

# Board of Public Utilities

*Cheyenne Water and Sewer Departments*

2416 Snyder Ave.  
P.O. Box 1469  
Cheyenne, Wyoming 82003

Phone 307.637.6460  
[www.cheyennebopu.org](http://www.cheyennebopu.org)

## Dry Creek Water Reclamation Facility Dewatering Improvements Construction 2020RPI01-B02 Addendum 01

To: All Prospective Bidders  
From: Bryce Dorr, BOPU  
Date: 10/16/2020  
Subject: Addendum 01 for the DCWRF Dewatering Improvements Construction

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The changes, clarifications, omissions, additions, and/or alterations in, on, and to the bid information and specifications shall apply to the Advertisement for Bid submitted for and to the project indicated above. Except as modified by this Addendum 01, all the terms and provisions of the bidding documents for the above listed project remain in full force and effect. This Addendum 01 supersedes all previous instructions pertaining to the items listed:

Addendum 01 for the DCWRF Dewatering Improvements Procurement consists of 1 total page and includes the following changes/additions:

1. Notes from the Pre-Bid Meeting held on October 14, 2020 are included as Attachment A.
2. Submittals for the Huber Screw Presses and supplementary equipment are included as Attachment B.

**End of Addendum 01**

Attachments:

- Attachment A: Pre-Bid Meeting Notes
- Attachment B: Huber Contract Submittals

2020RPI01-B02  
Addendum 01

Attachment A  
Pre-Bid Meeting Notes

**CHEYENNE BOARD OF PUBLIC UTILITIES  
Dry Creek  
Water Reclamation Facility (DCWRF)  
Dewatering Improvements Project**

**Pre-Bid Conference Agenda**

**Location:** Virtual/FreeConferenceCall.com  
**Date:** October 14, 2020  
**Time:** 10:00 a.m.

1. **CALL MEETING TO ORDER AND INTRODUCTIONS.** Bryce Dorr of the Board of Public Utilities (BOPU) will call the meeting to order and introduce key team members.

**Attendee List:**

**Bryce Dorr, Matt Buelow** - BOPU

**Kile Snider, Steve Tamburini, Mark Remmers** - Jacobs Engineering

**Bern Levesque** - [blevesque@rncivilconstruction.com](mailto:blevesque@rncivilconstruction.com)

**John Podeyn** - [jpodeyn@hydroconstruction.com](mailto:jpodeyn@hydroconstruction.com)

**Bryce Bowman** - [bbowman@rainforrent.com](mailto:bbowman@rainforrent.com)

**Matt Elsbury** - [melsbury@strobelenenergy.com](mailto:melsbury@strobelenenergy.com)

**Mike** - [mgiron@velocityci.com](mailto:mgiron@velocityci.com)

**Patrick Conlon** - [Patrick.conlon@interstates.com](mailto:Patrick.conlon@interstates.com)

**Automation Electronic** - 307-234-9311

**Ryan Bowar** - [Ryan\\_bowar@autoelect.com](mailto:Ryan_bowar@autoelect.com)

**Blake Evans** - [blake@moltzwyoming.com](mailto:blake@moltzwyoming.com)

**Adam Scott** - [ascott@velocitycl.com](mailto:ascott@velocitycl.com)

**Marc Rietmea** - [marc@srco.com](mailto:marc@srco.com)

**A&E PLC Group** - [ric\\_walker@autoelect.com](mailto:ric_walker@autoelect.com)

**Bob Davis** - [bob\\_davis@autoelect.com](mailto:bob_davis@autoelect.com)

**Steve Barnes** - [sbarnes@horizonmechs.com](mailto:sbarnes@horizonmechs.com)

2. **PURPOSE OF MEETING.** The purpose of the meeting is to clarify the conditions and specifications of the work to be performed for the construction of the DCWRF Dewatering Improvements Project.
3. **SIGN IN.** All meeting attendees should confirm their presence at the meeting to be recorded. Contractors should provide the company name that will be used on the bid form. Attendance at the pre-bid conference is highly encouraged but not mandatory.

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4. **PROJECT SCOPE.** The work covered by this contract includes the following:
- a) Replacement of the current sludge dewatering equipment, miscellaneous piping and controls improvements, and HVAC modifications.
  - b) Overview of design.
  - c) The Owner's monorails and hoists located above the centrifuges are not of sufficient capacity for installation of the screw presses and thus cannot be utilized to lift the screw press assemblies. The hoists can be used within design capacities by the Contractor with Owner approval and as long as Owner safety protocols are followed.
5. **BID INFORMATION.** The following items are related to the bidding process:
- a) Bid Opening: November 5, 2020 at 2:00 PM, **Timothy E. Wilson Administration Building located at 2416 Snyder Ave. Cheyenne, WY 82001 Attention: Bryce Dorr.** Front door will be open to drop off bid. Bid opening will be virtual via freeconferencecall.com with no public comment. Contact Bryce Dorr for more information if you are interested is dialing in.
  - b) Bidder qualification information per Instructions to Bidders shall be included with the bid.
  - c) No late bids will be accepted. Bids shall be submitted in a sealed envelope with the name of the project and endorsed on the outside of the envelope with the bidder's business address.
  - d) Receipt of all addenda must be acknowledged on the Bid Form.
  - e) The Bid Form includes a lump sum bid item, a lump sum price for the remainder of the screw press procurement contract with Huber Technology, Inc., and a total of all lump sums. The Huber contract will be assigned to the contractor and become part of the awarded the project. It is attached to Section 01 64 00, Owner-Furnished Products.
    - i) An initial submittal has been received by Huber and reviewed by the Engineer. The screw press units have been released for production. Resubmittal of ancillary equipment and controls panels is still required.
    - ii) Delivery date for the equipment is February 24, 2021 per Huber contract.
    - iii) Substantial completion date is July 2, 2021 in the current Huber contract. This date will be modified to align with the Contractor's substantial completion date of September 17, 2021 prior to assignment of the Huber contract.
  - f) Preliminary equipment submittals from Huber will be distributed via addendum.

- g) Bidding Documents may be obtained from the BOPU's website ([www.cheyennebopu.org](http://www.cheyennebopu.org)).
- h) Bidding questions must be submitted in writing only to Kile Snider at Jacobs (email: [kile.snider@jacobs.com](mailto:kile.snider@jacobs.com)) no later than 5 pm, October 29, 2020.
- i) Drawings included in the bidding documents may be printed from the PDF files to any size desired, but please note the scale bar on each drawing to indicate the appropriate scale. There are different scaling factors throughout the drawing set.

#### 6. TIME OF COMPLETION.

- a) The work will be substantially completed on or before September 17, 2021, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before October 17, 2021.
- b) Contractor shall pay Owner \$1,800 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in 6.a above for Substantial Completion until the Work is substantially complete.

#### 7. PRECONSTRUCTION CONFERENCE.

A preconstruction conference will be held with BOPU and Engineer before the Contractor shall commence construction.

#### 8. CONSTRUCTION OBSERVATION.

The Engineer will provide a Resident Project Representative (RPR). This person will observe the materials furnished and the work performed for compliance with the Drawings and Specifications. Due to the duration and size of the project, the RPR has been budgeted on a part-time basis for the project. The Contractor should coordinate with the RPR as appropriate. RPR will be located in Fort Collins and available by phone when not on site. Arrangements can be made for the RPR to be at the project site for scheduled inspections and on short notice when possible during normal working hours.

#### 9. CONSTRUCTION SCHEDULE.

- a) See Section 01 32 00, Construction Progress Documentation. Each bidder should review this section as the requirements are somewhat rigorous and extensive. These sequencing requirements are intended to help ensure continued sludge dewatering at the plant and are not intended to direct means and methods. The bidding should be based on the sequencing described in the Contract Documents including Section 01 31 13 Project Coordination and the Agreement. If alternate approaches are determined by the Contractor, this is open to discussion during construction, however, it should not be assumed at the time of bidding that any alternate approaches will be accepted.
- b) Contractor must submit copies of the preliminary construction schedule before the preconstruction conference as described in Section 01 32 00, Construction Progress Documentation. Updated schedules must be submitted with the payment applications as described in Section 01 32 00, Construction Progress Documentation.

c) The anticipated date for the Notice to Proceed is early-December 2020.

**10. COORDINATION AND SCHEDULE.** The following items pertain to coordination issues:

- a) Section 01 31 13, Project Coordination, discusses the construction sequencing constraints.
  - i) Phase 0 - installation of new PLC D2. Also refer to Section 40 90 00 Instrumentation and Control for Process Systems.
  - ii) Phase 1 - installation of Screw Press 1.
  - iii) Phase 2 - installation of Screw Press 2.
- b) Coordination with DCWRF staff will be required for all work due to the need to maintain facility operations and reliably provide sludge dewatering throughout construction.
- c) A staging area location plan is required per Section 01 50 00, paragraph 1.02.

**11. LICENSES, PERMITS AND INSPECTIONS.** The Contractor will obtain all licenses, permits and inspections required for the work as per Paragraph 6.08 of the General Conditions Section 01105, Administration, Procedures, and Codes. Building permit needs should be coordinated through the City of Cheyenne Building Department. There will be no fee required for the Contractor to obtain the City building permit.

**12. SURVEYING.** The nature of this project is to install and replace items primarily within existing facilities. As such, there is limited need for construction staking and surveying. All items are located relative to existing facility features (i.e., walls, floors, existing piping). There are no yard piping or new structures to be located that would require field surveying.

**13. SAFETY.** The Contractor is responsible for the protection of all persons including members of the public, employees of the Owner, and employees of other contractors and subcontractors, and for the protection of all public and private property. The Contractor will provide barriers as required to prevent public entry to construction areas.

**14. WASTING OF MATERIALS.** It is the Contractor's sole responsibility to properly haul offsite and dispose of all pipe and concrete and other waste materials.

**15. PAYMENT.** Monthly payments will be paid with BOPU retaining five percent (5%) from each payment. Refer to Agreement for details.

**16. ADDENDA.**

- a) Questions due by October 29, 2020 at 5:00 pm.
- b) Final addendum—issued by November 2, 2020.

- 17. OPERATION AND MAINTENANCE DATA.** Section 01 78 23, Operation and Maintenance Data, specifies the requirements for O&M Manuals. Each bidder should review this section as the requirements are somewhat rigorous.
- 18. MANUFACTURERS' SERVICES.** Section 01 43 33, Manufacturers' Field Services, specifies the requirements for manufacturers' services during installation and for startup and training assistance. Contractors should be sure the various suppliers understand the requirements of this section. Manufacturer's services required by the Owner from Huber are included in their current contract.
- 19. CONTRACT CLOSEOUT.** Section 01 77 00, Closeout Procedures, specifies closeout procedures including record document ("as-built") requirements.
- 20. EQUIPMENT TESTING AND STARTUP.** Equipment testing, and startup activities should be coordinated with BOPU following the completion of training. **Please review the performance testing requirements for the screw press contract.**
- 21. QUESTIONS AND CLARIFICATIONS.**
- Q: Has anything been changed in the D2 program since installation in 2006? A: Nothing significant. Will provide copy of most recent logic at beginning of project.
  - Q: Does schedule of values need to be turned in with the bid pack or can this be done by low bidder following the bid? If due with the bid packet, is it to be per phase? A: Intent is to submit with the bid. Intent was for the schedule of values to follow the spec schedule
  - Q: Is there a 5% preference to Wyoming contractors on this project? A: Yes, the 5% preference applies.
  - Q: What is the engineer's estimate? A: In the \$2 million range.
  - Q: What is the delivery date of the screw presses? A: February 24, 2021 per Huber contract
  - Q: Are the Huber liquidated damages the same as the general contractor's liquidated damages? A: No. It's in the Huber contract which is attached to Section 01 64 00 in the bid documents.
  - Q: Do we have drawings for the new screw conveyor control panels that will be provided? LCS-8100 and LCS-8200? A: There are no new screw conveyors. LCS-8100 and LCS-8200 are for the screw presses and are provided under Huber contract. Current submittal and review comments will be provided via addendum.
  - Q: Is the iFix program and IGS drier under a current service agreement? If so, is BOPU going to upgrade either before project awarding? A: Yes, under current service agreement. No, no upgrades planned prior to project award.
  - Q: Is the area where the screw press panels will go in the electrical room currently empty? A: No, the area is currently occupied by the centrifuge panels. Intent is for the centrifuge panels to be replaced by screw press panels in the same location.

➔ Q: What is the expected duration of the testing period prior to moving to phase 2?

A: Per Section 01 31 13 paragraph 1.06.A.2 Screw Press 1 must pass the Functional Testing, and the Pre-Performance Testing (both tests are described in Section 44 46 26) which describe the length of the testing.

**22. SITE TOUR.** Individual site tours may be arranged through the Owner. Contact Matt Buelow at the DCWRF facility.

a) Ground rules for tours: maximum of 3 people per contractor, masks are required, and only buildings where work will be performed with be entered. Schedule tours within normal business hours of 8 to 4 Monday through Friday.

**23. CLOSE MEETING.**



2020RPI01-B02  
Addendum 01

Attachment B  
Huber Contract Submittals



EQUIPMENT AND CONTROL PANEL SUBMITTAL  
Q-PRESS® 800.2 Sludge Dewatering System  
City of Cheyenne, WY – Dry Creek WRF Improvements



EQUIPMENT AND CONTROL PANEL SUBMITTAL  
Q-PRESS® 800.2 Sludge Dewatering System  
City of Cheyenne, WY – Dry Creek WRF Improvements



EQUIPMENT AND CONTROL PANEL SUBMITTAL  
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EQUIPMENT AND CONTROL PANEL SUBMITTAL  
Q-PRESS® 800.2 Sludge Dewatering System  
City of Cheyenne, WY – Dry Creek WRF Improvements



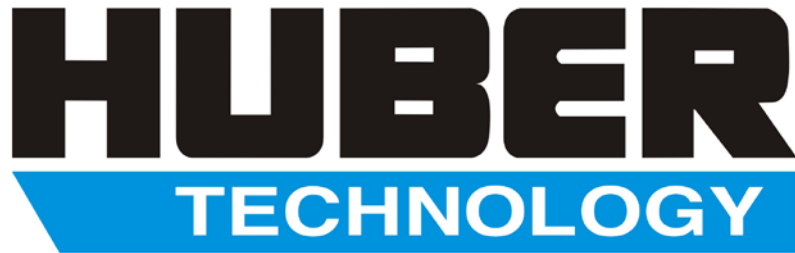
EQUIPMENT AND CONTROL PANEL SUBMITTAL  
Q-PRESS® 800.2 Sludge Dewatering System  
City of Cheyenne, WY – Dry Creek WRF Improvements



EQUIPMENT AND CONTROL PANEL SUBMITTAL  
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EQUIPMENT AND CONTROL PANEL SUBMITTAL  
Q-PRESS® 800.2 Sludge Dewatering System  
City of Cheyenne, WY – Dry Creek WRF Improvements



**WASTE WATER** Solutions

**Equipment and Control Panel Submittal**

**City of Cheyenne, WY – Dry Creek WRF Improvements**

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**Equipment:**

Q-PRESS 800.2<sup>®</sup> Sludge Dewatering System

**Manufacturer:**

HUBER Technology, Inc.  
1009 Airlie Parkway  
Denver, NC 28037

Contact : Wolrad Henze (wolrad@hhusa.net) 704-949-1018

**Customer**

City of Cheyenne, WY  
Board of Public Utilities  
2416 Snyder Avenue  
Cheyennem, WY 82001

Contact: Bryce Dorr (bdorr@cheyennebopu.org) 307.432.2618

**Representative:**

Goble Sampson Associates  
6355 Ward Road #200  
Arvada, CO 80004

Contact: Josh Queen (jqueen@goblesampson.com) (303) 770-6418

July 2020

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**Date:** July 20<sup>th</sup> , 2020

**To:** Bryce Dorr

**From:** Wolrad Henze

**Reference:** City of Cheyenne, WY – Dry Creek WRF Improvements

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Thank you for placing your trust in Huber Technology with your valued order for two (2) Screw Press Q-PRESS® Q800.2 with Control Panels, and auxiliaries.

To introduce myself I will be the Project Manager for Huber who will be facilitating this project through to site delivery. Please direct any questions or concerns through me via phone or E-mail, I will be happy to help.

Tel. 704 949 1018 E-mail. Wolrad@hhusa.net

I have booked a production slot for this machine for a site delivery of:

**02/24/2021**

This is based on a technical approval of this submittal by:

**08/31/2020**

Huber has more than 16,000 machine systems in operation worldwide. Our systems are used for both industrial and municipal applications. More than 1,000 of these systems are in operation in the USA. Huber is a system supplier for headworks equipment including grit treatment. Huber offers a wide array of headwork's screens from 6 inch bar spacing all the way down to 0.001 inch. Our core competency is the design, manufacture and service of such systems.

Huber has subsidiaries and agencies all over the world. The North American subsidiary (HHUSA) is located in Charlotte, NC, providing workshop, engineering, sales, administrative and after sales services. Spare parts are stocked at our state-of-the art warehouse in Charlotte providing immediate response to our customers.

Huber is a privately owned, German company, founded in 1872. Huber designs, manufactures and services stainless steel equipment for the water and waste water industry. The company is located in Erasbach, Upper Bavaria. This area is

home to many high quality manufacturing companies such as Audi, BMW, Flender, Siemens etc.

Huber holds ISO 9001 and ISO14001 certifications. Unlike other companies Huber ensures that only stainless steel is used in the manufacturing process. All equipment pieces are passivated in a pickling bath. This process ensures the elimination of dust particles left over from the manufacturing process. Since the equipment is submersed overnight in a tank, even the tightest corners, crevasses and tubes will be passivated to ensure best possible corrosion protection for the equipment and thus the best Return of Investment for our customers.

Huber has been awarded the quality award of the state of Bavaria. This is the highest recognition a company involved in manufacturing can receive.

Huber Technology has been recently awarded the highest endowed European environmental award. This award is one of the most prestigious awards the Deutsche Bundesstiftung Umwelt (DBU), one of Europe's largest foundations conveys to companies that are not only pioneers looking for new and innovative avenues but also promotes innovative and exemplary environmental projects.

Thank you for your continued trust in Huber Technology. We look forward to a successful working relationship to the completion of this project.

Sincerely,



Wolrad Henze

# Section 1.0

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# HUBER Screw Press Q-PRESS®



- The new generation of our well-proven sludge dewatering press
- even more efficient
  - increased reliability of operation
  - optimized operating costs

## ►► Sludge dewatering

Flocculated sludge is pumped into a cylindrical screen basket wherein an auger slowly rotates. The diameter of the auger's shaft increases towards the end of the basket and the gap between its flights decreases. The volume between basket, shaft and flights continuously decreases, and the pressure thus increases, as the sludge is moved through the basket. Sludge water is pressed through the basket's screen.

The auger pushes the increasingly thicker sludge towards the annular clearance, defined by a circular opening and an adjustable discharge cone therein. The cone is pressed against the opening by pneumatic cylinders, thus maintaining a defined sludge pressure at the discharge end.

Scrapers on the screw shaft permanently clean the filter basket from the inside. A stationary spray bar backwashes it periodically and segment by segment from the outside without interrupting the dewatering process.

## ►► Innovation

### Energy efficiency:

The screw drives exceed the current energy efficiency standards of electric motors. Due to maximised electrical efficiency the HUBER Screw Press Q-PRESS® can therefore be operated with higher solids throughputs.

### Dewatering results:

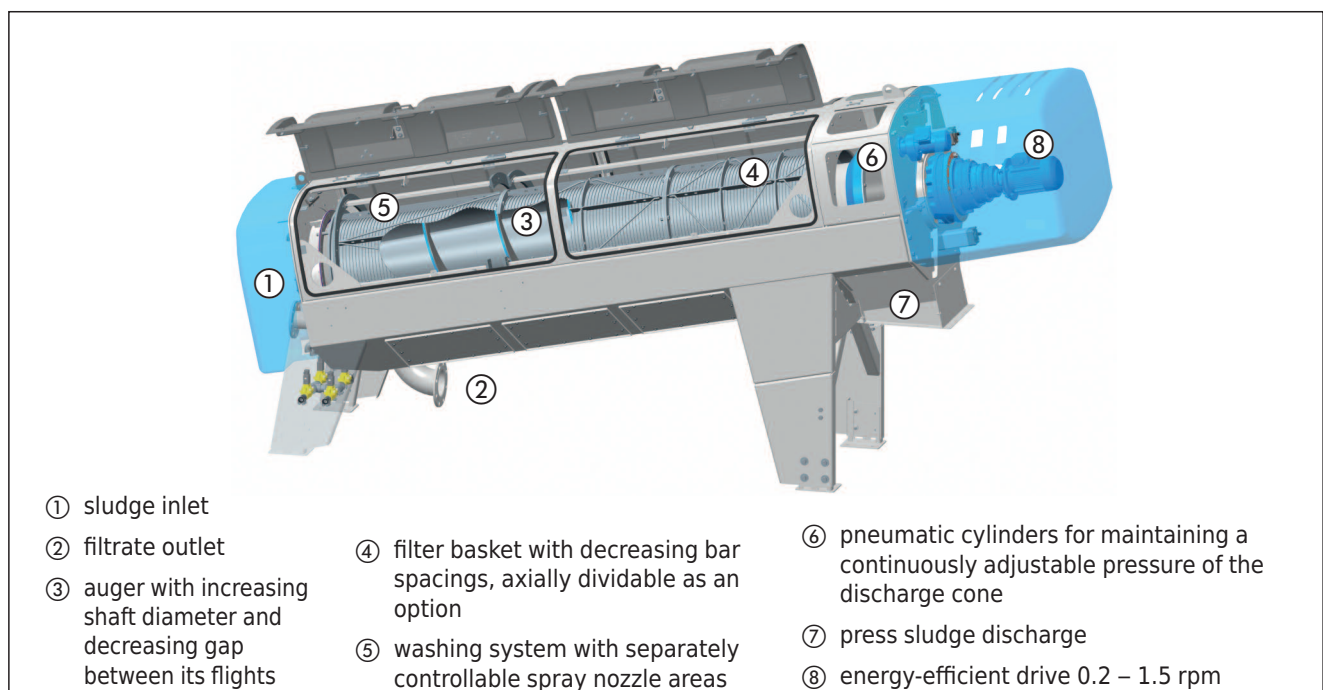
Unique scrapers on the screw shaft permanently and reliably clean the inner filter surface with every rotation of the screw. Additionally, the scrapers are optimally arranged to increase cleaning frequency. Free water can thus very easily run off. As a result, dewatering efficiency increases and flocculant consumption is reduced.

Due to the significantly enlarged open filter surface filter baskets with the same bar spacings are able to handle higher hydraulic loads without impairment of filtrate quality.

The outside of the filter is cleaned without interrupting the dewatering process. The predewatering and press zone can be washed independently of each other. Rewetting of press sludge through washing is reduced to a minimum especially in the press zone without neglecting the important washing in the predewatering zone.

### Maintenance:

As an option, the three segments of the filter baskets are available as axially divided segments. Only the upper half of the basket needs to be removed for maintenance. The lower half of the filter basket can be removed from the screw shaft by means of a special mechanism but remains inside the filtrate chamber of the Q-PRESS® during maintenance. This saves a lot of time, reduces space requirements and the need for using lifting devices for maintenance.



Partial section of a HUBER Screw Press Q-PRESS®

## ►► Advantages

### High dewatering

- defined sludge volume reduction in the screw press
- continuously adjustable counterpressure at the discharge end
- filtrate discharge enhanced by gravity due to inclined installation
- unique scraper system for permanent cleaning of the inner filter surface
- significantly increased free filter surface
- continuous dewatering

### Reliable operation with little downtime

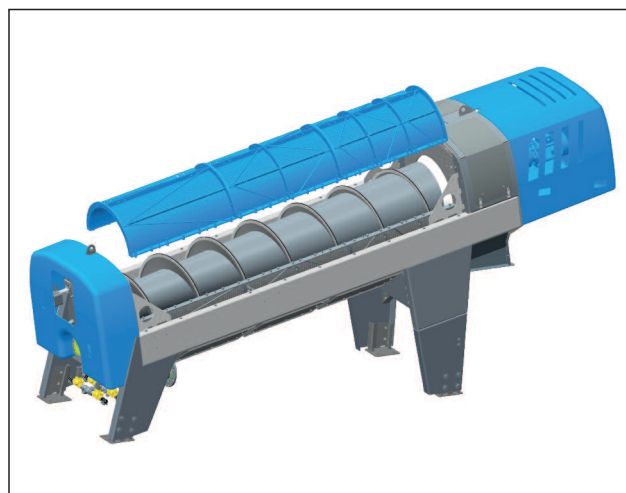
- virtually no wear because of < 1.5 rpm screw rotationspeed
- sturdy stainless steel design
- dividable filter baskets available as an option
- special filter dividing mechanism
- easy access through large inspection openings
- minimal space requirements for maintenance
- simple self-monitoring control strategy
- proven in hundreds of installations

### Minimum operation costs

- outstanding energy efficiency
- specific power consumption < 8 kWh/t<sub>DR</sub>
- little operator attention (< 20 min/day)
- high solids capture rate > 97%

### Low total investment costs

- compact design and small footprint
- easy connection of the screw conveyor
- optional tube flocculator
- integrated support legs
- simple control system
- vibration-free, virtually noiseless operation
- fully enclosed design



*HUBER Screw Press Q-PRESS® inclined installation with optionally dividable screen baskets*



*Sturdy wedge wire basket made of stainless steel*



*Stationary mounted screw press for 140 kgDS/h*

## ➤ Special applications of the Q-PRESS®

### Dewatering of thin sludges

Due to pump feeding, large volumes of sludge water are removed already in the pre-dewatering zone. This permits cost-efficient dewatering of thin sludges with a solids concentration < 1%.

#### Benefits

- sludge dewatering without the need for prior thickening
- typical dewatering results of 18 – 25% DS
- sludge volume reduction up to > 97% in a single step
- saves investment and operation costs for preceding sludge thickening
- little operator attention required

### Variable sludge characteristics

Dewatering performance is usually impaired and operator attention increased by frequently varying sludge quality.

Our HUBER Screw Press Q-PRESS® automatically selfadjusts to over- and underloading. A control loop makes sure that optimal operation is always maintained.

#### Benefits

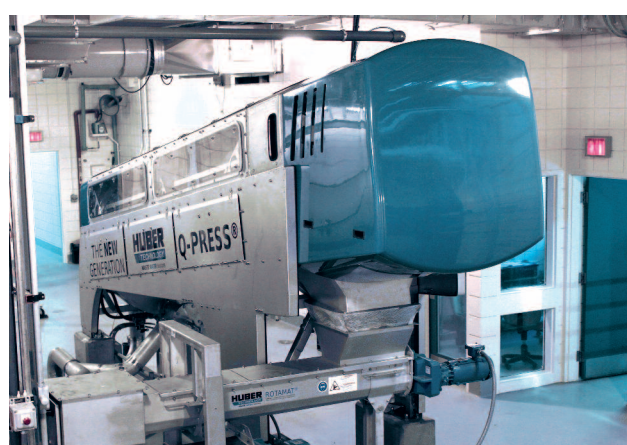
- always optimum performance
- flexible with varying sludge qualities
- minimised operator attention
- reliable operation

## ➤ Unit sizes / performance

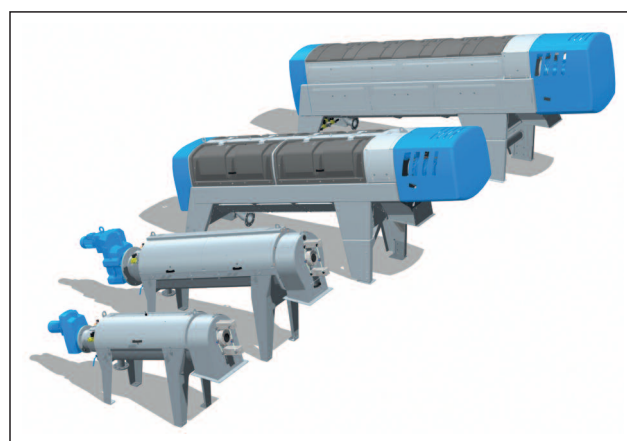
Size	Throughput [kg <sub>TR</sub> /h]	Drive [kW]	Weight [t]
280	15 - 90	0.37	0.7
440.2	30 - 180	1.5	1.5
620.2	60 - 350	2.3	2.7
800.2	90 - 540	4.1	3.5



Contract dewatering with a trailer-mounted HUBER Screw Press Q-PRESS®



HUBER Screw Press Q-PRESS® 800.2 for 20 m³/h



HUBER Screw Press Q-PRESS®

## HUBER TECHNOLOGY, Inc.

9735 Northcross Center Court STE A Huntersville, NC 28078  
Phone: 704-949-1010 · Fax: 704-949-1020  
Solutions@hhusa.net · <http://www.huber-technology.com>

Subject to technical modification  
0,0 / 9 – 1.2016 – 7.2010

HUBER Screw Press Q-PRESS®

**Reference list: HUBER Screw Press Q-PRESS®**

Date	Project	Quant.	Size
Dec 2018	Lincoln County WWTP, NC, US	1	440.2
Oct 2018	Midland WPCP, TX, US	5	800.2
Oct 2018	North Conway, NH, US	1	620.2
Sep 2018	Lebanon / IL, US	1	800.2
Sep 2018	Fairbury / IL, US	1	440.2
Sep 2018	Middle Oconee-Jackson Co., GA, US	1	440.2
Aug 2018	Dover / NH, US	2	800.2
Jul 2018	Oostburg / WI, US	1	620.2
Jun 2018	Dorchester County, SC, US	1	440.2
Jun 2018	South Beloit / IL, US	1	800.2
Jun 2018	Jeffersonville, IN - Oak Park, US	1	620.2
Apr 2018	Berwick / ME, US	1	440.2
Mar 2018	Yarmouth / ME, US	2	620.2
Dec 2017	Dynatec Z&S, US	2	280
Nov 2017	Dousman / WI, US	1	620.2
Nov 2017	Laie / HI, US	2	620.2
Nov 2017	Potawatomi / WI, US	1	440.2
Nov 2017	North Conway / NH, US	2	620.2
Nov 2017	Oak Hill / WV Rt. 61, US	1	280
Nov 2017	Oak Hill, Minden Road, WV	1	280
Nov 2017	Dyer / IN, US	2	440.2
Oct 2017	Mercer / PA, US	1	620.2
Sep 2017	Rochester / NH, US	2	800.2
Sep 2017	Chatsworth / GA, US	1	800.2
May 2017	Fountain Hills / AZ, US	2	620.2
May 2017	Moab / UT, US	1	620.2
Apr 2017	Far Best Food, US	1	620.2
Apr 2017	Old Orchard Beach, US	1	800.2
Apr 2017	Glen Rose / TX, US	1	620.2
Apr 2017	Marana / AZ, US	1	800.2
Apr 2017	Grants / NM, US	1	800.2
Feb 2017	Broad Creek WWTP, US	1	440.2
Jan 2017	Caveland, KY	1	620.2
Jan 2017	Hortonville / WI, US	1	280
Dec 2016	Castroville / TX, US	1	620.2
Dec 2016	Stockbridge-Munsee / WI, US	1	280
Nov 2016	Star / ID, US	1	620.2
Nov 2016	Sheboygan / WI, US	2	800.2
Oct 2016	Hortonville / WI, US	1	280
Sep 2016	Portsmouth / NH, US	2	800.2
Aug 2016	Dothan / AL, US	2	800
Jul 2016	Q-PRESS® 800.2, US	1	800.2
Jul 2016	Barstow / CA, US	1	620
Jul 2016	Stock Q-PRESS 440, US	5	440
Jun 2016	Trussville / AL, US	1	800
May 2016	Washington / IL, US	1	620
Mar 2016	Croswell / MI, US	1	440
Mar 2016	Albuquerque / NM, US	1	280
Feb 2016	Farmington / CT, US	2	800
Dec 2015	Newmarket / NH, US	1	620
Dec 2015	Spring Valley / IL, US	1	440
Dec 2015	Q-Press 800.2 Dover NH, US	1	800.2
Oct 2015	Dynatec Systems ? Ford RoS3Q, US	1	280
Oct 2015	West Richland / WA, US	1	800
Sep 2015	Schofield / HI, US	2	620
Aug 2015	City of Riverside / CA, US	2	800
Aug 2015	City of Riverside / CA, US	2	800
Jul 2015	Bucksport WWTF Upgardes / ME, US	1	800
Jun 2015	Robinson IL, US	1	440
May 2015	Chiquita WWTP, Rancho Santa M, US	2	800
May 2015	Jackson County / GA, US	1	440
Apr 2015	Stevensville / MT, US	1	280
Mar 2015	Dothan / AL, US	2	800
Feb 2015	Chillicothe Correctional Institutio	1	440
Feb 2015	Climber Twin Falls, US	1	440
Feb 2015	South Truckee Meadows WRF / NV, US	2	800
Feb 2015	Emporia / VA, US	1	800

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Jan 2015	Hailey, ID, US	1	620
Oct 2014	Stock Q620, US	2	620
Sep 2014	Forreston, IL - Q280	1	280
Sep 2014	Genoa Oceaola / MI, US	1	800
Aug 2014	Sheridan / IL, US	1	280
Jun 2014	Big Creek / GA, US	4	800
Jun 2014	Portales NM, US	1	800
Apr 2014	Ogden / UT, US	1	800
Feb 2014	Ele'ele / HI, US	1	440
Feb 2014	Premium Iowa Pork, IA; US	1	280
Jan 2014	Reidsville NC, US	1	800
Jan 2014	Arcadis-Houston / TX, US	1	280
Jan 2014	BCR Deltona / FL, US	1	800
Dec 2013	Patawatomi / WI, US	1	280
Dec 2013	Durham / NH, US	2	800
Nov 2013	CRAMAERTON, US	2	620
Nov 2013	Barstow / CA, US	1	620
Oct 2013	Ruiz Foods, US	1	280
Oct 2013	Clayton GA, US	1	620
Sep 2013	York / ME, US	2	620
Sep 2013	Porterville / CA, US	1	800
Aug 2013	Clayton GA, US	1	620
Jun 2013	Lena / IL, US	1	280
Apr 2013	Riverside / CA, US	2	800
Apr 2013	Newberg OR, US	2	800
Mar 2013	Running Springs CA, US	1	440
Mar 2013	Acton TX, US	1	440
Mar 2013	Monticello MN, US	1	800
Feb 2013	Various Jobs and inventory, US	2	280
Feb 2013	Various Jobs and inventory, US	4	440
Feb 2013	Cumberland County NJ, US	1	440
Jan 2013	Deltona Lakes FL, US	1	440
Jan 2013	SGWASA NC-Sludge, US	1	800
Jan 2013	Box Elder SD SLUDGE, US	1	440
Jan 2013	Lebanon NH, US	2	440
Jan 2013	Lincoln County / NC, US	1	440
Nov 2012	Sheboygan WI, US	1	800
Oct 2012	Gadsden / AL, US	2	440
Oct 2012	Clarkston WA, US	2	800
Oct 2012	Louisiana MO, US	1	280
Aug 2012	Nashua NH, US	1	800
Aug 2012	Nashua NH, US	2	800
Jul 2012	Q440 HUBER USA 1, US	1	440
Jul 2012	Q440 HUBER USA 2, US	1	440
Jul 2012	Gadson AL, US	2	440
Jun 2012	Grifton-CMSD / NC, US	2	800
Jun 2012	Falkenburg FL, US	3	800
Jun 2012	Millbrook AL, US	1	440
May 2012	Biddeford ME, US	2	440
Apr 2012	Bonifay FL, US	1	440
Apr 2012	Moorefield WV, US	1	800
Feb 2012	Dorchester SC, US	1	440
Feb 2012	St. Vrain SD, US	2	440
Nov 2011	Pekin WWTP IL, US	2	800
Nov 2011	Knoxville / IL, US	1	280
Nov 2011	Clark County / OH, US	1	440
Oct 2011	Lakehaven WA, US	1	800
Sep 2011	Berwick ME, US	1	280
Aug 2011	Greenleaf ID, US	1	280
Aug 2011	Rexburg II ID, US	2	800
Aug 2011	South Berwick ME, US	2	440
Jul 2011	Boerne TX, US	1	800
Jul 2011	Springfield, IL - Spring Creek	2	800
Jul 2011	Dover NH, US	2	800
Apr 2011	Libby MT, US	1	440
Mar 2011	Cumberland County NJ, US	1	440
Mar 2011	Allenstown, NH; US	1	440
Mar 2011	Mona UT, US	1	440
Mar 2011	MESSE HHUSA, US	1	280
Jan 2011	UConn CT, US	2	440
Oct 2010	Lincoln, ME; US	2	440
Sep 2010	Orange Beach / AL, US	2	440
Sep 2010	MAWSS, Mobile AL, US	1	800
Aug 2010	Daphne, AL; US	1	440
Aug 2010	Daphne, AL; US	1	440

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May 2010	Brookings, SD; US	1	440
Feb 2010	Blairville, GA, USA	1	440
Jan 2010	Broad Creek WWTP, USA	1	440
Dec 2009	Charlotte, US	1	800
Nov 2009	Allenstown, NH; US	2	440
Nov 2009	Platte City / MO, USA	1	280
Aug 2009	South Paris, ME; US	1	440
Feb 2009	Santa Paula / CA, US	1	800
Jan 2009	Cokeville, WY; US	1	280
Jan 2009	Kennebunk, ME; US	2	440
May 2008	Trial unit RoS3Q 280, USA	1	280
Apr 2007	North Fork WRF, Sundance ID;US	1	280
Sep 2006	Hill City, SD	1	280
Jun 2006	Weftec 2006 - RoS3Q 280, US	1	280

# Section 2.0

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# Scope of Supply

Project Name: Cheyenne, WY

Equipment Type: HUBER Proposal Number:  
Q-Press 800.2 Screw Press 433541

Proposal Date: Bid Date:  
5/5/2020 5/5/2020



#### HUBER Contacts:

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#### Represented by:

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JQueen@goblesampson.com

**HUBER**  
**TECHNOLOGY**  
WASTE WATER Solutions

**HUBER Technology, Inc.**

**1009 Airlie Parkway  
Denver, NC 28037**

**Phone: (704) 949-1010  
Fax: (704) 949-1020**

# Screw Press Design Parameters

Cheyenne, WY

May 5, 2020

## Sludge Characteristics:

Upstream Process:	Activated Sludge with Secondary Clarifier	
Digestion Process:	Anaerobic Digester	
Sludge Type:	Mixed (55% Primary, 45% Secondary)	
Sludge TDS:	Approx. 1,900 mg/L	(2013 Bench Testing)
Sludge VSS:	60-75%	
Sludge pH:	6.8-7.8	(2013 Bench Testing)
Chloride Concentration:	Cl ≤ 100 mg/L	(2013 Bench Testing)
Phosphate Concentration:	PO <sub>4</sub> ≤ 50 mg/L	(2013 Bench Testing)

## Project Design Parameters:

Sludge Concentration:	2.75%	
Guaranteed Performance Point 1:	37 gpm	(8.4 m <sup>3</sup> /hr)
Calculated Total Solids Loading Rate:	509 lb/hr	(231 kg/hr)
Guaranteed Performance Point 2:	40 gpm	(9.1 m <sup>3</sup> /hr)
Calculated Total Solids Loading Rate:	550 lb/hr	(250 kg/hr)

## Equipment Recommendation:

Recommended unit:	Q-Press 800.2	
Recommended unit quantity:	2	

## Typical Expected Performance:

Hydraulic Loading Rate (per unit):	54 gpm	(12.3 m <sup>3</sup> /hr)	(@ 2.75%)
Solids Loading Rate (per unit):	744 lb/hr	(337 kg/hr)	(@ 2.75%)

## Equipment Performance:

Estimated Cake Solids:	20%	(Guaranteed Perf Point 1 & 2)
Capture Rate:	97%	(Guaranteed Perf Point 1 & 2)

## Equipment Weights:

Screw Press Empty Weight:	7720 lbs	(3510 kg)
Screw Press Full Weight:	9700 lbs	(4400 kg)

## Equipment Requirements:

Instantaneous Air Requirement:	1.52 SCFM at 87 psi	(43 L/min at 6 bar)
Average Washwater Requirement <sup>1</sup> :	150.5 gph at 72.5 psi	(570 L/hr at 5 bar)

<sup>1</sup>Wash water cycle runs at 39.6 gpm for 152 seconds. Typical applications experience 1-2 wash cycles per hour.

## Polymer:

Estimated Polymer Consumption:	43 lb active polymer/dry ton of sludge
Flocculation Detention Time:	45 sec at 59 gpm

## Equipment Description

Cheyenne, WY

May 5, 2020

### Screw Press:

Two (2) Q-Press 800.2 Screw Press in 304L stainless steel construction; with full submersion passivated surface treatment for superior corrosion protection. Each including:

- Wedge wire screen made of 304L stainless steel
- Fully enclosed basket at 10° incline
- 5 hp screw press drive motor and gearbox [460 VAC, 60 Hz, 3 ph with VFD]
- 0.25 hp, spraywash motor, 460 VAC, 60 Hz, 3 ph
- Wash system for externally cleaning of the wedge wire screen
- Wash water connection including four (4) 1-inch, brass body solenoid valve, 120V, 60Hz
- Backpressure cone, pneumatically adjustable at the upper end of the screening basket for regulating the backpressure of the dewatering process.

### Ancillary Equipment:

- Two (2) Skid Platform in 304 Stainless Steel. Q-Press to be mounted to platform prior to delivery.
- Two (2) Polymer injection rings and mixing devices
- Two (2) IPM Mixing Devices with Integral Variable Frequency Drive
- Two (2) Compressor

### Two (2) Q-Press 800.2 Main Control Panel, including:

Per Specification: Section 44 46 26, and applicable Sections

Power Supply: 480VAC-3PH-60HZ

Panel Classification: NEMA 12, Non-Hazardous

- Enclosure, NEMA 12, 304 Stainless Steel, w/ 3-Point Latch
- Enclosure Drain / Breather
- Enclosure Voltage Barrier
- Control Panel Voltage Separation
- Main Disconnect, Non-Fused, w/Through Door Disconnect Handle
- Variable Frequency Drive, PowerFlex 525 Series, with BCP [5HP - Max, Press]
- Variable Frequency Drive, PowerFlex 525 Series, with BCP [2HP - Max, Booster Pump]
- Motor Starter, Rev, NEMA, w/Solid State Overload Relay and CB BCP [0.1HP - Max, Spray Drive]
- Current Monitor [Spray Drive]
- Control Power Transformer, 480-120VAC
- Door Mounted GFCI Receptacle
- Door Mounted RJ45 Port
- Panel Light, w/Door Switch
- Uninterruptible Power Supply
- Control Panel Fan Kit
- Programmable Logic Controller, Allen-Bradley CompactLogix w/ Ethernet (1769-L33ER CPU)

- 24VDC Power Supply
- Ethernet Switch, Moxa EDS-G508A-T
- Alarm Horn, w/Silence Push Button
- Panel Heater, with Thermostat
- Lot, Circuit Breakers, 120VAC; Pilot Lights, Push-To-Test, LED Type; Push Buttons; Selector Switches; Control Relays, Socket Type; Terminal Blocks; Dry Contacts. [As Required]
- UL Label

Two (2) Q-Press 800.2 Operator Interface Local Control Stations, including:

Per Specification: Section 44 46 26, and applicable Sections

Power Supply: 480VAC-3PH-60HZ

Panel Classification: NEMA 4X, Non-Hazardous

- Enclosure, NEMA 4X, 304 Stainless Steel, w/ 3-Point Latch
- Operator Interface Unit, Allen-Bradley PanelView Plus, 10" Display
- Emergency Stop Push Button, with Guard
- Lot, Terminal Blocks: [As Required]

Freight and Supervision Services:

- Sixteen (16) total days onsite for Phase 1-3 services.
- Five (5) total trips for Phase 1-3 services.
- Freight to jobsite.

## Pricing:

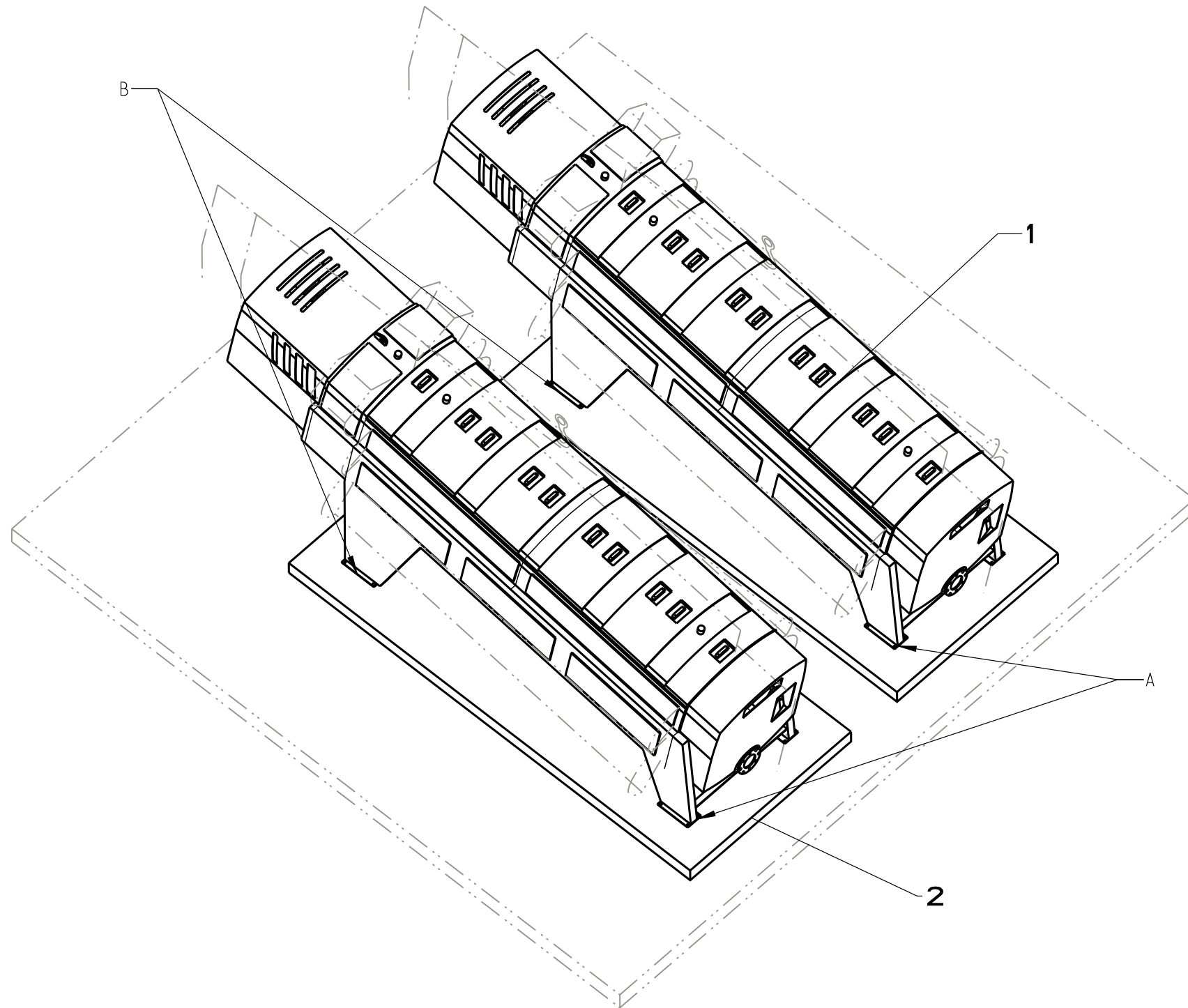
Cheyenne, WY

May 5, 2020

Qty	Equipment Description	Price
2	Sludge Dewatering Press	Included
2	Q-Press 800.2 Main Control Panel	Included
2	Ancillary Equipment Items	Included
1	Manufacturer's Services and Freight	Included

## Notes:

1. HUBER scope of supply is based on bid documents dated 04/14/2020, Section 44 46 26.
2. HUBER is in receipt of Addenda Numbers 1.
3. HUBER has included equipment skids comprised of stainless steel channels in lieu of mounting rails.
4. HUBER has supplied their Q-Press dewatering press in 304L Stainless Steel.
5. 44 46 26 Paragraph 2.06.D.4 The initial sludge/polymer mixer has been integrated into HUBER's IPM system, described in Paragraph E. HUBER will provide its standard IPM mixer, which meets the function of both Paragraphs D and E.
6. 44 46 26 Paragraph 2.06.E.11 Please note that HUBER IPM will have integral VFD.
7. HUBER will supply our standard compressor system. This is to be a self-regulated unit and will not be controlled by the Screw Press Main Control Panel. 120VAC power to be supplied by others.
8. Performance guarantee is based on using a polymer tested and approved by HUBER Technology.
9. HUBER Technology, Inc. is offering the equipment and associated performance guarantees based on information available at the time of the issuance date. Information not made available to HUBER, whether HUBER is asking for specific information or not, which could affect the performance of the equipment might void warranty and performance guarantees.
10. Piping to/from unit, wiring, junction boxes, and terminations shall be by installing contractor.
11. Purchase Agreement, Article 2: For bullet point iii, please delete "greater" and replace with "the remaining value".
12. Purchase Agreement, Article 4: Please kindly consider adding the following sentence to the end of the paragraph, "Summation of liquidated damages shall be exceed 5% of the total contract value."
13. HUBER supplied Grundfos Booster Pump has a cast iron/304SS wetted construction. Pump is vertical instead of horizontal. Pump will not be ANSI design as per data sheet.
14. Operator Interface has been include for Local Control Station only.



	empty weight	full weight
A	1435 lb	2095 lb
B	2425 lb	2755 lb

Machine Weight = 7720 lbs empty / 9700 lbs full

material of construction = 304 stainless steel  
motor and solenoids = Class 1, Division 1

Pos. No.	Quantity	Description
1	2	HUBER Screw Press Q-PRESS® 800.2
2	2	Skid -7'x 16'-6"

Intellectual property of HUBER Technology, Inc. Technical Information subject to change.		 <b>HUBER</b> TECHNOLOGY WASTE WATER Solutions 1009 Airlie Parkway Denver, NC 28037	HUBER Screw Press				
			Q-PRESS® 800.2				
Designed:	us-fl	04/29/2020		Scale: 1:48	Fig. No.: 1/7	Installation sketch	Size: B
Approved:	us-fl	29.04.2020					
Modified:	-	-	Cheyenne WY			Drawing No.: 51480658	
Rev.	Modification						

## GENERAL INSTALLATION NOTES:


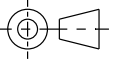
1.	EQUIPMENT MUST BE LEVEL IN ALL PLANES.
2.	AUTHORIZATION REQUIRED FOR FIELD MODIFICATIONS TO HUBER EQUIPMENT DUE TO SITE INCONSISTANCIES -CONTACT HUBER TECHNOLOGY.
3.	REFUSE CONTAINERS SHOWN ON DRAWINGS (IF ANY) ARE FOR REFERENCE ONLY AND ARE SUPPLIED BY OTHERS (UNLESS SPECIFIC TO HUBER'S SCOPE OF SUPPLY.)
4.	WELDING: DO NOT WELD UNTIL TEMPORARY MOCK-UP IS VERIFIED AGAINST THE INSTALLATION DRAWINGS AND ALL LEVEL, SQUARENESS, AND/OR ANGLES HAVE BEEN ACHIEVED -REFER TO WELD SPECIFICATIONS THIS DRAWING.
5.	INSTALLATION CONTRACTOR TO VERIFY ALL EXISTING STRUCTURAL DIMENSIONS BEFORE COMMENCEMENT OF WORK. CONTACT ENGINEER AND/OR HUBER IF FIELD DISCREPANCIES PREVENT PROPER INSTALLATION AS SHOWN ON THE INSTALLATION DRAWINGS, AND/OR OPERATIONS AND MAINTENANCE MANUAL.
6.	FIELD VERIFY ALL EXISTING SITE DIMENSIONS AND ELEVATIONS. DIMENSIONS AND ELEVATIONS SHOWN ARE BASED ON ENGINEERING DRAWINGS AVAILABLE AT THE TIME OF DESIGN OR AS BASED ON AVAILABLE PLANT RECORD DRAWINGS -ALL SITE DIMENSIONS SHOWN ON HUBER DRAWINGS ARE FOR "REFERENCE" ONLY. HUBER NOT RESPONSIBLE FOR DISCREPANCIES IN THE FIELD.
7.	INSTALLATION IS BY OTHERS.
8.	ALL REQUIRED ELECTRICAL, FITTINGS, CONDUIT, HAZARDOUS AREA CONDUIT SEALS, WIRING, AND/OR JUNCTION BOXES - ARE SUPPLIED BY OTHERS.
9.	REFER TO PROJECT DRAWINGS OR CONSULT ENGINEER FOR EQUIPMENT CONDUIT RUNS, CONTROL STATION LOCATION, AND FLOOR STUB UPS.
10.	VALVES SUPPLIED SEPARATE (IF ANY) MUST BE FIELD INSTALLED BY INSTALLING CONTRACTOR. ALL PIPE RUNS AND REQUIRED PIPING ARE SUPPLIED BY OTHERS. SEE ENGINEER FOR PIPE LAYOUT/ROUTING.
11.	FLANGE GASKETS, HARDWARE, AUXILLARY PIPING, FITTINGS, OR OTHER RELATED ARE SUPPLIED BY OTHERS (UNLESS SPECIFICALLY INCLUDED AS PART OF HUBER'S EQUIPMENT SUPPLY).
12.	EQUIPMENT ANCHORS AND HARDWARE SUPPLIED BY HUBER ARE METRIC.
13.	REFER TO EQUIPMENT OPERATIONS AND MAINTENANCE MANUAL FOR DETAILED INSTALLATION INSTRUCTIONS AND/OR EQUIPMENT SPECIFIC INFORMATION.
14.	CONSUMABLES ARE NOT PROVIDED BY HUBER

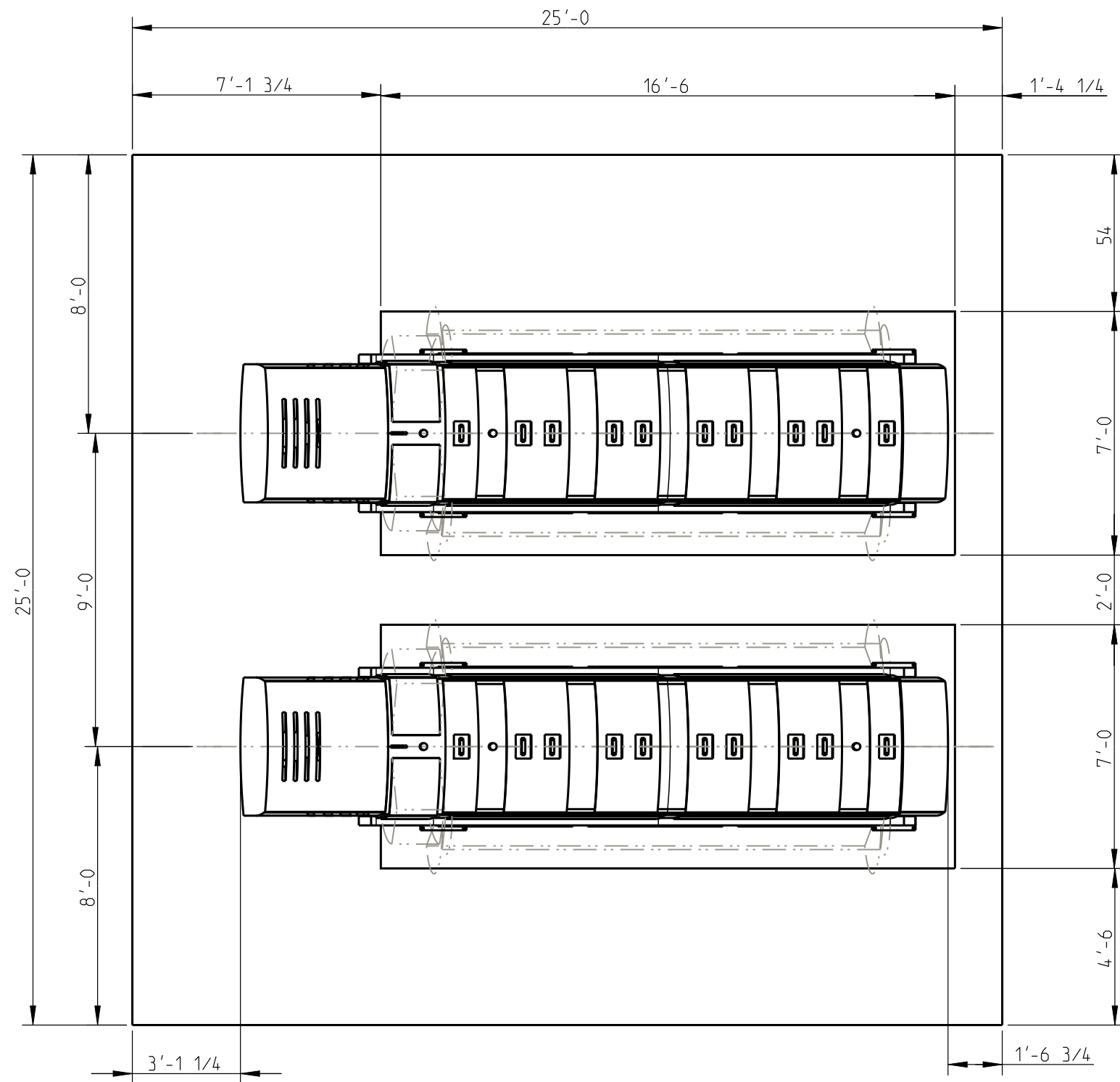
## WELDING SPECIFICATIONS:


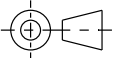
1.	NO AREA GRINDING OF NON-STAINLESS METALS OR IRON WELDS PERMITTED NEAR HUBER EQUIPMENT. CONTRACTOR TO INSPECT HUBER EQUIPMENT FOR "RUST SPECKS" IF IRON DUST IS SUSPECT. ALL "RUST SPECKS" MUST BE EXPEDIENTLY AND PROPERLY CLEANED.
2.	WELD ELECTRODES (USED ON HUBER EQUIPMENT) MUST BE AS FOLLOWS:
2. a	304L EQUIPMENT USE 308L ELECTRODE OR BETTER.
2. b	316L EQUIPMENT USE 316L ELECTRODE OR BETTER.
3.	REMOVE ALL BURRS AND SHARP EDGES FROM FIELD WELDS.
4.	ALL WELD AREAS TO BE CLEANED WITH SOLVENT MEK OR EQUIVALENT.
5.	WELDING PER AWS & ASME STANDARDS.

## ELECTRICAL NOTES:

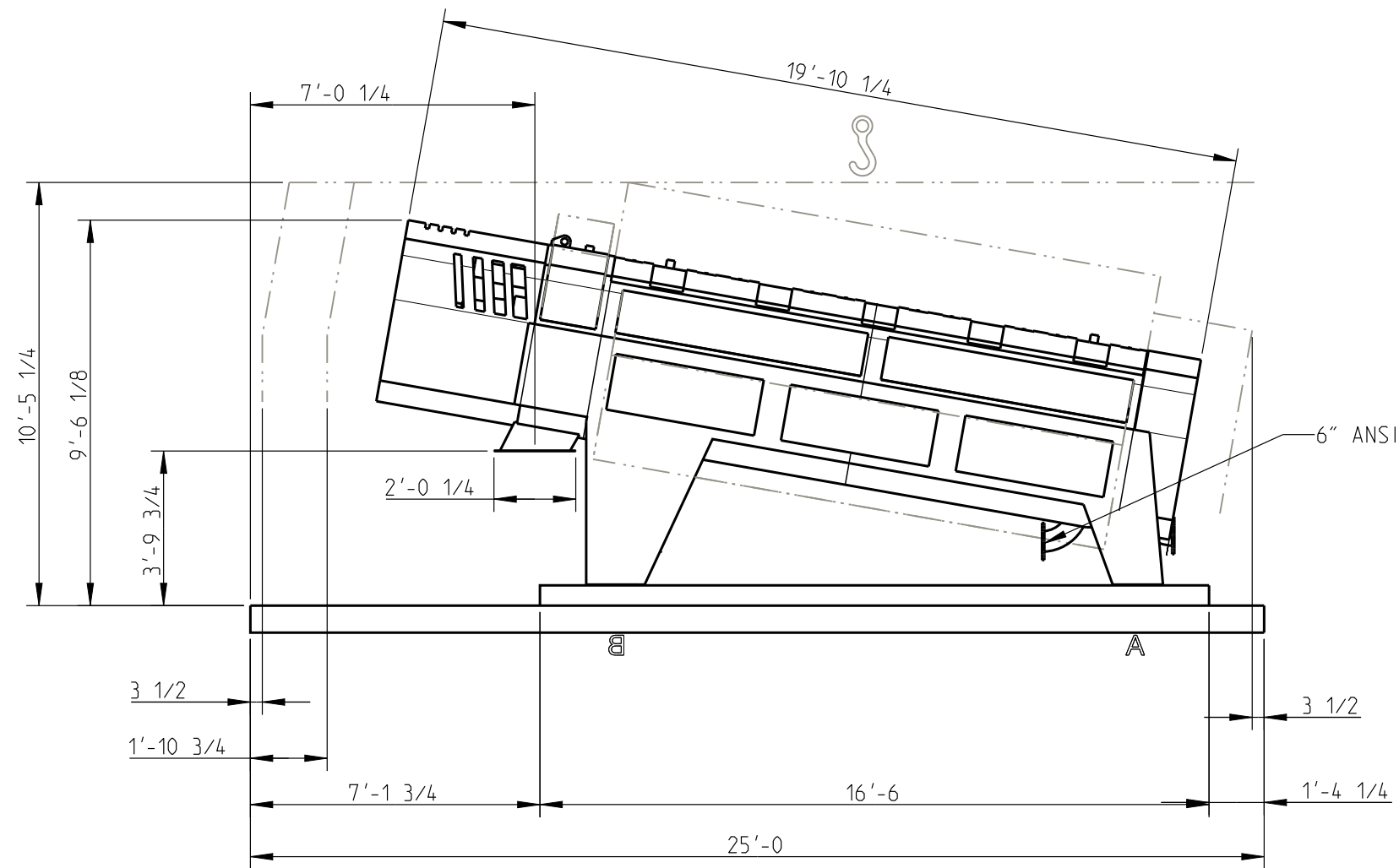
1.	ELECTRICAL FITTINGS, WIRING, FLEX CONDUIT/POWER CABLE, SO-CORD, JUNCTION BOXES, REQUIRED FOR MOTOR POWER ARE SUPPLIED BY OTHERS AND NOT PROVIDED BY HUBER.
2.	EQUIPMENT MOTORS SHOULD BE DIRECT WIRED UTILIZING CLASS 1, DIVISION 1 APPROVED FLEX CONDUIT OR OTHER AS APPROVED BY THE ENGINEER.
3.	EQUIPMENT MOTORS DO NOT COME PREWIRED AND REQUIRE CLASS 1, DIVISION 1 PROCEDURES.
4.	CONTRACTOR IS RESPONSIBLE FOR ALL APPLICABLE ELECTRICAL CODE PROCEDURES AND STANDARDS GOVERNING THE PROJECT LOCAL. FOR HAZARDOUS AREA ELECTRICAL CLASS 1, DIVISION 1, GROUP D, NEC ARTICLE 501 SHALL GOVERN.

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			Q-PRESS® 800.2								
Designed:	us-fl	04/29/2020		Scale:	1:14.4	Fig. No.:	2/7	Installation sketch	Size:	B	
Approved:	us-fl	29.04.2020		Rev.	Cheyenne WY			Drawing No.:	51480658		
Modified:	-	-									

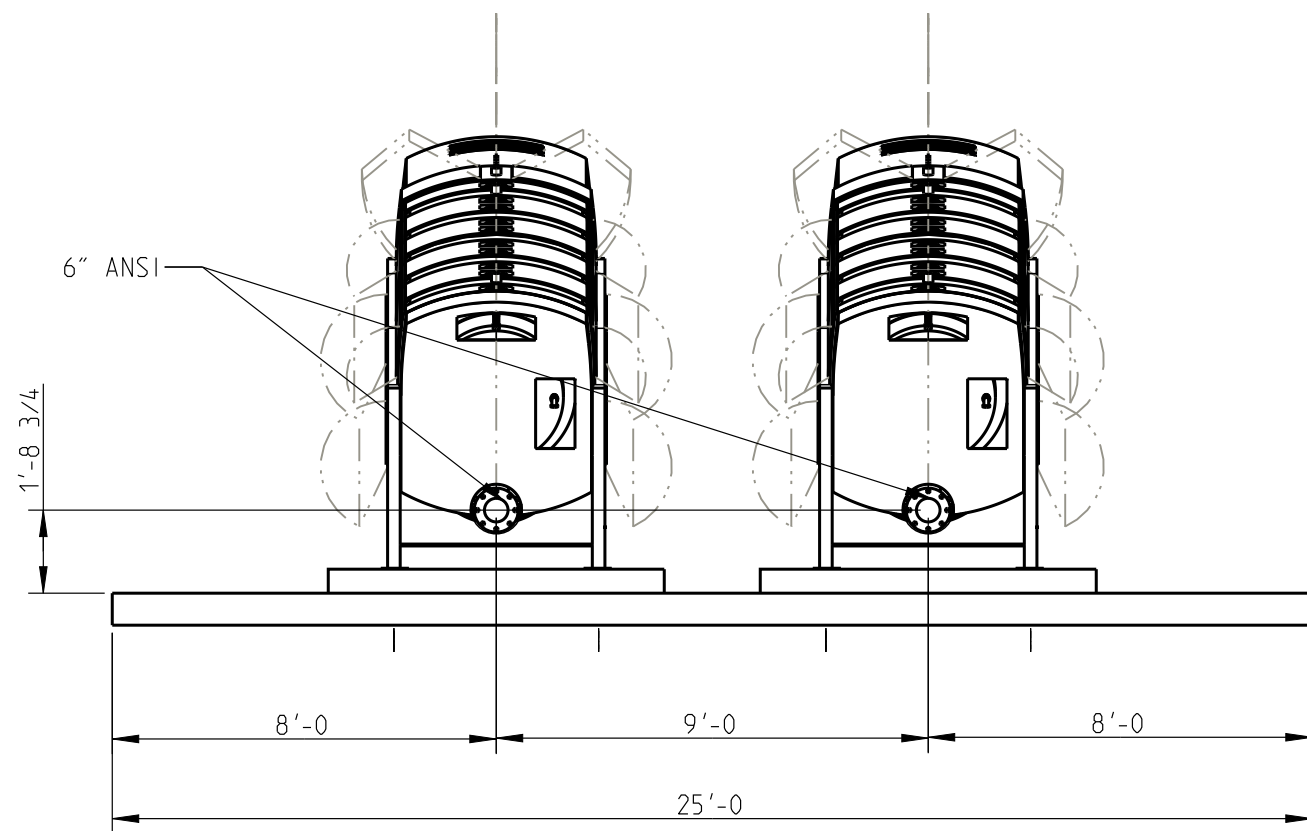


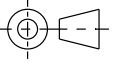
Intellectual property of HUBER Technology, Inc. Technical Information subject to change.		 <b>HUBER</b> TECHNOLOGY WASTE WATER Solutions 1009 Airlie Parkway Denver, NC 28037	HUBER Screw Press							
			Q-PRESS® 800.2							
Designed:	us-fl	04/29/2020		Scale:	1:48	Fig. No:	3/7	Installation sketch	Size:	B
Approved:	us-fl	29.04.2020		Rev.	-	-	Cheyenne WY			Drawing No:
Modified:	-	-	Modification							

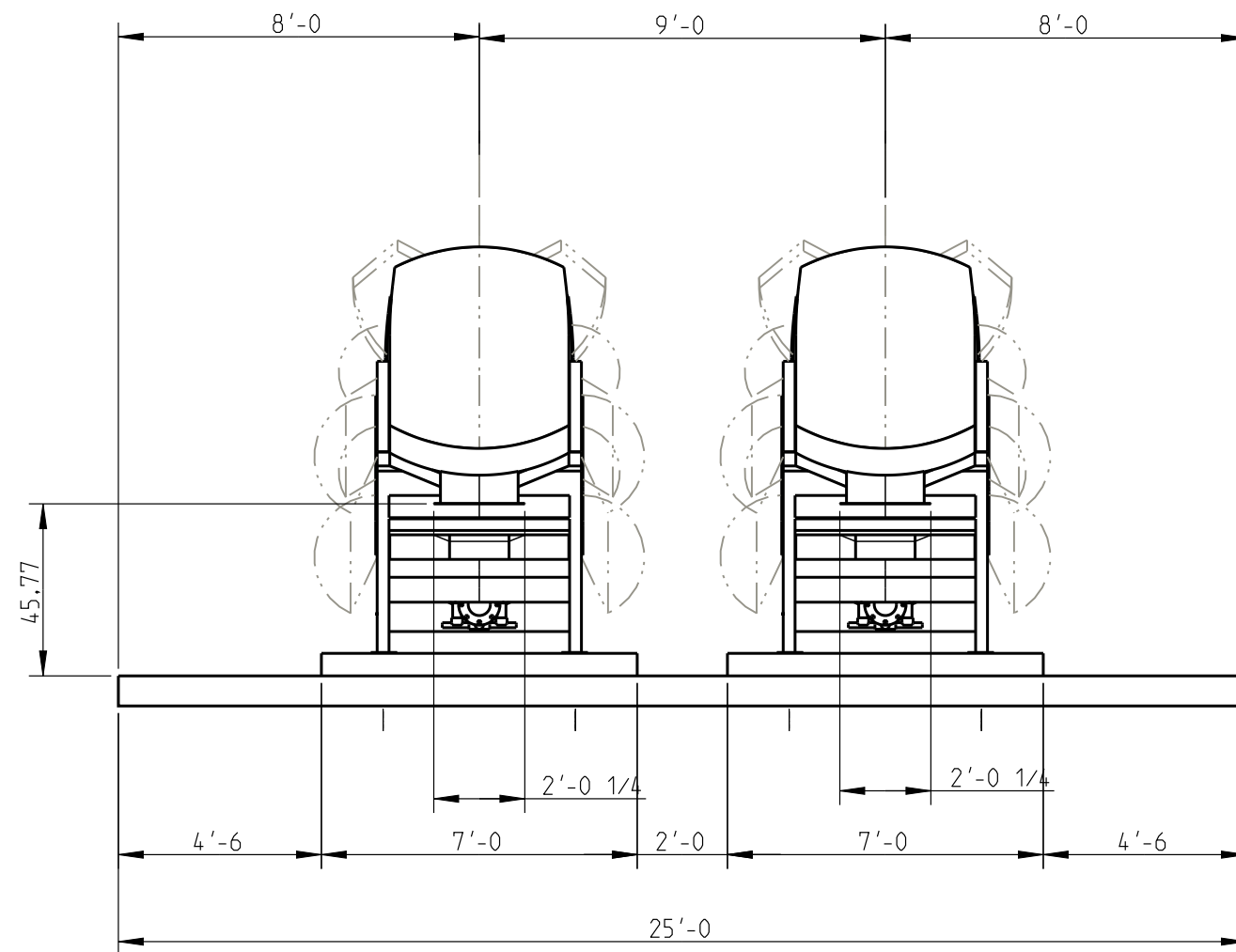


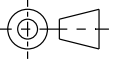


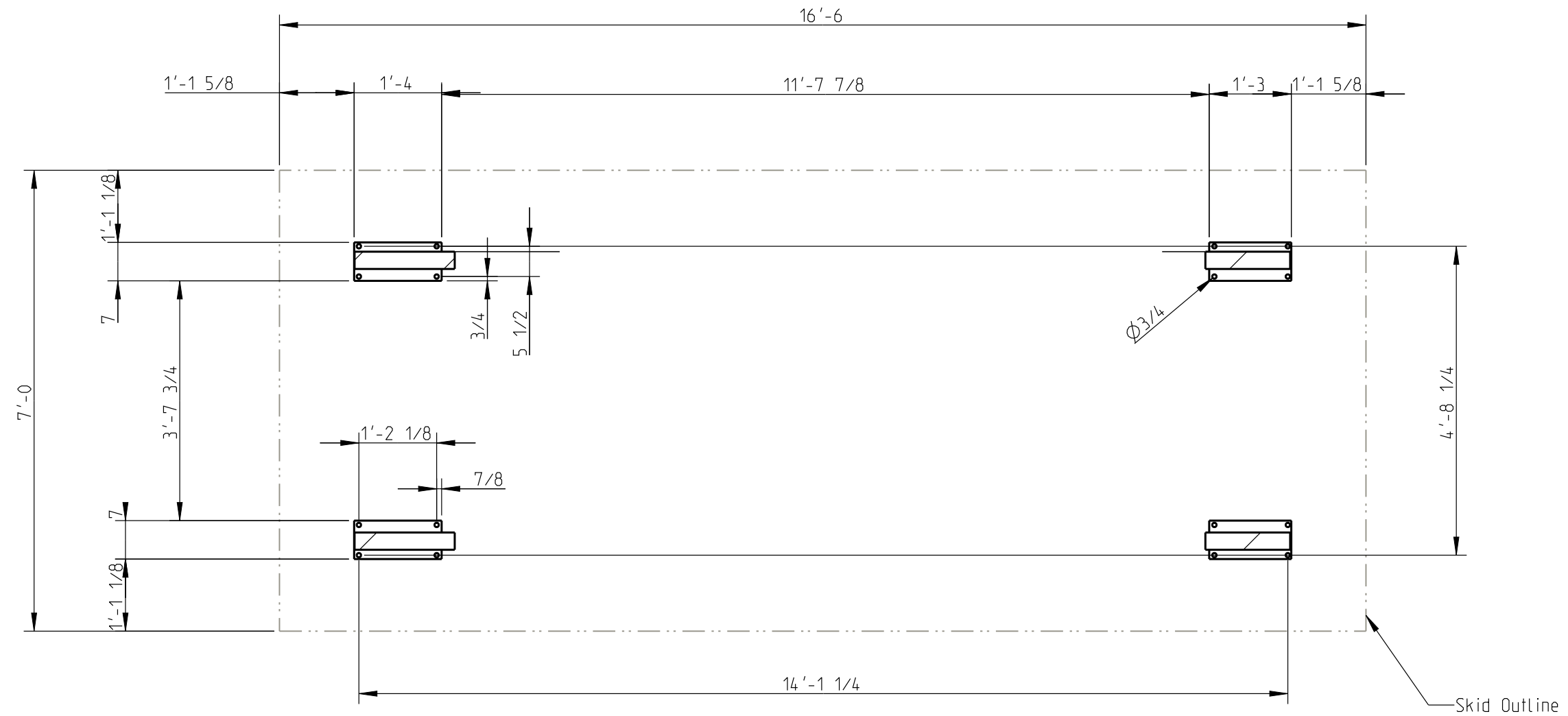
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			Q-PRESS® 800.2		
Designed:	us-tl	04/29/2020	Fig. No: 4/7	Installation sketch	Size: B
Approved:	us-tl	29.04.2020			
Modified:	-	-	Scale: 1:48	Cheyenne WY	Drawing No: 51480658
Rev.	Modification				




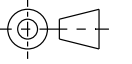
Intellectual property of HUBER Technology, Inc. Technical Information subject to change.			<b>HUBER</b> <b>TECHNOLOGY</b> WASTE WATER Solutions 1009 Airlie Parkway Denver, NC 28037	HUBER Screw Press		
				Q-PRESS® 800.2		
	<b>Name</b>	<b>Date</b>		<b>Scale:</b>	<b>Fig. No.:</b>	<b>Size:</b>
<b>Designed:</b>	us-fl	04/29/2020		1:48	5/7	B
<b>Approved:</b>	us-fl	29.04.2020			Installation sketch	
<b>Modified:</b>	-	-				
-	-	-				
<b>Rev.</b>	<b>Modification</b>			Cheyenne WY		<b>Drawing No.:</b> 51480658



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			Q-PRESS® 800.2							
<b>Designed:</b>	us-fl	04/29/2020		<b>Scale:</b>	1:48	<b>Fig. No.:</b>	6/7	Installation sketch	<b>Size:</b>	B
<b>Approved:</b>	us-fl	29.04.2020								
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<b>Rev.</b>								Cheyenne WY		<b>Drawing No.:</b> 51480658

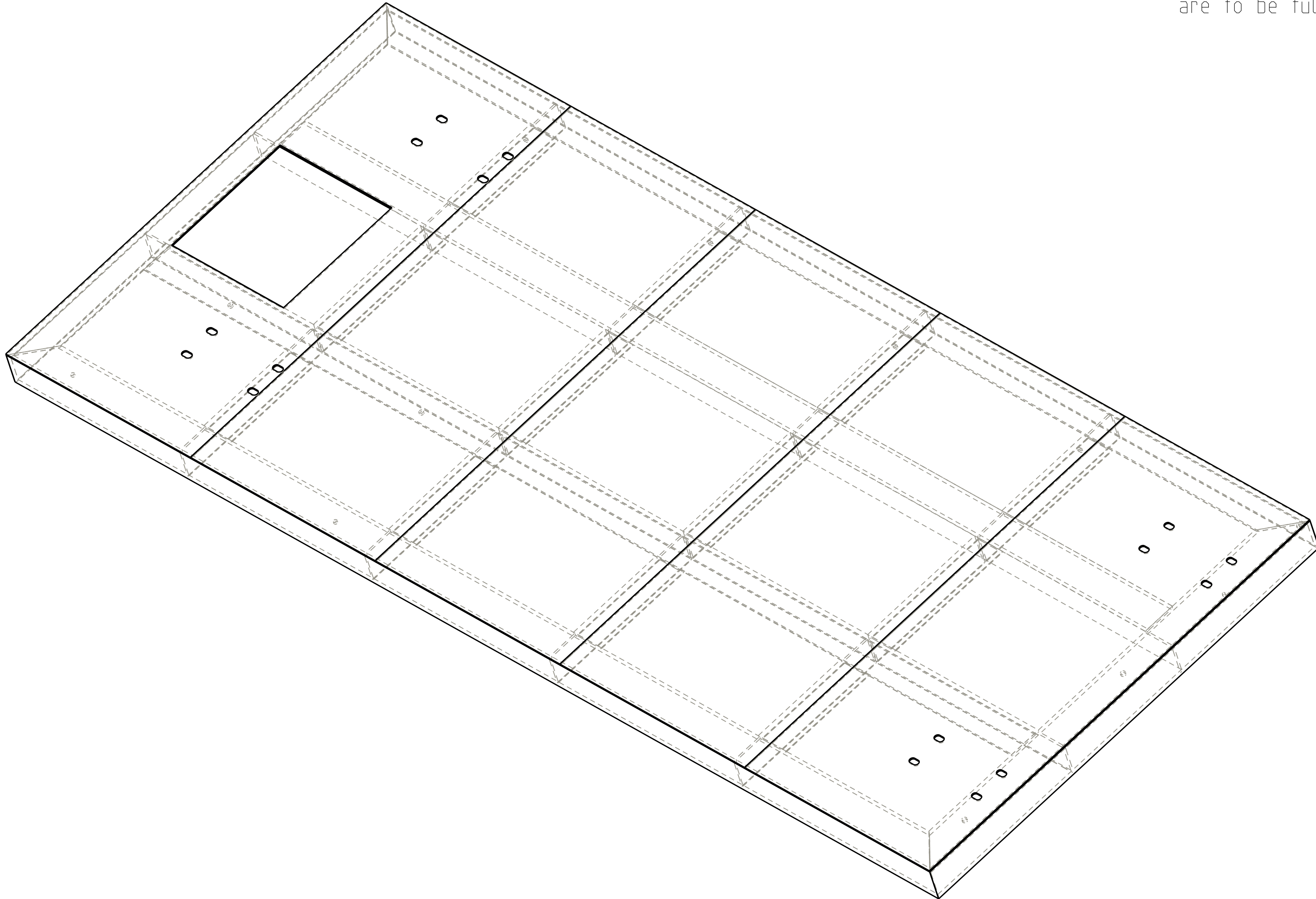


Detail : Drilling Points  
1:24

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				Q-PRESS® 800.2			
Designed:	us-fl	04/29/2020	 Scale: 1:24	Fig. No:	7/7	Installation sketch	Size: B
Approved:	us-fl	29.04.2020					
Modified:	-	-					
Rev.		Modification		Cheyenne WY			Drawing No: 51480658

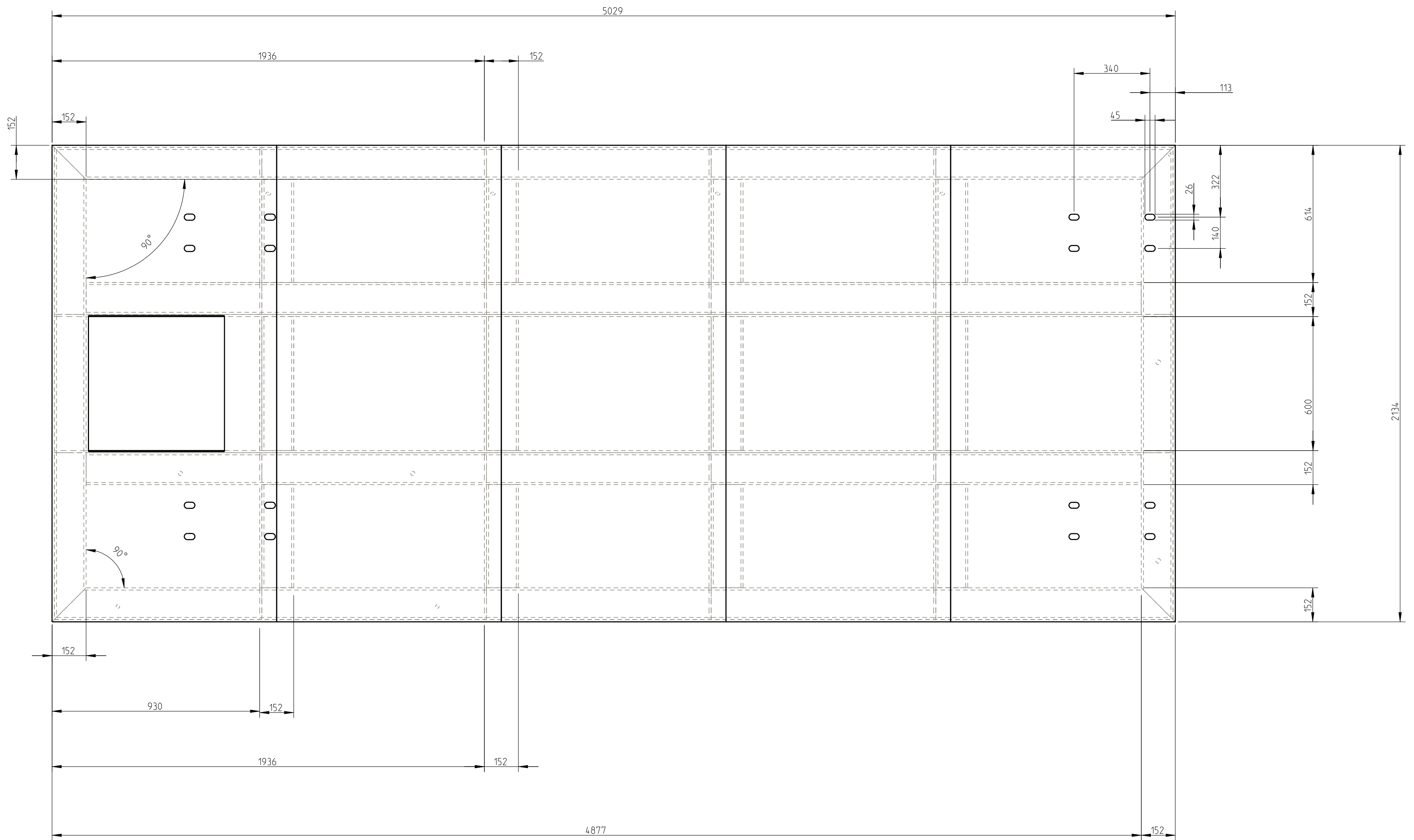
Line Schedule:  
 Solid Lines = 6" x 6" x 3/8" Angle  
 Dashed Lines = 3/8" Plate

All Seams and connections  
 are to be fully welded




**FOR QUOTATION ONLY**

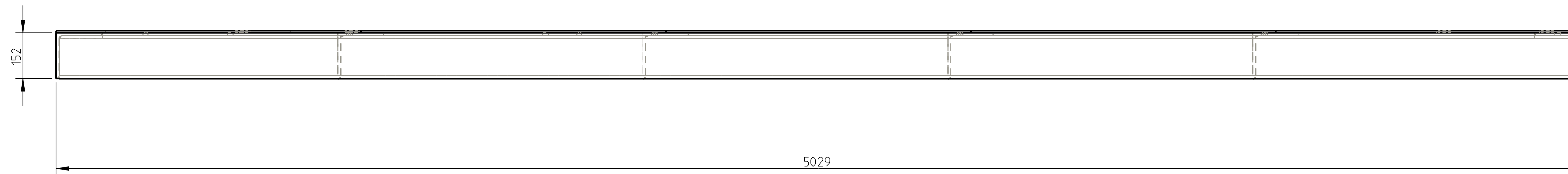
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				9'-11" x 8'-6"						
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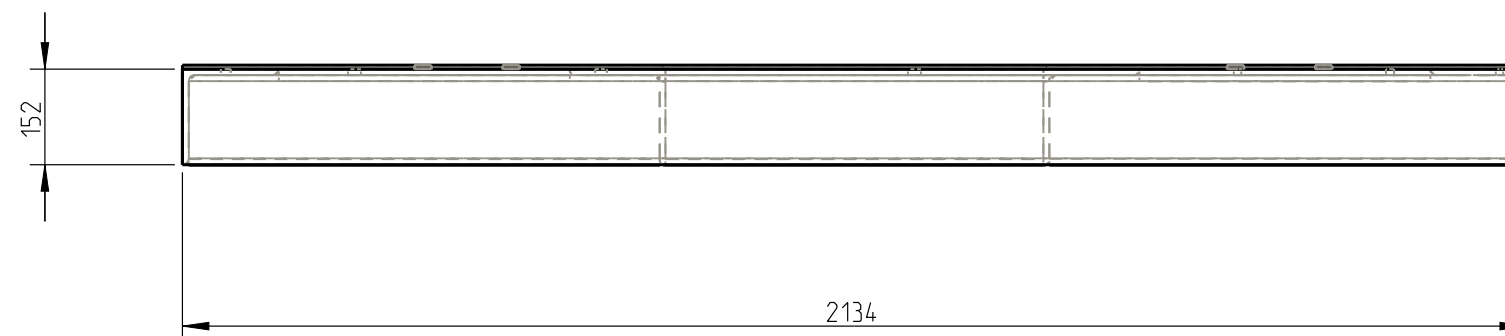
Line Schedule:  
 Solid Lines = 6" x 6" x 3/8" Angle  
 Dashed Lines = 3/8" Plate

All Seams and connections  
 are to be fully welded

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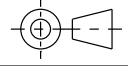


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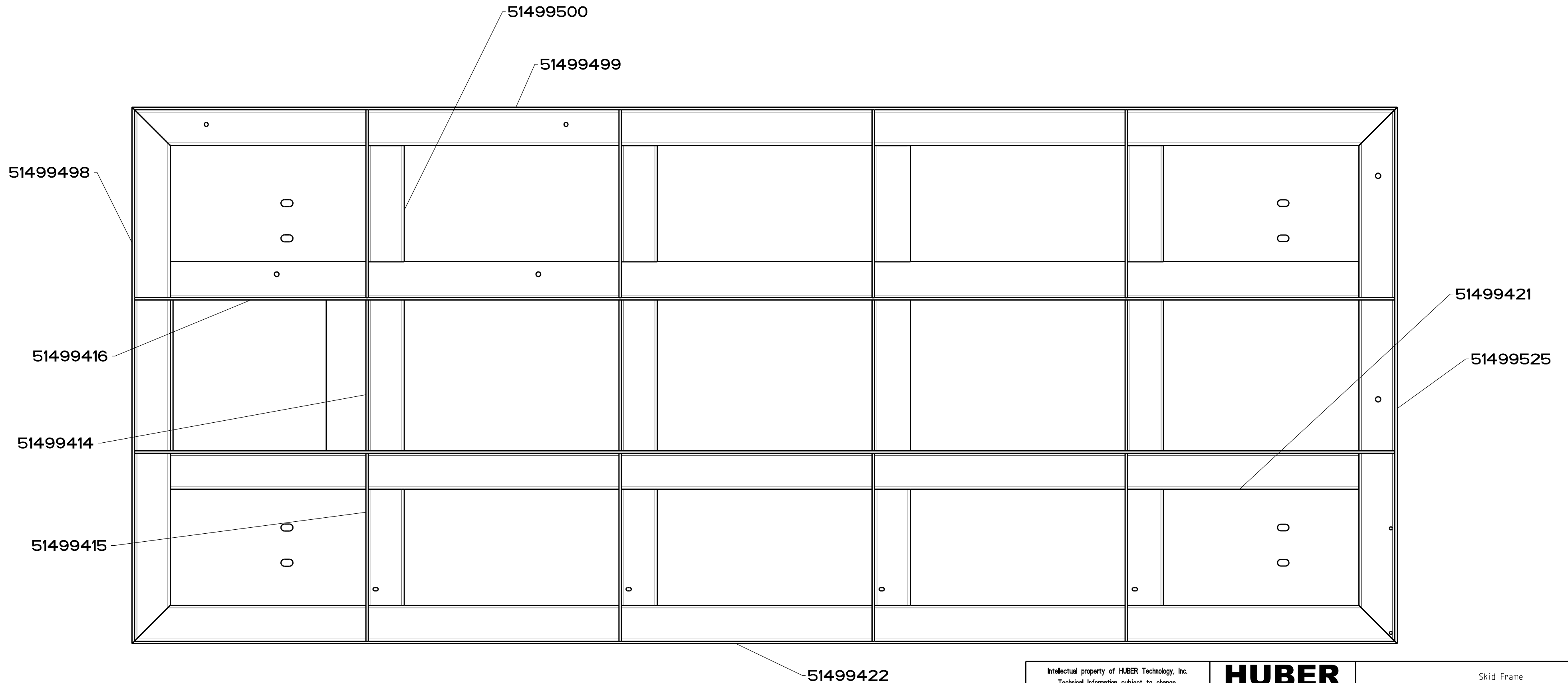
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All Seams and connections  
are to be fully welded

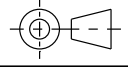
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Rev.	Modification					51499345

No.	Name	Nomination + Specification	QTY	positioning
1	51494554	Skid Plate - Right Side	3	51494554
2	51499414	6" x 6" x 3/8" Angle - 2' x 5 3/4"	4	51499414
3	51499415	6" x 6" x 3/8" Angle - 2'- 0 1/8", 2'-11 3/8"	4	51499415
4	51499416	6 x 6 x 3/8" Angle - 9'-5", 10'- 4 1/4"	1	51499416
5	51499417	Skid Plate - Center	1	51499417
6	51499418	Skid Plate - Right Side	1	51499418
7	51499421	6 x 6 x 3/8" Angle - 9'-5", 10'- 4 1/4"	1	51499421
8	51499422	6 x 6 x 3/8" Angle - 10'-5"	1	51499422
9	51499498	6" x 6" x 3/8" Angle - 8'-6"	1	51499498
10	51499499	6" x 6" x 3/8" Angle - 10'-5"	1	51499499
11	51499500	6 x 6 x 3/8" Angle - 2'- 0 1/8", 2'-11 3/8"	4	51499500
12	51499525	6" x 6" x 3/8" Angle - 8'-6"	1	51499525

Line Schedule:  
 Solid Lines = 6" x 6" x 3/8" Angle  
 Dashed Lines = 3/8" Plate



All Seams and connections are to be fully welded


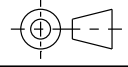
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						<b>Drawing No.:</b> 51499345



GENERAL INSTALLATION NOTES:	
1.	EQUIPMENT MUST BE LEVEL IN ALL PLANES.
2.	AUTHORIZATION REQUIRED FOR FIELD MODIFICATIONS TO HUBER EQUIPMENT DUE TO SITE INCONSISTANCIES -CONTACT HUBER TECHNOLOGY.
3.	REFUSE CONTAINERS SHOWN ON DRAWINGS (IF ANY) ARE FOR REFERENCE ONLY AND ARE SUPPLIED BY OTHERS (UNLESS SPECIFIC TO HUBER'S SCOPE OF SUPPLY.)
4.	WELDING: DO NOT WELD UNTIL TEMPORARY MOCK-UP IS VERIFIED AGAINST THE INSTALLATION DRAWINGS AND ALL LEVEL, SQUARENESS, AND/OR ANGLES HAVE BEEN ACHIEVED -REFER TO WELD SPECIFICATIONS THIS DRAWING.
5.	INSTALLATION CONTRACTOR TO VERIFY ALL EXISTING STRUCTURAL DIMENSIONS BEFORE COMMENCEMENT OF WORK. CONTACT ENGINEER AND/OR HUBER IF FIELD DISCREPANCIES PREVENT PROPER INSTALLATION AS SHOWN ON THE INSTALLATION DRAWINGS, AND/OR OPERATIONS AND MAINTENANCE MANUAL.
6.	FIELD VERIFY ALL EXISTING SITE DIMENSIONS AND ELEVATIONS. DIMENSIONS AND ELEVATIONS SHOWN ARE BASED ON ENGINEERING DRAWINGS AVAILABLE AT THE TIME OF DESIGN OR AS BASED ON AVAILABLE PLANT RECORD DRAWINGS -ALL SITE DIMENSIONS SHOWN ON HUBER DRAWINGS ARE FOR "REFERENCE" ONLY. HUBER NOT RESPONSIBLE FOR DISCREPANCIES IN THE FIELD.
7.	INSTALLATION IS BY OTHERS.
8.	ALL REQUIRED ELECTRICAL, FITTINGS, CONDUIT, HAZARDOUS AREA CONDUIT SEALS, WIRING, AND/OR JUNCTION BOXES - ARE SUPPLIED BY OTHERS.
9.	REFER TO PROJECT DRAWINGS OR CONSULT ENGINEER FOR EQUIPMENT CONDUIT RUNS, CONTROL STATION LOCATION, AND FLOOR STUB UPS.
10.	VALVES SUPPLIED SEPARATE (IF ANY) MUST BE FIELD INSTALLED BY INSTALLING CONTRACTOR. ALL PIPE RUNS AND REQUIRED PIPING ARE SUPPLIED BY OTHERS. SEE ENGINEER FOR PIPE LAYOUT/ROUTING.
11.	FLANGE GASKETS, HARDWARE, AUXILLARY PIPING, FITTINGS, OR OTHER RELATED ARE SUPPLIED BY OTHERS (UNLESS SPECIFICALLY INCLUDED AS PART OF HUBER'S EQUIPMENT SUPPLY).
12.	EQUIPMENT ANCHORS AND HARDWARE SUPPLIED BY HUBER ARE METRIC.
13.	REFER TO EQUIPMENT OPERATIONS AND MAINTENANCE MANUAL FOR DETAILED INSTALLATION INSTRUCTIONS AND/OR EQUIPMENT SPECIFIC INFORMATION.

WELDING SPECIFICATIONS:	
1.	NO AREA GRINDING OF NON-STAINLESS METALS OR IRON WELDS PERMITTED NEAR HUBER EQUIPMENT. CONTRACTOR TO INSPECT HUBER EQUIPMENT FOR "RUST SPECKS" IF IRON DUST IS SUSPECT. ALL "RUST SPECKS" MUST BE EXPEDIENTLY AND PROPERLY CLEANED.
2.	WELD ELECTRODES (USED ON HUBER EQUIPMENT) MUST BE AS FOLLOWS:
2. a	304L EQUIPMENT USE 308L ELECTRODE OR BETTER.
2. b	316L EQUIPMENT USE 316L ELECTRODE OR BETTER.
3.	REMOVE ALL BURRS AND SHARP EDGES FROM FIELD WELDS.
4.	ALL WELD AREAS TO BE CLEANED WITH SOLVENT MEK OR EQUIVALENT.
5.	WELDING PER AWS & ASME STANDARDS.

ELECTRICAL NOTES:	
1.	ELECTRICAL FITTINGS, WIRING, FLEX CONDUIT/POWER CABLE, SO-CORD, JUNCTION BOXES, REQUIRED FOR MOTOR POWER ARE SUPPLIED BY OTHERS AND NOT PROVIDED BY HUBER.
2.	EQUIPMENT MOTORS SHOULD BE DIRECT WIRED UTILIZING CLASS 1, DIVISION 1 APPROVED FLEX CONDUIT OR OTHER AS APPROVED BY THE ENGINEER.
3.	EQUIPMENT MOTORS DO NOT COME PREWIRED AND REQUIRE CLASS 1, DIVISION 1 PROCEDURES.
4.	CONTRACTOR IS RESPONSIBLE FOR ALL APPLICABLE ELECTRICAL CODE PROCEDURES AND STANDARDS GOVERNING THE PROJECT LOCAL. FOR HAZARDOUS AREA ELECTRICAL CLASS 1, DIVISION 1, GROUP D, NEC ARTICLE 501 SHALL GOVERN.

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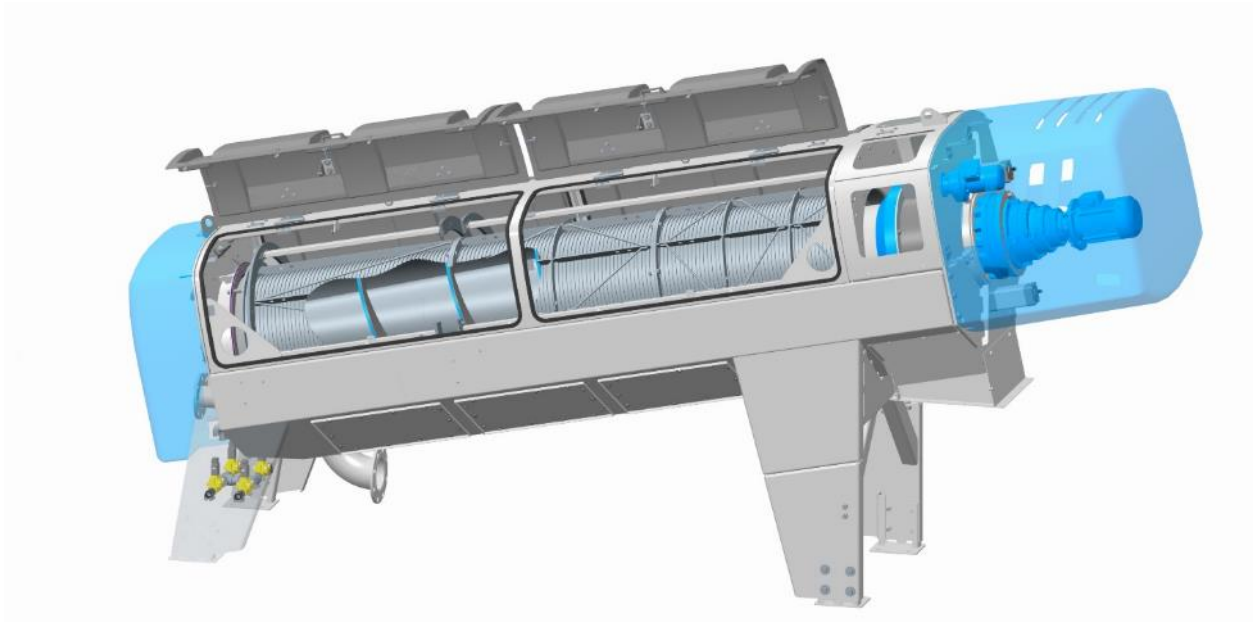
# Section 3.0

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# Operation Manual

## HUBER Screw Press Q-PRESS®

620.2  
800.2



**HUBER SE**  
**Industriepark Erasbach A1**  
**92334 Berching**

Original Operating Manual  
Version 08/16



## NOTICE

This manual is part of the plant and must be available for the operators any time.  
The safety instructions must be observed.  
In case of selling the plant, the manual must be included.

### **Translation**

For delivery in the EEA, the operating manual is to be translated into the language of the target country.

If inconsistencies occur in the text, refer to the original operating manual (German), or contact the manufacturer.

### **Copyright**

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# 1 Product specification

## 1.1 Intended use

The plant is designed for continuous dewatering of freely flowing conditioned suspensions (sewage sludge) by gravity, pressure and shear forces.

Fields of application: treatment of municipal and industrial sludge

Any other or additional use does not comply with the intended use. The manufacturer does not assume any liability for consequential damage caused by non-observance of these operating instructions. The operator bears the full risk.

The intended use also includes:

- Observance of the start-up, operation and maintenance conditions as set out in this operating manual.
- Due consideration of foreseeable misuse
- Operation by skilled workers only (who are familiar with the correct procedures and know the dangers)

### **WARNING**

The machine is intended exclusively for the above specified use.

Any additional use or rebuilding of the equipment without prior written approval by the manufacturer does not comply with the intended use.

The manufacturer will not assume liability for consequential damage. The operator alone will bear the risk.

Do not start up the machine before there has been ensured that all safety devices are completely mounted and operable, and that the plant into which the machine may be incorporated complies with the rules.

## 1.2 Intended use

The machine is only suitable to be used in hazardous areas, specified as Class 1 Div. 2 areas.

1.3 EMC advice

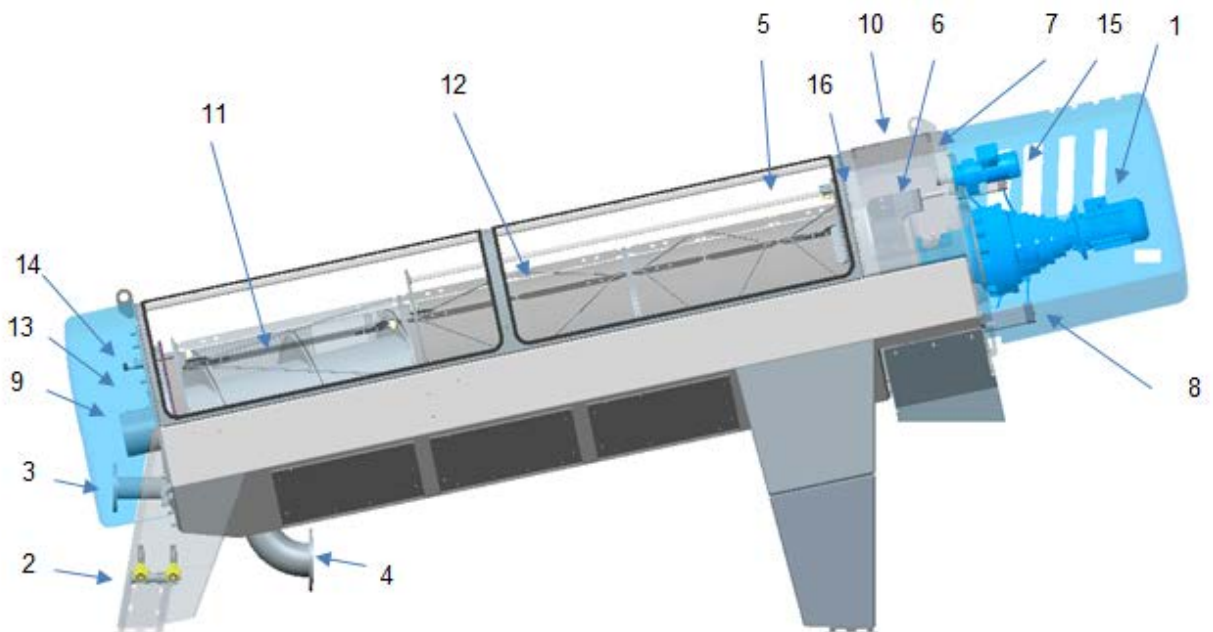
**NOTICE**

**Advice** for applying the EC rule EMV 2014/30/EU:  
 The plant is prepared for operation in industrial areas acc. to DIN EN 61000-6-4 (generic standards for transient emissions in industrial areas). Wiring and control technology have to meet additionally the requirements of DIN EN 61000-6-3 (transient emission in living areas) for operation in living areas, in business and commercial areas and in small companies.

1.4 Definition of terms for equipment components

Definition of terms:

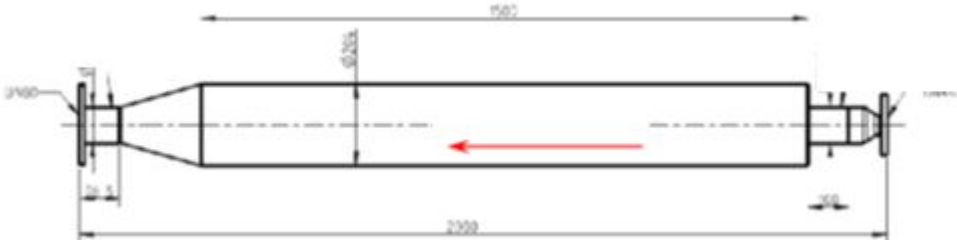
Partial section of a size 620.2 unit:



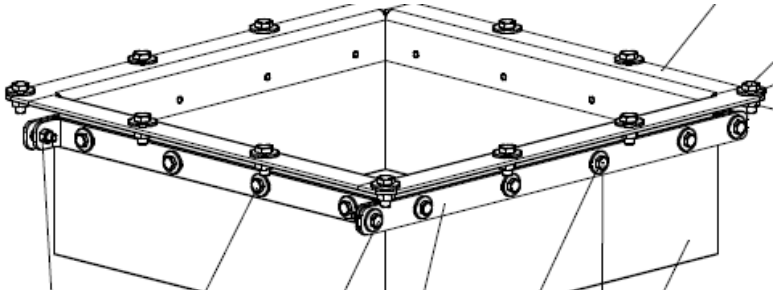
- |   |  |    |   |
|---|--|----|---|
| 1 | Screw drive  | 9  | Screw bearing lubricator                |
| 2 | Wash water connection to 4 solenoid valves             | 10 | Sludge discharge inspection cover       |
| 3 | Sludge inlet flange                                    | 11 | Screw shaft                             |
| 4 | Filtrate outlet flange                                 | 12 | Cylindrical screen drum                 |
| 5 | Spray nozzle bar / spray nozzles                       | 13 | Screening zone inspection cover         |
| 6 | Pressure cone  | 14 | Pressure sensor of sludge inlet chamber |
| 7 | Sludge discharge chamber                               | 15 | Drive of spray nozzle basket            |
| 8 | Pneumatic cylinder with connections for compressed air | 16 | Proximity switch of spray nozzle basket |



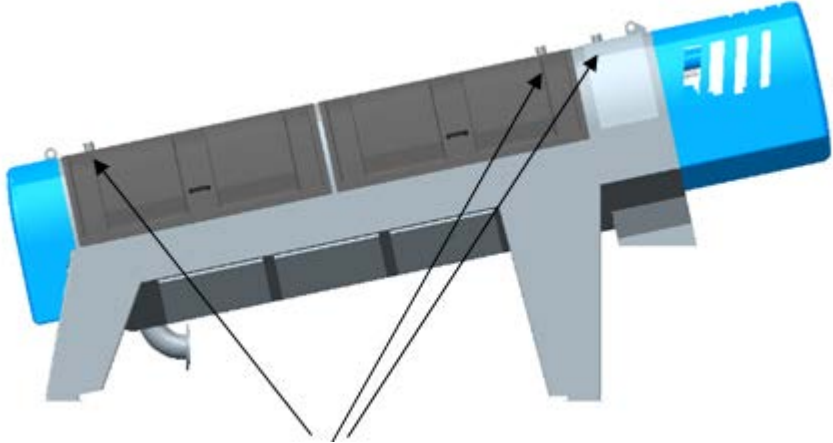
Optional equipment:



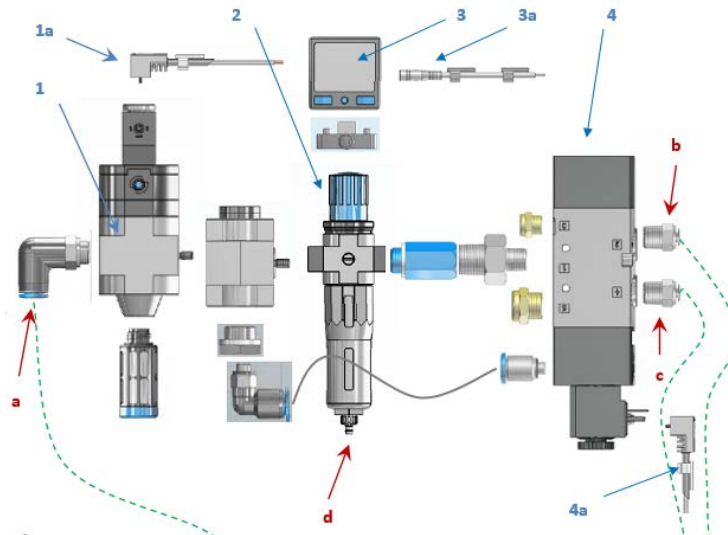
Tubular flocculation reactor for sludge conditioning, flow direction from right to left



Transfer chamber to downstream conveying system



Ventilation pipe sockets for the connection of an external ventilation plant



Pneumatic control unit for pressure cone control

## 1.5 Functional description

The RoS 3 Q is a screw press with a conical screw shaft and cylindrical sieve consisting of three treatment zones: inlet and drive zone, three-part thickening and dewatering zone, and press zone with pneumatic counter-pressure cone.

The screw press must be fed with flocculated sludge of sufficient stability. In the first section of the sieve the feed pump removes the free supernatant liquor quickly from the sludge via a large free screening surface and with low primary pressure. The pressure probe in the inlet protects the plant against excessive primary pressure and consequently excessive pollution of the filtrate liquor.

In the second section of the sieve the volume of material between the screw flights is reduced by the conical screw and the sludge pressed against the inner screen surface so that the sludge is dewatered, with a continuous reduction of filter cake thickness. The screen apertures are much smaller in this section of the sieve.

In the third section of the sieve the pneumatic counterpressure cone presses the residual water out of the sludge with a minimum filter cake thickness. Depending on the type and consistency of the sludge flocks the pressure applied on the sludge can be varied infinitely.

The dewatered sludge is pushed by the conveying screw past the pressure cone into the discharge chamber.

The sludge residence time in the screw press and thus the filtration time can be adjusted to individual requirements by adjusting the rotational speed of the screw shaft.

Scrapers fitted on the flights ensure permanent automatic sieve cleaning from inside. Intervallic cleaning of the sieves from outside is accomplished by means of a spray nozzle bar. On Q-PRESS® 440.2 units, the spray bar is stationary mounted whereas the screen basket is a rotating element. For the purpose of cleaning the feed into the screw press is temporarily stopped and the shaft starts to reverse. As the flexibly supported screen drum rotates passing by the spray nozzle bar, the screen surface is cleaned. In pressing mode sludge feeding starts again and the screw shaft rotates forwards. The screen basket rotates until arrested by ratchet pawls anchored in the casing. On Q-PRESS® 620.2 and 800.2 units, the dewatering process is not interrupted while the washing mode is active, i.e. the machine does not stop during a wash cycle. Four separately controllable spray nozzle segments permit screen basket washing zone by zone.

## 2 **EC Conformity Certificate, Certificate of Incorporation**

The plant conforms to the EU directives required for CE marking. With the EC Conformity Certificate we confirm that the machine delivered as ready for use conforms to all relevant health and safety standards. The EC Conformity Certificate is provided only if the HUBER plant is supplied as a ready-to-operate unit complete with the electrical switchboard and control panel, and if plant installation and commissioning are performed by HUBER SE.

The Certificate of Incorporation is required if the machine we supply is not ready for use, for example if it is to be connected to other machines in a system or if the switchgear and control system is provided by a third party. We herewith declare that the design of the plant as supplied complies with standards, EC directives and DIN EN standards, as far as applicable as delivery does not include the electrical switchboard and control panel. Any modification of the machine without our prior approval will invalidate this declaration. Start-up of the machine is prohibited until the complete plant is in conformity with the quoted directives.

The Certificate of Incorporation is attached in the appendix and is separately listed in the table of contents.

## 3 Safety

### 3.1 General safety instructions

#### **DANGER**

„DANGER“ indicates a hazardous situation which, if not avoided, will result in death or serious injury.

#### **WARNING**

„WARNING“ indicates a hazardous situation which, if not avoided, could result in death or serious injury.

#### **CAUTION**

„CAUTION“ indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

#### **NOTICE**

„NOTICE“ indicates a property damage message. Follow notices to avoid material damage!

This operating manual has to remain attached to the machine. It must be ensured that all personnel operating the machine have access to the operating manual at all times. In addition to these operating instructions, instructions in the sense of the labour protection law and ordinance regulating the use of tools have to be available.

The operating manual contains fundamental guidelines which must be observed during installation, operation and maintenance. For this reason, this operating manual must be read by the technicians responsible before assembly and commissioning. The operating manual must always be available in the immediate vicinity of the machine. In addition to the general safety guidelines listed in this section, the specific safety guidelines listed under the main points below must also be observed.

#### 3.1.1 Due diligence of the operator

The system is designed and built according to a risk assessment, careful selection of harmonised mandatory standards and additional technical specifications. The plant complies with state-of-the-art technology and offers the maximum amount of safety.



However, this level of safety can only be achieved during operation if all of the required measures are taken. The operator of the machine is responsible for planning these measures and ensuring that they are implemented.



The operator must especially ensure that

- The equipment is only used as intended (see chapter Product Specification).
- The equipment is only operated when it is in working order and that the function of the safety mechanisms is checked regularly.
- Personal protective equipment for the operating, maintenance and repair personnel is available and used.
- These operating manual is always in a legible state and is available in its entirety in the immediate vicinity of the machine.

- Only sufficiently qualified and authorised personnel operates, maintains and repairs the machine.
- Such personnel receive regular briefing concerning all questions of safety and environmental protection and know these operating instructions, especially the safety instructions contained.
- All safety and warning notices on the machine are not removed and can be read at all times.

### 3.1.2 Description of safety symbols

	 <b>WARNING</b>
	<p><b>Occupational safety symbol</b>                  This symbol will accompany all safety instructions that are associated with risks to life and/or limb. Follow these instructions and proceed carefully! At the same time, follow all applicable laws, general safety and accident prevention regulations.</p>

	 <b>WARNING</b>
	<p><b>Electric current warning</b>                  This symbol warns of electric current. Prior to performing any work, switch off the mains isolator and make sure that the system is off-circuit. At the same time, follow all applicable laws, general safety and accident prevention regulations.</p>

	 <b>WARNING</b>
	<p>Be careful not to get caught when starting up, servicing or repairing the machine!</p>

<h2>NOTICE</h2>
<p>This symbol is found where special attention is required to ensure compliance with instructions concerning correct operating sequences to prevent damage to the machine or its function.</p>

Instructions directly attached to the machine, e.g.

- Notice and warning signs
- Identification signs for liquid supply connections
- Rotational direction arrow

must be adhered to and fully legible at all times.

Damaged or illegible signs must be replaced immediately.

### 3.1.3 Qualification and training of personnel

Only well-trained and briefed persons who know these operating instructions and act according to these instructions are authorized to operate the machine. The individual areas of responsibility of operating staff must be defined clearly. The area of authority, responsibility and control of the personnel must be precisely regulated by the operator. The operator must further ensure that the personnel has fully understood these operating instructions.

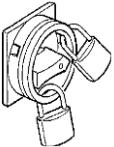
Personnel being trained must in the beginning work under the supervision of an experienced person. The completed successful training and briefing must be confirmed in writing.

Any electrical control and safety devices must generally be operated by instructed and authorized persons only.  
 Any person performing work on the machine must read these operating instructions and confirm by signature that the operating instructions have been understood.

### 3.1.4 Safety instructions for maintenance, inspection, installation

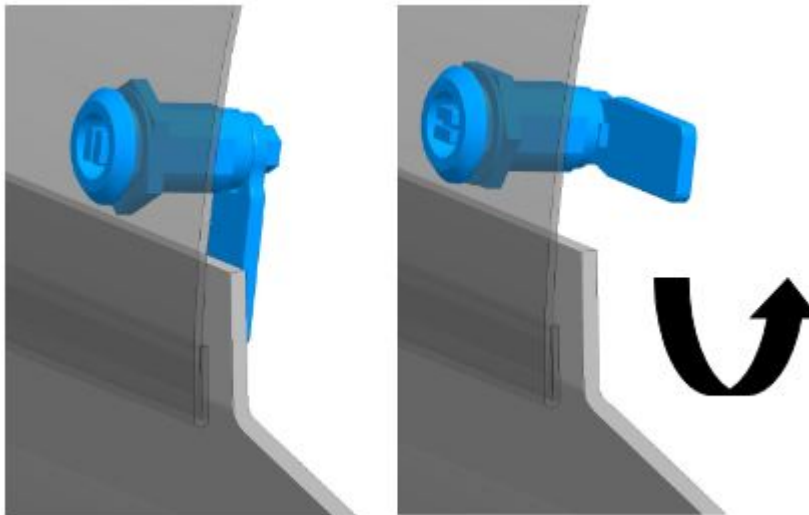
Maintenance work must only be carried out by qualified personnel.  
 Any inspection and installation work must be carried out by authorised and qualified personnel only. Work on electrical equipment must only be carried out by qualified electricians according to DIN VDE 1000-10.  
 Work on the plant may only be carried out when the plant is disconnected from the mains.

Enclosed rooms of wastewater treatment plants that must be entered for service and maintenance have to be aerated in a way that prevents a dangerous explosive atmosphere, lack of oxygen and presence of harmful concentrations of gas or vapour.

	<b>⚠ WARNING</b>
	<p><b>Shutdown procedure:</b> Switch off mains isolator and lock it.                  Each person who is commissioned to perform maintenance work on the machine must have his own padlock. Starting the machine is only possible when all padlocks on the mains isolator have been removed.                  Check if upstream and downstream equipment may cause a danger, switch off power supply for upstream and downstream equipment before performing maintenance or repair.                  If the whole plant cannot be disconnected from the mains for operational reasons, individual machines must be disconnected by a skilled electrician in accordance with DIN VDE 1000-10 and secured against unintentional restart acc. to DIN EN 50110-1 VDE 0105-1.                  As an option all machine drives can be supplied with a repair switch. For maintenance work the machine or area concerned can be switched off acc. to DIN VDE 0100-200. The repair switches must be switched off and locked as described above..</p>

Opening the machine:  
 All inspection openings are secured with screw connections or turning locks to prevent they are opened by unauthorized persons.

<b>⚠ CAUTION</b>
<p>Open the inspection covers only after shutdown of the machine or for visual inspection while the machine is running.                  Never grip into the inside of the machine while the machine is running.</p>




Turning locks closed

Turning locks open

Do not immediately re-start the machine, if the reason why it has stopped is unclear. Somebody could have stopped the machine in order to make a manual adjustment and may have forgotten to secure it against starting. The unexpected start could result in serious injury of personnel.

It is in your own interest to clean the machine prior to working on it to prevent the danger of infections.

 <b>CAUTION</b>
<p>Always protect yourself by means of waterproof protective gear, boots, gloves, and, if possible, also by face protection during cleaning of the machine - especially if a high pressure cleaner is being used – to avoid being hit by waste water, organic material, etc. Re-attach all safety equipment, covers, grates completely to their original place and assure that they are properly and completely reattached. Use only tools and means that are expressly intended for such work.</p>

Before starting the machine again, check the items mentioned in chapter Start-up.

**3.1.5 Other dangers**

Other dangers are potential, non-apparent dangers.

Residual risks exist despite all precautionary measures, for example:

- To be caught by unintentional movements of the machine
- Dangers caused by splash water from inside the machine
- Slipping on wet or soiled floors
- Tripping/fall hazard in front of or on the plant during maintenance work
- Faults in the control system
- Danger of electric shock
- Allergies and irritations caused by contact with wastewater or sludge
- Infections caused by bacteria or contamination
- Explosions or fire caused by gas or fumes

**3.1.6 Unauthorised rebuilding and production of spare parts**

Alterations or changes to the machine:

For safety reasons, it is not permitted to make unauthorized alterations or changes to the machine. This applies also to welding work on bearing components.

Any intended modifications, alterations or changes require the prior written consent of HUBER SE.

Use only original spare parts, original wearing parts and original accessories as these are especially designed for the machine. Components purchased from other sources give no guarantee that they have been designed and manufactured to suit the specific operating and safety requirements.

Components purchased from other sources give no guarantee that they have been designed and manufactured to suit the specific operating and safety requirements.

**3.2 Machine identification**

Any specifications made in these operating instructions apply to only the type of machine that is named on the title page.

The identification plate is attached to the screenings discharge and specifies the following.

- Name and address of supplier
- CE label
- Serial name and type, optionally serial number
- Year of manufacture

Always forward the machine type, year of manufacture and order number when inquiring or ordering spare parts to ensure perfect and prompt processing of your queries and orders.

**3.3 Incorporated safety systems**

The incorporated safety systems are subject to regular checkups (**t** = daily, **w** = weekly, **m** = monthly, **j** = yearly). The following methods are applied:  
**S** = sight inspection, **F** = functional test, **M** = measuring.

These specifications refer to a 24 hour operation on 365 days a year.

**Mains isolator**

The mains isolator is located on the control panel and disconnects/connects the machine from/with the mains supply.

Padlock the mains isolator after switch-off prior to performing service or repair work.

Inspection	
Interval	Method
y	F

**Emergency cutoff circuit**

The machine is equipped with an emergency cutoff circuit. Whenever the emergency cutoff switch (option) is operated, the machine or complete plant including incorporated units will be set into a safe operating state.

The emergency cutoff switch can be released by pulling or turning to the right.

Inspection	
Interval	Method
m	F



### Motor temperature control

The machine is equipped with an indirect motor temperature control with overload protection. The motor of the machine is switched off in the event of too much heat built-up. The overcurrent safety device using a thermic delay must be set to disrupt the drive motor from the power system within the delay  $t_E$ .

Inspection	
Interval	Method
y	F, M

### Plant control

Internal plant control includes a 5-conductor feed system, 3 phase, with separate earth line with GREEN/YELLOW line coating. Additionally earth the machine casing for potential equalisation..

Inspection	
Interval	Method
m	V, F, M

### Overpressure control

The machine is equipped with a feed pressure controller. If the pressure exceeds maximum pressure the complete plant included incorporated units must be set into a safe operating state. When the pressure has fallen below maximum pressure and the fault has been reset, the plant can be re-started.

Inspection	
Interval	Method
m	F

### Pneumatic isolation / maintenance system

As an option the machine is equipped with a pneumatic maintenance mechanism.

The pneumatic pressure cone can be depressurized for the purpose of executing maintenance and inspection work.

Inspection	
Interval	Method
m	F

### Wash cycle monitoring

The machine is equipped with a wash cycle monitoring mechanism. The end position of the spray basket is monitored by a proximity switch.

Inspection	
Interval	Method
m	F, M

**Categories according to DIN EN ISO 13849-1**

The following categories are installed in the plant:

Category	System performance	Component	Inspection interval
1	<ul style="list-style-type: none"> <li>• A fault may cause the loss of safety function,</li> <li>• Some faults may stay unrecognized</li> </ul>	Main switch, water shut-off device with protection against restart	1x per year or acc. to instructions of supplier of components
2	<ul style="list-style-type: none"> <li>• A fault may cause the loss of safety function between the tests.</li> <li>• The loss of safety function is recognized by the test.</li> </ul>	Emergency stop (emergency cut-off relays with push-button and cut-off protection)	1x per year or acc. to instructions of supplier of components

**WARNING**

Control panels can only be opened by using a special key. The special key may only be handed to an authorized person. Take care that doors of control panels are only opened by skilled staff for maintenance work and fault detection, otherwise the doors must stay locked!

**NOTICE**

These operating instructions are part of the machine and have to be available for the operating staff at any time.  
 The safety instructions contained must be observed.  
 It is strictly prohibited to override any safety instructions or change the mode of action of safety instructions.

**3.4 Safety measures**

It is the operator's responsibility to instruct his operating and servicing staff concerning:

- Protective devices on the machine,
- Control of observance of safety measures.

This copy of operating instructions has to be stored to be at hand when needed in the future. Observe the intervals for inspection and control measures! In these operating instructions, the work is described so that it can be understood

- by an instructed person (referring to chapter Operation and operation modes
- by skilled staff (referring to chapters Transport, Installation, Maintenance, Trouble Shooting and Repair).

The chapters Transport, Installation, Maintenance, Trouble Shooting and Repair are intended for skilled staff only. Any work described under these chapters must be performed by skilled staff only.

**Instructed person**

An instructed person is a person that has been instructed by a skilled person, and trained if necessary, about the assigned jobs and possible risks arising from improper performance and informed about necessary protective devices and protective measures.

**Skilled persons**

Skilled persons are persons that are able to evaluate assigned jobs and recognize possible risks, due to their professional skills, expertise and experience and knowledge of corresponding standards.

**This definition follows EN 60204-1**

**3.5 Operator's duty of care****NOTICE**

The valid national version of the framework directive 89/391/EEG and corresponding individual directives, especially 89/655/EEG concerning minimum requirements for safety and health protection of staff when using work equipment, are applicable in EEA countries and must be observed.

For Germany, the occupational safety directive of October 2002 is applicable and must be observed.

The operator has to obtain the local operating license and observe the respective requirements. In addition, the operator has to observe the local laws concerning

- Safety of personnel (accident prevention regulations)
- Safety of work equipment (protective gear and maintenance)
- Product disposal (Waste Management Law)
- Material disposal (Waste Management Law)
- Cleaning (cleaning agent and disposal)
- Environmental compliance

**Connections:**

The operator has to ensure before start-up of the machine, if installation and start-up are performed by the operator himself, to comply with local standards (such as for electrical connection for instance).

**NOTICE****Lighting**

The operator has to provide sufficient and equal lighting in all areas of the plant. The recommended illumination level is 300 lux (value for maintenance; in Germany acc. to ASR).

**3.6 Safety inspections**

Safety inspections are carried out by the manufacturer in the factory.

1. Measurement of airborne noise
  - according to appendix 1 of the EU Machinery Directive (1.74/f).

The machine noise level is below 70 dB(A).

2. Tested and verified in accordance with DIN EN 60204-1
  - Check of electrical equipment for correspondence with the technical documentation (chapter 18.1)
  - Function tests (chapter 18.1)  
Test functions of the electrical equipment, especially those which are related to safety and safety measures.

## 4 Handling and transporting

Observe the following points to avoid damage to the machine or persons when handling the equipment:

- Only qualified persons are permitted to perform transport work, observing the safety instructions.
- Lifting and righting of the equipment must be done only by the lifting eyes provided.
- Use only the lifting devices specified hereunder to transport the machine.
- Empty the machine prior to transporting it.
- Read also the chapter General Safety Instructions.

### 4.1 Dimensions and weight

Several plant sizes are available. The plant dimensions are specified in the project-specific installation drawing or general dimension sheet, which is attached to this Operation Manual. The weight of the plant depends on its size. The weights are specified in the installation drawing.

The machine can be transported with the machine feet and covers dismantled.



### 4.2 Approved equipment and accessories for transportation

#### CAUTION


Have transport and unloading done by experienced experts only.

#### WARNING

##### Approval of lifting devices for mass to be moved

Assure yourself that the lifting devices have the required load bearing capacity by means of the capacity specifications on the lifting devices and the weight specifications of the loads to be moved.

Transport the plant on site with the greatest possible care and observe the following instructions: If the plant was already operated before, then remove all connected supply lines from the machine prior to moving the machine.

	<b>⚠ WARNING</b>
	<p><b>Pay attention to always keeping the plant in an upright position!</b>          Hook the shackles, load hooks, etc. into the lifting eyes on the upper side of the plant. The attachment points are marked with the label in the margin. The lifting equipment cables must be freely suspended and must not be attached beyond 45° from the vertical line. The machine must be suspended horizontally during unloading.</p>

If you notice any damage which has occurred during transportation, note this on the consignment note and inform the carrier and the manufacturer immediately!

<b>NOTICE</b>
<p>Make sure the delivery is complete by carefully checking all received materials against the bill of delivery.</p>

### 4.3 Storage

The plant can be stored as supplied. The minimum ambient temperature should be + 8 C up to max. 45° C.

The place of installation must be vibration-free.

Never store organic solvents in the machine storage place.

Avoid UV radiation as well as ozone, hydrogen sulphide and chloride containing ambient air.

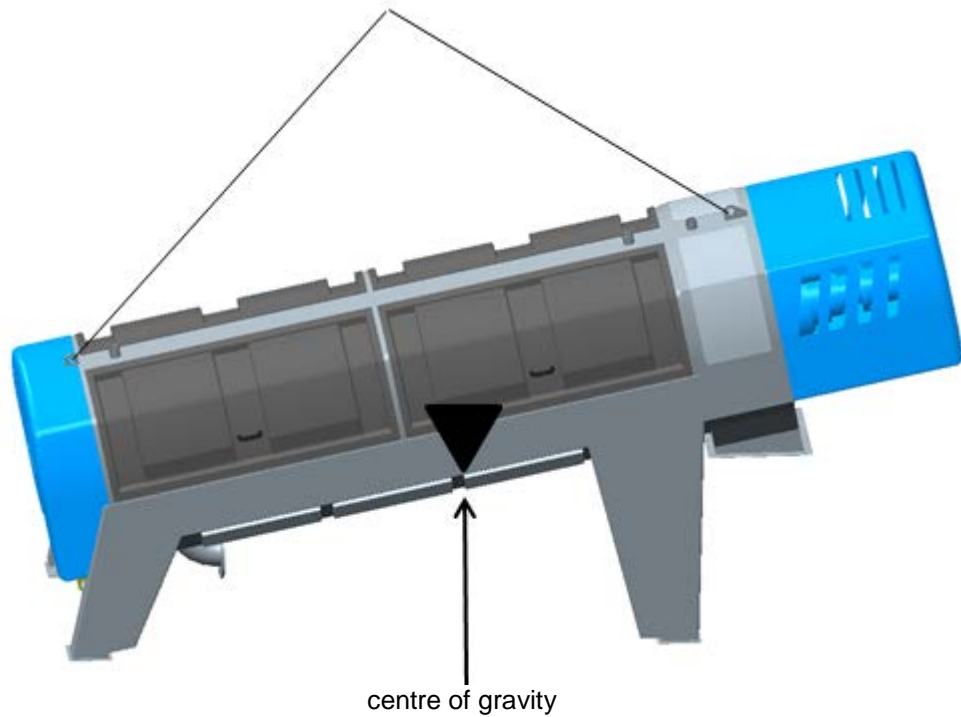
When selecting the storage place take care that the components cannot be damaged by vehicles or careless working. Make sure the components cannot get dirty due to splashes of concrete or mortar and protect the equipment against spark fountains from angle grinders etc.

#### 4.4 Lifting by crane

Size 620.2

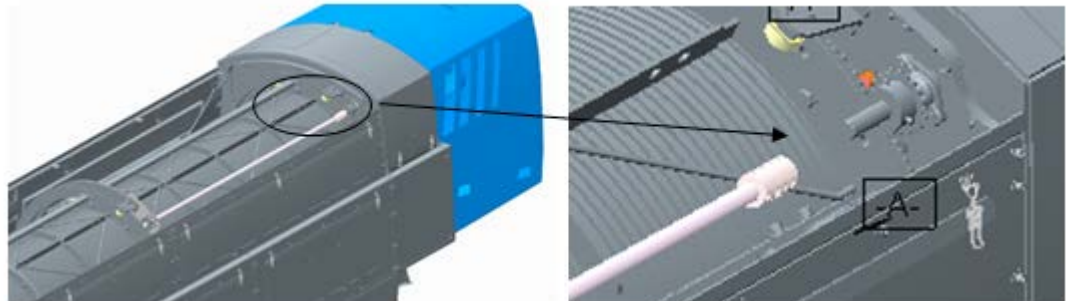
- Mount appropriate load-carrying equipment to the 2 outer lifting eyes at the top of the machine. (See below photo.)

Make sure the load-carrying equipment is suitable to bear the machine weight. The machine weight is specified in the dimension drawing. Please note that the tractive forces increase if the rope guide is not vertical.



Size 800.2

- Remove the upper covers from the machine.
- Loosen and displace the drive shaft of the spray nozzle basket.
  - Loosen the clamp on the drive shaft.
  - Fix the loose end of the drive shaft on the screen basket.

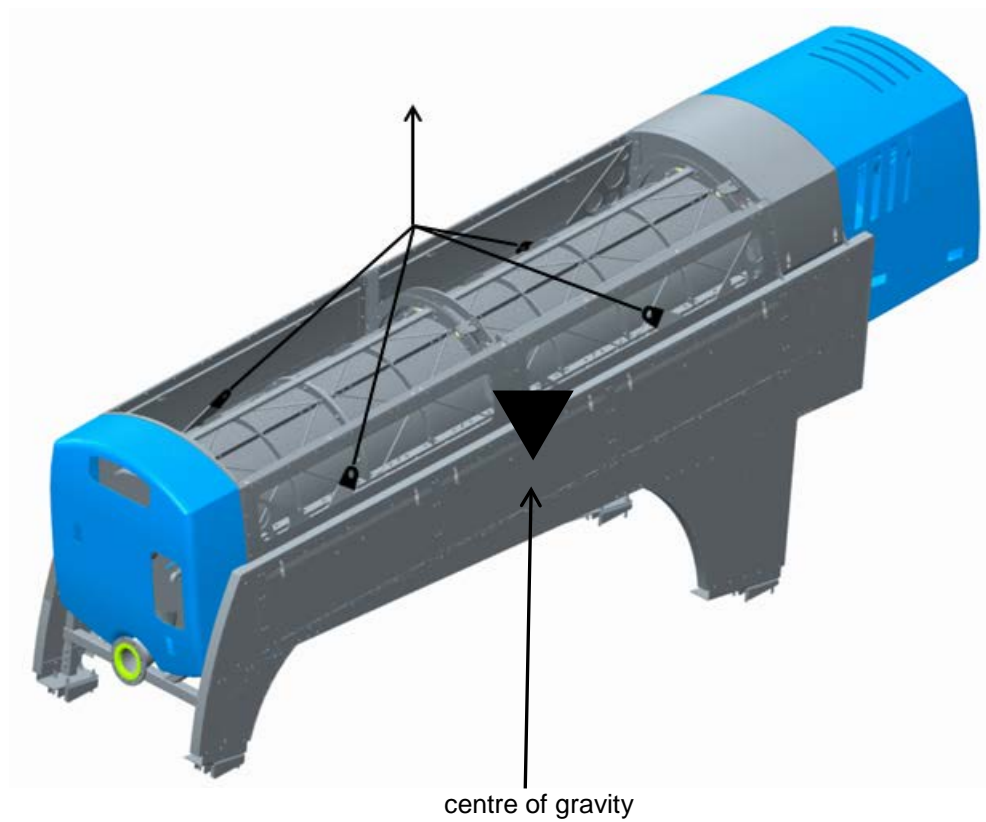


- Mount appropriate load-carrying equipment to the 4 lifting eyes on the base frame inside the machine (see below figure.)

Make sure the lifting devices do not exert any pressure load on the machine casing or internals.

Make sure the load-carrying equipment is suitable to bear the machine weight. The machine weight is specified in the dimension drawing.

Please note that the tractive forces increase if the rope guide is not vertical.



The machine feet on the discharge end may have been dismantled for transport.

Carefully lift the machine and balance it.



**⚠ WARNING**

The maximum working load of the lifting device must be above the weight of the single machine components.  
Observe the stability of the lifting device.

**⚠ CAUTION**

Wear safety shoes with steel caps to prevent injuries.



**⚠ WARNING**

Always stand clear off a suspended load!



## 5 Installation

Observe the following safety instructions when installing the machine to avoid critical injuries, damage to the machine and other damage.

- Only qualified persons are permitted to perform installation work, observing the safety instructions.
- Check the machine for transport damage prior to starting with any installation work.
- Make sure that only authorized persons have access to the working area and that installation work does not endanger any other persons.
- When laying machine connections, make sure that no one can trip over laid cables, hoses, pipelines, etc.
- Observe the prescribed bending radii when laying cables/hoses/pipelines.
- Observe the instructions for operating media, lubricants, auxiliary material used.
- Read also the chapter General Safety Instructions.

### 5.1 Acceptable environmental conditions for installation

#### NOTICE

Strictly observe the requirements specified below prior to installing and starting up the plant. The manufacturer does not assume any liability for damage caused by non-observance of these requirements.

The plant is designed for installation in a building. The manufacturer assumes no liability for any damage resulting from outdoor installation and inadequate protection against bad weather (storm, snow, ice, etc.).

The minimum protection grade of the electrical consuming devices of the Q-PRESS® is IP 55.

#### Foundation

The foundation must be designed to bear the machine weight and must allow for horizontal machine mounting and installation. This point must especially be observed when erecting bearing steel constructions. (See attached installation plan and dimension scheme.)

#### NOTICE

In the case of a concrete foundation the concrete should be at least class C20/25 to ensure safe anchorage of the machine.

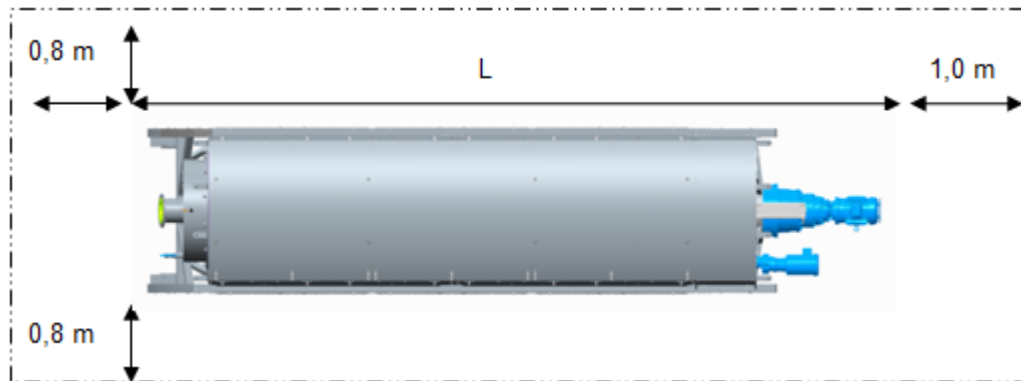
Clean the installation place prior to starting with any installation work. In addition, use a water level to check that the surface of the installation place is level.

#### Drainage of the operation room

Floor drainage is generally required to remove cleaning water.

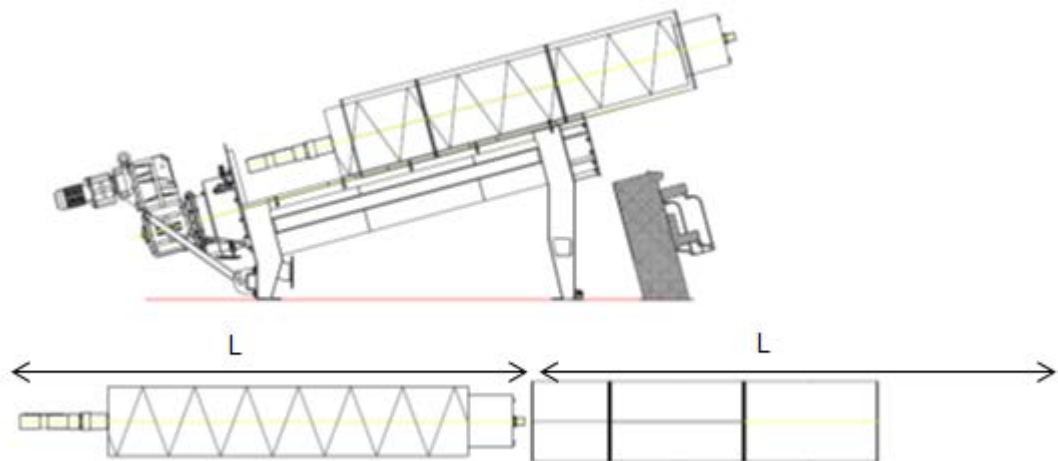
## Space requirements

Recommended minimum space for **operation/inspection/maintenance**:



Additional space for **maintenance** is required for machines with screen baskets that cannot be divided:

If the screen basket is not dividable, an additional space of approximately two times the machine length must be available outside the machine casing for separating the screw shaft from the screen basket.



If the scraper on the screw flights needs to be replaced, the screw shaft must be lifted out with the screen basket. Therefore, either sufficient free space must be available in longitudinal machine direction or a crane runway that provides the possibility to bring the machine into a position with sufficient space for scraper replacement.

## Lighting

The lighting system must be designed to ensure at any time riskless and safe working on any machine parts.

## NOTICE

### **Lighting**

The operator has to provide sufficient and equal lighting in all areas of the plant. The recommended illumination level is 300 lux (value for maintenance; in Germany acc. to ASR).

**Supply connections****Wash water:**

The wash water supply system must be designed to ensure that it supplies at any time the amount of wash water required by the spray nozzle bar for screen basket cleaning. (See Technical Data.) The required connections are specified in the Technical Data.

Minimum required wash water pressure: 5 bar  
Maximum permissible wash water pressure: 8 bar

**Water quality:**

Maximum permissible particle size: 0.3 mm  
Maximum permissible particle concentration: 200 ppm

To avoid sedimentation on the filter cloth, the wash water should have an as low as possible chloride and iron oxide content and a pH in excess of 6.5.

If fresh water is used, it is necessary to provide a return flow inhibitor complying with EN 1717 to prevent return flow of wastewater into the potable water network.

**NOTICE**

Depressurize the wash water supply line prior to executing any maintenance work.  
A shutoff valve must therefore be installed in the wash water line.

The connection of the wash water line to the screw press should consist of a flexible rubber fabric hose to facilitate the connection to the machine and reduce shock pressures when the valve closes.

**Compressed air:**

The compressed air supply system must be designed to ensure that it supplies the pneumatic pressure cone of the screw press at any time with the required amount of wash water. The required connections are specified in the Technical Data.

The working pressure of the pneumatic pressure cone is manually adjustable via an optional control unit.

Working pressure: 0.5 – 6 bar

The input pressure into the control unit must be 6 – 10 bar.

Minimum compressed air quality: according to DIN ISO 8573 class 4:

Maximum residual moisture: 37 g/m<sup>3</sup> (1 bar, 25°C)

Maximum residual dust: 8 mg/Nm<sup>3</sup>

Maximum residual oil content: 5 mg/Nm<sup>3</sup>

**NOTICE**

Depressurize the compressed air lines prior to executing any maintenance work.  
A suitable means to achieve this is a maintenance unit with arrestable pressure reducer.

**Technical ventilation:**

The optional ventilation connections of the screw press are provided to connect a customer supplied exhaust air plant.

Machine interior ventilation ...

- avoids an explosive atmosphere in the interior of the machine.
- reduces odour nuisance
- reduces corrosion in the machine interior.

Recommendation:

The air volume flow should permit at least 12 air changes of the machine volume.

Size	Machine volume
Q 620.2	3.5 m <sup>3</sup>
Q 800.2	8.0 m <sup>3</sup>

### **Protection against explosion (optional):**

The plant and its components are also available as ex-protected versions, if part of the scope of supply of HUBER SE.

- Gear motor
- Drives
- Proximity switch
- Solenoid valves
- Filling level probes
- Adjacent control box

### **Product connections**

Details on the machine connections are provided in the dimension sheet.

Product connections:

- Sludge inlet flange
- Filtrate outlet pipe connection
- Sludge discharge chamber
- Connection for wash water
- Connections for compressed air

### **Electrical connections**

The electrical power supply must comply with the circuit and wiring diagrams. (See appendix.)

Electrical consumers on the screw press:

- Screw shaft drive motor
- Drive motor of the spray basket
- Solenoid valves on wash water connection
- Pressure sensors of sludge inlet chamber
- Proximity switch
- Pressure switch of pressure supply unit (option)

### **Potential adjustment**

If mechanical and electrical plant installation is not executed by HUBER SE but by a third party, the operator shall be responsible to provide a connection for potential adjustment on the plant.

## 5.2 Installation

- Clean the installation place with a broom.
- Use a water level or levelling device to check the planeness of the machine foundations.

The height offset of the machine foundations must not exceed 2 mm.

- Mark the machine fixing points according to the axial dimensions specified in the installation drawing.
- Transport the plant to its intended installation place as described above under Handling and Transporting.
- Mount the machine feet to the machine casing.
- Check that the fixing points are in accordance with the machine feet.

Observe the installation instructions for the supplied fixing material.

- Drill the holes for the fixing material.

### NOTICE

Blow the holes for the stainless steel plugs under pressure after drilling (using bellows, air pump, etc.) to ensure a professional durable adhesive joint.

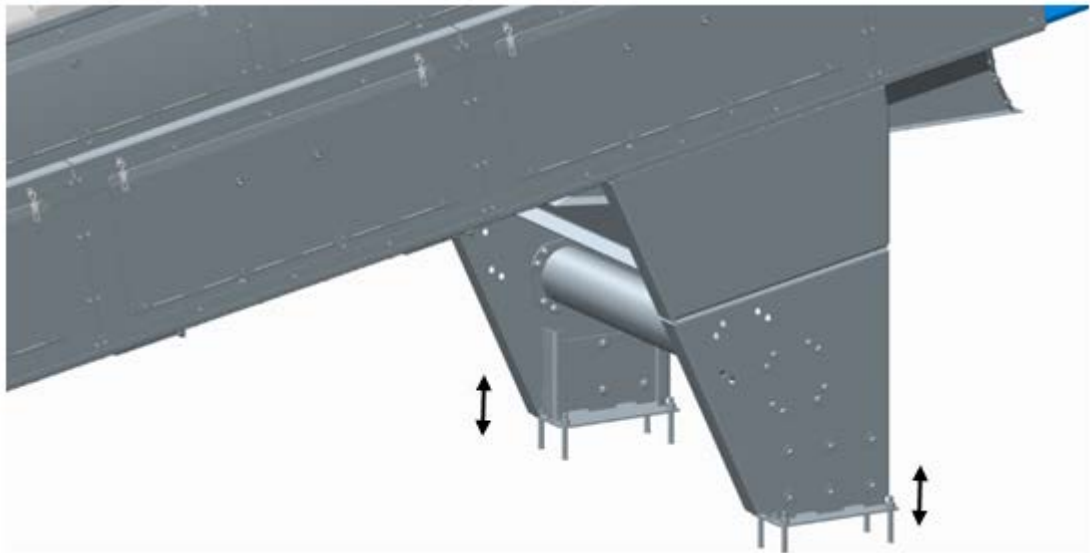
Use grease for all unlockable screws, thus providing a durable mobility of thread.

### NOTICE

Use only the supplied mounting material for installation of the machine!

## Alignment of screw press size 620.2 / 800.2 units

The screw press must be aligned to ensure that the height offset between the machine feet does not exceed  $\pm 2$  mm.  
The machines have 4 height-adjustable feet.



### NOTICE

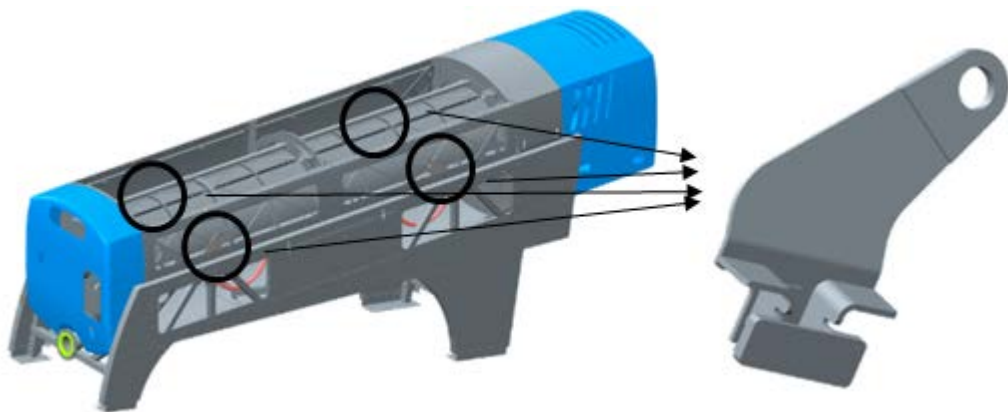
Do not remove the load-carrying equipment before all fixing screws of the four feet have been screwed tightly with the machine and the machine foundation.

### NOTICE

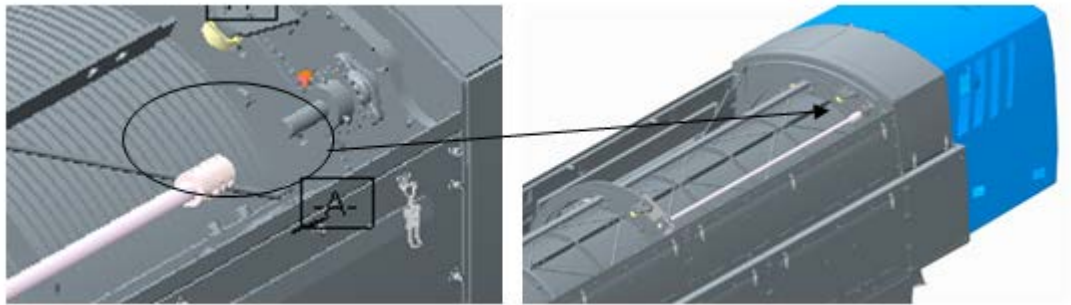
The machine must not be screwed in place and operated before it has been aligned on the machine foundations!

## Additional preparatory work on the size 800.2 screw press

Remove the four lifting eyes from the machine.



Mount the drive shaft of the spray nozzle basket with clamp to the drive journal. It is not necessary to loosen the bearing of the drive journal.



Mount the machine covers.

### 5.3 Customer-supplied connections

#### NOTICE

Ensure the tension-free installation of all connections.

Establish the following mechanical connections:

- Removal of dewatered sludge



Use a flexible transition piece between the sludge discharge of the screw press and the conveying unit.

#### WARNING

In case of open access to the discharge area, protect the machine against unintended start-up and secure the danger zone prior to starting the machine or executing maintenance on (or dismantling) a downstream machine. The requirements of DIN EN 13857 (“Safe distances to prevent danger zones being reached by the upper limbs”) must be observed.

- Sludge inlet



## NOTICE

The sludge line to the screw press should run horizontal or ascending.

Sloping lines bear the risk of gas accumulation or unfavourable pressure conditions.

- Polymer injection and mixing unit



Observe the operating instructions for the injection and mixing unit.



Provide for a sample taking pipe socket between the thin sludge pump and injection and mixing appliance to allow for sampling of unflocculated sludge.

- Filtrate outlet

The filtrate runs off without pressure through the filtrate outlet of the screw press.

The filtrate line must be laid with an inclination.

Provide for a sampling cock in the submerged area of the filtrate drain line to facilitate filtrate sampling.

- Wash water supply line



The wash water connection should be flexible.

- (Optional) exhaust air extraction, if required
- Air lines between pneumatic cylinders and pneumatic control unit

## NOTICE


Check that no tools or mounting materials has been left inside the pipelines. Otherwise, the plant may suffer damages.

### General information for electrical installation:

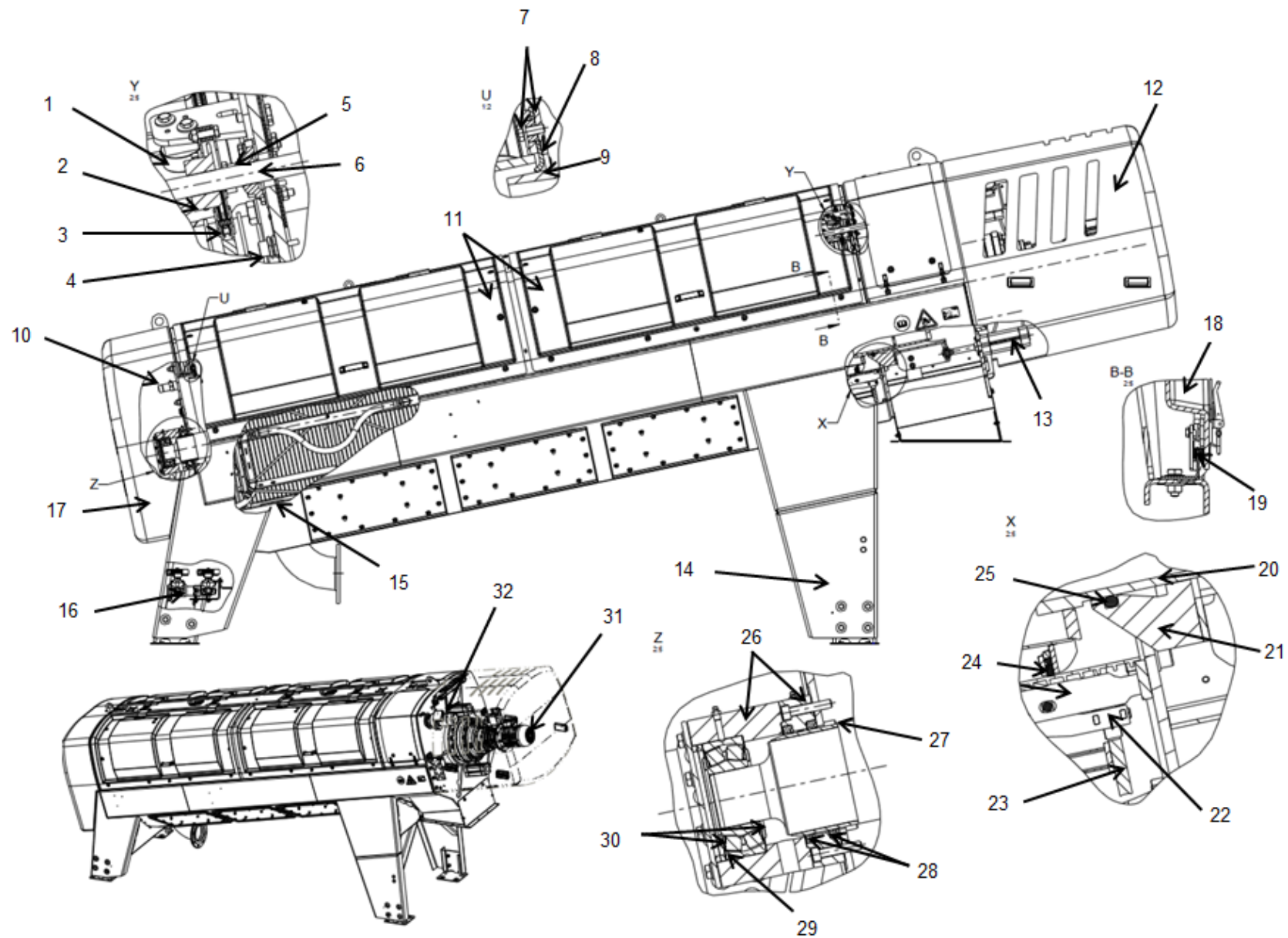
Installation must be carried out in accordance with these instructions if electrical installation is not part of the supply contract with HUBER SE.

If the customer assembles the machine, the manufacturer assumes no liability for damage which may occur as a result of improper assembly.

### Wiring:

	<p><b>⚠ WARNING</b></p>
	<p><b>Make sure that power supply is isolated!</b>  <b>Take appropriate measures to ensure that this is the case!</b>  <b>Have the electrical connection work executed only by an electric specialist only or by sufficiently instructed staff under the supervision of an electric specialist.</b></p>

- When laying all supply lines, make sure that they do not become a trip hazard for operating staff.
- Have laying of the electric connections executed by a specialist only. (See connecting/wiring diagram.)
- Prepare earth connection to the plant prior to beginning any other work, and earth the gear motor and solenoid valves (optional). The degree of protection of the terminal boxes and cable glands must match that of the safety area in which the machine is installed. Fix the control panel (option) with bolts in its intended position.
- Fix the adjacent control box (option) with dowels next to / onto the machine.
- Prepare all cables between the plant, control panel and adjacent control box and connect the plant to the power supply according to the specifications in the wiring diagram. The wiring diagram and cable list are attached in the appendix, if the electrical switchboard and control panel is part of the HUBER supply contract.



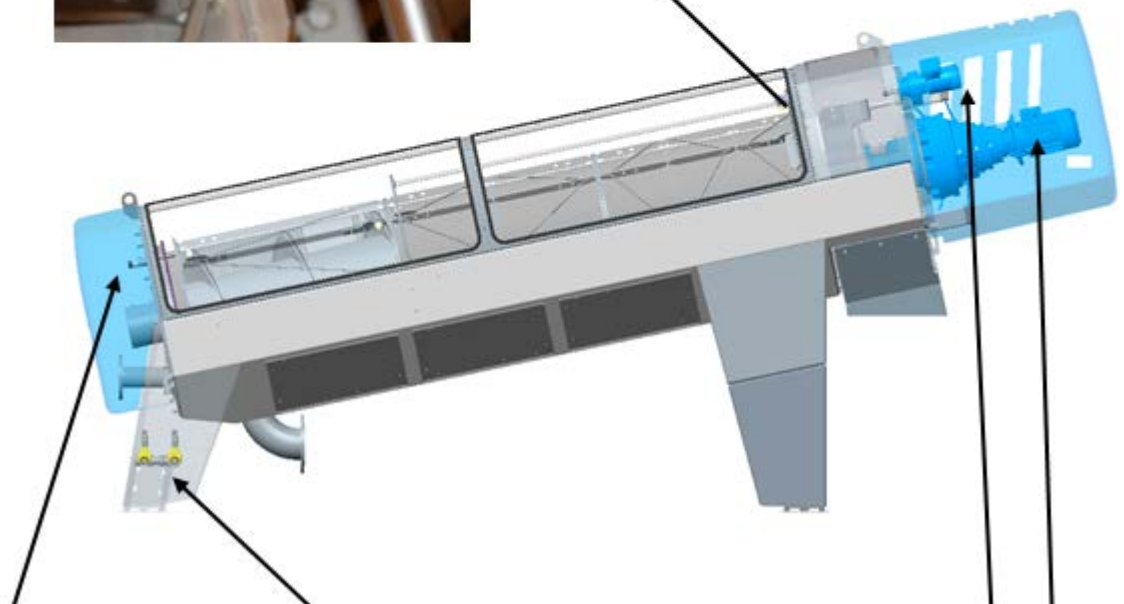
- |    |  |    |  |
|----|--|----|--|
| 1  | Roller with journal bearings, running axle | 17 | Inlet-end cover                                  |
| 2  | Chain wheel                                | 18 | Cover  |
| 3  | Roller chain                               | 19 | Sealing profile                                  |
| 4  | Proximity switch                           | 20 | Screw shaft                                      |
| 5  | Flange bearing                             | 21 | Pressure cone                                    |
| 6  | Drive shaft of the spray nozzle basket     | 22 | Roller with journal bearings, running axle       |
| 7  | Sealing fixation                           | 23 | Running surface of spray nozzle basket           |
| 8  | Sealing                                    | 24 | Screw flight with scraper lip, screening element |
| 9  | Clamping ring on screen basket             | 25 | Round cord                                       |
| 10 | Pressure probe                             | 26 | Retainer for the grooved ring and bearing        |
| 11 | Cover                                      | 27 | Bushing  |
| 12 | Discharge-end cover                        | 28 | Grooved ring                                     |
| 13 | Pneumatic cylinder                         | 29 | Self-aligning roller bearing                     |
| 14 | Protective conductor connection point      | 30 | Nilos rings                                      |
| 15 | Pressure hose                              | 31 | Planetary gear motor                             |
| 16 | Solenoid valve                             | 32 | Gear motor                                       |

The following items are to be earthed with a potential equalisation conductor 6 mm<sup>2</sup>: 16, 31, 32

Protective conductor connection point: (Line: minimum 10 mm<sup>2</sup> copper), connection point for connection to the main potential equalisation according to DIN EN 60204-1 (VDE 0113-1). Local protective measures must comply with applicable standards ((DIN, VDE, EN, EeEx-Atex 100a).

Electrical consumers on the screw press:

Proximity switch



Pressure switch

Solenoid valves

Drive motors

Check the running direction of the motors prior to initial start-up and prior to any re-start (e.g. after a change of voltage supply)!

## NOTICE

Running direction checks must be limited to only few seconds. The missing "lubricating" effect of sludge/water may lead to loud noise and/or wear of pumps or the screw press.

### Safety guideline for the use of frequency converters

## ⚠ CAUTION

This plant uses electrical equipment, e.g. frequency converters. Due to operating conditions and in the event of a fault direct currents and high-frequency alternating currents may occur which cannot be handled by customary residual current circuit breakers type A or AC so that no sufficient operator and plant protection can be guaranteed any more. We recommend the use of an AC/DC sensitive residual current circuit breaker type B.

**NOTICE**

The drive motor of the machine may be designed as a permanently-energised synchronous motor. Permanently-energised synchronous motors must only be operated on suitable frequency converters.

**5.4 Check-up of connections**

Check all electrical connections with a rotation direction test.

**NOTICE**

Check only for few seconds if the rotation direction is correct.  
Longer dry running may cause damage.

Check all safety devices by means of a functional test.

- Functional test

**⚠ CAUTION**

**Risk of injury! For functional checks with the control voltage switched on, the selector switch (mains isolator) must be switched on. Never put your hands into the machine interior, reactor or thick sludge trough!**

**NOTICE**

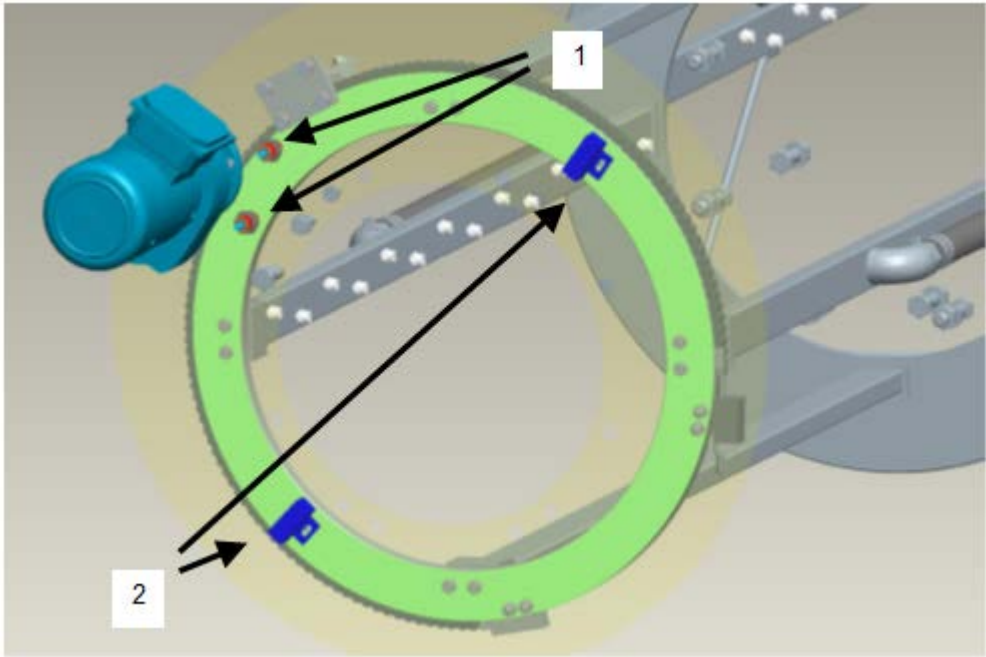
Wet the screen basket of the screw press with water before carrying out the functional test to prevent excessive noise or wear during dry running.

Check all mechanical connections for

- leakage when charged with water or compressed air.
- vibrations.

**NOTICE**

Check the spray nozzle basket position before starting with plant start-up.  
None of the two proximity switches below the spray nozzle basket drive must be positioned in end position (directly on the cam switch of the spray nozzle basket).



- 1: Proximity switch in the machine casing
- 2: Cam switches on the spray nozzle basket

## 6 Start-up

### Personnel

Have initial plant start-up executed by a start-up engineer of HUBER SE or specially trained external personnel. On that occasion your own operating staff must be instructed how to handle the equipment.

### Prerequisites

- The equipment must have been installed exactly as specified in the operating instructions.
- All mechanical and electrical installations must have been executed properly.
- The wash water supply to the machine must be sufficient.
- Peripheral plant equipment that is required for the function and operation of the dewatering process, such as coagulant agent conditioning unit, pumps, probes, measuring devices, indicators, platforms, etc., must be fully operable.
- It is recommended to commission test engineers of flocculant suppliers with the pre-selection of suitable coagulant agents.

## NOTICE

**Strictly observe the supplied operating instructions. The manufacturer does not assume any liability for consequential damage caused by non-observance of these operating instructions. The operator bears the full risk.**

Carefully fill in the start-up report and have it signed by the start-up engineer and responsible operator. Keep the report in safe custody together with the operating instructions and send one copy to HUBER SE.

### 6.1 Instructions for start-up

Suitable coagulant agents should be selected by means of flocculation tests prior to start-up of the screw press. The screw press normally requires flocks of a very high shearing stability.

Due to the long sludge residence time inside the press, modifications of the screw press settings, e.g. screw speed, cone pressure or flocculant dose, may become effective later than one to two hours.

The optimal screw press adjustment is always a compromise between throughput, dewatering results, filtrate quality, coagulant agent consumption and wear.

### 6.2 Screw press start-up

#### 6.2.1 Preparatory work

- Prepare a suitable polymer solution.
- Make sure sufficient mixing takes place in the intermediate sludge storage tank.
- Calculate the polymer dose required for the requested sludge throughput on the basis of the polymer tests.
- Wait until the ripening time stated by the flocculant supplier has expired.



## 6.2.2 Starting the screw press

- Drive the pressure cone completely back (open).
- Start the screw press with approx. 50 Hz.
- Start the polymer dosing pump.
- Start the sludge feed pump.
- Inspect the sludge structure at the discharge.

The discharged sludge should be thickened, i.e. not contain visible free water any more. The flock structure should be visible.

If free water can still be seen, the polymer dose may be too high, so that the screening surface becomes clogged with polymer. The free water may be milky turbid.

If no flocks can be seen, the flocculant is unsuitable, the dose too low or the polymer mix-in energy unfavourable.

## 6.2.3 Rough adjustment of the screw press

- Reduce the screw speed until clear water escapes on top of the first part of the sieve. In this way the inlet area is impounded and a small preliminary pressure built up.
- Drive the pressure cone with a low pressure against the escaping sludge.
- Make sure the power consumption of the motor remains within the permissible range.

Due to the counter pressure from the pressure cone the screw press becomes filled with sludge and the dewatering process starts. Along the second and third part of the screen some solids are pressed through the screen surface.

- Change the polymer settings if filtrate quality is insufficient.

## 6.2.4 Optimisation of settings

- Increase the cone pressure until the requested dewatering result is achieved, or filtrate quality becomes insufficient respectively.
- Too high a cone pressure may impair dewatering results and filtrate quality.



- Massive sludge deposition on the second and third screen sections, as shown in the photo above, are a sign for insufficient flocculation or a too high cone pressure.
- Deposition on the first part of the sieve (inlet area), as shown in the photo below, is a sign for insufficient screw speed or wrong polymer settings. As a result, the pressure in the inlet screen becomes too high which causes entrainment of solids into the filtrate. Read the pressure in the inlet from the pressure probe. Program the pressure at which too

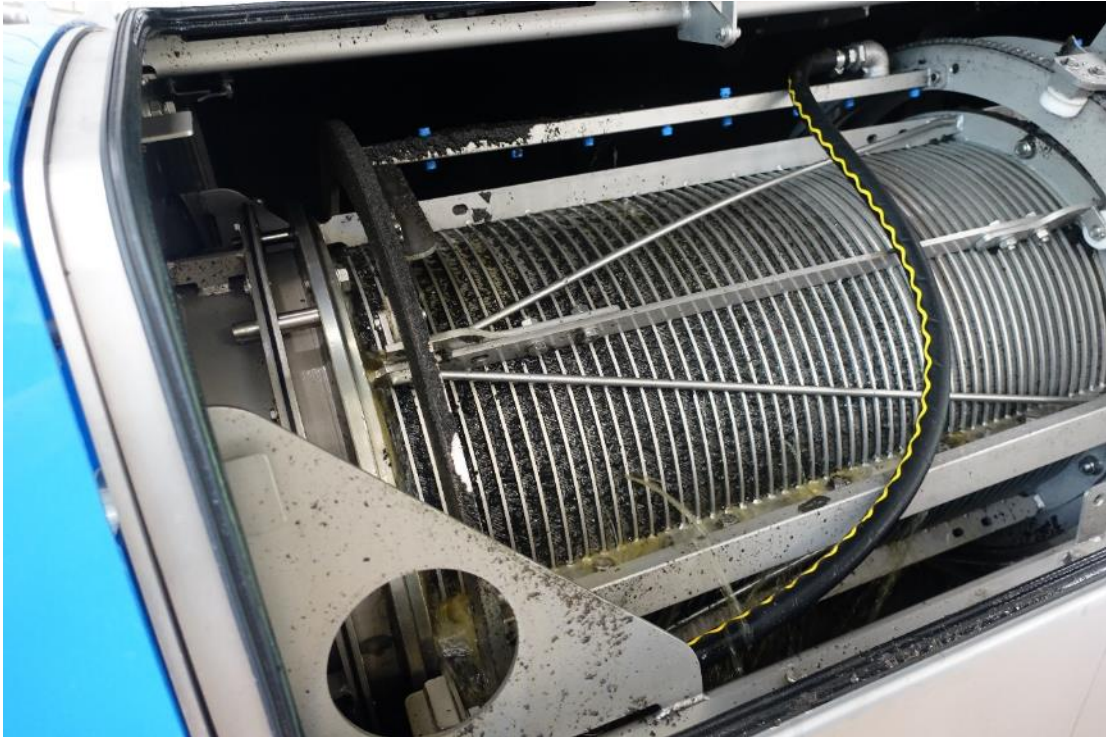
many solids are forced through the sieve as the limit pressure. As a safety function the plant will at this pressure switch off the feed pumps in automatic mode in the future.

- Observe the attached operating instructions for the pressure switch.
- Typical settings and limit values can be found in the separate electrical control description.



- Make sure the motor torque output lies below the nominal motor torque.
- The settings are optimal when clear water is pressed out of the screen basket in the inlet area, the middle and third part of the screen are completely filled with sludge with only

few solids escaping, and sludge is discharged evenly around the pressure cone. (See below.)



- Since every washing cycle means water entry into the sludge, screen washing should be activated as infrequently as possible. Screen washing must be activated if the screen has become clogged from the outside and no filtrate can escape any more.

### NOTICE

Check the motor torque of the screw drive motor whenever you have modified any settings. If the torque exceeds the nominal motor torque, this may lead to motor stoppage, screw blocking or even damage to the drive or screen.

## 7 Operation

### 7.1 Safety instructions

Operate the machine only when it is in a safe and functionable condition.

If any malfunction (incl. operating behaviour) occurs, report this immediately to the responsible authority. If required, the machine must immediately be shut down and locked! Have the causes of troubles eliminated immediately!

Prior to switching on the machine, always make sure no one can be endangered when the machine is operating.

### 7.2 Operation mode

The basic plant functions are automatic and do not require any manual operation.

The plant is controlled exclusively via the automatic system inside the central control panel. The complete plant is switched on and off there.

Manually adjust the plant settings (polymer settings, screw speed, inlet pressure, cone pressure, wash cycle settings, etc.) to the sludge quality.

#### CAUTION

In order to switch off the complete plant, it needs to be switched off at the control panel.

## 8 Trouble shooting and repair

### 8.1 Mechanical-technical and mechanical operational faults

Fault	Possible cause / Repair
<b>Fault indication on all drives of the sludge treatment unit</b>	
Motor fault Motor protection switch has tripped.	Remove any mechanical blockage. Check motor power consumption. Switch off mains isolator. Check the drive. Determine the cause and repair if required. Switch on motor protection switch and operate reset key. Check that there are no solid objects in the pump feed lines.
Phase breakdown	Check fuses in control panel. Check preceding fuses.
PLC (CPU) failure	Observe battery replacement intervals.
<b>Sludge treatment does not start although no fault is indicated.</b>	
External power supply is interrupted.	Make sure external power supply is OK.
Mains isolator is in OFF position.	Switch ON mains isolator.
Pre-selected operation: SEMI-AUTO mode	Set preselected operation mode to AUTO mode.
Emergency stop button activated	Release emergency stop button Operate reset button
Control fuse has melted.	Find the cause and replace the fuse.
<b>Sludge feed pump does not deliver although no fault is indicated.</b>	
Pre-selected operation: SEMI-AUTO mode	Set preselected operation mode to AUTO mode.
Air in pump housing	Shortly lift and then re-lower the switched-on feed pump on the lifting device.
Back valve is blocked.	Clean the back valve.
Intake pipe is blocked. A solid object blocks the inlet.	Clean the intake pipe. Remove the object.
Frequency converter overload	Check fault signal on frequency converter. Check the fuse. Check/change calibration
MAX pressure in the inlet	Wait for delay time.
<b>The delivery flow of the sludge feed pump is too small or there is no flow at all.</b>	
Check delivery flow control.	Frequency converter (see manufacturer's instructions) Check servo motor limit switch and adjust if required.
Check delivery flow indicator.	Re-calibrate flow indicator if required.
Worn rotor/stator assembly	Replace the rotor/stator.

Symptom	Possible cause / Repair
<b>Coagulant agent dosing pump does not start or stops.</b>	
Pre-selected operation: SEMI-AUTO mode	Set preselected operation mode to AUTO mode.
MIN or dry run probe in coagulant agent conditioning plant responds.	Check that coagulant agent conditioning plant is filled with sufficient medium.
Dry run protection has tripped.	Check if there is medium on the pump's suction side. Activate reset button and evaluation device.
Overpressure protection has tripped.	Find the cause. Clean the valve and back valve if required and wash the pipeline. Clean the coagulant agent dilution unit and pipeline. Activate the reset button and evaluation device.
Coagulant agent deposits in the casing or dosing line or a solid object block the inlet.	Clean and/or remove the object.
Frequency converter overload	Check fault signal on frequency converter. Check the fuse. Check/change calibration
<b>The delivery flow of the coagulant agent dosing pump is too small or there is no flow at all.</b>	
Check delivery flow control.	Frequency converter (see manufacturer's instructions) Adjust servo motor limit switch.
Check delivery flow indicator.	Re-calibrate flow indicator if required.
Worn rotor/stator system	Replace system according to manufacturer's instructions.
Coagulant agent deposits in the casing or dosing line or a solid object block the inlet.	Clean and/or remove the object.
Coagulant agent deposits in the coagulant agent dilution unit or dosing line or a solid object block the inlet.	Clean coagulant agent dilution unit, in particular the mixing unit and dosing line, and/or remove the object.
Shaft packing of coagulant agent dosing pump is untight.	
Shaft packing drips.	Check its seat. Re-adjust, if required. See manufacturer's instructions.
Slide ring sealing drips.	Replace slide ring sealing. (See manufacturer's instructions.)
<b>Sludge dewatering machine does not start although no fault is indicated.</b>	
Pre-selected operation: SEMI-AUTO mode	Set preselected operation mode to AUTO mode.
Frequency converter overload	Check fault signal on frequency converter. Check the fuse. Check/change calibration

## 8.2 Process-technical operational faults

Symptom	Possible cause / Repair
<b>Flock production is disturbed (instable) – Coagulant agent overdosing and/or underdosing</b>	
Only water is “conditioned”.	Check that coagulant agent concentrate tank is filled with sufficient medium. Dosing point / 3-way valve on coagulant agent conditioning plant is blocked. Clean it.
The dose delivered by the coagulant agent dosing pump is too high/small.	Check magnetic inductive flow meter. Check dose and flow rate and correct it. Clean coagulant agent injection nozzles of injection and mixing unit. Check adjustment of the back valve of the injection and mixing unit and correct it.
Incorrect secondary dilution of coagulant agent.	Check secondary dilution and correct flow rate.
Thin sludge concentration changed	Check concentration and correct flow rate.
Thin sludge amount is too high/small.	Check magnetic inductive flow meter. Check dose and flow rate and correct it.
Incorrect coagulant agent concentration in the conditioning plant	Water and/or coagulant agent concentrate inlet is disturbed. Re-adjust. Clean coagulant agent disperser. Check and clean filling level probes. Check if stirrers of coagulant agent conditioning plant work properly. Clean them if required. Check if coagulant agent concentrate line is clogged and clean it. Measure content of coagulant agent concentrate pump in litres. Check impulse/pause dosing times. Clean coagulant agent concentrate dosing screw and measure content in litres again. Remove deposits in the intermediate storage tank for powdery coagulant agent concentrate. Check heating. Check durability and effective substance of coagulant agent.
Coagulant agent not suitable for the sludge (summer-winter operation)	Test coagulant agents and select a suitable product.
<b>Coagulant agent conditioning plant does not start, or stops, although no fault is indicated.</b>	
Dry run of coagulant agent conditioning plant	Fill the plant with water and coagulant agent.
Pre-selected operation: SEMI-AUTO mode	Set preselected operation mode to AUTO mode.
Chemicals tank is empty (dry run protection).	Fill the intermediate chemicals storage tank.
Water supply is disturbed.  Reduced flow. The float element falls below the magnetic contact.	Ensure supply of process water; or water pressure is too low. Clean the sieve. Install a pressure reducer.



Symptom	Possible cause / Repair
The coagulant agent concentrate dosing process stops.	Process water supply is disturbed or water pressure too low.
MIN or dry run probe in preparation tank responds.	No conditioning of coagulant agent has taken place – plant EMPTY Reduce extraction rate and/or prepare new coagulant agent. Plant is set to AUTO operation while in SEMI-AUTO mode. (Change operation mode.)
<b>Inlet pressure in screw press too high</b>	
Sieve clogging	Check polymer settings.
Screw speed too low	Adjust screw speed.
Sieve apertures are blocked.	Clean the sieve.
Brush wear	Replace the brush.
Varying solids load	Adjust solids-specific polymer doses.
<b>Filtrate load too high</b>	
Screw speed too low	Adjust screw speed.
Varying solids load	Adjust solids-specific polymer doses.
Cone pressure too high	Adjust cone pressure.
Unfavourable polymer dose	Check polymer settings.
<b>Insufficient dewatering results</b>	
Unfavourable polymer dose	Check polymer settings.
Unfavourable cone pressure.	Check cone pressure.
Screw speed too high.	Adjust screw speed.
Sieve clogging/blocking	Adjust washing cycles. / Clean the sieve.
<b>Insufficient sieve washing</b>	
No wash water pressure.	Check/clean the wash water pump. Clean the pump suction side. Clean the wash water intermediate storage tank.
No water jet.	Clean/replace the nozzles. Clean the wash water intermediate storage tank.
Solenoid valve does not switch.	Clean solenoid valve / servo boring.
Spray nozzle basket does not rotate any more.	Proximity switch / overtravel of end positions Manually turn back the spray nozzle basket and adjust the proximity switch
Screw shaft overload (material jamming)	Reverse the screw shaft briefly, activate washing and discharge the soggy press cake with a high screw speed and with the pressure cone open.

9 Maintenance, repairs and cleaning

**⚠ CAUTION**

Enclosed rooms of wastewater treatment plants that must be entered for service and maintenance have to be aerated in a way that prevents a dangerous explosive atmosphere, lack of oxygen and presence of harmful concentrations of gas or vapour.



**⚠ CAUTION**

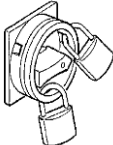
The chapter maintenance and repair is intended for skilled staff only. Any maintenance or repair work must be performed by skilled staff only. Skilled staff has to be equipped with personal protective gear (such as gloves, etc.).

**Qualified technician**

A person that is able to evaluate assigned jobs and recognize possible risks, due to his/her professional skills, expertise and experience and knowledge of corresponding standards. **(Definition adapted from EN 60204-1.)**

In order to prevent faults during operation, the machine must be cleaned and maintained at regular intervals.

 	<p><b>⚠ CAUTION</b></p>
<p>When cleaning the machine always protect yourself with waterproof protective clothing, boots, gloves, and also with a face mask (if available and especially when using a high-pressure cleaner, in order to avoid coming into contact with wastewater, faeces, etc.)</p>	

	<p><b>⚠ WARNING</b></p>
<p><b>Shutdown procedure:</b> Switch off the mains isolator and lock it. All persons responsible for carrying out maintenance work on the machine must have their own padlock. The machine can only be restarted when all padlocks have been removed from the mains isolator. Interrupt the water and compressed air supply. Secure the shut-off devices against re-opening. Depressurize the plant.</p>	

In order to prevent injuries and damage to the machine, it is important to observe the following points when carrying out maintenance on the machine:

- First cordon off a large space around the area in which maintenance work is to be carried out.
- Switch off all voltage sources and ensure that they cannot unintentionally be switched back on.
- Depressurize the pneumatic and water lines.
- Secure the shut-off devices against re-opening.
- Never use any other than the specified operating media.
- Only use spare parts which are listed in our spare parts lists.
- Also refer to the chapter *General Safety Instructions*.

The above maintenance measures add to the prolongation of the machine life. Furthermore, they improve machine availability and performance.

## 9.1 Inspection intervals

### NOTICE

Check the potential equalisation regularly, as described in chapter 3.3, Incorporated safety systems!

Prior to starting with any inspection work, clean the respective equipment parts.

### CAUTION

**Never use a high pressure unit to clean electrical plant equipment!**

**Risk of injury! Always wear protective goggles when cleaning the machine with a water jet. Never direct the jet towards a person standing nearby!**

### WARNING



**Risk of injury! For visual inspections with the control voltage switched on, the maintenance switch (main switch) must be switched on.**

**Never put your hands into the machine interior, reactor or thick sludge trough!  
Risk of injury! If you want to carry out function tests that require access to the machine interior, you must shut down the plant before.**

### 9.1.1 Weekly visual inspection

Visual inspection of the complete machine is required once a week. Visual inspection is also required whenever process settings have been changed or processes been adapted.

Check in particular the following:

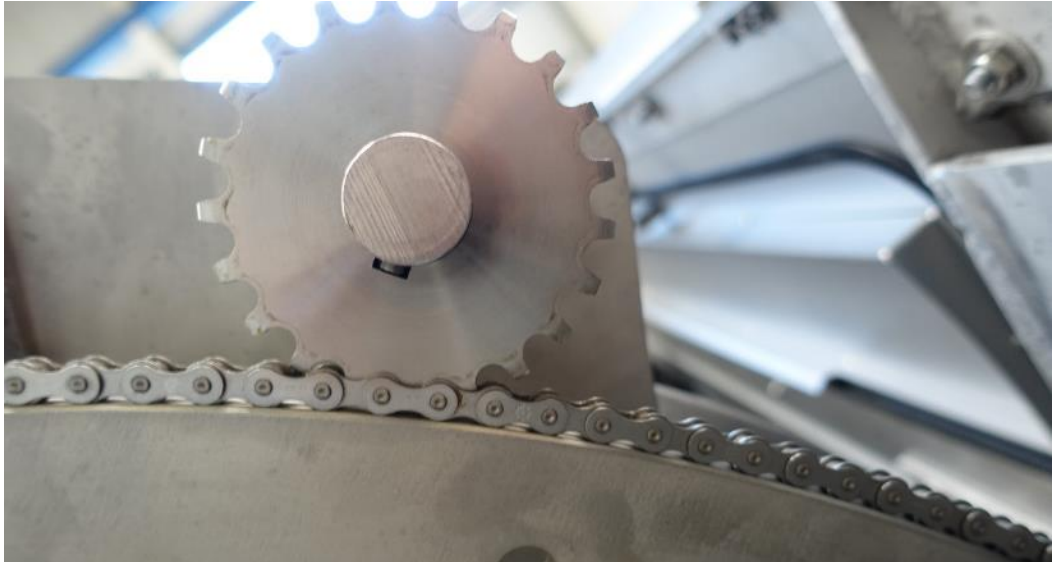
- Screen basket cleanness
- Function of the spray nozzle basket
- Filtrate chamber cleanness
- Functional test of cleaning nozzles
- Inspection of electric cables
- Inspection of connections

#### 9.1.1.1 Screen basket

Check the screen basket once a week for cleanness (visual inspection).

## 9.1.1.2 Function of the spray nozzle basket

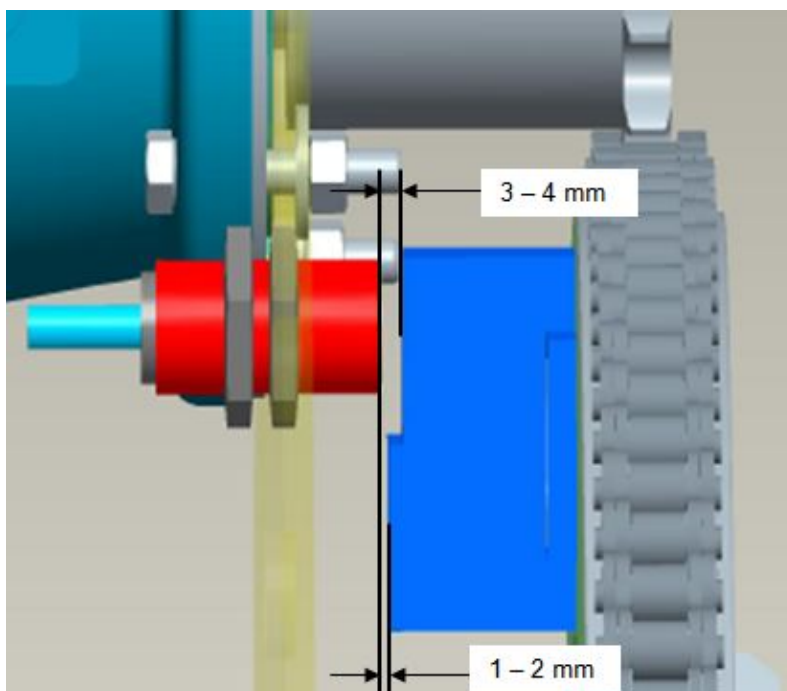
The screen basket must run without play. Worn rollers must be replaced.  
The drive pinion must engage into the drive chain deeply in the middle.



The spray nozzle basket must change its rotary direction when reaching the respective end positions.

### NOTICE

To ensure that the spray nozzle basket performs perfectly, the distance between the cam switches and the according proximity switch must be 2 mm (minimum) to 6 mm (maximum).



The distance between the proximity switch and the cam switch can be adjusted on the thread on the proximity switch.

### 9.1.1.3 Filtrate chamber

Check once a week that the filtrate chamber is clean (visual inspection).

### 9.1.1.4 Spray nozzles

- Check the nozzles by examining the jet pattern. Screw out and clean the nozzles that are clogged.

### 9.1.1.5 Electric cables

- Check all cables for damage.
- Have all damaged cables replaced by a specialist.

### 9.1.1.6 Connections

- Check that all connections of the machine are tight (leak-proof) and undamaged (pneumatic hoses, etc.).

### 9.1.2 Monthly functional test

Monthly execute the following maintenance work:

- Check the sieve apertures.
- Check the feed end oil seal.
- Check the pressure cone system.

#### 9.1.2.1 Inspection of sieve apertures

- After the washing mode, check the sieve apertures for organic or mineral sediments.

Mineral deposits caused by wash water with a high lime or iron content or organic deposits caused by sludges that contain grease for example may blind the screen apertures and reduce filtration efficiency. (See below.)





Useful is regular washing with warm water, using additives or screen basket cleaning with acid-containing agents.

### **⚠ CAUTION**

**Wear lye-resistant clothes and gloves, sealed goggles and respiratory protection to protect yourself while carrying out chemical purification! Pay attention that the working area is sufficiently ventilated. If you get in contact with hazardous substances, immediately take off your clothes and wash the affected skin with water.**

**Observe also separate safety instructions (safety data sheets) of the chemicals suppliers.**

### **NOTICE**

**In order not to impair the durability of the construction materials of the machine, observe the instructions for use provided by the suppliers of the chemicals.**

**The following recommendations for the use of cleaners apply additionally:**

- **Empty contaminated machine parts before chemical cleaning, clean them with clear water and let them dry.**
- **Use only chemical cleansers with a corrosion inhibitor.**
- **Dilute high-concentration acids or lyes to a concentration of 12% maximum.**
- **Let the cleaner react for 20 minutes maximum.**
- **Wash the cleaner off thoroughly after expiry of the reaction time.**

### 9.1.2.2 Feed-end oil seal

The oil seal can be inspected through a leakage opening below the grease nipples at the feed end. If sludge escapes at the point marked below, either the grease filling of the seal chamber is insufficient or the seal is defective.



### 9.1.2.3 Checking the pressure cone system

- Remove deposits from the shaft surface in the cone area.
- Remove deposits from the pushing rods of the pneumatic cylinder.
- Check the pneumatic cylinders at the pushing rods and exterior air connections.
- Drain the water collected in the pneumatic lines.

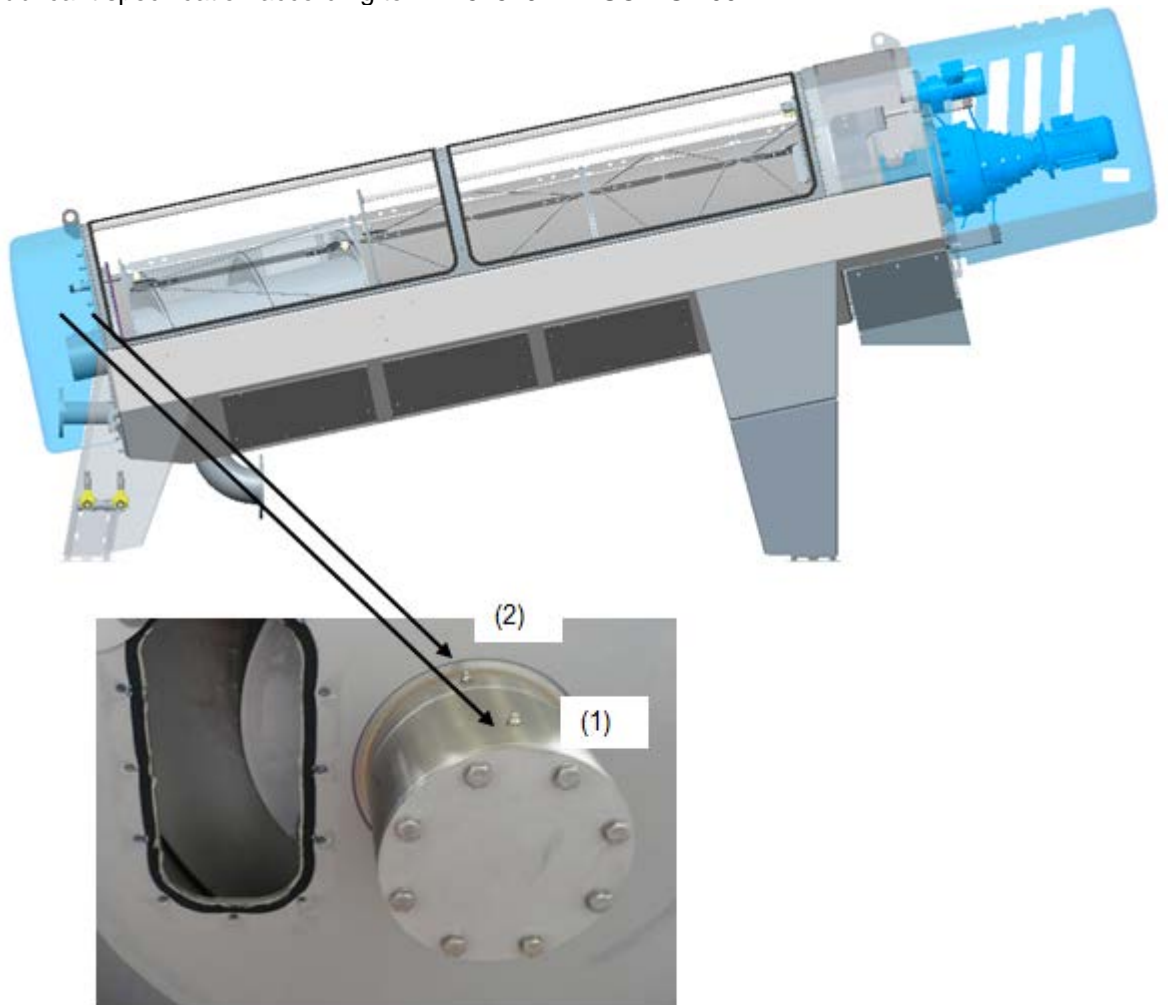


## 9.2 Maintenance

### 9.2.1 Lubrication

Lubrication point	Interval	(Proposed) lubricant
Feed-end screw shaft bearing (1)	monthly or every 500 operating hours 5 g lubricant	Plantogel 2 S
Feed-end oil seal (2)	monthly or every 500 operating hours 1 g lubricant (620) 2 g lubricant (800)	Plantogel 2 S

Lubricant specification according to DIN 51502: KPE 2 K-30  
 Lubricant specification according to DIN 51519: ISO-VG 100



If the bearing or oil seal is to be replaced, the new bearing or new sealing must be filled 100% with lubricant.



**NOTICE**

Grease the bearing points while the screw shaft is rotating to ensure the complete lubrication of the bearings.

**9.2.2 Oil change**

Observe the attached operating instructions for the gear motor.  
Observe the attached operating instructions for the pneumatic equipment components.

**9.3 Repair**

It may be necessary to dismount the machine or parts of the machine to do maintenance and repair work.

**⚠ WARNING**

Consider that some machine components may swing back and forth when they are lifted.  
Use separate lifting devices to secure machine components which are installed inclined (e.g. the screw drive) against pendular movement.

These auxiliary means and special tools facilitate maintenance work:

- Mounting rail above the machine's longitudinal axis
- Moveable portal crane or fork lift

The heaviest individual machine parts and their weight:

Size	Screw shaft	Screen baskets	Screw drive
Q 620.2	400 kg	420 kg 210 kg half-shell	280 kg
Q 800.2	650 kg	720 kg 360 kg half-shell	400 kg

Size 620.2 machines **without** dividable screen basket

- Pull-in device for screw shaft
- Chain hoists, lifting power  $\geq 1.5$  t
- Bearing blocks, load-bearing capacity  $\geq 1.5$  t

Weight of the heaviest assembly group to be handled: 1.8 t

This assembly group consists of the screen basket, screw shaft, discharge chamber with motors and pressure cone, and the spray nozzle basket.

**⚠ CAUTION**

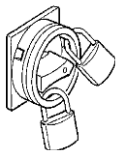
Observe the safety instructions under chapter Handling and transporting.  
Risk of injury! Always wear protective goggles when cleaning the machine with a water jet.  
Never direct the jet towards a person standing nearby!

For durable and reproducible positioning of plant components some connections are secured with at least 2 adjust pins (connections of the screen baskets, inlet/outlet chambers, screw shaft bearing).

## NOTICE

Pay attention to the drill holes for the adjust pins when you adjust and align the components during assembly.  
Use new adjust pins to secure the connections.

## ⚠ WARNING

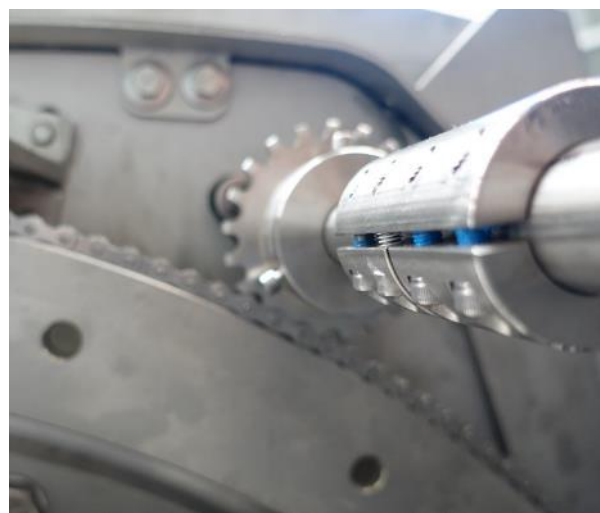


**Shutdown procedure:** Switch off the mains isolator and lock it.  
All persons responsible for carrying out maintenance work on the machine must have their own padlock. The machine can only be restarted when all padlocks have been removed from the mains isolator.  
Check if hazards arise from upstream or downstream equipment. Switch off the power supply of upstream and downstream machines before carrying out maintenance or repair work.  
If, for operational reasons, it is not possible to disconnect the entire plant the responsible electrician, who must be qualified according to DIN VDE 1000-10, has to disconnect the individual machines and make sure according to DIN EN 50110-1 VDE 0105-1 they cannot be restarted unintentionally.  
As an option, all drives and machines can be equipped with a repair switch which allows to switch off the respective machines/areas prior to carrying out repair work, according to DIN VDE 0100-200. The repair switches must be switched off and locked as described above.

### 9.3.1 Replacing the rollers of the spray nozzle basket

If the spray nozzle basket shows a radial play on the screen basket or the drive pinion does not perfectly engage into the drive chain any more, the rollers of the spray nozzle basket must be replaced.

- Completely deplete the machine.
- Shut down the machine.
- Remove the machine covers.
- Clean the machine interior and the drive elements of the spray nozzle basket using a high-pressure unit.
- Temporarily close the filtrate outlet with paper to avoid that screws or tools get lost.
- Remove the driving axle of the spray nozzle basket from the machine along with the drive pinions.



- Remove the hose lines from the spray nozzle basket.
- Turn the spray nozzle basket in the machine into a position where the flange plates of the spray nozzle basket can be accessed.
- Secure the upper and bottom half shells of the spray nozzle basket on the screen basket or on the machine frame so it cannot move.
- Loosen the flange plates of the spray nozzle basket paying attention to the markings on the elements for later reassembly.



- Lower the bottom half of the spray nozzle basket into the filtrate chamber of the machine.
- Lift the upper half of the spray nozzle basket out of the machine.
- Replace the axial and radial rollers including the axle bolts and pins.



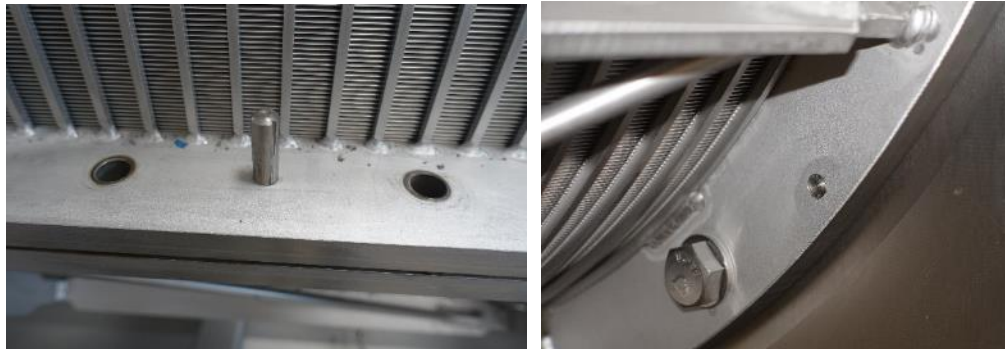
- When reassembling the equipment, pay attention to the markings on the individual elements.
- After completed reassembly, check the concentric alignment towards the screen basket. Check also that the drive pinions engage perfectly and that the cam switches have the correct distance to the proximity switches.

## 9.3.2 Replacing the scraper on the screw shaft

Replace the scraper if the dewatering efficiency decreases significantly, or if the feeding pressure or the rotary speed of the screw increases despite otherwise unchanged sludge properties and settings for the flocculant.

How to proceed with machines with a splittable screen basket:

- Divide the spray nozzle basket as described above.
- Loosen the radial grooved pins on the half shells of the screen basket.
- Loosen the axial grooved pins on both ends of the upper half shell of the screen basket.



- Loosen the through-bolts on the holder of the screen basket support at the inlet end of the machine. The clamping ring at the inlet side can now be pushed some centimetres into the inlet chamber. The upper half of the screen basket now has axial play inside the machine casing.



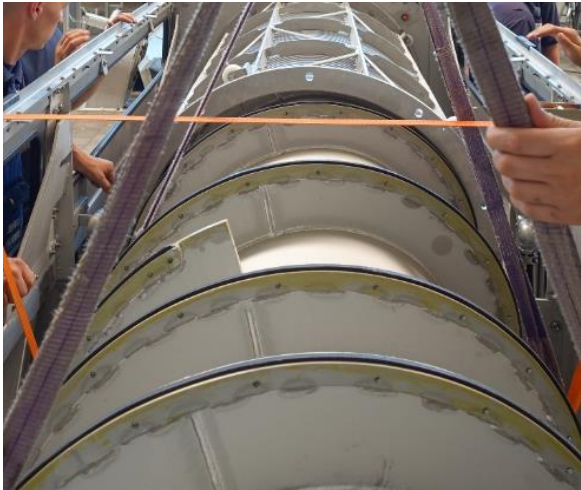
- Temporarily fix the pushed back clamping ring in the inlet chamber.



- Lift the upper half of the spray nozzle basket out of the machine casing.



- Loosen now the exposed headless screws that fix the scraper.



- Give the screw shaft a half turn.

## WARNING

The machine must be in maintenance mode when turning the screw shaft (see Electrical Control Description).

- only tip operation (no intervention into the machine possible at the same time)
- significantly reduced rotary speed
- only forward moving
- time-limited

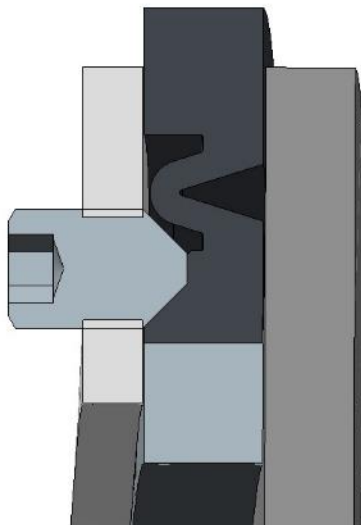
## WARNING



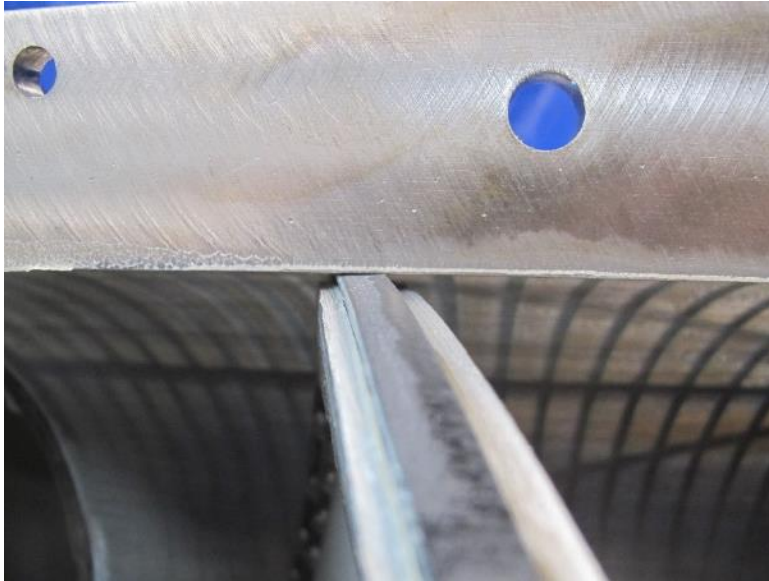
**Risk of injury! For visual inspections with the control voltage switched on, the maintenance switch (main switch) must be switched on.**

**Never put your hands into the machine interior, reactor or thick sludge trough! Risk of injury! If you want to carry out function tests that require access to the machine interior, you must shut down the plant before.**

- Loosen the other headless screws that fix the scraper.
- Pull the worn scraper out of its frame.
- Thoroughly clean the frame.
- Insert a new scraper lip into the frame beginning on the discharge end.



- Fix the scraper with threaded pins on the first half, exposed turn. The screwed-in threaded pins should be flush with the metal frame.
- Bevel the scraper with a knife on the first 3 cm to make it flush with the upper edge of the screw flight and thus allow the scraper to easily slide into the bottom half of the screen basket when the screw shaft is turned.
- Lubricate the scraper with flocculant or soft soap.



- Give the screw shaft a half turn and fix the scraper with screws.
- Continue this way to replace the scraper over the whole screw shaft.
- Cut off the projecting length. Bevel the last 3 cam with a knife to make it flush with the upper edge of the shaft.
- Reassemble the machine proceeding in reverse order.
- Use new grooved pins when pinning the individual components.
- Prior to restarting the machine, check that the drive pinions of the spray nozzle basket engage correctly and that the distance between the cam switches and the proximity switches is correct.

How to proceed with machines with a non-dividable screen basket:

- Completely deplete the machine.
- Shut down the machine.
- Remove the machine covers.
- Clean the machine interior and the drive elements of the spray nozzle basket using a high-pressure unit.
- Temporarily close the filtrate outlet with paper to avoid that screws or tools get lost.
- Remove the electrical connections of the motors and the pneumatic hoses from the pressure cone.
- If any, loosen the connections to the press sludge conveying unit.
- Remove the wash water hoses from the spray nozzle basket.
- Remove the discharge casing from the machine frame.
- Remove the radial screen basket holders from the machine frame.

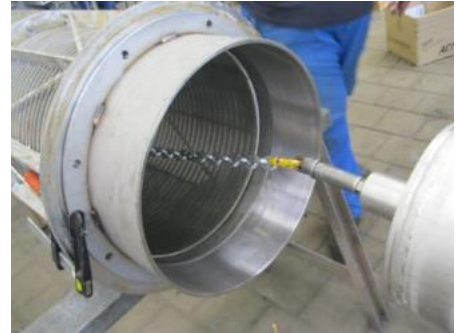
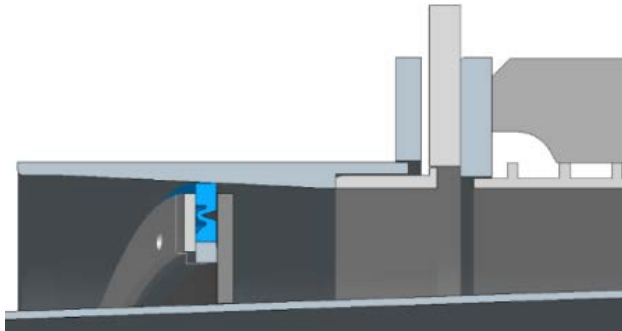


- Attach the end of the screen basket on the inlet side and the discharge casing to the lifting device.
- Slowly pull out of the machine the screen basket along with the washing system and the discharge casing with the motors and the pressure cone. Pull in axial direction until the shaft journal can be seen.
- Lift the complete assembly group upwards out of the machine casing.
- Place the assembly group onto bearing blocks beside the machine.



- Loosen the screws that connect the gearing and screw shaft.
- Pull the screw shaft out of the screen basket at the inlet end.
- Replace the scraper on the screw shaft as described above.
- Separate the drive shaft of the spray nozzle basket from the drive journal.
- Separate the discharge chamber from the screen basket.
- Lubricate the scraper and screen basket.
- Attach the screw shaft at the inlet end to the conical clamping ring on the screen basket.
- Pull the screw shaft out of the screen basket at the inlet end.





- Pay attention that the scraper does not get jammed but slides easily into the screen basket.



- Replace the sealing ring in the pressure cone.
- Replace the rollers of the spray nozzle basket, if necessary.
- Reassemble the machine proceeding in reverse order.
- Use new grooved pins when pinning the individual components.
- Pay attention that the tightening torques are correct when fixing the screw shaft to the gearing (see operating instructions of the gearing supplier).
- Prior to restarting the machine, check that the drive pinions of the spray nozzle basket engage correctly and that the distance between the cam switches and the proximity switches is correct.

### 9.3.3. Replacing the feed end shaft sealing/bearing

Replace the shaft sealing if sludge exits from the leakage borehole under the grease nipple. The bearing holder and the sealing support are screwed together. The sealing support is screwed and pinned to the inlet chamber.



- Loosen the bearing cover, bearing bush and sealing support, one after the other.
- Replace the shaft sleeve.
- Replace the shaft sealing rings and, if necessary, the shaft bearing.
- Before reassembly, completely fill the shaft bearing and the sealing gap with grease.
- Re-mount the components proceeding in reverse order.
- Lubricate the bearing and the shaft sealing only while the screw shaft is rotating. Pay attention to apply the correct amount of lubricant and lubricate in the required intervals.

## 9.4 Spares, wear parts

### a) Wear parts

Our guarantee does not include wearing parts that are subject to natural wear during operation. Wearing parts are defined as parts that show increased wear due to their function – such as the rotating plant parts, shaft seal and gearbox seals, scrapers, packing strips, etc. – the degree of wear depending on operational conditions, running hours and plant maintenance.

These are the main wear parts of the plant:

1. Scraper brushes on the screw flights
2. Shaft sealing with shaft sleeve
3. Shaft bearing
4. Rollers of the spray nozzle basket (620.2, 800.2)
5. Rollers of the spray nozzle basket (620.2, 800.2)
6. Nozzles of the spray nozzle basket
7. Hoses of the spray nozzle basket
8. Pneumatic cylinder

If the plant is fed with abrasive material (as frequently contained especially in industrial sludges), the life of the cleaning brushes may significantly be reduced. Components subject to emery wear are excluded from warranty.

**b) Spare parts**

For other spare parts such as gear motor, solenoid valve, lubricator, etc. see appendix.

Please provide the following details when ordering spare parts:

Type of machine

Size

Order number = machine number

Year of manufacture

Operating voltage of the electrical part

Order number from the spare part list (see appendix)

Required number of units

Delivery address

**9.5 Regular tests of machines subject to ATEX – Recurring tests and permanent control**

The regular tests for maintenance of the plant's nominal condition shall include after every 2000 operation hours, at least however after 2 years, checkup of the components listed below. Replace the components, if they show signs of an unacceptable operating condition.

Operating hours	Interval	Subject	Recommended method
2000	2 years	Operating condition of screw shaft Screw shaft bearing Oil seal	Check for wear. (visual inspection) Replacement
2000	2 years	Operating condition: Screw shaft and basket vibrations	Check wear of brushes. Brush replacement



**CAUTION**

There is a danger of burning in the area of the drive motors.

**NOTICE**

Additionally observe the separate operating instructions for electro motors, drives and bearings for maintenance.



**CAUTION**

Repair or extensive maintenance work on machines with ex protection should be performed in a separate room on the dismantled machine.

## 10 Shutdown

In order to avoid injury, damage to machinery and environmental damage when decommissioning the machine, the following safety guidelines must always be observed:

- The machine must only be decommissioned by authorised, qualified personnel.
- Please contact the manufacturer if you have questions concerning the disposal of the machine.
- Take care of environmentally sound disposal of operating media, lubricants and auxiliary material (e.g. gearbox oil): Observe the regulations for eco-friendly waste disposal!
- The machine must only be lifted at the points specified for the purpose.
- Only the lifting equipment and accessories listed here must be used for lifting the machine and parts of the machine.
- Also refer to the chapter *Transportation*.
- Also refer to the chapter *General Safety Instructions*.

### 10.1 Temporary shutdown

- Make sure there are no sludge residues left in the tanks and sludge dewatering machine after cleaning which might lead to biogas production.
- Empty the coagulant agent concentrate and dosing line (suction and pressure lines).
- Completely evacuate the coagulant agent conditioning plant.
- Flush all dosing pumps and deplete them.
- Empty the feed reactor.
- Empty the thick sludge trough.
- Clean coagulant agent injection nozzles of injection and mixing unit.
- Completely evacuate the sludge thickening machine and manually remove sludge residues. Make sure the filter surfaces are completely clean.
- Clean the nozzles of the filter cleaning system.
- Empty the coagulant agent concentrate pump.
- Frost-protect the pipelines and prevent deposits.
- Check control panel battery of the PLC (E-Prom).
- Completely evacuate the coagulant agent conditioning tank.
- Lubricate all bearings and sealings.

### 10.2 Final decommissioning / disposal

Qualified staff only is authorized to perform electrical and mechanical shutdowns. Prior to a final shutdown, follow the instructions for a temporary shutdown and the following additional instructions:

Completely empty the coagulant agent conditioning plant and coagulant agent concentrate tank. Clean the coagulant agent conditioning plant with appropriate agents. Return/dispose unused chemicals to the supplier.

## 11 Additional information

If you require more information, please write or phone. We will do our best to support you.

Our US headquarters:

Huber Technology, Inc.  
9735 NorthCross Center Court STE A  
Huntersville, NC 28078

Phone: 1-704-949-1010  
Fax: 1-704-949-1020  
E-mail: huber@hhusa.net

Our customer service:

Phone: 1-877-US HUBER  
E-mail: service@hhusa.net  
parts@hhusa.net

We will help you to quickly find the right specialist to answer your questions.

Or visit our website <http://www.huber-technology.com> providing up-to-date information concerning our Business Unit Service.

Our service comprises **preventive maintenance, routine servicing, short-term repair**.  
Our service hotline is available **24 hours a day, 7 days a week**.

Our qualified team offers a customer-oriented and reliable service. This service includes:

- **Installation and start-up**
- **Expert support, information and briefing of operating staff**
- **Regular servicing**
- **Optimisation of plant operation**
- **Maintenance of machine performance**
- **Repair and standard spare parts within 48 hours**

These additional services guarantee reliable plant operation, which is an important aspect for both municipal and industrial applications, and will help you to meet the requirements within your area of responsibility.

# Section 4.0

---

**Motor Data Sheet EX 4205 SBD – 184TC**

Gearbox:	STM
Motor:	Baldor
Enclosure:	TEFC
Explosion Proof Rating:	Class 1, Division 2
Gearbox:	EX 4205 SBD
Motor:	184TC
Horsepower (HP):	5.0
Motor Speed (RPM):	1,750
Output Shaft Speed (RPM):	0.99
Duty:	Inverter Duty VFD
Output Shaft Torque (lbf-in):	265,522
Hertz/Phase/Voltage:	60/3/230/460
Full Current Load (A):	13.0/6.5
Weight (lb):	882
Service Factor:	1.0
Efficiency:	89.5%
Maximum Ambient Temperature:	40°C
Winding Material:	Copper
Frame Material:	Cast Iron
Insulation	Class: F
NEMA Design Code:	B
Color:	Sky blue (RAL 5015)

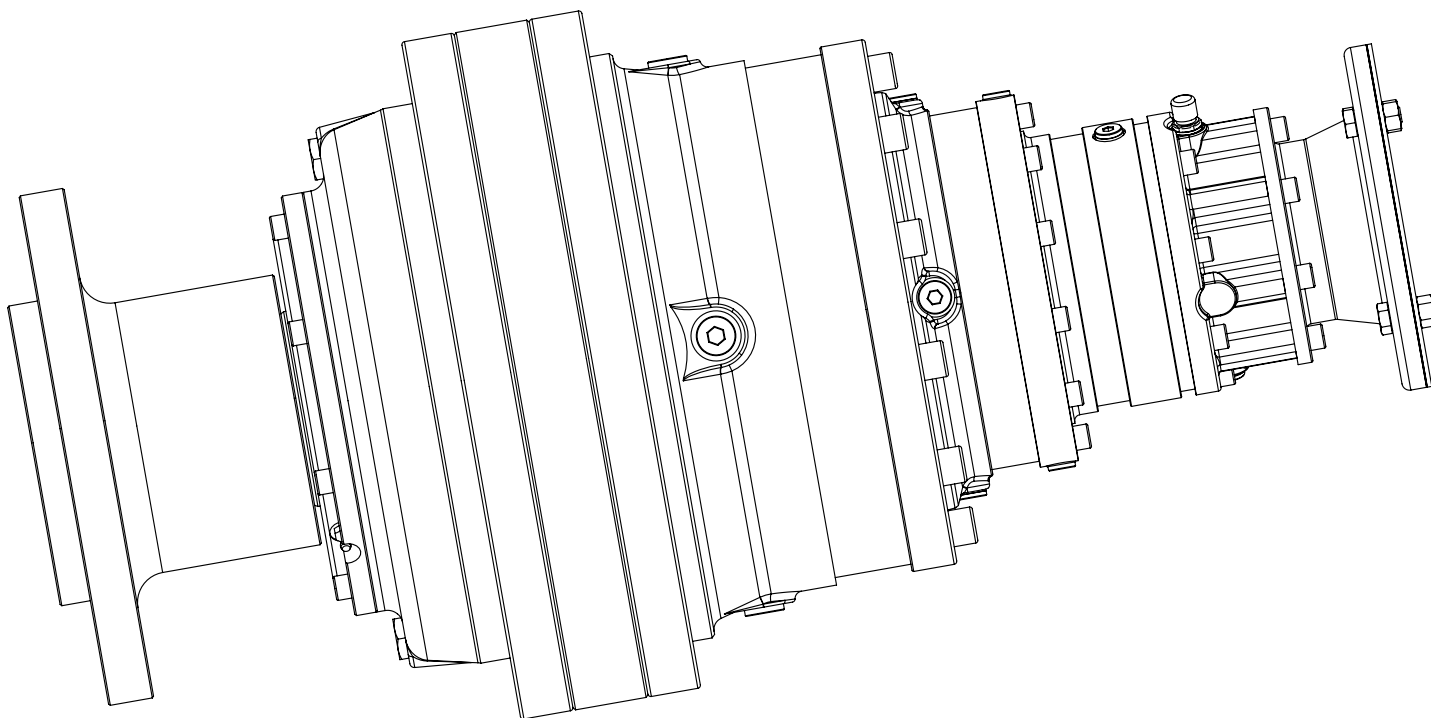
## GEARBOX APPENDIX INFORMATION

### STM EX 4205 SBD





# INDEX



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Updates	Date	Editor	Checked	Approved	Details updates
0.0	19-02-2019	Ing. Enrico Baroni	Daniele Nannetti	Davide Fabbri	Editing document





# Calculation

## Input Data:

Spectrum load:

Output torque [T2] Lbf-ft:18439.05, Output speed [n2] Rpm:0.45, Fr Out [Fr2] Lbf: 4371.284, for 70%

Output torque [T2] Lbf-ft:22126.86, Output speed [n2] Rpm:1.00, Fr Out [Fr2] Lbf: 5245.541, for 25%

Output torque [T2] Lbf-ft:33190.3, Output speed [n2] Rpm:1.00, Fr Out [Fr2] Lbf: 7868.313, for 5%

Distance of Radial Load Fr Out [Fr2] from shaft shoulder, in: 4.724395

Axial load [Fa<sub>2</sub>] Lbf: 5620

Requested life for all gears:100000 h

Application factor [KA]:1.00

KISSsoft - Release 03-2014G

### First step - CALCULATION OF A SPUR PLANETARY GEAR: EX10 IR3.48

Calculation method ISO 6336:2006 Method B

Number of element in the Load spectrum: 3

Reference gear: Planet carrier

Bin	[%]	[hP]	[1/min]	[Lbf-ft]
1	70.00000	1.696393	236.9	37.61442
2	25.00000	4.523804	526.4	45.13733
3	5.00000	6.785706	526.4	67.70599

		----- Gear 1 -----	Gear 2 -----	Gear 3 ---
Number of planets	[p]	(1)	3	(1)
Application factor	[KA]		1.00	
Required service life	[H]		100000.00	
Center distance (mm)	[a]		49.500	
Normal module (mm)	[mn]		2.2500	
Helix angle at reference circle (°)	[beta]		0.0000	
Number of teeth	[z]	25	18	-62
Facewidth (mm)	[b]	14.00	12.00	14.00
Hand of gear		Spur gear		

Safety Root: 14.54 6.40/4.64 12.46

Safety Flank: 2.40 2.39/2.93 2.10

### Second step - CALCULATION OF A SPUR PLANETARY GEAR: EX20 IR5.77

Calculation method ISO 6336:2006 Method B

Number of element in the Load spectrum: 3

Reference gear: Planet carrier

Bin	[%]	[hP]	[1/min]	[Lbf-ft]
1	70.00000	1.656699	41.1	211.9282
2	25.00000	4.417997	91.2	254.3139
3	5.00000	6.626929	91.2	381.4709

		----- Gear 1 -----	Gear 2 -----	Gear 3 ---
Number of planets	[p]	(1)	3	(1)
Application factor	[KA]		1.00	
Required service life	[H]		100000.00	
Center distance (mm)	[a]		43.300	
Normal module (mm)	[mn]		2.2500	
Helix angle at reference circle (°)	[beta]		0.0000	
Number of teeth	[z]	13	24	-62
Facewidth (mm)	[b]	26.00	24.00	26.00
Hand of gear		Spur gear		

Safety Root: 5.51 3.27/2.77 4.93

Safety Flank: 1.45 1.67/2.49 1.80





# Calculation

### Third step - CALCULATION OF A SPUR PLANETARY GEAR: EX50 IR5.33

Calculation method ISO 6336:2006 Method B

Number of element in the Load spectrum: 3

Reference gear: Planet carrier

Bin	[%]	[hP]	[1/min]	[Lbf-ft]
1	70.00000	1.628403	7.7	1110.98
2	25.00000	4.342498	17.1	1333.176
3	5.00000	6.513747	17.1	1999.764

		----- Gear 1 -----	Gear 2 -----	Gear 3 ---
Number of planets	[p]	(1)	3	(1)
Application factor	[KA]		1.00	
Required service life	[H]		100000.00	
Center distance (mm)	[a]		61.250	
Normal module (mm)	[mn]		2.5000	
Helix angle at reference circle (°)	[beta]		0.0000	
Number of teeth	[z]	18	29	-78
Facewidth (mm)	[b]	38.00	36.00	38.00
Hand of gear		Spur gear		

Safety Root: 3.00 1.94/2.01 3.10

Safety Flank: 1.45 1.63/2.60 1.55

### Fourth step - CALCULATION OF A SPUR PLANETARY GEAR: EX150 IR4.09

Calculation method ISO 6336:2006 Method B

Number of element in the Load spectrum: 3

Reference gear: Planet carrier

Bin	[%]	[hP]	[1/min]	[Lbf-ft]
1	70.00000	1.602387	1.9	4472.37
2	25.00000	4.273167	4.2	5366.844
3	5.00000	6.409817	4.2	8050.266

		----- Gear 1 -----	Gear 2 -----	Gear 3 ---
Number of planets	[p]	(1)	3	(1)
Application factor	[KA]		1.00	
Required service life	[H]		100000.00	
Center distance (mm)	[a]		91.100	
Normal module (mm)	[mn]		4.0000	
Helix angle at reference circle (°)	[beta]		0.0000	
Number of teeth	[z]	22	23	-68
Facewidth (mm)	[b]	60.00	62.00	60.00
Hand of gear		Spur gear		

Safety Root: 3.07 2.23/1.91 3.09

Safety Flank: 1.60 1.74/2.31 1.42

### Fifth step - CALCULATION OF A SPUR PLANETARY GEAR: EX420 IR4.18

Calculation method ISO 6336:2006 Method B

Number of element in the Load spectrum: 3

Reference gear: Planet carrier

Bin	[%]	[hP]	[1/min]	[Lbf-ft]
1	70.00000	1.579858	0.5	18439.05
2	25.00000	4.212955	1.0	22126.86
3	5.00000	6.319432	1.0	33190.3

		----- Gear 1 -----	Gear 2 -----	Gear 3 ---
Number of planets	[p]	(1)	4	(1)
Application factor	[KA]		1.00	





# Calculation

Required service life	[H]		100000.00		
Center distance (mm)	[a]		116.400		
Normal module (mm)	[mn]		5.0000		
Helix angle at reference circle (°)	[beta]		0.0000		
Number of teeth	[z]	22	23		-70
Facewidth (mm)	[b]	86.00	85.00		80.00
Hand of gear		Spur gear			

Safety Root: 1.94 1.50/1.82 2.17  
 Safety Flank: 1.45 1.58/2.31 1.19

**First step planet - BEARINGS CALCULATION**

Service life [Lnh] >100000 h  
 static safety factor [SO] 42.87

**Second step planet - BEARINGS CALCULATION**

Service life [Lnh] >100000 h  
 static safety factor [SO] 14.45

**Third step planet - BEARINGS CALCULATION**

Service life [Lnh] >100000 h  
 static safety factor [SO] 8.82

**Fourth step planet - BEARINGS CALCULATION**

Service life [Lnh] >100000 h  
 static safety factor [SO] 7.89

**Fifth step planet - BEARINGS CALCULATION**

Service life [Lnh] >100000 h  
 static safety factor [SO] 5.89

**Output shaft FIRST BEARING CALCULATION**

Service life [Lnh] >100000 h  
 static safety factor [SO] 17.30

**Output shaft SECOND BEARING CALCULATION**

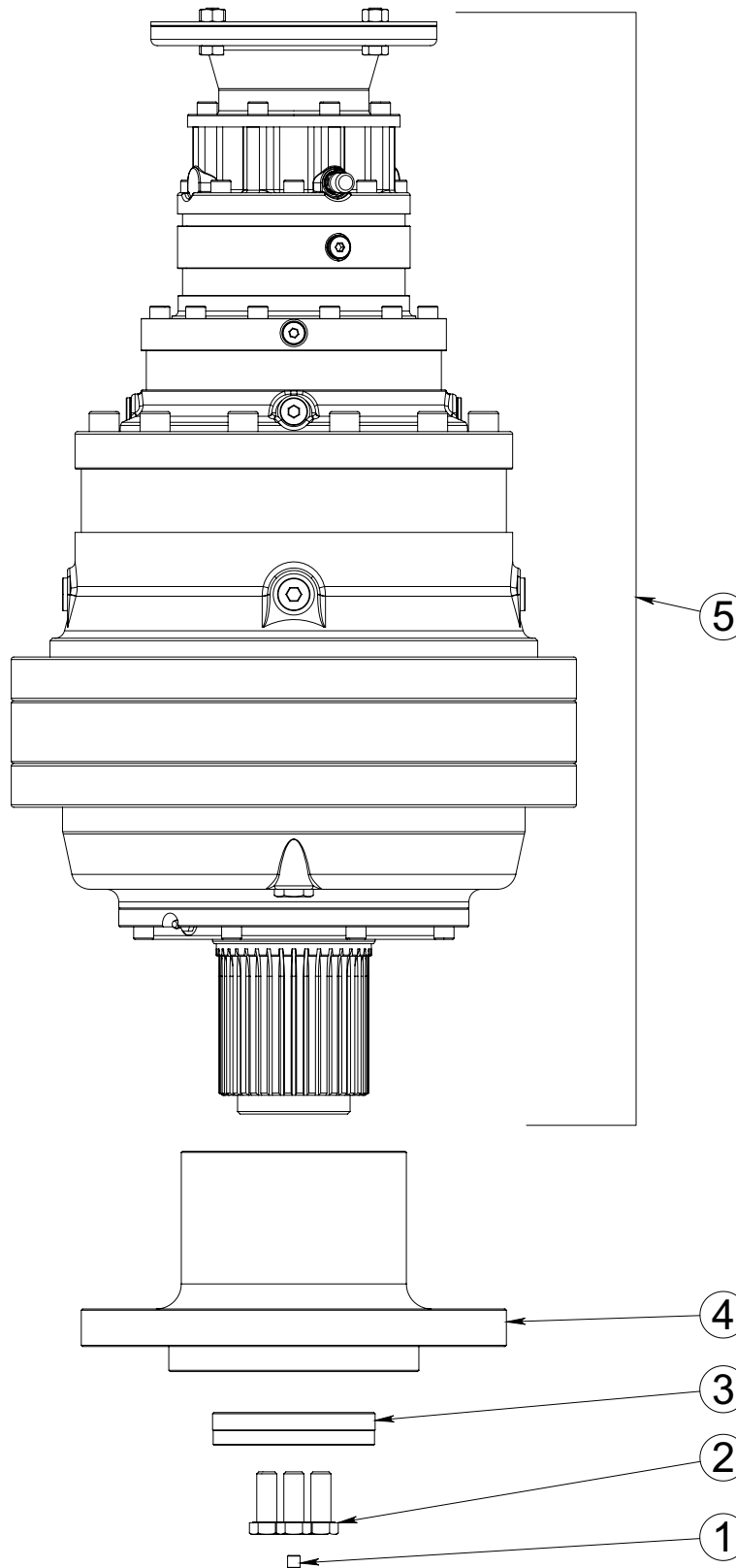
Service life [Lnh] >100000 h  
 static safety factor [SO] 3.59

-----END REPORT-----

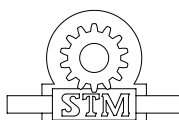


# Accessories drawing

210x297



AM\_SQADA4



DRAWN BY <b>L.MALAGOLI</b>	DRG.TITLE <b>AS6775_EX_4205_SBD_N180C_M1</b>		M.U. inch
	CHECKED	SIZE DRW. <b>A4</b>	
DATE <b>19/02/2019</b>		SCALE <b>1:5</b>	DRAWING <b>AS6775</b>
ATTENTION: "STM" PROTECTS HIS OWN RIGHTS ON THE DRAWINGS, UNDER THE LAW			

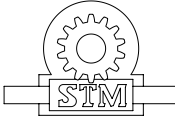
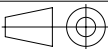


# Accessories part list

210x297

POS.	CODE	DESCRIPTION	QTY
1	1041310621	GRUB SCREW E.I. MA 10 X 10 UNI 5923	1
2	1040313521	HEXAGON HEAD CAP SCREW 16X40 UNI 5739 ZN 8.8	3
3	1089954191	WASHER EX420 X ID NITOX AS	1
4	1089954181	FD FL WHEEL EX420 NITOX AS	1
5	223-----1	EX 4205 SBD 1831,8 N180C M1	1

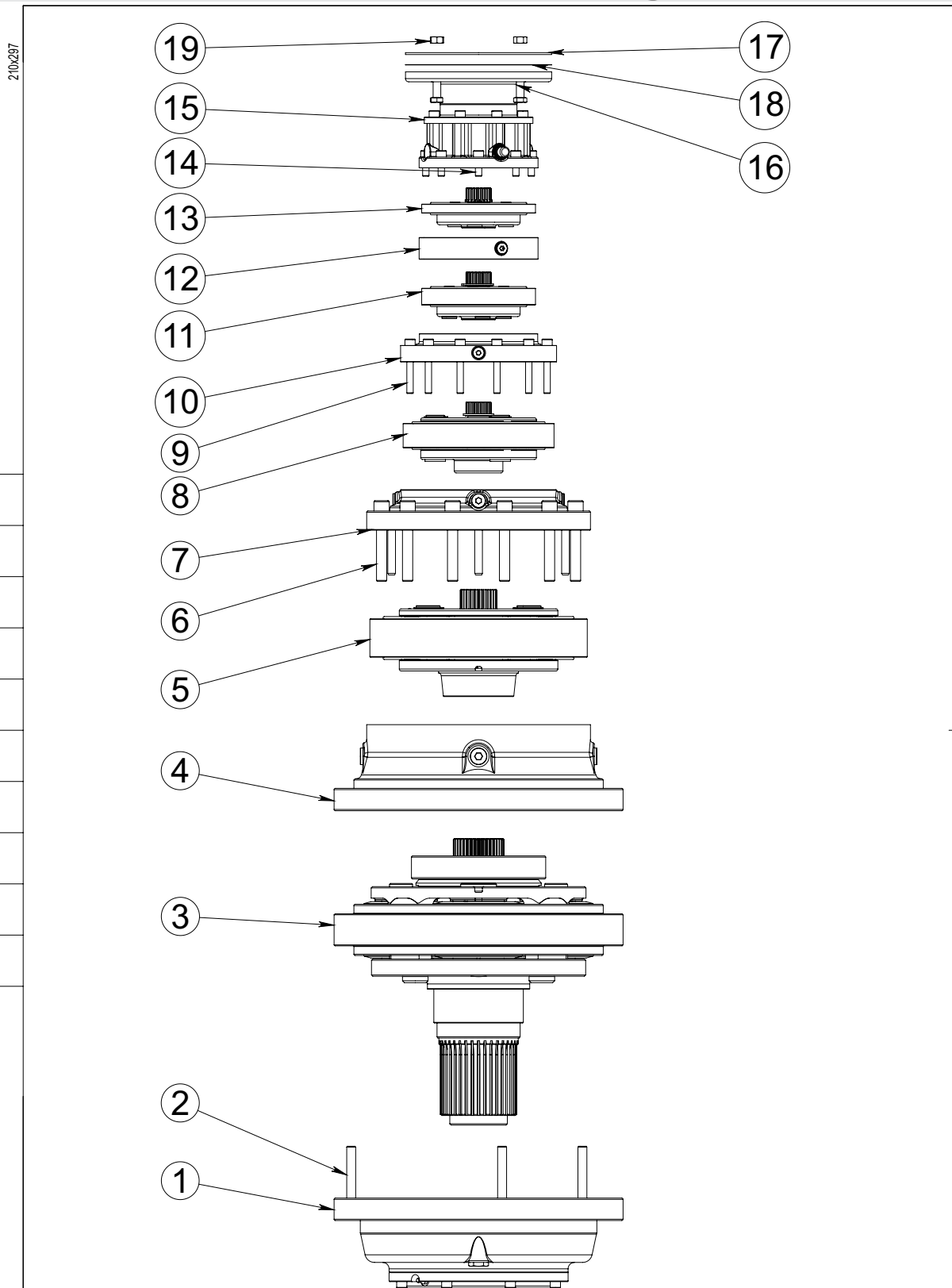
AM\_SQADA4

	DRAWN BY <b>D.NANNETT</b>	DRG.TITLE <b>AS6775 EX 4205 SBD N180C FF FD M1</b>	M.U. inch
	CHECKED	SIZE DRW. <b>A4</b>	
	DATE <b>19/02/2019</b>	 SCALE <b>1:4.5</b>	DRAWING <b>AS6775</b>

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# Groups drawing



210x297

AM\_SQADA4

	DRAWN BY <b>L.MALAGOLI</b>	DRG.TITLE <b>AS6775_EX_4205_SBD_N180C_M1</b>	M.U. inch
	CHECKED		SIZE DRW. A4
	DATE 19/02/2019		SCALE 1:8
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# Groups drawing

210x297

POS.	CODE	DESCRIPTION	QTY
1	2429998771	OUTPUT GROUP EX420 SD M1 AS	1
2	1040613061	CAP SCREW 14X100 UNI5931 ZN 8.8	3
3	2429998781	STAGE GROUP EX420 IR4.18 SBD	1
4	2429998791	COMBINED GROUP EX420/150 SB	1
5	2429996601	STAGE GROUP EX150 IR4.09	1
6	1040613821	CAP SCREW 16X110UNI5931 BR12.9	12
	1040613161	CAP SCREW 14X85UNI 5931 ZN 8.8	3
7	2429996681	COMBINED GROUP EX150/30-50	1
8	2429996361	STAGE GROUP EX50 IR5.33	1
9	1040612551	CAP SCREW 10X80UNI 5931 BR12.9	12
10	2429996541	COMBINED GROUP EX50/20-EX30/10	1
11	2429996121	STAGE GROUP EX20 IR3.48	1
12	2429996531	COMBINED GROUP EX20/10-EX10/10	1
13	2429996101	STAGE GROUP EX10 IR5.77	1
14	1040612951	CAP SCREW 10X100 UNI 5931 BR12.9	8
15	2429995211	INPUT FLANGE GROUP EX10 Z13 N180C M1	1
16	1040312601	HEXAGON HEAD CAP SCREW 12X30 UNI5739 ZN8.8	4
17	1089951561	INPUT FLANGE PROTECTION COVER EX*228,6 AS	1
18	1031005081	MOTOR/INPUT FLANGE GASKET N180C	1
19	1041511511	NUT 12MA H10 UNI5588 6S ZN	4

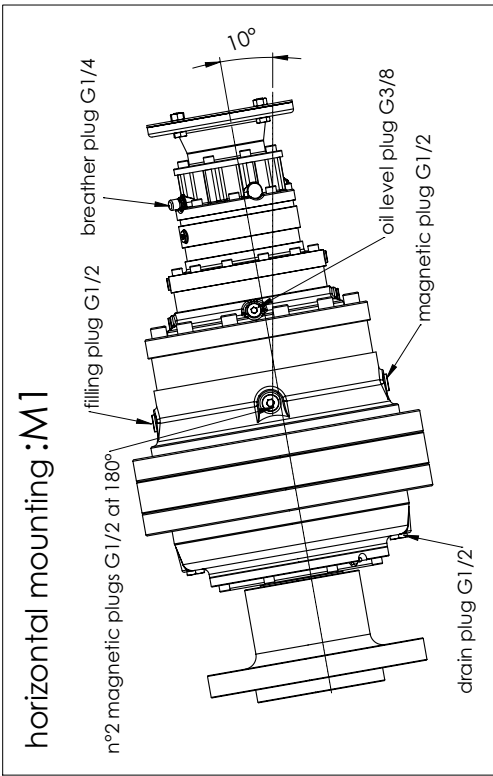
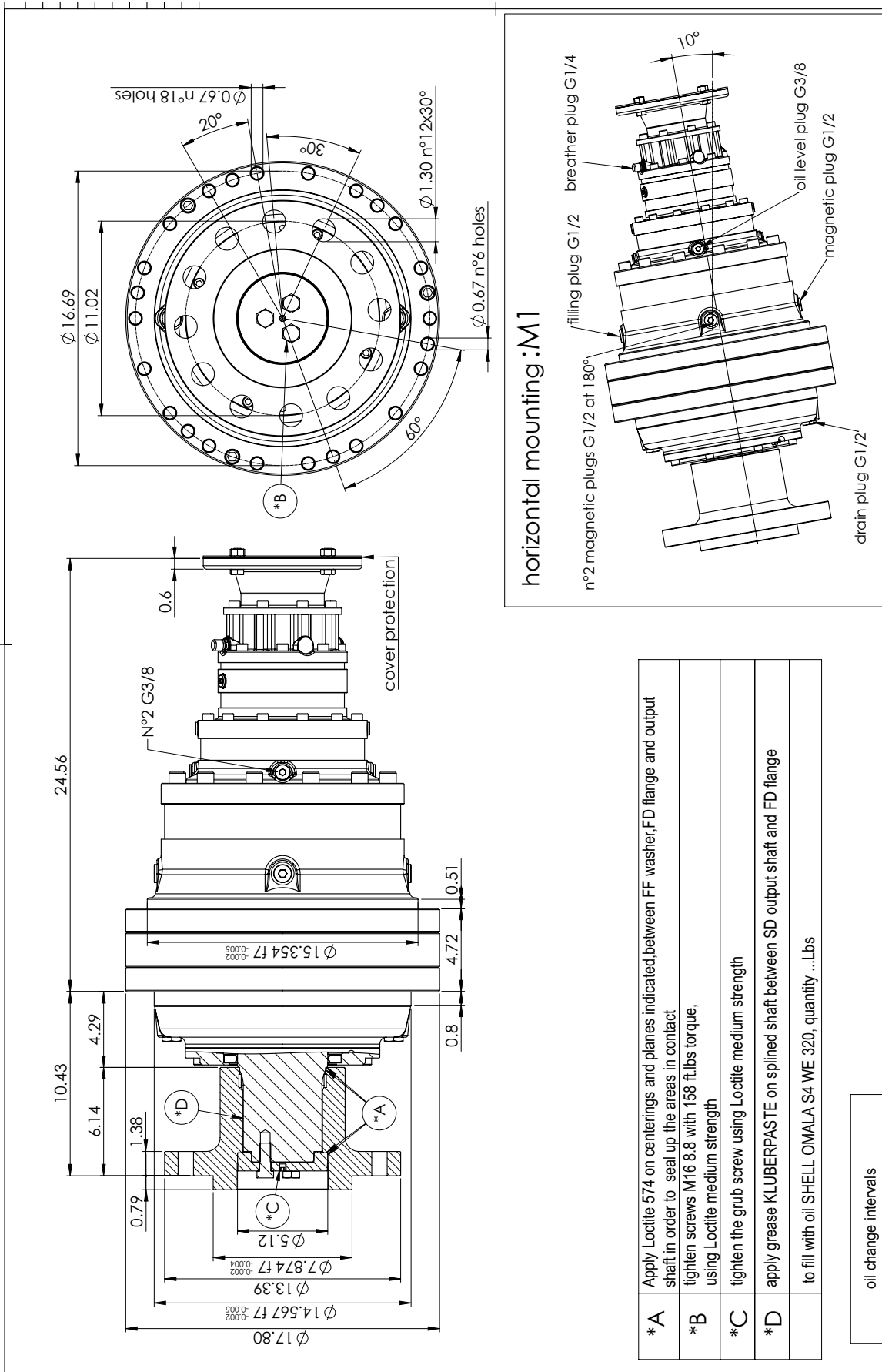
AM\_SQAD4

	DRAWN BY <b>D.NANNETTI</b>	DRG.TITLE <b>AS6775 - PART LIST</b>	M.U. inch
	CHECKED		SIZE DRW. A4
	DATE 19/02/2019	SCALE 1:6.5	DRAWING <b>AS6775</b>
ATTENTION: "STM" PROTECTS HIS OWN RIGHTS ON THE DRAWINGS, UNDER THE LAW			





# Dimension drawing



	DRAWN BY <b>D.MANNETTI</b> CHECKED DATE <b>19/02/2019</b>	DWTITLE <b>AS6775_EX_4205_SBD_N180C_M1</b>	W.U. inch SER/DWG A3
	SCALE <b>1:5</b>	DRAWING <b>AS6775</b>	

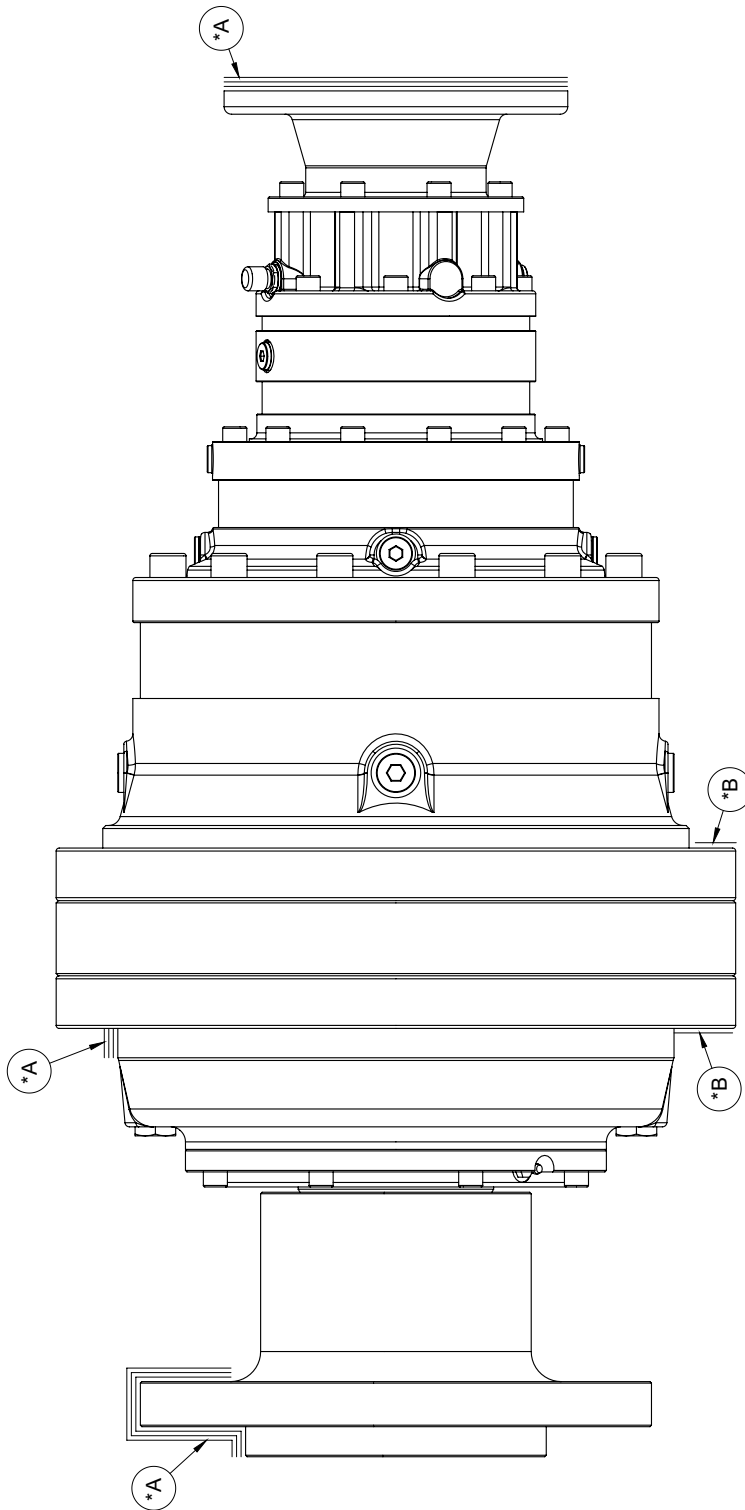
ATTENTION: STM PROTECTS ITS OWN RIGHTS ON THE DRAWINGS. UNDER THE LAW.



*A	Apply Loctite 574 on centerings and planes indicated, between FF washer, FD flange and output shaft in order to seal up the areas in contact
*B	tighten screws M16 8.8 with 158 ft.lbs torque, using Loctite medium strength
*C	tighten the grub screw using Loctite medium strength
*D	apply grease KLUBERPASTE on splined shaft between SD output shaft and FD flange
	to fill with oil SHELL OMALA S4 WE 320, quantity ...Lbs

oil change intervals
1° oil change = after 500 hours
next oil changes = once a year



# Paint drawing



*A	no paint on surfaces indicated (  )
*B	paint: blue RAL 5015 with a thickness of 0.0012mm on surfaces indicated (  )
*C	paint: all the rest of the gearbox with blue paint RAL 5015 following the paint cycle 3.

 DRAWN BY <b>D. NANNETTI</b> CHECKED DATE 19/02/2019	DWG. TITLE <b>AS6775_EX_4205_SBD_N180C_M1</b>	 SCALE 1:3	DRAWING SIZE BWH A3	M.U. inch
AS6775				

297420

MIL SQAD34



# Installation and Maintenance



EMPOWERING YOUR IDEAS

EMPOWERING YOUR IDEAS



HIGH TECH *line* HeavyDuty









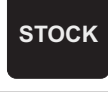



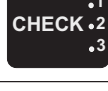




MT 27 I GB D

## Installation and Maintenance

# STM

**Ex** ATEX INCLUDED



<b>INDICE</b> <b>INDEX</b> <b>INHALTSVERZEICHNIS</b>	
<b>INFORMAZIONI GENERALI</b> <b>GENERAL INFORMATION</b> <b>ALLGEMEINE INFORMATIONEN</b>	
<b>NORME DI SICUREZZA</b> <b>SAFETY RULES</b> <b>SICHERHEITSVORSCHRIFTEN</b>	
<b>IDENTIFICAZIONE</b> <b>IDENTIFICATION</b> <b>KENNZEICHNUNG</b>	
<b>STATO DI FORNITURA</b> <b>SCOPE OF THE SUPPLY</b> <b>LIEFERZUSTAND</b>	
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<b>STOCCAGGIO</b> <b>STOCKING</b> <b>EINLAGERUNG</b>	
<b>INSTALLAZIONE</b> <b>INSTALLATION</b> <b>INSTALLATION</b>	
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## 0. INFORMAZIONI GENERALI

0.0 GENERALITA' (VALIDITA', CAMPO APPLICAZIONE STATO REVISIONE E ERRATA CORRIGE)

LE INFORMAZIONI CONTENUTE SONO DA APPLICARSI AI PRODOTTI STANDARD E SPECIALI.  
TENERE SEMPRE UNA COPIA DEL PRESENTE MANUALE A BORDO MACCHINA.

QUALORA NON FOSTE IN POSSESSO DEL DOCUMENTO RICHIEDERE UNA COPIA ALL'UFFICIO COMMERCIALE STM S.P.A. PRIMA DELLA MESSA IN SERVIZIO DELLA MACCHINA.

Le informazioni relative alla Errata Corrige e al codice catalogo sono riportate in fondo al presente documento.

## 0. GENERAL INFORMATION

0.0 GENERAL (VALIDITY, SCOPE, REVISION AND ERRATA)

*DATA GIVEN HEREIN APPLY TO STANDARD AND SPECIAL PRODUCTS.  
ALWAYS KEEP A COPY OF THIS MANUAL WITH THE MACHINE.*

*IF YOU DO NOT HAVE THIS DOCUMENT, PLEASE ASK A COPY TO THE SALES DEPT. OF STM S.P.A. BEFORE MACHINE COMMISSIONING.*

*Information on Errata and catalogue code can be found at the end of this document.*

## 0. ALLGEMEINE INFORMATIONEN

0.0 ALLGEMEINES (GÜLTIGKEITSBEREICH, ANWENDUNGSBEREICH, REVISION UND DRUCKFEHLERVERZEICHNIS)

DIE HIER ENTHALTENEN INFORMATIONEN BEZIEHEN SICH AUF DIE PRODUKTE IN IHREN STANDARD- UND SPEZIALVERSIONEN.  
BEWAHREN SIE IMMER EINE KOPIE DIESES HANDBUCHS AN DER MASCHINE AUF.

SOLLTEN SIE NICHT ÜBER DIESE UNTERLAGE VERFÜGEN, BITTEN WIR SIE, EINE KOPIE BEI DER VERKAUFSABTEILUNG DER STM S.P.A ANZUFORDERN, BEVOR SIE DIE MASCHINE IN BETRIEB SETZTEN.

Die Informationen bezüglich des Druckfehlerverzeichnisses und der Katalognummer werden am Ende dieser Unterlage angegeben.



## 0. INFORMAZIONI GENERALI

### 0.1 SCOPO

Questo manuale contiene tutte le informazioni per il corretto stoccaggio, uso e manutenzione ed il rispetto di queste costituisce condizione necessaria per la garanzia di un corretto funzionamento; è consigliabile prendere coscienza dei contenuti di questo manuale e conservarne una copia in prossimità dei gruppi.

Le informazioni principali di carattere generale sono valide oltre che per i riduttori di serie anche per gli speciali.

Tutte le informazioni necessarie agli acquirenti ed ai progettisti, sono riportate nel "catalogo di vendita".

Oltre ad adottare le regole della buona tecnica di costruzione, le informazioni devono essere lette attentamente ed applicate in modo rigoroso.

Le informazioni riguardanti il motore elettrico che si può trovare abbinato al riduttore devono essere reperite nel Manuale di uso, installazione e manutenzione del motore elettrico stesso.

La non osservanza di dette informazioni può essere causa di rischi per la salute e la sicurezza delle persone e danni economici.

Queste informazioni, realizzate dal Costruttore nella propria lingua originale (italiana), possono essere rese disponibili anche in altre lingue per soddisfare le esigenze legislative e/o commerciali.

La documentazione deve essere custodita da persona responsabile allo scopo preposta, in un luogo idoneo, affinché essa risulti sempre disponibile per la consultazione nel miglior stato di conservazione.

In caso di smarrimento o deterioramento, la documentazione sostitutiva dovrà essere richiesta direttamente al costruttore citando il codice del presente manuale.

Il manuale rispecchia lo stato dell'arte al momento dell'immissione sul mercato del riduttore.

Il costruttore si riserva comunque la facoltà di apportare modifiche, integrazioni o miglioramenti al manuale stesso, senza che ciò possa costituire motivo per ritenere la presente pubblicazione inadeguata.

Per evidenziare alcune parti di testo di rilevante importanza o per indicare alcune specifiche importanti, sono stati adottati alcuni simboli il cui significato viene a pagina 1.

## 0. GENERAL INFORMATION

### 0.1 PURPOSE

*This manual gives all instructions about stocking, use and maintenance; follow these rules to ensure correct operation. It is recommended to thoroughly read this manual and keep one copy next to the units.*

*General information apply not only to the standard gearboxes but also to the special versions.*

*All purchasing and design criteria is provided in the Sales Catalogue.*

*Apart from adhering to established engineering practices, the information given in this manual must be carefully read and applied rigorously.*

*The information regarding the electric motor that can be found matching the gearbox is supplied with the owner's manual relevant to the specific electric motor.*

*Failure to adhere to the information provided herein may result in risk to personal health and safety, and may incur economic damages.*

*This information, provided in the original language (Italian) of the Manufacturer, may also be made available in other languages to meet legal and/or commercial requirements.*

*The documentation must be stored by a person with the correct authority in a suitable place and must always be made available for consultation.*

*In case documents are lost or damaged, replacement documentation must be requested directly from the Manufacturer, quoting the code of this manual.*

*The manual reflects the state of the art at the time of commercialisation of the gear unit.*

*The Manufacturer reserves the right to modify, supplement and improve the manual, without the present publication being for that reason considered inadequate.*

*Particularly significant sections of the manual and important specifications are highlighted by symbols whose meaning is given on page 1.*

## 0. ALLGEMEINE INFORMATIONEN

### 0.1 EINSATZZWECK

Dieses Handbuch enthält alle Informationen bezüglich einer korrekten Einlagerung, dem Einsatz und der Instandhaltung. Der Einhaltung dieser Vorgaben stellt die Bedingung für die Gewährleistung eines korrekten Betriebs dar. Es wird daher empfohlen, den Inhalt dieses Handbuchs zur Kenntnis zu nehmen und eine Kopie davon in der Nähe der Aggregate aufzubewahren.

Die Hauptinformationen mit allgemeinem Charakter sind nicht nur für die serienmäßigen Getriebe sondern auch für die Spezialgetriebe gültig.

Alle Informationen, die für Käufer und Planer erforderlich sein könnten, finden Sie im "Verkaufskatalog".

Über die Erfordernis die Regeln der "guten Bautechnik" anzuwenden, müssen auch alle übermittelten Informationen aufmerksam gelesen und strikt angewandt werden.

Informationen, die sich auf den Elektromotor beziehen, der an das Getriebe gekoppelt sein könnte, müssen der Betriebs-, Installations- und Instandhaltungsanleitung des Elektromotors selbst entnommen werden.

Die Nichtbeachtung dieser Informationen kann gesundheits- und sicherheitsgefährdende Folgen haben und zu finanziellen Einbußen führen.

Diese Informationen, die vom Hersteller in der Herkunftssprache (Italienisch) erstellt wurden, stehen auch in anderen Sprachen zur Verfügung, um gesetzlichen und/oder wirtschaftlichen Anforderungen gerecht zu werden.

Diese Dokumentation muss von einer verantwortungsbewussten Person zum vorgesehenen Zweck und an einem angebrachten Ort aufbewahrt werden, damit sie immer zum Nachschlagen zur Verfügung steht und ihren einwandfreien Zustand beibehält.

Sollte diese Dokumentation verloren gehen oder beschädigt werden, muss direkt beim Händler, unter Angabe der Handbuchnummer, ein entsprechender Ersatz angefordert werden.

Dieses Handbuch spiegelt den technologischen Stand zum Zeitpunkt der Markteinführung des Getriebes wider.

Der Hersteller behält sich jedoch das Recht vor, jederzeit Änderungen, Integrationen oder Verbesserungen in das Handbuch einfügen zu können, ohne dass dadurch die vorliegende Veröffentlichung ungeeignet resultiert.

Um besonders wichtige Textteile hervorzuheben oder einige wichtige Spezifikationen zu unterstreichen, wurden Symbole verwendet, deren Bedeutung auf Seite 1 erläutert wird.



## 0. INFORMAZIONI GENERALI

### 0.2 GARANZIA

#### 0.2.1 Condizioni di assistenza Tecnica

La garanzia del prodotto, relativa ai difetti di fabbricazione, ha la durata di 12 (dodici) mesi a partire dalla data riportata sulla targhetta. Le condizioni e le modalità di garanzia alle quali riferirsi sono quelle riportate sul listino prezzi generale del prodotto. L'eventuale richiesta di preventivo di riparazione viene presa in considerazione solo per riduttori di taglia media e grande e deve essere concordata con il servizio di Assistenza Tecnica Post-vendita della STM SpA.

In merito alle modalità di reso del materiale non conforme è necessario:

1-Compilare il modulo "Assistenza Tecnica post vendita modulo di richiesta intervento del cliente" e inviarlo via fax al recapito sopra indicato;

2-Attendere fax di conferma da parte della STM SpA;

3-Inviare il prodotto in porto franco (spese di trasporto a carico del mittente) alla STM SpA, con allegato il modulo approvato dalla STM SpA stessa.

La STM SpA non si assume alcuna responsabilità per le conseguenze, a livello di sicurezza e funzionamento del sistema, che un utilizzo del prodotto non conforme a quanto specificato nel presente manuale può produrre.

#### 0.2.2 LIMITI DELLA GARANZIA

La garanzia si limita esclusivamente alla sostituzione del componente difettoso, qualora si determina, dopo averlo visionato, un'effettiva nostra responsabilità.

La garanzia sul prodotto in ogni modo non ha più valore nel momento in cui si dovessero riscontrare delle manomissioni a qualsiasi parte o componente l'impianto.

Si escludono inoltre dalla garanzia le riparazioni conseguenti a danni causati da trascuratezza di manutenzione o da applicazioni inadeguate.

Tutte le spese di trasporto, sopralluogo, smontaggio dovute, per l'intervento di un nostro tecnico s'intendono in ogni caso a totale carico del cliente.

Per qualunque controversia l'unico foro competente è quello di Bologna

## 0. GENERAL INFORMATION

### 0.2 WARRANTY

#### 0.2.1 Technical/After Sales Conditions

*The product is guaranteed against construction faults for 12 (twelve) months as from the date indicated on the nameplate. The warranty terms and conditions to be referred to are those contained in the product general price list. Any price inquiry for product repair will be examined only for medium/big sized gearboxes and will have to be agreed with the after-sales service of STM SpA.*

*Regarding the procedure to return goods in non conformity with the requirements it is necessary:*

*1-to fill in the form "After sales /Technical assistance and customer's service request for intervention form" and fax it to the above mentioned number.*

*2-to wait for the confirmation reply from STM SpA.*

*3-To send the product free of transportation charges ( charged to the sender ) to STM SpA along with the form approved by STM SpA.*

*STM SpA can not be held liable for any consequence, in terms of safety and system operation, which might result from improper use of the product other than that specified in this document.*

#### 0.2.2 LIMITS OF THE WARRANTY

*Warranty only covers replacement of faulty component if, after inspection, fault proves to be our responsibility.*

*Product warranty becomes null and void whenever any system part or component has been tampered with.*

*Repairs for damage due to lack of maintenance or unsuitable application are further excluded.*

*All the expenses for transport, on-the-spot inspection and disassembly consequent to the intervention of one of our technicians are anyway completely at customer's charge.*

*Any controversy will be heard before Bologna Court.*

## 0. ALLGEMEINE INFORMATIONEN

### 0.2 GARANTIE

#### 0.2.1 Bedingungen des Technischen Kundendienstes

Die Produktgarantie für Herstellungsdefekte beläuft sich, ab dem auf dem Produktschild angegebenen Datum, auf 12 (zwölf) Monate. Die Garantiebedingungen und -modalitäten, auf die Bezug genommen wird, werden in der allgemeinen Preisliste des Produkts angegeben. Eine eventuelle Anfrage eines Kostenvoranschlags für Reparaturen kann nur für mittelgroße/große Getriebe und nach entsprechender Absprache mit der Technischen Kundendienstabteilung der STM SpA berücksichtigt werden.

Bei Rücksendungen von sich als nicht konform erwiesenem Material ist folgendes zu beachten:

1- Das Formular "Technischer Kundendienst - Kundenformular für Eingriffsanforderung" ausfüllen und an die darauf angegebene Adresse senden.

2- Den Eingang der Bestätigung STM SpA per Fax abwarten.

3- Das Produkt portofrei (Transportkosten gehen zu Lasten des Absenders) unter Anlage der von der STM SpA bestätigten Formulare an die STM SpA senden.

Die STM SpA übernimmt keinerlei Haftung für Folgen im Sinne der Sicherheit und Funktionsfähigkeit des Systems, die auf einen den Angaben in diesem Handbuch nicht konform erfolgenden Einsatz zurückgeführt werden können.

#### 0.2.2 GARANTIEBESCHRÄNKUNG

Die Garantie beschränkt sich ausschließlich auf den Austausch der defekten Komponente, nachdem in Folge einer Überprüfung eine effektive diesbezügliche Verantwortung unsererseits festgestellt wurde.

Die Produktgarantie verfällt jedoch in dem Moment, in dem Handhabungen, egal an welchem Teil oder welcher Komponente der Anlage, festgestellt werden.

Von der Garantie ausgeschlossen sind darüber hinaus Reparaturen, die in Folge von Schäden erforderlich sind, die durch Nachlässigkeit in der Instandhaltung oder unangemessene Applikationen verursacht wurden.

Alle für den Transport, Inspektion und Ausbauarbeiten entstehenden Kosten für den Eingriff einer unser Techniker gehen immer und vollständig zu Lasten des Kunden.

Für Streitigkeiten ist allein das Gericht in Bologna zuständig.



## 0. INFORMAZIONI GENERALI

### 0.3 AVVERTENZE GENERALITÀ SULL'USO

Prima di procedere a qualunque manutenzione SI RACCOMANDA DI TOGLIERE TENSIONE perché all'interno ci sono parti in movimento pericolosi per l'operatore.

Seguire inoltre le seguenti disposizioni:

- Consentire al solo personale autorizzato d'intervenire sull'unità.
- NON AVVIARE L'UNITÀ IN AVARIA
- Prima di usare l'unità accertarsi che qualsiasi condizione pericolosa per la sicurezza sia stata opportunamente eliminata.
- Accertarsi che tutte le protezioni siano al loro posto ed i dispositivi di sicurezza siano presenti ed efficienti.
- Fare in modo che nella zona dell'operatore non siano presenti oggetti estranei. Qualunque operazione di manutenzione deve avvenire con la macchina isolata dalle reti di distribuzione dell'energia (elettrica, pneumatica, idraulica od altro).
- Quando sussiste la possibilità d'essere colpiti dalle proiezioni o dalla caduta di parti solide o simili, usare gli occhiali con paraocchi laterali, elmetti o guanti se necessari.
- Quando si opera con materiale caldo può essere richiesto l'uso di guanti od altri mezzi di protezione individuale, per evitare scottature da contatto manuale.
- Anche se l'unità non è di per sé rumorosa, può essere richiesto l'uso di protezioni contro il rumore a causa del livello di pressione sonora dell'ambiente in cui la macchina è installata.

### Livelli di pressione sonora SPL [dB(A)]

Valori normali di produzione del livello medio di pressione sonora SPL (dB(A)) a velocità in entrata di 1450 giri/min (tolleranza +3 dB(A)). Valori misurati ad 1 m dalla superficie esterna del riduttore ed ottenuti su elaborazione di prove sperimentali. Per raffreddamento artificiale con ventola sommare ai valori di tabella: +2 dB(A) per ogni ventola. Per entrata ad un numero di giri diverso sommare i valori come in tabella. Per particolari esigenze è possibile fornire riduttori con livello medio di pressione sonora ridotto.

Contattare nostro ufficio tecnico commerciale.

### 0.4 SPECIFICHE PRODOTTI

#### 0.4.1 SPECIFICHE PRODOTTI NON "ATEX"

I riduttori della STM SpA sono organi meccanici destinati all'uso industriale e all'incorporazione in apparecchiature meccaniche più complesse. Dunque non vanno considerati macchine indipendenti per una predeterminata applicazione ai sensi 2006/42/CE, né tantomeno dispositivi di sicurezza.

## 0. GENERAL INFORMATION

### 0.3 WARNINGS - GENERAL NOTES ON THE CORRECT USE OF THE SYSTEM

*Before proceeding to any maintenance operation IT IS RECOMMENDED TO CUT OFF POWER SUPPLY because inside the system are moving parts dangerous for the operator.*

*Please stick to these provisions:*

- *Only allow authorised personnel to work on the machine.*
- *DO NOT START THE UNIT IF FAULTY*
- *Before starting the unit, ensure that any dangerous condition has been suitably eliminated.*
- *Ensure that all protections are in place and that safety devices are available and in efficient conditions.*
- *Ensure that there are no foreign objects in the operator's area.*
- *Cut off any machine (power, air, water or other) supply before performing any maintenance operation.*
- *If there is the risk of being hit by solid particles (or else) falling or being projected, use goggles with side shields, helmets or gloves, if necessary.*
- *When working with hot material, it could be necessary to wear gloves or any other safety gear to avoid scalds.*
- *Though the unit is not noisy in itself, it could be necessary to wear noise-proof protections due to the noise level of the room where machine is installed.*

### Mean sound pressure levels SPL [dB(A)]

*Noise levels are mean sound pressure levels SPL (dB(A)) and refer to normal operation at an input speed of 1450 rpm (tolerance +3 dB (A)). Measurements are taken at 1 m from the external surface of the gear unit and ratings are obtained by processing test data. For fan-cooled applications, add 2dB (A) to table values for each fan. For different input speeds, add the appropriate values indicated in the table below. Gear units with lower noise levels to suit particular needs are available on request.*

Please, contact our technical sales dept

### 0.4 PRODUCT SPECIFICATIONS

#### 0.4.1 SPECIFICATIONS OF NON-"ATEX" PRODUCTS

*STM SpA gearboxes are mechanical devices for industrial use and incorporation in more complex machines. Consequently, they should not be considered neither self-standing machines for a pre-determined application according to 2006/42/CE nor safety devices.*

## 0. ALLGEMEINE INFORMATIONEN

### 0.3 ALLGEMEINE EINSATZHINWEISE

Vor Beginn irgendwelcher Instandhaltungseingriffe MUSS DIE SPANNUNGSVERSORGUNG UNTERBROCHEN WERDEN, da sich im Innenbereich für den Bediener gefährliche Teile in Bewegung befinden. Sich darüber hinaus an folgende Anweisungen halten:

- Eingriffe an der Einheit dürfen nur dem befugten Personal erlaubt werden.
- NIE EINE SICHERHEITSSCHUTZVORRICHTUNG BEFINDLICHE EINHEIT EINSCHALTEN
- Vor Einsatz der Einheit muss man sich darüber vergewissern, dass jegliche, die Sicherheit gefährdende Bedingung in angemessener Weise beseitigt wurde.
- Sicherstellen, dass alle Schutzvorrichtungen sich an ihrem Platz befinden und dass die Sicherheitsvorrichtungen vorhanden und wirksam sind.
- Dafür sorgen, dass im Bedienerbereich keine Fremdkörper vorhanden sind. Jeglicher Instandhaltungseingriff muss an einer von den Energieversorgungsnetzen (Strom, Druckluft, Hydraulik oder anderweitige) getrennten Maschine erfolgen.
- Sollte die Möglichkeit bestehen, von herausgeschleuderten oder herunterfallenden Festkörpern oder ähnlichem getroffen werden zu können, müssen ggf. eine Brille mit seitlichem Schutz, ein Helm oder Handschuhe getragen werden.
- Bei Umgang mit heißem Material kann sich im Hinblick auf ein Verhindern von Handverbrennungen das Anlegen von Schutzhandschuhen oder anderen persönlichen Schutzkleidungsstücken als erforderlich erweisen.
- Auch wenn die Einheit sich nicht als besonders laut erweist, kann sich das Anlegen eines Ohrenschutzes gegen den im Umfeld der Maschine vorliegenden Schalldruck als erforderlich erweisen.

### Schalldruckpegel SPL [dB(A)]

Normale Werte des durchschnittlichen Schalldruckpegels SPL (dB(A)) bei einer Antriebsdrehzahl von 1450 U/min (Toleranz +3 dB(A)). Werte, die aus den Auswertungen der experimentellen Tests, bei denen die Messung in 1 m Entfernung von der Getriebeoberfläche erfolgte, resultieren. Bei Vorliegen einer Zusatzluftkühlung durch Lüfter muss ein Korrekturwert von +2 dB(A) pro Lüfterrad zum Tabellenwert addiert werden. Bei abweichender Antriebsdrehzahl sind die Werte gemäß Tabellenangaben zu addieren. Im Fall besonderer Anforderungen können Getriebe mit einem reduzierten durchschnittlichen Schalldruckpegel geliefert werden. Bitte setzen Sie sich mit unserer technischen Abteilung in Verbindung

### 0.4 PRODUKTSPEZIFIKATIONEN

#### 0.4.1 SPEZIFIKATIONEN FÜR PRODUKTE, DIE NICHT DER "ATEX"-NORM ENTSPRECHEN

Bei den Getrieben der STM SpA handelt es sich um Mechanikorgane, die für den industriellen Einsatz und einen Einbau in komplexere Einrichtungen bestimmt sind. Sie werden deshalb weder unter dem Aspekt unabhängiger, für eine bestimmte Anwendung vorgesehener Maschinen im Sinne der 2006/42/CE, noch als Sicherheitsvorrichtungen berücksichtigt.

## 0. INFORMAZIONI GENERALI



### 0.4.2 SPECIFICHE PRODOTTI "ATEX"

#### 0.4.2.1 Campo applicabilità

La direttiva ATEX (2014/34/UE) si applica a prodotti elettrici e non elettrici destinati a essere introdotti e svolgere la loro funzione in atmosfera potenzialmente esplosiva. Le atmosfere potenzialmente esplosive vengono suddivise in gruppi e zone a seconda della probabilità di formazione. I prodotti STM sono Conformi alla seguente classificazione:

- 1- Gruppo: II
- 2-Categoria: **Gas 2G polveri 2D**
- 3-Zona: **Gas 1 ; 2 – Polveri 21 ; 22**

## 0. GENERAL INFORMATION

### 0.4.2 SPECIFICATIONS OF ATEX PRODUCTS

#### 0.4.2.1 Application field

ATEX set of provisions (2014/34/UE) is referred to electric and non-electric products which are used and run in a potentially explosive environment. The potentially explosive environments are divided into different groups and zones according to the probability of their formation. STM products are in conformity with following classification:

- 1-Group : II
- 2-Type : **Gas 2G dust 2D**
- 3-Zone : **Gas 1 ; 2– Dust 21 ; 22**

## 0. ALLGEMEINE INFORMATIONEN

### 0.4.2 SPEZIFIKATIONEN FÜR "ATEX"-PRODUKTE

#### 0.4.2.1 Anwendungsbereich

Die ATEX-Richtlinie (2014/34/UE) wird bei elektrischen und nicht elektrischen Produkten angewendet, die dazu bestimmt sind, in potentiell explosionsfähigen Atmosphären eingesetzt und betrieben zu werden. Die potentiell explosionsfähigen Atmosphären werden in Abhängigkeit der Wahrscheinlichkeit in Gruppen und Zonen unterteilt. Die STM-Produkte entsprechen der folgenden Klassifizierung:

- 1- Gruppe: II
- 2- Kategorie: **Gas 2G Staub 2D**
- 3- Zone: **Gas 1 ; 2 - Staub 21 ; 22**

Massime temperature di superficiali / Max surface temperature allowed / Maximale Oberflächentemperaturen

Classe di temperatura / Temperature class / Temperaturklasse	Massima temp. di superficie / Max surface temperature / Max. Oberflächentemperaturen (°C)
T1	450
T2	300
T3	200
T4	135
T5 <sup>(1)</sup>	100 <sup>(1)</sup>

Classi di temperatura ATEX dei prodotti STM / ATEX temperature class of STM products / ATEX Temperaturklassen der STM-Produkte

<sup>(1)</sup> Classe di temperatura ATEX ottenibile a richiesta / ATEX temperature class on request / Auf Anfrage erhältliche ATEX-Temperaturklasse

I prodotti STM sono marcati classe di temperatura **T4** per IIG (atmosfera gassosa) e **135° C** per IID (atmosfera polverosa).

STM products are branded temperature class **T4** for IIG (gas environment) and **135°C** for IID (dust environment).

Die STM-Produkte sind mit der Temperaturklasse **T4** für IIG (Atmosphäre mit gasförmiger Belastung) und **135° C** für IID (Atmosphäre mit staubförmiger Belastung) gekennzeichnet.

Nel caso di classe di temperatura **T5** occorre verificare la potenza limite termico declassata (rif. normativa interna **NORM\_0198**, visionabile sul sito web: [www.stmspa.com](http://www.stmspa.com)).

In case of **T5** temperature class it will be necessary to verify the declassified thermal limit power (refer to internal standard **NORM\_0198**, available on the web site: [www.stmspa.com](http://www.stmspa.com)).

Bei der Temperaturklasse **T5** muss die deklassierte thermische Grenzleistung überprüft werden (Bezug auf firmeninterne **NORM\_0198**, abrufbar aus der Website: [www.stmspa.com](http://www.stmspa.com)).

I prodotti del gruppo IID (atmosfera polverosa) vengono definiti dalla massima temperatura di superficie effettiva.

The products of the family IID (dust environment) are defined by the max effective surface temperature.

Die der Gruppe IID (Atmosphäre mit staubförmiger Belastung) angehörigen Produkte werden ihrer effektiven maximalen Oberflächentemperatur gemäß definiert.

La massima temperatura di superficie è determinata in normali condizioni di installazione e ambientali (-20°C e +40°C) e senza depositi di polvere sugli apparecchi. Qualunque scostamento da queste condizioni di riferimento può influenzare notevolmente lo smaltimento del calore e quindi la temperatura.

Max surface temperature is determined in standard installation and environmental conditions (-20°C and +40°C) and in absence of dust on product surface. Any other condition will modify the heat dissipation and consequently the temperature.

Die maximale Oberflächentemperatur wird in normalen Einbau- und Umgebungsbedingungen (-20°C und +40°C) und ohne auf den Vorrichtungen vorhandenen Staubablagerungen bestimmt. Jegliche Abweichung von diesen Bezugsbedingungen kann sich erheblich auf die Wärmeableitung bzw. auf die Betriebstemperatur auswirken.

#### 0.4.2.2 Specifiche di sicurezza

- 1-tappi sfiato (ove previsti) con valvola anti-intrusione
- 2-assenza di superfici o parti di materiale plastico in grado di accumulare cariche elettrostatiche
- 3-applicazione di termometri termosensibili di tipo irreversibile
- 4-per installazioni in atmosfere polverose (zona 2D, Z21, Z22) il committente deve prevedere uno specifico piano di pulizia periodica delle superfici allo scopo di evitare significativi depositi (spessore max 5mm) di materiale o polvere sull'involucro del riduttore.

#### 0.4.2.2 Safety specifications

- 1- breather plugs ( if supplied ) must have a safety valve
- 2- absence of plastic based surfaces or material potentially attracting electrostatic charge
- 3- application of irreversible thermosensitive thermometers
- 4- for installations in dusty environments (zone 2D, Z21, Z22) the client must necessarily arrange for a regular surface cleaning plan intended to prevent significant material/dust deposit (max thickness allowed 5mm) on the gearbox housing.

#### 0.4.2.2 Sicherheitsbestimmungen

- 1- Entlüftungsstopfen (wo vorhanden) mit Schutzventil gegen Eindringen von Fremdkörpern
- 2- Keine Oberflächen oder Teile aus Kunststoffen, die elektrostatische Ladungen speichern können
- 3- Applikation von irreversiblen Thermometern mit Wärmefühler.
- 4- Bei einer Installation in Atmosphären mit staubförmiger Belastung (Zone 2D, Z21, Z22) muss der Auftraggeber eine spezifischen Plan für die regelmäßige Oberflächenreinigung mit dem Ziel erstellen, dass bedeutende Material- oder Staubablagerungen (max. Stärke 5 mm) auf dem Getriebegehäuse vermieden werden.

#### 0.4.2.3 Limiti e condizioni di impiego

Modifiche apportate alla forma costruttiva e/o qualunque intervento (es. smontaggio, riparazione, ecc) apportato al riduttore, non preventivamente autorizzate da STM S.p.A. comportano la decadenza delle condizioni di conformità del prodotto alla direttiva ATEX 2014/34/UE .

#### 0.4.2.3 Limitations and use conditions

Any modification on the gearbox mounting position or execution as well as any intervention (i.e. disassembly, repair, etc.) not previously authorized by STM S.p.A. will cancel the product conformity conditions to ATEX set of provisions 2014/34/UE.

#### 0.4.2.3 Einsatzbedingungen und -einschränkungen

An der Bauform des Getriebes angebrachte Änderungen und/oder jegliche daran erfolgte Eingriffe (z.B. Auseinanderbau, Reparatur, usw.), die ohne eine vorausgehende Genehmigung der STM S.p.A. erfolgt sind, führen zum Verfall der Produktkonformität im Sinne der Richtlinie ATEX 2014/34/UE.



## 0. INFORMAZIONI GENERALI

### 0.4.2.4 Prodotti disponibili

I prodotti disponibili in esecuzione "ATEX" sono:  
 - Vite senza fine (RI,RMI);  
 - Vite senza fine con precoppia (CR,CB);  
 - Ad ingranaggi coassiale (AR, AM /1/2/3);  
 - Ad ingranaggi ortogonale (OR, OM);  
 - Ad ingranaggi parallelo/pendolare (PR,PM).

#### N.B

Sono escluse dalla certificazione tutte le versioni con limitatore di coppia e con motore compatto.

### 0.5 SMALTIMENTI - IMPATTO AMBIENTALE

Particolare attenzione si deve riporre nel recupero o smaltimento dei prodotti e sottoprodotti inerenti all'uso del riduttore.

Tali precauzioni, più precisamente, riguardano:

- Lo smaltimento dell'imballaggio;
  - Lo smaltimento del lubrificante e il recupero delle protezioni in plastica;
  - La rottamazione del prodotto.
- Occorre smaltire tali oggetti secondo le locali disposizioni di legge.  
 Il rifiuto di tipo urbano può essere smaltito nei cassonetti dei rifiuti o attraverso una raccolta differenziata (es. materiali di imballo).  
 Il rifiuto di tipo speciale deve invece essere smaltito secondo le locali disposizioni di legge. Indicativamente, rientrano in codesta fattispecie le parti del riduttore e i lubrificanti.

Prima di rottamare il riduttore occorre svuotarlo del lubrificante, tenendo presente che l'olio esausto ha un forte impatto ambientale. Agli effetti dello smaltimento del prodotto, si considerino i seguenti materiali e sostanze contenute: ghisa, ferro (Fe), alluminio (Al), bronzo, lubrificante, gomma, plastica.

## 0. GENERAL INFORMATION

### 0.4.2.4 Products available

Products available in "ATEX" execution:  
 - Worm screw (RI,RMI);  
 - Worm screw with snug torque (CR,CB);  
 - In-line gear unit (AR, AM /1/2/3);  
 - Helical bevel gear unit (OR, OM);  
 - Parallel shaft/shaft-mounted gear unit (PR,PM).

#### N.B.

All versions with torque limiter and compact motor are excluded from certification.

### 0.5 DISPOSAL – ENVIRONMENT PROTECTION

Special attention must be paid to collection and disposal/recycling of all products and components related to the gearbox.

More in detail, such precautions deal with:

- package recycling
- lubricant and plastic wrapping recycling
- product disposal.

Dispose of above mentioned products according to the local prevailing law.

The standard type of waste can be put into appropriate waste containers for recycling (e.g. packaging) whereas special waste (such as gearbox parts and lubricants) must be disposed of according to the law prescriptions.

Before disposing of the gearbox, the lubricant must be drained out, keeping in mind that dirty oil is highly polluting.

As far as product disposal is concerned, please consider the following materials and elements contained: cast iron, iron (Fe), aluminium (Al), bronze, lubricant, rubber, plastic.

## 0. ALLGEMEINE INFORMATIONEN

### 0.4.2.4 Verfügbare Produkte

In der "ATEX"-Version verfügbare Produkte:  
 - Schneckengetriebe (RI, RMI);  
 - Schneckengetriebe mit Vorstufe (CR,CB);  
 - Stirnradgetriebe (AR, AM /1/2/3);  
 - Kegelradgetriebe (OR, OM);  
 - Parallelwellen-/Aufsteckgetriebe (PR,PM).

#### HINWEIS

Ausgenommen von dieser Zertifizierung sind alle Versionen mit Rutschkupplung und Kompaktmotoren.

### 0.5 ENTSORGUNG - UMWELTBELASTUNG

Besondere Aufmerksamkeit muss bei der Rückgewinnung oder der Entsorgung der mit dem Einsatz des Getriebes verbundenen Produkten und Unterprodukten geübt werden.

Diese Vorsichtsmaßnahmen betreffen insbesondere:

- die Verpackungsentsorgung;
- die Entsorgung des Schmiermittels und die Wiederverwertung der Kunststoffabdeckungen;
- die Verschrottung des Produkts.

Diese Materialien müssen den örtlichen Gesetzen gemäß entsorgt werden.

Der normale Stadtmüll kann in Mülltonnen oder mittels differenzierter Sammlung (Trennmüll) entsorgt werden (z.B. Verpackungsmaterial). Der Sondermüll muss hingegen den gesetzlichen Vorschriften gemäß entsorgt werden. Unter diesen Mülltyp fallen insbesondere die Getriebeteile und die Schmiermittel.

Bevor das Getriebe verschrottet wird, muss das sich darin befindliche Schmiermittel abgelassen werden. Dabei ist zu berücksichtigen, dass das Altöl eine starke Umweltbelastung darstellt. Unter das Argument der Produktentsorgung fallen folgende Materialien und enthaltene Stoffe: Gusseisen, Eisen (Fe), Aluminium (Al), Bronze, Schmiermittel, Gummi, Kunststoff.

## 0. INFORMAZIONI GENERALI

### 0.6 UE Direttive- marcatura CE- ISO9001

#### **Direttiva Bassa Tensione 2014/35/UE**

I motoriduttori, motorivii angolari, motovariatori e i motori elettrici STM sono conformi alle prescrizioni della direttiva Bassa Tensione .

#### **2014/30/UE Compatibilità elettromagnetica**

I motoriduttori, motoriviiangolari, motovariatori e i motori elettrici STM sono conformi alle specifiche della direttiva di Compatibilità Elettromagnetica.

#### **Direttiva Macchine 2006/42/CE**

I motoriduttori, motoriviiangolari, motovariatori e i motori elettrici STM non sono macchine ma organi da installare o assemblare nelle macchine.

#### **Marchio CE, dichiarazione del fabbricante e dichiarazione di conformità.**

I motoriduttori, motovariatori e i motori elettrici hanno il marchio CE.

Questo marchio indica la loro conformità alla direttiva Bassa Tensione e alla direttiva Compatibilità Elettromagnetica.

Su richiesta, STM può fornire la dichiarazione di conformità dei prodotti e la dichiarazione del fabbricante secondo la direttiva macchine.

#### **ISO 9001**

I prodotti STM sono realizzati all'interno di un sistema di qualità conforme allo standard ISO 9001. A tal fine su richiesta è possibile rilasciare copia del certificato.

## 0. GENERAL INFORMATION

### 0.6 UE Directives- CE mark- ISO 9001

#### **Directive 2014/35/UE Low VoltageSTM**

geared motors, right angle drives with motor, motovariators and electric motors meet the specification of the low voltage directive.

#### **2014/30/UE Electromagnetic Compatibility**

STM geared motors, right angle drives with motor, motovariators and electric motors correspond to the specifications of the EMC directive.

#### **Machinery Directive 2006/42/CE**

STM geared motors, right angle drives with motor, motovariators and electric motors are not standalone machines, they are exclusively for installation into a machine or for assembly on a machine.

#### **CE Mark, Conformity Declarations and Manufacturer's Declaration.**

STM geared motors, right angle drives with motor, motovariators and electric motors carry the CE Mark.

It indicates conformity to the low voltage directive and to electromagnetic compatibility directive.

On request STM supplies both the conformity declarations and the manufacturer's declaration according to the machine directive.

#### **ISO 9001**

STM products have been designed and manufactured according to ISO 9001 quality system standard.

On re

## 0. ALLGEMEINE INFORMATIONEN

### 0.6 UE-Richtlinien - CE-Zeichen - ISO9001

#### **Niederspannungsrichtlinie. 2014/35/UE**

Die Getriebemotoren, Winkelgetriebe, Verstellgetriebe und Elektromotoren der STM entsprechen den Vorschriften der Niederspannungsrichtlinie.

#### **2014/30/UE Elektromagnetische**

**Verträglichkeit**  
Die Getriebemotoren, Winkelgetriebe, Verstellgetriebe und Elektromotoren der STM entsprechen den Vorschriften der Richtlinie zur Elektromagnetischen Verträglichkeit.

#### **Maschinenrichtlinie 2006/42/CE**

Die Getriebemotoren, Winkelgetriebe, Verstellgetriebe und Elektromotoren der STM sind keine Maschinen sondern Organe, die in Maschinen eingebaut oder an diesen montiert werden.

#### **CE-Zeichen, Hersteller- und Konformitätserklärung**

Die Getriebemotoren, Verstellgetriebe und Elektromotoren tragen das CE-Zeichen.

Dieses Zeichen weist auf ihre Konformität mit der Niederspannungsrichtlinie und der Richtlinie zur Elektromagnetischen Verträglichkeit hin.

Auf Anfrage kann die STM die Konformitätserklärung und die Herstellererklärung gemäß Maschinenrichtlinie zu den Produkten liefern.

#### **ISO 9001**

Die STM-Produkte werden in einem Qualitätssystem gemäß dem Standard ISO 9001 realisiert. Auf Anfrage kann daher eine Kopie der Zertifizierung geliefert werden.

## 1. NORME DI SICUREZZA

I riduttori vengono progettati, costruiti e commercializzati avvalendosi di tutte le conoscenze tecnologiche e scientifiche attualmente a disposizione. Nell'ottica di un naturale sviluppo delle conoscenze il costruttore si riserva il diritto di modificare componenti al fine di migliorarne efficienza e sicurezza. Non dovranno essere apportate modifiche da parte dell'utilizzatore che ne diminuiscano l'affidabilità variando le condizioni applicative e funzionali di contratto.

I riduttori non devono essere posti in servizio prima che la macchina in cui saranno incorporati sia stata dichiarata conforme alle disposizioni della Direttiva Macchine 2006/42/CE e successivi aggiornamenti.

Il costruttore della macchina deve inglobare le informazioni contenute nel presente manuale con quelle relative alla propria macchina. Prima di effettuare interventi occorre che il riduttore sia fermo e che siano presi tutti i provvedimenti necessari affinché non si abbiano accidentali avviamenti. Occorre prevedere una protezione delle parti rotanti (es. giunti) onde prevenire contatti accidentali.

In presenza di variazioni anomale di temperatura e/o rumorosità, non motivate da variazioni applicative, il riduttore deve essere fermato ed ispezionato per prevenire danneggiamenti più gravi.

Tutte le normative vigenti in termini di inquinamento ambientale, prevenzione e sicurezza devono essere rispettate.



STM SpA dichiara la conformità alla direttiva ATEX 2014/34/UE del solo riduttore. Per quanto attiene il suo utilizzo e incorporazione in un insieme, rimane a cura dell'assemblatore:

1- Verificare che i componenti annessi al riduttore siano normativamente adeguati;  
2- Svolgere l'analisi dei rischi insorgenti dal collegamento a un motore.

Dare corso a tutte le prescrizioni contenute nel presente manuale (in caso contrario decadono le condizioni di validità della certificazione di conformità del prodotto fornita da STM SpA).

Prima di iniziare qualunque attività su riduttori operanti in ambiente con possibile presenza di atmosfera esplosiva, occorre:

1- Sospendere al riduttore l'alimentazione di energia, ponendolo in regime di «fuori servizio»  
2- Accertarsi che non vi siano condizioni di instabilità dell'applicazione tali da generare un avvio involontario o moto inaspettato degli organi meccanici.

Attuare tutte le misure di sicurezza ambientali necessarie per garantire la sicurezza dell'operatore (bonifica da gas e vapori, pulitura da polveri depositate, assenza di sorgenti esterne di innesco, &c.)

## 1. SAFETY RULES

*Our gear units are designed, manufactured and distributed following the technological and scientific knowledge available.*

*In the light of future development of knowledge we reserve the right to introduce modifications to the components in order to further improve efficiency and safety.*

*Unauthorized modifications which may decrease reliability by changing the application conditions specified in the contract, are not allowed.*

*The gear units must not be put into operation until the machine in which they are to be embodied has been declared to be in conformity with the Machinery Directive 2006/42/CE and subs. rev.*

*The machine constructor has to complete the information concerning his machine with that contained in this manual. Before any intervention, the gear unit should be stopped and all necessary precautions should be taken to prevent the accidental start-up. A protection for moving parts (eg.: couplings), should be provided in order to avoid any possible accidental contact.*

*If strange changes in the temperature and/or noise are detected while running the gear unit and are not due to application variations, the gear unit should be stopped and checked to prevent more serious damages.*

*All regulations in force concerning environment pollution, caution and safety must be respected.*

*STM SpA herewith states conformity with ATEX 2014/34/UE provisions only for the gearbox. As far as its usage and incorporation in a more complex machinery is concerned, this will have to be eventually provided by the installer:*

*1- Always verify that components connected to the gearbox are appropriate and comply with the relevant provisions;  
2- Develop the analysis of the potential risks relating to connection with a motor.*

*Comply with all provisions specified in this booklet (if not, the conditions of validity of the product conformity certification supplied by STM SpA will be null and void).*

*Before starting up any activity on gearboxes operating in potentially explosive environments you need to:*

*1- Disconnect the gearbox from any power source by setting it in "out of service" condition.  
2- Make sure that an unintentional start-up or motion of the application will not take place in any case.*

*Carry out all the environmental safety precautions to grant the safety of the operator (degassing, dust cleaning, make sure of the absence of external elements that could trigger a fire).*

## 1. SICHERHEITSVORSCHRIFTEN

Die Getriebe werden unter Anwendung der momentan zur Verfügung stehenden technologischen und wissenschaftlichen Kenntnisse entworfen, hergestellt und gehandelt. Im Sinne einer natürlichen Entwicklung dieser Kenntnisse behält sich der Hersteller das Recht vor, die Komponenten im Hinblick auf die Verbesserung der Leistungsfähigkeit und Sicherheit ändern zu können. Der Benutzer darf keine Änderungen vornehmen, die zu einer Minderung der Zuverlässigkeit führen und damit eine Veränderung der Anwendungs- und Funktionsbedingungen zur Folge haben.

Die Getriebe dürfen nicht in Betrieb gesetzt werden, bevor die Maschine, in die sie eingebaut werden sollen, den Voraussetzungen der Maschinenrichtlinie 2006/42/CE und späteren Aktualisierungen als konform erklärt wurde.

Der Hersteller der Maschine muss die in diesem Handbuch enthaltenen Informationen in die seine Maschine betreffenden einbeziehen. Vor dem Beginn von Eingriffen muss das Getriebe zum Stillstand gebracht werden. Darüber hinaus müssen alle Vorkehrungen getroffen werden, die erforderlich sind, dass es nicht zufällig wieder eingeschaltet werden kann. Die sich im Umdrehung befindlichen Teile (z.B. Kupplungen) müssen mit Schutzabdeckungen versehen werden, um einen zufälligen Kontakt zu vermeiden.

Sollte es zu anomalen Temperaturschwankungen und/oder abweichenden Geräuschen kommen, die nicht durch Änderungen der Anwendung begründbar sind, muss das Getriebe gestoppt und geprüft werden, um schwerere Schäden zu vermeiden. Alle im Sinne der Umweltbelastung, der Unfallvorsorge und Sicherheit gültigen Richtlinien müssen eingehalten werden.

STM SpA erklärt ausschließlich für das Getriebe die Konformität mit der Richtlinie ATEX 2014/34/UE. Was seinen Einsatz und sein Einfügen in eine Gesamtheit anbelangt, unterliegen dem Monteur folgende Aufgaben:

1- Überprüfen, dass die mit dem Getriebe verbundenen Komponenten den Bestimmungen gemäß geeignet sind.

2- Erstellen einer Analyse der aus dem Anschluss an einen Motor resultierenden Gefahren.

Umsetzung der in diesem Handbuch enthaltenen Vorschriften (andernfalls kommt es zum Verfall der Gültigkeitsbedingungen der von STM SpA gelieferten Konformitätsbescheinigung).

Vor Beginn jeglicher Tätigkeit an Getrieben, die in Umgebungen eingesetzt werden, in denen die Möglichkeit einer explosionsfähigen Atmosphäre besteht, muss:

1- die Energieversorgung des Getriebes unterbrochen werden, indem man es im den Zustand "Außer Betrieb" versetzt;

2- sichergestellt werden, dass die Applikation keine Instabilität aufweist, die zu einem versehentlichen Anlauf oder einer Bewegung der mechanischen Organe führen könnten.

Alle Sicherheitsmaßnahmen für die Umgebung umsetzen, die zur Gewährleistung der Bediener-sicherheit erforderlich sind (Abgas- und Dampf-abzug, Beseitigung der Staubablagerungen, keine externen Auslösequellen, usw.)



## 2. IDENTIFICAZIONE

### 2.0 IDENTIFICAZIONE PRODOTTO

Le istruzioni di carattere generale riportate nel seguente manuale sono valide per tutti i riduttori riportati nella tabella seguente. Nella tabella seguente sono indicati anche i riferimenti specifici dei prodotti/documentazione tecnica disponibile.

## 2. IDENTIFICATION






### 2.0 PRODUCT IDENTIFICATION

The general instructions given in this booklet apply to all gearboxes included in the following table. The table below also makes specific reference to available products/technical literature.

## 2. KENNZEICHNUNG

### 2.0 PRODUKTIDENTIFIZIERUNG

Die in diesem Handbuch gegebenen Anleitungen mit allgemeinem Charakter treffen für alle Getriebe aus der nachstehenden Tabelle zu. In dieser Tabelle werden auch die spezifischen Produktbezüge/verfügbaren Technischen Unterlagen angegeben.

Prodotto <i>Product</i> Produkt	Descrizione Prodotto <i>Product Description</i> Produktbeschreibung	Linea Prodotto <i>Product Line</i> Produktlinie	Linea Mercato <i>Market Line</i> Markt	Catalogo Tecnico/ <i>Technical Catalogue/Technischer Katalog</i> Designazione/ <i>Description/Bezeichnung</i> Dati Tecnici/ <i>Specifications/Technische Daten</i> Dimensioni/ <i>Dimensions/Baugrößen</i> <a href="http://www.stmspa.com">URL:www.stmspa.com</a>		Note/ <i>Notes/Notizen</i>
				Codice <i>Part number</i> Art.-Nr.	Sezione <i>Section</i> Abschnitt	
	Lineare In line Linear	HIGH TECH LINE	Heavy Duty	CT26IGBDR..	A B C D E	
	Ortagonale Bevelgear Kegelgetriebe					
	Riduttore Accoppiato Combined gearbox Kombiniertes Getriebe					
	Posizioni di montaggio Mounting positions Einbaulagen					
	EX - SLEWING	HIGH TECH LINE	Heavy Duty Slewing	CT30IGBDR..	A	



## 2.IDENTIFICAZIONE

### 2.1 TARGHETTA

La targhetta contiene le principali informazioni tecniche relative alle caratteristiche funzionali e costruttive ne definisce i limiti applicativi contrattuali; deve perciò essere mantenuta integra e visibile.

Qualora la targa si deteriori e/o non sia più leggibile, anche in un solo degli elementi informativi riportati, si raccomanda di richiederne un'altra al costruttore, citando i dati contenuti nel presente manuale, e provvedere alla sua sostituzione.

**Tipo:** identificazione riduttore  
**M:** Posizione di montaggio  
**Rapporto:** rapporto trasmissione  
**Data:** data produzione  
**Codice:** codice prodotto  
**OL/WO:** Work order

## 2. IDENTIFICATION

### 2.1 IDENTIFICATION PLATE

*The identification plate features main technical details concerning its operation and construction and sets its intended application; it is thus very important to keep it in good condition and in a visible place.*

*Should the identification plate wear and/or become damaged so as to affect its readability or that of even one of the items of information thereon, the User must request a new nameplate from the Manufacturer, quoting the information given in this manual, and replace the old one.*

**Type:** gearbox description  
**M:** mounting position  
**Ratio:** reduction ratio  
**Date:** production date  
**Code:** product code  
**OL/WO:** Work order number

Tipo/Type		M
Rapp./Ratio	Data/Date	
Cod./Code	OL/WO	
S.T.M.		BOLOGNA Made in Italy

## 2. KENNZEICHNUNG

### 2.1 TYPENSCHILD

Auf dem Schild werden die wesentlichen technischen Informationen zur den Betriebs- und Konstruktionseigenschaften gegeben, durch die die vertraglichen Anwendungsgrenzen definiert werden. Es muss daher immer leserlich und unbeschädigt sein.

Sollte sich das Schild als verschlissen erweisen und/oder die darauf angegebenen Daten, auch nur einer Information, nicht mehr leserlich sein, sollte beim Hersteller unter Angabe der in diesem Handbuch enthaltenen Daten ein neues Schild angefordert und für seinen Austausch gesorgt werden.

**Typ:** Getriebebezeichnung  
**M:** Einbaulage  
**Übersetzung:** Übersetzungsverhältnis  
**Datum:** Produktionsdatum  
**Code:** Artikelnummer  
**OL/WO:** Work order

### 2.2 TARGHETTA ATEX



Nel caso in cui i prodotti forniti siano certificati secondo la Direttiva ATEX è fornita una ulteriore targhetta nella quale sono riportate le seguenti informazioni.

**OL/WO:** Work order  
**ATEX:** Gruppo, categoria, classe di temperature o temperature superficiale massimae  
**P1:** Potenza massima applicabile  
**N1:** numero giri Massimo in ingresso  
**FT\_ATEX\_REV\_:** Riferimento documentazione interna "ATEX".

Marcatura CE  
 1-Limiti ambientali: temp. ambiente compresa tra -20 °C e +40°C  
 2-Temperatura superficiale massima: T4 per 2G e 135°C per 2D.  
 È possibile, a richiesta e previa verifica potenza applicabile declassata, la certificazione per la classe di temperatura T5 per 2G e 100°C per 2D

### 2.2 ATEX IDENTIFICATION PLATE

*If the supplied products are certified according to ATEX Directive, a further nameplate is supplied containing the following information.*

**OL/WO:** Work order number  
**ATEX:** Family, type, temperature class or max surface temperature  
**P1:** max input power allowance  
**N1:** max input speed allowance  
**FT\_ATEX\_REV\_:** Reference to "ATEX" internal paperwork

CE marking  
 1-Environmental limits: environmental temperature between -20°C and +40°C  
 2-Max surface temperature allowed: T4 for 2G and 135°C for 2D.  
 It is possible, upon request and verification of the declassified allowed power, to certify the temperature class T5 for 2G and 100°C for 2D.

### 2.2 "ATEX"-TYPENSCHILD

Sollte es sich bei den gelieferten Produkten um der ATEX-Richtlinie gemäß zertifizierte Produkte handeln, wird ein weiteres Typenschild geliefert, auf dem folgende Informationen gegeben werden.

**OL/WO:** Work order  
**ATEX:** Gruppe, Kategorie, Temperaturklasse oder maximale Oberflächentemperatur  
**P1:** Max. applizierbare Leistung  
**N1:** Max. Antriebsdrehzahl  
**FT\_ATEX\_REV\_:** Bezug auf firmeninterne "ATEX"-Unterlagen.

CE-Kennzeichnung  
 1 - Umgebungsgrenzwerte: Umgebungstemp. zwischen -20 °C und +40°C  
 2- Max. Oberflächentemperatur: T4 für 2G und 135°C für 2D.  
 Auf entsprechende Anfrage und nach Prüfung der deklassifizierten applizierbaren Leistung, kann eine Zertifizierung für die Temperaturklasse T5 für 2G und 100°C für 2D gegeben werden.

OL/WO	
CE (Ex)	
P1	N1
FT_ATEX_REV	
S.T.M.	BOLOGNA Made in Italy





### 3. STATO DI FORNITURA

#### 3.1 VERNICIATURA E PROTEZIONE

I riduttori sono verniciati esternamente con fondo antiossidante all'acqua di colore rosso, salvo disposizioni contrattuali diverse

La protezione è idonea a resistere a normali ambienti industriali anche esterni, e a consentire finiture ulteriori con vernici sintetiche.

Per maggiori informazioni relative allo stato di fornitura vedere la tabella seguente

#### 3.1.1 Caratteristiche della Vernice

Nel caso si prevedano condizioni ambientali particolarmente aggressive occorre adottare prodotti adeguati apposti con opportuno ciclo di verniciatura. In questi casi si suggerisce di concordare il ciclo in fase di ordine. (TYP0-TYP1-TYP2 - TYP3 - TYP4).

#### ATTENZIONE

In caso di verniciatura dei prodotti, si devono preservare da tale trattamento i piani lavorati e le tenute, al fine di evitare che la vernice ne alteri le caratteristiche chimico-fisiche e pregiudichi l'efficienza dei paraolio. Occorre analogamente preservare la targa di identificazione, e proteggere contro l'occlusione il tappo di livello dell'olio e il foro del tappo di sfiato (ove esistenti).

### 3. SCOPE OF THE SUPPLY

#### 3.1 PAINTING AND PROTECTION

The gear units are externally painted with a red water-base antioxidising undercoat, unless different contractual instructions are given.

The protection is suitable to stand normal industrial environments, also outdoors, and allows additional synthetic paint finishes.

For further details about the supply conditions, please refer to the following table

#### 3.1.1 Paint features

In case of particularly aggressive weather condition it is necessary to paint the gearboxes with a special painting cycle. We suggest you to specify your requests while ordering our products. (TYP0-TYP1-TYP2 - TYP3 - TYP4).

#### ATTENTION

If the product must be painted, protect the machined surfaces and oil seals/gaskets in order to prevent any damage. It is also necessary to protect the identification plate, the oil level plug (if fitted) and the hole in the breather plug (if fitted) against obstruction.

### 3. LIEFERZUSTAND

#### 3.1 LACKIERUNG UND SCHUTZ

Außen mit einer roten Rostschutzgrundierung auf Wasserbasis lackiert, vorbehaltlich abweichender vertraglicher Vereinbarungen.

Dieser Schutz ist für einen Einsatz in normalen industriellen, auch im Freien liegenden Umfeldern geeignet und erlaubt Überlackierungen mit Synthetiklack.

Weitere Informationen zum Lieferzustand können der folgenden Tabelle entnommen werden.

#### 3.1.1 Eigenschaften der Lackierung

Bei besonders aggressiven Umweltbedingungen müssen hierfür geeignete Produkte mit den entsprechenden Lackierzyklen verwendet werden. In diesen Fällen wird vorgeschlagen, dass Sie den Zyklus in der Auftragsphase vereinbaren. (TYP0-TYP1-TYP2 - TYP3 - TYP4).

#### ACHTUNG

Sollten die Produkte lackiert werden, muss darauf geachtet werden, dass die bearbeiteten und Dichtflächen dabei geschützt werden, so dass verhindert werden kann, dass die Lackierung die chemisch-physischen Eigenschaften verändert und die Wirkung der Öabdichtungen einschränkt. In der gleichen Weise und aus gleichem Grund müssen das Typenschild und die Öleinfüllschraube sowie die Bohrung der Entlüftungsschraube (wo vorhanden) geschützt werden.

OPT2 Options - Painting and surface protection					
Serie Series Baureihe	Verniciatura Interna Inner painting Innenlackierung	Verniciatura Esterna Outer painting Außenlackierung		Piani lavorati Machined surfaces Bearbeitete Flächen	Alberi Shafts Wellen
		Tipo e Caratteristiche vernice Paint type and features Lacktyp und -eigenschaften	Verniciabile Can be painted Kann lackiert werden		
<b>TypEX</b>					
<b>EX EXB EX.</b>	Uguale a verniciatura esterna Same as outer painting Wie Außenlackierung	Fondo antiossidante all'acqua di colore rosso, a red water-base antioxidising undercoat, Roten Rostschutzgrundierung auf Wasserbasis lackiert	Si	Quando il materiale è la ghisa sono protetti con prodotto antiossidante. When material is cast iron, they are protected by oxide protectant. Falls aus Gusseisen mit Rostschutzpaste geschützt.	Protetti con antiruggine. Protected by oxide protectant. Mit Rostschutzpaste geschützt.

#### 3.2 LUBRIFICAZIONE

Per i dati relativi allo stato di fornitura dei riduttori per quanto riguarda la lubrificazione si rimanda al paragrafo relativo alla lubrificazione.

#### ATTENZIONE:

Lo stato di fornitura è messo in evidenza con una targhetta adesiva posta sul riduttore. Verificare la corrispondenza tra stato di fornitura e targhetta adesiva.

Catalogo Tecnico  
CT 26..  
CT 30..

[URL:www.stmspa.com](http://www.stmspa.com)

#### 3.2 LUBRICATION

Please refer to the paragraph about lubrication for further details on state of supply of gearboxes as far as lubrication is concerned.

#### CAUTION:

Gearbox state of supply is indicated on a nameplate applied on gearbox. Ensure that nameplate data and state of supply correspond.

Technical Catalogue  
CT 26..  
CT 30..

[URL:www.stmspa.com](http://www.stmspa.com)

#### 3.2. SCHMIERUNG

Die sich auf die Schmierung beziehenden Daten bezüglich dem Lieferzustand der Getriebe verweisen wir auf den Paragraph "Schmierung".

#### ACHTUNG:

Der entsprechende Lieferzustand wird auf einem Aufkleber am Getriebe angegeben. Überprüfen Sie die Übereinstimmung zwischen effektivem Lieferzustand und Aufkleber.

Technischer Katalog  
CT 26..  
CT 30..

[URL:www.stmspa.com](http://www.stmspa.com)



### 3. STATO DI FORNITURA

#### 3.3 CONNESSIONE MOTORE/RIDUTTORE CON GIUNTO STM/ROTEX

Qualora la connessione tra riduttore e macchina motrice sia effettuata con un giunto è necessario verificare se è necessario montare un linguetta di dimensioni a disegno STM.

La linguetta e la targhetta nella quale sono riportate le istruzioni di montaggio sono allegate ad ogni fornitura.

Qualora non fornite segnalare il problema al Nostro Ufficio Commerciale ed attenersi alle istruzioni di installazione riportate nello specifico paragrafo.

#### 3.4 VERIFICHE

Compete al ricevente controllare che i dati di targa corrispondano all'ordine effettuato, che il prodotto sia integro e non abbia subito danni durante il trasporto.

Per avarie o rotture dovute a danni imputabili al trasporto, il destinatario dovrà sporgere immediata contestazione direttamente al vettore od avvisare il nostro Ufficio Commerciale.

Il materiale danneggiato non deve essere installato o messo in funzione per evitare rischi di funzionamento pericoloso.

Gli alberi recano delle protezioni di sicurezza in plastica e opportuni avvolgimenti di nastro isolante per il fissaggio della linguetta; l'estremità dell'albero e le superfici lavorate sono protette con pasta antiossidante.

Questi allestimenti non devono essere rimossi se non al momento dell'installazione.

#### 3.5 IMBALLAGGIO

Il prodotto viene consegnato imballato in contenitori di cartone, in alcuni casi avvolto o protetto con materiali di riempimento e di recupero degli spazi vuoti.

Gli imballi di peso superiore a 30 kg sono provvisti di bancale in legno, per essere facilmente movimentati tramite carrello a forche.

Le confezioni di imballaggio non devono essere sovrapposte.

Nel reimballare per qualunque motivo il prodotto, occorre utilizzare ovunque possibile l'imballo originale (del quale si consiglia la conservazione) e comunque curare particolarmente la protezione delle superfici e delle parti di accoppiamento.

Il trasporto va quindi effettuato nelle predette condizioni, e proteggendo il prodotto contro urti e altre significative sollecitazioni meccaniche, la polvere e lo sporco.

### 3. SCOPE OF THE SUPPLY

#### 3.3 CONNECTING THE MOTOR AND GEARBOX WITH STM/ROTEX JOINT

*If gearbox and driving machine are connected by means of a joint, check whether it is necessary to install a key sized as specified on STM drawing.*

*Key and nameplate indicating assembly instructions come with any supply.*

*Should they be missing, report this problem to our Sales Dept. and follow the installation instructions given in the relevant paragraph.*

#### 3.4 INSPECTIONS

*The person receiving the goods is in charge of checking that the data on the nameplate correspond to the goods ordered, that the product is complete and has not suffered damage during transportation.*

*The recipient shall immediately claim to the carrier any failure or faults due to transport damage or report to our Sales Department.*

*Any damaged material shall not be installed or operated to avoid any risk and danger.*

*The shafts are delivered with plastic safety protections and the keys are appropriately taped to the shafts. Shafts and machined parts are protected by oxide protectant.*

*These protections must not be removed unless before installation.*

#### 3.5 PACKING

*The products are delivered packed in cardboard boxes, in some cases wrapped or protected with appropriate material to fill empty areas inside boxes.*

*Packages over Kg. 30 are set on wooden pallets and are easily handled by fork lift truck.*

*Do not stack packages.*

*Should it be necessary to pack the equipment again, do not forget to use the original packaging (that should be kept after first unpacking) and take special care to protect the surfaces and the coupling shafts.*

*Only transport the device if it is suitably packed and protected against shocks, dust and dirt.*

### 3. LIEFERZUSTAND

#### 3.3 VERBINDUNG ZWISCHEN MOTOR UND GETRIEBE ÜBER KUPPLUNG STM/ROTEX

Bei Verbindung zwischen Getriebe und Antriebseinheit über eine Kupplung muss überprüft werden, ob ein Federkeil gemäß STM-Maßzeichnung erforderlich ist.

Der Federkeil und das Schild, auf dem die Montageanleitung wiedergegeben wird, sind im Lieferumfang enthalten.

Sollten sie nicht angeliefert werden, muss dies unserer Verkaufsabteilung mitgeteilt werden. Für die Installation muss man sich dann an die Anleitungen im spezifischen Paragraph halten.

#### 3.4 ÜBERPRÜFUNGEN

Der Empfänger muss kontrollieren, dass die auf dem Typenschild angegebenen Daten dem übermittelten Auftrag entsprechen, dass das Produkt unbeschädigt ist und während des Transports keine Schäden entstanden sind.

Im Fall von Defekten oder Schäden, die sich auf den Transport zurückführen lassen, muss der Empfänger sofort und direkt beim Frachtführer Beanstandung erstatten oder unsere Verkaufsabteilung informieren.

Beschädigtes Material darf nicht eingebaut oder in Betrieb gesetzt werden, so dass ein gefährlicher Betrieb vermieden werden kann.

Die Wellen sind mit Schutzkappen aus Kunststoff versehen und mit Isolierband umwickelt, durch das der Federkeil fixiert wird. Das Wellenende und die bearbeiteten Flächen werden mit Rostschutzpaste geschützt. Diese Ausstattungen müssen spätestens bei der Installation entfernt werden.

#### 3.5 VERPACKUNG

Das Produkt wird in Kartons verpackt, in einigen Fällen im eingewickelten Zustand oder durch Füllmaterial zum Ausfüllen der Freiräume geschützt geliefert.

Packungen mit einem Gewicht über 30 kg werden auf eine Holzpalette gepackt, so dass sie einfach mit einem Gabelstapler transportiert werden können.

Die Verpackungen dürfen nicht gestapelt werden.

Sollte sich ein erneutes Verpacken des Produkts aus irgendwelchen Gründen als erforderlich erweisen, sollte soweit wie möglich die Originalverpackung (die deshalb aufbewahrt werden sollte) verwendet und insbesondere auf den Schutz der Ober- und Passflächen geachtet werden.

Der Transport muss unter den angegebenen Bedingungen erfolgen. Dabei muss das Produkt vor Stößen und anderen mechanischen bedeutenden Belastungen, Staub und Schmutz geschützt werden.



#### 4. SOLLEVAMENTO TRASPORTO

Il sollevamento ed il trasporto dell'unità devono essere eseguiti con prudenza per evitare pericolose cadute o ribaltamenti. Per il trasporto si può utilizzare un carrello a forche d'adeguata portata.

Le modalità e mezzi per la movimentazione del prodotto devono essere predisposti dall'utilizzatore nel quadro del proprio sistema di sicurezza nel luogo di lavoro e conformemente alle disposizioni prevenzionali vigenti. Compete in particolare a quegli la corrispondente valutazione dei rischi dorso-lombari incombenti sugli addetti, che può imporre mezzi meccanici di sollevamento e/o altri ausili anche per masse consistentemente inferiori ai 30Kg menzionati poco oltre.

I mezzi di sollevamento e movimentazione utilizzati devono essere scelti in relazione alle caratteristiche del prodotto ed essere conformi alle disposizioni regolamentari applicabili. Per la movimentazione del prodotto imballato è necessario prevedere idonei dispositivi di sollevamento per i colli di peso superiore ai 30 Kg, adottando in ogni caso cautele contro il verificarsi di urti sulle superfici delle parti di accoppiamento. Per la movimentazione del prodotto non imballato, si può utilizzare, nei casi in cui è previsto, l'apposito golfare, ponendo mente alla sua idoneità al sollevamento del singolo prodotto e non del complesso di organi a cui esso può essere connesso. Diversamente, i prodotti non imballati, di peso superiore ai 30 Kg e sprovvisti di golfare devono essere movimentati tramite gru/paranco e imbracatura.

Nel caso di motoriduttori è consigliabile agganciare anche il motore visto che lo spostamento del centro di gravità è molto variabile con la tipologia. Nella tabella sono riportate le masse indicative riduttori di serie privi di lubrificante (kg).

#### 4. LIFTING AND HANDLING

*The unit must be lifted and handled carefully to avoid dangerous tilting or fall of the unit. It is possible to use a fork lift truck of suitable capacity for handling the unit.*

*In full respect of the existing appropriate legislation, the user must use appropriate tools for correctly handling the products in accordance with his own safety system. His task is also to evaluate back-lumbar risks for the operators which eventually might imply the use of mechanical lifting devices and/or other tools for even lighter weights than Kg. 30 previously mentioned.*

*Lifting and handling equipment must be selected depending on the product specifications but always in full conformity with applicable safety legislation. For handling the packed product it is necessary to arrange suitable lifting equipment for packages over 30 Kg, making sure to adequately protect product surfaces and connecting parts against shocks. For handling the unpacked product, it is advisable to use the appropriate eyebolt (where provided), remembering that it is intended to lift just the product itself and not the overall machinery. While, in case of unpacked products over 30 Kg. and with no eyebolt, they must be lifted and handled through cranes/hoists and slings.*

*When geared motors are handled it is recommended to connect the motor on the gear unit since the centre of gravity may very much vary according to the type. Approximate weights of standard gearboxes without lubricant (kg).*

#### 4. HEBEN UND TRANSPORT

Das Heben und das Befördern der Einheit müssen mit entsprechender Umsicht erfolgen, so dass ein mit Gefahren verbundenes Herunterfallen oder Umkippen vermieden werden können. Für den Transport kann ein Gabelstapler mit ausreichender Tragfähigkeit verwendet werden.

Die Verfahrensweisen und Transportmittel für die Bewegung des Produkts müssen vom Benutzer im Rahmen seines am Arbeitsplatz geltenden Sicherheitssystems und den geltenden Vorsorgerichtlinien konform ausgelegt werden. Ihnen unterliegt auch die entsprechende Bewertungspflicht der für den Oberkörperbereich der Zuständigen bestehenden Gefahren, was einen Einsatz von mechanischen Hebevorrichtungen und/oder anderen Hilfsmitteln auch im Fall von Massen, die unter den genannten 30 kg liegen erforderlich machen kann.

Die eingesetzten Hebe- und Transportmittel müssen in Abhängigkeit zu den Produkteigenschaften gewählt werden und den anwendbaren Regelvorschriften konform sein. Für das Bewegen des verpackten Produkts bzw. für Frachtstücke mit einem Gewicht über 30 kg müssen angemessene Hebemittel verwendet werden. Dazu müssen auf alle Fälle Vorsichtsmaßnahmen gegen Anstöße gegen die Passungsflächen getroffen werden. Für den Transport des unverpackten Produkts kann wo vorgesehen die entsprechende Transportöse verwendet werden. Dabei muss ihre Eignung für das Heben des Einzelprodukts abgewägt werden und nicht der Einheit, mit der es verbunden sein könnte. Unverpackte Produkte mit einem Gewicht über 30 kg und ohne Transportöse müssen dagegen mit einem Kran oder einer Hebewinde und entsprechender Hebesaile bewegt werden.

Bei Getriebemotoren wird empfohlen, auch den Motor zu verankern, da der Schwerpunkt dem Typ entsprechend stark variiert.

In der Tabelle werden die Richtgewicht der serienmäßigen Getriebe ohne Schmiermittel angegeben (kg).




4. SOLLEVAMENTO TRASPORTO

4. LIFTING AND HANDLING

4. HEBEN UND TRANSPORT

OUTPUT VERSION Kg	PD-PN	ND-RD NN-RN	LD LN	KD-MD-M XD KN-MN-M XN	TD-TN	FS-FP	F-FB	FC FU-FCB	
10	101	25	16	15	17	—	12	15	16
	102	30	20	19	21	—	16	19	19
	103	34	23	22	24	—	19	22	22
	104	39	27	26	28	—	23	26	26
20	201	29	19	18	20	—	15	18	18
	202	33	22	21	23	—	18	21	21
	203	37	26	25	27	—	22	25	25
	204	42	30	29	31	—	26	29	29
25	251	31	21	20	22	—	17	20	20
	252	35	24	23	25	—	20	23	23
	253	39	28	27	29	—	24	27	27
	254	44	32	31	33	—	28	30	31
30	301	46	35	—	38	40	26	33	34
	302	54	41	—	44	46	32	39	40
	303	58	45	—	48	50	36	43	44
	304	63	49	—	52	54	40	47	48
35	351	47	36	—	39	41	27	34	35
	352	55	42	—	45	47	33	40	41
	353	59	46	—	49	51	37	44	45
	354	64	50	—	53	55	41	48	49
40	402	55	42	—	45	47	33	40	41
	403	60	46	—	49	51	37	44	45
	404	64	50	—	53	55	41	48	49
50	501	50	38	—	41	43	29	36	37
	502	57	44	—	47	49	35	42	43
	503	62	48	—	51	53	39	46	47
	504	66	52	—	55	57	43	49	50
70	701	52	40	—	43	45	31	38	39
	702	59	46	—	49	51	37	44	45
	703	64	50	—	53	55	41	48	49
	704	68	54	—	57	59	45	52	53
80	801	86	62	—	64	73	41	59	60
	802	96	72	—	74	86	51	68	70
	803	100	76	—	78	95	55	72	74
	804	104	80	—	82	101	59	76	78
90	902	113	103	81	—	110	63	98	100
	903	117	107	85	—	120	67	102	104
	904	121	111	89	—	125	71	105	108
95	952	114	104	82	—	111	64	99	101
	953	118	108	86	—	121	68	103	105
	954	122	112	90	—	126	72	106	109
100	1001	104	94	74	—	100	54	89	91
	1002	116	106	84	—	114	66	101	103
	1003	120	110	88	—	124	70	105	107
	1004	124	114	92	—	131	74	108	111


**4. SOLLEVAMENTO TRASPORTO**
**4. LIFTING AND HANDLING**
**4. HEBEN UND TRANSPORT**

OUTPUT VERSION 	PD PN	ND RD NN RN	SD SBD SN SBN	HD HN	TD TN	XD XN	FS FSR	SFD	FU	SU	HU FCB	PSD PSBD PSN PSBN	PHD PHN	PXD PXN	
150	1501	143	116	—	105	120	132	75	—	110	—	100	—	133	160
	1502	154	127	—	116	132	143	86	—	121	—	110	—	144	171
	1503	163	136	—	125	143	152	95	—	129	—	119	—	153	180
	1504	171	144	—	133	150	160	103	—	137	—	126	—	161	188
180	1802	156	129	—	118	135	145	88	—	123	—	112	—	146	173
	1803	165	138	—	127	145	154	97	—	131	—	121	—	155	182
	1804	173	146	—	135	152	162	105	—	139	—	128	—	163	190
200	2001	145	118	—	107	122	134	77	—	112	—	102	—	135	162
	2002	158	133	—	120	136	147	90	—	125	—	114	—	148	175
	2003	167	142	—	129	146	156	99	—	133	—	123	—	157	184
	2004	175	150	—	137	155	164	107	—	141	—	130	—	165	192
250	2501	—	—	—	170	169	—	145	—	—	—	160	—	212	—
	2502	—	—	—	186	216	—	161	—	—	—	176	—	228	—
	2503	—	—	—	197	228	—	173	—	—	—	188	—	239	—
	2504	—	—	—	204	237	—	179	—	—	—	194	—	246	—
280	2802	—	—	—	198	229	—	173	—	—	—	188	—	240	—
	2803	—	—	—	209	244	—	185	—	—	—	200	—	251	—
	2804	—	—	—	216	254	—	191	—	—	—	206	—	258	—
300	3001	—	—	—	175	201	—	150	—	—	—	166	—	217	—
	3002	—	—	—	200	274	—	175	—	—	—	190	—	242	—
	3003	—	—	—	211	286	—	187	—	—	—	202	—	253	—
	3004	—	—	—	218	294	—	193	—	—	—	208	—	260	—
350	3501	—	—	190	—	—	—	165	—	—	180	—	251	—	—
	3502	—	—	250	—	—	—	228	—	—	240	—	316	—	—
	3503	—	—	270	—	—	—	248	—	—	260	—	336	—	—
	3504	—	—	280	—	—	—	260	—	—	270	—	346	—	—
360	3602	—	—	271	—	—	—	246	—	—	256	—	332	—	—
	3603	—	—	291	—	—	—	266	—	—	276	—	364	—	—
	3604	—	—	301	—	—	—	276	—	—	286	—	369	—	—
420	4201	—	—	210	—	—	—	170	—	—	194	—	270	—	—
	4202	—	—	287	—	—	—	250	—	—	272	—	348	—	—
	4203	—	—	307	—	—	—	270	—	—	292	—	380	—	—
	4204	—	—	317	—	—	—	280	—	—	302	—	385	—	—
360	6002	—	—	337	—	—	—	300	—	—	322	—	398	—	—
	6003	—	—	357	—	—	—	320	—	—	342	—	430	—	—
	6004	—	—	367	—	—	—	330	—	—	352	—	435	—	—
650	6501	—	—	260	—	—	—	240	—	—	250	—	350	—	—
	6502	—	—	400	—	—	—	380	—	—	390	—	490	—	—
	6503	—	—	445	—	—	—	430	—	—	440	—	536	—	—
	6504	—	—	460	—	—	—	440	—	—	450	—	550	—	—
800	8002	—	—	524	—	—	—	440	—	—	450	—	640	—	—
	8003	—	—	580	—	—	—	495	—	—	505	—	700	—	—
	8004	—	—	600	—	—	—	511	—	—	521	—	715	—	—
850	8501	—	—	380	—	—	—	300	—	—	310	—	500	—	—
	8502	—	—	524	—	—	—	440	—	—	450	—	640	—	—
	8503	—	—	580	—	—	—	495	—	—	505	—	700	—	—
	8504	—	—	600	—	—	—	511	—	—	521	—	715	—	—



4. SOLLEVAMENTO TRASPORTO

4. LIFTING AND HANDLING

4. HEBEN UND TRANSPORT


OUTPUT VERSION 	SD SBD SN SBN	FS FSR	SFD	SU	PSD PSBD PSN PSBN	
1000	10001	510	405	—	415	645
	10002	720	615	—	625	860
	10003	786	680	—	690	920
	10004	800	695	—	705	940
1200	12001	590	425	—	435	730
	12002	800	636	—	646	940
	12003	870	693	—	706	1000
	12004	880	711	—	721	1020
1500	15002	900	636	910	646	1070
	15003	975	693	990	706	1160
	15004	995	711	1010	721	1180
1600	16001	693	560	710	565	880
	16002	930	790	940	795	1100
	16003	1005	870	1020	875	1190
	16004	1025	890	1040	895	1210
2000	20001	720	580	730	585	900
	20002	1010	875	1025	880	1292
	20003	1150	1010	1160	1015	1330
	20004	1200	1058	1208	1063	1380
2500	25003	1720	1440	1640	1428	2110
	25004	1780	1496	1695	1484	2166
2600	26001	1170	890	1090	876	1560
	26002	1580	1295	1495	1283	1965
	26003	1720	1440	1640	1428	2110
	26004	1780	1496	1695	1484	2166
3000	30003	2040	1615	1800	1685	2425
	30004	2100	1671	1860	1740	2480
3100	31001	1340	910	1100	980	1720
	31002	1865	1438	1628	1508	2250
	31003	2040	1615	1800	1685	2425
	31004	2100	1671	1860	1740	2480
3200	32002	1895	1468	1658	1538	2280
	32003	2070	1645	1830	1715	2455
	32004	2130	1701	1890	1770	2510
3700	37001	1595	1205	1505	1215	2075
	37002	2195	1800	2100	1815	2675
	37003	2405	2015	2315	2025	2885
	37004	2465	2075	2375	2085	2945
4500	45001	1595	1210	1510	1265	2075
	45002	2330	1960	2260	2015	2810
	45003	2640	2195	2495	2241	3045
	45004	2465	2275	2575	2325	3120
5500	55001	2320	1820	2120	1900	—
	55002	3160	2660	2960	2735	—
	55003	3450	2960	3260	3030	—
	55004	3590	3095	3395	3170	—
6800	68001	2460	1922	2322	2000	—
	68002	3620	3090	3490	3165	—
	68003	4026	3500	3900	3570	—
	68004	4170	3645	4025	3713	—
7500	75002	3820	3290	3365	3165	—
	75003	4226	3700	3770	3570	—
	75004	4370	3845	3913	3713	—
8000	80001	2560	2022	2100	2000	—
	80002	3820	3290	3365	3165	—
	80003	4226	3700	3770	3570	—
	80004	4370	3845	3913	3713	—



4. SOLLEVAMENTO TRASPORTO

4. LIFTING AND HANDLING

4. HEBEN UND TRANSPORT

SIZE	OUTPUT VERSION	
10-20-25	V1A	
30-35 40-50-70	V1A	
	V1Ae	
	V2A	
	V3A	
	V3B	
	V3C	
	V3Ce	
80	V3D	
	V1A	
	V1Ae	
	V3A	
	V3Ae	
90-100	V4A	
	V1A	
	V1Ae	
	V1B	
	V2A	
	V3A	
	V3Ae	
150-180-200	V3B	
	V1A	<p><b>Contattare nostro ufficio tecnico commerciale</b>  <b>Please, contact our technical sales dept.</b>  <b>Bitte setzen Sie sich mit unserer technischen Abteilung in Verbindung</b></p>
	V1B	
	V1C	
	V1Ce	
	V1D	
	V1De	
	V2A	
	V2B	
	V3A	
V3Ae		
250-280-300	V1A	
	V1Ae	
	V3A	
	V3Ae	
350-360	V1A	
	V1Ae	
420	V1A	
	V1Ae	
	V3A	
	V3Ae	
600-650	V1A	
	V1Ae	
	V3A	
	V3Ae	
800-850	V3A	
	V3Ae	
1000-1200	V3A	



4. SOLLEVAMENTO TRASPORTO

4. LIFTING AND HANDLING

4. HEBEN UND TRANSPORT

Kg EXB 2				Kg EXB 3				Kg EXB 4			
EXB_102			14	EXB_103			14	EXB_104			14
EXB_202			14	EXB_203			14	EXB_204			14
EXB_252			14	EXB_253			14	EXB_254			14
EXB_302			14	EXB_303			14	EXB_304			14
EXB_352			14	EXB_353			14	EXB_354			14
				EXB_403			14	EXB_404			14
EXB_502			32	EXB_503			14	EXB_504			14
EXB_702			32	EXB_703			14	EXB_704			14
EXB_802	Output version	+	47	EXB_803			14	EXB_804			14
				EXB_903			14	EXB_904			14
				EXB_953			14	EXB_954			14
EXB_1002			47	EXB_1003			32	EXB_1004			14
EXB_1502			65	EXB_1503			32	EXB_1504			14
				EXB_1803			32	EXB_1804			14
EXB_2002			65	EXB_2003			32	EXB_2004			14
EXB_2502			109	EXB_2503			47	EXB_2504			14
				EXB_2803	Output version	+	47	EXB_2804	Output version	+	32
EXB_3002			109	EXB_3003			47	EXB_3004			32
				EXB_3503			47	EXB_3504			32
				EXB_3603			65	EXB_3604			32
				EXB_4203			65	EXB_4204			32
				EXB_6003			65	EXB_6004			32
				EXB_6503			109	EXB_6504			47
				EXB_8003			109	EXB_8004			47
				EXB_8503			109	EXB_8504			47
				EXB_10003			109	EXB_10004			47
								EXB_12004			47
								EXB_15004			47
								EXB_16004			65
								EXB_20004			109
								EXB_25004			109
								EXB_26004			109
								EXB_30004			109
								EXB_31004			109

Kg INPUTS EU - ECE							
EU	ECE1	ECE2	ECE3	ECE4	ECE5	ECE6	ECE7
5.8	5	5	6	6	5	26	30

Kg INPUTS ECR									
ECR0	ECR1	ECR2	ECR3	ECR4	ECR5	ECR6	ECR7	ECR8	ECR9
9		17	17	26	42	48	80	110	120

Kg INPUTS ELECTRIC IEC													
71	80	90	100	112	132	160	180	200	225	250	280	315	355
8	10		12		19			25	30	51		—	—

Kg INPUTS HYDRAULIC							INPUTS HYDRAULIC BRAKE									
BA	CA	CB	DA	DB	EA	FA	FB	GB	GC	HA	HB	KB	Altri Others	Z0	Z1	Z2
7			7		8			8		9			10	12	26	30

Kg ACCESSORIES
<i>Look at Technical Catalogue</i>



## 5. STOCCAGGIO

I riduttori devono essere immagazzinati in ambienti adeguatamente secchi, puliti e privi di vibrazioni. Con periodicità semestrale è bene fare compiere agli ingranaggi qualche giro onde prevenire danneggiamenti di cuscinetti e tenute. Per periodi di stoccaggio superiori ad un anno è necessario sostituire il tappo di carico con valvola di sfogo con uno chiuso e riempire i riduttori completamente d'olio.

Controllare e ripristinare ogni sei mesi il grasso nelle tenute e il protettivo sulle parti lavorate. Per ambienti aggressivi prevedere verniciature speciali, per ambienti umidi o con forti escursioni termiche pastiglie igroscopiche e, in ogni caso, verifiche più frequenti.

Nel caso di soste prolungate dopo il funzionamento, occorre adottare i provvedimenti prima citati avendo cura di ripristinare le protezioni di fornitura come indicato al punto 3; in alternativa è possibile riempire il riduttore con olio fresco del tipo impiegato.

## 5. STOCKING

*Gear units have to be stored in adequately dry, clean and vibration free premises. We suggest to run the gears every six months to prevent bearings and seal rings damages. For storage periods longer than one year, you need to change the filler plug and the breather valve with a closed plug and fill completely the gearboxes with oil.*

*Check and top up grease in the seal rings and protective fluid on machined parts every six months. In case of aggressive environment, special paints are to be provided; in case of either damp environments or with great thermal excursions, frequent inspections and hygrosopic tabs will be needed.*

*In case of long stops after running, the above mentioned measures should be taken by restoring the supply protections as indicated at point 3; alternatively, the gear unit can be filled with fresh oil of the same type of oil used.*

## 5. EINLAGERUNG

Die Getriebe müssen in angemessen trockenen, sauberen und schwingungsfreien Orten gelagert werden. Alle sechs Monate sollten die Zahnräder um einige Runden weitergedreht werden, um Schäden an den Lagern und Dichtungen zu vermeiden. Im Fall von Lagerzeiten, die über ein Jahr hinausgehen, muss der Einfüllverschluss mit Entlüftungsventil durch einen geschlossenen Verschluss ersetzt und das Getriebe vollständig mit Öl gefüllt werden.

Alle sechs Monate das Fett an den Dichtungen und die Schutzschmierung an den bearbeiteten Teilen kontrollieren und ggf. nachfüllen. Bei aggressiven Umgebungsbedingungen müssen Speziallackierungen, im Fall von feuchten Umgebungen oder Umfeldern mit starken Temperaturschwankungen hygroskopische Pads verwendet werden und, auf jeden Fall, häufige Kontrollen erfolgen.

Sollten nach einem Betrieb längere Stillstandzeiten vorgesehen werden, müssen die zuvor genannten Vorkehrungen getroffen und die im Lieferzustand vorhandenen Schutzbedingungen gemäß Punkt 3 wieder hergestellt werden. Als Alternative kann das Getriebe mit frischem Öl vom vorgesehenen Typ gefüllt werden.



## 6. INSTALLAZIONE

Le attività di installazione e messa in servizio devono essere svolte esclusivamente da personale qualificato per operazioni manutentive di tipo meccanico su apparecchiature e macchinario.

L'installazione scorretta del prodotto può pregiudicare l'incolumità delle persone esposte e può indurre danni gravi o irreparabili al prodotto e all'insieme di cui faccia parte. È necessario seguire scrupolosamente le prescrizioni che seguono.

Se prima dell'installazione si prevede un funzionamento a vuoto, occorre prestare particolare attenzione alla possibile espulsione della linguetta, con rischio di ferimento del personale e convogliamento: asportare pertanto la linguetta o predisporre adeguata protezione all'albero, stazionando in ogni caso a distanza di sicurezza dagli organi in moto e fuggendo indumenti o fogge personali adescanti il convogliamento.

Le misure di sicurezza illustrate sono solo esemplificative e hanno lo scopo di segnalare la mera circostanza di pericolo, rimanendo ogni predisposizione prevenzionale di competenza dell'utilizzatore nel quadro del proprio sistema di sicurezza nel luogo di lavoro e conformemente alle disposizioni prevenzionali vigenti.

In caso di guasto si possono raggiungere temperature elevate o si possono determinare perdite di lubrificante: analogamente, le misure prevenzionali a fronte necessarie devono essere in funzione delle caratteristiche dell'insieme di incorporazione e di quanto testé menzionato.

## 6. INSTALLATION

*Product mechanical maintenance or installation and start-up operations must be carried out by qualified personnel.*

*Incorrect installation of the product may endanger the worker's safety and cause irreparable damage to the device itself and the machine to which it is connected. Strictly follow the instructions below.*

*If a running test is carried out without load before installation make sure that the key does not pop out from the shaft and harm or entangle operators. Always remove the key and arrange adequate shaft protection, stay clear of the moving parts and do not wear loose-fitting clothes.*

*These safety precautions are mainly to be used as examples and guideline to simply warn danger circumstance. Every safety arrangement must be taken and carried out by the operator in charge according to the safety system in the working environment and in conformity with current legislation.*

*In the event of failure, high temperatures might be reached or lubricant may leak out. It is therefore necessary to equip the machine with all necessary preventive measures in accordance with machine operational characteristics.*

## 6. INSTALLATION

Die Installation und die Inbetriebsetzung dürfen ausschließlich nur von für mechanische Instandhaltungsarbeiten an Geräten und Maschinen qualifiziertes Personal ausgeübt werden.

Eine falsche Installation des Produkts kann zu Verletzungen der damit/daran arbeitenden Personen führen und schwere oder irreparable Schäden am Produkt selbst und der Einheit verursachen, zu der es gehört. Nachstehende Anweisungen müssen strikt befolgt werden.

Sollte vor der Installation ein Leerbetrieb vorgesehen sein, muss besondere Aufmerksamkeit darauf gerichtet werden, dass der Federkeil herausgeschleudert werden kann, wodurch das Personal getroffen oder verletzt werden kann: Aus diesem Grund muss der Federkeil entfernt oder die Welle entsprechend geschützt werden. Auf jedem Fall muss man sich dabei in einem angemessenen Sicherheitsabstand von den sich in Bewegung befindlichen Organen aufhalten und darf keine Bekleidungsstücke oder losen persönlichen Gegenstände tragen, die in die Organe eingezogen werden könnten.

Die hier illustrierten Sicherheitsmaßnahmen sollen nur als Beispiele dienen und haben zum Ziel, auf die reell vorliegenden Gefahren hinzuweisen. Die Vorsorgemaßnahmen liegen jedoch im Zuständigkeitsbereich des Benutzers im Rahmen seines am Arbeitsplatz angewendeten und den geltenden Vorsorgerichtlinien entsprechenden Sicherheitssystemen.

Bei Defekten kann es zu hohen Temperaturentwicklungen oder zu Schmiermittelleckagen kommen: Analog dazu müssen die entsprechend erforderlichen Vorsorgemaßnahmen in Abhängigkeit der Eigenschaften der Einheit und der eben genannten Faktoren getroffen werden.


**6. INSTALLAZIONE**
**6. INSTALLATION**
**6. INSTALLATION**
**6.0.3 Verifica Velocità ingresso**
**6.0.3 Input speed check**
**6.0.3 Überprüfung der Antriebsdrehzahl**

Grandezza Size Größe	EX 1	EX 2	EX 3	EX 4	EXB 2-3-4
10	2800	2800	2800	2800	2800
20	2800	2800	2800	2800	2800
25	2800	2800	2800	2800	2800
30	2800	2800	2800	2800	2800
35	2800	2800	2800	2800	2800
40	—	2800	2800	2800	2800
50	2800	2800	2800	2800	2800
70	2800	2800	2800	2800	2800
80	2000	2800	2800	2800	2800
90	—	2800	2800	2800	2800
95	—	2800	2800	2800	2800
100	2000	2800	2800	2800	2800
150	2000	2800	2800	2800	2800
180	—	2800	2800	2800	2800
200	2000	2800	2800	2800	2800
250	2000	2000	2800	2800	2800
280	—	2000	2800	2800	2800
300	2000	2000	2800	2800	2800
350	1500	2000	2800	2800	2800
360	—	2000	2800	2800	2800
420	1500	2000	2800	2800	2800
600	—	2000	2800	2800	2800
650	1000	2000	2800	2800	2800
800	—	2000	2800	2800	2800
850	1000	2000	2800	2800	2800
1000	500	1500	2000	2800	2800
1200	500	1500	2000	2800	2800
1500	—	1500	2000	2800	2800
1600	500	1500	2000	2800	2800
2000	500	1000	2000	2800	2800
2500	—	—	2000	2800	2800
2600	500	1000	2000	2800	2800
3000	—	—	1500	2000	2800
3100	500	500	1500	2000	2800
3200	—	500	1500	2000	2800
3700	500	500	1500	2000	2800
4500	500	500	1500	2000	2800
5500	500	500	1000	2000	2800
6800	500	500	1000	2000	2800
7500	—	500	500	1500	2800
8000	500	500	500	1500	2800

Grandezza Size Größe	Freno Brake Bremse		Servizio - S1 Duty - S1 Betrieb - S1
	Z0	$n_{1 \max} \leq 2800$	
	Z1-Z2	$n_{1 \max} \leq 750$	
	Z1-Z2	$n_{1 \max} > 750$	

**S1 - Servizio continuo:**

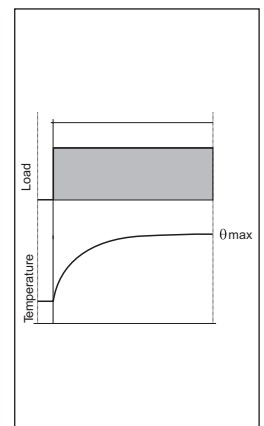
funzionamento a carico costante per un periodo di tempo indefinito, comunque sufficiente a raggiungere l'equilibrio termico.

**S1 - Continuous duty:**

Steady load operation for an indefinite period, but sufficient to achieve a thermal balance.

**S1 - Dauerbetrieb:**

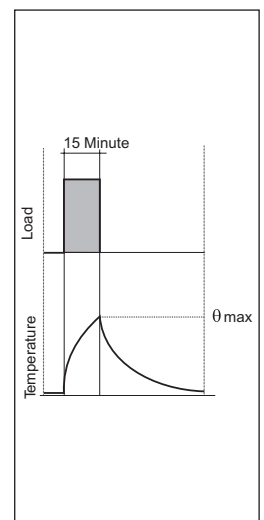
Betrieb mit konstanter Last über eine unbestimmte Zeit, die ausreichen muß, um das thermische Gleichgewicht zu erreichen.


**S2 - Servizio di durata limitata:**

funzionamento a carico costante per un periodo di tempo limitato insufficiente a raggiungere l'equilibrio termico, seguito da un periodo di riposo sufficiente a riportare il freno a temperatura ambiente.

**S2 - Limited duty:**

Steady load operation for a limited time, insufficient to achieve a thermal balance, followed by a resting period sufficient to return the brake to ambient temperature.


**S2 - Kurzzeitbetrieb:**

Betrieb mit konstanter Last für eine begrenzte Zeit, die nicht ausreicht um das thermische Gleichgewicht zu erreichen, gefolgt von einer für die Abkühlung der Bremse ausreichend langen Stillstandzeit.



## 6. INSTALLAZIONE

### 6.1 LUOGO DI FUNZIONAMENTO

La collocazione deve consentire adeguato spazio per i successivi controlli e manutenzioni e garantire sufficiente passaggio d'aria di refrigerazione per lo smaltimento del calore. Nel caso si abbiano temperature ambientali esterne all'intervallo (0-40)°C, non considerate in fase contrattuale, contattarci.

### 6.2 LUOGO CHIUSO E/O POLVEROSO

E' indispensabile che nel locale in cui siano installati i riduttori esista un ricambio d'aria sufficiente in modo che l'aria stessa non venga riscaldata pregiudicando la resa termica.

La temperatura massima dell'ambiente non deve superare i 30 °C, viceversa è pregiudicata la resa termica dell'unità.

L'installazione in un ambiente molto polveroso provoca un calo di resa termica.

E' per questo che in un ambiente polveroso o saturo d'olio e' indispensabile mantenere pulito il riduttore con una pulizia regolare (vedi manutenzione).

### 6.3 INSTALLAZIONE IN LUOGO APERTO

In questo caso l'unità deve essere protetta dalle intemperie; prevedere quindi una tettoia, in modo che essa non risulti esposta direttamente all'acqua piovana.

## 6. INSTALLATION

### 6.1 INSTALLATION SITE

*The place of installation has to foresee enough free area for periodical inspections and maintenance and secure sufficient cooling air flow for heat dispersion. In case the ambient temperature does not fall within (0-40)°C range and is different than that considered in the contract, please contact us.*

### 6.2 ENCLOSED AND/OR DUSTY ROOM

*It is indispensable that the room where the gearboxes are installed has a sufficient air circulation so that air does not reach such a temperature that would jeopardise gearbox efficiency.*

*Maximum allowed ambient temperature is 30 °C; above this limit, the unit efficiency is compromised.*

*Installing in a dusty environment leads to a drop in efficiency.*

*This is why it is fundamental to regularly clean the gearboxes in case of dusty environment or saturated with oil (see maintenance).*

### 6.3 OUTDOOR INSTALLATION

*In this case the unit shall be protected against weather conditions; set a roofing for this purpose, so that unit is not under the rain.*

## 6. INSTALLATION

### 6.1 EINSATZORT

Die Anordnung muss so erfolgen, dass ein angemessener Freiraum für spätere Kontrollen und Instandhaltungseingriffe verbleibt und zum Wärmeabbau ausreichend Kühlluftzufuhr gewährleistet wird. Sollten Umgebungstemperaturen vorliegen, die nicht innerhalb der berücksichtigten Werte (0-40)°C liegen und bei Vertragsabschluss nicht berücksichtigt wurden, setzen Sie sich bitte mit uns in Verbindung.

### 6.2 GESCHLOSSENER UND/ODER STAUBIGER INSTALLATIONSORT

Der Raum, in dem die Getriebe installiert werden, muss einen ausreichenden Luftaustausch aufweisen, so dass vermieden wird, dass sich die Luft aufheizt und so die thermische Leistung verringert.

Die max. Umgebungstemperatur darf 30 °C nicht überschreiten, andernfalls wird die thermische Leistung der Einheit negativ beeinflusst.

Die Installation in einem stark mit Staub belasteten Umfeld führt zu einer geringeren thermischen Leistung.

Daher ist es in einer staubigen oder mit Öl gesättigten Umgebung unbedingt erforderlich, das Getriebe regelmäßig zu reinigen (siehe Instandhaltung).

### 6.3 INSTALLATION IM FREIEN

In diesem Fall muss die Einheit vor Witterungseinflüssen geschützt werden. Dazu eine Überdachung vorsehen, so dass sie dem Regen nicht direkt den Regenwasser ausgesetzt wird.

## PICTURE (Under Costruction)

In inverno, nel caso di fermo macchina prolungata, la temperatura dell'olio diventa molto bassa e quindi aumenta di molto la sua viscosità (in fase di analisi dell'applicazione è necessario valutare la viscosità di olio necessaria e la tipologia di guarnizioni da utilizzare).

*In winter, in case of long periods of inactivity, oil temperature becomes very low and thus its viscosity is remarkably increased (when analysing the application it is necessary to evaluate necessary oil grade and the type of seal to be used.)*

Im Winter, bei einem längeren Maschinenstillstand, sinkt auch die Temperatur des Öls stark ab und demzufolge seine Viskosität stark zu (in der Analysephase der Anwendung ist es daher erforderlich, die erforderliche Ölviskosität und die einzusetzenden Dichtungstypen zu bewerten).

### 6.4 ILLUMINAZIONE

Il luogo d'installazione della macchina deve avere un'illuminazione naturale e/o artificiale conforme alla normativa vigente, in ogni caso sufficiente a compiere eventuali operazioni di manutenzione o riparazione.

### 6.4 LIGHTING

*The machine installation site should be naturally and/or artificially lit, as required by the prevailing standard, but in any case lit enough to allow for any maintenance or repair operations.*

### 6.4 BELEUCHTUNG

Der Installationsort der Maschine muss der geltenden Richtlinie konform natürlich/künstlich beleuchtet werden. Die Beleuchtung muss ausreichen, um eventuelle Instandhaltungs- oder Reparaturarbeiten ausführen zu können.



## 6. INSTALLAZIONE

### 6.5 ASPETTI GENERALI DI INSTALLAZIONE

1 - Il protettivo presente sugli alberi deve essere rimosso con diluente, in ambiente sufficientemente areato evitando il contatto diretto con la pelle; non fumare durante quest'operazione.

2 - Curare l'allineamento con la macchina motrice e operatrice; è consigliabile l'uso di giunti elastici.

3 - Utilizzare i fori filettati in testa all'estremità degli alberi per il montaggio di pulegge, ruote, ecc. evitando urti che potrebbero danneggiare i cuscinetti.

4 - Qualora siano previste trasmissioni esterne ridurre al minimo gli sbalzi ed evitare i carichi radiali dovuti a giochi nulli su ingranaggi, tensioni sulle catene e tiri eccessivi sulle cinghie.

5 - Evitare vibrazioni, scegliere superfici di fissaggio sufficientemente rugose, utilizzare sistemi anti-allentamento per le viti di serraggio.

6 - Verificare le velocità critiche torsionali nel caso di azionamento di ventilatori.

8 - Prevedere limitatori di momento torcente o dispositivi di sicurezza analoghi, qualora si prevedano funzionamenti con sovraccarichi.

9 - Prevedere dispositivi appositi di prevenzione e sicurezza qualora un accidentale perdita di lubrificante possa causare danni importanti.

10 - Evitare inquinamento del lubrificante dall'esterno.

11 - Proteggere le tenute da intemperie e irraggiamenti solari diretti con grasso idrorepellente.

12 - In caso di motori di elevata potenza (oltre la grandezza IEC-200 compresa o peso non superiore a 200Kg) usare motori in esecuzione B3-B5 con adeguati supporti.

### 6.6 ESECUZIONE CON FLANGIA:

Ricavare, sulla macchina o sull'impianto su cui vengono installati, le controflange di accoppiamento. Queste dovranno avere la superficie di accoppiamento con la flangia del riduttore piana e lavorata di macchina utensile. Collegare l'albero d'uscita all'organo da comandare secondo le indicazioni dei disegni seguenti.

## 6. INSTALLATION

### 6.5 GENERAL INSTALLATION FEATURES

1 - Use diluent to remove protective coating on shafts in a well-aired environment, avoiding direct contact with skin. Refrain from smoking during this operation.

2 - The gear unit must be perfectly aligned with the driving and operating machine; the use of flexible couplings is recommended wherever possible.

3 - Use the threaded shaft end holes when fitting pulleys, couplings, etc. avoid any shocks when mounting which could damage bearings.

4 - In case of external drives, reduce overhang to a minimum and avoid radial load due to excessive tension of belt or chain pull and low clearance on teeth.

5 - Avoid vibrations; gear unit must be mounted on a sufficiently rough surface; use anti-loosening systems for retaining screws.

6 - Verify critical torsional speeds in case of fan drive gear units.

8 - Foresee torque limiters or similar safety devices in case of application with overload.

9 - Foresee protection and safety devices in case an accidental leakage of lubricant might cause major damage.

10 - Prevent lubricant from being contaminated by the outside.

11 - Protect the oil seals from direct sunbeams or bad weather by using water-repellent grease.

12 - If the motor in question is a particularly high power motor (beyond size IEC 200 included or if weight does not exceed Kg. 200), use B3-B5 motors with suitable supports.

### 6.6 FLANGED DESIGN:

Machine, on the unit or plant on which it will be installed, the coupling counterflanges. The surfaces where the gearboxes will be coupled must be flat and worked with a machine tool. Connect the output shaft to the mechanism to be controlled following the instructions given in the draws below.

## 6. INSTALLATION

### 6.5 ALLGEMEINE ASPEKTE ZUR INSTALLATION

1 - Das auf den Wellen vorhandene Schutzmittel muss mit einem Verdünnungsmittel an einem ausreichend belüfteten Ort entfernt werden. Dabei ist ein direkter Hautkontakt zu vermeiden und es darf dabei nicht geraucht werden.

2 - Die Fluchtung zwischen Antriebs- und Arbeitsmaschine besonders sorgfältig vornehmen, dazu wird der Einsatz elastischer Kupplungen empfohlen.

3 - Für die Montage der Riemenscheiben, Räder, usw. die am Kopfende der Wellen vorgesehenen Gewindebohrungen verwenden und dabei Stöße vermeiden, die zu Lagerschäden führen könnten.

4 - Sollten externe Antriebe vorgesehen sein, die Überstände auf ein Mindestmaß beschränken und vermeiden, dass durch zu wenig Spiel an den Zahnradern, übermäßige Spannungen an den Ketten oder Riemen Radialkräfte erzeugt werden.

5 - Schwingungen vermeiden, ausreichend raue Befestigungsflächen wählen und Lösungsschutzsysteme an den Anzugschrauben verwenden.

6 - Die kritischen Drehzahlen beim Gebläseantrieben überprüfen.

8 - Sollte ein Betrieb vorgesehen sein, bei dem es zu Überbelastungen kommen kann, sind entsprechende Drehzahlbegrenzer oder gleichwertige Sicherheitsvorrichtungen vorzusehen.

9 - Falls eine unvorhersehbare Ölleckage schwere Schäden verursachen könnte, müssen entsprechende Vorsorge- und Schutzvorrichtungen vorgesehen werden.

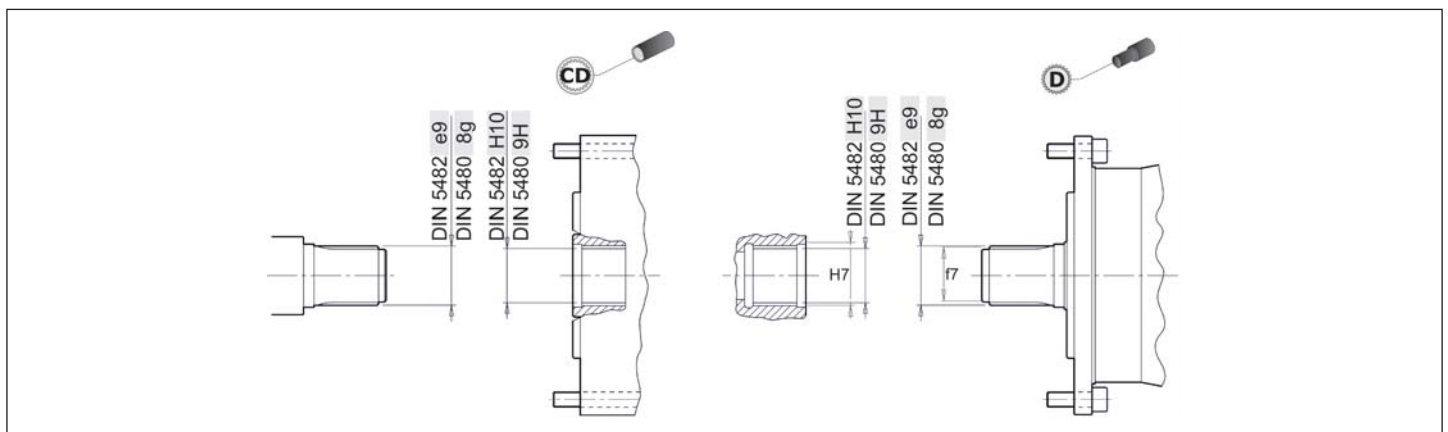
10 - Eine Verschmutzung des Schmiermittels durch externe Einflüsse vermeiden.

11 - Die Dichtungen vor Schlechtwettereinflüssen und direkten Sonneneinstrahlungen durch Auftrag von wasserabstossendem Fett schützen.

12 - Bei Motoren mit hoher Leistung (bei höherer Größe als IEC 200 einschließlich oder wenn Gewicht unter Kg. 200 bleibt) Motoren in der Ausführung B3-B5 mit entsprechenden Halterungen benutzen

### 6.6 AUSFÜHRUNG MIT FLANSCH:

An der Maschine oder Anlage, an der sie installiert werden, die Größe der Kupplungsflansche feststellen. Sie müssen Kupplungsflächen für flachen Flansch der Untersetzung aufweisen und mit der Werkzeugmaschine bearbeitet sein. Die Ausgangswelle des anzutreibenden Organs unter Beachtung der Anweisungen der folgenden Zeichnungen anschließen.

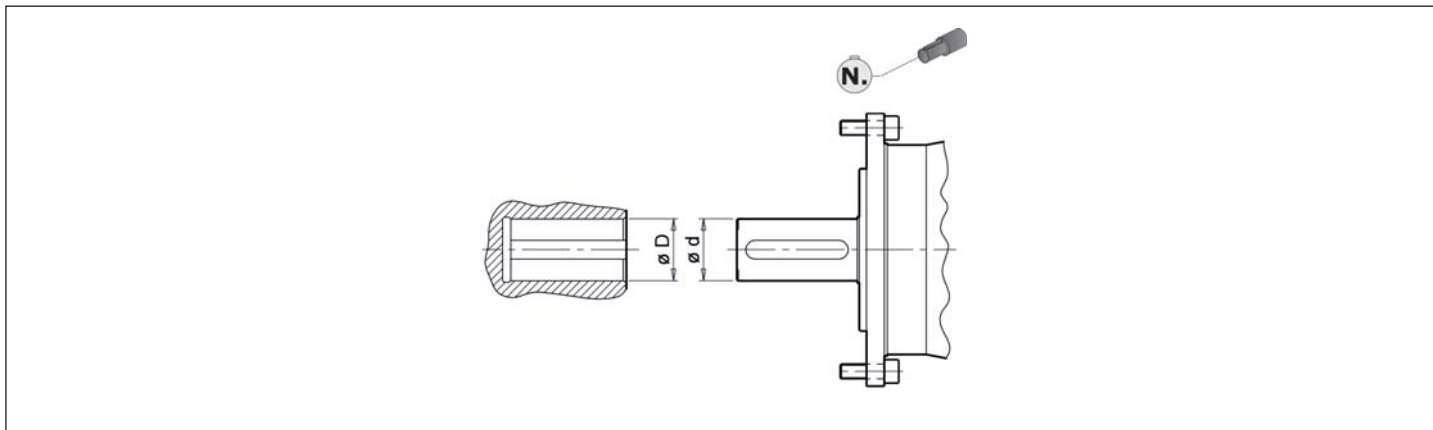




## 6. INSTALLAZIONE

## 6. INSTALLATION

## 6. INSTALLATION

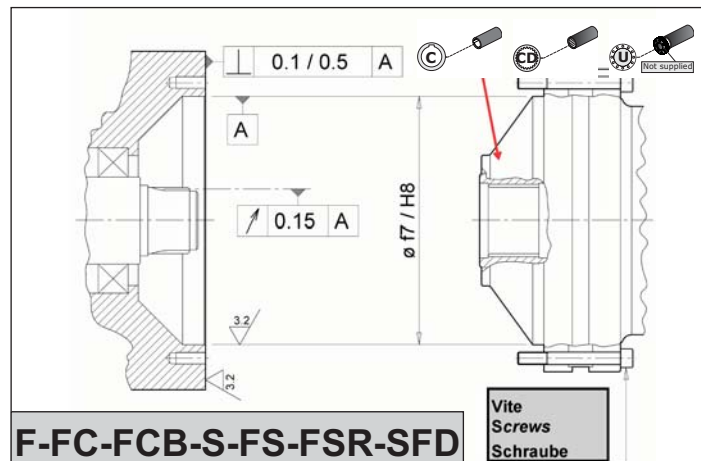
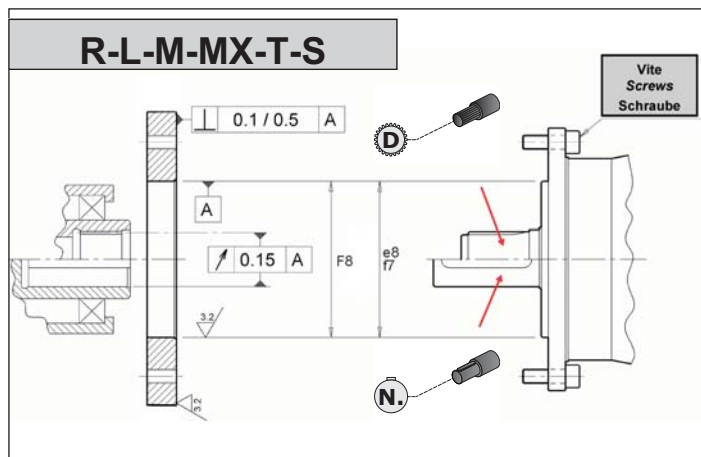


Tolleranze consigliate / Recommend tolerances / Empfohlene Toleranzen

Accoppiamento Libero / loose coupling / Freie Passung

Albero Pieno  
Sold Shaft  
Vollwelle $\varnothing d$  h7Albero cavo  
hollow Shaft  
Hohlwelle $\varnothing D$  G7 $\varnothing D$  F7

Accoppiamento con Interferenza / Coupling with interference / Passung mit Interferenz

 $\varnothing d$  h7 $\varnothing D$  K7 $\varnothing D$  M7 $\varnothing D$  N7**ESECUZIONE CON FLANGIA - H - X:**

I riduttori con le versioni uscita H e X sono provvisti di due diametri di centraggio.

Nel realizzare le flange di accoppiamento è necessario sfruttare entrambi i centrggi presenti sul riduttore.

Nel caso in cui il riduttore debba trasmettere coppie elevate con urti ed inversioni è necessario realizzare i fori per le spine con una profondità almeno pari al loro diametro.

**OPERATION WITH FLANGE - H - X:**

Gearboxes with H and X output versions are equipped with two centring diameters.

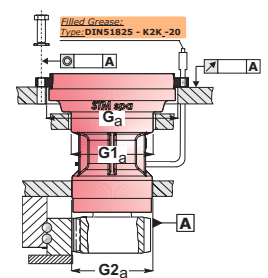
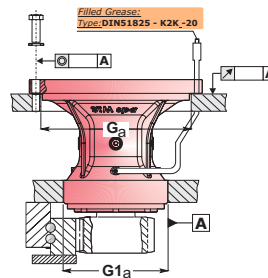
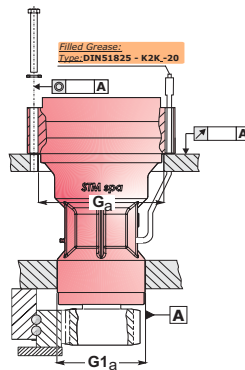
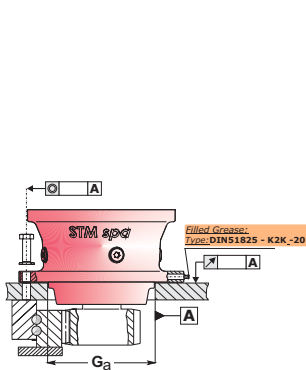
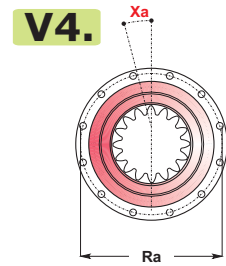
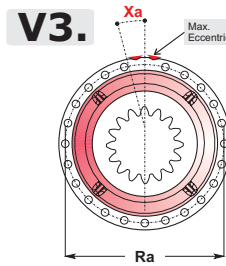
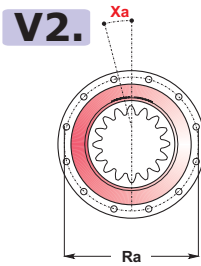
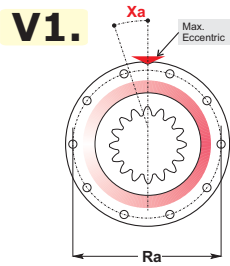
When realising the coupling flanges, it is necessary to use both centring tools on the gearbox.

In the event the gearbox must transmit high torque values with collisions and inversions, it is necessary to make pin holes with a depth of at least the same diameter.

**AUSFÜHRUNG MIT FLANSCH - H - X:**

Die Getriebe mit den Abtriebsversionen H und X weisen zwei Zentrierdurchmesser auf. Bei der Herstellung der Passflansche müssen beide Zentrierungen am Getriebe genutzt werden.

Falls das Getriebe hohe Drehmomente mit Stoßbelastungen und Umkehrungen übertragen muss, ist es erforderlich, die Bohrungen für die Stifte mit einer Tiefe zu bohren, die mindestens ihrem Durchmesser entspricht.


**6. INSTALLAZIONE**
**6.6 ESECUZIONE CON FLANGIA  
V1. - V2. - V3. - V4.**

**Realizzazione struttura**

Le strutture devono essere costruite in modo che siano rispettate le seguenti modalità costruttive:

- rispettare le tolleranze sulle quote riportate in tabella;

- La struttura cui vanno fissati deve essere rigida, con superficie d'appoggio ben pulita, ortogonale all'asse azionato e priva di scorie di saldatura;
- I centraggi e i piani d'accoppiamento del riduttore devono essere puliti e privi di ammaccature

I controlli sopra descritti sono importanti per ottenere un perfetto ingranamento tra il pignone del riduttore e la ralla e non provocare il mal funzionamento del riduttore e/o dell'applicazione.

Per le versioni V2. - V3. - V4. si consiglia di eseguire il centraggio  $G_a$  con una dimensione  $0.5 \div 1.0$  mm superiore a quella del diametro del relativo supporto.

**6. INSTALLATION**
**6.6 FLANGED DESIGN  
V1. - V2. - V3. - V4.**
**Frame manufacturing**

Frames must be manufactured in compliance with the following construction methods:

- follow the value tolerances listed in the table;
- The frame on which they will be fixed must be rigid, with a thoroughly clean resting surface, orthogonal to the enabled axis and free from welding slags;
- Centring tools and mating surfaces of gearbox must be clean and without dents.

The checks described above are important in order to have the perfect mesh between gearbox pinion and fifth wheel and not to lead to the malfunctioning of the gearbox and/or application.

For V2. - V3. - V4. we recommend carrying out the  $G_a$  centring operation with a size  $0.5 - 1.0$  mm higher than the diameter of the relevant support.

**6. INSTALLATION**
**6.6 AUSFÜHRUNG MIT FLANSCH  
V1. - V2. - V3. - V4.**
**Herstellen der Struktur**

Die Strukturen müssen so gebaut sein, dass sie den folgenden Konstruktionsvorgaben entsprechen:

- Einhaltung der Toleranzen an den in der Tabelle angegebenen Abmessungen;
- Die Struktur, an der die Befestigung erfolgt, muss steif sein, eine saubere Auflagefläche aufweisen, auf rechtem Winkel zur angetriebenen Achse liegen und darf keine Schweißrückstände aufweisen;
- Die Zentrierungen und die Passflächen des Getriebes müssen sauber und frei von Beschädigungen sein. Die oben beschriebenen Kontrollen sind wichtig, um ein perfektes Eingreifen der Verzahnungen zwischen dem Getrieberitzel und der Spurpfanne zu erhalten und um keine Fehlfunktion des Getriebes und/oder seiner

Anwendung zu erzeugen. Für die Versionen V2. - V3. - V4. wird empfohlen die Zentrierung  $G_a$  mit einer Größe von  $0,5$  ,  $1,0$  mm über der des Durchmessers des entsprechenden Halters vorzusehen.



### 6. INSTALLAZIONE



### 6. INSTALLATION

### 6. INSTALLATION

6.6 ESECUZIONE CON FLANGIA  
V1. - V2. - V3. - V4.

6.6 FLANGED DESIGN  
V1. - V2. - V3. - V4.

6.6 AUSFÜHRUNG MIT FLANSCH  
V1. - V2. - V3. - V4.

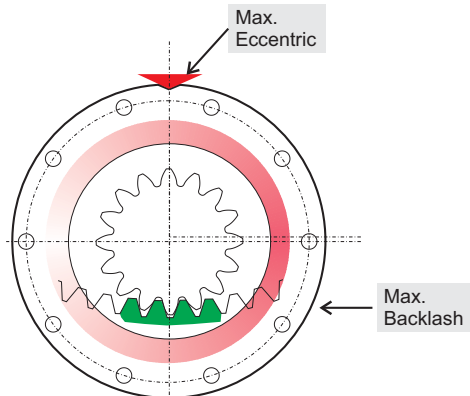
Grandezza Size Größe	Ra ±	 <b>A</b>	 <b>A</b>	Xa ±
10	0.2	0.2	0.05	10'
20	0.2	0.2	0.05	10'
25	0.2	0.2	0.05	10'
30	0.2	0.2	0.05	10'
35	0.2	0.2	0.05	10'
40	0.2	0.2	0.05	10'
50	0.2	0.2	0.05	10'
70	0.2	0.2	0.05	10'
80	0.2	0.3	0.05	8'
90	0.2	0.3	0.05	8'
95	0.2	0.3	0.05	8'
100	0.2	0.3	0.05	8'
150	0.2	0.3	0.05	8'
180	0.2	0.3	0.05	8'
200	0.2	0.3	0.05	8'
250	0.3	0.5	0.07	8'
280	0.3	0.5	0.07	8'
300	0.3	0.5	0.07	8'
350	0.3	0.5	0.07	8'
360	0.3	0.5	0.07	8'
420	0.3	0.5	0.07	8'
600	0.3	0.5	0.07	8'
650	0.3	0.5	0.07	8'
800	0.3	0.5	0.07	8'
850	0.3	0.5	0.07	8'
1000	0.3	0.5	0.10	8'
1200	0.3	0.5	0.10	8'





## 6. INSTALLAZIONE

### 6.6 ESECUZIONE CON FLANGIA V1. - V2. - V3. - V4.



#### Regolazione Gioco - per riduttori con Flange tipo V1.e - V3.e

Generalmente i costruttori di ralle, contrassegnano 3 denti della ralla per indicare il punto di maggior ovalizzazione del diametro primitivo della ralla stessa.

Qualora non fosse presente alcun contrassegno, si consiglia di contattare il costruttore della ralla stessa.

#### CALCOLO GIOCO INGRANAMENTO

Sul riduttore stesso è presente una tacca, che indica il punto di maggiore eccentricità, corrispondente al gioco max. d'ingranamento ottenibile tra pignone e ralla; sia che il riduttore sia posto all'interno o all'esterno della ralla stessa.

Il valore del gioco tra i fianchi dei denti tra pignone e ralla, si ottiene moltiplicando il valore del modulo della dentatura, per due valori fissi 0,03 e 0,04 che moltiplicati rispettivamente per il modulo forniscono i due valori rispettivamente di massimo e minimo della tolleranza del gioco.

Per esempio per modulo 10 si ottengono i valori 0.3 mm e 0.4 mm. Questo significa che per un perfetto ingranamento il gioco di ingranamento dovrà essere compreso tra  $0,3 \div 0,4$  mm.

#### REGOLAZIONE DEL GIOCO

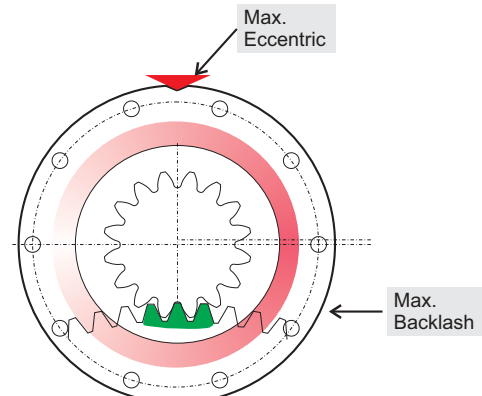
Per regolare il gioco è necessario posizionare il riduttore con la tacca in corrispondenza dei 3 denti contrassegnati della ralla come in figura, ruotare il riduttore avvicinandolo così alla ralla, inserendo sui fianchi dei denti che ingranano il valore di spessori ottenuto dal calcolo sopra descritto;

infine serrare il riduttore con le apposite viti di fissaggio.

Controllare di nuovo il gioco tra i fianchi in vari punti, su tutta la circonferenza primitiva della ralla.

## 6. INSTALLATION

### 6.6 FLANGED DESIGN V1. - V2. - V3. - V4.



#### Backlash adjustment - for gearboxes with type V1.e - V3.e Flanges.

Usually, fifth wheel manufacturers mark 3 fifth wheel teeth to indicate the highest ovalization point of the fifth wheel pitch diameter. If no mark is present, contact the manufacturer of the fifth wheel.

#### MESH BACKLASH CALCULATION

The gearbox features a notch indicating the highest eccentricity point that corresponds to the mesh max. backlash between pinion and fifth wheel, regardless of whether the gearbox is inside or outside the fifth wheel.

Backlash value between the sides of the teeth between pinion and fifth wheel can be obtained by multiplying the gear module value by two fixed values - 0.03 mm and 0.04 - that when multiplied by the module provide the two minimum and maximum backlash tolerance values, respectively.

For instance, for module 10 the values calculated are 0.3 mm and 0.4. That means that for perfect mesh, the mesh backlash must be within 0.3 and 0.4 mm.

#### BACKLASH ADJUSTMENT

To adjust the backlash it is necessary to position the gearbox with the notch in correspondence of the 3 marked teeth of the fifth wheel, as shown in the figure. Rotate the gearbox by moving it close to the fifth wheel, engaging it in the sides of the teeth that mesh the shim value obtained from the calculation described above; conclude the operation by tightening the gearbox with the special retaining screws.

Check the backlash between the sides in different points and along the whole pitch line of the fifth wheel again.

## 6. INSTALLATION

### 6.6 AUSFÜHRUNG MIT FLANSCH V1. - V2. - V3. - V4.

#### Spieleinstellung - für Getriebe mit Flanschen vom Typ V1.e - V3.e

Im Allgemeinen kennzeichnen die Hersteller der Spurfannen 3 daran vorhandene Zähne und damit den Punkt, an dem die größte Ovalisierung des Teilkreisdurchmessers der Spurfanne selbst vorliegt. Sollte keine Kennzeichnung vorhanden sein, wird empfohlen, sich an den Hersteller der Spurfanne zu wenden.

#### BERECHNUNG DES EINGRIFFSPIELS

Am Getriebe selbst befindet sich eine Kerbe, an der die größte Exzentrizität vorliegt, dies entsprechend dem max. Eingriffsspiel, das zwischen dem Ritzel und der Spurfanne erhalten werden kann. Der Wert des Spiels zwischen den Zahnflanken des Ritzels und der Spurfanne, wird durch das Multiplizieren des Werts des Moduls der Verzahnung mit zwei festen Werten 0,03 und 0,04 erhalten.

Werden diese Werte jeweils für das Modul multipliziert, ergeben sich die beiden Werte der maximalen und der minimalen Toleranz des Spiels. Beispiel: Für das Modul 10 erhält man die Werte 0,3 mm und 0,4 mm. Dies bedeutet, dass für ein perfektes Eingreifen das Eingriffsspiel zwischen 0,3 , 0,4 mm liegen muss.

#### EINSTELLUNG DES SPIELS

Zum Einstellen des Spiels muss das Getriebe wie abgebildet mit seiner Kerbe an den gekennzeichneten 3 Zähnen der Spurfanne angeordnet werden, dann das Getriebe drehen und es so der Spurfanne annähern. Nun an den Zahnflanken der ineinander greifenden Zähne die Passscheiben mit den Werten einfügen, die sich aus der oben beschriebenen Berechnung ergeben. Schließlich das Getriebe mit den entsprechenden Befestigungsschrauben festspannen.

Das Spiel zwischen den Flanken an verschiedenen Punkten des gesamten Teilkreisdurchmessers der Spurfanne kontrollieren.



## 6. INSTALLAZIONE

### 6.6.1 ESECUZIONE FEMMINA FSR

#### MONTAGGIO

1 - Smontare i due semianelli di fissaggio assiale dell'albero del riduttore;

2 - Realizzare l'albero cliente riferendosi alle indicazioni riportate sul catalogo tecnico disponibile sul sito WEB aziendale;

3 - Lubrificare adeguatamente sia l'albero cliente che l'albero del riduttore. Quindi procedere al montaggio dell'albero cliente sul riduttore.

4 - Applicare i due semianelli posizionandoli nelle rispettive sedi circolari ricavate sull'albero;

5 - Avviare gradualmente in senso diametrale le viti di fissaggio;

#### SMONTAGGIO

Per smontare l'albero è necessario:

a.1 - Allentare tutte le viti;

a.2- Prendere ulteriori n°4 viti (con dimensioni come da tabella);

a.3 - avvitare le stesse nei fori filetati presenti sui due semianelli.

In questo modo si effettua una reazione sul riduttore stesso favorendo lo smontaggio dell'albero cliente.

## 6. INSTALLATION

### 6.6.1 FSR FEMALE EXECUTION

#### FITTING

1 - Remove the two half rings for the axial fastening of the gear shaft;

2 - Make the customer's shaft referring to the indications on the technical catalogue available on the company WEB site;

3 - Properly lubricate both the customer's shaft and the gear shaft.

Fit the customer's shaft on the gearbox.

4 - Fit the two half rings by positioning them in the relevant circle seats provided on the shaft;

5 - Gradually tighten, in the diametral direction, the retaining screws;

#### REMOVAL

To remove the shaft it is necessary to:

a.1 - Loosen all screws;

a.2- Take 4 more screws (see table for size);

a.3 - screw them in the threaded holes on the two half rings.

In this way a reaction is performed on the gearbox, thus favouring customer's shaft removal.

## 6. INSTALLATION

### 6.6.1 AUSFÜHRUNG MIT INNENGEWINDE FSR

#### MONTAGE

1 - Die beiden Halbringe für die axiale Befestigung der Getriebewelle ausbauen.

2 - Die Welle des Kunden unter Bezugnahme auf die Angaben im Technischen Katalog, der auf der WEB-Seite des Unternehmens verfügbar ist, herstellen.

3 - Sowohl die Kunden- als auch die Getriebewelle angemessen schmieren. Nun die Kundenwelle am Getriebe montieren.

4 - Die beiden Halbringe anlegen und dabei in ihre runden Sitze in der Welle einfügen.

5 - Die Befestigungsschrauben graduell auf dem Durchmesser anschrauben.

#### AUSBAU

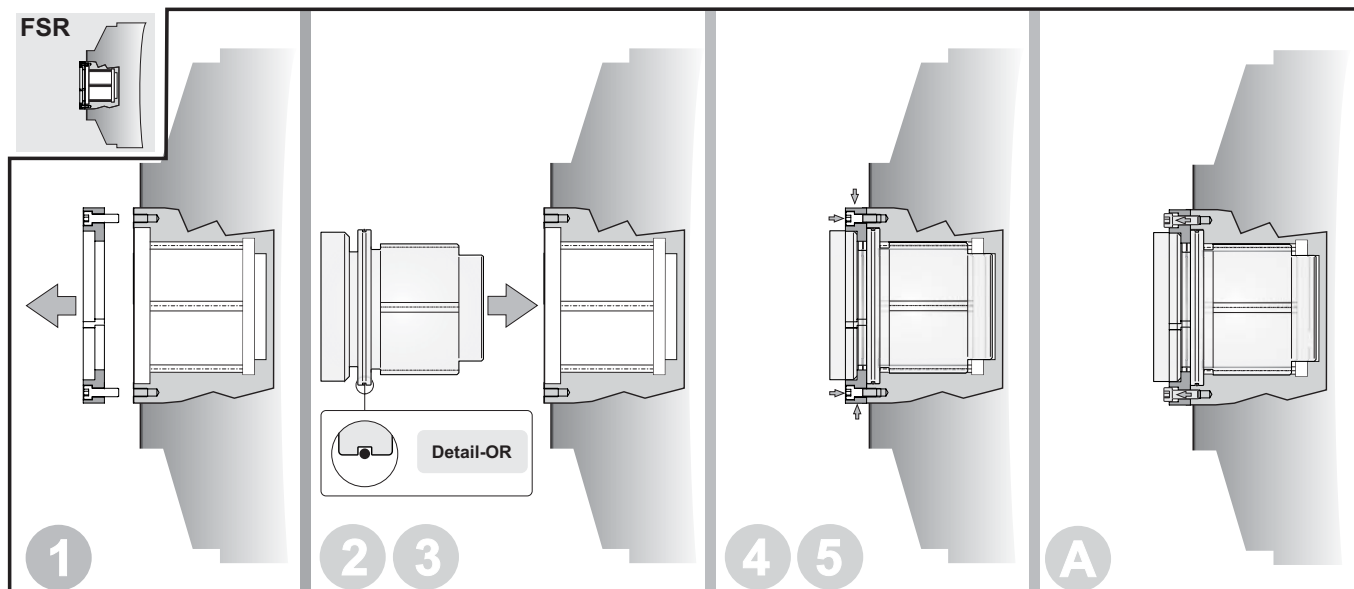
Zum Ausbau der Welle wie folgt vorgehen:

1 - Alle Schrauben lockern.

a.2- Die letzten 4 Schrauben nehmen (mit Größe laut Tabelle):

a.3 - Diese Schrauben nun in die Gewindebohrungen schrauben, die an den Halbringen vorhanden sind.

Auf diese Weise wird eine Reaktion am Getriebe erzeugt und damit der Ausbau der Kundenwelle erleichtert.



Size	Screws n° x M.
350 - 360	n°4 - M8
420	n°4 - M8
600 - 650	n°4 - M8
800 - 850	n°4 - M8
1000 - 1200	n°4 - M10
1500 - 1600 - 2000	n°4 - M10
2500 - 2600 - 3100 - 3200	n°4 - M10
3700 - 4500	n°4 - M12
5500	n°4 - M14
6800-7500-8000	n°4 - M16



## 6. INSTALLAZIONE

### 6.6.2 ESECUZIONE FEMMINA FCB

#### MONTAGGIO

- Ingrassare le sedi degli o-ring pos. 1 e 2 sul coperchio pos. 3; quindi inserire i rispettivi o-ring nelle loro sedi; inserire a sua volta il coperchio sull'albero.
- Inserire poi la linguetta pos. 4 nelle rispettive sedi sull'albero.
- Montare il braccio di reazione pos. n°7 sul riduttore.
- Lubrificare adeguatamente sia l'albero macchina che l'albero femmina riduttore; quindi effettuare l'accoppiamento tra albero e riduttore (non deve essere forzato).
- Posizionare il coperchio pos. 3, serrarlo con le viti e rispettive rondelle grower pos. 5, facendo attenzione di avvitare le viti gradualmente in senso circolare (fig 1) fino al totale serraggio applicando una coppia come da tabella "coppie di serraggio" (classe delle viti 8.8), utilizzando un frena filetti medio.
- Montare tutte le altre viti e relative rondelle grower pos. 6 (meno una in posizione alta), inserire altro lubrificante da questo foro lasciato aperto; quindi montare anche l'ultima vite chiudendo così l'accoppiamento in una camera stagna lubrificata, utilizzando un frena filetti medio.

#### SMONTAGGIO

- Liberare il braccio di reazione del riduttore, sostenendo adeguatamente il riduttore stesso.
- Togliere le viti pos. 6 sostituendole con viti di maggior lunghezza, compatibilmente con lo spazio a disposizione.
- Togliere le viti pos. 5; quindi avvitare le viti pos. 6 gradualmente e in senso circolare (fig. 2) fino allo sbloccaggio del riduttore.

#### ATTENZIONE

Al rimontaggio dopo una qualsiasi operazione di riparazione o altro, le rondelle tipo "grower" in pos. 5 e 6 non possono essere utilizzate; devono essere tassativamente sostituite con rondelle nuove.

## 6. INSTALLATION

### 6.6.2 FEMALE SHAFT DESIGN FCB

#### ASSEMBLY

- Grease the seats of the o-rings pos. 1 and 2 on the cover pos.3; then insert the respective o-rings in their seats; then insert the cover on the shaft.
- Insert the tongue pos.4 in their respective seats on the shaft.
- Assemble the torque arm pos. 7 on the reduction gear.
- Suitably lubricate both the application shaft and reduction gear female shaft; then carry out coupling of the shaft and the reduction gear (do not force).
- Place the cover pos. 3, clamping it with the screws and the respective grower pos. 5, taking care to gradually screw the screws in a circular direction (fig. 1) until completely clamped using a torque given in the "tightening torque" table (screw classes 8.8), by means of medium loctyte.
- Assemble all the other screws and relative dowty washers pos. 6 (omitting one at the top), insert further lubricant in the hole which has been left open; then assemble this last screw as well to thus close the coupling in a lubricated hermetic chamber, by means of medium loctyte.

#### DISASSEMBLY

- Whilst suitably supporting the reduction gear free the torque arm.
- Remove the screws pos.6 replacing them with longer screws, suitable for the room available.
- Remove the screws pos. 5; then screw the screws pos. 6 gradually in a circular direction (fig. 2) until the reduction gear is unlocked.

#### WARNING:

The grower in pos. 5 and 6 cannot be reused when reassembling the reduction gear after repairs or any other type of operation; they must always be replaced with new washers.

## 6. INSTALLATION

### 6.6.2 AUFSTECKVERSIONFCB

#### MONTAGE

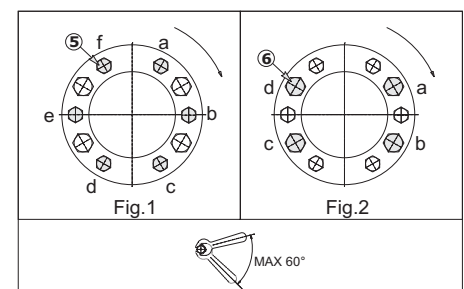
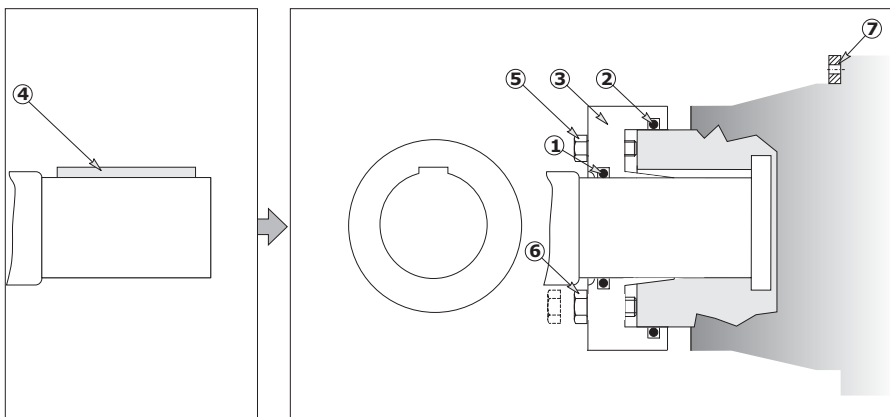
- Die Sitze der O-Ringe Pos. 1 und 2 am Deckel Pos. 3 einfetten, dann die jeweiligen O-Ringe in ihre Sitze einfügen, dann den Deckel auf die Welle fügen.
- Schließlich die Passfeder Pos. 4 in die Sitze auf der Welle fügen.
- Die Drehmomentenstütze Pos. 7 am Getriebe montieren.
- Sowohl die Maschinenwelle, als auch die Aufsteckwelle des Getriebes angemessen schmieren, dann die Passung zwischen Welle und Getriebe vornehmen (nicht forcieren).
- Den Deckel Pos. 3 anordnen, mit den Schrauben und den entsprechenden Grower-Scheiben Pos. 5 befestigen und dabei darauf achten, dass die Schrauben graduelle im Uhrzeigersinn (Abb. 1) bis zum vollständigen Feststellen angezogen werden. Hierzu einen Anzugsmoment gemäß Tabelle „Anzugsmoment“ (Schraubenklasse 8.8) ansetzen und mittelstarke Schraubensicherung auftragen.
- Alle anderen Schrauben und die entsprechenden Grower-Scheiben Pos. 6 (dabei eine in oberer Position auslassen) einschrauben, dann weiteres Schmiermittel über die dadurch freigelassene Bohrung zufügen. Schließlich auch die letzte Schrauben montieren und damit die Passung in einer geschmierten, abgedichteten Kammer nach Auftrag einer mittelstarken Schraubensicherung schließen.

#### AUSBAU

- Die Drehmomentenstütze des Getriebes lösen und dabei das Getriebe angemessen abstützen.
- Die Schrauben Pos. 6 lösen und, dem verfügbaren Platz entsprechend, durch längere Schrauben ersetzen.
- Die Schrauben Pos. 5 lösen, dann die Schrauben Pos. 6 graduell rundum anziehen (Abb. 2) bis sich das Getriebe löst.

#### ACHTUNG

Nach erneuter Montage infolge irgendwelcher Reparatur- oder anderer Arbeitseingriffe können die „Grower“-Scheiben in Pos. 5 und 6 nicht mehr verwendet werden und sich unbedingt durch neue zu ersetzen.





## 6. INSTALLAZIONE

### 6.6.3 ESECUZIONE PENDOLARE FU-TU-HU-SU

Nel fissaggio pendolare l'albero della macchina costituisce il vincolo alla traslazione radiale e assiale del riduttore; il vincolo alla rotazione deve essere imposto utilizzando gli appositi attacchi sulla carcassa in modo che si abbia un gioco tale da consentire piccole oscillazioni evitando l'iperstaticità alla struttura.

Fissare il braccio di reazione al riduttore con viti classe minima di resistenza 8.8 serrate ad una coppia corrispondente al 70% del loro carico di snervamento.

## 6. INSTALLATION

### 6.6.3 PENDULAR DESIGN FU-TU-HU-SU

*In shaft mounting execution, the shaft is the constraint for radial and axial translation of the gear; rotational constraint must be realized by using the proper eyelets on the casing thus obtaining a gap allowing minor swing and avoiding making the structure hyperstatic.*

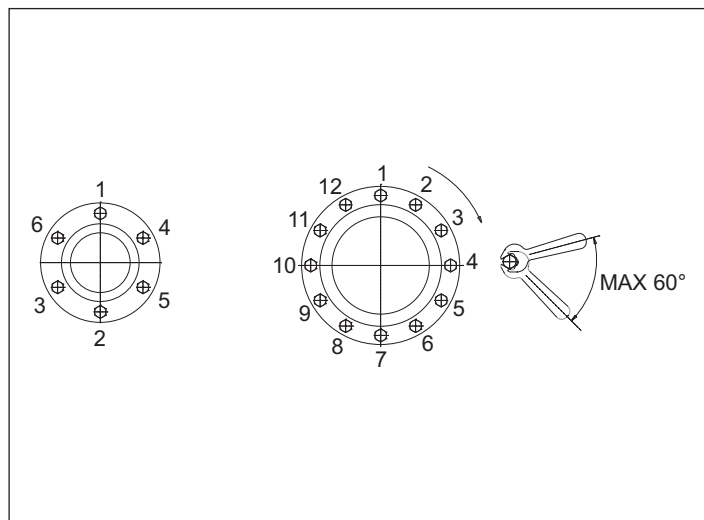
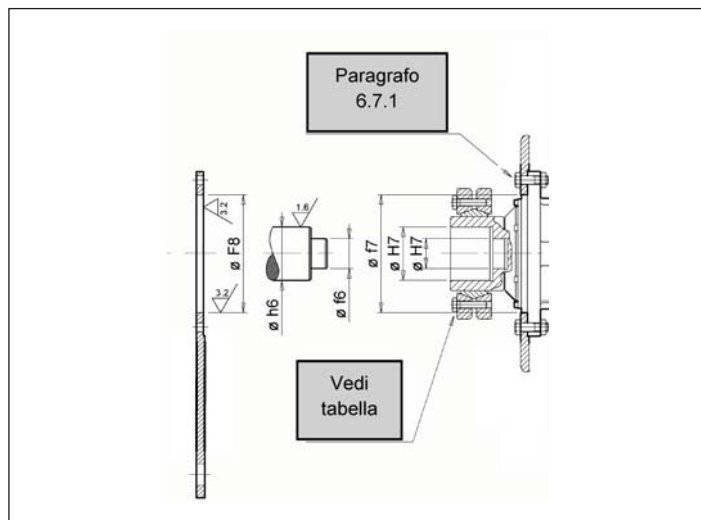
*Fasten the reaction arm to the gearbox with a screw with a minimum resistance class of 8.8 tightened to a torque corresponding to 70% of their yielding load.*

## 6. INSTALLATION

### 6.6.3 SENKRECHTE AUSFÜHRUNG FU-TU-HU-SU

Bei einer Aufsteckbefestigung stellt die Welle der Maschine die Einschränkung für die radiale und axiale Verschiebung des Getriebes dar. Die Befestigung bezüglich der Drehung muss durch den Einsatz entsprechender Anschlüsse am Gehäuse so erfolgen, dass ein solches Spiel verbleibt, dass kleine Schwingungen ermöglicht und so ein hyperstatischer Zustand der Struktur vermieden werden kann.

Den Reaktionsarm mit Schrauben der Festigkeitsklasse von mindestens 8.8 an der Unterseite anbringen und mit einem Drehmoment anziehen, der 70% ihrer Verwindungslast entspricht.



Pulire accuratamente le superfici di contatto dell'albero e del mozzo.  
Applicare sulle stesse una leggera pellicola d'olio.  
Inserire l'unità di bloccaggio all'esterno dell'albero cavo.  
Serrare le viti in modo graduale ed uniforme con sequenza continua sino a raggiungere la coppia di serraggio **Ms** indicata in tabella.  
Per raggiungere la coppia di serraggio **Ms** richiesta sono necessari più serraggi delle viti.

**Attenzione:** non usare **bisolfuro di molibdeno** o altri grassi, causa di notevoli riduzioni del coefficiente d'attrito.

In particolare è consigliato serrare le viti secondo lo schema a croce ma qualora il numero delle viti è superiore a 12, per facilitare le operazioni di montaggio è consentito il serraggio sequenziale prestando particolare attenzione allo schema indicato in figura.

*Carefully clean the contact surfaces of the shaft and the hub.  
Smear the same with a light film of oil.*

*Place the block unit outside the hollow shaft.*

*Gradually tighten the screws in an even way, with a continuous sequence until reaching the tightening torque **Ms** indicated in table.*

*Tighten screws in steps to reach the tightening torque **Ms**.*

**Attention:** do not use **molybdenum disulphide** or other greases; it would cause big reductions of friction coefficient.

*It is recommended to tighten the screws in a cross pattern, but it is allowed to tighten screws in a sequence in case there are more than 12, to facilitate assembly operations; in this case special attention should be paid to the diagram in the figure.*

Die Kontaktflächen der Welle und der Nabe sorgfältig reinigen.

Einen leichten Ölfilm auf diesen Flächen auftragen.

Die Sperreinheit extern an der Hohlwelle anbringen.

Die Schrauben schrittweise und gleichmäßig in Dauersequenz anziehen, bis das Anzugsmoment **Ms**, das in der Tabelle angegeben wird, erreicht wurde.

Für das Erreichen des erforderlichen Anzugsmoments **Ms** müssen die Schrauben mehrfach angezogen werden.

**Achtung:** Kein **Molybdändisulfid** oder andere Fette verwenden, da dadurch der Reibungsbeiwerts erheblich gemindert werden würde.

Insbesondere wird empfohlen die Schrauben einem Kreuzschema gemäß anzuziehen. Sollten jedoch mehr als 12 Schrauben angezogen werden müssen, ist im Sinne einer einfacheren Montage, auch ein sequentieller Anzug zulässig, wobei besondere Aufmerksamkeit auf das abgebildete Schema gerichtet werden muss.



## 6. INSTALLAZIONE


## 6. INSTALLATION

## 6. INSTALLATION

### 6.6.3 ESECUZIONE PENDOLARE FU-TU-HU-SU

### 6.6.3 PENDULAR DESIGN FU-TU-HU-SU

### 6.6.3 SENKRECHTE AUSFÜHRUNG FU-TU-HU-SU

SIZE	Coppia Slittamento / <i>Slipping torques</i> / Rutsch- momente $M_{2s}$ [Nm]	Coppia serraggio / <i>Tightening torque</i> / Anzugsmoment $M_s$ [Nm] DIN 931 1DIN 931 10.9	Viti di serraggio / <i>Retaining screws</i> / Anzugsschrauben N° x M...	 Kg
10	2200	12	10 x M6	1.3
20	2200	12	10 x M6	1.3
25	2200	12	10 x M6	1.3
30	7500	30	12 x M8	4.7
35	7500	30	12 x M8	4.7
40	7500	30	12 x M8	4.7
50	7500	30	12 x M8	4.7
70	7500	30	12 x M8	4.7
80	13000	59	12 x M10	8.3
90	17600	100	10 x M12	10
95	17600	100	10 x M12	10
100	17600	100	10 x M12	10
150	35000	250	8 x M16	22
180	35000	250	8 x M16	22
200	35000	250	8 x M16	22
250	41000	250	8 x M16	22
280	41000	250	8 x M16	22
300	52000	250	10 x M16	37
350	86000	250	14 x M16	47
420	86000	250	14 x M16	47
600	136000	250	20 x M16	65
650	136000	250	20 x M16	65
800	176000	490	15 x M20	87
850	176000	490	15 x M20	87
1000	342000	840	M24	126
1200	342000	840	M24	126
1500	398000	840	M24	141
1600	398000	840	M24	141
2000	398000	840	M24	141
2500	603000	1250	M27	235
2600	603000	1250	M27	235
3100	603000	1250	M27	235
3200	603000	1250	M27	235
3700	800000	1250	M27	251
4500	800000	1250	M27	251
5500	990000	1250	M27	324
6800	1235000	1250	M27	409
7500	1235000	1250	M27	409
8000	1235000	1250	M27	409



## 6. INSTALLAZIONE

### 6.7 ESECUZIONE CON PIEDI

Il fissaggio deve essere fatto utilizzando i fori di fissaggio previsti sulle basi.

Accertarsi che il fissaggio del riduttore alla struttura portante sia stabile, in modo tale da eliminare qualsiasi vibrazione, e che esso venga effettuato su piani lavorati; utilizzare sistemi antisvitamento per le viti di serraggio.

Curare particolarmente l'allineamento del dispositivo con il motore e la macchina da comandare interponendo dove è possibile giunti elastici o autoallineanti. In caso di sovraccarichi prolungati, urti o pericoli di bloccaggio, installare salvamotori, limitatori di coppia, giunti idraulici od altri dispositivi simili.

Vedi disegno.



I giunti e simili sono in generale dispositivi con contenuto di sicurezza anche agli effetti Ex, e devono essere conformi ATEX per l'ambiente di impiego o di conserva valutati all'interno dell'insieme di destinazione. Lo stesso vale per gli altri dispositivi testé menzionati).

## 6. INSTALLATION

### 6.7 DESIGN WITH FEET

*Unit shall be fastened by means of the suitable securing holes located on the bases. Make sure that the fastening of the gearbox to the load-bearing structure is steady so to be able to eliminate any possible vibration and also make sure that the fastening is done between machined surfaces. Remember to use anti-loosening systems for the fixing bolts.*

*Take special care to align the device to the motor and the machinery to be driven by fitting in-between flexible or self-aligning couplings wherever possible. In the event of prolonged overloads, shocks or jamming risks, install motor cut-outs, torque limiters, hydraulic couplings or other similar devices*

See draw

*Couplings and similar devices generally do accomplish with Ex safety requirements and must be complying with ATEX provisions for the working and storing environment to be evaluated as a function of the final assembly. This is also true for the other mentioned devices.*

## 6. INSTALLATION

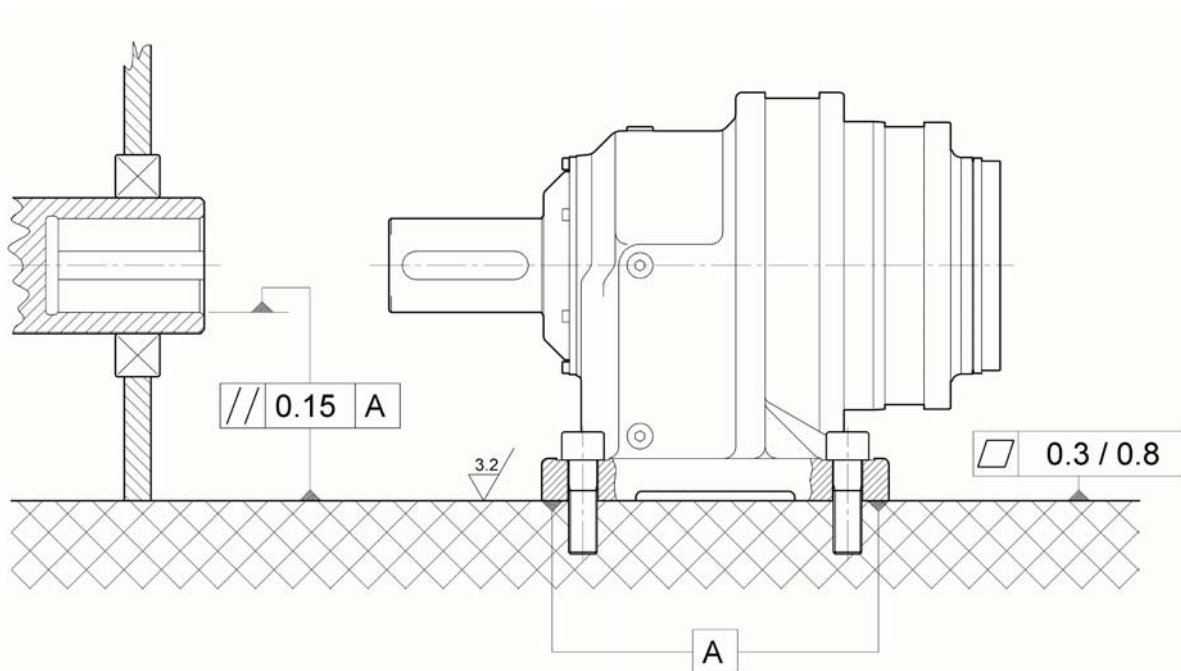
### 6.7 AUSFÜHRUNG MIT FÜSSEN

Die Befestigung muss über die an den Gestellen vorgesehenen Bohrungen erfolgen. Sich darüber vergewissern, dass die Befestigung des Getriebes an die tragende Struktur stabil ist, so dass jegliche Schwingung beseitigt wird. Die Befestigung muss auf bearbeiteten Flächen und unter Anwendung von Lösungssicherungssystemen der Anzugschrauben erfolgen.

Insbesondere ist dabei die Fluchtung der Vorrichtung mit dem Motor und der zu steuernden Maschine zu beachten, dazu können, wo möglich, elastische oder selbstfluchtende Kupplungen verwendet werden. Bei länger andauernden Überlastungen, Stößen oder Klemmgefahr müssen ein Motorschutzschalter, eine Rutschkupplung, hydraulische Kupplungen oder andere ähnliche Vorrichtungen installiert werden.

Siehe Zeichnung

Die Kupplungen und ähnliche Vorrichtungen sind im Allgemeinen Systeme die auch im Sinne der Ex den Sicherheitsbestimmungen entsprechen, sie müssen jedoch auch als Einheit mit ihrer Betriebsapplikation im Hinblick auf den Einsatz- oder Aufbewahrungsort der ATEX-Norm entsprechen. Dies gilt auch für die zuvor genannten Vorrichtungen).





## 6. INSTALLAZIONE

## 6. INSTALLATION

## 6. INSTALLATION

### 6.8 COPPIA DI SERRAGGIO

### 6.8 TIGHTENING TORQUE

### 6.8 ANZUGSMOMEN

Sizes	Versions	Screws	Class	Tightening torque	Quantity	
10-20-25	R-L-F-FC-FU	M10	12.9	86	8	
	FS	M10	12.9	86	8	
	P	M12	12.9	148	4	
	M	M12	12.9	148	10	
30-35-40-50-70	R-F-FC-FU	M12	12.9	148	10	
	M	M12	12.9	148	10	
	MX	M12	12.9	148	10	
	T	M18	12.9	509	4	
	FS	M10	12.9	86	12	
	FCB	M10	12.9	86	12	
	P	M20	10.9	615	4	
	FP	M12	12.9	148	10	
	80	R-F-FC-FU	M14	12.9	235	12
		M	M16	12.9	368	12
T		M18	12.9	509	4	
FB		M12	12.9	148	10	
P		M24	10.9	1060	4	
FS		M12	12.9	148	10	
FCB		M12	12.9	148	10	
90-95-100	R-L-F-FC-FU	M16	12.9	368	10	
	FB	M16	12.9	368	10	
	T	M18	12.9	509	8	
	P	M24	10.9	1060	4	
	FS	M12	12.9	148	16	
	FCB	M12	12.9	148	16	
150-180-200	R-FU	M16	12.9	368	10	
	T-TU	M18	12.9	509	8	
	P	M30	10.9	2130	4	
	PH	M24	10.9	1060	4	
	PX	M24	10.9	1060	4	
	H-HU	M16	12.9	368	12	
	X	M16	12.9	368	12	
	FCB	M16	12.9	368	12	
	FS	M16	12.9	368	12	
250-280	T-TU	M18	12.9	509	8	
	PH	M24	10.9	1060	4	
	H-HU	M16	12.9	368	15	
	FS	M16	12.9	368	15	
	FCB	M16	12.9	368	15	
300	T-TU	M18	12.9	509	8	
	PH	M24	10.9	1060	4	
	H-HU	M16	12.9	368	15	
	FS	M16	12.9	368	15	
350-360-420	S-SB-FS-FSR-SU	M16	12.9	368	18	
	PS	M30	10.9	2130	4	
600-650	S-FS-FSR-SU	M20	10.9	615	28	
	PS	M30	10.9	2130	4	
800-850	S-FS-FSR-SU	M24	10.9	1060	28	
	PS	M30	10.9	2130	8	
1000-1200	S-FS-FSR-SU	M24	10.9	1060	32	
	PS	M27	10.9	1570	8	
1500-1600-2000	S-SFD-FS-FSR-SU	M24	10.9	1060	32	
	PS	M30	10.9	2130	8	
2500-2600-3000-3100-3200	S-SFD-FS-FSR-SU	M30	10.9	2130	32	
	PS	M42	10.9	5610	8	
3700-4500	S-SFD-FS-FSR-SU	M30	10.9	2130	36	
5500-6800-7500-8000	S-SFD-FS-FSR-SU	M36	10.9	3490	36	







## 6. INSTALLAZIONE

### 6.9 CONNESSIONE MOTORE/RIDUTTORE CON GIUNTO STM/ROTEX

Qualora la connessione tra riduttore e macchina motrice sia effettuata con un giunto è necessario verificare se è necessario montare un linguetta di dimensioni a disegno STM.

La linguetta e la targhetta nella quale sono riportate le istruzioni di montaggio sono allegate ad ogni fornitura.

Qualora non fornite segnalare il problema al Nostro Ufficio Commerciale ed attenersi alla presenti istruzioni per l'installazione del motore sul riduttore.

Nelle prossime pagine sono allegate targhette con le relative istruzioni di montaggio.

#### 6.9.1 GIUNTO A DISEGNO "STM"

**CODICE TARGHETTA - CODE PLATE**  
1080031271

#### 1.12.4 Installazione

Prescrizioni di installazione del Motore con Riduttore.

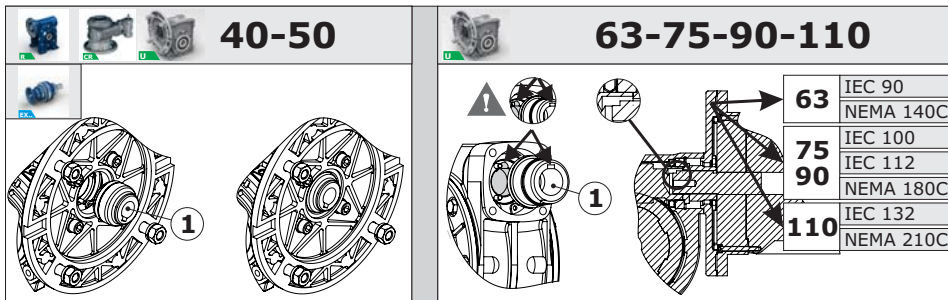
Giunto a disegno STM / Coupling made to STM drawing / Kupplung gemäß STM-Zeichnung

#### 1.12.4 Installation

Instructions for installing motor on gearbox.

#### 1.12.4 Montage

Installation des Motors mit dem Getriebe.



#### FASI DI INSTALLAZIONE:

##### A1) UMI 40-50 - EX:



Montare il componente 1 applicando una pressione manuale. Eventualmente usare un piccolo martello di plastica per agevolare l'inserimento del componente.

##### A2) UMI 63-75-90-110:

A2.1 - Nei riduttori con le predisposizioni riportate in figura, prima di procedere al montaggio del componente 1, allineare la sede della linguetta presente nel componente con la corrispettiva sede presente nella vite senza fine.

A2.2 - Montare il componente 1 applicando una pressione manuale. Eventualmente usare un piccolo martello di plastica per agevolare l'inserimento del componente.

B) Apporre un film di grasso sull'albero del motore elettrico;  
C) Montare il motore elettrico sul riduttore e serrare le viti.

#### INSTALLATION STEPS:

##### A1) UMI 40-50 - EX:

Install part 1 by applying lightly pressure. If it would be necessary, use a small plastic hammer to facilitate the insertion of the component.

##### A2) UMI 63-75-90-110:

A2.1 - For gearboxes with arrangement shown in the figure, before starting installation of the component 1, align the key groove in this component with the corresponding groove of the worm.

A2.2 - Install part 1 by applying lightly pressure. If it would be necessary, use a small plastic hammer to facilitate the insertion of the component.

B) Apply grease on the electric motor shaft;  
C) Assemble electric motor into the gearbox and tighten screws.

#### MONTAGESCHRITTE

##### A1) UMI 40-50 - EX:

Der Einbau der Komponente 1 erfolgt mit leichtem, manuellem Druck. Verwenden Sie gegebenenfalls einen kleinen Kunststoffhammer, um das Einsetzen des Bauteils zu erleichtern.

##### A2) UMI 63-75-90-110:

A2.1 - Bei Getrieben mit Vorbereitung, wie im Bild dargestellt, muss vor Einbau der Komponente 1 die Passfeder mit entsprechend der Nut der Schneckenwelle ausgerichtet werden.

A2.2 - Der Einbau der Komponente 1 erfolgt mit leichtem, manuellem Druck. Verwenden Sie gegebenenfalls einen kleinen Kunststoffhammer, um das Einsetzen des Bauteils zu erleichtern.

B) Fetten sie die Motorwelle des Elektromotors ein;  
C) Montieren sie Elektromotor am Getriebe und sichern sie die Schrauben.



#### FASI DI SMONTAGGIO

Prima di procedere allo smontaggio del motore assicurarsi che il motore sia assicurato ad un sistema di sollevamento tramite cinghia onde prevenire danni a persone o cose. Questo per evitare che durante lo smontaggio delle viti di serraggio tra motore e riduttore il motore possa cadere a terra.

#### DE-INSTALLATION

Before starting de-installation, please assure that the engine is secured with a suitable hoist to prevent injury or damage. This action is necessary because, with release of the locking screws between the gearbox and engine, the engine could fall to the ground.

#### DEMONTAGE

Bevor Sie mit der Demontage beginnen, stellen Sie bitte sicher, dass der Motor mit einem geeigneten Hebezeug vor Absturz gesichert ist, um Personen- und Sachschäden zu verhindern. Diese Maßnahme ist notwendig, da bei Lösen der Spanschrauben zwischen Getriebe und Motor der Motor zu Boden fallen könnte.

Per ulteriori informazioni contattare il Nostro Ufficio Tecnico.

Contact our Technical Dept. for more information

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6. INSTALLAZIONE

6. INSTALLATION

6. INSTALLATION

6.9.2 GIUNTO TIPO "ROTEX"

6.9.2 "ROTEX" TYPE OF JOINT

6.9.2 KUPPLUNG - TYP "ROTEX"

CODICE TARGHETTA - CODE PLATE 1080031051

1.12.4 Installazione

1.12.4 Installation

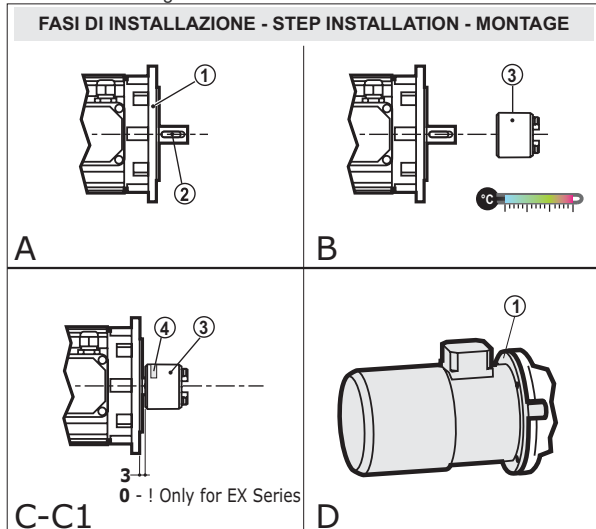
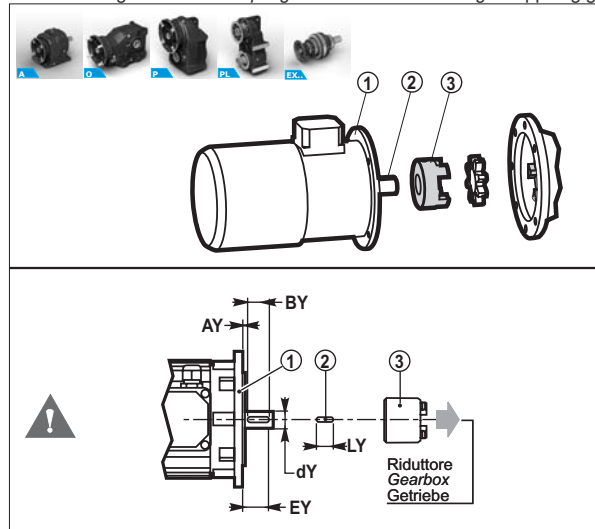
1.12.4 Montage

Prescrizioni di installazione del Motore con Riduttore.

Instructions for installing motor on gearbox.

Installation des Motors mit dem Getriebe.

Giunto a disegno Rotex / Coupling made to Rotex drawing / Kupplung gemäß Rotex-Zeichnung



IEC	dY	EY	KEY	BY	⚠ AY	LY
200	55	110	16 x 10	100	< 6	45
225	60	140	18 x 11	130	< 6	55
250	65	140	18 x 11	130	< 6	63

Linguetta con dimensione LY a disegno STM. I riduttori nei PAM riportati in tabella sono forniti con allegato il KIT boccola + linguetta.

Tab with size LY to STM drawing. The gearboxes in the PAMs shown on the table are supplied with the bushing + tab kit.

Lamelle mit Maß LY nach Zeichnung von STM. Die in der Tabelle angegebenen Getriebe in den PAM werden mit dem KIT Buchse + Lamelle geliefert.

- 1) Se la quota misurata AY è minore o uguale a quella riportata in tabella si può procedere al montaggio utilizzando una linguetta di dimensioni LY;
- 2) Se la quota misurata AY è maggiore a quella riportata in tabella è necessario montare una linguetta di dimensione LY ridotta della differenza della quota AY misurata rispetto a quella indicata in tabella.

- 1) If the measured value AY is less or equal than the value in the table, the installation will be continued by using a key with dimension LY;
- 2) If the resulting value AY is bigger than indicated in the table, it is necessary to use a key with dimension LY, which is reduced according to the value AY in the table.

- 1) Wenn der ermittelte Messwert AY kleiner oder gleich dem Wert in der Tabelle ist, kann mit der Montage, durch Verwendung einer Passfeder der Größe LY, fortgefahren werden;
- 2) Ist der ermittelte Wert AY größer als in der Tabelle angegeben, ist es notwendig, eine Passfeder der Größe LY zu verwenden, welche entsprechend der Maßzahl AY in der Tabelle reduziert ist.

FASI DI INSTALLAZIONE:

A) Montare il componente 2 sul componente 1;

STEP INSTALLATION

A) Assemble part 2 on part 1.

MONTAGE

A) Bauteil 2 an Bauteil 1 montieren;

B) Preriscaldamento componente 3 - Vista l'eventualità pratica di una possibile interferenza è necessario montare i semigiunti preriscaldandoli (max. 90°), il foro filettato in testa all'albero aiuterà il montaggio e lo smontaggio; in ogni caso evitare di battere i semigiunti onde evitare danni al motore.

B) Preheated part 3 - Coupling halves should be preheated before assembly (max. 90°), considering that a possible interference fit is likely; the threaded hole on shaft end will help installation and removal. At any rate, do not tap on the couplings or damage could result for motor.

B) Erarmten Bauteil 3 - Unter Berücksichtigung einer möglichen Interferenz müssen die Kupplungshälften im erwärmten Zustand (max. 90°) montiert werden. Die vordere Gewindebohrung an der Welle wird sich bei der Montage und dem Ausbau als hilfreich erweisen. Auf jeden Fall ist im Hinblick auf Schäden am Motor zu vermeiden, auf die Kupplungshälften zu schlagen.

C) Montare il componente 3 sul motore rispettando la quota a disegno (3mm);

C) Assemble part 3 on the electric motor regarding quote in the drawing (3mm);

C) Bauteil 3 am Motoren montieren - sehen Sie bitte die Abmessung in der Zeichnung (3mm);

! - Solo EX - la quota è (0 mm).

! - Only for EX - the quote is (0 mm).

! nur für EX - Abmessung ist (0 mm)

C1) Bloccaggio componente 3 - è comunque sempre necessario bloccare assialmente i semigiunti tramite il grano radiale presente - componente 4.

C1) Tighten - Part 3 - it is always necessary to tighten coupling halves axially by means of the provided radial grub screw - part 4.

C1) Anziehen Bauteil 3 - es ist jedoch immer erforderlich, die Kupplungshälften axial mit Hilfe des vorhandenen radialen Stifts zu blockieren - Bauteil 4.

D) Montare il componente 1 sul riduttore e serrare le viti di fissaggio.

D) Assemble part 1 on the gearbox and tighten the fixing screws.

D) Bauteil 1 am Getriebe anbauen und Befestigungsschrauben anziehen.

FASI DI SMONTAGGIO

Prima di procedere allo smontaggio del motore assicurarsi che il motore sia assicurato ad un sistema di sollevamento tramite cinghia onde prevenire danni a persone o cose. Questo per evitare che durante lo smontaggio delle viti di serraggio tra motore e riduttore il motore possa cadere a terra.

DE-INSTALLATION

Before starting de-installation, please assure that the engine is secured with a suitable hoist to prevent injury or damage. This action is necessary because, with release of the locking screws between the gearbox and engine, the engine could fall to the ground.

DEMONTAGE

Bevor Sie mit der Demontage beginnen, stellen Sie bitte sicher, dass der Motor mit einem geeigneten Hebezeug vor Absturz gesichert ist, um Personen- und Sachschäden zu verhindern. Diese Maßnahme ist notwendig, da bei Lösen der Spanschrauben zwischen Getriebe und Motor der Motor zu Boden fallen könnte.

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## 6. INSTALLAZIONE

### 6.10 CONNESSIONE MOTORE/RIDUTTORE CON ATTACCO DIRETTO

Qualora la connessione tra riduttore e macchina motrice sia effettuata con attacco diretto attenersi alle seguenti istruzioni di montaggio.

## 6. INSTALLATION

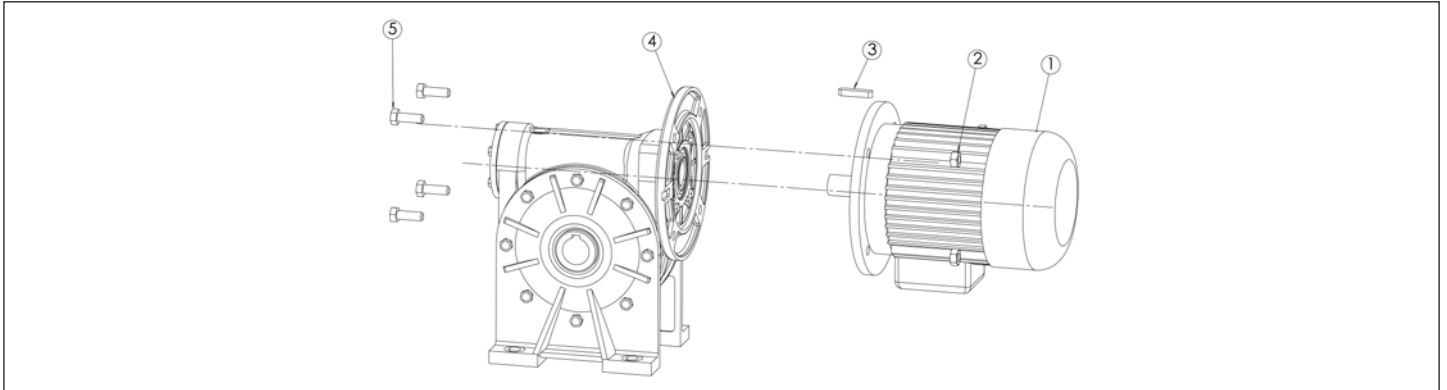
### 6.10 CONNECTING THE MOTOR AND GEARBOX DIRECTLY

If gearbox and driving machine are connected directly, follow installation instructions below.

## 6. INSTALLATION

### 6.10 VERBINDUNG ZWISCHEN MOTOR UND GETRIEBE ÜBER DIREKTANSCHLUSS

Sollte die Verbindung zwischen Getriebe und Antriebsmaschine mittels Direktanschluss erfolgen, sind folgende Montageanleitungen zu befolgen.



ITEM	COMPONENTI / COMPONENTS / KOMPONENTEN
	MOTORE / MOTOR / MOTOR
	DADO DI FISSAGGIO / RETAINING NUT / KLEMMMUTTER
	LINGUETTA / KEY / PASSFEDER
	RIDUTTORE / GEARBOX / GETRIEBE
	VITE DI FISSAGGIO / RETAINING SCREW / BEFESTIGUNGSSCHRAUBE

CICLO DI MONTAGGIO INSTALLATION CYCLE MONTAGESEQUENZ	
COMPONENTI COMPONENTS KOMPONENTEN	DESCRIZIONE FASE DI MONTAGGIO INSTALLATION STAGE DESCRIPTION BESCHREIBUNG DER MONTAGESCHRITTE
1-3	<p>Controllo gioco tra linguetta e sede linguetta La linguetta deve introdursi nella propria sede con una certa interferenza, usando un martello di rame ed evitando di forzare l'inserimento, al fine di evitare la formazione di bave da trafilazione o rigonfiamenti. In tali ultimi casi il montaggio è non conforme. <i>Check clearance between key and keyway</i> <i>Key shall be a tight fit, use a copper hammer and do not force insertion in order to avoid burrs or swelling.</i> <i>In these cases installation is non-conforming.</i> <i>Kontrolle des zwischen Passfeder und ihrer Aufnahme vorliegenden Spiels</i> Die Passfeder muss sich mit einem gewissen Übermaß in ihren Sitz einfügen lassen. Zum Einfügen kann ein Kupferhammer verwendet werden, dabei muss jedoch ein übermäßiges Einwirken vermieden werden, um Grate zu vermeiden, die durch Verzug oder Schwellungen entstehen können. In diesen Fällen resultiert die Montage als nicht konform.</p>
1-2-3-4-5	<p>Prima di procedere alla fase di montaggio del riduttore apporre un film di Pasta: <b>Klüberpaste® 46 MR 401</b> sull'albero del motore. Avvicinare il motore al riduttore impuntando l'albero dello stesso motore al foro della vite, avvedendosi che la chiavetta sia nell'esatta corrispondenza della sede relativa posta sul sopraccitato foro vite. Inserire il motore assicurandosi che il tutto proceda senza interferenze. Controllare che le due flange giunte a battuta combacino perfettamente, quindi serrare stringendo viti e bulloni. Nel caso si fosse verificata qualche interferenza nell'assemblaggio è necessario togliere il motore dal riduttore e controllare sulla chiavetta dello stesso la zona che si presenta danneggiata. Quindi l'operatore valuterà il recupero con operazioni di aggiustaggio, verificando visivamente che non danneggino la funzionalità dell'albero stesso. Ripetere le operazioni fino a permettere l'assemblaggio, senza impedimento alcuno, del motore al riduttore.</p> <p><i>Before installing the gearbox, smear a film of sealant: <b>Klüberpaste® 46 MR 401</b> onto motor shaft.</i> <i>Move motor close to gearbox and slide motor shaft into hole, ensure that key is in the correct position with respect to keyway in the hole.</i> <i>Fit the motor ensuring that nothing jams.</i> <i>Check that the two flanges are fully home, then tighten nuts and bolts.</i> <i>In case of jamming during assembly, remove the motor from gearbox and check if there is a damaged area nearby the key. The operator will then evaluate if part can be recovered by adjusting, visually ensuring that nothing hinders shaft operation.</i> <i>Repeat the operations until completing assembly of motor to gearbox with no problems or hard spots.</i></p> <p>Vor Beginn der Getriebemontage eine Schicht: <b>Klüberpaste® 46 MR 401</b> auf der Motorwelle auftragen. Den Motor dem Getriebe nähern und die Motorwelle in die Bohrung der Schnecke einfügen, dabei sicherstellen, dass die Passfeder sich in exakter Position in ihrem Sitz in der genannten Schneckenbohrung sitzt. Den Motor einfügen und darauf achten, dass keine Interferenzen vorliegen. Kontrollieren, dass die beiden auf Anschlag gekommenen Flanschen perfekt untereinander ausgerichtet sind, dann die Schrauben und Bolzen anziehen. Sollte man beim Zusammenfügen irgendwelche Klemmungen erfasst haben, muss der Motor vom Getriebe abgenommen und kontrolliert werden, ob die Passfeder beschädigt ist. Sollte dies der Fall sein, muss der Bediener bewerten, ob sie durch entsprechende Bearbeitungen wieder zurückgesetzt werden kann, ohne dass dabei die Funktion derWelle beeinträchtigt wird. Die Arbeitsschritte so lange wiederholen, bis der Motor sich einwandfrei mit dem Getriebe koppeln lässt.</p>

**6. INSTALLAZIONE****6.10.1 CONNESSIONE MOTORE/RIDUTTORE RMI 110 - PAM 132**

Nella tabella è illustrata la targhetta allegata con le relative istruzioni di montaggio del Motore con riduttore RMI 110 PAM 132.

**6. INSTALLATION****6.10.1 CONNECTING THE MOTOR/GEARBOX RMI 110 - PAM 132**

The table shows the nameplate with installation instructions for coupling Motor to gearbox RMI 110 PAM 132.

**6. INSTALLATION****6.10.1 VERBINDUNG ZWISCHEN MOTOR UND GETRIEBE RMI 110 - PAM 132**

In der Tabelle wird die anliegende Anleitung für die Montage des Motors am Getriebe RMI 110 PAM 132 dargestellt.

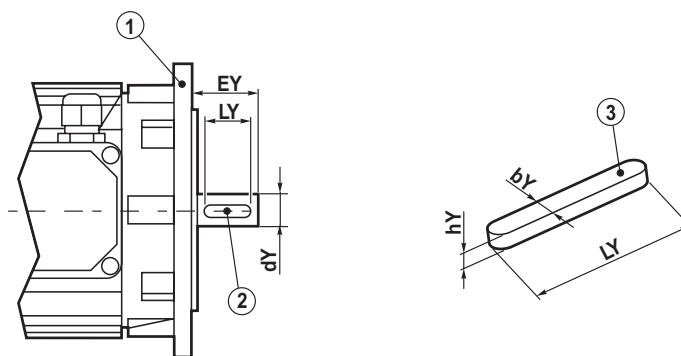
STANDARD *line*
**CODICE TARGHETTA - CODE PLATE  
1080031041**
**1.11 Installazione****1.11 Installation**

Prescrizioni di installazione del Motore con Riduttore **RMI 110 PAM 132**.

Procedure to assemble electric motor to

Getriebe **RMI110 IEC132**

Tab. 1.13



Tipo riduttore Gearbox type Getriebe Typ	IEC	dY	EY	Key Standard  (bY x hY x LY)	Key Fornitura STM Supplied by STM STM Lieferung  (bY x hY x LY)
RMI 110	132	38	80	10 x 8 x 70	10 x 7 x 70

**!**  
Linguetta con dimensione **hY** diversa da misura unificata.  
I riduttori nei PAM riportati in tabella sono forniti con allegata la linguetta con la dimensione **hY** con dimensione ridotta.

**!**  
*Special key having h Y dimension different from standard.  
Gearboxes in the PAM versions specified in the chart are supplied with enclosed the special key having h Y reduced dimension.*

**!**  
Passfeder mit Massen **hY** nicht nach Uni norm.  
Die Getriebe mit IEC wie nach Tabelle werden mit kleineren Passfedern (Mass **hY**) geliefert.

**FASI DI INSTALLAZIONE:**

- A) Smontare il componente 2 (linguetta unificata) dal componente 1 (motore elettrico);
- B) Montare il componente 3 (linguetta fornita STM) sull'albero del motore;
- C) Montare il componente 1 (motore elettrico) su riduttore.

**STEP INSTALLATION**

- A) Disassemble the component 2 (standard key) from the component 1 (electric motor);
- B) Assemble component 3 (key supplied by STM) on the motor shaft;
- C) Assemble component 1 (electric motor) to the gearbox.

**MONTAGE**

- Einbauphasen:
- A) Einzelteil 2 (Passfeder nach UNI) vom Einzelteil 1 (E-Motor) demontieren;
- B) Einzelteil 3 (STM Passfeder) auf dem Motor montieren;
- C) Das Einzelteil 1 (E-Motor) auf das Getriebe montieren.



## 6. INSTALLAZIONE

### 6.11 COLLEGAMENTO ALL'ALBERO VELOCE

Pulire prima di accoppiare gli organi.

In caso di montaggio pulegge per trasmissioni a cinghia o pignoni dentati per trasmissioni a catena, gli alberi devono essere paralleli e le pulegge allineate.

Non tendere la cinghia più del necessario in quanto una eccessiva tensione può causare danni ai cuscinetti.

Nel caso di collegamento con giunto rigido prevedere un sistema di compensazione per recuperare l'eventuale sfasamento dell'albero veloce rispetto al fissaggio riduttore.

Vedi disegno

## 6. INSTALLATION

### 6.11 CONNECTION TO THE FAST SHAFT

*Clean all the mechanisms before connection.*

*In the event that pulleys for belt drives or toothed pinions for chain gearing are fitted, the shafts must be parallel and the pulleys aligned.*

*Do not tighten the pulleys more than necessary as excessive tension could damage the bearings.*

*If the connection is made with a rigid joint, a compensation system must be added to recover any phase displacement between the fast shaft and the gearbox fastening.*

See draw

## 6. INSTALLATION

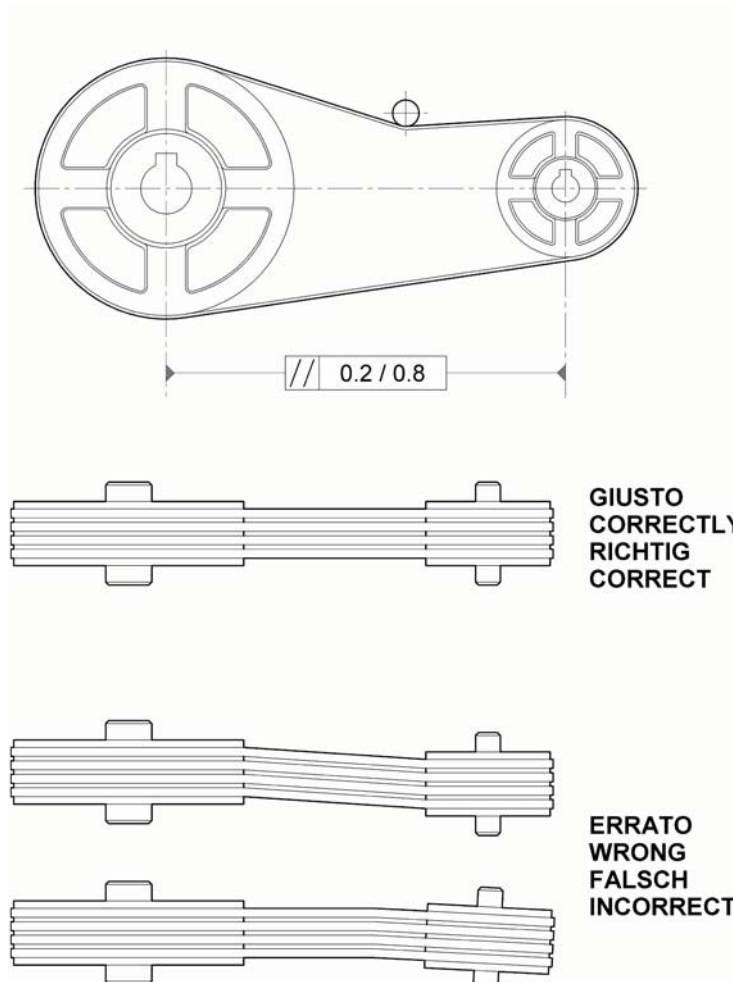
### 6.11 ANSCHLUSS AN DIE EINGANGSWELLE

Die Organe vor dem verbinden reinigen.

Bei der Montage von Riemenscheiben für die Übertragung mit Riemen oder Zahnitzeln für die Übertragung mit Ketten müssen die Wellen parallel und die Riemenscheiben ausgerichtet sein.

Den Riemen nicht stärker falls nötig spannen, da eine zu starke Spannung die Lager beschädigen kann. Bei der Verbindung mit starrer Kupplung ein Ausgleichssystem für die eventuelle Abweichung der Eingangswelle von der Befestigung der Untersetzung vorsehen.

Siehe Zeichnung





## 6. INSTALLAZIONE



### 6.12 AVVERTENZE COGENTI DI SICUREZZA

Per garantire la corretta installazione dei riduttori occorre che l'ambiente di destinazione sia preventivamente valutato in base alle prescrizioni ATEX e p.es. alle indicazioni contenute nelle norme EN1127, EN60079-10 ed EN50281 riguardanti la classificazione Ex dei luoghi e i rischi collegati. In alternativa, devono essere posti in opera modi protettivi o controllo ambientale tali da garantire analoghe condizioni microambientali nello spazio che ospita il prodotto.

- 1- La valutazione o gli allestimenti di cui sopra devono dare esito compatibile con il Gruppo e la Categoria ATEX dichiarati da STM SpA (II 2G/D, vedi par. 2.0) e riportati in targa. **In assenza di verifica o con esito negativo, è vietata l'installazione e messa in servizio.**
- 2- Effettuare tutte le operazioni di messa in servizio in assenza di atmosfera potenzialmente esplosiva.
- 3- Pulire accuratamente le superfici lavorate (alberi, piani, flange) dai protettivi utilizzati per lo stoccaggio, da impurità e da sostanze contaminanti.
- 4- Durante queste operazioni evitare di il contatto diretto fra i solventi utilizzati per la pulizia e gli anelli di tenuta, per non alterarne le caratteristiche chimico-fisiche e pregiudicarne l'efficienza.
- 5- Evitare qualunque tipo di urto e sollecitazione meccanica in esubero dalla massima portata indicata in targa.
- 6- Se l'olio utilizzato per lo stoccaggio non è compatibile con il lubrificante sintetico, occorre effettuare un accurato lavaggio interno del riduttore prima di riempirlo con l'olio previsto per il funzionamento.
- 7- Prima di procedere al montaggio del prodotto controllare che non risultino parti danneggiate, perdite d'olio, o altri indizi di non perfetta integrità.
- 8 - Evitare che in condizione di funzionamento vi siano strisciamenti tra parti metalliche esterne al riduttore e lo stesso. Nel caso utilizzare elementi antifrizione non metallici conformi ad ATEX 2014/34/UE.
- 9 -Garantire il corretto parallelismo tra alberi uscita e gli organi di trasmissione ad esso collegati, la perpendicolarità tra piano di appoggio flangia o piedi con asse uscita.
- 10- Accertarsi che lo spazio libero attorno al riduttore sia sufficiente per la libera ventilazione dello stesso (carterature avvolgenti o ambienti angusti possono ostacolare l'adeguato smaltimento del calore prodotto e innalzare la temperatura superficiale oltre i valori massimi ammessi).
- 11 - Accertarsi che durante il funzionamento non vi siano elementi esterni che possano danneggiare le tenute striscianti del riduttore precludendone la corretta ritenuta del lubrificante.

## 6. INSTALLATION

### 6.12 SAFETY COMPULSORY WARNING

*To guarantee correct gearbox installation, the working environment will have to be previously evaluated according to ATEX provisions and standards and, for example, all indications given in EN1127, EN60079-10 and EN50281 regarding Ex classification of environments and related risks. As an alternative, appropriate protections and environmental monitoring activities must be set in place so that similar microenvironmental conditions can be achieved in the area where the product operates.*

- 1 - *The evaluation or the specifications above given must be compatible with the ATEX Family and Type declared by STM SpA (II 2G/D, see par. 2.0) and mentioned on the nameplate. Without verification or in presence of verification with negative result, installation and operation are forbidden.*
- 2 - *Carry out all commissioning activities in absence of potentially explosive environment.*
- 3 - *Appropriately clean all machined surfaces (shafts, surfaces, flanges, etc.) to eliminate all protective elements used for the product storage as well as dirt and polluting substances.*
- 4 - *During these activities prevent thinners from reaching the oil seals in order not to alter the product specification and impair its efficiency.*
- 5 - *Make sure not to damage the product and not to load the product more than max. admissible torque value indicated on the nameplate.*
- 6 - *In case oil used for storage is not compatible with the synthetic lubricant, it is necessary to carry out a thorough cleaning inside the gearbox prior to filling it up with oil recommended for operation.*
- 7 - *Prior to assembling the product, it is advisable to check if any parts have been damaged, if oil leakage has taken place or if there are any other signs of failure.*
- 8 - *Make sure that during operation no metal parts external to the gearbox interfere with the gearbox. In case this happens, make sure to use non metallic anti-friction components in conformity with ATEX 2014/34/UE standard.*
- 9 - *Guarantee correct parallelism between output shafts and the transmission components connected as well as the perpendicularity between flange support surface/feet with output axis.*
- 10 - *Make sure that the area around the gearbox is enough to grant proper ventilation (enclosures, covers as well as restricted environments might easily interfere with adequate heat dissipation and consequently increase the surface temperature over the maximum allowed values)*
- 11 - *Make sure that during operation there are no external elements which might damage the seals of the gearbox so preventing the correct oil retention inside the gearbox.*

## 6. INSTALLATION

### 6.12 VERBINDLICHE SICHERHEITSHINWEISE

Um eine korrekte Installation der Getriebe gewährleisten zu können, ist es erforderlich, dass der vorgesehene Installationsort zuvor in Bezug auf die ATEX-Vorschriften und auf die in den Normen EN1127, EN60079-10 und EN50281 enthaltenen Angaben zur Ex-Klassifizierung der Installationsorte und der damit verbundenen Gefahren bewertet wird. Als Alternative müssen Schutzmaßnahmen oder Umgebungskontrollvorrichtungen vorgesehen werden, die gleichwertige Mikroumweltbedingungen in dem Bereich garantieren, in denen das Produkt installiert wird.

- 1- Die Bewertung oder o.g. Ausstattungen müssen ein Ergebnis bringen, das mit der von STM SpA erklärten und auf dem Typenschild angegebenen ATEX-Gruppe und -Kategorie (II 2G/D, siehe Par. 2.0) kompatibel ist. **Sollte eine solche Überprüfung nicht oder mit negativem Ergebnis erfolgt sein, sind die Installation und die Inbetriebsetzung verboten.**
- 2- Alle Inbetriebsetzungsarbeiten dürfen nicht innerhalb einer potentiell explosionsfähigen Atmosphäre erfolgen.
- 3- Die für die Einlagerung aufgetragenen Schutzmittel entfernen und die bearbeiteten Flächen (Wellen, Platten, Flanschen) sorgfältig reinigen, dabei den Schmutz und die Verunreinigungen entfernen.
- 4- Während dieser Arbeit ist ein direkter Kontakt mit den für die Reinigung verwendeten Lösungsmitteln. Ebenso sollten die Dichtringe nicht behandelt werden, um deren chemisch-physischen Eigenschaften und Wirkungsgrad aufrecht erhalten zu können.
- 5- Jegliche Art von Stößen und mechanischen Belastungen vermeiden, durch die es zum Überschreiten der auf dem Typenschild angegebenen maximalen Tragfähigkeit kommen würde.
- 6- Sollte das für die Einlagerung verwendete Öl nicht mit dem synthetischen Öl verträglich sein, muss der Innenbereich des Getriebes sorgfältig ausgewaschen werden, bevor das für den Betrieb vorgesehene Öl eingefüllt wird.
- 7- Vor Beginn der Montage des Produkts muss kontrolliert werden, dass keine beschädigten Teile, Ölleckagen oder andere Hinweise bezüglich einer nicht perfekten Integrität vorliegen.
- 8 - Vermeiden, dass es in Betriebsbedingungen zum Anschleifen externer Metallteile am Getriebe kommt. In solchen Fällen sich nicht metallische Reibschutzelemente zu verwenden, die der ATEX 2014/34/UE konform sind.
- 9 - Die korrekte Parallelität zwischen den Abtriebswellen und den daran angeschlossenen Antriebsorganen und das Lot zwischen Auflagefläche und Füßen mit der Abtriebsachse müssen gewährleistet sein.
- 10 - Sich darüber vergewissern, dass der Freiraum um das Getriebe herum für einen freie Belüftung desselben ausreicht (Abdeckungen oder enge Räume, die eine Ableitung der produzierten angemessene Wärme behindern und die zu einem Anstieg der Oberflächentemperatur über die maximal zulässigen Werte hinaus führen können).
- 11 - Sicherstellen, dass während des Betriebs keine externen Elemente vorhanden sind, durch die die Schleifdichtungen des Getriebes beschädigt werden könnten, da dadurch die korrekte Abdichtung gefährdet werden könnte.



## 6. INSTALLAZIONE



Per tutti riduttori in esecuzione "ATEX " occorre:

- 1- Un collegamento elettrico a terra del riduttore, oppure un montaggio metallicamente solidale con una struttura conduttrice posta elettricamente a terra.
- 2- Un montaggio tale da non esporre a urti/danneggiamenti l'indicatore di livello, il tappo olio e tutti gli elementi di tenuta del lubrificante (tappi di chiusura, paraolio, &c.).
- 3- Verificare l'assenza di correnti parassite, catodiche o altrimenti vaganti che possono interessare il riduttore. In particolare ove dovute al flusso disperso del motore elettrico accoppiato.
- 4- Nel caso di presenza di atmosfere in grado di reagire chimicamente con il lubrificante o i suoi vapori/nebbie e quindi formare miscele esplosive, prevedere il riempimento di lubrificante e/o i successivi controlli di livello o ispezioni varie, in aree lontane dalla zona potenzialmente esplosiva; oppure prevedere una accurata bonifica preventiva dell'ambiente.

Accoppiamento riduttore - motore elettrico:

- 1) Applicare uno strato di sigillante anaerobico sulla superficie del centraggio e frontale di accoppiamento delle flange.
- 2) Applicare pasta antigrippaggio (p. es. pasta a base di bisolfuro di molibdeno) sull'albero motore e all'interno del foro manicotto.
- 3) Procedere all'accoppiamento e quindi sigillare la zona di congiunzione tra motore e riduttore con adeguata pasta sigillante.

## 6. INSTALLATION

Each gearbox certified as ATEX must feature the following items:

- 1- An electrical contact to earth or a metallic assembly compatible with a conductive earth driven structure.
- 2- Such a type of assembly able to protect from damages the level indicator, the oil cap and all elements regarding the lubricant seals (oil seals, oil plug, etc.).
- 3- To verify the absence of elements such as: parasitic currents, catodical currents or any other which could affect the gearbox. Especially in areas where a leakage flux could be present caused by a coupled electrical motor.
- 4- In case of a chemical reaction of atmosphere against the lubricant and its vapors, in order to avoid explosive mixtures, top up and/or inspections must be carried out in very distant areas, far from those considered as potentially explosive. Any other solution should be providing accurate environment decontamination.

Gearbox – electric motor coupling:

- 1) Apply a layer of anaerobic sealing compound on the centering surface and side flange mating surface.
- 2) Apply some antiseize compound (for example compound based on molybdenum disulphide) on the motor shaft and inside the sleeve hole.
- 3) Connect the two components and then seal the connection parts between motor and gearbox by using appropriate sealing compound.

## 6. INSTALLATION

Bei allen Getrieben in der "ATEX-Version ist folgendes erforderlich:

- 1- Eine elektrische Erdung des Getriebes oder eine im metallischem Sinne feste Montage mit einer leitenden Struktur die geerdet ist.
- 2- Eine Montage, bei der die Ölstandanzeige, die Öleinfüllschraube und alle Schmiermittelabdichtelemente (Verschluss-stopfen, Ölabdichtungen, usw.) keinen Stößen /Beschädigungen ausgesetzt sind.
- 3- Überprüfen, dass kein Wirbel-, Strahl- oder anderweitig vagabundierender Strom vorliegt, der sich auf den Getriebetrieb auswirken könnte. Insbesondere durch den Streufluss des angebauten Elektromotors.
- 4- Bei Vorliegen von Atmosphären, die eine chemische Reaktion mit dem Schmiermittel oder seinen Dämpfen/Nebel erzeugen und damit explosionsfähige Gemische bilden können, müssen das Einfüllen des Schmiermittels und/oder die späteren Füllstandkontrollen oder anderweitige Inspektionen in Bereichen erfolgen, die weit von den potentiell explosionsfähigen Zonen liegen. Andernfalls muss zuvor eine sorgfältige Vergütung des Umfelds erfolgen.

Passung von Getriebe und Elektromotor:

- 1) Eine Schicht anerobe Dichtmasse auf die Zentrierungs- und die frontale Passungsfläche der Flanschen auftragen.
- 2) Auf die Motorwelle und in die Bohrung der Hülse Fressschutzmittel (z.B. Paste auf Molybdändisulfidbasis) auftragen.
- 3) Die Passung vornehmen und den Verbindungsbereich zwischen Motor und Getriebe mit angemessener Dichtmasse versiegeln.

**PICTURE  
(Under Costruction)**



## 7. MESSA IN SERVIZIO

### 7.0 MODALITA' DI FUNZIONAMENTO

**Caratteristiche operative:** il riduttore può sopportare qualunque tipo di ciclo compatibile con una variazione dei parametri di coppia e velocità di rotazione entro i valori nominali dati a catalogo, per un fattore di servizio pari ad uno. (Per ulteriori informazioni consultare il catalogo generale STM SpA).

**Avviamento/arresto:** la messa in marcia e l'arresto del riduttore dipendono unicamente dalla sua alimentazione di energia; si raccomanda, ove l'applicazione possa comportare rischi elevati, di dotare la macchina di sistemi di arresto agenti sulla trasmissione, conformemente alle misure prevenzionali adottate nell'insieme meccanico di incorporazione.

**Rumore aereo riduttore:** il livello di pressione acustica deve mantenersi al di sotto dei valori riportati al paragrafo 0.3.1.

**Temperatura (esterna della carcassa):** deve mantenersi sempre al di sotto di 90°C, salvo contraria specifica contrattuale.

**N.B.**

**Variatore meccanico !!!**

La variazione dei giri deve essere assolutamente eseguita a motore in moto.

## 7. COMMISSIONING

### 7.0 OPERATING MODES

**Operative features:** the gearbox can tolerate any working cycle compatible with a variation of the torque/rotating speed within the rated values indicated on the catalogue according to service factor 1. (Please refer to STM SpA general catalogue for further details).

**Start/Stop:** the start and the stop of the gearbox only depend on the power supply; it is recommended, wherever the application might imply high risks, to equip the machine with braking systems acting on the drive transmission in conformity with the preventive measures used on the mechanical combination set.

**Gearbox air noise level:** acoustic pressure level must be below values specified in par. 0.3.1.

**(Casing outer) Temperature:** it should always stay below 90°C, unless otherwise stated on the contract.

**N.B.**

**Mechanical variator!!!**

Rpm variation must be performed with motor running.

## 7. INBETRIEBSETZUNG

### 7.0 BETRIEBSWEISE

**Funktionseigenschaften:** Das Getriebe kann, in Übereinstimmung mit einem Betriebsfaktor von eins, in jedem Zyklustyp eingesetzt werden, der mit einer Änderung der Parameter von Drehmoment und Drehzahl innerhalb der im Katalog angegebenen Nenndaten kompatibel ist. (Weitere Informationen können dem Hauptkatalog der STM SpA entnommen werden).

**Start/Stop:** Die Inbetriebsetzung und der Stopp des Getriebes hängen ausschließlich von seiner Energieversorgung ab. Es wird empfohlen, dort wo es zu erheblichen Gefahren kommen kann, die Maschine mit Bremssystemen auszustatten, die auf den Antrieb wirken und die den an der mechanischen Gesamtheit der Einbaueinheit angewandten Sicherheitsvorkehrungen konform sind.

**Geräuschpegel des Getriebes:** Der Schalldruck muss unter den Werten liegen, die im Paragraph 0.3.1. angegeben werden.

**Temperatur (außen am Gehäuse):** Muss, anderweitige vertragliche Spezifikation ausgenommen, immer unter 90°C liegen.

**HINWEIS**

**Mechanisches Verstellgetriebe !!!**

Die Änderung der Drehzahl muss unbedingt bei laufendem Motor erfolgen.

## PICTURE (Under Costruction)

### 7.1 CONTROLLO LIQUIDI/OLII

Le quantità di olio sono approssimative; per una corretta lubrificazione occorre fare riferimento al livello segnato sul riduttore.

Vedere specifico paragrafo.

### 7.1 FLUIDS/OIL INSPECTION

Oil quantities listed in the table are approximate; to ensure correct lubrication, please refer to the level mark on the gear unit.

See relevant paragraph.

### 7.1 KONTROLLE DER FLÜSSIGKEITEN/ÖLE

Bei den Ölmengenangaben handelt es sich um approximative Werte; für den Erhalt einer korrekten Schmierung muss Bezug auf den am Getriebe gekennzeichneten Füllstand genommen werden.

Siehe spezifischen Paragraph.

### 7.2 CONTROLLO FORMA COSTRUTTIVA/ POSIZIONE DI MONTAGGIO

Il riduttore deve essere montato nella forma costruttiva prevista in targhetta; posizioni di montaggio diverse richiedono una modifica del livello o del sistema di lubrificazione.

### 7.3 CONTROLLO SENSI ROTAZIONE

Verificare prima dell'avviamento il senso di rotazione nel caso di dispositivo antiretro.

Qualora il senso di rotazione libera dell'antiretro sia errato è necessario invertirne il senso di rotazione della macchina motrice.

### 7.2 CHECKING THE CONSTRUCTION VERSION / MOUNTING POSITION

Do not mount the gear unit in a position different than the one specified in the rating plate; a different mounting position requires in general a modification of the level indicator or a different lubrication system.

### 7.3 CHECKING THE DIRECTION OF ROTATION

Before starting, check direction of rotation if back stop device is fitted.

If back stop device free direction of rotation is incorrect, reverse driving machine direction of rotation.

### 7.2 KONTROLLE DER BAUFORM/ EINLAULAGE

Das Getriebe muss in der auf dem Typenschild vorgesehenen Einbaulage montiert werden. Abweichende Einbaulagen erfordern eine Änderung der Füllstandsanzeige oder des Schmiersystems.

### 7.3 KONTROLLE DER DREHRICHTUNGEN

Bei montierter Rücklaufsperrung vor dem Start die Drehrichtung überprüfen.

Sollte sich die freie Drehrichtung der Rücklaufsperrung als falsch erweisen, muss die Drehrichtung der Antriebseinheit invertiert werden.



## 7. MESSA IN SERVIZIO

### 7.4 VERIFICHE PRODOTTI ATEX



1. Accertarsi che durante il servizio il riduttore sia sufficientemente ventilato e che non vi siano fonti di calore nelle vicinanze;

## 7. COMMISSIONING

### 7.4 ATEX PRODUCTS INSPECTIONS

1. *Make sure that during operation the gearbox is sufficiently ventilated and no heat sources are present nearby;*

## 7. INBETRIEBSETZUNG

### 7.4 ÜBERPRÜFUNG DER "ATEX"-PRODUKTE

1. Sicherstellen, dass während des Betriebs das Getriebe ausreichend belüftet ist und keine Wärmequellen in der Nähe vorliegen.

**PICTURE  
(Under Construction)**



2. Accertarsi che in regime di funzionamento la temperatura dell'aria di raffreddamento non superi i 40°C; in caso contrario decadono le condizioni di validità della certificazione di conformità del prodotto fornita da STM SpA .

2. *Make sure that during operation the cooling air temperature does not reach 40°C or the conditions necessary for the conformity certification supplied by STM SpA would not be valid anymore.*

2. Sich darüber vergewissern, dass im Betriebsdrehzahlbereich die Temperatur der Kühlluft die 40°C nicht überschreitet. Sollte dies der Fall sein, kommt es zum Verfall der von der STM SpA gelieferten Erklärung der Produktkonformität .

**PICTURE  
(Under Construction)**



4. Verifica temperatura superficiale del riduttore in funzionamento:

- a. Verificare nelle prime ore di funzionamento le temperatura superficiale del riduttore (si raggiunge la situazione di regime generalmente nelle prime 3 ore a pieno carico).
- b. La temperatura raggiungibile dal riduttore varia in funzione del numero di giri, del rapporto di trasmissione e della forma costruttiva, attenersi alle potenze massime installabili con il relativo numero di giri del motore come indicato in targa.
- c. La temperatura massima delle superfici del riduttore a pieno carico, considerando la massima temperatura ambientale ammissibile di 40°C, non deve superare nel caso di classe di temperatura T4 (o 135°C), 130 °C; nel caso di classe di temperatura T5 (o 100°C), 93°C.

In caso di eccedimento arrestare immediatamente il funzionamento e contattare il servizio assistenza STM SpA .

4. *Verification of the temperature of the gearbox housing surface while running*

- a. *Verify the temperature of the gearbox housing surface during the initial running hours (the standard running conditions are normally reached after 3 hours at full load).*
- b. *The temperature reached by the gearbox depends on the speed, reduction ratio and the assembly position. Make sure to comply with the maximum applicable power in relation with the motor speed as indicated on the nameplate.*
- c. *The maximum temperature of the outer surfaces of the gearbox running at full load, considering the maximum environmental temperature admitted of 40°C, must not exceed 130°C in case temperature class is T4 (or 135°C) and 93°C in case temperature is T5 (or 100°C).*

*In case temperature is exceeded, stop immediately the system and get in touch with STM SpA.*

4. Überprüfung der Oberflächentemperatur des sich im Betrieb befindlichen Getriebes:

- a. In den ersten Betriebsstunden die Oberflächentemperatur des Getriebes prüfen (die Betriebstemperatur wird im Allgemeinen in den ersten 3 Stunden unter Vollast erreicht).
  - b. Die vom Getriebe erreichbare Temperatur variiert in Abhängigkeit der Drehzahl, des Übersetzungsverhältnisses und der Bauform. Sich an die maximalen installierbaren Leistungen mit der entsprechenden Motordrehzahl gemäß Angaben auf dem Typenschild halten.
  - c. Die maximale Oberflächentemperatur des Getriebes bei Vollast, unter Berücksichtigung der zulässigen Umgebungstemperatur von 40°C, darf im Fall der Temperaturklasse T4 (oder 135°C), 130 °C und im Fall der Temperaturklasse T5 (oder 100°C), 93°C nicht überschreiten.
- Bei Überschreiten dieser Werte muss der Betrieb sofort gestoppt und Verbindung mit dem Kundendienst der STM SpA aufgenommen werden.

**PICTURE  
(Under Construction)**



## 7. MESSA IN SERVIZIO

### 7.5 Taratura Limitatore di Coppia

Nelle tabelle seguenti sono riportate le coppie di slittamento  $M_{2S}$  in funzione del numero dei giri del dado, o della ghiera di regolazione ottenibili con la disposizione standard delle molle (par. 1.6).

Tali valori prescindono dalle prestazioni delle dentature.

Valori più elevati di  $M_{2S}$  si possono ottenere, a richiesta, con una diversa disposizione delle molle.

I valori di taratura si riferiscono ad una condizione statica (durante lo slittamento la coppia trasmessa decade considerevolmente) ed hanno un significato indicativo in quanto ottenuti per via teorica.

E' opportuno verificare periodicamente la coppia di taratura soprattutto durante la prima fase di funzionamento.

## 7. COMMISSIONING

### 7.5 Slipping Torque

*In the following tables the slipping torques  $M_{2S}$  are listed according to number of turns of nut or ring nut obtainable with a standard arrangement of the springs (chapter 1.6).*

*Such data prescind from tothing performances.*

*$M_{2S}$  higher values can eventually be obtained with a different arrangement of the springs.*

*Calibration values refer to a static condition (during slippage torque reports a considerable decrease) and are approximate being calculated on a theoretic basis. It is important therefore to check the calibration torque periodically especially during first phase of running.*

## 7. INBETRIEBSETZUNG

### 7.5 Rutsch-momente

In der folgenden Tabelle sind die Rutschmomente  $M_{2S}$  dargestellt, wie sie je nach Stellung der Sechskant- oder Nutmutter mit der Standardanordnung der Tellerfedern erreicht werden (siehe kapitel 1.6).

Diese Werte lassen die maximal übertragbare Leistung der Getriebe in Abhängigkeit von der Untersetzung jedoch außer acht.

Mit einer anderen Anordnung der Tellerfedern können auch größere Rutschmomente  $M_{2S}$  erreicht werden.

Die angegebenen Werte sind statische Momente (das Rutschmoment nimmt während des Schlupfvorganges ab) und sind nur als Näherungswerte zu betrachten.

Das eingestellte Rutschmoment sollte in der Einlaufphase in periodischen Abständen überprüft und gegebenenfalls korrigiert werden.

LP

LC

		$M_{2S}$ (Nm)										
RI RMI	ir	N. GIRI DEL DADO DI REGOLAZIONE NUMBER OF TURNS OF ADJUSTMENT RING NUT DREHUNGEN DER EINSTELLMUTTER										
		1/2	2/3	1	1 1/3	1 2/3	2	2 1/3	2 2/3	3	3 1/3	3 2/3
28	tutti i rapporti all ratios alle Untersetzungen	4	5.5	7.5	10	13						
40		12	16	24	31	38	46					
50		16	20	29	39	47	55	63				
63		21	27	41	55	65	79	89	101	112	124	
70		21	27	41	55	65	79	89	101	112	124	
85	7-10-15-28	60	79	113.5	148	175	210	236	265	298	323	345
	20-40-49	66	87	125	163	192.5	231	260	292	328	356	380
	56 - 100	72	95	136	178	210	253	284	319	358	388	415
110	7-10-15-28	106	141	207	271	334	392	454	516	572	630	
	20-40-49	114	152	224	293	361	423	490	557	618	680	
	56 - 100	131	174	257	336	414	486	640	709	781		
130	tutti / all / alle	240	310	450	590	720	850	950				
150	tutti / all / alle	550	730	1070	1390	1700	1990	2200				

		$M_{2S}$ (Nm)											
RI RMI	CRI CRMI	ir	N. GIRI DEL DADO DI REGOLAZIONE NUMBER OF TURNS OF ADJUSTMENT RING NUT DREHUNGEN DER EINSTELLMUTTER							ir	CR CB		
			1/2	2/3	1	1 1/3	1 2/3	2	2 1/3				
28	28	tutti i rapporti all ratios alle Untersetzungen	12.5	17	24								
40	40		40	53	77	91				tutti/all/alle	40		
50	50		50	65	93	128					50		
63	63		96	125	178	231	288						
70	70		96	125	178	231	288			tutti/all/alle	70		
85	85	7-10-15-28	146	185	263	350	414	471	542	43.0 - 128.8	85		
		20-40-49	161	204	289	385	456	518	596	167.6 - 225.4			
		56 - 100	176	223	316	420	497	566	651	286.4 - 460.0			
110	110	7-10-15-28	261	342	501	653	805	945		43.0 - 128.8	110		
		20-40-49	282	369	541	705	869	1021		167.6 - 225.4			
		56 - 100	323	424	621	810	998	1172		286.4 - 460.0			
130	130	tutti / all / alle	470	620	910	1180	1450	1700	1900				
150	150	tutti / all / alle	830	110	1600	2050	2500	3000	3350				



## 7. MESSA IN SERVIZIO

### ATTENZIONE!

Quando è richiesto il minimo errore di taratura è opportuno verificare in pratica, staticamente, che la frizione slitti effettivamente al valore desiderato è comunque consigliabile testare la coppia trasmissibile direttamente sulla macchina utilizzatrice.

## 7. COMMISSIONING

### ATTENTION!

*When minimum calibration error is required it is always advisable to actually verify, statically, that clutch slips at the required value. We suggest, however, to test the torque directly on to the machine.*

## 7. INBETRIEBSETZUNG

### ACHTUNG!

Um Abweichungen zu vermeiden, müssen die eingestellten Momente im eingebauten Zustand kontrolliert und eventuell korrigiert werden.

**LF**

RI RMI	ir	M <sub>2S</sub> (Nm)													
		N. GIRI DELLA GHIERA DI REGOLAZIONE N. OF TURNS OF ADJUSTEMENT RING NUT DREHUNGEN DER EINSTELLMUTTER													
		1/4	1/2	2/3	1	1 1/3	1 2/3	2	2 1/3	2 2/3	3	3 1/3	3 2/3	4	
<b>40</b>	tutti i rapporti all ratios alle Untersetzungen	15	28	36	51	64	75	86	97						
<b>50</b>		21	40	52	74	93	110	126	141	154	167				
<b>63</b>		27	51	66	93	120	140	160	175	195	210				
<b>70</b>		24	45	58	81	100	115	125	135	145	151	155	160		
<b>85</b>	7-10-15-28	50	85	115	160	200	240	280	310	340	370	395	420		
	20-40-49	60	95	120	170	220	265	300	340	370	400	430	460		
	56-70-80-100	80	100	130	190	240	290	330	370	400	440	470	500		
<b>110</b>	7-10-15-28	140	260	340	490	630	750	860	960	1060	1150	1230	1310	1390	
	20-40-49	150	285	370	530	670	800	930	1040	1140	1230	1330	1410	1500	
	56-70-80-100	170	330	430	600	770	930	1060	1190	1300	1415	1520	1620	1720	
<b>130</b>	tutti / all / alle	244	476	625	910	1180	1438	1686	1920	2160	2390				
<b>150</b>	tutti / all / alle	550	860	1130	1660	2170	2660	3140	3600	4050	4500	4930	5370		

RI RMI	CRI CRMI	ir	M <sub>2S</sub> (Nm)														ir	CR CB
			N. GIRI DELLA GHIERA DI REGOLAZIONE N. OF TURNS OF ADJUSTEMENT RING NUT DREHUNGEN DER EINSTELLMUTTER															
			1/4	1/2	2/3	1	1 1/3	1 2/3	2	2 1/3	2 2/3	3	3 1/3	3 2/3	4			
<b>40</b>	<b>40</b>	tutti i rapporti all ratios alle Untersetzungen	15	28	36	51	64	75	86	97							tutti / all / alle	<b>40</b>
<b>50</b>	<b>50</b>		21	40	52	74	93	110	126	141	154	167						<b>50</b>
<b>63</b>	<b>63</b>		51	100	130	190	245	295	345	385	440	480						
<b>70</b>	<b>70</b>		38	74	96	135	175	210	240	270	300	320	350				tutti / all / alle	<b>70</b>
<b>85</b>	<b>85</b>	7-10-15-28	100	125	160	230	300	360	410	460	510	560	600	640	680	43.0 - 128.8	<b>85</b>	
		20-40-49	110	135	180	255	330	390	450	510	560	610	650	700	750	167.6 - 225.4		
		56-70-80-100	120	150	195	280	350	425	490	550	610	665	715	765	815	286.4 - 460.0		
<b>110</b>	<b>110</b>	7-10-15-28	190	380	500	740	930	1150	1350	1500	1700	1850	2020	2180	—	43.0 - 128.8	<b>110</b>	
		20-40-49	200	400	540	780	1000	1230	1430	1620	1800	2000	2170	2360	—	167.6 - 225.4		
		56-70-80-100	220	450	600	900	1150	1380	1620	1840	2070	2300	2500	2700	—	286.4 - 460.0		
<b>130</b>	<b>130</b>	tutti / all / alle	244	476	625	910	1180	1438	1686	1920	2160	2390						
<b>150</b>	<b>150</b>	tutti / all / alle	550	860	1130	1660	2170	2660	3140	3600	4050	4500	4930	5370				



## 7. MESSA IN SERVIZIO

La disposizione standard delle molle garantisce una buona sensibilità di regolazione e consente di trasmettere la massima coppia nominale del riduttore.

## 7. COMMISSIONING

Standard arrangement of springs guarantees an acceptable setting and enables the gearbox to transmit the maximum nominal torque

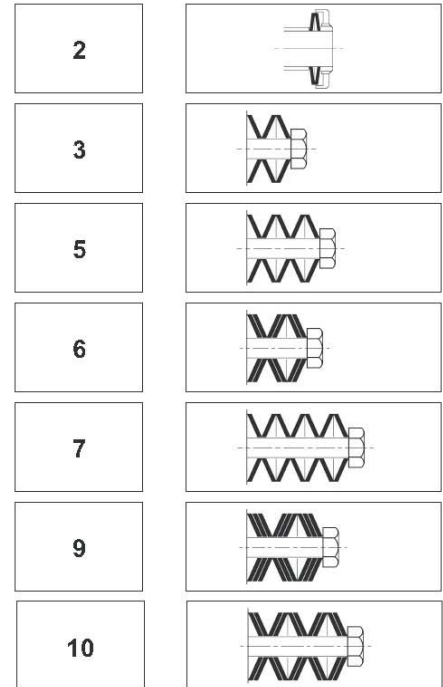
## 7. INBETRIEBSETZUNG

Die Standardanordnung der Tellerfedern erlaubt eine feinfühlige Einstellung des Rutschmomentes bis zum maximalen Nennmoment des Getriebes.

**LP**

**LC**

	RI- RMI	RI - RMI <small>Taratura maggiorata Heavy calibration Erhoete eichung</small>	CRI - CRMI	CR - CB
28	5 molle/springs 20/10.2/1.1		6 molle/springs 20/10.2/1.1	
40	5 molle/springs 23/12.2/1.5		6 molle/springs 23/12.2/1.5	
50	5 molle/springs 31.5/16.3/1.75		6 molle/springs 31.5/16.3/1.75	
63	7 molle/springs 31.5/16.3/2		6 molle/springs 31.5/16.3/2	—
70	7 molle/springs 34/16.3/2		6 molle/springs 34/16.3/2	
85	10 molle/springs 40/18.3/2		9 molle/springs 40/18.3/2	
110	10 molle/springs 45/22.4/2.5		9 molle/springs 45/22.4/2.5	
130	3 molle/springs 60/30.5/3.5		6 molle/springs 60/30.5/3.5	—
150	6 molle/springs 60/30.5/3.5		9 molle/springs 60/30.5/3.5	—



**LF**

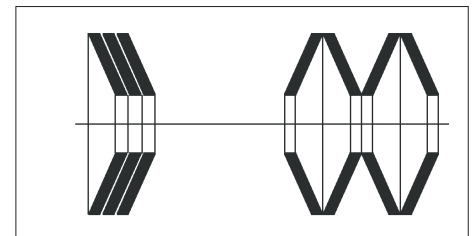
	RI- RMI	RI - RMI <small>Taratura maggiorata Heavy calibration Erhoete eichung</small>	CRI - CRMI	CR - CB
40		2 molle/springs 63/31/2.5		
50		2 molle/springs 80/41/3		
63	2 molle/springs 80/41/3		2 molle/springs 80/41/4	—
70	2 molle/springs 90/46/2.5		2 molle/springs 90/46/3.5	
85	2 molle/springs 100/51/3.5		2 molle/springs 100/51/4	
110	2 molle/springs 125/61/5		2 molle/springs 125/61/6	
130		2 molle/springs 125/75.5/6		—
150		2 molle/springs 150/81/8		—

### IN PARALLELO

max. coppia  
min. sensibilita'  
**PARALLEL**  
max. torque  
min. sensitivity  
**PARALLEL**  
max. Moment  
min. Empfindlichkeit

### IN SERIE

min. coppia  
max. sensibilita'  
**SERIES**  
min. torque  
max. sensitivity  
**SERIE**  
min. Moment  
max. Empfindlichkeit



Per problemi specifici è opportuno consultarci, ma a livello indicativo si può affermare che accoppiando più molle con lo stesso verso (in parallelo) si incrementa la coppia massima di slittamento raggiungibile; viceversa alternandone il posizionamento in serie si aumenta la sensibilità di taratura.

*Should the user require any specific information, we suggest to contact our technical department. On a general basis, however, if the springs are arranged in the same direction, a higher maximum torque of slippage can be reached; on the contrary by alternating their arrangement the calibration sensitivity is increased.*

Das Rutschmoment ist umso größer, je mehr Tellerfedern parallel angeordnet sind (progressive Federkennlinie). Wird ein niedrigeres Moment oder eine erhöhte Justiergenauigkeit gewünscht, so können die Federn auch gegensinnig angeordnet werden (degressive Federkennlinie). Sollten spezifische Fragen bestehen, so empfehlen wir, unser technisches Büro zu Rate zu ziehen.



## 8. LUBRIFICAZIONE

### Riduttori

I riduttori vengono invece forniti a secco ed è quindi compito dell'utilizzatore riempirli con olio adeguato (vedere tab. 8.1), prima della messa in opera, servendosi dei tappi di carico, scarico, livello e sfiato, della quantità corrispondente alla specifica posizione di montaggio.

Tutti i riduttori con limitatore di coppia devono essere lubrificati ad olio: **la lubrificazione a grasso non è ammessa.**

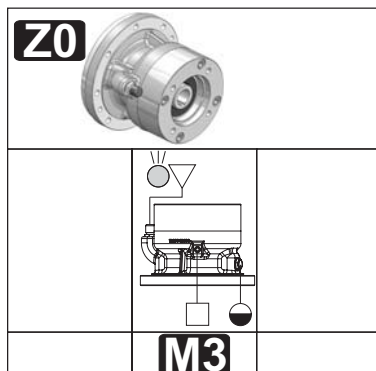
### Freni - Z0. - Z1. - Z2.

**Z0** - L'olio utilizzato per la lubrificazione del freno è lo stesso di quello del riduttore epicicloidale.

**Z1-Z2** - Il freno ha la lubrificazione separata da quella del riduttore epicicloidale e vengono invece forniti a secco.

Pertanto si dovrà provvedere al riempimento del freno con olio idraulico di viscosità ISO VG32, utilizzando lo specifico tappo di riempimento.

Se richiesti completi di lubrificante, verranno forniti con olio Shell Hydraulic S1 M ISO VG 32.



	M1	M3	M4
<b>Z0</b>	<b>Look gearbox - EX-EXB</b>		
<b>Z1.1 - Z1.2</b>	0.15	0.30	0.30
<b>Z2.2 - Z2.3</b>	0.30	0.60	0.60



**Z0.1** - Per le posizioni di montaggio M3 è necessario installare il vaso di espansione OT.

Attenzione  
Scelta grandezza OT: **Sezione E**;  
Installazione OT : **Punto 8.3** manuale uso e manutenzione.



Le quantità di olio sono approssimative; per una corretta lubrificazione occorre fare riferimento al livello.

## 8. LUBRICATION

### Gearboxes

The units are instead supplied dry and it will be the customer care to fill them with appropriate lubricant (tab. 8.1) prior to putting them into operation, using filler, drain, level and breather plugs and with quantity according to the particular mounting position.

All gearboxes incorporating torque limiters will have to be lubricated with oil: **grease lubrication is not admitted.**

### Brakes - Z0. - Z1. - Z2.

**Z0** - Brake oil is the same of Gearboxoil,

**Z1-Z2** - The brake has separated lubrication from the planetary gearbox and the units are instead supplied dry.

For this reason we have to fill the brake with Hydraulic oil viscosity ISO VG32.

For such operation it must be used the specific filling plug.

If customer requests supply of gearbox with lubricant, we shall supply them with Shell Hydraulic S1 M ISO VG 32.

## 8. SCHMIERUNG

### Getrieben

Die Getriebe dagegen "trocken" geliefert. Der Benutzer muss sie daher vor der Inbetriebsetzung mit dem angemessenen Öl füllen (siehe Tab. 8.1). Das Befüllen kann über die Füll-, Ablass-, Entlüftungs- und Füllstandsschrauben in den der Einbaulage entsprechenden Einbaulagen erfolgen.

Alle Getriebe mit Rutschkupplung müssen mit Öl geschmiert werden: **Eine Fettschmierung ist hier nicht zulässig.**

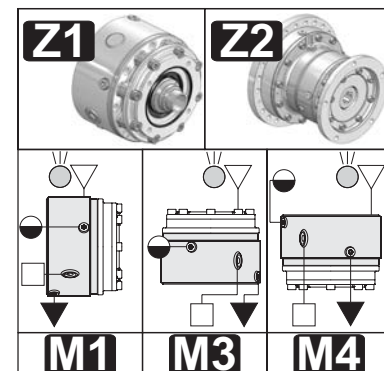
### Bremsen - Z0. - Z1. - Z2.

**Z0** - Das Öl der Bremse ist gleich von Planetengetriebe.

**Z1-Z2** - Die Bremse hat eine separate Schmierung, die von dem Planetengetriebe getrennt ist und "trocken" geliefert.

Deshalb ist beim Befüllen darauf zu achten, dass nur Hydrauliköl gemäß ISO VG32 unter Verwendung des hierfür bestimmten Einfüllstutzens eingefüllt werden.

Falls diese Getriebe mit Schmiermittelfüllung angefordert werden, werden sie mit dem Öl Shell Hydraulic S1 M ISO VG 32 geliefert.



- ▽ Carico / Filling plug / Einfüllschraube
- ▼ Scarico / Drain plug / Ablassschraube
- Livello / Level plug / Schauglas
- Sfiato / Vent plug / Entlüftungsstopfen
- Attacco Comando Freno/Brake releasing /PlugAnschluss zum Loesen der Bremse

**Z0.1** - Bei den Montagepositionen M3 ist es notwendig einen OT Öltank zu installieren. Achtung OT Auswahl: Siehe Sektion E; OT Installation: Siehe Punkt 8.3 des Benutzungs&Wartungshandbuchs

Bei den Ölmenangaben handelt es sich um approximative Werte; für den Erhalt einer korrekten Schmierung muss Bezug auf den gekennzeichneten Füllstand genommen werden.



## 8. LUBRIFICAZIONE

### ATTENZIONE:

Lo stato di fornitura è messo in evidenza con una targhetta adesiva posta sul riduttore. Verificare la corrispondenza tra stato di fornitura e targhetta adesiva.

Catalogo Tecnico  
CT 26..  
CT 30..

[URL:www.stmspa.com](http://www.stmspa.com)

### 8.0 SCELTA TIPOLOGIA OLIO

Gli oli disponibili appartengono generalmente a tre grandi famiglie:

- 1) Oli minerali
- 2) Oli sintetici Poli-Alfa-Olefine
- 3) Oli sintetici Poli-Glicole

La scelta più appropriata è generalmente legata alle condizioni di impiego. riduttori non particolarmente caricati e con un ciclo di impiego discontinuo, senza escursioni termiche importanti, possono certamente essere lubrificati con olio minerale.

Nei casi di impiego gravoso, quando i riduttori saranno prevedibilmente caricati molto ed in modo continuativo, con conseguente prevedibile innalzamento della temperatura, è bene utilizzare lubrificanti sintetici tipo polialfaolefine (PAO).

Gli oli di tipo poliglicole (PG) sono da utilizzare strettamente nel caso di applicazioni con forti strisciamenti fra i contatti, ad esempio nelle viti senza fine. Debbono essere impiegati con grande attenzione poiché non sono compatibili con gli altri oli e sono invece completamente miscibili con l'acqua. Questo fenomeno è particolarmente pericoloso poiché non si nota, ma deprime velocemente le caratteristiche lubrificanti dell'olio.

Oltre a questi già menzionati, ricordiamo che esistono gli oli per l'industria alimentare. Questi trovano specifico impiego nell'industria alimentare in quanto sono prodotti speciali non nocivi alla salute. Vari produttori forniscono oli appartenenti a tutte le famiglie con caratteristiche molto simili.

Più avanti proponiamo una tabella comparativa.  
TABELLA 8.1

## 8. LUBRICATION

### CAUTION:

*Gearbox state of supply is indicated on a nameplate applied on gearbox. Ensure that nameplate data and state of supply correspond.*

*Technical Catalogue  
CT 26..  
CT 30..*

[URL:www.stmspa.com](http://www.stmspa.com)

### 8.0 CORRECT OIL TYPES

*Available oils are typically grouped into three major classes:*

- 1) *Mineral oils*
- 2) *Poly-Alpha-Olefin synthetic oils*
- 3) *Polyglycol synthetic oils*

*Oil is normally selected in accordance with environmental and operating conditions. Mineral oil is the appropriate choice for moderate load, non-continuous duty applications free from temperature extremes.*

*In severe applications, where gear units are to operate under heavy loads in continuous duty and high temperatures are expected, synthetic Poly-Alpha-Olefin oils (PAO) are the preferred choice.*

*Polyglycol oils (PG) should only be used in applications involving high sliding friction, as is the case with worm shafts. These particular oils should be used with great care, as they are not compatible with other oils, but are totally mixable with water. The oil mixed with water cannot be told from uncontaminated oil, but will degrade very rapidly.*

*In addition to the oils mentioned above, there are food-grade oils. These are special oils harmless to human health for use in the food industry. Oils with similar characteristics are available from a number of manufacturers.*

*A comparative overview table is provided in the next pages.  
TABLE 8.1.*

## 8. SCHMIERUNG

### ACHTUNG

Der entsprechende Lieferzustand wird auf einem Aufkleber am Getriebe angegeben. Überprüfen Sie die Übereinstimmung zwischen effektivem Lieferzustand und Aufkleber.

Technischer Katalog  
CT 26..  
CT 30..

[URL:www.stmspa.com](http://www.stmspa.com)

### 8.0 WAHL DER ÖLSORTE

Die verfügbaren Öle gehören im Allgemeinen drei großen Familien an:

- 1) Mineralöle
- 2) Polyalphaolefine-Synthetiköle
- 3) Polyglykol-Synthetiköle

Die angemessene Wahl ist im Allgemeinen an die Einsatzbedingungen gebunden. Getriebe, die keinen besonders schweren Belastungen ausgesetzt werden und einem unregelmäßigen Einsatzzyklus unterliegen, ohne starke thermische Schwankungen, können problemlos mit Mineralöl geschmiert werden.

Unter harten Einsatzbedingungen, d.h. wenn die Getriebe stark und andauernd belastet werden, was einen sicheren Temperaturanstieg zur Folge hat, sollten Synthetiköle vom Typ Polyalphaolefine (PAO), verwendet werden.

Die Öle, Typ Polyglykole (PG), sind unbedingt dann einzusetzen, wenn es sich um Applikationen handelt, bei denen es zu starken Reibungen zwischen den in Kontakt stehenden Elementen kommt, z.B. bei Schnecken. Bei ihrem Einsatz ist besondere Aufmerksamkeit erforderlich, da sie nicht mit anderen Ölen kompatibel sind, sich jedoch vollständig mit Wasser vermischen lassen. Diese Tatsache erweist sich daher als besonders gefährlich, da sie sich nicht feststellen lässt, jedoch die Schmiereigenschaften des Öls bereits nach kurzer Zeit unterdrückt.

Über die bereits genannten Öle hinaus, gibt es auch Öle, die speziell für die Lebensmittelindustrie ausgelegt sind.

Diese finden demzufolge in diesem Bereich ihren Einsatz, da es sich dabei um spezielle Produkte handelt, die für die Gesundheit unschädlich sind. Die den jeweiligen Familien angehörigen Ölarten werden von verschiedenen Herstellern angeboten; sie weisen jeweils sehr ähnliche Eigenschaften auf.

In Folge finden Sie eine entsprechende Vergleichstabelle.  
TABELLE 8.1



## 8. LUBRIFICAZIONE

### 8.1.1- SCELTA VISCOSITA' OLIO EX-EXB



Input speed $n_1$ (min <sup>-1</sup> )	Absorbed power (kW)	Lubrication system	Viscosity ISO VG at 40° (cSt)	
			$i \leq 10$	$i > 10$
$2000 < n_1 \leq 5000$	$P < 7.5$	Forced or Oil splash	68	68
	$7.5 \leq P \leq 22$		68	150
	$P > 22$		150	220
$1000 < n_1 \leq 2000$	$P < 7.5$	Forced or Oil splash	68	150
	$7.5 \leq P \leq 37$		150	220
	$P > 37$		220	320
$300 < n_1 \leq 1000$	$P < 15$	Forced Oil splash	68	150
	$15 \leq P \leq 55$	Forced Oil splash	150	220
		Forced Oil splash	220	320
	$P > 55$	Forced Oil splash	320	460
$50 < n_1 \leq 300$	$P < 22$	Forced Oil splash	150	220
	$22 \leq P \leq 75$	Forced Oil splash	220	320
		Forced Oil splash	320	460
	$P > 75$	Forced Oil splash	460	680

Nel caso di lubrificazione forzata con pompa, qualora siano richieste ISO VG > 220 e/o temperature < 10°C, consultarci.

*In case of forced lubrication by pump, when ISO VG > 220 and/or temperatures < 10°C, are requested, it is advisable to contact us.*

Im Fall einer Zwangsschmierung über eine Pumpe, falls die ISO VG > 220 und/oder Temperaturen < 10°C gefordert werden, setzen Sie sich bitte mit uns in Verbindung.

La tabella è valida per velocità periferiche normali; in caso di velocità > 13m/s, consultarci.

*The table is valid for normal peripheral speeds; in case of speed > 13 m/s, contact us.*

Die Tabelle ist für normale Umfangsgeschwindigkeiten gültig. Bei Geschwindigkeiten > 13m/s, setzen Sie sich bitte mit uns in Verbindung.

### 8.1.2- SCELTA VISCOSITA' OLIO EX - SLEWING



Output speed	Ambient Temperature
	$-20^\circ\text{C} < t_a \leq 50^\circ\text{C}$
$n_2 > 100$	150
$5 < n_2 \leq 100$	220
$n_2 \leq 5$	320

#### - Viscosità consigliata:

Per la scelta della viscosità ISO VG dell'olio a 40° (cst) attenersi alla tabella ipotizzando che la temperatura di funzionamento del riduttore possa raggiungere al massimo i 75 °C.

#### - Recommended viscosity:

to choose the ISO VG oil viscosity at 40° (cst) refer to the table by assuming a maximum operating temperature of the gearbox of 75 °C.

#### - Empfohlene Viskosität:

Für die Wahl der Viskosität ISO VG del Öls bei 40 ° (cst) müssen die Angaben der Tabelle, unter Berücksichtigung der Tatsache, dass die Betriebstemperatur des Getriebes 75 °C erreichen kann, befolgt werden.

#### - Tipo di lubrificantei:

Più avanti proponiamo una tabella comparativa:  
TABELLA 8.1

#### - Lubricant type:

*A comparative overview table is provided in the next pages:  
TABLE 8.1.*

#### - Schmiermitteltyp:

In Folge finden Sie eine entsprechende Vergleichstabelle.  
TABELLE 8.1



## 8. LUBRIFICAZIONE

## 8. LUBRICATION

## 8. SCHMIERUNG

Tabella 8.1

Table 8.1

Tabelle 8.1

Produttore Manufacturer Hersteller	Oli Minerali Mineral oils Mineralöle			Oli Sintetici Polialfaolefine (PAO) Poly-Alpha-Olefin synthetic oils (PAO) Polyalphaolefine-Synthetiköle (PAO)			Oli Sintetici Poliglicoli (PG) Polyglycol synthetic oils (PG) Polyglykol-Synthetiköle (PG)		
	ISO VG	ISO VG	ISO VG	ISO VG	ISO VG	ISO VG	ISO VG	ISO VG	ISO VG
	150	220	320	150	220	320	150	220	320
AGIP	Blasia 150	Blasia 220	Blasia 320	-	Blasia SX 220	Blasia SX 320	Blasia S 150	Blasia S 220	Blasia S 320
ARAL	Degol BG 150 Plus	Degol BG 220 Plus	Degol BG 320 Plus	Degol PAS 150	Degol PAS 220	Degol PAS 320	Degol GS 150	Degol GS 220	Degol GS 320
BP	Energol GR-XP 150	Energol GR-XP 220	Energol GR-XP 320	Enersyn EPX 150	Enersyn EPX 220	Enersyn EPX 320	Enersyn SG 150	Enersyn SG-XP 220	Enersyn SG-XP 320
CASTROL	Alpha SP 150	Alpha SP 220	Alpha SP 320	Alphasyn EP 150	Alphasyn EP 220	Alphasyn EP 320	Alphasyn PG 150	Alphasyn PG 220	Alphasyn PG 320
CHEVRON	Ultra Gear 150	Ultra Gear 220	Ultra Gear 320	Tegra Synthetic Gear 150	Tegra Synthetic Gear 220	Tegra Synthetic Gear 320	HiPerSYN 150	HiPerSYN 220	HiPerSYN 320
ESSO	Spartan EP 150	Spartan EP 220	Spartan EP 320	Spartan S EP 150	Spartan S EP 220	Spartan S EP 320	Glycolube 150	Glycolube 220	Glycolube 320
KLÜBER	Klüberoil GEM 1-150	Klüberoil GEM 1-220	Klüberoil GEM 1-320	Klübersynth EG 4-150	Klübersynth EG 4-220	Klübersynth EG 4-320	Klübersynth GH 6-150	Klübersynth GH 6-220	Klübersynth GH 6-320
MOBIL	Mobilgear XMP 150	Mobilgear XMP 220	Mobilgear XMP 320	Mobilgear SHC XMP 150	Mobilgear SHC XMP 220	Mobilgear SHC XMP 320	Glygoyle 22	Glygoyle 30	Glygoyle HE320
MOLIKOTE	L-0115	L-0122	L-0132	L-1115	L-1122	L-1132	-	-	-
OPTIMOL	Optigear BM 150	Optigear BM 220	Optigear BM 320	Optigear Synthetic A 150	Optigear Synthetic A 220	Optigear Synthetic A 320	Optiflex A 150	Optiflex A 220	Optiflex A 320
Q8	Goya 150	Goya 220	Goya 320	El Greco 150	El Greco 220	El Greco 320	Gade 150	Gade 220	Gade 320
SHELL	OMALA S2 GX 150	OMALA S2 GX 220	OMALA S2 GX 320	Omala S4 GXV 150	Omala S4 GXV 220	Omala S4 GXV 320	OMALA S4 WE 150	OMALA S4 WE 220	OMALA S4 WE 320
TEXACO	Meropa 150	Meropa 220	Meropa 320	Pinnacle EP 150	Pinnacle EP 220	Pinnacle EP 320	-	Synlube CLP 220	Synlube CLP 320
TOTAL	Carter EP 150	Carter EP 220	Carter EP 320	Carter SH 150	Carter SH 220	Carter SH 320	Carter SY 150	Carter SY 220	Carter SY 320
TRIBOL	1100/150	1100/220	1100/320	1510/150	1510/220	1510/320	800/150	800/220	800/320

## Lubrificanti sintetici per uso alimentare / Food-grade synthetic lubricants / Synthetische Schmiermittel für den Lebensmittelbereich

AGIP				Rocol Foodlube Hi-Torque 150	—	Rocol Foodlube Hi-Torque 320			
ESSO				—	Gear Oil FM 220	—			
KLÜBER				Klüberoil 4 UH1 N 150	Klüberoil 4 UH1 N 220	Klüberoil 4 UH1 N 320			
MOBIL				DTE FM 150	DTE FM 220	DTE FM 320			
FUCHS				Cassida Fluid GL 150	Cassida Fluid GL 220	Cassida Fluid GL 320			

Se la temperatura ambiente  $T < 0^{\circ}\text{C}$  ridurre di una gradazione la viscosità prevista in tabella, viceversa aumentarla di una se  $T > 40^{\circ}\text{C}$ .

If the environment temperature  $T < 0^{\circ}\text{C}$ , decrease viscosity class by one, vice versa increase by one if  $T > 40^{\circ}\text{C}$ .

Bei einer Umgebungstemperatur  $T < 0^{\circ}\text{C}$  den von der Tabelle vorgesehenen Viskositätsgrad um eine Gradation mindern und, im entgegengesetzten Fall, bei einer Temperatur  $T > 40^{\circ}\text{C}$ , um eine anheben.

Le temperature ammissibili per gli oli minerali sono:  
(-10 =  $T = 90$ ) $^{\circ}\text{C}$  (fino a 100 $^{\circ}\text{C}$  per periodi limitati).

Permissible temperatures for mineral oil are:

(-10 =  $T = 90$ ) $^{\circ}\text{C}$ , up to 100 $^{\circ}\text{C}$  for a short time.

Für Mineralöle zulässige Temperaturen:

Le temperature ammissibili per gli oli sintetici sono:  
(-20 =  $T = 110$ ) $^{\circ}\text{C}$  (fino a 120 $^{\circ}\text{C}$  per periodi limitati).

Permissible temperatures for synthetic oil are:  
(-20 =  $T = 110$ ) $^{\circ}\text{C}$ , up to 120 $^{\circ}\text{C}$  for a short time.

(-10 =  $T = 90$ ) $^{\circ}\text{C}$  (bis 100 $^{\circ}\text{C}$  über begrenzte Zeiträume).

Für Synthetiköle zulässige Temperaturen:  
(-20 =  $T = 110$ ) $^{\circ}\text{C}$  (bis 120 $^{\circ}\text{C}$  über begrenzte Zeiträume).

Per temperature dell'olio esterne a quelle ammissibili per il minerale e per aumentare l'intervallo di sostituzione del lubrificante adottare olio sintetico a base di polialfaolefine.

If the oil temperature is not permissible for mineral oil and for decreasing frequency of oil change, use synthetic oil with polyalphaolefins (PAOs).

Bei Temperaturen, die diese für Mineralöle zulässigen Werte überschreiten und um die Auswechselzeiten verlängern zu können, sollte Synthetiköl auf Basis von Polyalphaolefinen verwendet werden.

## 8.2 Specifiche di sicurezza adottate per prodotti "ATEX"

## 8.2 Safety features applied to "ATEX" products

## 8.2 Sicherheitsmaßnahme für "ATEX"-Produkte



1-Tappi sfiato (ove previsti) con valvola anti-intrusione

1- Breather caps (if any) fitted with safety valve

1- Entlüftungsstopfen (wo vorhanden) mit Schutzventil gegen Eindringen von Fremdkörpern

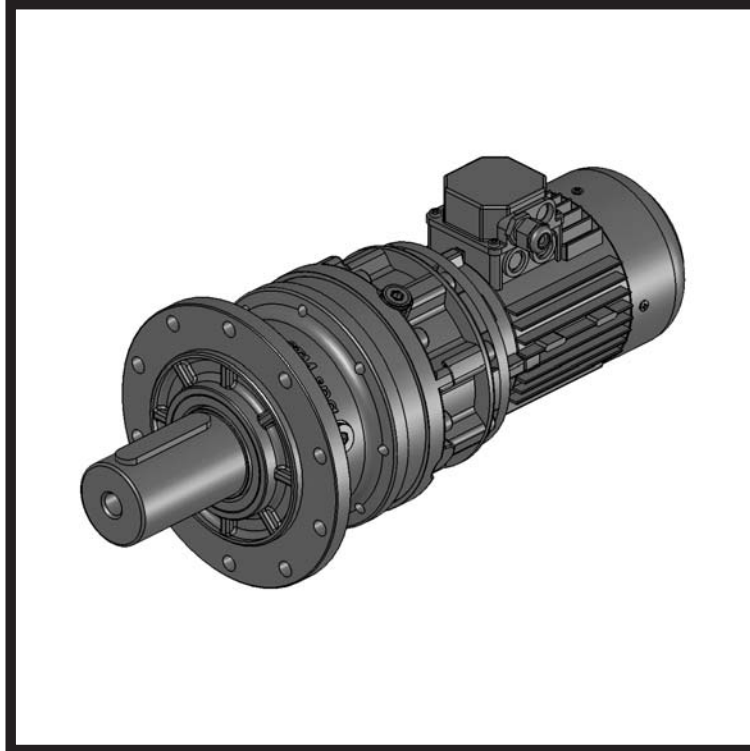




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**EX**





**R**

M1 M3 M4

	M1				M3				M4			
10	0,6	0,8	1,0	1,2	1,0	1,3	1,7	2,1	0,9	1,3	1,6	2,0
20	0,7	0,9	1,1	1,3	1,1	1,5	1,9	2,3	1,1	1,4	1,8	2,2
25	0,6	0,8	1,0	1,3	1,0	1,4	1,8	2,2	1,0	1,4	1,7	2,1
30-35	0,9	1,3	1,5	1,8	1,6	2,3	2,7	3,0	1,5	2,2	2,5	2,9
40		1,4	1,7	1,9		2,5	2,9	3,2		2,3	2,7	3,1
50	1,0	1,5	1,8	2,0	1,8	2,7	3,0	3,4	1,7	2,5	2,9	3,2
70	1,0	1,4	1,7	1,9	1,7	2,5	2,9	3,2	1,6	2,3	2,7	3,1
80	1,6	2,6	2,9	3,1	2,8	4,6	4,9	5,3	2,6	4,3	4,7	5,0
90-95		2,9	3,1	3,4		5,0	5,4	5,8		4,8	5,1	5,5
100	1,9	3,0	3,5	3,7	3,2	5,2	6,1	6,5	3,1	5,0	5,8	6,1
150	2,1	3,0	3,5	3,7	3,7	5,2	6,1	6,5	3,5	5,0	5,8	6,1
180		3,0	3,5	3,7		5,2	6,1	6,5		5,0	5,8	6,1
200	2,1	3,0	3,4	3,6	3,7	5,1	5,9	6,3	3,5	4,9	5,6	5,9
EX	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>

1 - Standard  
Posizione morsetteria  
Terminal board position  
Lage des Klemmenkastens

\*Attenzione: Per la posizione corretta dei fori di fissaggio fare riferimento ai disegni riportati nella Sezione C  
 \*Attention: For the correct position of the fixing holes refer to the drawings in accordance with Section C.  
 \*Achtung: Um die korrekte Position der Befestigungsbohrungen zu finden, bitte in die Zeichnungen entsprechend

**M**

M1 M3 M4

	M1				M3				M4			
10	0,7	0,9	1,1	1,3	1,1	1,5	1,9	2,3	1,1	1,4	1,8	2,2
20	0,8	1,0	1,2	1,4	1,3	1,7	2,1	2,5	1,3	1,6	2,0	2,3
25	0,7	0,9	1,2	1,4	1,2	1,6	2,0	2,4	1,2	1,5	1,9	2,3
30-35	1,0	1,4	1,7	1,9	1,8	2,5	2,9	3,2	1,7	2,3	2,7	3,1
40		1,5	1,8	2,0		2,7	3,0	3,4		2,5	2,9	3,2
50	1,2	1,7	1,9	2,1	2,0	2,9	3,2	3,6	1,9	2,7	3,1	3,4
70	1,1	1,5	1,8	2,0	1,9	2,7	3,0	3,4	1,8	2,5	2,9	3,2
80	1,7	2,7	2,9	3,1	2,9	4,7	5,0	5,4	2,7	4,4	4,8	5,1
EX	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>

1 - Standard  
Posizione morsetteria  
Terminal board position  
Lage des Klemmenkastens

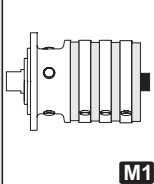
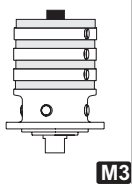
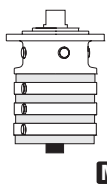
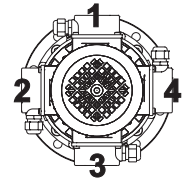
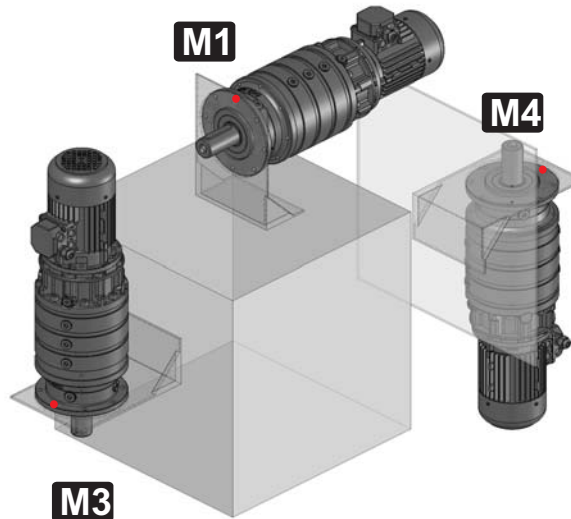
\*Attenzione: Per la posizione corretta dei fori di fissaggio fare riferimento ai disegni riportati nella Sezione C  
 \*Attention: For the correct position of the fixing holes refer to the drawings in accordance with Section C.  
 \*Achtung: Um die korrekte Position der Befestigungsbohrungen zu finden, bitte in die Zeichnungen entsprechend

- A.**  $n_2 < 5 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 5 rpm, per il riempimento fare riferimento ai quantitativi della posizione M4 (vedere punto C);
- B.**  $n_2 < 1 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 1 rpm per il riempimento fare riferimento ai quantitativi della posizione M3 (vedere punto C);
- C.** Per le posizioni di montaggio M3 e M4 è necessario installare il vaso di espansione OT.

Attenzione  
Scelta grandezza OT: **Sezione E**;  
Installazione OT: **Punto 8.3** manuale uso e manutenzione.  
D. Le quantità di olio sono approssimative; per una corretta lubrificazione occorre fare riferimento al livello segnato sul riduttore.

- A.**  $n_2 < 5 \text{ rpm}$  - in case the gearbox output speed is lower than 5 rpm, please refill the oil following the quantity of mounting position M4 . (see item C);
- B.**  $n_2 < 1 \text{ rpm}$  - once the output speed of the unit is lower than 1 rpm, please refill the oil following the quantity of mounting position M3.(see item C);
- C.** For M3 and M4 mounting positions is necessary to install the OT oil tank.
- Attention**  
OT selection: please see **section E**;  
OT installing: please see point 8.3 of use & maintenance manual.  
D. Oil quantities listed in the table are approximate; to ensure correct lubrication, please refer to the level mark on the gear unit.

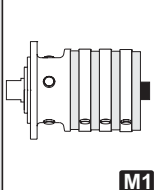
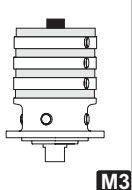
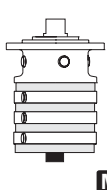
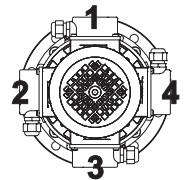
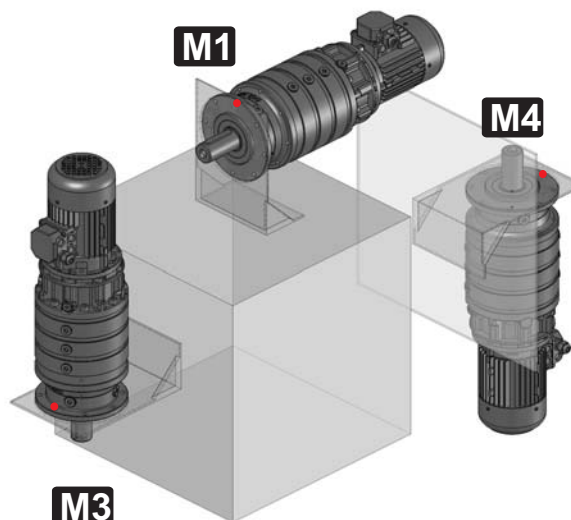
- A.**  $n_2 < 5 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 5 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M4 beziehen.siehe Punkt C
- B.**  $n_2 < 1 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 1 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M3 beziehen.siehe Punkt C
- C.** Bei den Montagepositionen M3 und M4 ist es notwendig einen OT Öltank zu installieren.
- Achtung OT** Auswahl: Siehe Sektion E;  
**OT** Installation: Siehe Punkt 8.3 des Benutzungs&Wartungshandbuchs
- D.** Bei den Ölmengenangaben handelt es sich um approximative Werte; für den Erhalt einer korrekten Schmiering muss Bezug auf den am Getriebe gekennzeichneten Füllstand genommen werden.

**EX**HIGH TECH *line* HeavyDuty**MX****M1****M3****M4**

**1 - Standard**  
Posizione morsetteria  
Terminal board position  
Lage des Klemmenkastens

Attenzione: Per la posizione corretta dei fori di fissaggio fare riferimento ai disegni riportati nella Sezione C  
Attention: For the correct position of the fixing holes refer to the drawings in accordance with Section C.  
Achtung: Um die korrekte Position der Befestigungsbohrungen zu finden, bitte in die Zeichnungen entsprechend

	M1				M3				M4			
30-35	1,0	1,4	1,7	1,9	1,8	2,5	2,9	3,2	1,7	2,3	2,7	3,1
40		1,5	1,8	2,0		2,7	3,0	3,4		2,5	2,9	3,2
50	1,2	1,7	1,9	2,1	2,0	2,9	3,2	3,6	1,9	2,7	3,1	3,4
70	1,1	1,5	1,8	2,0	1,9	2,7	3,0	3,4	1,8	2,5	2,9	3,2
EX	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>

**T****M1****M3****M4**

**1 - Standard**  
Posizione morsetteria  
Terminal board position  
Lage des Klemmenkastens

Attenzione: Per la posizione corretta dei fori di fissaggio fare riferimento ai disegni riportati nella Sezione C  
Attention: For the correct position of the fixing holes refer to the drawings in accordance with Section C.  
Achtung: Um die korrekte Position der Befestigungsbohrungen zu finden, bitte in die Zeichnungen entsprechend

	M1				M3				M4			
30 35	1,5	1,9	2,1	2,4	2,7	3,3	3,7	4,1	2,5	3,2	3,5	3,9
40		2,0	2,3	2,5		3,5	3,9	4,3		3,3	3,7	4,1
50	1,7	2,1	2,4	2,6	2,9	3,7	4,1	4,5	2,7	3,5	3,9	4,2
70	1,6	2,0	2,3	2,5	2,8	3,5	3,9	4,3	2,6	3,3	3,7	4,1
80	2,5	3,5	3,7	4,0	4,3	6,1	6,5	6,8	4,1	5,8	6,1	6,5
90 95		3,7	3,9	4,1		6,4	6,7	7,1		6,0	6,4	6,8
100	2,6	3,8	4,3	4,5	4,6	6,6	7,4	7,8	4,3	6,2	7,0	7,4
150	3,1	4,0	4,5	4,7	5,4	6,9	7,8	8,2	5,1	6,6	7,4	7,7
180		4,0	4,5	4,7		6,9	7,8	8,2		6,6	7,4	7,7
200	3,1	4,0	4,4	4,6	5,4	6,8	7,6	8,0	5,1	6,5	7,2	7,6
250	4,2	5,7	6,7	6,9	7,3	9,8	11,6	12,0	6,9	9,3	11,0	11,3
280		5,8	7,0	7,2		10,1	12,1	12,4		9,5	11,4	11,8
300	5,0	6,5	7,7	7,9	8,6	11,3	13,3	13,7	8,1	10,7	12,6	13,0
EX	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>



- A.**  $n_2 < 5 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 5 rpm, per il riempimento fare riferimento ai quantitativi della posizione M4 (vedere punto C);
- B.**  $n_2 < 1 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 1 rpm per il riempimento fare riferimento ai quantitativi della posizione M3 (vedere punto C);
- C.** Per le posizioni di montaggio M3 e M4 è necessario installare il vaso di espansione OT.

Attenzione

Scelta grandezza OT: **Sezione E**;Installazione OT: **Punto 8.3** manuale uso e manutenzione.

**D.** Le quantità di olio sono approssimative; per una corretta lubrificazione occorre fare riferimento al livello segnato sul riduttore.

- A.**  $n_2 < 5 \text{ rpm}$  - in case the gearbox output speed is lower than 5 rpm, please refill the oil following the quantity of mounting position M4. (see item C);
- B.**  $n_2 < 1 \text{ rpm}$  - once the output speed of the unit is lower than 1 rpm, please refill the oil following the quantity of mounting position M3. (see item C);
- C.** For M3 and M4 mounting positions is necessary to install the OT oil tank.

**Attention**OT selection: please see **section E**;OT installing: please see **point 8.3 of use & maintenance manual**.

**D.** Oil quantities listed in the table are approximate; to ensure correct lubrication, please refer to the level mark on the gear unit.

- A.**  $n_2 < 5 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 5 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M4 beziehen.siehe Punkt C
- B.**  $n_2 < 1 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 1 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M3 beziehen.siehe Punkt C
- C.** Bei den Montagepositionen M3 und M4 ist es notwendig einen OT Öltank zu installieren.

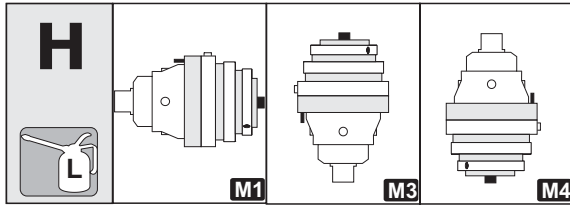
**Achtung OT** Auswahl: Siehe **Sektion E**;OT Installation: Siehe **Punkt 8.3** des Benutzungs&Wartungshandbuchs

**D.** Bei den Ölmengenangaben handelt es sich um approximative Werte; für den Erhalt einer korrekten Schmierung muss Bezug auf den am Getriebe gekennzeichneten Füllstand genommen werden.

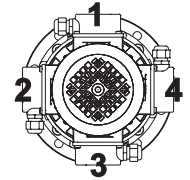
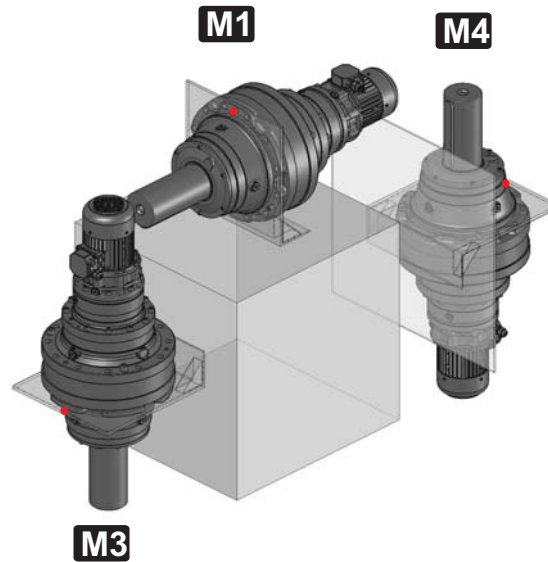
MT27 IGBD 1.0

EX Series

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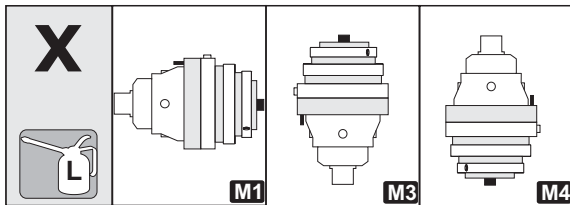


	M1				M3				M4			
150	2,4	3,2	3,7	4,0	4,1	5,6	6,5	6,8	3,9	5,3	6,1	6,5
180		3,2	3,7	4,0		5,6	6,5	6,8		5,3	6,1	6,5
200	2,4	3,2	3,6	3,9	4,1	5,5	6,3	6,7	3,9	5,2	5,9	6,3
250	3,4	4,8	5,9	6,1	5,9	8,4	10,2	10,5	5,6	7,9	9,6	10,0
280		5,0	6,2	6,4		8,6	10,6	11,0		8,2	10,1	10,4
300	3,6	5,2	6,3	6,5	6,2	8,9	10,9	11,3	5,9	8,5	10,4	10,7
EX	1	2	3	4	1	2	3	4	1	2	3	4

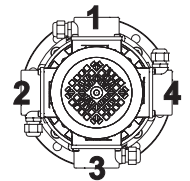
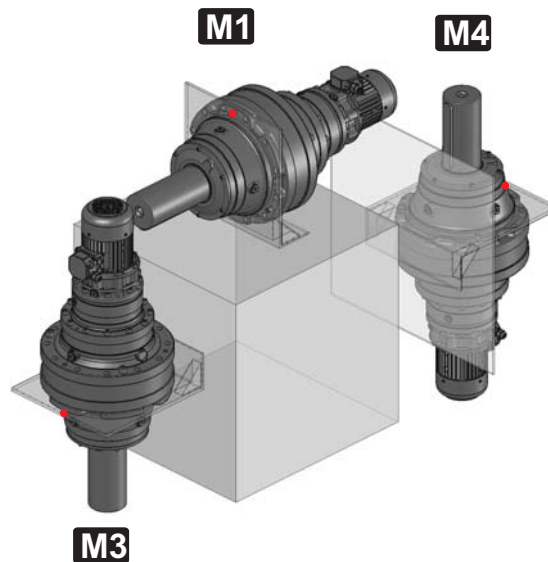


1 - Standard  
Posizione morsetti  
Terminal board position  
Lage des Klemmenkastens

Attenzione: Per la posizione corretta dei fori di fissaggio fare riferimento ai disegni riportati nella Sezione C  
Attention: For the correct position of the fixing holes refer to the drawings in accordance with Section C.  
Achtung: Um die korrekte Position der Befestigungsbohrungen zu finden, bitte in die Zeichnungen entsprechend



	M1				M3				M4			
150	3,1	4,0	4,5	4,7	5,4	6,9	7,8	8,2	5,1	6,6	7,4	7,7
180		4,0	4,5	4,7		6,9	7,8	8,2		6,6	7,4	7,7
200	3,1	4,0	4,4	4,6	5,4	6,8	7,6	8,0	5,1	6,5	7,2	7,6
EX	1	2	3	4	1	2	3	4	1	2	3	4



1 - Standard  
Posizione morsetti  
Terminal board position  
Lage des Klemmenkastens

Attenzione: Per la posizione corretta dei fori di fissaggio fare riferimento ai disegni riportati nella Sezione C  
Attention: For the correct position of the fixing holes refer to the drawings in accordance with Section C.  
Achtung: Um die korrekte Position der Befestigungsbohrungen zu finden, bitte in die Zeichnungen entsprechend



- A.  $n_2 < 5 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 5 rpm, per il riempimento fare riferimento ai quantitativi della posizione M4 (vedere punto C);
- B.  $n_2 < 1 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 1 rpm per il riempimento fare riferimento ai quantitativi della posizione M3 (vedere punto C);
- C. Per le posizioni di montaggio M3 e M4 è necessario installare il vaso di espansione OT.

Attenzione

Scelta grandezza OT: **Sezione E**;

Installazione OT: **Punto 8.3** manuale uso e manutenzione.

D. Le quantità di olio sono approssimative; per una corretta lubrificazione occorre fare riferimento al livello segnato sul riduttore.

- A.  $n_2 < 5 \text{ rpm}$  - in case the gearbox output speed is lower than 5 rpm, please refill the oil following the quantity of mounting position M4. (see item C);
- B.  $n_2 < 1 \text{ rpm}$  - once the output speed of the unit is lower than 1 rpm, please refill the oil following the quantity of mounting position M3. (see item C);
- C. For M3 and M4 mounting positions is necessary to install the OT oil tank.

**Attention**

OT selection: please see **section E**;

OT installing: please see **point 8.3 of use & maintenance manual**.

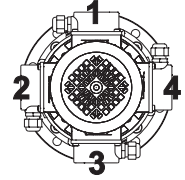
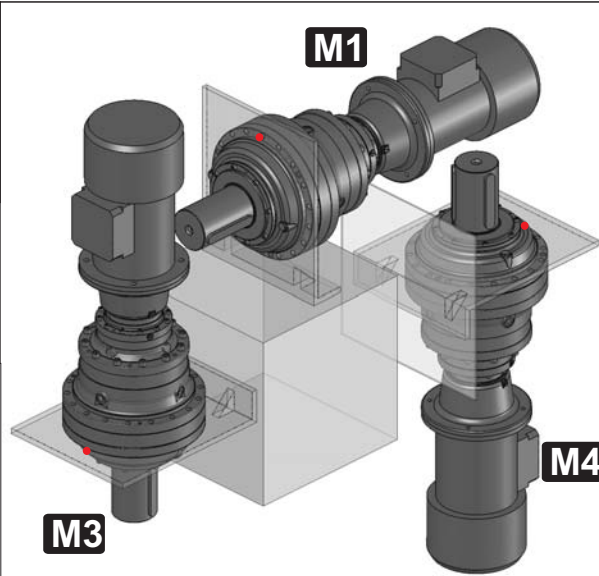
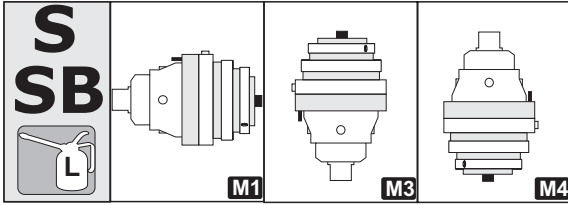
D. Oil quantities listed in the table are approximate; to ensure correct lubrication, please refer to the level mark on the gear unit.

- A.  $n_2 < 5 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 5 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M4 beziehen.siehe Punkt C
- B.  $n_2 < 1 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 1 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M3 beziehen.siehe Punkt C
- C. Bei den Montagepositionen M3 und M4 ist es notwendig einen OT Öltank zu installieren.

**Achtung OT** Auswahl: Siehe **Sektion E**;

OT Installation: Siehe **Punkt 8.3** des Benutzungs&Wartungshandbuchs

D. Bei den Ölmengenangaben handelt es sich um approximative Werte; für den Erhalt einer korrekten Schmierung muss Bezug auf den am Getriebe gekennzeichneten Füllstand genommen werden.

**EX**HIGH TECH *line* HeavyDuty

**1 - Standard**  
Posizione morsettiera  
Terminal board position  
Lage des Klemmenkastens

	M1				M3				M4			
350	2,5	4,5	5,6	5,8	4,4	7,7	9,7	10,1	4,1	7,3	9,2	9,5
360	2,5	4,5	5,6	5,8	4,4	7,7	9,7	10,1	4,1	7,3	9,2	9,5
420	2,5	4,6	5,5	6,0	4,4	8,0	9,5	10,4	4,1	7,6	9,0	9,8
600	4,3	8,1	9,5	10,6	7,4	14,0	16,4	18,2	7,0	13,2	15,6	17,3
650	4,3	8,1	9,5	10,6	7,4	14,0	16,4	18,2	7,0	13,2	15,6	17,3
800	4,3	8,0	9,6	10,8	7,5	13,9	16,6	18,6	7,1	13,1	15,8	17,6
850	4,3	8,0	9,6	10,8	7,5	13,9	16,6	18,6	7,1	13,1	15,8	17,6
>850	*											
EX	1	2	3	4	1	2	3	4	1	2	3	4

Attenzione: Per la posizione corretta dei fori di fissaggio fare riferimento ai disegni riportati nella Sezione C  
 Attention: For the correct position of the fixing holes refer to the drawings in accordance with Section C.  
 Achtung: Um die korrekte Position der Befestigungsbohrungen zu finden, bitte in die Zeichnungen entsprechend

\* Contattare nostro ufficio tecnico commerciale / \* Please, contact our technical sales dept. / \* Bitte setzen Sie sich mit unserer technischen Abteilung in Verbindung



- A.  $n_2 < 5 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 5 rpm, per il riempimento fare riferimento ai quantitativi della posizione M4 (vedere punto C);
- B.  $n_2 < 1 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 1 rpm per il riempimento fare riferimento ai quantitativi della posizione M3 (vedere punto C);
- C. Per le posizioni di montaggio M3 e M4 è necessario installare il vaso di espansione OT.

Attenzione

Scelta grandezza OT: **Sezione E;**Installazione OT: **Punto 8.3** manuale uso e manutenzione.

D. Le quantità di olio sono approssimative; per una corretta lubrificazione occorre fare riferimento al livello segnato sul riduttore.

- A.  $n_2 < 5 \text{ rpm}$  - in case the gearbox output speed is lower than 5 rpm, please refill the oil following the quantity of mounting position M4. (see item C);
- B.  $n_2 < 1 \text{ rpm}$  - once the output speed of the unit is lower than 1 rpm, please refill the oil following the quantity of mounting position M3. (see item C);
- C. For M3 and M4 mounting positions is necessary to install the OT oil tank.

**Attention**OT selection: please see **section E;**

OT installing: please see point 8.3 of use &amp; maintenance manual.

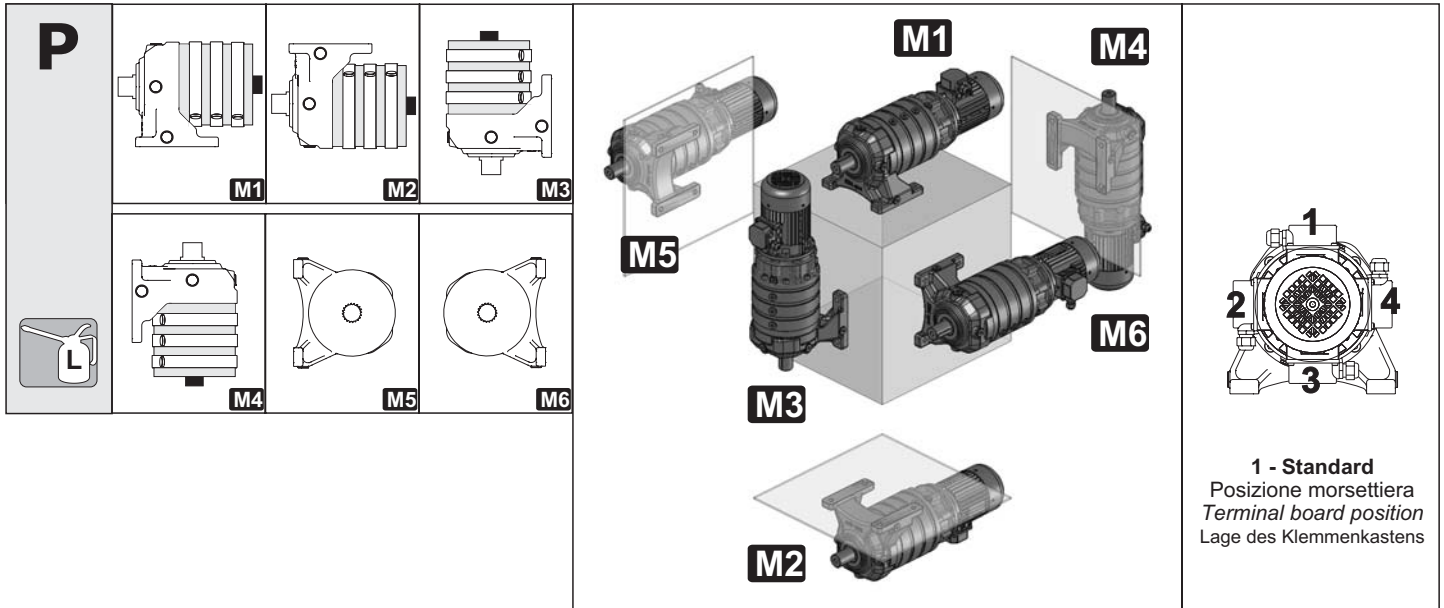
D. Oil quantities listed in the table are approximate; to ensure correct lubrication, please refer to the level mark on the gear unit.

- A.  $n_2 < 5 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 5 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M4 beziehen.siehe Punkt C
- B.  $n_2 < 1 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 1 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M3 beziehen.siehe Punkt C
- C. Bei den Montagepositionen M3 und M4 ist es notwendig einen OT Öltank zu installieren.

**Achtung OT** Auswahl: Siehe Sektion E;

OT Installation: Siehe Punkt 8.3 des Benutzungs&amp;Wartungshandbuchs

D. Bei den Ölmengenangaben handelt es sich um approximative Werte; für den Erhalt einer korrekten Schmierung muss Bezug auf den am Getriebe gekennzeichneten Füllstand genommen werden.



	M1				M2				M3				M4				M5				M6			
10	0,8	1,0	1,2	1,4	0,8	1,0	1,2	1,4	1,3	1,7	2,1	2,5	1,3	1,6	2,0	2,3	0,8	1,0	1,2	1,4	0,8	1,0	1,2	1,4
20	0,9	1,1	1,3	1,5	0,9	1,1	1,3	1,5	1,5	1,9	2,3	2,7	1,4	1,8	2,2	2,5	0,9	1,1	1,3	1,5	0,9	1,1	1,3	1,5
25	0,8	1,0	1,3	1,5	0,8	1,0	1,3	1,5	1,4	1,8	2,2	2,6	1,4	1,7	2,1	2,4	0,8	1,0	1,3	1,5	0,8	1,0	1,3	1,5
30-35	1,6	2,0	2,2	2,4	1,6	2,0	2,2	2,4	2,8	3,4	3,8	4,2	2,6	3,2	3,6	4,0	1,6	2,0	2,2	2,4	1,6	2,0	2,2	2,4
40		2,1	2,3	2,5		2,1	2,3	2,5		3,6	4,0	4,4		3,4	3,8	4,1		2,1	2,3	2,5		2,1	2,3	2,5
50	1,7	2,2	2,4	2,6	1,7	2,2	2,4	2,6	2,9	3,8	4,2	4,6	2,8	3,6	4,0	4,3	1,7	2,2	2,4	2,6	1,7	2,2	2,4	2,6
70	1,7	2,1	2,3	2,5	1,7	2,1	2,3	2,5	2,9	3,6	4,0	4,4	2,7	3,4	3,8	4,1	1,7	2,1	2,3	2,5	1,7	2,1	2,3	2,5
80	2,3	3,3	3,5	3,7	2,3	3,3	3,5	3,7	3,9	5,7	6,1	6,5	3,7	5,4	5,8	6,1	2,3	3,3	3,5	3,7	2,3	3,3	3,5	3,7
90-95		3,6	3,8	4,0		3,6	3,8	4,0		6,2	6,6	6,9		5,9	6,2	6,6		3,6	3,8	4,0		3,6	3,8	4,0
100	2,5	3,7	4,2	4,4	2,5	3,7	4,2	4,4	4,4	6,4	7,2	7,6	4,1	6,0	6,8	7,2	2,5	3,7	4,2	4,4	2,5	3,7	4,2	4,4
150	3,2	4,1	4,6	4,8	3,2	4,1	4,6	4,8	5,6	7,1	8,0	8,4	5,3	6,8	7,6	7,9	3,2	4,1	4,6	4,8	3,2	4,1	4,6	4,8
180		4,1	4,6	4,8		4,1	4,6	4,8		7,1	8,0	8,4		6,8	7,6	7,9		4,1	4,6	4,8		4,1	4,6	4,8
200	3,2	4,1	4,5	4,7	3,2	4,1	4,5	4,7	5,6	7,0	7,8	8,2	5,3	6,7	7,4	7,7	3,2	4,1	4,5	4,7	3,2	4,1	4,5	4,7
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>



- A.**  $n_2 < 5 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 5 rpm, per il riempimento fare riferimento ai quantitativi della posizione M4 (vedere punto C);
- B.**  $n_2 < 1 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 1 rpm per il riempimento fare riferimento ai quantitativi della posizione M3 (vedere punto C);
- C.** Per le posizioni di montaggio M3 e M4 è necessario installare il vaso di espansione OT.

Attenzione

Scelta grandezza OT: **Sezione E;**

Installazione OT: **Punto 8.3** manuale uso e manutenzione.

**D.** Le quantità di olio sono approssimative; per una corretta lubrificazione occorre fare riferimento al livello segnato sul riduttore.

- A.**  $n_2 < 5 \text{ rpm}$  - in case the gearbox output speed is lower than 5 rpm, please refill the oil following the quantity of mounting position M4. (see item C);
- B.**  $n_2 < 1 \text{ rpm}$  - once the output speed of the unit is lower than 1 rpm, please refill the oil following the quantity of mounting position M3. (see item C);
- C.** For M3 and M4 mounting positions is necessary to install the OT oil tank.

**Attention**

OT selection: please see **section E;**

OT installing: please see **point 8.3 of use & maintenance manual.**

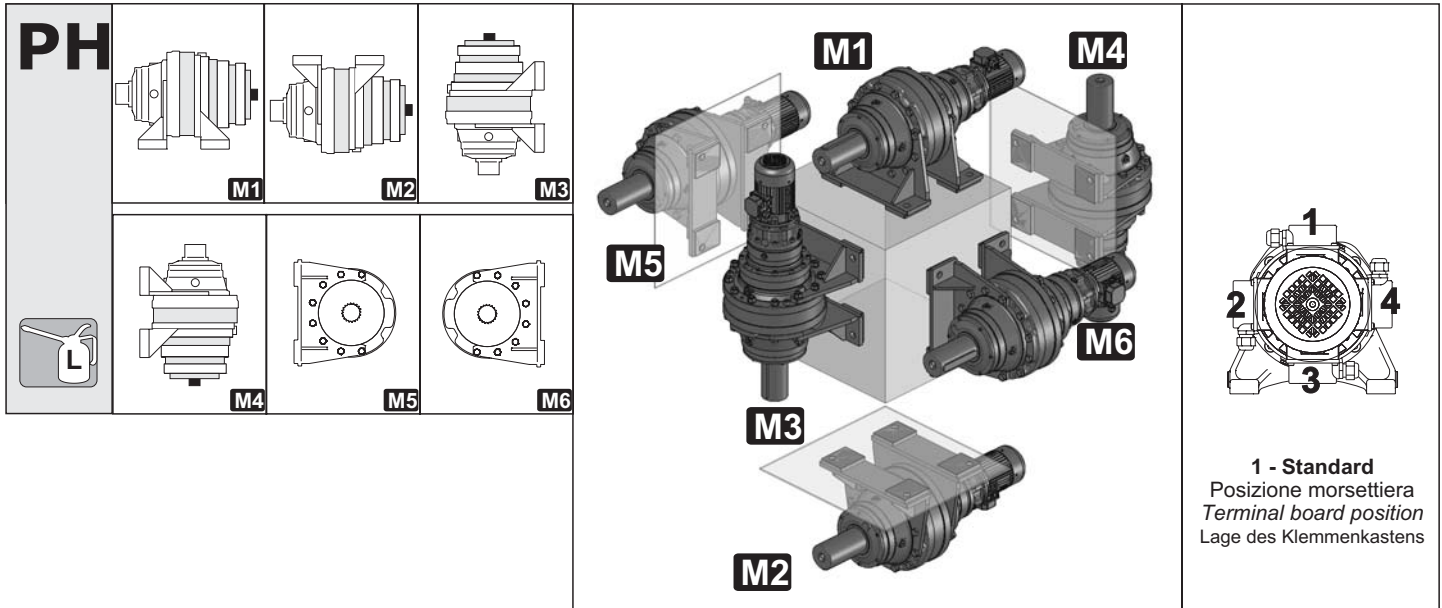
**D.** Oil quantities listed in the table are approximate; to ensure correct lubrication, please refer to the level mark on the gear unit.

- A.**  $n_2 < 5 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 5 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M4 beziehen.siehe Punkt C
- B.**  $n_2 < 1 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 1 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M3 beziehen.siehe Punkt C
- C.** Bei den Montagepositionen M3 und M4 ist es notwendig einen OT Öltank zu installieren.

**Achtung OT** Auswahl: Siehe **Sektion E;**

OT Installation: Siehe **Punkt 8.3** des Benutzungs&Wartungshandbuchs

**D.** Bei den Ölmengenangaben handelt es sich um approximative Werte; für den Erhalt einer korrekten Schmierung muss Bezug auf den am Getriebe gekennzeichneten Füllstand genommen werden.

**EX**HIGH TECH *line* HeavyDuty

	M1				M2				M3				M4				M5				M6			
150	2,4	3,2	3,7	4,0	2,4	3,2	3,7	4,0	4,1	5,6	6,5	6,8	3,9	5,3	6,1	6,5	2,4	3,2	3,7	4,0	2,4	3,2	3,7	4,0
180		3,2	3,7	4,0	3,2	3,7	4,0		5,6	6,5	6,8		5,3	6,1	6,5		3,2	3,7	4,0		3,2	3,7	4,0	
200	2,4	3,2	3,6	3,9	2,4	3,2	3,6	3,9	4,1	5,5	6,3	6,7	3,9	5,2	5,9	6,3	2,4	3,2	3,6	3,9	2,4	3,2	3,6	3,9
250	3,4	4,8	5,9	6,1	3,4	4,8	5,9	6,1	5,9	8,4	10,2	10,5	5,6	7,9	9,6	10,0	3,4	4,8	5,9	6,1	3,4	4,8	5,9	6,1
280		5,0	6,2	6,4		5,0	6,2	6,4		8,6	10,6	11,0		8,2	10,1	10,4		5,0	6,2	6,4		5,0	6,2	6,4
300	3,6	5,2	6,3	6,5	3,6	5,2	6,3	6,5	6,2	8,9	10,9	11,3	5,9	8,5	10,4	10,7	3,6	5,2	6,3	6,5	3,6	5,2	6,3	6,5
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>



- A.**  $n_2 < 5 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 5 rpm, per il riempimento fare riferimento ai quantitativi della posizione M4 (vedere punto C);
- B.**  $n_2 < 1 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 1 rpm per il riempimento fare riferimento ai quantitativi della posizione M3 (vedere punto C);
- C.** Per le posizioni di montaggio M3 e M4 è necessario installare il vaso di espansione OT.

Attenzione

Scelta grandezza OT: **Sezione E;**Installazione OT: **Punto 8.3** manuale uso e manutenzione.

**D.** Le quantità di olio sono approssimative; per una corretta lubrificazione occorre fare riferimento al livello segnato sul riduttore.

- A.**  $n_2 < 5 \text{ rpm}$  - in case the gearbox output speed is lower than 5 rpm, please refill the oil following the quantity of mounting position M4. (see item C);
- B.**  $n_2 < 1 \text{ rpm}$  - once the output speed of the unit is lower than 1 rpm, please refill the oil following the quantity of mounting position M3. (see item C);
- C.** For M3 and M4 mounting positions is necessary to install the OT oil tank.

**Attention**OT selection: please see **section E;**OT installing: please see **point 8.3 of use & maintenance manual.**

**D.** Oil quantities listed in the table are approximate; to ensure correct lubrication, please refer to the level mark on the gear unit.

- A.**  $n_2 < 5 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 5 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M4 beziehen.siehe Punkt C
- B.**  $n_2 < 1 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 1 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M3 beziehen.siehe Punkt C
- C.** Bei den Montagepositionen M3 und M4 ist es notwendig einen OT Öltank zu installieren.

**Achtung OT** Auswahl: Siehe **Sektion E;**OT Installation: Siehe **Punkt 8.3** des Benutzungs&Wartungshandbuchs

**D.** Bei den Ölmengenangaben handelt es sich um approximative Werte; für den Erhalt einer korrekten Schmierung muss Bezug auf den am Getriebe gekennzeichneten Füllstand genommen werden.



## PX

**1 - Standard**  
Posizione morsetti  
Terminal board position  
Lage des Klemmenkastens

	M1				M2				M3				M4				M5				M6			
150	3,1	4,0	4,5	4,7	3,1	4,0	4,5	4,7	5,4	6,9	7,8	8,2	5,1	6,6	7,4	7,7	3,1	4,0	4,5	4,7	3,1	4,0	4,5	4,7
180		4,0	4,5	4,7		4,0	4,5	4,7		6,9	7,8	8,2		6,6	7,4	7,7		4,0	4,5	4,7		4,0	4,5	4,7
200	3,1	4,0	4,4	4,6	3,1	4,0	4,4	4,6	5,4	6,8	7,6	8,0	5,1	6,5	7,2	7,6	3,1	4,0	4,4	4,6	3,1	4,0	4,4	4,6
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>

## PS PSB

**1 - Standard**  
Posizione morsetti  
Terminal board position  
Lage des Klemmenkastens

	M1				M2				M3				M4				M5				M6			
350-360	2,5	4,5	5,6	5,8	2,5	4,5	5,6	5,8	4,4	7,7	9,7	10,1	4,1	7,3	9,2	9,5	2,5	4,5	5,6	5,8	2,5	4,5	5,6	5,8
420	2,5	4,6	5,5	6,0	2,5	4,6	5,5	6,0	4,4	8,0	9,5	10,4	4,1	7,6	9,0	9,8	2,5	4,6	5,5	6,0	2,5	4,6	5,5	6,0
600-650	4,3	8,1	9,5	10,6	4,3	8,1	9,5	10,6	7,4	14,0	16,4	18,2	7,0	13,2	15,6	17,3	4,3	8,1	9,5	10,6	4,3	8,1	9,5	10,6
800-850	4,3	8,0	9,6	10,8	4,3	8,0	9,6	10,8	7,5	13,9	16,6	18,6	7,1	13,1	15,8	17,6	4,3	8,0	9,6	10,8	4,3	8,0	9,6	10,8
>850	* Contattare nostro ufficio tecnico commerciale / * Please, contact our technical sales dept. / * Bitte setzen Sie sich mit unserer technischen Abteilung in Verbindung																							
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>

**A.**  $n_2 < 5 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 5 rpm, per il riempimento fare riferimento ai quantitativi della posizione M4 (vedere punto C);

**B.**  $n_2 < 1 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 1 rpm per il riempimento fare riferimento ai quantitativi della posizione M3 (vedere punto C);

**C.** Per le posizioni di montaggio M3 e M4 è necessario installare il vaso di espansione OT.

Attenzione  
Scelta grandezza OT: **Sezione E**;  
Installazione OT: **Punto 8.3** manuale uso e manutenzione.  
D. Le quantità di olio sono approssimative; per una corretta lubrificazione occorre fare riferimento al livello segnato sul riduttore.

**A.**  $n_2 < 5 \text{ rpm}$  - in case the gearbox output speed is lower than 5 rpm, please refill the oil following the quantity of mounting position M4. (see item C);

**B.**  $n_2 < 1 \text{ rpm}$  - once the output speed of the unit is lower than 1 rpm, please refill the oil following the quantity of mounting position M3. (see item C);

**C.** For M3 and M4 mounting positions is necessary to install the OT oil tank.

**Attention**  
OT selection: please see section E;  
OT installing: please see point 8.3 of use & maintenance manual.  
D. Oil quantities listed in the table are approximate; to ensure correct lubrication, please refer to the level mark on the gear unit.

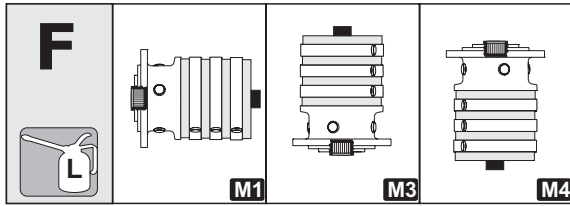
**A.**  $n_2 < 5 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 5 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M4 beziehen.siehe Punkt C

**B.**  $n_2 < 1 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 1 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M3 beziehen.siehe Punkt C

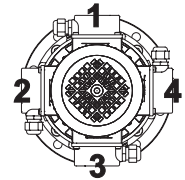
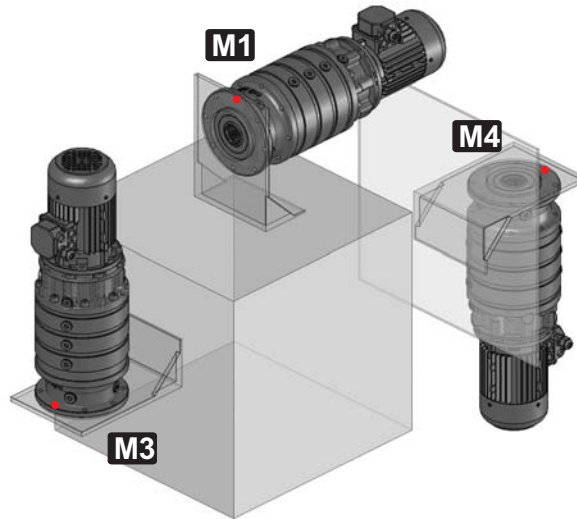
**C.** Bei den Montagepositionen M3 und M4 ist es notwendig einen OT Öltank zu installieren.

**Achtung OT** Auswahl: Siehe Sektion E;  
OT Installation: Siehe Punkt 8.3 des Benutzungs&Wartungshandbuchs

**D.** Bei den Ölmengenangaben handelt es sich um approximative Werte; für den Erhalt einer korrekten Schmierung muss Bezug auf den am Getriebe gekennzeichneten Füllstand genommen werden.

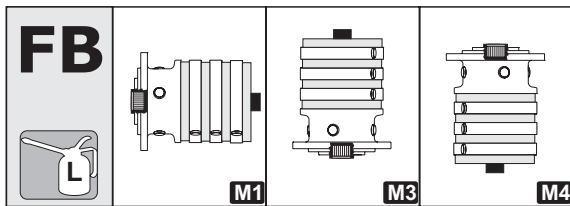
**EX**HIGH TECH *line* HeavyDuty

	M1				M3				M4			
10	0,6	0,8	1,0	1,2	1,0	1,3	1,7	2,1	0,9	1,3	1,6	2,0
20	0,7	0,9	1,1	1,3	1,1	1,5	1,9	2,3	1,1	1,4	1,8	2,2
25	0,6	0,8	1,0	1,3	1,0	1,4	1,8	2,2	1,0	1,4	1,7	2,1
30-35	0,9	1,3	1,5	1,8	1,6	2,3	2,7	3,0	1,5	2,2	2,5	2,9
40		1,4	1,7	1,9		2,5	2,9	3,2		2,3	2,7	3,1
50	1,0	1,5	1,8	2,0	1,8	2,7	3,0	3,4	1,7	2,5	2,9	3,2
70	1,0	1,4	1,7	1,9	1,7	2,5	2,9	3,2	1,6	2,3	2,7	3,1
80	1,6	2,6	2,9	3,1	2,8	4,6	4,9	5,3	2,6	4,3	4,7	5,0
90-95		2,9	3,1	3,4		5,0	5,4	5,8		4,8	5,1	5,5
100	1,9	3,0	3,5	3,7	3,2	5,2	6,1	6,5	3,1	5,0	5,8	6,1
EX	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>

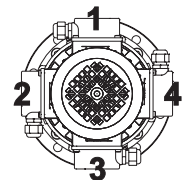
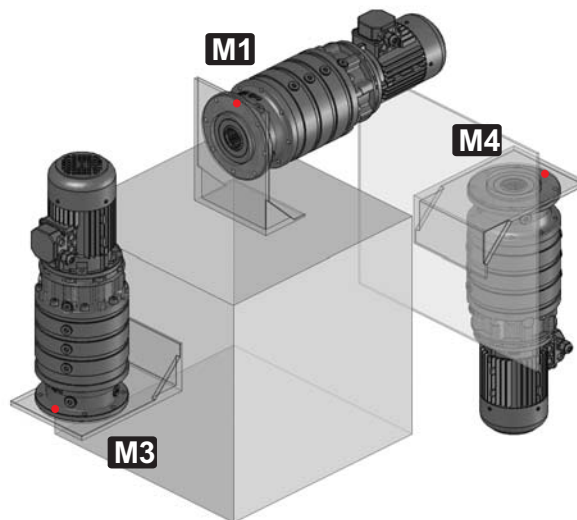


**1 - Standard**  
 Posizione morsetteria  
 Terminal board position  
 Lage des Klemmenkastens

Attenzione: Per la posizione corretta dei fori di fissaggio fare riferimento ai disegni riportati nella Sezione C  
 Attention: For the correct position of the fixing holes refer to the drawings in accordance with Section C.  
 Achtung: Um die korrekte Position der Befestigungsbohrungen zu finden, bitte in die Zeichnungen entsprechend



	M1				M3				M4			
80	1,6	2,6	2,9	3,1	2,8	4,6	4,9	5,3	2,6	4,3	4,7	5,0
90-95		2,9	3,1	3,4		5,0	5,4	5,8		4,8	5,1	5,5
100	1,9	3,0	3,5	3,7	3,2	5,2	6,1	6,5	3,1	5,0	5,8	6,1
EX	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>



**1 - Standard**  
 Posizione morsetteria  
 Terminal board position  
 Lage des Klemmenkastens

Attenzione: Per la posizione corretta dei fori di fissaggio fare riferimento ai disegni riportati nella Sezione C  
 Attention: For the correct position of the fixing holes refer to the drawings in accordance with Section C.  
 Achtung: Um die korrekte Position der Befestigungsbohrungen zu finden, bitte in die Zeichnungen entsprechend



- A.  $n_2 < 5 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 5 rpm, per il riempimento fare riferimento ai quantitativi della posizione M4 (vedere punto C);
- B.  $n_2 < 1 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 1 rpm per il riempimento fare riferimento ai quantitativi della posizione M3 (vedere punto C);
- C. Per le posizioni di montaggio M3 e M4 è necessario installare il vaso di espansione OT.

Attenzione

Scelta grandezza OT: **Sezione E**;Installazione OT: **Punto 8.3** manuale uso e manutenzione.

D. Le quantità di olio sono approssimative; per una corretta lubrificazione occorre fare riferimento al livello segnato sul riduttore.

- A.  $n_2 < 5 \text{ rpm}$  - in case the gearbox output speed is lower than 5 rpm, please refill the oil following the quantity of mounting position M4. (see item C);
- B.  $n_2 < 1 \text{ rpm}$  - once the output speed of the unit is lower than 1 rpm, please refill the oil following the quantity of mounting position M3. (see item C);
- C. For M3 and M4 mounting positions is necessary to install the OT oil tank.

**Attention**OT selection: please see **section E**;OT installing: please see **point 8.3 of use & maintenance manual**.

D. Oil quantities listed in the table are approximate; to ensure correct lubrication, please refer to the level mark on the gear unit.

- A.  $n_2 < 5 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 5 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M4 beziehen.siehe Punkt C
- B.  $n_2 < 1 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 1 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M3 beziehen.siehe Punkt C
- C. Bei den Montagepositionen M3 und M4 ist es notwendig einen OT Öltank zu installieren.

**Achtung OT** Auswahl: Siehe **Sektion E**;OT Installation: Siehe **Punkt 8.3** des Benutzungs&Wartungshandbuchs

D. Bei den Ölmengenangaben handelt es sich um approximative Werte; für den Erhalt einer korrekten Schmiering muss Bezug auf den am Getriebe gekennzeichneten Füllstand genommen werden.

MT27 IGBD 1.0

EX Series



FS	M1				M3				M4			
	1	2	3	4	1	2	3	4	1	2	3	4
10	0,4	0,6	0,8	1,0	0,7	1,0	1,4	1,8	0,6	1,0	1,4	1,7
20	0,5	0,7	0,9	1,2	0,9	1,2	1,6	2,0	0,8	1,2	1,5	1,9
25	0,4	0,7	0,9	1,1	0,8	1,1	1,5	1,9	0,7	1,1	1,4	1,8
3035	0,7	1,1	1,3	1,5	1,2	1,9	2,3	2,7	1,2	1,8	2,2	2,5
40		1,2	1,4	1,7		2,1	2,5	2,9		2,0	2,3	2,7
50	0,8	1,3	1,5	1,8	1,4	2,3	2,7	3,0	1,4	2,2	2,5	2,9
70	0,8	1,2	1,4	1,7	1,3	2,1	2,5	2,9	1,3	2,0	2,3	2,7
80	1,0	2,1	2,3	2,5	1,8	3,6	4,0	4,4	1,7	3,4	3,8	4,1
90-95		2,3	2,5	2,7		3,9	4,3	4,7		3,7	4,1	4,4
100	1,2	2,4	2,9	3,1	2,1	4,1	4,9	5,3	2,0	3,9	4,7	5,0
150	1,5	2,4	2,9	3,1	2,6	4,1	4,9	5,3	2,4	3,9	4,7	5,0
180		2,4	2,9	3,1		4,1	4,9	5,3		3,9	4,7	5,0
200	1,5	2,3	2,8	3,0	2,6	4,0	4,8	5,1	2,4	3,8	4,5	4,9
EX	1	2	3	4	1	2	3	4	1	2	3	4

**1 - Standard**  
Posizione morsetti  
Terminal board position  
Lage des Klemmenkastens

⚠ Attenzione: Per la posizione corretta dei fori di fissaggio fare riferimento ai disegni riportati nella Sezione C.  
 ⚠ Attention: For the correct position of the fixing holes refer to the drawings in accordance with Section C.  
 ⚠ Achtung: Um die korrekte Position der Befestigungsbohrungen zu finden, bitte in die Zeichnungen entsprechend

FS	M1				M3				M4			
	1	2	3	4	1	2	3	4	1	2	3	4
250	2,6	4,0	5,1	5,3	4,5	6,9	8,7	9,1	4,2	6,6	8,3	8,6
280	2,6	4,2	5,3	5,6	4,5	7,2	9,2	9,6	4,2	6,8	8,7	9,1
300	2,5	4,1	5,3	5,5	4,4	7,1	9,1	9,5	4,1	6,8	8,6	9,0
350	2,5	4,5	5,6	5,8	4,4	7,7	9,7	10,1	4,1	7,3	9,2	9,5
360												
420	2,5	4,6	5,5	6,0	4,4	8,0	9,5	10,4	4,1	7,6	9,0	9,8
600	4,3	8,1	9,5	10,6	7,4	14,0	16,4	18,2	7,0	13,2	15,6	17,3
650												
800	4,3	8,0	9,6	10,8	7,5	13,9	16,6	18,6	7,1	13,1	15,8	17,6
850												
>850												
EX	1	2	3	4	1	2	3	4	1	2	3	4

**1 - Standard**  
Posizione morsetti  
Terminal board position  
Lage des Klemmenkastens

⚠ Attenzione: Per la posizione corretta dei fori di fissaggio fare riferimento ai disegni riportati nella Sezione C.  
 ⚠ Attention: For the correct position of the fixing holes refer to the drawings in accordance with Section C.  
 ⚠ Achtung: Um die korrekte Position der Befestigungsbohrungen zu finden, bitte in die Zeichnungen entsprechend

\* Contattare nostro ufficio tecnico commerciale / \* Please, contact our technical sales dept. / \* Bitte setzen Sie sich mit unserer technischen Abteilung in Verbindung



- A.**  $n_2 < 5 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 5 rpm, per il riempimento fare riferimento ai quantitativi della posizione M4 (vedere punto C);
- B.**  $n_2 < 1 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 1 rpm per il riempimento fare riferimento ai quantitativi della posizione M3 (vedere punto C);
- C.** Per le posizioni di montaggio M3 e M4 è necessario installare il vaso di espansione OT.

Attenzione

Scelta grandezza OT: **Sezione E**;

Installazione OT: **Punto 8.3** manuale uso e manutenzione.

D. Le quantità di olio sono approssimative; per una corretta lubrificazione occorre fare riferimento al livello segnato sul riduttore.

**A.**  $n_2 < 5 \text{ rpm}$  - in case the gearbox output speed is lower than 5 rpm, please refill the oil following the quantity of mounting position M4. (see item C);

**B.**  $n_2 < 1 \text{ rpm}$  - once the output speed of the unit is lower than 1 rpm, please refill the oil following the quantity of mounting position M3. (see item C);

**C.** For M3 and M4 mounting positions is necessary to install the OT oil tank.

**Attention**

OT selection: please see section E;

OT installing: please see point 8.3 of use & maintenance manual.

D. Oil quantities listed in the table are approximate; to ensure correct lubrication, please refer to the level mark on the gear unit.

**A.**  $n_2 < 5 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 5 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M4 beziehen.siehe Punkt C

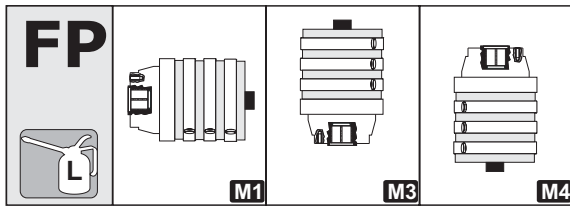
**B.**  $n_2 < 1 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 1 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M3 beziehen.siehe Punkt C

**C.** Bei den Montagepositionen M3 und M4 ist es notwendig einen OT Öltank zu installieren.

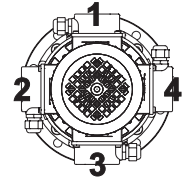
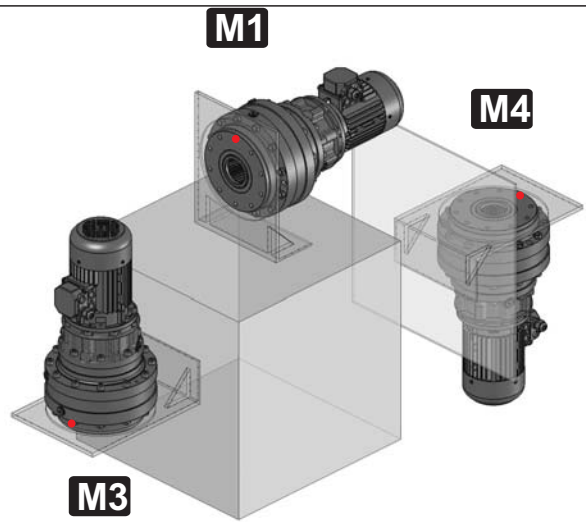
**Achtung OT** Auswahl: Siehe Sektion E;

**OT** Installation: Siehe Punkt 8.3 des Benutzungs&Wartungshandbuchs

D. Bei den Ölmengenangaben handelt es sich um approximative Werte; für den Erhalt einer korrekten Schmiering muss Bezug auf den am Getriebe gekennzeichneten Füllstand genommen werden.

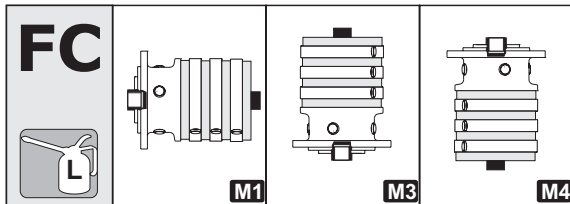
**EX**HIGH TECH *line* HeavyDuty

	M1				M3				M4			
30-35	0,7	1,1	1,3	1,5	1,2	1,9	2,3	2,7	1,2	1,8	2,2	2,5
40		1,2	1,4	1,7		2,1	2,5	2,9		2,0	2,3	2,7
50	0,8	1,3	1,5	1,8	1,4	2,3	2,7	3,0	1,4	2,2	2,5	2,9
70	0,8	1,2	1,4	1,7	1,3	2,1	2,5	2,9	1,3	2,0	2,3	2,7
EX	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>

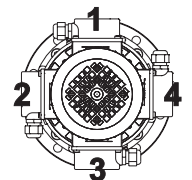
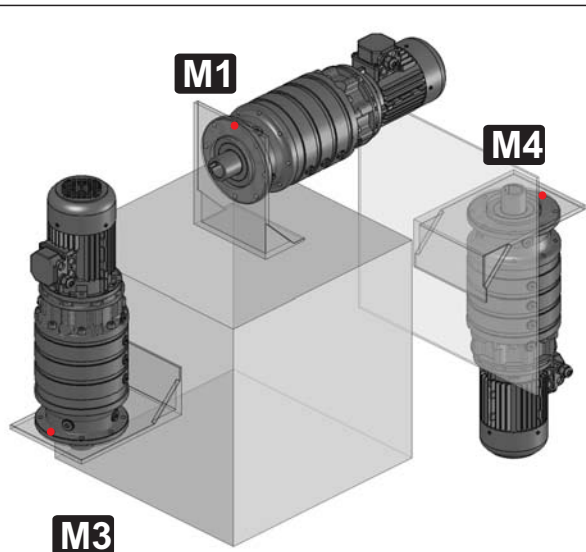


**1 - Standard**  
 Posizione morsettiere  
 Terminal board position  
 Lage des Klemmenkastens

Attenzione: Per la posizione corretta dei fori di fissaggio fare riferimento ai disegni riportati nella Sezione C  
 Attention: For the correct position of the fixing holes refer to the drawings in accordance with Section C.  
 Achtung: Um die korrekte Position der Befestigungsbohrungen zu finden, bitte in die Zeichnungen entsprechend



	M1				M3				M4			
10	0,6	0,8	1,0	1,2	1,0	1,3	1,7	2,1	0,9	1,3	1,6	2,0
20	0,7	0,9	1,1	1,3	1,1	1,5	1,9	2,3	1,1	1,4	1,8	2,2
25	0,6	0,8	1,0	1,3	1,0	1,4	1,8	2,2	1,0	1,4	1,7	2,1
30-35	0,9	1,3	1,5	1,8	1,6	2,3	2,7	3,0	1,5	2,2	2,5	2,9
40		1,4	1,7	1,9		2,5	2,9	3,2		2,3	2,7	3,1
50	1,0	1,5	1,8	2,0	1,8	2,7	3,0	3,4	1,7	2,5	2,9	3,2
70	1,0	1,4	1,7	1,9	1,7	2,5	2,9	3,2	1,6	2,3	2,7	3,1
80	1,6	2,6	2,9	3,1	2,8	4,6	4,9	5,3	2,6	4,3	4,7	5,0
90-95		2,9	3,1	3,4		5,0	5,4	5,8		4,8	5,1	5,5
100	1,9	3,0	3,5	3,7	3,2	5,2	6,1	6,5	3,1	5,0	5,8	6,1
EX	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>



**1 - Standard**  
 Posizione morsettiere  
 Terminal board position  
 Lage des Klemmenkastens

Attenzione: Per la posizione corretta dei fori di fissaggio fare riferimento ai disegni riportati nella Sezione C  
 Attention: For the correct position of the fixing holes refer to the drawings in accordance with Section C.  
 Achtung: Um die korrekte Position der Befestigungsbohrungen zu finden, bitte in die Zeichnungen entsprechend



**A.**  $n_2 < 5 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 5 rpm, per il riempimento fare riferimento ai quantitativi della posizione M4 (vedere punto C);  
**B.**  $n_2 < 1 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 1 rpm per il riempimento fare riferimento ai quantitativi della posizione M3 (vedere punto C);  
**C.** Per le posizioni di montaggio M3 e M4 è necessario installare il vaso di espansione OT.

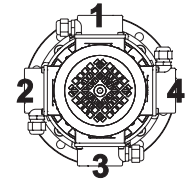
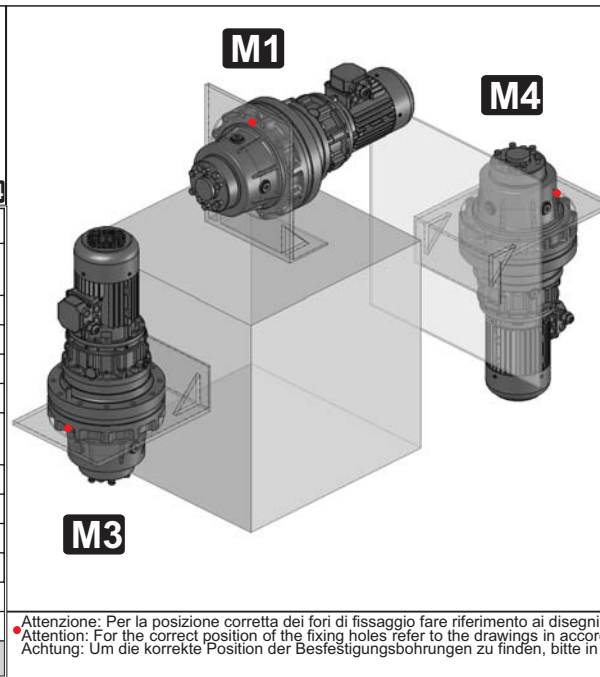
Attenzione  
 Scelta grandezza OT: **Sezione E**;  
 Installazione OT: **Punto 8.3** manuale uso e manutenzione.  
**D.** Le quantità di olio sono approssimative; per una corretta lubrificazione occorre fare riferimento al livello segnato sul riduttore.

**A.**  $n_2 < 5 \text{ rpm}$  - in case the gearbox output speed is lower than 5 rpm, please refill the oil following the quantity of mounting position M4 . (see item C);  
**B.**  $n_2 < 1 \text{ rpm}$  - once the output speed of the unit is lower than 1 rpm, please refill the oil following the quantity of mounting position M3.(see item C);  
**C.** For M3 and M4 mounting positions is necessary to install the OT oil tank.  
**Attention**  
 OT selection: please see section E;  
 OT installing: please see point 8.3 of use & maintenance manual.  
**D.** Oil quantities listed in the table are approximate; to ensure correct lubrication, please refer to the level mark on the gear unit.

**A.**  $n_2 < 5 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 5 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M4 beziehen.siehe Punkt C  
**B.**  $n_2 < 1 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 1 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M3 beziehen.siehe Punkt C  
**C.** Bei den Montagepositionen M3 und M4 ist es notwendig einen OT Öltank zu installieren.  
**Achtung OT** Auswahl: Siehe Sektion E;  
**OT** Installation: Siehe Punkt 8.3 des Benutzungs&Wartungshandbuchs  
**D.** Bei den Ölmengenangaben handelt es sich um approximative Werte; für den Erhalt einer korrekten Schmierung muss Bezug auf den am Getriebe gekennzeichneten Füllstand genommen werden.



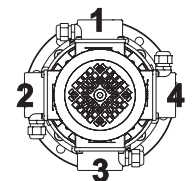
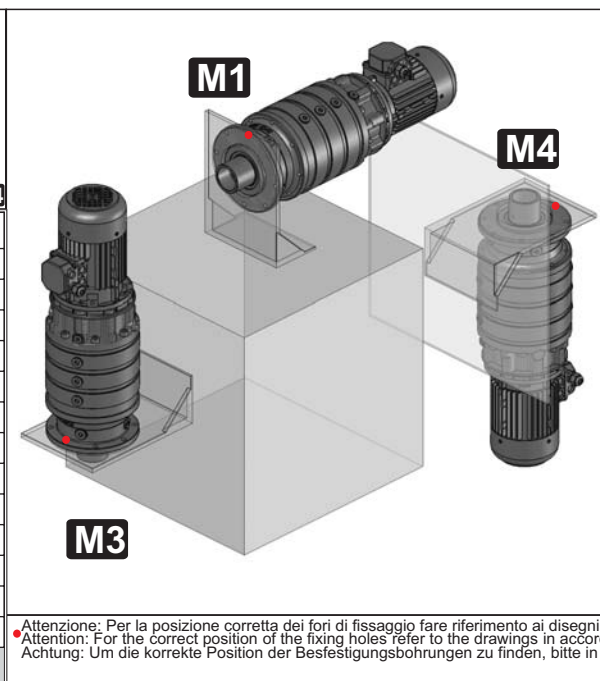
FCB												
	M1				M3				M4			
30	0,9	1,3	1,5	1,8	1,6	2,3	2,7	3,0	1,5	2,2	2,5	2,9
35												
40		1,4	1,7	1,9		2,5	2,9	3,2		2,3	2,7	3,1
50	1,0	1,5	1,8	2,0	1,8	2,7	3,0	3,4	1,7	2,5	2,9	3,2
70	1,0	1,4	1,7	1,9	1,7	2,5	2,9	3,2	1,6	2,3	2,7	3,1
80	1,6	2,6	2,9	3,1	2,8	4,6	4,9	5,3	2,6	4,3	4,7	5,0
90												
95		2,9	3,1	3,4		5,0	5,4	5,8		4,8	5,1	5,5
100	1,9	3,0	3,5	3,7	3,2	5,2	6,1	6,5	3,1	5,0	5,8	6,1
150	2,4	3,2	3,7	4,0	4,1	5,6	6,5	6,8	3,9	5,3	6,1	6,5
180		3,2	3,7	4,0		5,6	6,5	6,8		5,3	6,1	6,5
200	2,4	3,2	3,6	3,9	4,1	5,5	6,3	6,7	3,9	5,2	5,9	6,3
250	3,4	4,8	5,9	6,1	5,9	8,4	10,2	10,5	5,6	7,9	9,6	10,0
280		5,0	6,2	6,4		8,6	10,6	11,0		8,2	10,1	10,4
EX	1	2	3	4	1	2	3	4	1	2	3	4



1 - Standard  
Posizione morsetti  
Terminal board position  
Lage des Klemmenkastens

Attenzione: Per la posizione corretta dei fori di fissaggio fare riferimento ai disegni riportati nella Sezione C  
Attention: For the correct position of the fixing holes refer to the drawings in accordance with Section C.  
Achtung: Um die korrekte Position der Befestigungsbohrungen zu finden, bitte in die Zeichnungen entsprechend

FU												
	M1				M3				M4			
10	0,6	0,8	1,0	1,2	1,0	1,3	1,7	2,1	0,9	1,3	1,6	2,0
20	0,7	0,9	1,1	1,3	1,1	1,5	1,9	2,3	1,1	1,4	1,8	2,2
25	0,6	0,8	1,0	1,3	1,0	1,4	1,8	2,2	1,0	1,4	1,7	2,1
30-35	0,9	1,3	1,5	1,8	1,6	2,3	2,7	3,0	1,5	2,2	2,5	2,9
40		1,4	1,7	1,9		2,5	2,9	3,2		2,3	2,7	3,1
50	1,0	1,5	1,8	2,0	1,8	2,7	3,0	3,4	1,7	2,5	2,9	3,2
70	1,0	1,4	1,7	1,9	1,7	2,5	2,9	3,2	1,6	2,3	2,7	3,1
80	1,6	2,6	2,9	3,1	2,8	4,6	4,9	5,3	2,6	4,3	4,7	5,0
90-95		2,9	3,1	3,4		5,0	5,4	5,8		4,8	5,1	5,5
100	1,9	3,0	3,5	3,7	3,2	5,2	6,1	6,5	3,1	5,0	5,8	6,1
150	2,1	3,0	3,5	3,7	3,7	5,2	6,1	6,5	3,5	5,0	5,8	6,1
180		3,0	3,5	3,7		5,2	6,1	6,5		5,0	5,8	6,1
200	2,1	3,0	3,4	3,6	3,7	5,1	5,9	6,3	3,5	4,9	5,6	5,9
EX	1	2	3	4	1	2	3	4	1	2	3	4



1 - Standard  
Posizione morsetti  
Terminal board position  
Lage des Klemmenkastens

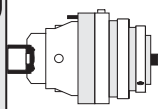
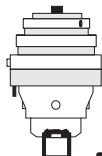
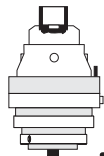
Attenzione: Per la posizione corretta dei fori di fissaggio fare riferimento ai disegni riportati nella Sezione C  
Attention: For the correct position of the fixing holes refer to the drawings in accordance with Section C.  
Achtung: Um die korrekte Position der Befestigungsbohrungen zu finden, bitte in die Zeichnungen entsprechend

**A.**  $n_2 < 5 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 5 rpm, per il riempimento fare riferimento ai quantitativi della posizione M4 (vedere punto C);  
**B.**  $n_2 < 1 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 1 rpm per il riempimento fare riferimento ai quantitativi della posizione M3 (vedere punto C);  
**C.** Per le posizioni di montaggio M3 e M4 è necessario installare il vaso di espansione OT.

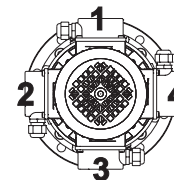
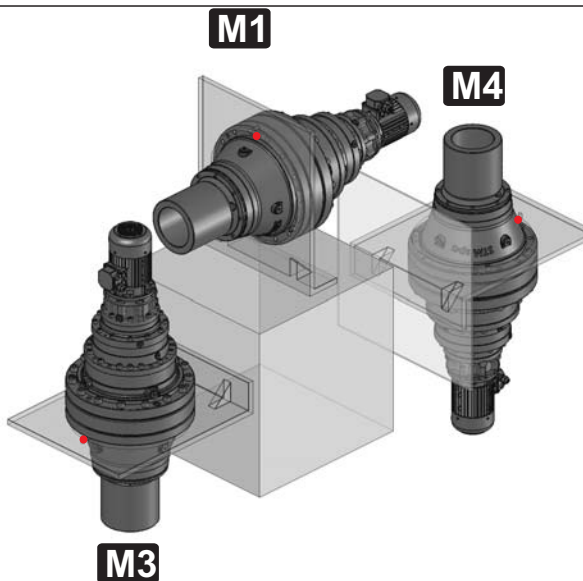
Attenzione  
Scelta grandezza OT: **Sezione E**;  
Installazione OT: **Punto 8.3** manuale uso e manutenzione.  
 **D.** Le quantità di olio sono approssimative; per una corretta lubrificazione occorre fare riferimento al livello segnato sul riduttore.

**A.**  $n_2 < 5 \text{ rpm}$  - in case the gearbox output speed is lower than 5 rpm, please refill the oil following the quantity of mounting position M4. (see item C);  
**B.**  $n_2 < 1 \text{ rpm}$  - once the output speed of the unit is lower than 1 rpm, please refill the oil following the quantity of mounting position M3. (see item C);  
**C.** For M3 and M4 mounting positions is necessary to install the OT oil tank.  
**Attention**  
OT selection: please see section E;  
OT installing: please see point 8.3 of use & maintenance manual.  
**D.** Oil quantities listed in the table are approximate; to ensure correct lubrication, please refer to the level mark on the gear unit.

**A.**  $n_2 < 5 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 5 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M4 beziehen.siehe Punkt C  
**B.**  $n_2 < 1 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 1 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M3 beziehen.siehe Punkt C  
**C.** Bei den Montagepositionen M3 und M4 ist es notwendig einen OT Öltank zu installieren.  
**Achtung OT** Auswahl: Siehe Sektion E;  
**OT** Installation: Siehe Punkt 8.3 des Benutzungs&Wartungshandbuchs  
**D.** Bei den Ölmengenangaben handelt es sich um approximative Werte; für den Erhalt einer korrekten Schmierung muss Bezug auf den am Getriebe gekennzeichneten Füllstand genommen werden.

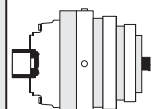
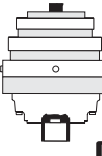
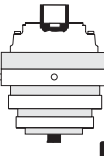
**EX**HIGH TECH *line* HeavyDuty**HU****M1****M3****M4**

	M1				M3				M4			
150	2,4	3,2	3,7	4,0	4,1	5,6	6,5	6,8	3,9	5,3	6,1	6,5
180		3,2	3,7	4,0		5,6	6,5	6,8		5,3	6,1	6,5
200	2,4	3,2	3,6	3,9	4,1	5,5	6,3	6,7	3,9	5,2	5,9	6,3
250	3,4	4,8	5,9	6,1	5,9	8,4	10,2	10,5	5,6	7,9	9,6	10,0
280		5,0	6,2	6,4		8,6	10,6	11,0		8,2	10,1	10,4
300	3,6	5,2	6,3	6,5	6,2	8,9	10,9	11,3	5,9	8,5	10,4	10,7
EX	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>

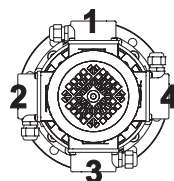
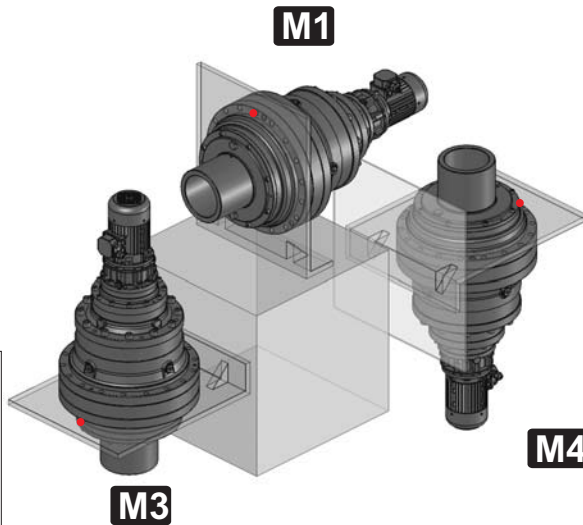


**1 - Standard**  
 Posizione morsetti  
 Terminal board position  
 Lage des Klemmenkastens

Attenzione: Per la posizione corretta dei fori di fissaggio fare riferimento ai disegni riportati nella Sezione C  
 Attention: For the correct position of the fixing holes refer to the drawings in accordance with Section C.  
 Achtung: Um die korrekte Position der Befestigungsbohrungen zu finden, bitte in die Zeichnungen entsprechend

**SU****M1****M3****M4**

	M1				M3				M4			
350	2,5	4,5	5,6	5,8	4,4	7,7	9,7	10,1	4,1	7,3	9,2	9,5
360		4,6	5,5	6,0		8,0	9,5	10,4		7,6	9,0	9,8
420	2,5	4,6	5,5	6,0	4,4	8,0	9,5	10,4	4,1	7,6	9,0	9,8
600	4,3	8,1	9,5	10,6	7,4	14,0	16,4	18,2	7,0	13,2	15,6	17,3
650												
800	4,3	8,0	9,6	10,8	7,5	13,9	16,6	18,6	7,1	13,1	15,8	17,6
850												
>850	*											
EX	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>



**1 - Standard**  
 Posizione morsetti  
 Terminal board position  
 Lage des Klemmenkastens

Attenzione: Per la posizione corretta dei fori di fissaggio fare riferimento ai disegni riportati nella Sezione C  
 Attention: For the correct position of the fixing holes refer to the drawings in accordance with Section C.  
 Achtung: Um die korrekte Position der Befestigungsbohrungen zu finden, bitte in die Zeichnungen entsprechend



- A.**  $n_2 < 5 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 5 rpm, per il riempimento fare riferimento ai quantitativi della posizione M4 (vedere punto C);  
**B.**  $n_2 < 1 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 1 rpm per il riempimento fare riferimento ai quantitativi della posizione M3 (vedere punto C);  
**C.** Per le posizioni di montaggio M3 e M4 è necessario installare il vaso di espansione OT.

Attenzione

Scelta grandezza OT: **Sezione E**;Installazione OT: **Punto 8.3** manuale uso e manutenzione.

**D.** Le quantità di olio sono approssimative; per una corretta lubrificazione occorre fare riferimento al livello segnato sul riduttore.

- A.**  $n_2 < 5 \text{ rpm}$  - in case the gearbox output speed is lower than 5 rpm, please refill the oil following the quantity of mounting position M4 . (see item C);  
**B.**  $n_2 < 1 \text{ rpm}$  - once the output speed of the unit is lower than 1 rpm, please refill the oil following the quantity of mounting position M3.(see item C);  
**C.** For M3 and M4 mounting positions is necessary to install the OT oil tank.

**Attention**OT selection: please see **section E**;

OT installing: please see point 8.3 of use &amp; maintenance manual.

**D.** Oil quantities listed in the table are approximate; to ensure correct lubrication, please refer to the level mark on the gear unit.

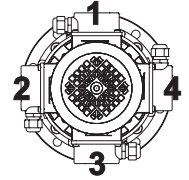
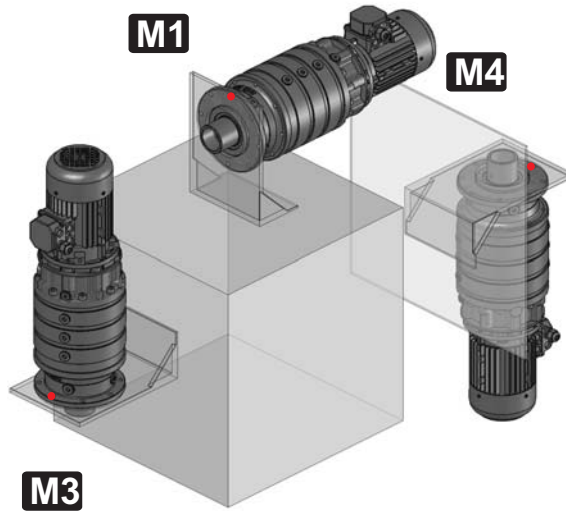
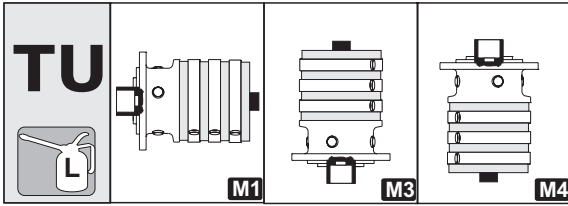
- A.**  $n_2 < 5 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 5 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M4 beziehen.siehe Punkt C  
**B.**  $n_2 < 1 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 1 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M3 beziehen.siehe Punkt C  
**C.** Bei den Montagepositionen M3 und M4 ist es notwendig einen OT Öltank zu installieren.

**Achtung OT** Auswahl: Siehe **Sektion E**;OT Installation: Siehe **Punkt 8.3** des Benutzungs&Wartungshandbuchs

**D.** Bei den Ölmengenangaben handelt es sich um approximative Werte; für den Erhalt einer korrekten Schmiering muss Bezug auf den am Getriebe gekennzeichneten Füllstand genommen werden.

MT27 IGBD 1.0

EX Series



**1 - Standard**  
 Posizione morsettiere  
 Terminal board position  
 Lage des Klemmenkastens

	M1				M3				M4			
150	3,1	4,0	4,5	4,7	5,4	6,9	7,8	8,2	5,1	6,6	7,4	7,7
180		4,0	4,5	4,7		6,9	7,8	8,2		6,6	7,4	7,7
200	3,1	4,0	4,4	4,6	5,4	6,8	7,6	8,0	5,1	6,5	7,2	7,6
250	4,2	5,7	6,7	6,9	7,3	9,8	11,6	12,0	6,9	9,3	11,0	11,3
280		5,8	7,0	7,2		10,1	12,1	12,4		9,5	11,4	11,8
300	5,0	6,5	7,7	7,9	8,6	11,3	13,3	13,7	8,1	10,7	12,6	13,0
EX	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>

Attenzione: Per la posizione corretta dei fori di fissaggio fare riferimento ai disegni riportati nella Sezione C.  
 Attention: For the correct position of the fixing holes refer to the drawings in accordance with Section C.  
 Achtung: Um die korrekte Position der Befestigungsbohrungen zu finden, bitte in die Zeichnungen entsprechend



**A.**  $n_2 < 5 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 5 rpm, per il riempimento fare riferimento ai quantitativi della posizione M4 (vedere punto C);

**B.**  $n_2 < 1 \text{ rpm}$  - Qualora la velocità uscita del riduttore sia inferiore a 1 rpm per il riempimento fare riferimento ai quantitativi della posizione M3 (vedere punto C);

**C.** Per le posizioni di montaggio M3 e M4 è necessario installare il vaso di espansione OT.  
 Attenzione

Scelta grandezza OT: **Sezione E;**

Installazione OT: **Punto 8.3** manuale uso e manutenzione.

**D.** Le quantità di olio sono approssimative; per una corretta lubrificazione occorre fare riferimento al livello segnato sul riduttore.

**A.**  $n_2 < 5 \text{ rpm}$  - in case the gearbox output speed is lower than 5 rpm, please refill the oil following the quantity of mounting position M4. (see item C);

**B.**  $n_2 < 1 \text{ rpm}$  - once the output speed of the unit is lower than 1 rpm, please refill the oil following the quantity of mounting position M3. (see item C);

**C.** For M3 and M4 mounting positions is necessary to install the OT oil tank.

**Attention**

OT selection: please see **section E;**

OT installing: please see **point 8.3 of use & maintenance manual.**

**D.** Oil quantities listed in the table are approximate; to ensure correct lubrication, please refer to the level mark on the gear unit.

**A.**  $n_2 < 5 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 5 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M4 beziehen.siehe Punkt C  
**B.**  $n_2 < 1 \text{ rpm}$  - Ist die Abtriebsdrehzahl des Getriebes niedriger als 1 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M3 beziehen.siehe Punkt C  
**C.** Bei den Montagepositionen M3 und M4 ist es notwendig einen OT Öltank zu installieren.

**Achtung OT** Auswahl: Siehe Sektion E;

**OT** Installation: Siehe Punkt 8.3 des Benutzungs&Wartungshandbuchs

**D.** Bei den Ölmengenangaben handelt es sich um approximative Werte; für den Erhalt einer korrekten Schmierung muss Bezug auf den am Getriebe gekennzeichneten Füllstand genommen werden.

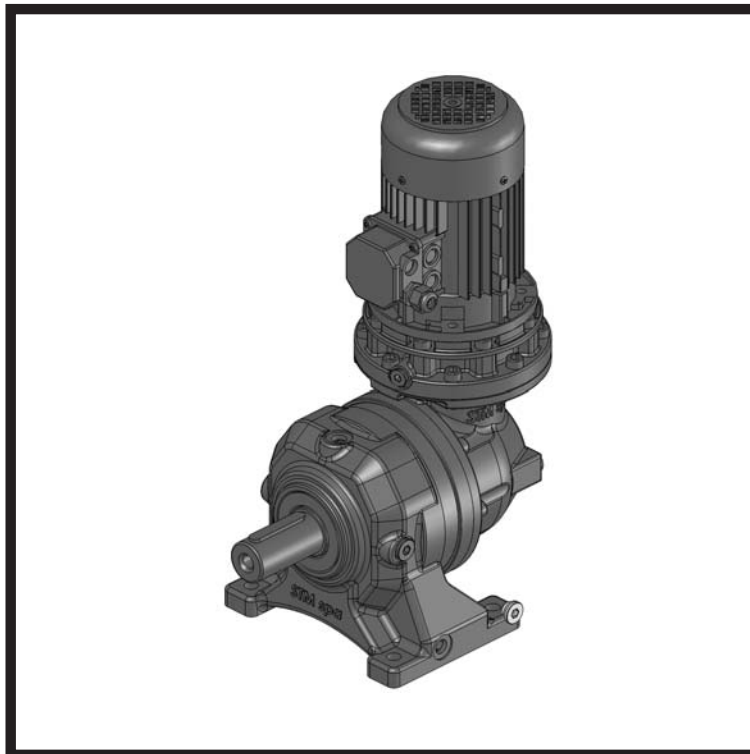
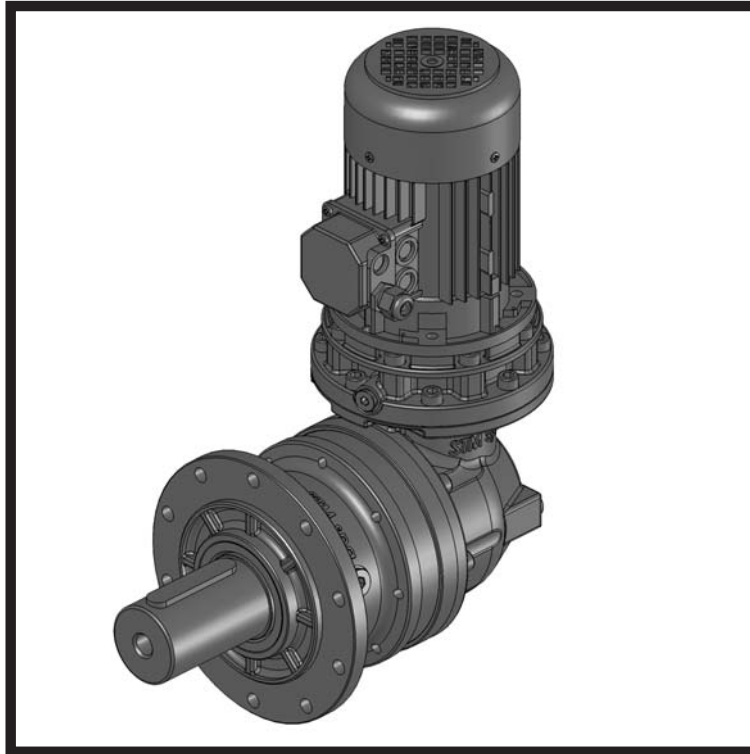


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# EXB





EXV

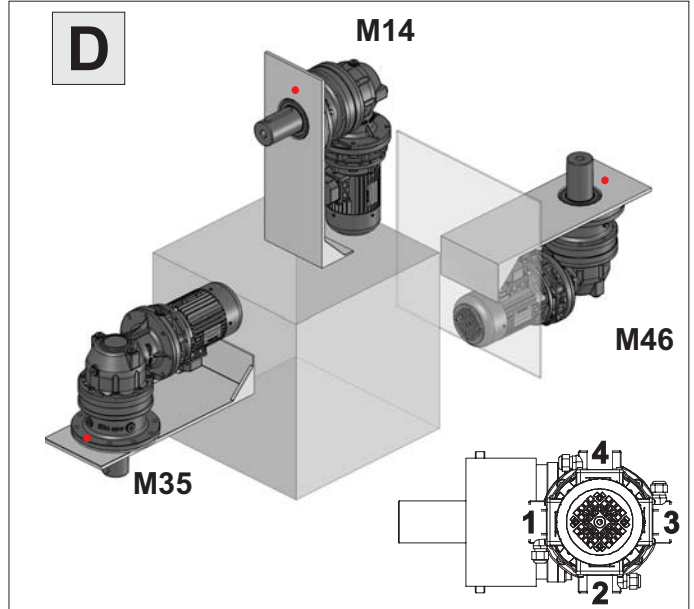
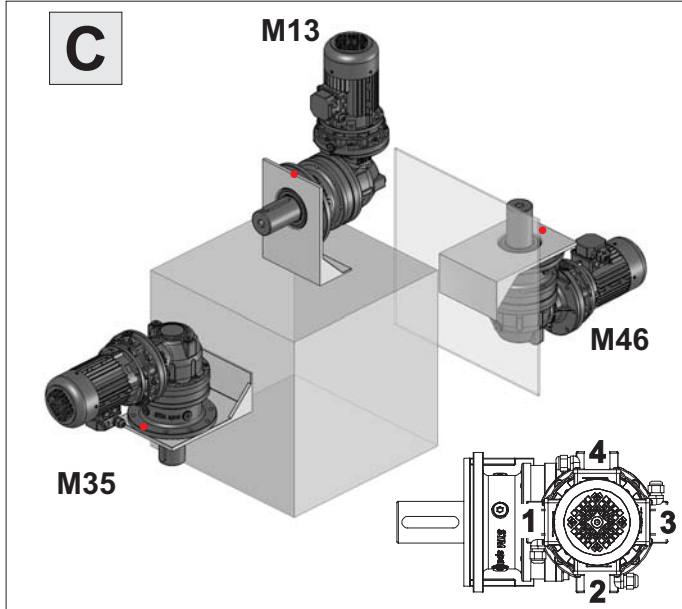
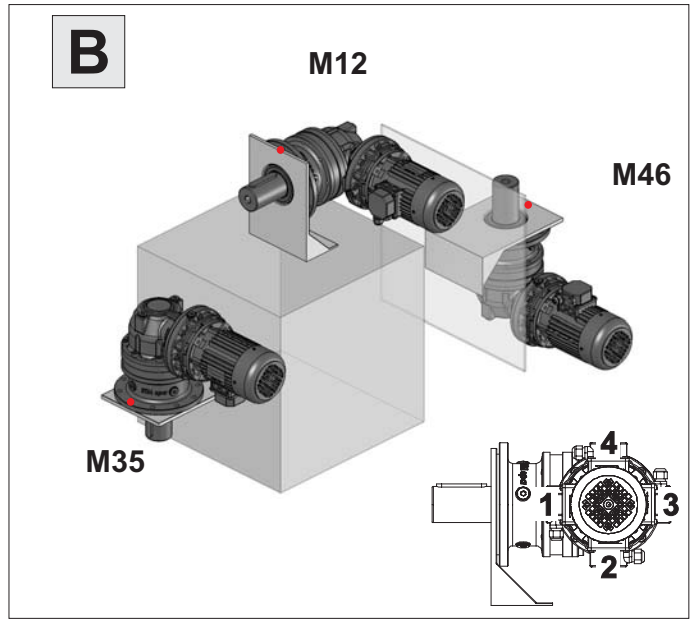
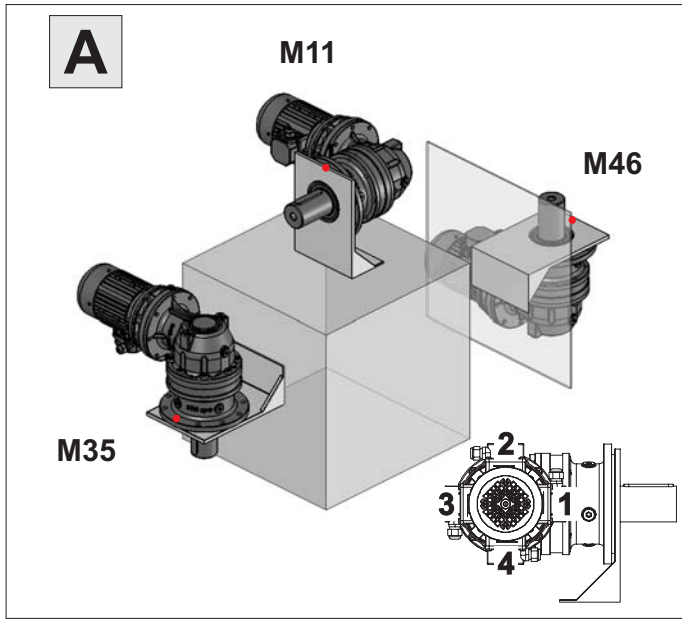


A-B  
C-D

HIGH TECH *line* HeavyDuty



# R-M.-T-H.-X-S.-F.



• Attenzione: Per la posizione corretta dei fori di fissaggio fare riferimento ai disegni riportati nella Sezione C  
 Attention: For the correct position of the fixing holes refer to the drawings in accordance with Section C.  
 Achtung: Um die korrekte Position der Befestigungsbohrungen zu finden, bitte in die Zeichnungen entsprechend

<b>M11</b>	<b>M12</b>	<b>M13</b>	<b>M14</b>	<b>M35</b>	<b>M46</b>

N.B. schema rappresentativo anche per 2, 3 e 4 stadi

- ▽ Carico / Filling plug / Einfüllschraube
- ▼ Scarico / Drain plug / Ablassschraube
- Livello / Level plug / Schauglas
- Sfiato / Vent plug/ Entlüftungsstopfen



## R-F-FU-FC-FB

	M11			M12			M13			M14			M35			M46		
10	1,0	1,3	1,5	1,0	1,3	1,5	1,9	2,3	2,7	1,1	1,3	1,5	1,5	1,9	2,2	1,9	2,2	2,6
20	1,1	1,4	1,6	1,1	1,4	1,6	2,1	2,5	2,9	1,2	1,4	1,6	1,7	2,1	2,4	2,1	2,4	2,8
25	1,1	1,3	1,5	1,1	1,3	1,5	2,0	2,4	2,8	1,1	1,4	1,6	1,6	2,0	2,3	2,0	2,3	2,7
30-35	1,4	1,8	2,0	1,4	1,8	2,0	2,6	3,3	3,6	1,5	1,9	2,1	2,1	2,8	3,2	2,5	3,1	3,5
40		1,9	2,1		1,9	2,1		3,4	3,8		2,0	2,2		3,0	3,4		3,3	3,7
50	2,6	2,0	2,2	2,6	2,0	2,2	4,9	3,6	4,0	2,8	2,1	2,3	3,6	3,2	3,6	4,8	3,5	3,9
70	2,6	1,9	2,1	2,6	1,9	2,1	4,8	3,4	3,8	2,8	2,0	2,2	3,5	3,0	3,4	4,7	3,3	3,7
80	3,3	3,1	3,3	3,3	3,1	3,3	6,3	5,5	5,9	3,5	3,2	3,4	4,7	5,1	5,5	6,1	5,3	5,7
90-95		3,4	3,6		3,4	3,6		6,0	6,4		3,5	3,7		5,6	5,9		5,7	6,1
100	3,6	4,6	4,0	3,6	4,6	4,0	6,7	8,3	7,1	3,8	4,8	4,1	5,2	7,0	6,6	6,6	8,1	6,7
150		4,6	4,0	0,0	4,6	4,0		8,3	7,1		4,8	4,1		7,0	6,6		8,1	6,7
180		4,6	4,0	0,0	4,6	4,0		8,3	7,1		4,8	4,1		7,0	6,6		8,1	6,7
200		4,6	3,9	0,0	4,6	3,9		8,2	6,9		4,8	4,0		6,9	6,4		8,0	6,6
	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>



## M-MX

	M11			M12			M13			M14			M35			M46		
10	1,1	1,4	1,6	1,1	1,4	1,6	2,1	2,5	2,9	1,2	1,4	1,6	1,7	2,1	2,4	2,1	2,4	2,8
20	1,3	1,5	1,7	1,3	1,5	1,7	2,3	2,7	3,1	1,3	1,5	1,8	1,9	2,2	2,6	2,2	2,6	3,0
25	1,2	1,4	1,6	1,2	1,4	1,6	2,2	2,6	3,0	1,3	1,5	1,7	1,8	2,1	2,5	2,1	2,5	2,9
30-35	1,5	1,9	2,1	1,5	1,9	2,1	2,8	3,4	3,8	1,6	2,0	2,2	2,3	3,0	3,4	2,7	3,3	3,7
40		2,0	2,2		2,0	2,2		3,6	4,0		2,1	2,3		3,2	3,6		3,5	3,9
50	2,8	2,1	2,4	2,8	2,1	2,4	5,1	3,8	4,2	3,0	2,2	2,4	3,7	3,4	3,8	5,0	3,7	4,0
70	2,7	2,0	2,2	2,7	2,0	2,2	5,0	3,6	4,0	2,9	2,1	2,3	3,7	3,2	3,6	4,9	3,5	3,9
80	3,4	3,2	3,4	3,4	3,2	3,4	6,4	5,6	6,0	3,6	3,2	3,5	4,8	5,2	5,6	6,2	5,4	5,7
	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>



## S-SU-SB - FS-FSB - FP

	M11			M12			M13			M14			M35			M46		
10	0,9	1,1	1,3	0,9	1,1	1,3	1,6	2,0	2,4	0,9	1,1	1,4	1,2	1,6	2,0	1,6	2,0	2,3
20	1,0	1,2	1,4	1,0	1,2	1,4	1,8	2,2	2,6	1,0	1,3	1,5	1,4	1,8	2,1	1,8	2,1	2,5
25	0,9	1,1	1,4	0,9	1,1	1,4	1,7	2,1	2,5	1,0	1,2	1,4	1,3	1,7	2,1	1,7	2,1	2,4
30-35	1,2	1,6	1,8	1,2	1,6	1,8	2,2	2,9	3,3	1,3	1,6	1,9	1,8	2,4	2,8	2,1	2,8	3,1
40		1,7	1,9		1,7	1,9		3,1	3,4		1,8	2,0		2,6	3,0		3,0	3,3
50	2,4	1,8	2,0	2,4	1,8	2,0	4,5	3,3	3,6	2,6	1,9	2,1	3,2	2,8	3,2	4,5	3,1	3,5
70	2,4	1,7	1,9	2,4	1,7	1,9	4,4	3,1	3,4	2,6	1,8	2,0	3,1	2,6	3,0	4,4	3,0	3,3
80	2,8	2,6	2,8	2,8	2,6	2,8	5,3	4,6	5,0	2,9	2,6	2,9	3,7	4,1	4,5	5,2	4,4	4,8
90-95		2,7	3,0		2,7	3,0		4,9	5,2		2,8	3,0		4,4	4,8		4,7	5,0
100	3,0	4,0	3,3	3,0	4,0	3,3	5,6	7,2	5,9	3,1	4,2	3,4	4,0	5,8	5,5	5,5	7,0	5,7
150		4,0	3,3		4,0	3,3		7,2	5,9		4,2	3,4		5,8	5,5		7,0	5,7
180		4,0	3,3		4,0	3,3		7,2	5,9		4,2	3,4		5,8	5,5		7,0	5,7
200		3,9	3,2		3,9	3,2		7,1	5,7		4,1	3,3		5,7	5,3		6,9	5,5
250		5,8	5,5		5,8	5,5		10,4	9,7		5,9	5,6		8,9	9,3		10,1	9,3
280		5,9	6,9		5,9	6,9		10,7	12,3		6,1	7,1		9,2	11,0		10,3	11,8
300		5,9	6,9		5,9	6,9		10,6	12,2		6,0	7,1		9,1	10,9		10,3	11,7
350-360		6,2	7,2		6,2	7,2		11,2	12,8		6,4	7,4		9,6	11,4		10,8	12,3
420			7,1			7,1			12,6			7,3			11,3			12,1
600-650			11,3			11,3			19,9			11,4			18,4			19,1
800-850			11,4			11,4			20,1			11,5			18,6			19,3
>850																		
	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>

**A.**  $n_2 < 5$  rpm - Qualora la velocità uscita del riduttore sia inferiore a 5 rpm, per il riempimento fare riferimento ai quantitativi della posizione M46 (vedere punto C);  
**B.**  $n_2 < 1$  rpm - Qualora la velocità uscita del riduttore sia inferiore a 1 rpm per il riempimento fare riferimento ai quantitativi della posizione M13 (vedere punto C);  
**C.** Per le posizioni di montaggio M13 e M46 è necessario installare il vaso di espansione OT.  
**Attenzione**  
 Scelta grandezza OT: **Sezione E;**  
 Installazione OT: **Punto 8.3** manuale uso e manutenzione.

**A.**  $n_2 < 5$  rpm - in case the gearbox output speed is lower than 5 rpm, please refill the oil following the quantity of mounting position M46. (see item C);  
**B.**  $n_2 < 1$  rpm - once the output speed of the unit is lower than 1 rpm, please refill the oil following the quantity of mounting position M13. (see item C);  
**C.** For M13 and M46 mounting positions is necessary to install the OT oil tank.  
**Attention**  
 OT selection: please see **section E;**  
 OT installing: please see point 8.3 of use & maintenance manual.  
**D.** Oil quantities listed in the table are approximate; to ensure correct lubrication, please refer to the level mark on the gear unit.

**A.**  $n_2 < 5$  rpm - Ist die Abtriebsdrehzahl des Getriebes niedriger als 5 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M46 beziehen.siehe Punkt C  
**B.**  $n_2 < 1$  rpm - Ist die Abtriebsdrehzahl des Getriebes niedriger als 1 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M13 beziehen.siehe Punkt C  
**C.** Bei den Montagepositionen M13 und M46 ist es notwendig einen OT Öltank zu installieren.  
**Achtung OT** Auswahl: Siehe Sektion E;  
 OT Installation: Siehe Punkt 8.3 des Benutzungs&Wartungshandbuchs  
**D.** Bei den Ölmenangaben handelt es sich um approximative Werte; für den Erhalt einer korrekten Schmierung muss Bezug auf den am Getriebe gekennzeichneten Füllstand genommen werden.

**EXB****A-B  
C-D**HIGH TECH *line* HeavyDuty**H**

	M11			M12			M13			M14			M35			M46		
150	4,8	4,2		4,8	4,2		8,7	7,4		5,0	4,3		7,4	7,0		8,4	7,1	
180	4,8	4,2		4,8	4,2		8,7	7,4		5,0	4,3		7,4	7,0		8,4	7,1	
200	4,8	4,1		4,8	4,1		8,6	7,2		5,0	4,2		7,3	6,8		8,3	6,9	
250	6,6	6,4		6,6	6,4		11,9	11,1		6,7	6,4		10,3	10,7		11,4	10,6	
280	6,8	7,8		6,8	7,8		12,1	13,7		6,9	8,0		10,6	12,4		11,7	13,2	
300	6,9	7,9		6,9	7,9		12,4	14,0		7,1	8,1		10,9	12,7		12,0	13,5	
	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>

**X-T**

	M11			M12			M13			M14			M35			M46		
30-35	2,4	2,6		2,4	2,6		4,3	4,7		2,5	2,7		3,9	4,2		4,1	4,5	
40	2,5	2,7		2,5	2,7		4,5	4,9		2,6	2,8		4,0	4,4		4,3	4,7	
50	2,6	2,8		2,6	2,8		4,7	5,1		2,7	2,9		4,2	4,6		4,5	4,8	
70	2,5	2,7		2,5	2,7		4,5	4,9		2,6	2,8		4,0	4,4		4,3	4,7	
80	4,0	4,2		4,0	4,2		7,1	7,4		4,1	4,3		6,6	7,0		6,7	7,1	
90-95	4,2	4,4		4,2	4,4		7,3	7,7		4,2	4,4		6,9	7,3		7,0	7,4	
100	5,4	4,8		5,4	4,8		9,7	8,4		5,6	4,8		8,3	7,9		9,3	8,0	
150	5,6	5,0		5,6	5,0		10,0	8,8		5,8	5,1		8,7	8,3		9,7	8,4	
180	5,6	5,0		5,6	5,0		10,0	8,8		5,8	5,1		8,7	8,3		9,7	8,4	
200	5,6	4,9		5,6	4,9		9,9	8,6		5,8	4,9		8,6	8,1		9,6	8,2	
250	7,4	7,2		7,4	7,2		13,3	12,6		7,6	7,3		11,7	12,1		12,8	12,0	
280	7,6	8,6		7,6	8,6		13,6	15,2		7,7	8,8		12,0	13,8		13,0	14,5	
300	8,3	9,3		8,3	9,3		14,8	16,4		8,4	9,5		13,2	15,1		14,2	15,7	
	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>

**FCB**

	M11			M12			M13			M14			M35			M46		
10	1,0	1,3	1,5	1,0	1,3	1,5	1,9	2,3	2,7	1,1	1,3	1,5	1,5	1,9	2,2	1,9	2,2	2,6
20	1,1	1,4	1,6	1,1	1,4	1,6	2,1	2,5	2,9	1,2	1,4	1,6	1,7	2,1	2,4	2,1	2,4	2,8
25	1,1	1,3	1,5	1,1	1,3	1,5	2,0	2,4	2,8	1,1	1,4	1,6	1,6	2,0	2,3	2,0	2,3	2,7
30-35	1,4	1,8	2,0	1,4	1,8	2,0	2,6	3,3	3,6	1,5	1,9	2,1	2,1	2,8	3,2	2,5	3,1	3,5
40		1,9	2,1		1,9	2,1		3,4	3,8		2,0	2,2		3,0	3,4		3,3	3,7
50	2,6	2,0	2,2	2,6	2,0	2,2	4,9	3,6	4,0	2,8	2,1	2,3	3,6	3,2	3,6	4,8	3,5	3,9
70	2,6	1,9	2,1	2,6	1,9	2,1	4,8	3,4	3,8	2,8	2,0	2,2	3,5	3,0	3,4	4,7	3,3	3,7
80	3,3	3,1	3,3	3,3	3,1	3,3	6,3	5,5	5,9	3,5	3,2	3,4	4,7	5,1	5,5	6,1	5,3	5,7
90-95		3,4	3,6		3,4	3,6		6,0	6,4		3,5	3,7		5,6	5,9		5,7	6,1
100	3,6	4,6	4,0	3,6	4,6	4,0	6,7	8,3	7,1	3,8	4,8	4,1	5,2	7,0	6,6	6,6	8,1	6,7
150		4,8	4,2		4,8	4,2		8,7	7,4		5,0	4,3		7,4	7,0		8,4	7,1
180		4,8	4,2		4,8	4,2		8,7	7,4		5,0	4,3		7,4	7,0		8,4	7,1
200		4,8	4,1		4,8	4,1		8,6	7,2		5,0	4,2		7,3	6,8		8,3	6,9
250		6,6	6,4		6,6	6,4		11,9	11,1		6,7	6,4		10,3	10,7		11,4	10,6
280		6,8	7,8		6,8	7,8		12,1	13,7		6,9	8,0		10,6	12,4		11,7	13,2
	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>



A.  $n_2 < 5$  rpm - Qualora la velocità uscita del riduttore sia inferiore a 5 rpm, per il riempimento fare riferimento ai quantitativi della posizione M46 (vedere punto C);

B.  $n_2 < 1$  rpm - Qualora la velocità uscita del riduttore sia inferiore a 1 rpm per il riempimento fare riferimento ai quantitativi della posizione M13 (vedere punto C);

C. Per le posizioni di montaggio M13 e M46 è necessario installare il vaso di espansione OT.

Attenzione

Sceita grandezza OT: **Sezione E;**

Installazione OT: **Punto 8.3** manuale uso e manutenzione.

D. Le quantità di olio sono approssimative; per una corretta lubrificazione occorre fare riferimento al livello segnato sul riduttore.

A.  $n_2 < 5$  rpm - in case the gearbox output speed is lower than 5 rpm, please refill the oil following the quantity of mounting position M46. (see item C);

B.  $n_2 < 1$  rpm - once the output speed of the unit is lower than 1 rpm, please refill the oil following the quantity of mounting position M13.(see item C);

C. For M13 and M46 mounting positions is necessary to install the OT oil tank.

**Attention**

OT selection: please see **section E;**

OT installing: please see point 8.3 of use & maintenance manual.

D. Oil quantities listed in the table are approximate; to ensure correct lubrication, please refer to the level mark on the gear unit.

A.  $n_2 < 5$  rpm - Ist die Abtriebsdrehzahl des Getriebes niedriger als 5 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M46 beziehen.siehe Punkt C

B.  $n_2 < 1$  rpm - Ist die Abtriebsdrehzahl des Getriebes niedriger als 1 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M13 beziehen.siehe Punkt C

C. Bei den Montagepositionen M13 und M46 ist es notwendig einen OT Öltank zu installieren.

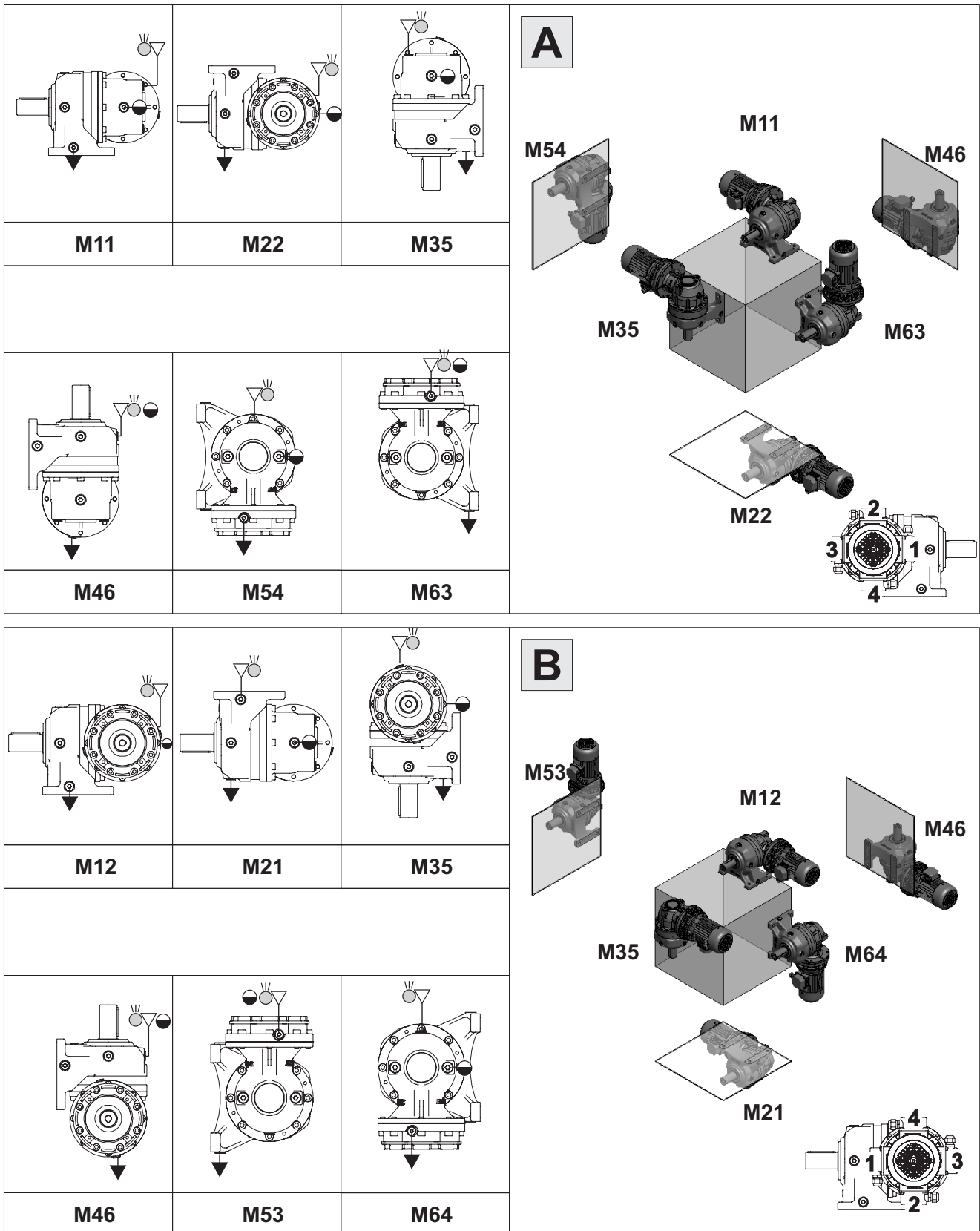
**Achtung OT** Auswahl: Siehe Sektion E;

OT Installation: Siehe Punkt 8.3 des

Benutzungs&Wartungshandbuches

D. Bei den Ölmengenangaben handelt es sich um approximative Werte; für den Erhalt einer korrekten Schmierung muss Bezug auf den am Getriebe gekennzeichneten Füllstand genommen werden.

# P-PH-PX-PS-PSB



N.B. schema rappresentativo anche per 2, 3 e 4 stadi

- ▽ Carico / Filling plug / Einfüllschraube
- ▼ Scarico / Drain plug / Ablasschraube
- Livello / Level plug / Schauglas
- Sfiato / Vent plug / Entlüftungsstopfen



EXB

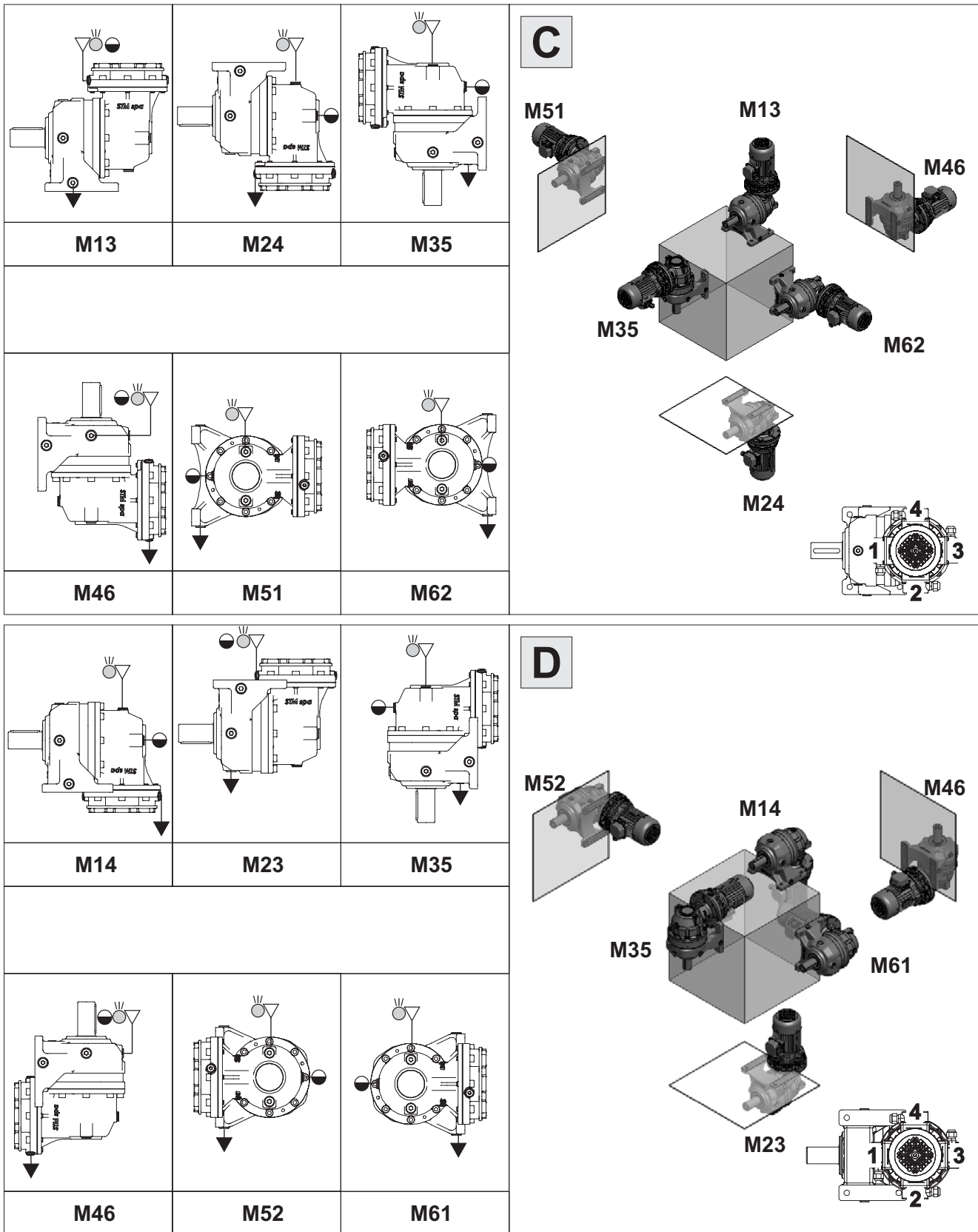


A-B  
C-D

HIGH TECH *line* HeavyDuty



# P-PH-PX-PS-PSB



N.B. schema rappresentativo anche per 2, 3 e 4 stadi

- ▽ Carico / Filling plug / Einfüllschraube
- ▼ Scarico / Drain plug / Ablasschraube
- Livello / Level plug / Schauglas
- Sfiato / Vent plug / Entlüftungstopfen

**P**

	M11-M21 M51-M61			M12-M22 M52-M62			M13-M23 M53-M63			M14-M24 M54-M64			M35			M46		
10	1,3	1,5	1,7	1,3	1,5	1,7	2,3	2,7	3,1	1,3	1,5	1,8	1,9	2,2	2,6	2,2	2,6	3,0
20	1,4	1,6	1,8	1,4	1,6	1,8	2,5	2,9	3,3	1,4	1,6	1,9	2,1	2,4	2,8	2,4	2,8	3,1
25	1,3	1,5	1,7	1,3	1,5	1,7	2,4	2,8	3,2	1,4	1,6	1,8	2,0	2,3	2,7	2,3	2,7	3,0
30-35	2,1	2,5	2,7	2,1	2,5	2,7	3,7	4,4	4,8	2,1	2,5	2,7	3,3	4,0	4,3	3,6	4,2	4,6
40		2,6	2,8	D	2,6	2,8	D	4,6	5,0		2,6	2,9		4,1	4,5		4,4	4,8
50	3,3	2,7	2,9	3,3	2,7	2,9	6,0	4,8	5,2	3,5	2,7	3,0	4,7	4,3	4,7	5,9	4,6	4,9
70	3,3	2,6	2,8	3,3	2,6	2,8	6,0	4,6	5,0	3,5	2,6	2,9	4,6	4,1	4,5	5,8	4,4	4,8
80	4,0	3,8	4,0	4,0	3,8	4,0	7,4	6,7	7,1	4,2	3,8	4,1	5,8	6,2	6,6	7,2	6,4	6,7
90-95		4,1	4,3		4,1	4,3		7,1	7,5		4,1	4,3		6,7	7,1		6,8	7,2
100	4,3	5,3	4,7	4,3	5,3	4,7	7,9	9,5	8,2	4,4	5,5	4,7	6,3	8,1	7,8	7,6	9,1	7,8
150		5,7	5,1		5,7	5,1		10,2	9,0		5,9	5,2		8,9	8,5		9,9	8,5
180		5,7	5,1		5,7	5,1		10,2	9,0		5,9	5,2		8,9	8,5		9,9	8,5
200		5,7	5,0		5,7	5,0		10,1	8,8		5,9	5,1		8,8	8,3		9,8	8,4
	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>

**PH**

	M11-M21 M51-M61			M12-M22 M52-M62			M13-M23 M53-M63			M14-M24 M54-M64			M35			M46		
150		4,8	4,2		4,8	4,2		8,7	7,4		5,0	4,3		7,4	7,0		8,4	7,1
180		4,8	4,2		4,8	4,2		8,7	7,4		5,0	4,3		7,4	7,0		8,4	7,1
200		4,8	4,1		4,8	4,1		8,6	7,2		5,0	4,2		7,3	6,8		8,3	6,9
250		6,6	6,4		6,6	6,4		11,9	11,1		6,7	6,4		10,3	10,7		11,4	10,6
280		6,8	7,8		6,8	7,8		12,1	13,7		6,9	8,0		10,6	12,4		11,7	13,2
300		6,9	7,9		6,9	7,9		12,4	14,0		7,1	8,1		10,9	12,7		12,0	13,5
	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>

**PX**

	M11-M21 M51-M61			M12-M22 M52-M62			M13-M23 M53-M63			M14-M24 M54-M64			M35			M46		
150		5,6	5,0		5,6	5,0		10,0	8,8		5,8	5,1		8,7	8,3		9,7	8,4
180		5,6	5,0		5,6	5,0		10,0	8,8		5,8	5,1		8,7	8,3		9,7	8,4
200		5,6	4,9		5,6	4,9		9,9	8,6		5,8	4,9		8,6	8,1		9,6	8,2
	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>

**PS-PSB**

	M11-M21 M51-M61			M12-M22 M52-M62			M13-M23 M53-M63			M14-M24 M54-M64			M35			M46		
350-360		6,2	7,2		6,2	7,2		11,2	12,8		6,4	7,4		9,6	11,4		10,8	12,3
420			7,1			7,1			12,6			7,3			11,3			12,1
600-650			11,3			11,3			19,9			11,4			18,4			19,1
800-850			11,4			11,4			20,1			11,5			18,6			19,3
>850									*									
	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>

\* Contattare nostro ufficio tecnico commerciale / \* Please, contact our technical sales dept. / \* Bitte setzen Sie sich mit unserer technischen Abteilung in Verbindung



**A.**  $n_2 < 5$  rpm - Qualora la velocità uscita del riduttore sia inferiore a 5 rpm, per il riempimento fare riferimento ai quantitativi della posizione M46 (vedere punto C);

**B.**  $n_2 < 1$  rpm - Qualora la velocità uscita del riduttore sia inferiore a 1 rpm per il riempimento fare riferimento ai quantitativi della posizione M13 (vedere punto C);

**C.** Per le posizioni di montaggio M13 e M46 è necessario installare il vaso di espansione OT. Attenzione

Sceita grandezza OT: **Sezione E;**

Installazione OT: **Punto 8.3** manuale uso e manutenzione.

D. Le quantità di olio sono approssimative; per una corretta lubrificazione occorre fare riferimento al livello segnato sul riduttore.

**A.**  $n_2 < 5$  rpm - in case the gearbox output speed is lower than 5 rpm, please refill the oil following the quantity of mounting position M46. (see item C);

**B.**  $n_2 < 1$  rpm - once the output speed of the unit is lower than 1 rpm, please refill the oil following the quantity of mounting position M13.(see item C);

**C.** For M13 and M46 mounting positions is necessary to install the OT oil tank.

**Attention**

OT selection: please see **section E;**

OT installing: please see point 8.3 of use & maintenance manual.

D. Oil quantities listed in the table are approximate; to ensure correct lubrication, please refer to the level mark on the gear unit.

**A.**  $n_2 < 5$  rpm - Ist die Abtriebsdrehzahl des Getriebes niedriger als 5 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M46 beziehen.siehe Punkt C

**B.**  $n_2 < 1$  rpm - Ist die Abtriebsdrehzahl des Getriebes niedriger als 1 rpm, fuer die Oelfuellung bitte auf die Vorgehensweise wie bei Position M13 beziehen.siehe Punkt C

**C.** Bei den Montagepositionen M13 und M46 ist es notwendig einen OT Öltank zu installieren.

**Achtung OT** Auswahl: Siehe **Sektion E;**

**OT** Installation: Siehe **Punkt 8.3** des

Benutzungs&Wartungshandbuchs

**D.** Bei den Ölmengenangaben handelt es sich um approximative Werte; für den Erhalt einer korrekten Schmierung muss Bezug auf den am Getriebe gekennzeichneten Füllstand genommen werden.

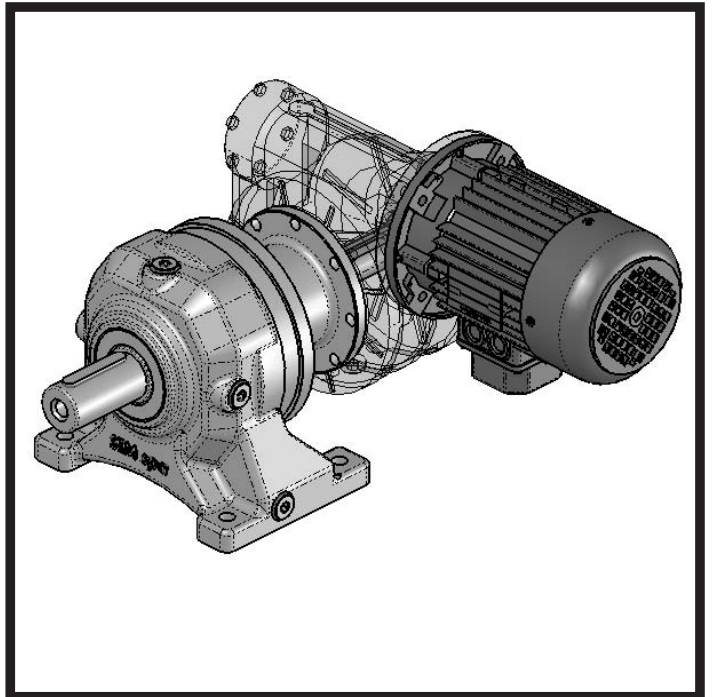
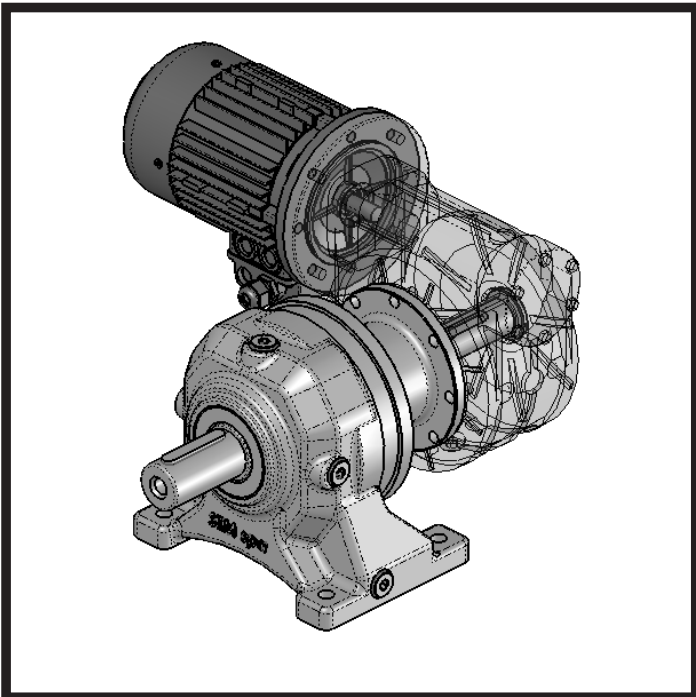
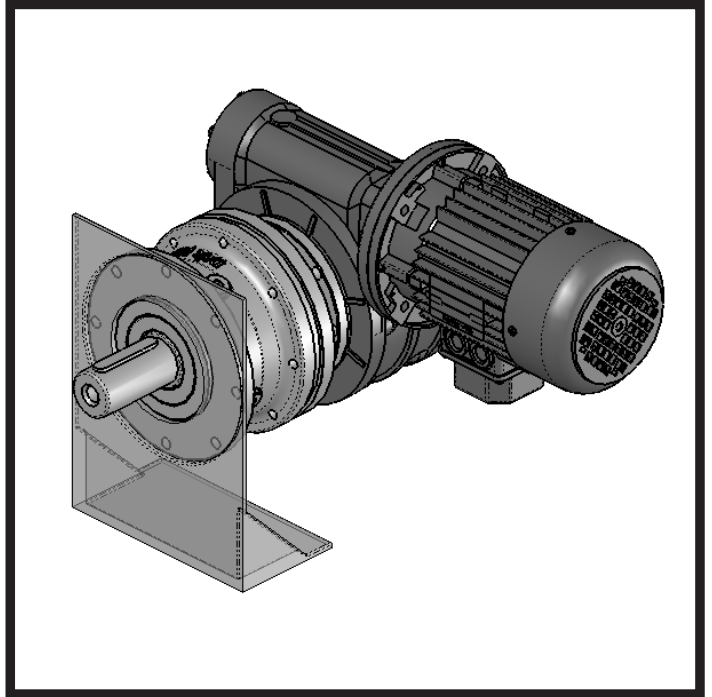
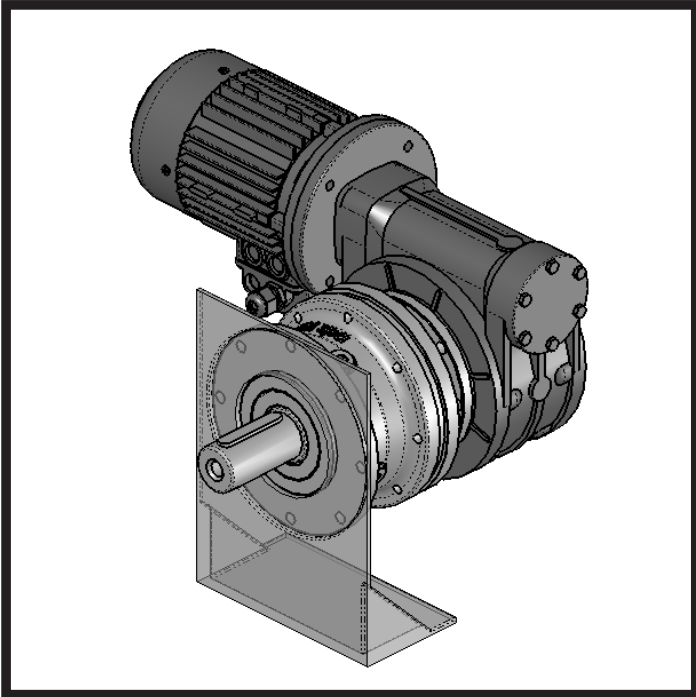


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# EXV





EXV

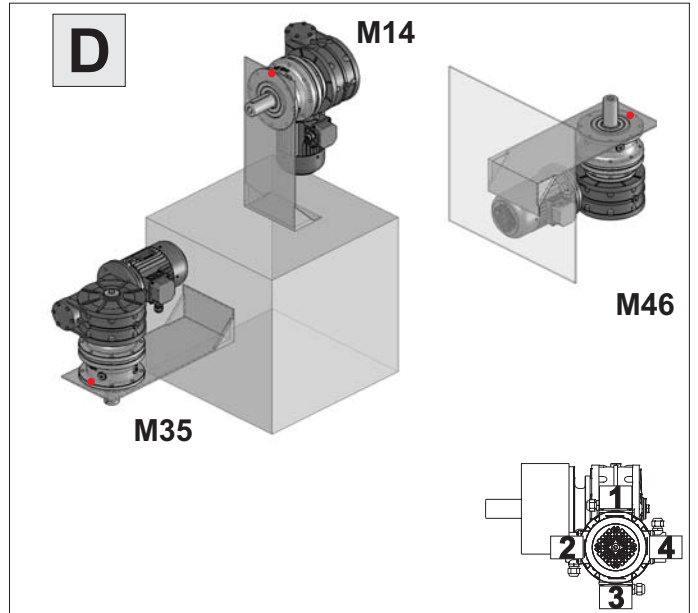
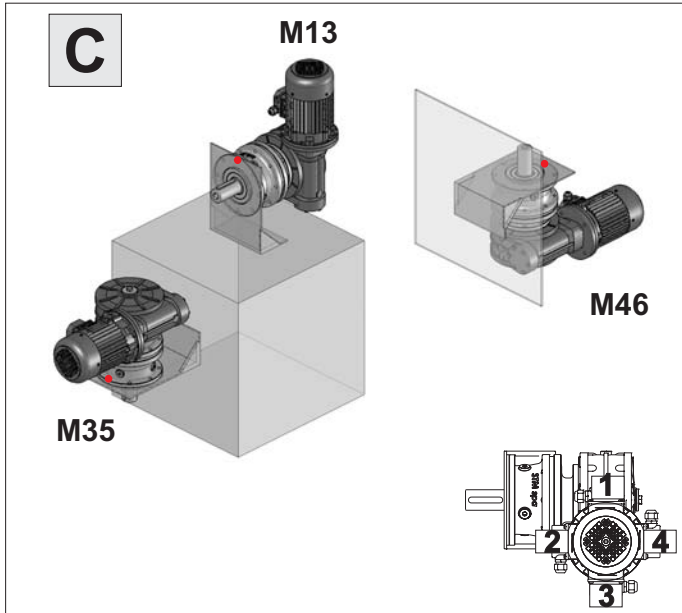
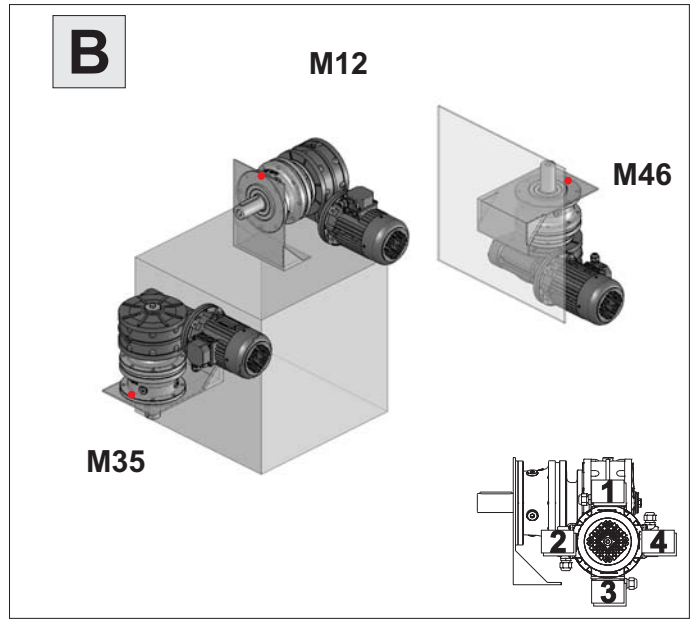
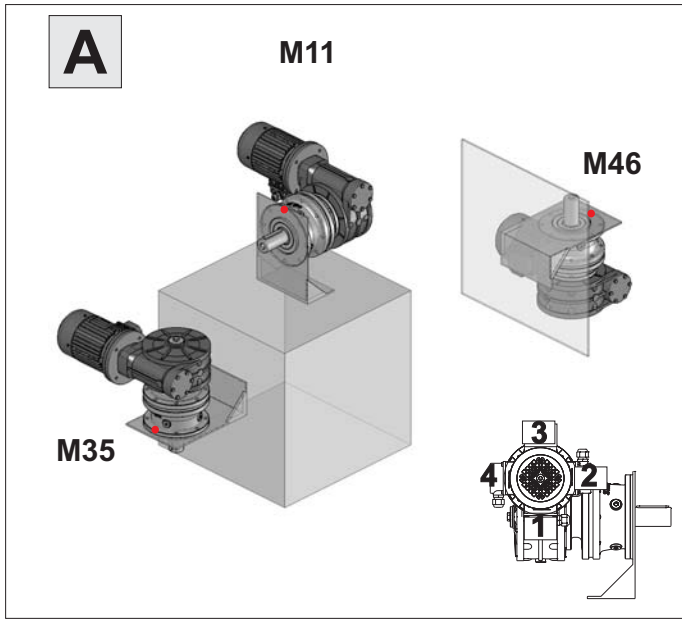


A-B  
C-D

HIGH TECH *line* HeavyDuty



# R-M.-T-H.-X-S.-F.



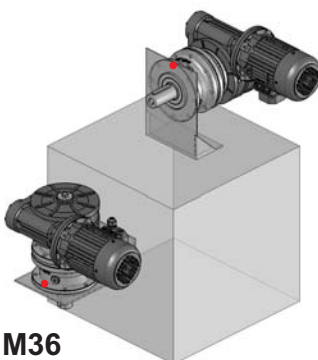
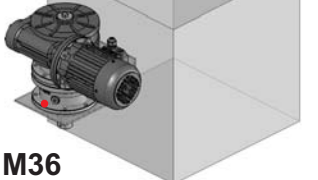
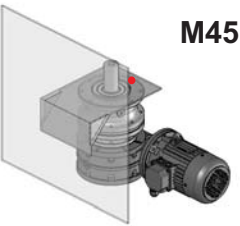
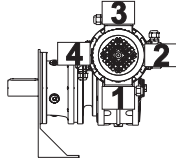
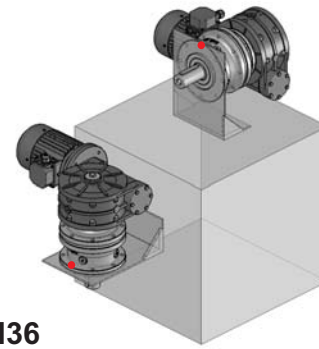
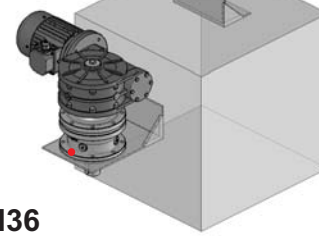
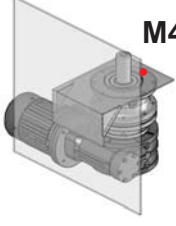
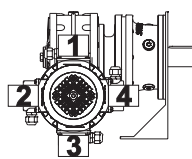
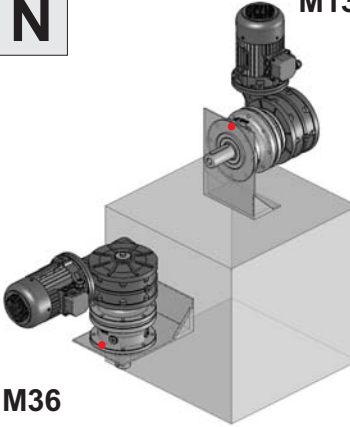
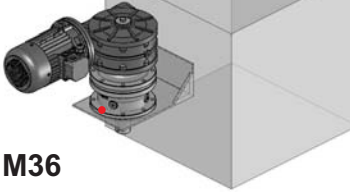
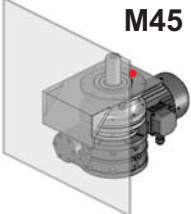
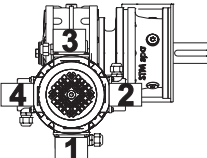
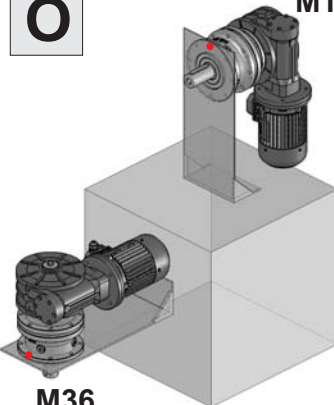
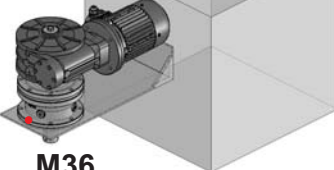
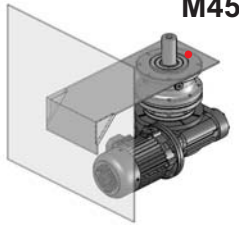
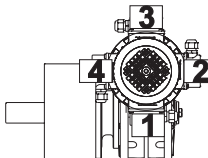
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 Achtung: Um die korrekte Position der Befestigungsbohrungen zu finden, bitte in die Zeichnungen entsprechend

<b>M11</b>	<b>M12</b>	<b>M13</b>	<b>M14</b>	<b>M35</b>	<b>M46</b>

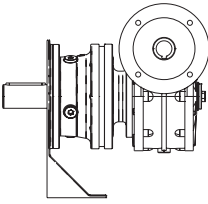
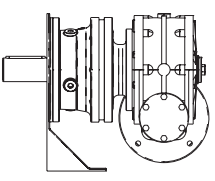
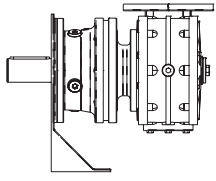
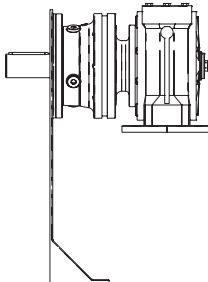
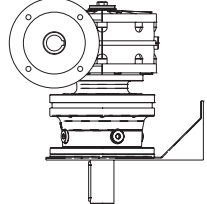
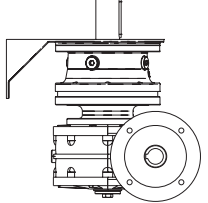
N.B. schema rappresentativo anche per 2, 3 e 4 stadi

- ▽ Carico / Filling plug / Einfüllschraube
- ▼ Scarico / Drain plug / Ablassschraube
- Livello / Level plug / Schauglas
- ⊙ Sfiato / Vent plug/ Entlüftungstopfen

# R-M.-T-H.-X-S.-F.

<p><b>L</b></p> <p><b>M11</b></p>  <p><b>M36</b></p>  <p><b>M45</b></p>  	<p><b>M</b></p> <p><b>M12</b></p>  <p><b>M36</b></p>  <p><b>M45</b></p>  
<p><b>N</b></p> <p><b>M13</b></p>  <p><b>M36</b></p>  <p><b>M45</b></p>  	<p><b>O</b></p> <p><b>M14</b></p>  <p><b>M36</b></p>  <p><b>M45</b></p>  

• Attenzione: Per la posizione corretta dei fori di fissaggio fare riferimento ai disegni riportati nella Sezione C  
 Attention: For the correct position of the fixing holes refer to the drawings in accordance with Section C.  
 Achtung: Um die korrekte Position der Befestigungsbohrungen zu finden, bitte in die Zeichnungen entsprechend

					
<p><b>M11</b></p>	<p><b>M12</b></p>	<p><b>M13</b></p>	<p><b>M14</b></p>	<p><b>M36</b></p>	<p><b>M45</b></p>

N.B. schema rappresentativo anche per 2, 3 e 4 stadi

- ▽ Carico / Filling plug / Einfüllschraube
- ▼ Scarico / Drain plug / Ablassschraube
- Livello / Level plug / Schauglas
- Sfiato / Vent plug/ Entlüftungstopfen



EXV



A-B  
C-D

HIGH TECH *line* HeavyDuty



# P-PH-PX-PS-PSB

			<p><b>A</b></p>
M11	M22	M35	
M46	M54	M63	

			<p><b>B</b></p>
M12	M21	M35	
M46	M53	M64	

N.B. schema rappresentativo anche per 2, 3 e 4 stadi

- ▽ Carico / Filling plug / Einfüllschraube
- ▼ Scarico / Drain plug / Ablasschraube
- Livello / Level plug / Schauglas
- ⊙ Sfiato / Vent plug/ Entlüftungstopfen

# P-PH-PX-PS-PSB

			<b>C</b> 
<b>M13</b>	<b>M24</b>	<b>M35</b>	
			<b>D</b> 
<b>M46</b>	<b>M51</b>	<b>M62</b>	
			<b>D</b> 
<b>M14</b>	<b>M23</b>	<b>M35</b>	
			<b>D</b> 
<b>M46</b>	<b>M52</b>	<b>M61</b>	

N.B. schema rappresentativo anche per 2, 3 e 4 stadi

- ▽ Carico / Filling plug / Einfüllschraube
- ▼ Scarico / Drain plug / Ablasschraube
- Livello / Level plug / Schauglas
- Sfiato / Vent plug / Entlüftungstopfen



EXV



L-M  
N-O

HIGH TECH *line* HeavyDuty



# P-PH-PX-PS-PSB

			<div style="border: 1px solid black; padding: 5px; text-align: center; font-weight: bold; font-size: 2em;">L</div>
<b>M11</b>	<b>M22</b>	<b>M36</b>	
<b>M45</b>	<b>M53</b>	<b>M64</b>	

			<div style="border: 1px solid black; padding: 5px; text-align: center; font-weight: bold; font-size: 2em;">M</div>
<b>M12</b>	<b>M21</b>	<b>M36</b>	
<b>M45</b>	<b>M54</b>	<b>M63</b>	

N.B. schema rappresentativo anche per 2, 3 e 4 stadi

- ▽ Carico / Filling plug / Einfüllschraube
- ▼ Scarico / Drain plug / Ablasschraube
- Livello / Level plug / Schauglas
- ⊙ Sfiato / Vent plug/ Entlüftungsstopfen

# P-PH-PX-PS-PSB

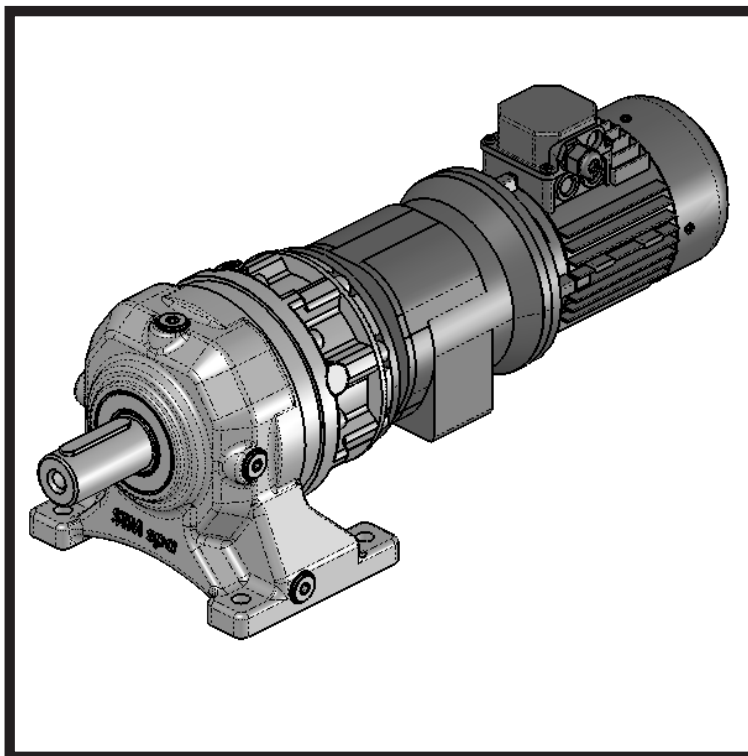
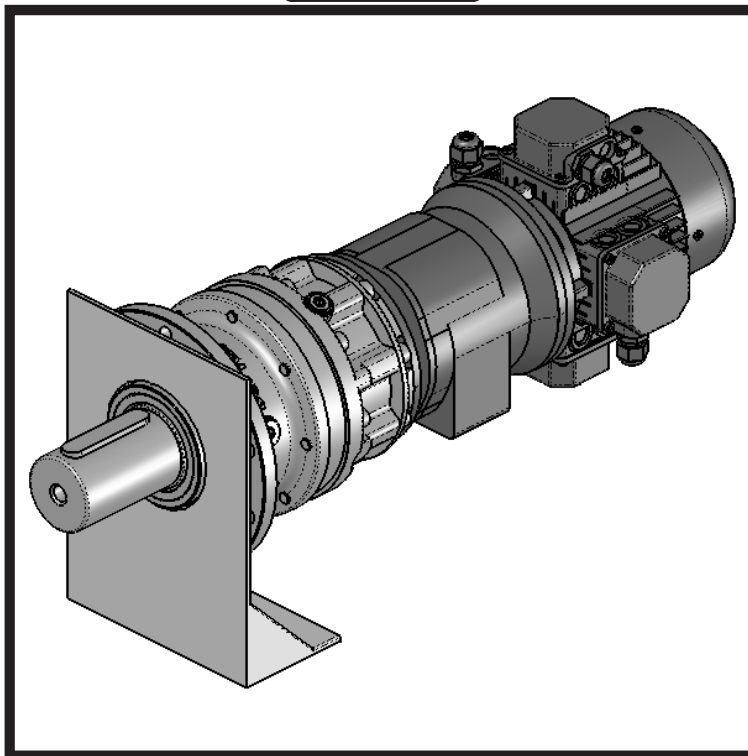
			<p><b>N</b></p>
M13	M24	M36	
			<p><b>O</b></p>
M45	M52	M61	
			<p><b>O</b></p>
M14	M23	M36	
			<p><b>O</b></p>
M45	M51	M62	

N.B. schema rappresentativo anche per 2 , 3 e 4 stadi

- ▽ Carico / Filling plug / Einfüllschraube
- ▼ Scarico / Drain plug / Ablasschraube
- Livello / Level plug / Schauglas
- ⊙ Sfiato / Vent plug/ Entlüftungsstopfen



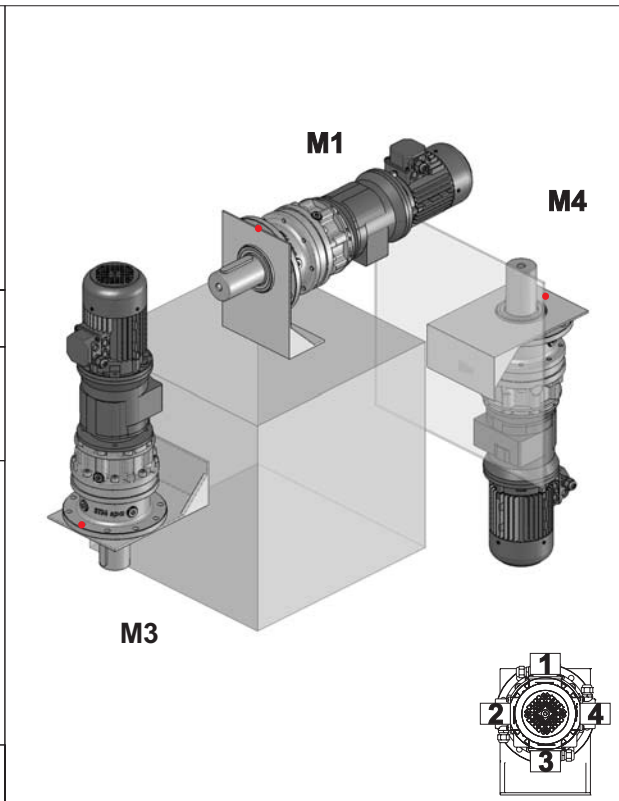
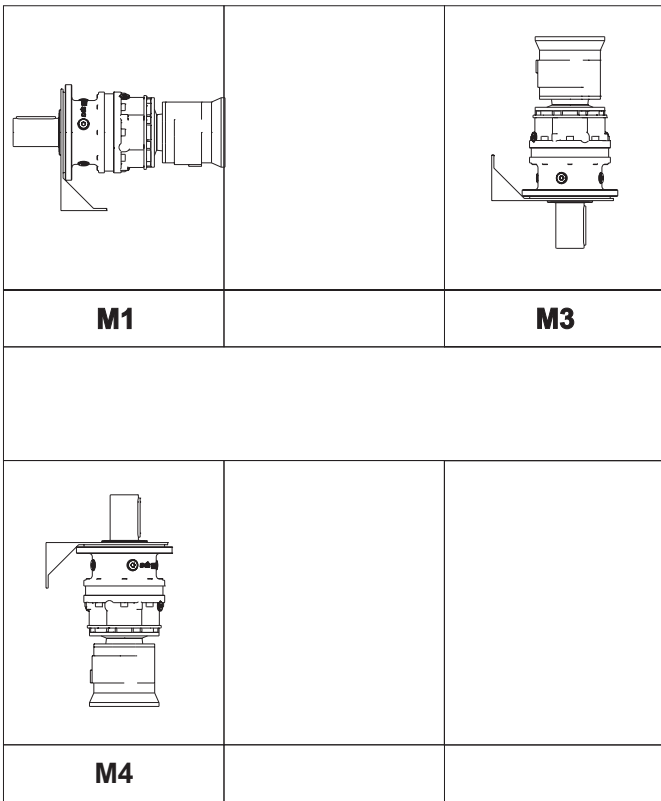
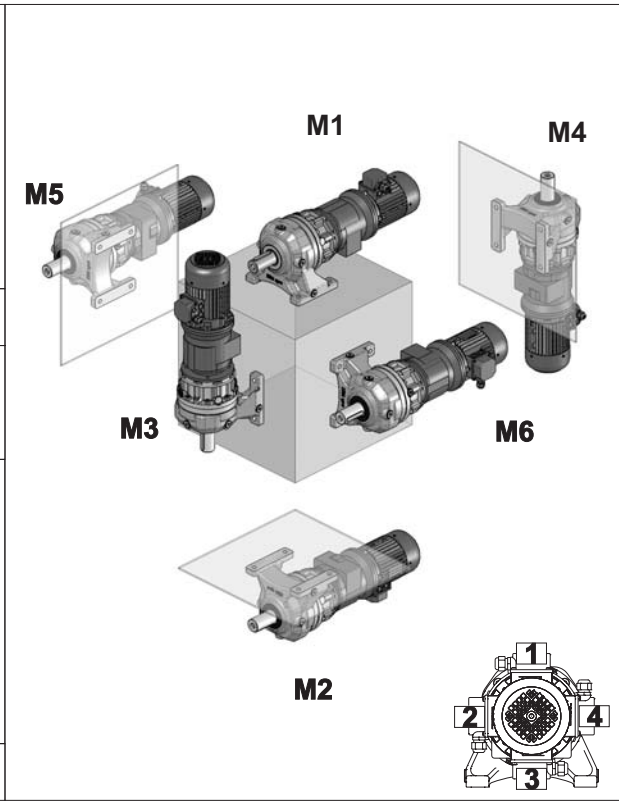
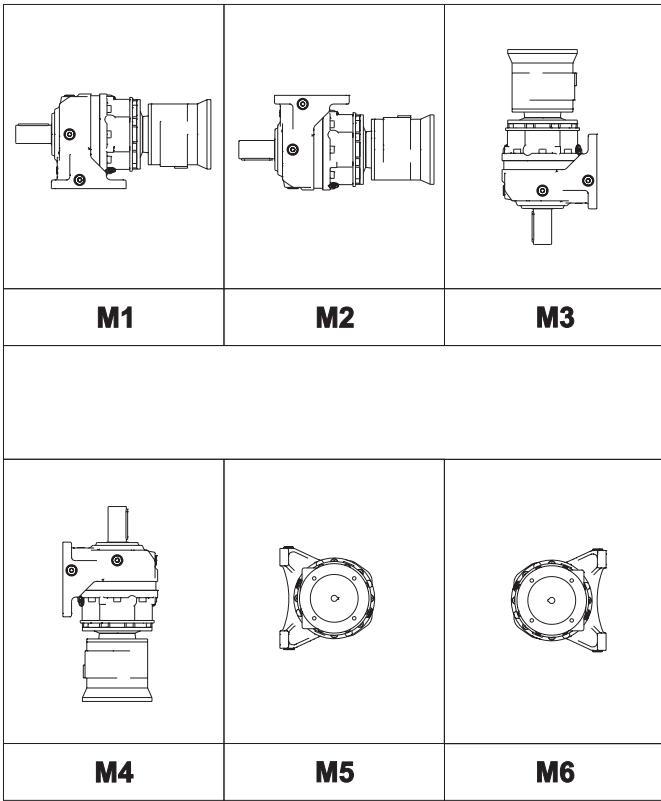
# EXA







# R-M-T-H-X-S-F - P-PH-PX-PS-PSB



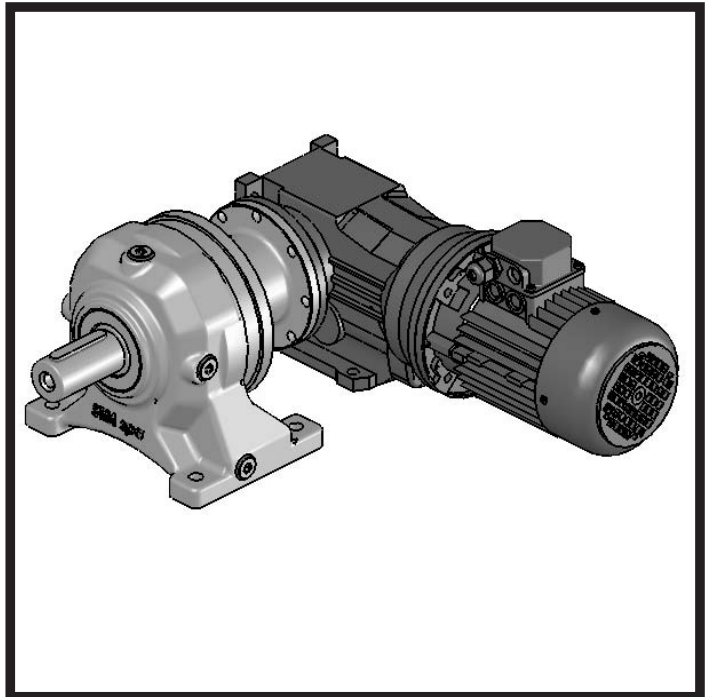
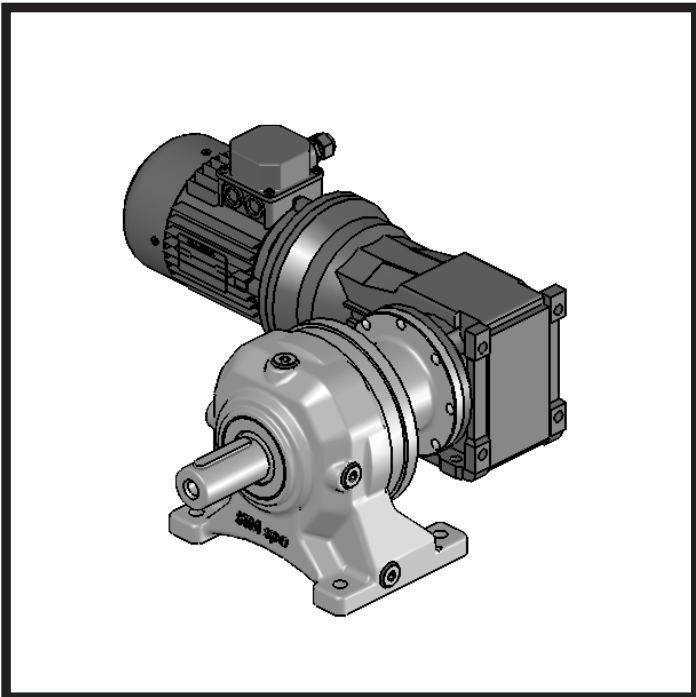
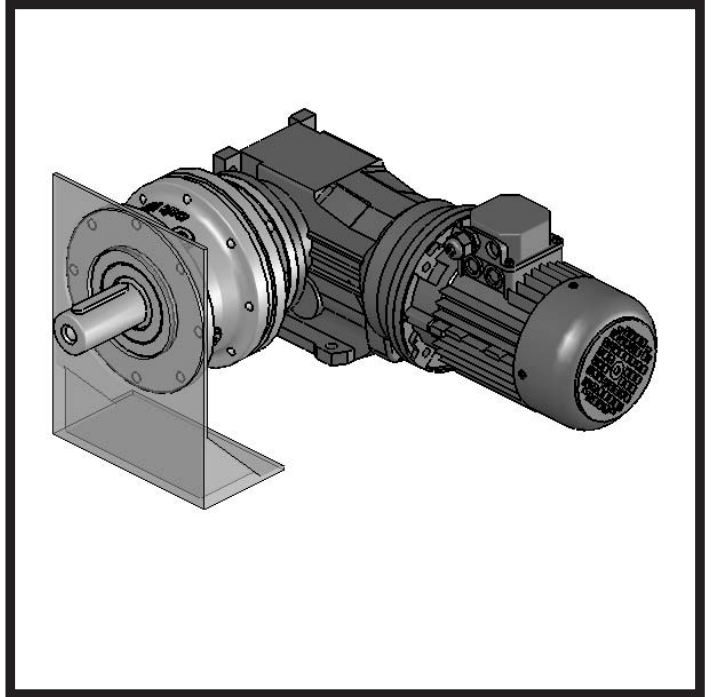
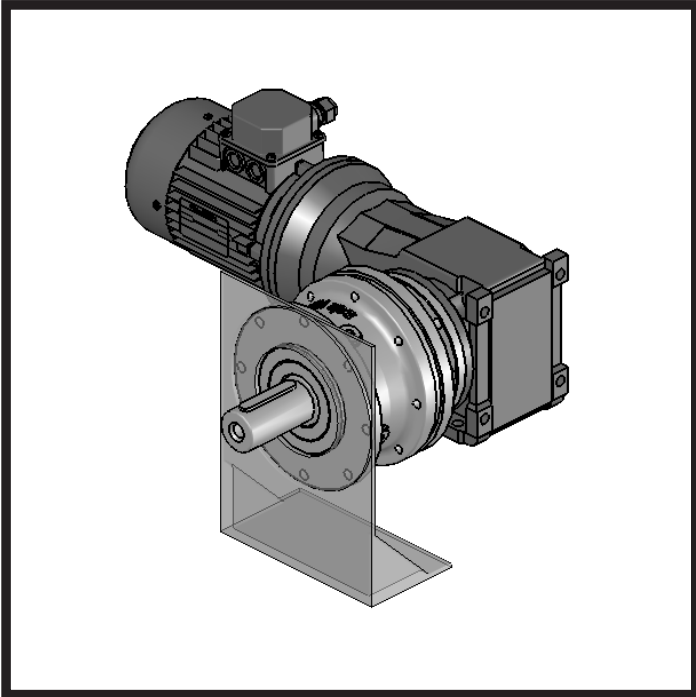
• Attenzione: Per la posizione corretta dei fori di fissaggio fare riferimento ai disegni riportati nella Sezione C  
 Attention: For the correct position of the fixing holes refer to the drawings in accordance with Section C.  
 Achtung: Um die korrekte Position der Befestigungsbohrungen zu finden, bitte in die Zeichnungen entsprechend

N.B. schema rappresentativo anche per 2, 3 e 4 stadi

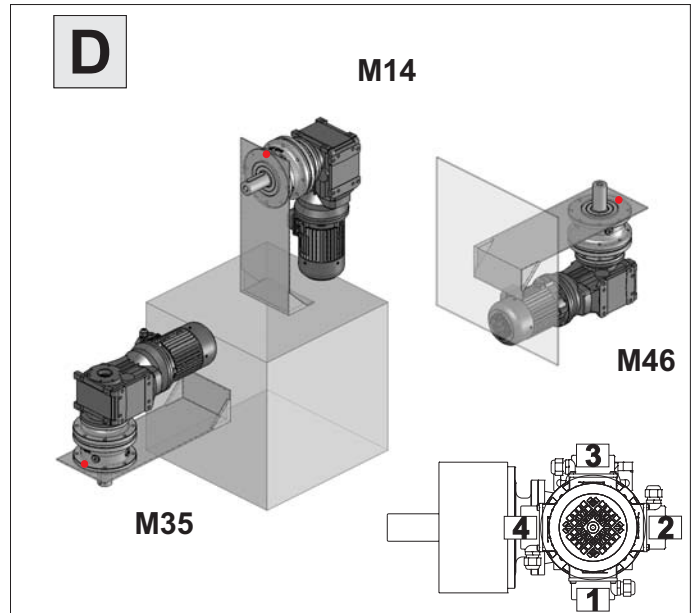
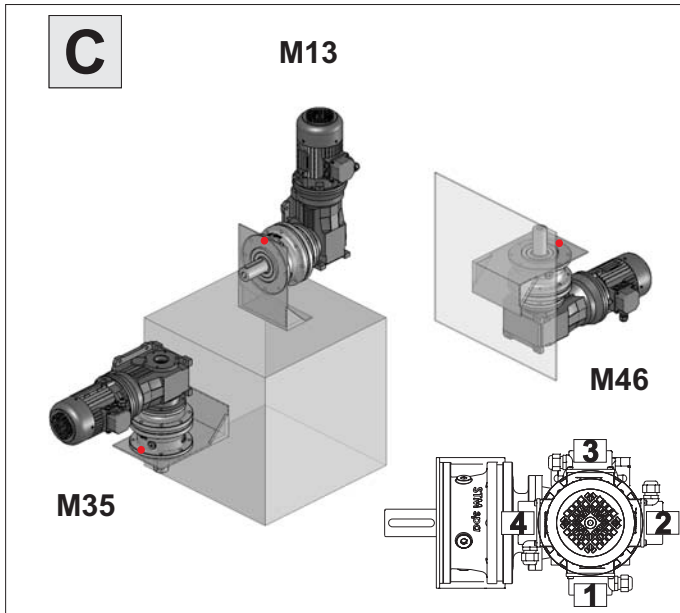
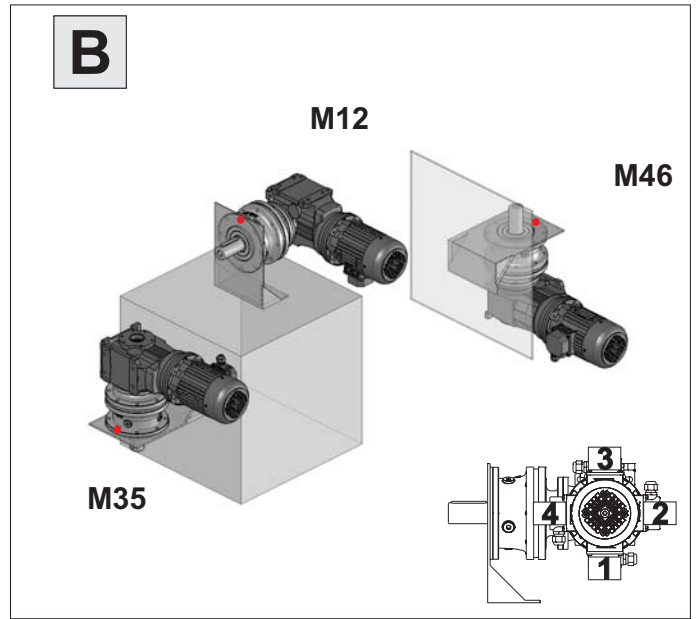
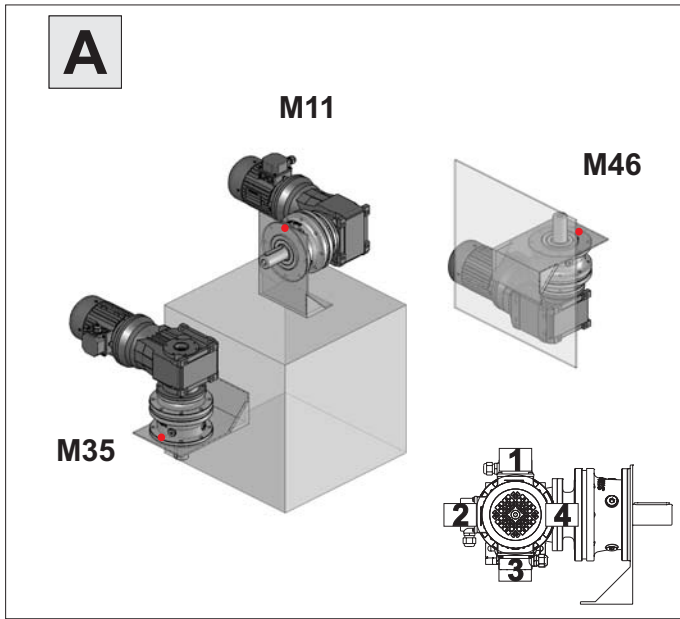
- ▽ Carico / Filling plug / Einfüllschraube
- ▼ Scarico / Drain plug / Ablasschraube
- Livello / Level plug / Schauglas
- ⊙ Sfiato / Vent plug/ Entlüftungsstopfen



# EXO



# R-M.-T-H.-X-S.-F.



• Attenzione: Per la posizione corretta dei fori di fissaggio fare riferimento ai disegni riportati nella Sezione C  
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 • Achtung: Um die korrekte Position der Befestigungsbohrungen zu finden, bitte in die Zeichnungen entsprechend

<b>M11</b>	<b>M12</b>	<b>M13</b>	<b>M14</b>	<b>M35</b>	<b>M46</b>

N.B. schema rappresentativo anche per 2, 3 e 4 stadi

- ▽ Carico / Filling plug / Einfüllschraube
- ▼ Scarico / Drain plug / Ablasschraube
- Livello / Level plug / Schauglas
- ⊙ Sfiato / Vent plug/ Entlüftungstopfen



EXO

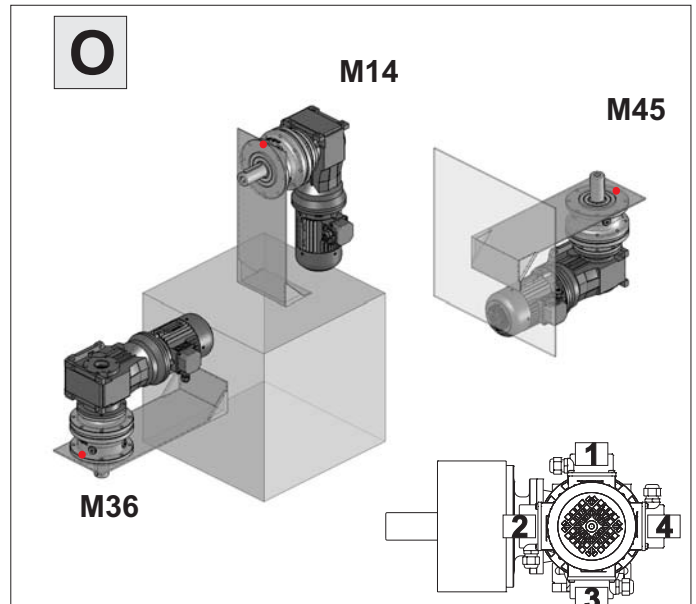
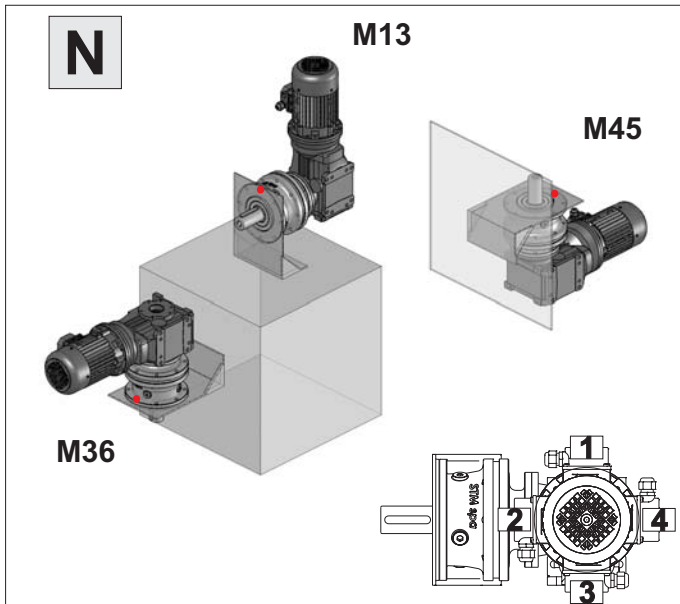
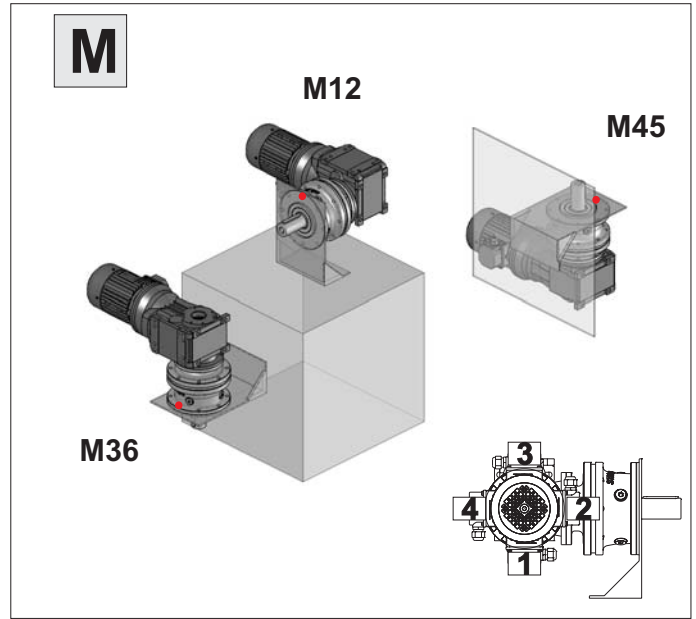
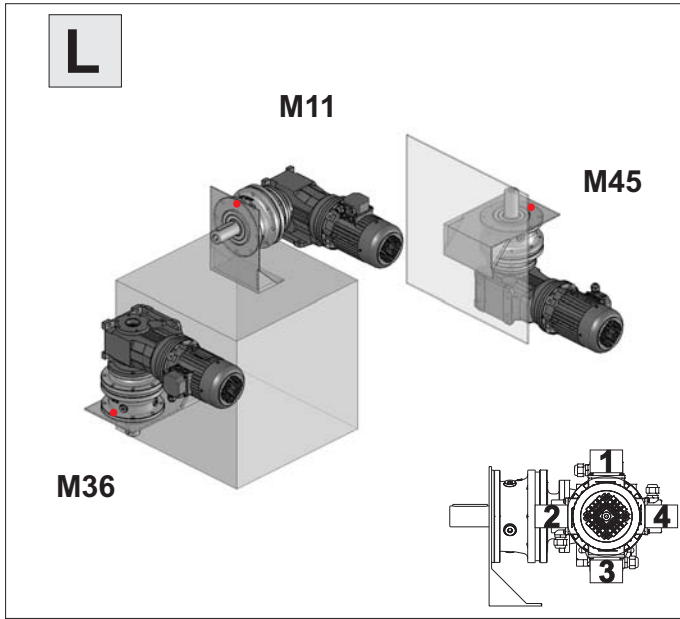


L-M  
N-O

HIGH TECH *line* HeavyDuty



# R-M.-T-H.-X-S.-F.



Attenzione: Per la posizione corretta dei fori di fissaggio fare riferimento ai disegni riportati nella Sezione C  
 Attention: For the correct position of the fixing holes refer to the drawings in accordance with Section C.  
 Achtung: Um die korrekte Position der Befestigungsbohrungen zu finden, bitte in die Zeichnungen entsprechend

<b>M11</b>	<b>M12</b>	<b>M13</b>	<b>M14</b>	<b>M36</b>	<b>M45</b>

N.B. schema rappresentativo anche per 2, 3 e 4 stadi

- ▽ Carico / Filling plug / Einfüllschraube
- ▼ Scarico / Drain plug / Ablasschraube
- Livello / Level plug / Schauglas
- Sfiato / Vent plug/ Entlüftungstopfen

# P-PH-PX-PS-PSB

			<b>A</b> 
<b>M11</b>	<b>M22</b>	<b>M35</b>	
<b>M46</b>	<b>M54</b>	<b>M63</b>	

			<b>B</b> 
<b>M12</b>	<b>M21</b>	<b>M35</b>	
<b>M46</b>	<b>M53</b>	<b>M64</b>	

N.B. schema rappresentativo anche per 2, 3 e 4 stadi

- ▽ Carico / Filling plug / Einfüllschraube
- ▼ Scarico / Drain plug / Ablasschraube
- Livello / Level plug / Schauglas
- Sfiato / Vent plug / Entlüftungstopfen



EXO



A-B  
C-D

HIGH TECH *line* HeavyDuty



# P-PH-PX-PS-PSB

			<b>C</b> 
M13	M24	M35	
			<b>D</b> 
M46	M51	M62	
			<b>D</b> 
M14	M23	M35	
			<b>D</b> 
M46	M52	M61	

N.B. schema rappresentativo anche per 2, 3 e 4 stadi

- ▽ Carico / Filling plug / Einfüllschraube
- ▼ Scarico / Drain plug / Ablasschraube
- Livello / Level plug / Schauglas
- ⊙ Sfiato / Vent plug / Entlüftungstopfen

# P-PH-PX-PS-PSB

<b>M11</b>	<b>M22</b>	<b>M36</b>
<b>M45</b>	<b>M53</b>	<b>M64</b>

<b>M12</b>	<b>M21</b>	<b>M36</b>
<b>M45</b>	<b>M54</b>	<b>M63</b>

N.B. schema rappresentativo anche per 2, 3 e 4 stadi

- ▽ Carico / Filling plug / Einfüllschraube
- ▼ Scarico / Drain plug / Ablasschraube
- Livello / Level plug / Schauglas
- ⊙ Sfiato / Vent plug/ Entlüftungstopfen



EXO



L-M  
N-O

HIGH TECH *line* HeavyDuty



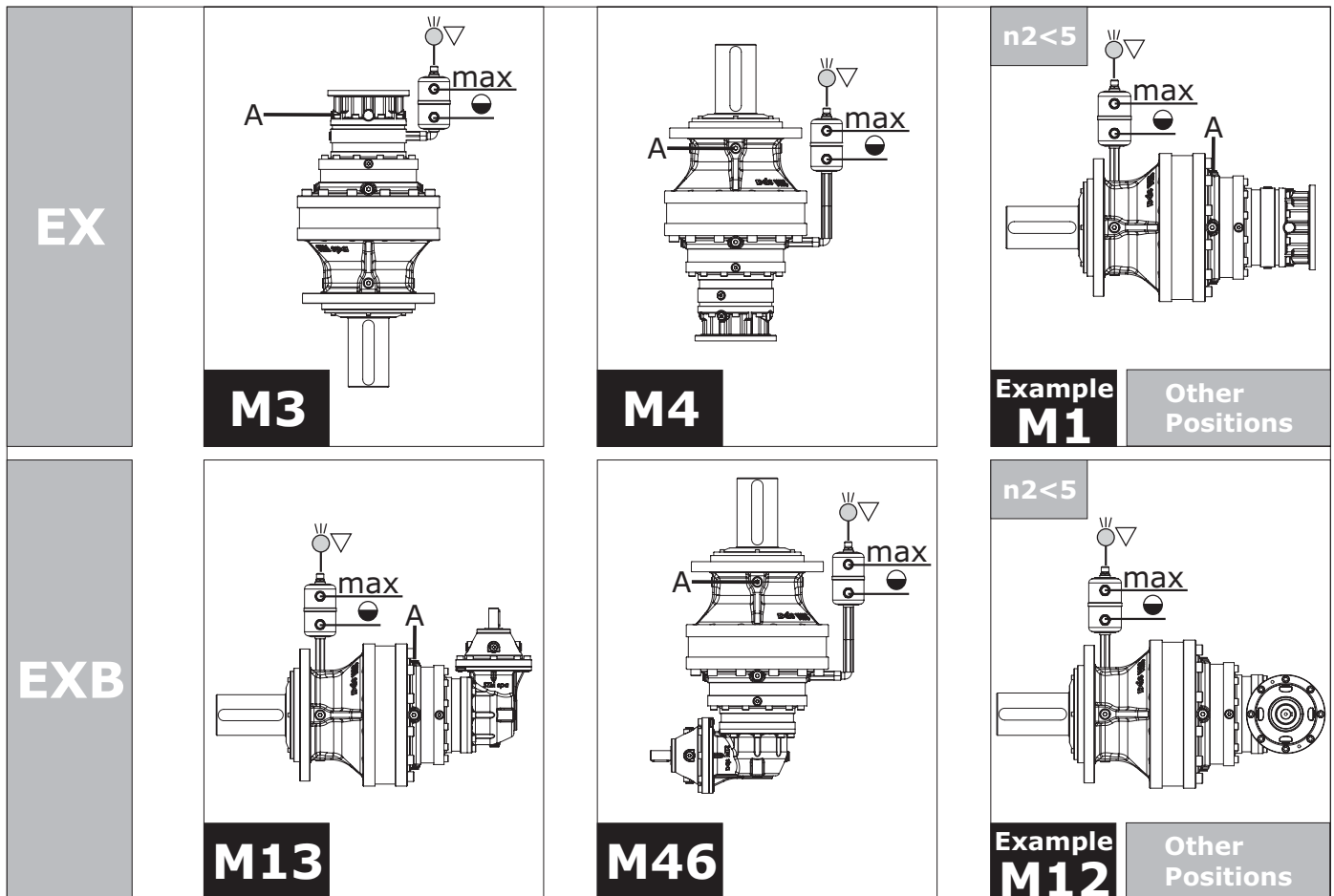
# P-PH-PX-PS-PSB

			<p><b>N</b></p>
M13	M24	M36	
			<p><b>O</b></p>
M45	M52	M61	
			<p><b>O</b></p>
M14	M23	M36	
			<p><b>O</b></p>
M45	M51	M62	

N.B. schema rappresentativo anche per 2 , 3 e 4 stadi

- ▽ Carico / Filling plug / Einfüllschraube
- ▼ Scarico / Drain plug / Ablasschraube
- Livello / Level plug / Schauglas
- ⊙ Sfiato / Vent plug/ Entlüftungstopfen




**8.3. Vaso Espansione**
**8.3. Expansion tank**
**8.3 Expansionsgefäß**


▽ Carico / Filling plug / Einfüllschraube  
 ● Livello / Level plug / Schauglas  
 ○ Sfiato / Vent plug / Entlüftungsstopfen

- 1 - Verificare che il vaso di espansione si trovi nella parte più alta del riduttore;
- 2 - Rimuovere il tappo di sfiato;
- 3 - Per facilitare la fuoriuscita dell'aria (solo in fase di riempimento) è possibile svitare uno dei tappi dalla parte superiore del riduttore (per esempio il tappo "A" come da figura);
- 4 - Durante la fase di riempimento, quando l'olio sale in corrispondenza del tappo "A", provvedere ad avvitare il tappo stesso;
- 5 - Continuare nel riempimento fino al raggiungimento del tappo di livello;
- 6 - Avvitare il tappo di sfiato;
- 7 - Fare girare il riduttore alcuni minuti e controllare nuovamente il livello ;
- 8 - Dopo la messa in servizio della macchina sotto carico del riduttore e dopo aver atteso la stabilizzazione delle temperature di esercizio verificare che il livello dell'olio non oltrepassi il livello "max".

- 1 - Check that the oil tank is located in the highest part of the gearbox;
- 2 - Remove the breather plug;
- 3 - To facilitate the expulsion of air (only in oil filling phase) is possible to unscrew one of the oil plugs from the top of the gearbox (for example the plug "A" as showed in the picture);
- 4 - During the oil filling phase, when the oil reach the side plug "A", please provide for screw the plug in order to avoid leaking;
- 5 - Continue in oil filling up to the level plug;
- 6 - Tighten the breather plug;
- 7 - Start the gearbox running-in for few minutes, and check the oil level again ;
- 8 - After the startup of the unit with load, wait for the stabilization of operating temperatures and verify that the oil level is below the "max" mark level.

- 1 – Überprüfen Sie ob sich der Öltank an der höchsten Position des Getriebes befindet.
- 2 – Entlüftungsventil entfernen.
- 3 – Um den Luftaustritt zu ermöglichen (nur in der Befüllungsphase) kann man eines der Ölventile von der Oberseite des Getriebes aufschrauben (zum Beispiel das Ventil „A“ im Bild)
- 4 – Während der Ölbefüllungsphase, wenn das Öl auf den Stopfen „A“ kommt, die Schraube festziehen)
- 5 – Fortfahren mit der Ölbefüllung bis zum Oelschauglas
- 6 – Entlüftungsventil festschrauben.
- 7 – Getriebe ein paar Minuten einschalten um den Ölstand zu kontrollieren.
- 8 – Nach dem Start der Maschine unter Last und des Erreichens der Betriebstemperatur, überprüfen Sie, ob der Ölstand unter dem „maximal“ Standes ist.

## 9. MANUTENZIONE

### 9.1 CONTROLLI GENERALI

Tutti i lavori devono essere eseguiti da personale adeguatamente preparato nel rispetto delle norme di sicurezza vigenti.

Il nostro servizio di assistenza è a vostra disposizione per qualsiasi esigenza.

Controllare frequentemente che non vi siano variazioni immotivate di temperatura e /o rumorosità.

La durata delle guarnizioni dipende da vari fattori fra i quali velocità, temperature ed ambiente e si può ritenere variabile fra le 4000 e 20000 h.

Ispezionare il riduttore ogni 2 anni.

Controllare il serraggio delle viti alla fine del rodaggio e successivamente ogni 2000 h.

Nel caso il riduttore sia fornito di giunto si consiglia di verificare periodicamente lo stato di usura degli elementi elastici, controllando inoltre che le condizioni di installazione non si siano modificate.

Verificare la corretta chiusura dei tappi di rabbocco e uscita lubrificante (mensilmente).

Effettuare periodicamente una accurata pulizia esterna del riduttore, per rimuovere lo sporco eventualmente depositato nel tempo e che limita la capacità di dissipazione del calore.

## 9. MAINTENANCE

### 9.1 GENERAL INSPECTIONS

*All works should be carried out by adequately prepared operators and in observance of the safety rules in force.*

*Our assistance service is at your disposal for any need.*

*Check often for strange variations of temperature and/or noise.*

*Life of seals depends on various factors such as speed, temperature and environment, and could vary between 4000 and 20000 hours.*

*Inspect the gear unit every two years.*

*Check the screws tightening at the end of the running-in period and then every 2000h.*

*In case the gearbox is fitted with a coupling, we suggest to periodically check the wearing condition of the elastic components, verifying that installation conditions have not been modified as well.*

*Ensure (once a month) that filler and lubricant drain plugs are correctly closed.*

*Periodically clean the outer surfaces of the gearbox, remove the dirt that could have settled in time and that could limit heat dispersion.*

## 9. INBETRIEBSETZUNG

### 9.1 ALLGEMEINE KONTROLLEN

Alle Arbeiten müssen von entsprechend geschultem Personal unter Einhaltung der geltenden Sicherheitsnormen durchgeführt werden.

Unser Kundendienst steht Ihnen für jegliche Erfordernisse gerne zur Verfügung.

Regelmäßig prüfen, dass keine unbegründeten Temperatur- und/oder Geräuschpegel-schwankungen vorliegen.

Die Lebensdauer der Dichtungen ist von verschiedenen Faktoren abhängig, wie Temperaturen und Umgebungsbedingungen, und kann zwischen 4000 und 20000 Stunden liegen.

Das Getriebe alle 2 Jahre einer Inspektion unterziehen.

Nach der Einlaufzeit, dann alle 2000 Stunden den Anzug der Schrauben kontrollieren.

Sollte das Getriebe mit Kupplung geliefert werden, wird empfohlen, den Verschleißzustand der elastischen Elemente regelmäßig zu kontrollieren. Darüber hinaus muss kontrolliert werden, dass es zu keinen Veränderungen der Installationsbedingungen gekommen ist.

Den korrekt erfolgten Verschluss der Einfüll- und Ablassschrauben des Schmiermittels überprüfen (monatlich).

Den Außenbereich des Getriebes regelmäßig reinigen und dabei den sich ggf. mit der Zeit angesetzten Schmutz entfernen, der die Wärmeableitungsleistung einschränkt.

## 9. MANUTENZIONE

Prestare le dovute precauzioni poiché durante il normale funzionamento le superfici sono calde.

## 9. MAINTENANCE

*During normal operation surfaces are hot: take care to avoid burns.*

## 9. INBETRIEBSETZUNG

Angemessene Vorsicht walten lassen, da die Oberflächen während des Betriebs heiß werden.

**PICTURE**  
(Under Costruction)

### 9.2 MOMENTI DI SERRAGGIO

Momenti di serraggio consigliati (Nm) in accordo con UNI 5739 mat.8.8:

### 9.2 TIGHTENING TORQUES

*Recommended screws tightening torques (Nm) according UNI 5739 mat.8.8.*

### 9.2 ANZUGSMOMENTE

Empfohlene Anzugsmomente (Nm) in Übereinstimmung mit der UNI 5739 Mat. 8.8:

M6	M8	M10	M12	M14	M16	M18	M20	M22	M24	M27	M30
10.4	24.6	50.1	84.8	135	205	283	400	532	691	1010	1370



### 9.3 PRESCRIZIONI ATEX

Negli ambienti polverosi prevedere un opportuno piano di pulizia periodico delle superfici esterne del riduttore atte ad evitare che lo strato depositato superi lo spessore di 5mm.

### 9.3 ATEX PROVISIONS

*In dusty operation environments make sure to put in place an appropriate regular cleaning plan for the outer surface of the gearbox so that the layer thickness does not exceed 5mm.*

### 9.3 ATEX-VORSCHRIFTEN

In staubhaltigen Umgebungen ist ein angemessener Plan für die regelmäßige Reinigung der Außenflächen des Getriebes zu erstellen, so dass verhindert wird, dass sich Ablagerungen mit einer Stärke von über 5 mm bilden.

**PICTURE**  
(Under Costruction)

### ATTENZIONE

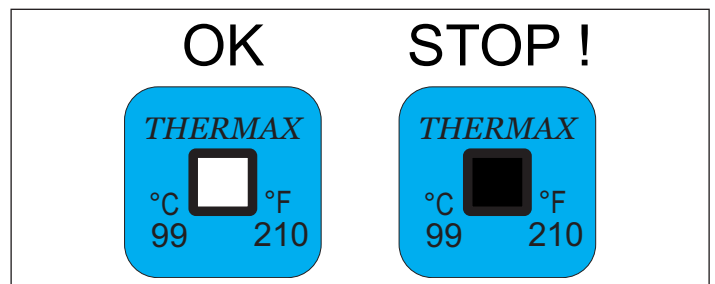
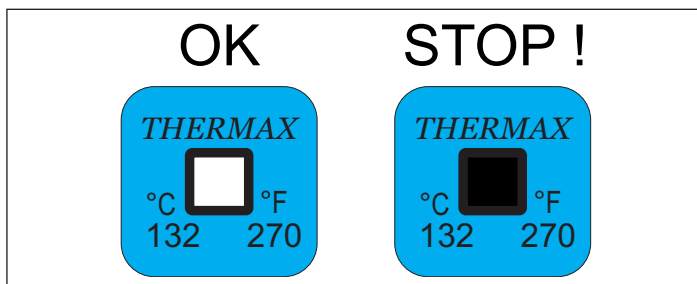
Verificare periodicamente che l'indicatore di temperatura termosensibile (non evidenzi esposizione o trascorsa esposizione a temperatura superiore a quella indicata; in questo caso (si annerisce completamente il dischetto centrale del rilevatore) arrestare immediatamente il riduttore e contattare il servizio assistenza presso STM SpA per la risoluzione dell'anomalia e per l'invio di un nuovo indicatore termosensibile.

### ATTENTION

*Periodically verify that the thermosensitive temperature indicator does not show marks indicating current or past exposition to temperature higher than indicated. In this case the indicator central disc will blacken and the gearbox must be stopped immediately. After this, get in touch with STM SpA service center to solve the problem and receive a new thermosensitive indicator to replace the old one.*

### ACHTUNG

Regelmäßig überprüfen, dass die Temperaturanzeige mit Wärmefühler keine momentane oder vergangene Aussetzung an Temperaturen hervorhebt, die über der angegebenen liegt. In diesem Fall (die mittlere Scheibe der Instruments wird dabei vollkommen schwarz) das Getriebe sofort stoppen und sich mit dem Kundendienst der STM SpA in Verbindung setzen, um eine Abhilfe der Störung zu finden oder um sich einen neuen Wärmefühler liefern zu lassen.



## 9. MANUTENZIONE



Al termine di qualsiasi intervento:  
1-Ripristinare l'integrità del prodotto e le predisposizioni di sicurezza;

2-Pulire accuratamente il riduttore;

3-Chiudere i tappi olio se presenti;

4-Ripristinare tutte le tenute statiche, utilizzando le appropriate sigillature;

5- Effettuare tutte le fasi previste per la messa in servizio del riduttore

### 9.4 CONTROLLO STATO LUBRIFICANTE

Verificare con periodicità mensile il livello dell'olio;

Sostituire l'olio esausto a riduttore ancora caldo. Prima di sostituire il lubrificante accertarsi che il prodotto sia fermo da circa 30 minuti, periodo sufficiente affinché la temperatura dell'olio possa scendere a livelli non pericolosi per l'operatore.

Prima di introdurre olio nuovo fare fluire dell'olio dello stesso tipo per rimuovere particelle rimaste all'interno della carcassa.

L'olio nuovo va introdotto accertandosi che non vi siano impurità presenti.

Controllare mensilmente che non vi siano perdite di lubrificante.

Se il prodotto resta per lungo tempo inattivo in un ambiente con elevata percentuale di umidità (p.es. con RH oltre il 50%), riempirlo completamente di olio. Naturalmente al momento della successiva messa in funzione sarà necessario ripristinare il livello di lubrificante.

Per i riduttori e i variatori lubrificati con olio minerale, dopo le prime 500 - 1000 ore di funzionamento sostituire l'olio.

Nella tabella sottostante riportiamo gli intervalli di sostituzione del lubrificante consigliati, validi indicativamente in assenza di inquinamento esterno e di sovraccarichi. Informazioni più precise potranno ottenersi dal proprio fornitore di lubrificanti ad esempio attraverso analisi periodiche dell'olio.

## 9. MAINTENANCE

As soon as any intervention is over:

1- Restore product integrity and safety devices;

2- Carefully clean the gearbox;

3- Close any oil plugs;

4- Restore static sealing, using all the suitable seals;

5- Carry out all steps required for gearbox commissioning.

### 9.4 LUBRICANT INSPECTION

Check monthly the oil level.

Change the oil when gear unit is still in temperature.

Before replacing lubricant, always make sure that the product has not been operated for at least 30 minutes, so that the temperature has dropped to a level not dangerous for the operator.

Before filling the gear unit with new oil, first pour some oil of the same type to remove particles remained inside the casing.

Make sure the new oil is introduced when no impurities are present.

Check monthly for lubricant leakages.

If the product remains unused for a long time in a moist environment (e.g. RH above 50%), completely fill it up with oil.

Before starting it, you will obviously need to restore lubricant level first.

While gearboxes and variators lubricated with mineral oil require oil change after the first 500 - 1000 working hours.

Table for suggested oil change intervals indicatively valid in absence of pollution and overload, is reported below. More precise information can be obtained by your lubricant supplier for example through periodical analysis of the oil.

## 9. INBETRIEBSETZUNG

Nach jeden Eingriff:

1- Die Integrität des Produkts und seiner Sicherheitsauslegung wieder herstellen

2- Das Getriebe sorgfältig reinigen.

3- Die ggf. vorhanden Öleinfüll-/ablassschrauben schließen.

4- Alle statischen Abdichtungen wieder herstellen und dazu die angemessenen Abdichtmittel verwenden.

5- Alle für die Inbetriebsetzung des Getriebes vorgesehenen Phasen durchführen.

### 9.4 KONTROLLE DES SCHMIERMITTELZUSTANDS

Monatlich den Öfüllstand überprüfen.

Das Altöl durch frisches ersetzen, wenn das Getriebe noch warm ist.

Vor dem Schmiermittelwechsel sich darüber vergewissern, dass das Produkt seit ungefähr 30 Minuten stillsteht. Diese Zeit reicht aus, dass die Öltemperatur unter ein Niveau absinkt, das für den Bediener nicht mehr gefährlich ist.

Vor dem Einfüllen von frischem Öl, Öl von der selben Sorte durchfließen lassen, so dass die sich im Gehäuse angesammelte Teilchen herausgespült werden.

Das Frischöl nur dann einfüllen, wenn man sicher ist, dass kein Schmutz mehr vorhanden ist.

Monatlich kontrollieren, dass keine Schmiermittelleckagen vorliegen.

Wird das Produkt über längere Zeit nicht eingesetzt und befindet es sich in einer Umgebung mit hoher Feuchtigkeit (z.B. mit RH über 50%) sollte es vollkommen mit Öl gefüllt werden. Natürlich ist es in einem solchen Fall erforderlich, dass bei der darauf folgenden Inbetriebsetzung der korrekte Schmiermittelfüllstand wieder hergestellt wird.

Bei mit Mineralöl geschmierten Getrieben und Verstellgetrieben muss das Öl nach den ersten 500 - 1000 Betriebsstunden gewechselt werden.

In der nachstehenden Tabelle werden die empfohlenen Zeiten für dem Schmiermittelwechsel angegeben, bei denen es sich um Richtzeiten im Fall von keinerlei externer Verschmutzung und Überlastungen handelt. Genauere Informationen können beim Schmiermittellieferant z.B. mittels regelmäßiger Ölanalysen angefordert werden.

### Frequenza cambi olio [h] / Oil change intervals [h] / Ölwechselfrequenz [h]

Tipo olio / Oil type / Öltyp	Temperatura olio / Oil temperature / Öltemperatur		
	< 60°C	80 °C	90 °C
Minerale <i>Mineral</i> Mineralöl	5000	2500	1000
Sintetico <i>Synthetic</i> Synthetiköl	20000	10000	6000

9. MANUTENZIONE

9. MAINTENANCE

9. INBETRIEBSETZUNG

Frequenza ringrassaggio cuscinetti / grease it / Nachschmieren

**Riduttori forniti con il cuscinetto schermato**



Il cuscinetto del supporto uscita è fornito lubrificato a grasso e non necessita di manutenzione **ordinaria** in condizioni di servizio che prevedono temperature di esercizio del riduttore < 75 °C con classe del meccanismo M5.

**The gearboxes with a shielded bearing**

The output support bearing is supplied already lubricated with grease and does not require **ordinary** maintenance under service conditions with gearbox operating temperatures < 75 °C with mechanism M5 class.

**Getrieben mit abgeschirmtem Lager geliefert werden**

Das Lager der Abtriebslagerung wird bereits mit Fett geschmiert geliefert und erfordert unter Bedingungen, die Betriebstemperaturen des Getriebes < 75 °C mit der Klasse M5 des Mechanismus vorsehen, keine **üblichen**. Instandhaltungsmaßnahmen.



Se ne consiglia il ringrassaggio indipendentemente dalle ore di esercizio effettuate, dopo almeno 2-3 anni.

Pertanto è stato predisposto un ingrassatore per provvedere all'opportuno ringrassaggio.

**Le Caratteristiche tecniche generali del grasso utilizzato sono:**

- Inspessente: base di Litio;
- NGLI: 2;
- Olio: minerale con aditivazione EP di viscosità minima ISO VG 160;
- Additivi: l'olio presente nel grasso deve avere caratteristiche di aditivazione EP;

SPECIFICHE E APPROVAZIONI

ISO:L-X-BCHB 2  
DIN 51 825: KP2K -20

It is recommended to grease it at least every 2-3 years regardless of the operating hours.

To this end it is provided with a greaser.

**Following are the general technical features of the lubrication grease:**

- Thickener: Lithium-based;
- NGLI: 2;
- Oil: mineral with EP additives with minimum viscosity as per ISO VG 160;
- Additives: the oil in the grease must feature EP additive;

SPECIFICATIONS AND APPROVALS

ISO:L-X-BCHB 2  
DIN 51 825: KP2K -20

Wir empfehlen, unabhängig von den erfolgten Betriebsstunden, mindestens alle 2-3 Jahre ein entsprechendes Nachschmieren.

Daher wurde ein angemessener Schmiernippel für das Nachschmieren vorgesehen.

**Allgemeine technische Eigenschaften des verwendeten Fetts:**

- Verdickungsmittel: auf Lithiumbasis;
- NGLI: 2;
- Öl: Mineralöl mit Zusatz von EP mit Mindestviskosität gemäß ISO VG 160;
- Additive: das im Fett enthaltene Öl muss die Eigenschaften der EP Additivierung aufweisen;

SPEZIFIKATIONEN  
ISO:L-X-BCHB 2  
DIN 51 825: KP2K -20



### 10. PROSSIMITI

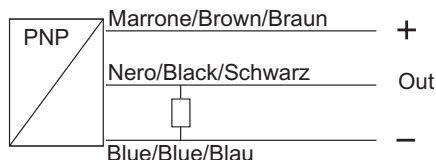
(Questo accessorio è disponibile per i riduttori RMI – CRMI – CB)

Caratteristiche tecniche – sensore prossimiti

### 10. PROXIMITY SENSOR

(This accessory is available for gearboxes RMI – CRMI – CB)

Specifications – Proximity sensor



### 10. NÄHERUNGSSENSOR

(Dieses Zubehör ist für die Getriebe RMI – CRMI - CB verfügbar)

Technische Eigenschaften – Näherungssensor

Non schermato - <i>Unshielded</i> - Nicht abgeschirmt	●
Tensione di alimentazione - <i>Supply voltage</i> - Versorgungsspannung	10..30Vdc
Ondulazione residua - <i>Ripple</i> - Restwelligkeit	< 10%
Correntemassima di carico - <i>Maximum load current</i> - Max. Ladestrom	200mA
Caduta di tensione - <i>Voltage drop</i> - Spannungsabfall	< 3V@200mA
Assorbimento - <i>Power consumption</i> - Aufnahme	< 10mA
Ripetibilità - <i>Repeatability</i> - Wiederholbarkeit	<2% della portata nominale/ <i>of nominal sensing distance</i> /der Nennreichweite
Isteresi - <i>Hysteresis</i> - Hysterese	< 10%Sn
Frequenza di commutazione - <i>Switching frequency</i> - Schaltfrequenz	1kHz
Protezione al cortocircuito - <i>Short-circuit protection</i> - Kurzschlussfest	Si - Yes - Ja
Led di segnalazione - <i>Status output led</i> - LED-Anzeige	Si - Yes - Ja
Temperatura di funzionamento - <i>Working temperature</i> - Betriebstemperatur	-25+70°C
Grado di protezione - <i>IP rating</i> - Schutzart	IP67 (connettore montato/ <i>with connector mounted</i> /mit montiertem Stecker)
Connessione - <i>Connection</i> - Verbindung	2m Cavo - <i>Cable</i> - Kabel

Questo accessorio consiste in un'apparecchiatura elettronica studiata per la rilevazione e la segnalazione della condizione di albero uscita fermo nei motoriduttori provvisti di limitatore di coppia.

Esso è composto da due parti: il sensore (a), incorporato nel riduttore (b) senza ulteriori ingombri e l'unità elettronica di monitoraggio (c).

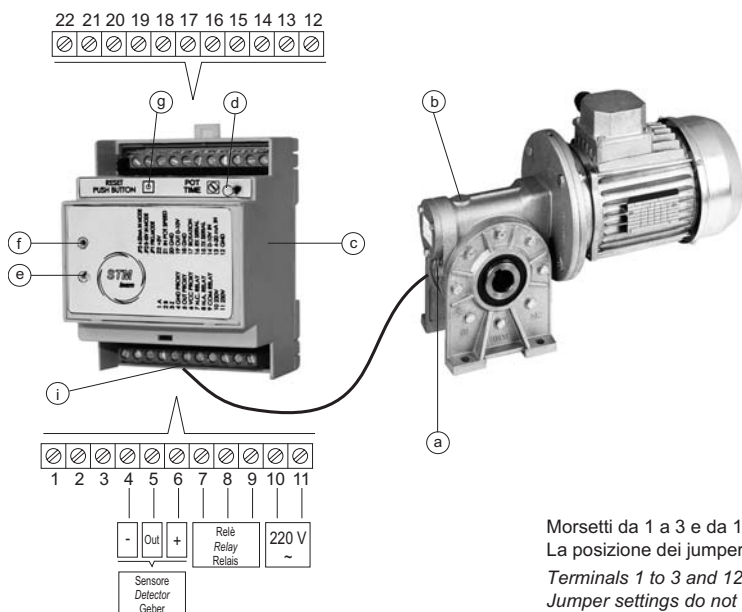
*It consists of an electronic device designed to detect and warn about a locked output shaft in gearmotors equipped with torque limiters.*

*It is mainly composed of two parts: the sensor (a) which is built in the gearbox (b) without any additional need of space and the electronic monitoring unit (c).*

Bei diesem Zubehör handelt es sich um eine elektronische Vorrichtung, die bei mit Rutschkupplung ausgestatteten Getriebemotoren den Zustand einer stehenden Abtriebswelle erfasst.

Sie setzt sich aus zwei Teilen zusammen: Dem Sensor (a), der im Getriebe (b) integriert ist und keinen weiteren Platz erfordert, und der elektronischen Anzeigeeinheit (c).

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- a - Rivelatore/Detector/Erfassungseinheit
- b - Riduttore/Gearbox/Getriebe
- c - Unità monitor/Monitoring unit/Bildschirm
- d - Regolazione tempo di intervento/Response time setting / Auslösezeiteinstellung
- e - Spia verde (presenza di alimentazione)/Green LED (power on) / Grüne Kontrollleuchte (Versorgung liegt an)
- f - Spia rossa (segnalazione condizione di allarme) / Red LED (indicates an alarm condition) / Rote Kontrollleuchte (Anzeige einer Alarmbedingung)
- g - Pulsante di Reset allarme/Alarm reset button/Reset-Taste für Alarme

- i - Morsettiera/Terminal block/Klemmenleiste
- 4 - Alimentazione Negativa Sensore/Negative Power Supply to Sensor / Negative Sensorversorgung
- 5 - OUT - Sensore/OUT - Sensor/OUT - Sensor
- 6 - Alimentazione Positiva Sensore/Positive Power Supply to Sensor / Positive Sensorversorgung
- 7 - RELE' N.C./INC RELAY/N.C.-RELAIS
- 8 - RELE' N.A./NO RELAY/N.O.-RELAIS
- 9 - RELE' Comune/Common RELAY/Allgemeines RELAIS
- 10 - Alimentazione c.a. 230 V./230 VAC power supply/WS-Versorgung 230 V.
- 11 - Alimentazione c.a. 230 V./230 VAC power supply/WS-Versorgung 230 V.

Morsetti da 1 a 3 e da 12 a 22 non sono utilizzati per la suddetta applicazione.

La posizione dei jumper non influenza la suddetta applicazione.

Terminals 1 to 3 and 12 to 22 are not used in this application.

Jumper settings do not affect this application.

Die Klemmen von 1 bis 3 und von 12 bis 22 werden in der o.g. Applikation nicht verwendet.

Die Position der Jumper hat keinen Einfluss auf die vorstehend genannte Applikation.

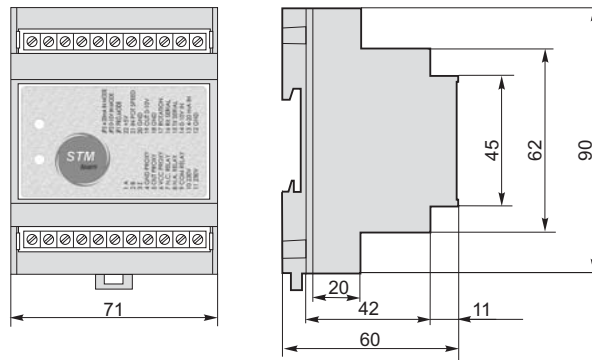


## 10. PROSSIMITI

## 10. PROXIMITY SENSOR

## 10. NÄHERUNGSSENSOR

Fig.3.3 Contenitore / Casing / Abb. 3.3 Gehäuse DIN H60 90x71x60



Il sensore genera un segnale elettrico digitale discontinuo con una frequenza proporzionale alla velocità di rotazione dell'albero d'uscita del riduttore; la mancanza di segnale è interpretata dall'unità elettronica come condizione di blocco, evidenziata con l'accensione di una spia luminosa rossa (f) e l'attivazione di un relè di uscita i cui contatti possono essere utilizzati per un segnale d'allarme, per avviare una procedura automatica di blocco del ciclo produttivo o per interrompere l'alimentazione al motore che aziona il riduttore entrato in blocco.

Come già accennato, il sensore genera un segnale ripetitivo di natura discontinua; ciò è da tenere in particolare considerazione in tutte le applicazioni caratterizzate da basse velocità in uscita dal riduttore in quanto l'intervallo di tempo che separa gli impulsi prodotti, può innescare il processo di riconoscimento del blocco.

Questa eventualità può essere evitata imponendo al circuito un ritardo in base alle caratteristiche della motorizzazione, al fine di coprire con un certo margine gli intervalli di ripetizione del segnale compatibilmente con la sicurezza di funzionamento dell'apparecchiatura.

La regolazione del tempo di intervento consentita dall'unità elettronica, può anche essere effettuata per imporre un ritardo alla segnalazione di blocco in casi dove brusche variazioni di velocità, di inerzia, o momentanee punte di carico determinano l'intervento del limitatore di coppia con conseguente arresto temporaneo dell'albero comandato.

Ovviamente il ritardo dovrà essere sufficiente a consentire il ripristino delle normali condizioni di funzionamento, considerando che il protrarsi della condizione di blocco oltre il tempo impostato viene rilevato e segnalato dall'unità, la quale mantiene in memoria questo evento (anche se la rotazione dell'albero riprende) evidenziandolo visivamente con la spia rossa fino allo spegnimento dell'apparecchiatura dell'apparecchiatura o fino a che non si cancelli l'allarme premendo il pulsante di reset (g).

*The sensor generates a digital discontinuous electric signal at a frequency which is proportional to the rotational speed of the output shaft of the gearbox; every time the signal is not generated, the electronic unit activates an output relay, highlighted by means of a red led (f), that warns about the condition of locked shaft. The contacts of the above relay may be used to activate an alarm that starts an automatic shutdown procedure or simply cuts off power to the motor which drives the locked gearbox. As mentioned above, the sensor generates a discontinuous repetitive signal.*

*This is particularly important in all those applications characterized by low gearbox output speed since the time interval between the pulses generated by the detector could trigger detection of a locked shaft condition which does not actually exist.*

*In order to prevent this, the circuit can be programmed with a slight delay, according to motor characteristics, to compensate for the signal repetition intervals without compromising the operating safety of the equipment.*

*Regulation of trigger time provided by the electronic unit can also be carried out in order to set a delay to the signalling of a locked shaft condition in all those cases where, during normal operation, sudden changes of speed or inertia or when there are load peaks, could determine the intervention of the torque limiter with subsequent temporary stop of the shaft.*

*Such delay should obviously be adequately long to restore the normal operating conditions. In fact, if the shaft remains locked for longer than the set time, the condition is detected and signalled to the equipment. The limiter has actually a memory function which is used to prevent the locked shaft condition from being cancelled even if the gearbox resumes rotation and it is highlighted by means of a red led, which remains on until the equipment is powered off or the alarm reset button (g) is depressed.*

Der Sensor erzeugt ein elektrisches Rechtecksignal, das proportional zur Abtriebsdrehzahl des Getriebes steht. Das Ausbleiben des Signals wird von der elektronischen Einheit als Blockierung ausgelegt. Dieser Zustand wird durch das Aufleuchten einer roten Kontrollleuchte (f) und dem Auslösen eines Ausgangsrelais hervorgehoben, dessen Kontakte für ein Alarmsignal, für den Start eines automatischen Sperrverfahrens der Produktionszyklus oder die Unterbrechung der Versorgung an den Motor verwendet werden können, der für den Antrieb des blockierten Getriebes zuständig ist.

Wie bereits erwähnt, erzeugt der Sensor ein periodisch auftretendes Rechtecksignal. Dies muss bei allen Applikationen berücksichtigt werden, die sich durch niedrige Getriebeabtriebsdrehzahlen charakterisieren, das die zwischen den abgegebenen Impulsen verstreichende Zeit zum Auslösen der Blockierungserfassung führen könnte.

Dies kann dadurch vermieden werden, dass an der Schaltung eine Verzögerung in Abhängigkeit zu den Antriebseigenschaften programmiert werden kann, so dass eine gewisse Spanne an Wiederholungsintervallen des Signals abgedeckt werden kann und gleichzeitig die Betriebssicherheit der Vorrichtung beibehalten wird.

Die Einstellung der von der elektronischen Einheit zulässigen Auslösezeit kann auch dazu verwendet werden, um der Blockierungsanzeige eine Verzögerung im Hinblick auf die Anzeige der Sperrfunktion aufzuerlegen. Dies ist insbesondere bei abrupten Drehzahländerungen und Änderungen des Trägheitsmoments oder momentanen Belastungsspitzen hilfreich, die zum Auslösen der Rutschkupplung führen, die einen momentanen Stopp der gesteuerten Welle zur Folge haben.

Natürlich muss die Ansprechverzögerung ausreichen, um ein Wiederherstellen der normalen Betriebsbedingungen zu ermöglichen. Dabei muss berücksichtigt werden, dass dann eine länger anhaltende Sperrbedingung von der Einheit erfasst und angezeigt wird. Dieses Ereignis wird von der Einheit gespeichert (auch wenn die Welle sich erneut zu drehen beginnt) und durch das Aufleuchten der roten Kontrollleuchte so lange angezeigt, bis die Vorrichtung ausgeschaltet wird oder bis der Alarm durch Drücken der Reset-Taste (g) zurückgesetzt wird.

**10. PROSSIMITI****Condizioni di funzionamento:****Grado di protezione:**  
IP00**Temperatura di funzionamento della unità:**

0° ÷ +50°C

**Temperatura di stoccaggio:**

-20° ÷ +70°C

**Tensione di alimentazione:**

230 V(±10%)

**Frequenza di funzionamento:**

50-60 Hz

**Corrente assorbita:**

200mA

(oltre i 250 l'apparecchio è protetto da fusibile autoripristinabile)

**Tempo di intervento:**

impostabile da 0.2 sec. a 8 sec.

**Morsettiera tipo:**Phoenix contact MKDS 1,5/X  
(X sta per N° di poli)**Massimo diametro filo serrabile:**Rigido 2,5 mm<sup>2</sup>  
Flessibile 1,5 mm<sup>2</sup>**Minimo diametro filo serrabile:**0,14 mm<sup>2</sup>**Caratteristiche contatti Relè:**Tensione applicabile 250 V  
Corrente massima 5 A

Relativamente al tempo di intervento, è opportuno considerare che il minimo slittamento rilevabile con i sensori standard è di 25° quando la velocità di rotazione è tale da far rientrare il tempo impiegato per questo slittamento tra quelli possibili.  
N° di giri minimo rilevabili sull'ordine di 0.2 min<sup>-1</sup> dato che dipende dal modello del riduttore.

Il sensore è fornito, senza specifica richiesta, con cavo non schermato: è consigliabile quindi sostituirlo con uno schermato.

Per quanto riguarda le indicazioni sull'utilizzo del rivelatore di blocco si rimanda alle istruzioni allegate allo strumento stesso.

**10. PROXIMITY SENSOR****Operating conditions:****Degree of protection:**  
IP00**Unit operating temperature:**

0° ÷ +50°C

**Storage temperature:**

-20° ÷ +70°C

**Voltage supply:**

230V (±10%)

**Operating frequency:**

50-60 Hz

**Current draw:**

200mA

(above 250 mA, protection is ensured by a self-resetting fuse)

**Response time:**

0.2 sec. to 8 sec. setting range

**Terminal block type:**Phoenix contact MKDS 1.5/X  
(X stands for no. of poles)**Max wire diameter accepted:**Stiff 2.5 sq mm  
Flexible 1.5 sq mm**Min wire diameter accepted:**

0.14 sq mm

**Relay contact specifications:**Input voltage 250 V  
Maximum current 5 A

*As regards response time, it should be noted that the minimum slip detected with standard sensors is 25° when rotational speed is such that slip time falls within allowed slip time range.  
Rpm resolution from 0.2 rpm (depends on gearbox model).*

*Unless specified on order, sensor comes with unshielded cable; if so, replacement with a shielded cable is recommended.*

*For information on locked shaft detector operation, please read the instructions supplied with the detector.*

**10. NÄHERUNGSSENSOR****Betriebsbedingungen:****Schutzart:**  
IP00**Betriebstemperatur der Einheit:**

0° ÷ +50°C

**Einlagerungstemperatur:**

-20° ÷ +70°C

**Versorgungsspannung:**

230 V(±10%)

**Betriebsfrequenz:**

50-60 Hz

**Stromaufnahme:**

200mA

(über 250 wird das Gerät von einer selbstrücksetzenden Sicherung geschützt)

**Auslösezeit:**

zwischen 0,2 Sek. bis 8 Sek. einstellbar

**Klemmenbrett - Typ:**Phoenix contact MKDS 1,5/X  
(X steht für die Anzahl der Pole)**Max. Durchmesser des Klemmdrahts:**Steif 2,5 mm<sup>2</sup>  
Flexibel 1,5 mm<sup>2</sup>**Min. Durchmesser des Klemmdrahts:**0,14 mm<sup>2</sup>**Eigenschaften der Relaiskontakte:**Applizierbare Spannung 250 V  
Max. Strom 5 A

Was die Auslösezeit anbelangt sollte berücksichtigt werden, dass der erfassbare min. Schlupf 25° beträgt, wenn die Drehzahl so ausfällt, dass die für diesen Schlupf aufgewendete Zeit unter die möglichen Werte fällt.  
Erfassbare min. Drehzahl liegt bei 0,2 min<sup>-1</sup> und ist vom Getriebemodell abhängig.

Der Sensor wird, falls nicht anderweitig angefordert, mit ungeschirmtem Kabel geliefert: Es sollte jedoch durch ein geschirmtes Kabel ersetzt werden.  
Was die Angaben bezüglich des Einsatzes der Blockierungserfassungseinheit anbelangt, verweisen wir auf die dem Gerät selbst beigelegten Anleitungen.



## 11. ALLEGATI

### 11.1 ALLEGATO.1 INFORMATIVA ATEX

Informativa sulla certificazione secondo normativa ATEX 2014/34/UE dei prodotti STM.

#### 11.1.1 COS'E' ATEX

La direttiva ATEX, oltre a introdurre tutti i criteri del "Nuovo approccio", si sostituisce alle precedenti direttive (di "Vecchio approccio") sulla materia e stabilisce elementi innovativi riguardanti la regolamentazione dei prodotti destinati a funzionare in atmosfera esplosiva.

#### 11.1.2 QUANDO. DOVE E A CHI SI APPLICA

ATEX si applica a prodotti elettrici e non elettrici destinati a essere introdotti e svolgere la loro funzione in atmosfera potenzialmente esplosiva oppure in relazione con tale situazione ambientale.

Definizione di atmosfera potenzialmente esplosiva:

Atmosfera che in presenza di condizioni ambientali e/o legate all'esercizio degli impianti e apparecchiatura di cui trattasi, può divenire esplosiva.

In genere, possono originare esplosione le sostanze infiammabili come gas, vapori, polveri combustibili disperse in aria (comburente ossigeno) ove si produca come innesco una scintilla (di origine elettrica o meccanica), arco elettrico, sovratemperatura, fiamma, irradiazione, compressione, etc.

ATEX si applica ai soli prodotti (acquistati dalla fabbrica dal 01/07/2003) immessi sul mercato UE (per la prima volta) o messi in servizio (per la prima volta) nel territorio UE.

- **PRODOTTI USATI**: Si intendono prodotti sul mercato o in servizio prima dell'1/7/03 e privi dei riscontri di conformità ATEX.

Tali prodotti non sono assoggettati, anche dopo cambi di proprietà o utilizzatore.

Occorre tuttavia prestare attenzione a:

- Modificazioni intervenute, o variazioni del destino d'impiego.
- Provenienza dall'esterno del territorio UE (ATEX si applica come al prodotto nuovo).
- **PRODOTTI MODIFICATI**: In presenza di modifiche quali ricondizionamento o riconfigurazione, ATEX non si (ri)applica se:
  - La modifica non è sostanziale (p.es. riguarda aspetti estetici o funzionali accessori).
  - Il prodotto non è nuovamente immesso sul mercato.
- **PRODOTTI RIPARATI**: In assenza di modifiche, ATEX non si (ri)applica.
- Se sono impiegati ricambi diversi dagli originali ma funzionalmente inalterati, ATEX non si (ri)applica (si applica al ricambio se costituisce apparecchio, dispositivo, sistema o componente Ex).

## 11. ATTACHMENTS

### 11.1 ATTACHMENT.1 ATEX INFORMATION SHEET

Report on certification in conformity with ATEX 2014/34/UE provision on STM products.

#### 11.1.1 WHAT IS ATEX

The ATEX directive, besides introducing the whole standard of the "New approach", replaces the former directives ("Old approach") on the matter and determines innovative elements concerning the regulation of products operating in explosive atmosphere.

#### 11.1.2 WHEN, WHERE AND TO WHAT IS IT APPLIED

ATEX is applied to electric and non-electric products designed to be introduced and to operate in a potentially explosive atmosphere, otherwise in relation to that environmental condition.

Definition of potentially explosive atmosphere:

Atmosphere that could become explosive in the presence of environmental conditions and/or conditions related to the operation of system and equipment taken into consideration.

Mostly, explosion could originate from flammable substances such as gas, vapours, dispersed combustible powders (comburent: oxygen) where a spark (of electric or mechanical origin) can be the triggering condition as well as electric arc, overtemperature, flame, irradiation, compression, etc.

ATEX only applies to the products (purchased from the factory since 1/7/2003) released on EU market (for the first time) or started (for the first time) within EU territory.

- **SECOND-HAND PRODUCTS**: Products put on the market or in service before 1/7/2003 lacking ATEX conformity checks.

The above products are not subject to these provisions, even after changes of owner or user.

Care should nevertheless be taken over the following:

- Modifications or changes in use application;
- Place of origin out of the EU territory (ATEX applies like for a new product).
- **MODIFIED PRODUCTS**: In presence of modifications such as reconditioning or reconfiguration, ATEX is not (re)applied if:
  - The modification is not fundamental (i.e., it concerns appearance or functional accessory parts).
  - The product is not released on the market again.
- **REPAIRED PRODUCTS**: In absence of modifications, ATEX is not (re)applied.
- In case spare parts different from the original parts but functionally unaltered are employed, ATEX is not (re)applied (it is applied to the spare part if forming appliance, device, system or EX component).

## 11.1 ANLAGEN

### 11.1 ANLAGE 1 ATEX-INFORMATIONSBLETT

Informationsblatt zur Zertifizierung gemäß Richtlinie ATEX 2014/34/UE der STM-Produkte.

#### 11.1.1 WAS BEDEUTET "ATEX"?

Die ATEX-Richtlinie stützt sich über die Einführung aller Kriterien der "New Approach" hinaus, auf die vorausgehenden Richtlinien (der "Old Approach") dieser Materie und legt innovative Elemente fest, die das Reglement der Produkte betrifft, die für einen Einsatz in explosionsgefährdeten Atmosphären bestimmt sind.

#### 11.1.2 WANN, WO UND FÜR WAS TRIFFT ATEX ZU

Die ATEX-Richtlinie wird bei elektrischen und nicht elektrischen Produkten angewendet, die dazu bestimmt sind, in potentiell explosionsfähigen Atmosphären oder im Zusammenhang mit einer solchen Umgebungsbedingung eingesetzt und betrieben zu werden.

Definition "potentiell explosionsfähige Atmosphäre":

Atmosphäre, die unter atmosphärischen und/oder an den Betrieb der betreffenden Anlagen und Vorrichtungen gebundenen Bedingungen explosiv werden kann.

Im Allgemeinen können entflammbare, in der Luft enthaltene Substanzen wie brennbare Gase, Dämpfe oder Stäube (Sauerstoffträger) dort zu Explosionen führen, wo sich Funken auslösen (elektrischer oder mechanischer Herkunft) oder elektrische Lichtbögen, Übertemperaturen, Flammen, Bestrahlungen, Kompressionen, usw. vorliegen.

ATEX kommt an den Produkten zur Anwendung (ab dem 01/07/2003 ab Fabrik gekauft), die auf dem EU-Markt (erstmalig) eingeführt oder im EU-Gebiet (erstmalig) in Betrieb gesetzt wurden.

- **GEBRAUCHTE PRODUKTE**: Darunter fallen die Produkte, die vor dem 1/7/03 auf den Markt gebracht wurden und über keine Anlehnungen an die ATEX-Konformität verfügen.

Diese Produkte unterliegen dieser Norm auch dann nicht, wenn es zu einem Eigentümer- oder Benutzerwechsel kam.

Es muss jedoch auf folgendes geachtet werden:

- angesetzte Änderungen oder Variationen der Einsatzbestimmungen.
- Herkunft aus einem nicht zur EU gehörendem Land (ATEX wird hier bei Neuprodukten angewendet).
- **MODIFIZIERTE PRODUKTE**: Bei Vorliegen von Modifizierungen wie Wiederingangesetzung oder Rekonfiguration wird die ATEX nicht (erneut) appliziert, wenn:
  - die Modifizierung nicht erheblich ist (z.B. ästhetische Aspekte oder Funktionszubehör).
  - das Produkt nicht wieder in den Verkehr gebracht wird.
- **REPAIRTE PRODUKTE**: Bei keinerlei angesetzten Modifizierungen wird ATEX nicht (erneut) angewendet, wenn keine originalen, jedoch funktionsmäßig unveränderte Ersatzteile verwendet werden, wird ATEX nicht (erneut) angewendet (wird bei Ersatzteilen appliziert, wenn diese ein Gerät, eine Vorrichtung, ein System oder eine Ex-Komponente bilden).



**11. ALLEGATI**

**11. ATTACHMENTS**

**11.1 ANLAGEN**

**11.1 INFORMATIVA ATEX**

**11.1 ATEX INFORMATION SHEET**

**11.1 ATEX-INFORMATIONSBLETT**

**11.1.3. COME SI APPLICA**

Le atmosfere potenzialmente esplosive vengono suddivise in **Gruppi** e **Zone** a seconda del livello di pericolosità. Per ognuno di questi sono previsti particolari accorgimenti o regole da rispettare (la determinazione della zona in cui avviene l'applicazione del riduttore spetta al costruttore della macchina, pertanto i clienti **devono** indicare il gruppo, la categoria o la indicazione secondo EN60079 del tipo di atmosfera).

**11.1.3. HOW IS IT APPLIED**

*Potentially explosive atmospheres are divided into **Groups** and **Parts** depending on their level of danger. For each of them, particular devices or rules are required (the machine manufacturer must determine the part in which the gear unit application is; therefore customers **must** indicate the group, the category or the type of atmosphere according to EN 60079).*

**11.1.3. ANWENDUNGSWEISE**

Die potentiell explosionsfähigen Atmosphären werden in Abhängigkeit des Gefährlichkeitsgrads in **Gruppen** und **Zonen** unterteilt. Für jede sind besondere einzuhaltende Vorkehrungen oder Regeln zu berücksichtigen (das Bestimmen der Zone, in der das Getriebe zur Anwendung kommt, unterliegt der Zuständigkeit des Maschinenherstellers. Die Kunden **müssen** daher die Gruppe, die Kategorie oder den Atmosphärentyp gemäß EN60079 angeben).

**Classificazione dei prodotti.**

Gli apparecchi sono classificati in due Gruppi e in Categorie entro i gruppi

**Product classification**

Devices are classified into two Groups and in Categories within the Groups

**Produktklassifizierung**

Die Geräte werden in zwei Gruppen und innerhalb dieser wiederum in Kategorien klassifiziert.

GRUPPO GROUP GRUPPE	<b>1 (I)</b> (Lavori in sotterraneo) / (Underground work) / (Arbeiten im Grubenbau)		<b>2 (II)</b> (Generica atmosfera esplosiva) / (Generic explosive atmosphere) / (Allgemein explosionsfähige Umgebung)		
	M1	M2	1	2	3
CATEGORIA(EN50014) CATEGORY(EN50014) KATEGORIE (EN50014)					
CARATTERI AMBIENTALI ENVIRONMENTAL CHARACTERISTICS UMGEBUNGSEIGENSCHAFTEN	Miniere e loro impianti di superficie <i>Mines and above-ground equipments</i> Minen und ihre Anlagen über Erdboden		Atmosfera esplosiva presente per lunghi periodi o di frequente <i>Long-period or frequent explosive atmosphere</i> Über längere Zeit oder häufig explosionsgefährdete Atmosphäre	Atmosfera esplosiva probabile <i>Possible explosive atmosphere</i> Atmosphäre mit Wahrscheinlichkeit einer Explosionsgefährdung	Atmosfera esplosiva in casi particolari o per breve periodo. <i>Explosive atmosphere in particular cases or for a short period</i> In besonderen Fällen oder kurzzeitig explosionsfähige Atmosphäre.
SOSTANZA PERICOLOSA DANGEROUS MATERIAL GEFÄHRLICHE SUBSTANZ	Grisù, polveri <i>Firedamp, powders</i> Entflammare Gase, Staub		Aria/gas, vapori, nebbie, aria/polveri / <i>Air/gas, vapours, smoke, air/powders</i> / Luft/Gas, Dämpfe, Nebel, Luft/Staub		
LIVELLO DI PROTEZIONE PROTECTION LEVEL SCHUTZGRAD	Molto elevato <i>Quite high</i> Sehr hoch	ElevatoFuori tensione in atmosfera <i>High Out of tension in atmosphere</i> Hoch Nicht unter Spannung in Atmosphäre	Molto elevato <i>Quite high</i> Sehr hoch	Elevato <i>High</i> Hoch	Normale <i>Normal</i> Normal
EN60079-10(Gas) EN60079-10(Gas) EN60079-10 (Gas)			Z0	Z1	Z2
EN50281-1(Polveri) EN50281-1 (Powders) EN50281-1 (Staub)			Z20	Z21	Z22
	= Zone incluse nella certificazione ATEX prodotti STM = <i>Parts included in ATEX certification (STM products)</i> = Zonen, die in der ATEX-Zertifizierung der STM-Produkte enthalten sind				

## 11. ALLEGATI

### 11.1 ALLEGATO.1 INFORMATIVA ATEX

Una volta identificato il gruppo (nel nostro caso possiamo fornire prodotti solo per il gruppo 2 (normalmente il 2 viene indicato II)) occorre conoscere se si tratta di **atmosfera gassosa (II G) o polverosa (II D)**.

Gli apparecchi del **gruppo II G** (atmosfera gassosa) devono essere:  
- preferibilmente classificati in una classe di temperatura indicata nel prospetto 1;  
- o definiti dalla massima temperatura di superficie effettiva;  
- o, se appropriato, limitati al gas o vapore specifico per il quale sono previsti;  
e devono essere marchiati appositamente.

Definito il gruppo II esiste una ulteriore suddivisione in atmosfera esplosiva probabile (categoria 2) o atmosfera esplosiva in casi particolari o per breve periodo (categoria 3). Possiamo quindi identificare nel caso dei prodotti certificati da STM 4 possibili alternative:

- a) gruppo 2, categoria 2, ambiente gassoso = II 2G = Z1
- b) gruppo 2, categoria 2, ambiente polveroso = II 2D = Z21
- c) gruppo 2, categoria 3, ambiente gassoso = II 3G = Z2
- d) gruppo 2, categoria 3, ambienti polveroso = II 3G = Z22

## 11. ATTACHMENTS

### 11.1 ATTACHMENT.1 ATEX INFORMATION SHEET

*Once the group is identified (in the examined case only Group 2 products can be provided – Group 2 is normally marked as II), it must be known whether it is a **matter of gas (IIG) or dusty (IID) atmosphere.***

**Group IIG devices (gas atmosphere) must be:**  
- preferably classified into a class of temperature indicated in table 1;  
- or defined according to the actual highest temperature of the surface;  
- or, if appropriate, limited to the specific gas or vapour for which they are provided; and they must be expressly marked.

Once Group II is defined, a further division into possible explosive atmosphere (category 2) and explosive atmosphere in particular cases or for a short period (category 3) should be added. Four possible alternatives can be determined speaking about STM certified products:

- a) group 2, category 2, gas environment = II 2G = Z1
- b) group 2, category 2, dusty environment = II 2D = Z21
- c) group 2, category 3, gas environment = II 3G = Z2
- d) group 2, category 3, dusty environment = II 3G = Z22

## 11.1 ANLAGEN

### 11.1 ANLAGE 1 ATEX-INFORMATIONSBLETT

Wurde die Gruppe ermittelt (wir können nur Produkte für die Gruppe 2 liefern; normalerweise wird 2 mit II angegeben) muss man darüber informiert sein, ob es sich um eine **gasförmige (II G) oder staubförmige (II D)** Atmosphäre handelt.

Die Geräte der **Gruppe II G** (gasförmige Atmosphäre) müssen wie folgt ausgelegt sein:  
- vorzugsweise in eine Temperaturklasse gemäß Prospekt 1 klassifiziert;  
- durch die effektive maximale Oberflächentemperatur definiert;  
- oder, wo angemessen, auf spezifische Gase oder Dämpfe, für die sie vorgesehen sind, definiert.  
Sie müssen dann entsprechend gekennzeichnet werden.

Nach Bestimmung der Gruppe II besteht eine weitere Unterteilung gemäß der Wahrscheinlichkeit einer explosionsfähigen Atmosphäre (Kategorie 2) oder einer in bestimmten Fällen oder kurzzeitig vorliegende explosionsfähige Atmosphäre (Kategorie 3). Im Fall der von der STM zertifizierten Produkte ist also eine Ermittlung von 4 Alternativen möglich:

- a) Gruppe 2, Kategorie 2, gasförmige Umgebung = II 2G = Z1
- b) Gruppe 2, Kategorie 2, staubförmige Umgebung = II 2D = Z21
- c) Gruppe 2, Kategorie 3, gasförmige Umgebung = II 3G = Z2
- d) Gruppe , Kategorie 3, staubförmige Umgebungen = II 3G = Z22

**11. ALLEGATI****11.1 ALLEGATO.1  
INFORMATIVA ATEX****11.1.4. TEMPERATURA SUPERFICIALE**

Una volta definito il gruppo, zona e tipo di atmosfera, occorre indicare la massima temperatura superficiale che può raggiungere il riduttore sotto carico nelle reali condizioni di applicazione.

Definizione secondo EN13463-1:

massima temperatura superficiale:  
"Temperatura più elevata ottenuta durante il servizio come determinato nelle condizioni operative più difficili (ma entro la tolleranza riconosciuta) da una parte o superficie dell'apparecchio, del sistema di protezione o del componente, che può produrre un'accensione dell'atmosfera esplosiva circostante".

Nota 1:

La massima temperatura di superficie degli apparecchi comprende il margine di sicurezza fino alla minima temperatura di accensione dell'atmosfera potenzialmente esplosiva come richiesto nel punto 6.4.2 della EN 1127-1:1997

Nota 2:

Il rapporto fra la massima temperatura di superficie degli apparecchi e la minima temperatura di accensione degli strati di polvere e delle nubi di polvere è indicato nella EN 1127-1

Nota 3:

La massima temperatura di superficie è determinata senza depositi di polvere sugli apparecchi

Nel caso di atmosfera potenzialmente esplosiva con presenza di gas (II 2G, Z1, Z2) ci si riferisce a classi di temperatura (prospetto 1) o alla temperatura massima superficiale definita secondo il tipo di gas presente dalla normativa stessa.

Nel caso di atmosfera potenzialmente esplosiva con presenza di polveri (II2D, Z21, Z22), occorre indicare la temperatura massima superficiale (°C) sempre secondo normativa, del tipo di polvere presente.

**11. ATTACHMENTS****11.1 ATTACHMENT.1  
ATEX INFORMATION SHEET****11.1.4 SURFACE TEMPERATURE**

*Once the group, part and type of atmosphere are determined, the highest surface temperature reachable by the gear unit under load, in real application conditions, should be indicated.*

*Definition according to EN 13463-1:*

*highest surface temperature:  
"Highest temperature obtained during service in the hardest operative conditions (though within the established tolerance) from a part or from the surface of the device, of the protection system or of the component, which can trigger the explosion of the surrounding explosive atmosphere."*

*Note 1:*

*The highest surface temperature of the devices includes the safety margin up to the lowest firing temperature of potentially explosive atmosphere as required in EN 1127-1:1997 6.4.2.*

*Note 2:*

*The relationship between the highest surface temperature of the devices and the lowest firing temperature of the layers and clouds of dust is indicated in EN 1127-1.*

*Note 3:*

*The highest surface temperature is determined without dust on the devices.*

*In case of potentially explosive atmosphere in presence of gas (II 2G, Z1, Z2), reference is made to classes of temperature (table 1) or to the highest surface temperature determined by the same provisions according to the type of gas.*

*In case of potentially explosive atmosphere in presence of dust (II2D, Z21, Z22), the highest surface temperature (°C) of the type of dust should be indicated in conformity with the provisions.*

**11.1 ANLAGEN****11.1 ANLAGE 1  
ATEX-INFORMATIONSBLECH****11.1.4. OBERFLÄCHENTEMPERATUR**

Nach Ermittlung von Gruppe, Zone und Atmosphärentyp muss die maximale Oberflächentemperatur angegeben werden, die das Getriebe unter Belastbedingungen und realen Applikationsbedingungen erreichen kann.

Definition gemäß EN13463-1:

Maximale Oberflächentemperatur: "Die höchste Temperatur, die im Betrieb unter ungünstigsten Bedingungen (aber innerhalb der anerkannten Toleranzen) von einem Teil oder der Oberfläche eines Gerätes, Schutzsystems oder einer Komponente erreicht wird und die zum Zünden der explosionsfähigen Atmosphäre führen kann.

Hinweis 1:

Die maximale Oberflächentemperatur der Geräte beinhaltet, wie unter Punkt 6.4.2 der EN 1127-1:1997 gefordert, eine Sicherheitsspanne, die bis zur untersten Zündtemperatur der potentiell explosionsfähigen Atmosphäre reicht

Hinweis 2:

Das Verhältnis zwischen maximaler Oberflächentemperatur der Geräte und der minimalen Zündtemperatur der Staubschichten und -wolken wird in der EN 1127-1 angegeben.

Hinweis 3:

Die maximale Oberflächentemperatur wird ohne sich auf den Geräten befindliche Staubablagerungen bestimmt.

Im Fall der potentiell explosionsfähigen Atmosphäre bei Vorliegen von Gasen (II 2G, Z1, Z2) wird Bezug auf die Temperaturklassen (Prospekt 1) oder die maximale Oberflächentemperatur genommen, die der in der Richtlinie selbst angegebenen Gasart gemäß definiert wird.

Im Fall einer potentiell explosionsfähigen Atmosphäre bei Vorliegen von Staub (II2D, Z21, Z22) ist die Angabe der maximalen Oberflächentemperatur (°C) erforderlich, auch hier gemäß Richtlinienangaben, des vorhandenen Staubtyps.

## 11. ALLEGATI

## 11. ATTACHMENTS

## 11.1 ANLAGEN

### 11.1 ALLEGATO.1 INFORMATIVA ATEX

### 11.1 ATTACHMENT.1 ATEX INFORMATION SHEET

### 11.1 ANLAGE 1 ATEX-INFORMATIONSBLECH

**PROSPETTO 1**  
Classificazione delle massime temperature di superficie per gli apparecchi del gruppo II G.

**SCHEDULE 1**  
*Classification of the highest surface temperatures for Group IIG devices.*

**PROSPEKT 1** Klassifizierung der maximalen Oberflächentemperaturen für Geräte der Gruppe II G.

Classe di temperatura / <i>Class of temperature</i> / Temperaturklasse	Massima temperatura di superficie / <i>Highest surface temperature</i> / Maximale Oberflächentemperatur [°C]
T1	450
T2	300
T3	200
T4	135
T5	100
T6	85
= Classi di temperatura nella certificazione ATEX prodotti STM = <i>Classes of temperature in ATEX certification (STM products)</i> = Temperaturklassen in der ATEX-Zertifizierung der STM-Produkte	

**Nota 4:**  
Nel caso di Classe di temperatura T5 occorre verificare la potenza limite termico declassata;  
In tutti gli altri casi vale la potenza riportata a catalogo prevista per i singoli rapporti con fattore di servizio complessivo dell'applicazione pari a 1 e le considerazioni sul limite termico.

**Note 4:**  
*In case of T5 Class of temperature the extreme down-graded thermic power should be checked.*  
*In all the other instances, the power indicated on the catalogue for the single ratios with overall application service factor equal to 1 and the considerations on temperature limits apply.*

**Hinweis 4:**  
Bei der Temperaturklasse T5 muss die deklassierte thermische Grenzleistung überprüft werden.  
In den anderen Fällen gilt die im Katalog für die einzelnen Übersetzungsverhältnisse angegebene Leistung mit Betriebsfaktor einschließlich der Applikation entsprechend 1 und die Berücksichtigungen im Hinblick auf die thermische Grenzleistung.

**11. ALLEGATI****11.1 ALLEGATO.1  
INFORMATIVA ATEX****11.1.5. ESEMPI DI DESIGNAZIONE**

Esempio di apparecchi del gruppo II, categoria 2 per gas esplosivo del gruppo IIB con una massima temperatura di superficie della classe T4

II 2G c II B T4

N.B: per alcuni tipi specifici di protezione, gli apparecchi del gruppo II destinati all'uso in atmosfere di gas esplosivo sono classificati in base alla natura dell'atmosfera potenzialmente esplosiva alla quale sono destinati. Questi apparecchi sono classificati in base ai gruppi d'esplosione (suddivisioni) IIA, IIB, IIG. Queste suddivisioni però non comportano alcuna variazione per quanto riguarda i prodotti STM-GSM pertanto può essere riportata in targhetta se richiesta dal cliente e di conseguenza deve essere inserita in fase di ordine.

1. Esempio di apparecchi del gruppo II, categoria 3 per atmosfere esplosive di gas, con una massima temperatura di superficie della classe T4 senza alcun tipo di protezione contro l'accensione

II 3G T4

2. Esempio per gli apparecchi del gruppo II, categoria 2, per atmosfere esplosive di polvere con protezione contro l'accensione, sicurezza costruttiva ed una massima temperatura di superficie di 110 °C

II 2D c 110 °C

3. Esempio di marcatura per le atmosfere di gas e polvere

II 2GD c 230 °C

**11.1.6. COME SI APPLICA**

Al momento di una richiesta di offerta per prodotto conforme a normativa ATEX 2014/34/UE occorre compilare la **scheda acquisizione dati** ([www.stmspa.com](http://www.stmspa.com)).

Effettuare le verifiche come prima descritto. I riduttori certificati verranno consegnati con:

- una seconda targhetta contenente i dati ATEX;
- ove previsto un tappo sfiato, tappo sfiato con molla interna;
- se rispondente alla classe di temperatura T4 e T5 verrà allegato un indicatore di temperatura (132 °C nel caso di T4 e 99°C rispettivamente per la T5)
- Indicatore di temperatura : termometro a singolo rilevamento, una volta raggiunta la temperatura indicata si annerisce segnalando il raggiungimento di tale limite.

**11. ATTACHMENTS****11.1 ATTACHMENT.1  
ATEX INFORMATION SHEET****11.1.5. DESIGNATION EXAMPLES**

*Example of group II devices, category 2, for group IIB explosive gas with highest surface temperature belonging to T4 class*

II 2G c II B T4

*NB: for some specific types of protection, group II devices to be used in explosive gas atmospheres are classified according to the nature of the potentially explosive atmosphere to which they pertain.*

*These devices are classified on the basis of explosion groups (divisions) IIA, IIB, IIG. These divisions, however, do not involve any variation for what concerns STM-GSM products, the above variation should therefore be tag-reported if demanded by the customer and should consequently be included in the order phase.*

*1. Example of group II devices, category 3, for explosive gas atmospheres, with highest surface temperature belonging to T4 class without any type of protection from firing.*

II 3G T4

*2. Example of group II devices, category 2, for dusty explosive atmospheres inclusive of protection from firing, structural security and highest surface temperature of 110 °C*

II 2D c 110 °C

*3. Example of marking for gas and dusty atmospheres*

II 2GD c 230 °C

**11.1.6. HOW IS IT APPLIED**

*In case of request of offer relating to any product in conformity with the provisions ATEX/2014/34/UE, the data sheet should be filled in ([www.stmspa.com](http://www.stmspa.com)).*

*Perform the inspections as described above. Certified gearboxes will be delivered with:*

- a second nameplate containing ATEX data;
- a breather valve with internal spring, where a breather is needed;
- if in accordance with classes of temperature T4 and T5, a temperature gauge will be included (132 °C in case of T4 and 99 °C in case of T5).
- Temperature gauge: single-reading thermometer, it blackens once temperature is reached, pointing out the achievement of that limit.

**11.1 ANLAGEN****11.1 ANLAGE 1  
ATEX-INFORMATIONSBLECH****11.1.5. BESTIMMUNGSBEISPIEL**

Beispiel für Geräte der Gruppe II, Kategorie 2 für explosionsfähige Gase der Gruppe IIB mit einer maximalen Oberflächentemperatur der Klasse T4

II 2G c II B T4

MERKE: Bei einigen spezifischen Schutztypen werden die Geräte der Gruppe II, die für den Einsatz in explosionsfähigen gasbelasteten Atmosphären bestimmt sind, in Abhängigkeit der Herkunft der potentiell explosionsfähige Atmosphäre für die sie bestimmt sind, klassifiziert. Diese Geräte werden in Abhängigkeit der Explosionsgefährdungsgruppe (Unterteilungen) IIA, IIB, IIG klassifiziert. Diese Unterteilungen ziehen jedoch was die Produkte STM-GSM anbelangt keinerlei Variationen nach sich, daher kann sie auf entsprechende Anfrage des Kunden auf dem Typenschild angegeben und muss dann in der Auftragsphase eingefügt werden.

1. Beispiel für Geräte der Gruppe II, Kategorie 3 für explosionsfähige, mit Gas belastete Atmosphären, mit maximaler Oberflächentemperatur der Klasse T4 ohne jeglichen Zündungsschutz

II 3G T4

2. Beispiel für Geräte der Gruppe II, Kategorie 2 für explosionsfähige, mit Staub belastete Atmosphären mit produktionsmäßigen Zündungsschutz und maximaler Oberflächentemperatur von 110 °C

II 2D c 110 °C

3. Kennzeichnungsbeispiel für gas- und staubförmigen Atmosphären

II 2GD c 230 °C

**11.1.6. ANWENDUNGSWEISE**

Bei einer Angebotsanfrage für der Richtlinie ATEX 2014/34/UE entsprechende Produkte muss das Datenerfassungsformular ([www.stmspa.com](http://www.stmspa.com)) ausgefüllt werden.

Dazu die beschriebenen Kontrollen vornehmen. Die zertifizierten Getriebe werden wie folgt ausgestattet geliefert:

- mit einem zweiten Typenschild mit ATEX-Daten;
- wo vorgesehen, mit einem Entlüftungsverschluss, Entlüftungsverschluss mit interner Feder;
- falls der Temperaturklasse T4 und T5 entsprechend, wird eine Temperaturanzeige vorgesehen (132 °C bei T4 und 99°C bei T5)
- Temperaturanzeige: einzelnes Erfassungsthermometer - bei Erreichen der angegebenen Temperatur wechselt die Farbe zur Anzeige der erreichten Temperaturgrenze in Schwarz.

**Gestione Revisioni Cataloghi STM**
**Managing STM Catalogue Revisions**
**Verwaltung Revisionen STM-Kataloge**
**Codice Catalogo**
**Catalogue Code**
**Katalognummer**

<b>MT27</b>	<b>I</b>	<b>GB</b>	<b>D</b>	<b>1.0</b>
N° Identificativo <i>Identification Number</i> Kennnummer	Identificativo Lingua - <i>Language</i> - Sprache  <b>I - Italiano – <i>Italian</i> - Italienisch</b> <b>GB – Inglese – <i>English</i> - Englisch</b> <b>D – Tedesco – <i>German</i> - Deutsch</b>			Indice di Revisione <i>Review</i> Bericht

1) Ogni catalogo STM in distribuzione e' provvisto di un codice che lo identifica che è riportato nell'ultima pagina dei cataloghi e a piè pagina di tutte le pagine del catalogo stesso. Per verificare la revisione attualmente in vostro possesso è necessario guardare l'ultima cifra che compone il codice del catalogo:

1) *Each STM catalogue is identified by a code printed on the last page and reported in the page footer. The last digit in the catalogue code identifies catalogue revision.*

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2) Der Katalog, der die letzten Aktualisierungen enthält, kann von der Internetseite der STM herunter geladen werden. Die eingefügten Neuerungen können der Tabelle der Aktualisierungen entnommen werden, die diesem Dokument anhängt. Die Seiten, die Änderungen unterlagen, sind mit der geänderten Revisionsnummer versehen.

3) Guardare con attenzione il simbolo inserito nella colonna "Classificazione Modifica". In questa colonna sarà inserito un simbolo che determina una classificazione delle modifiche apportate. Questo consente di identificare con estrema rapidità l'importanza della modifica apportata;

3) *Pay attention to the symbol in the "Update Classification" column. This symbol indicates the category and significance of any changes. This allows you to quickly identify important changes.*

3) Dem in der Spalte "Änderungsklassifikation" enthaltenen Symbol ist besondere Aufmerksamkeit zuzuwenden. In dieser Spalte wird das Symbol eingefügt, das für die Klasse der applizierten Änderungen steht. Dies ermöglicht ein schnelles Erkennen der Wichtigkeit der angesetzten Änderung.

Classificazione <i>Classification</i> Klassifizierung	Definizione Specificante gli elementi di modifica <i>Change identifier Definition</i> Erklärende Definition der Änderungselemente	Simbolo Identificativo <i>Symbol</i> Identifikationssymbol
Chiave <i>Key</i> Schlüssel	Uscita e immissione di un prodotto <i>Product release and marketing</i> Ausgabe und Einführung eines Produkts	
Importante <i>Major</i> Wichtig	Modifica che influenza gli ingombri/stato fornitura/installazione del prodotto <i>Change affecting overall dimensions/delivery condition/product installation</i> Änderung, die sich auf die Abmessungen/den Lieferzustand/die Installation des Produkts auswirkt	
Secondaria <i>Minor</i> Zweitrangig	Modifica che riguarda traduzioni/impaginazioni/inserimento descrizioni <i>Change to translations/layout/captions</i> Änderung, die Übersetzungen/den Umbruch/das Einfügen von Beschreibungen betrifft	—

4) Qualora risultasse una diversità di quote tra disegno **2D** – **3D** scaricato dal sito internet e tabella del catalogo è necessario consultare il nostro servizio tecnico.


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*Warning*  
*Check your catalogue revision status against the latest updates table.*

Achtung  
Überprüfen Sie die Revision, die sich in Ihren Händen befindet, und die Tabelle der in der neuen Revision eingefügten Aktualisierung.

			Aggiornamenti apportati	<i>Updates made</i>	Wichtige Aktualisierungen	Classificazione Modifica <i>Update classification</i> Klassifizierung - Änderung
Paragrafo <i>Paragraph</i> Paragraph	Pagina <i>Page</i> Seite	Indice Revisione <i>Revision Index – Updates</i> Revisionsindex	Descrizione	<i>Description</i>	Beschreibung	














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**MT 27 IGB D 1.0****10/16**

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# Installation and Maintenance

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# STM



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MOTOR APPENDIX INFORMATION  
TYPE BALDOR 5.0HP 184TC

**BALDOR® • RELIANCE** 

**Product Information Packet**

**ABB Automation Products GmbH**

**VECP3665TÆÁ GHOE**

**5HP, 1750RPM, 3PH, 60HZ, 184TC, 0642M, TEFC, F1**

Part Detail							
Revision:	P	Status:	PRD/A	Change #:		Proprietary:	No
Type:	AC	Elec. Spec:	06WGX182	CD Diagram:	CD0005	Mfg Plant:	
Mech. Spec:	06H480	Layout:	06LYH480	Poles:	04	Created Date:	04-05-2012
Base:	N	Eff. Date:	04-06-2017	Leads:	9#16		

Specs			
Catalog Number:	VECP3665T	Front Shaft Indicator:	None
Enclosure:	TEFC	Heater Indicator:	No Heater
Frame:	184TC	Insulation Class:	F
Frame Material:	Iron	Inverter Code:	Inverter Duty
Output @ Frequency:	5.000 HP @ 60 HZ	KVA Code:	J
Synchronous Speed @ Frequency:	1800 RPM @ 60 HZ	Lifting Lugs:	Standard Lifting Lugs
Voltage @ Frequency:	208.0 V @ 60 HZ	Locked Bearing Indicator:	Locked Bearing
	460.0 V @ 60 HZ	Motor Lead Quantity/Wire Size:	9 @ 16 AWG
	230.0 V @ 60 HZ	Motor Lead Exit:	Ko Box
XP Class and Group:	CLI GP A,B,C,D	Motor Lead Termination:	Flying Leads
XP Division:	Division II	Motor Type:	0642M
Agency Approvals:	CSA EEV	Mounting Arrangement:	F1
	UR	Power Factor:	79
	CSA	Product Family:	Chemical Processing (Not DC)
	CCSA US	Pulley End Bearing Type:	Ball
Auxillary Box:	No Auxillary Box	Pulley Face Code:	C-Face
Auxillary Box Lead Termination:	None	Pulley Shaft Indicator:	Standard
Base Indicator:	No Mounting	Rodent Screen:	None

<b>Bearing Grease Type:</b>	Polyrex EM (-20F +300F)	<b>Shaft Extension Location:</b>	Pulley End
<b>Blower:</b>	None	<b>Shaft Ground Indicator:</b>	No Shaft Grounding
<b>Constant Torque Speed Range:</b>	1.7	<b>Shaft Rotation:</b>	Reversible
<b>Current @ Voltage:</b>	6.500 A @ 460.0 V	<b>Shaft Slinger Indicator:</b>	Shaft Slinger
	14.000 A @ 208.0 V	<b>Speed Code:</b>	Single Speed
	13.000 A @ 230.0 V	<b>Motor Standards:</b>	NEMA
<b>Design Code:</b>	B	<b>Starting Method:</b>	Direct on line
<b>Drip Cover:</b>	Drip Cover	<b>Thermal Device - Bearing:</b>	NONE (OLD)
<b>Duty Rating:</b>	CONT	<b>Thermal Device - Winding:</b>	Thermostats
<b>Electrically Isolated Bearing:</b>	Not Electrically Isolated	<b>Vibration Sensor Indicator:</b>	No Vibration Sensor
<b>Feedback Device:</b>	NO FEEDBACK	<b>Winding Thermal 1:</b>	None
<b>Front Face Code:</b>	Standard	<b>Winding Thermal 2:</b>	None
		<b>XP Temp Code:</b>	T3C



<b>Nameplate NP3257E</b>										
<b>CAT.NO.</b>	VECP3665T									
<b>SPEC.</b>	06H480X182G1									
<b>HP</b>	5	TE								
<b>VOLTS</b>	208-230/460									
<b>AMP</b>	14-13/6.5									
<b>RPM</b>	1750									
<b>FRAME</b>	184TC						<b>HZ</b>	60		
<b>SER.F.</b>	1.15				<b>CODE</b>	J	<b>DES</b>	B		
<b>RATING</b>	40C AMB-CONT									
<b>SN</b>										
<b>DE</b>	6206						<b>ODE</b>	6206		
<b>NEMA-NOM-EFF</b>	89.5				<b>PF</b>	79				
<b>G.MIN.EFF</b>	87.5				<b>CC</b>	010A				
<b>T. CODE</b>	T3C				<b>T=</b>	160				
							<b>PH</b>	3		
							<b>CL</b>	F		

<b>Nameplate NP3260E</b>	
<b>SPEC.</b>	06H480X182G1
<b>D.E. BRG.</b>	30BC02XP30X
<b>O.D.E. BRG.</b>	30BC02XP30X
<b>GREASE</b>	POLYREX EM
<b>RPM MAX</b>	2700
<b>MAX. KVAR</b>	1.7
<b>BLANK</b>	
<b>INV. TYPE</b>	PWM
<b>T=</b>	160
<b>C HP FR</b>	60
<b>CT HZ FROM</b>	1.7
<b>VT HZ FROM</b>	0-
<b>C HP TO</b>	90
<b>CT HZ TO</b>	60
<b>VT HZ TO</b>	60
<b>HTR-VOLTS</b>	
<b>HTR-WATTS</b>	
<b>HTR-AMPS</b>	
<b>MAX. SPACE HEATER TEMP.</b>	

Parts List		
Part Number	Description	Quantity
SA242299	SA 06H480X182G1	1.000 EA
RA229210	RA 06H480X182G1	1.000 EA
36FN3000C01SP	EXFN, PLASTIC, 5.25 OD, .912 ID	1.000 EA
HW3201A05	3/8-16 EYEBOLT	1.000 EA
06CB1000A02G	CONDUIT BOX, MACH GRAY	1.000 EA
RM1016	LEAD SEPARATOR GASKET - 305/306 C.P.MOTO	1.000 EA
51XF2520A16	SCREW,HEX SER SLT HD,ZN 1/4-20X1.00LG TD	2.000 EA
WD1000B16	T&B CX70TN TERMINAL	2.000 EA
10XN2520S06	1/4 20X3/8 HX HD CAP S.S.	2.000 EA
11XW1032G06	10-32 X .38, TAPTITE II, HEX WSHR SLTD U	1.000 EA
HW3001B01	BRASS CUP WASHER, FOR #10 SCREW	1.000 EA
36EP1100B73G	FREP 6206,GRSR,RLF, .25-20 FH HOLES @.50	1.000 EA
HW4500A01	1641B(ALEMITE)400 UNIV, GREASE FITT	1.000 EA
HA4051A00	PLASTIC CAP FOR GREASE FITTING	1.000 EA
HW4500A17	317400 ALEMITE GREASE RELIEF	1.000 EA
HA4054	SHORT T-DRAIN FITTING, .125" N.P.T.	1.000 EA
HW5100A06	W2420-025 WVY WSHR (WB)	1.000 EA
36EP1300A48G	SPL PU 206 BRG. 182-4TC W/GREASER & RELI	1.000 EA
HW4500A01	1641B(ALEMITE)400 UNIV, GREASE FITT	1.000 EA
HA4051A00	PLASTIC CAP FOR GREASE FITTING	1.000 EA
HW4500A17	317400 ALEMITE GREASE RELIEF	1.000 EA
HA4054	SHORT T-DRAIN FITTING, .125" N.P.T.	1.000 EA
10XN2520A24	1/4-20X 1 1/2 HEX HD X	4.000 EA
HA3101A34	THRUBOLT- 1/4-20 X 10.375	4.000 EA

Parts List (continued)		
Part Number	Description	Quantity
51XB1214A16	12-14X1.00 HXWSSLD SERTYB	1.000 EA
36FH1001A02G	FAN HOUSING MACH, W/GRAY EPOXY	1.000 EA
10XN2520A16	1/4-20 X 1 HEX HEAD CAP SCR, ZINC PLATED	3.000 EA
WD4100A02	DP-1000 HEYCO PLUG OR 62MP1000 MICRO PL	1.000 EA
36FH4500A10	DRIP/FAN COVER, W/PRIMER	1.000 EA
12XF0832A06	8-32 X 3/8 TYP HX SL	4.000 EA
06CB1502A01G	LIPPED CONDUIT BOX LID, MACH GRAY EPOXY	1.000 EA
06GS1003	GASKET, KOBX LID, 1/8" THICK BLACK NEOPR	1.000 EA
10XN2520A12	O1/4-20X 3/4 HEX HEAD CAP	2.000 EA
HW1001A25	LOCKWASHER 1/4, ZINC PLT .493 OD, .255 I	2.000 EA
HA1005A22	SLINGER, OD 2.00, ID 1.14, 206 BRG, GM	1.000 EA
HW4600B36SP	V-RING SLINGER 1.188 X 1.690 X .24 VITON	1.000 EA
HW2501E16	KEY, 1/4 SQ X 1.750	1.000 EA
HA7000A02	KEY RETAINER RING, 1 1/8 DIA, 1 3/8 DIA	1.000 EA
MJ5001A27	32220KN GRAY SEALER *MIN BUY 4 QTS=1GAL	0.001 QT
85XU0407S04	4X1/4 U DRIVE PIN STAINLESS	2.000 EA
LB1115N	LABEL,LIFTING DEVICE (ON ROLLS)	1.000 EA
LB1002N	LABEL,MARINE DUTY (ON ROLLS)	1.000 EA
MJ1000A02	GREASE, POLYREX EM EXXON (USe 4824-15A)	0.050 LB
MG1025N19	WILKOFASST, 778.50, RELIANCE BLUE-GREEN	0.028 GA
LB1449	DIV-2/NEC WARNING LABEL	1.000 EA
LC0005E01	CONN.DIA./WARNING LABEL (LC0005/LB1119N)	1.000 EA
NP3257E	SS CP SUPER-E DIV-2 UL CSA-C US EEV PREM	1.000 EA
NP3260E	SS CP SUPER-E AUX DATA INFORMATION	1.000 EA

Product Information Packet: VECP3665T - 5HP,1750RPM,3PH,60HZ,184TC,0642M,TEFC,F1

85XU0407S04	4X1/4 U DRIVE PIN STAINLESS	2.000 EA
36PA1001	PKG GRP, PRINT PK1017A06	1.000 EA
PK3082	STYROFOAM CRADLE	1.000 EA
MN416A01	TAG-INSTAL-MAINT no wire (1200/bx) 5/18	1.000 EA

**AC Induction Motor Performance Data**

Record # 47003 - Typical performance - not guaranteed values

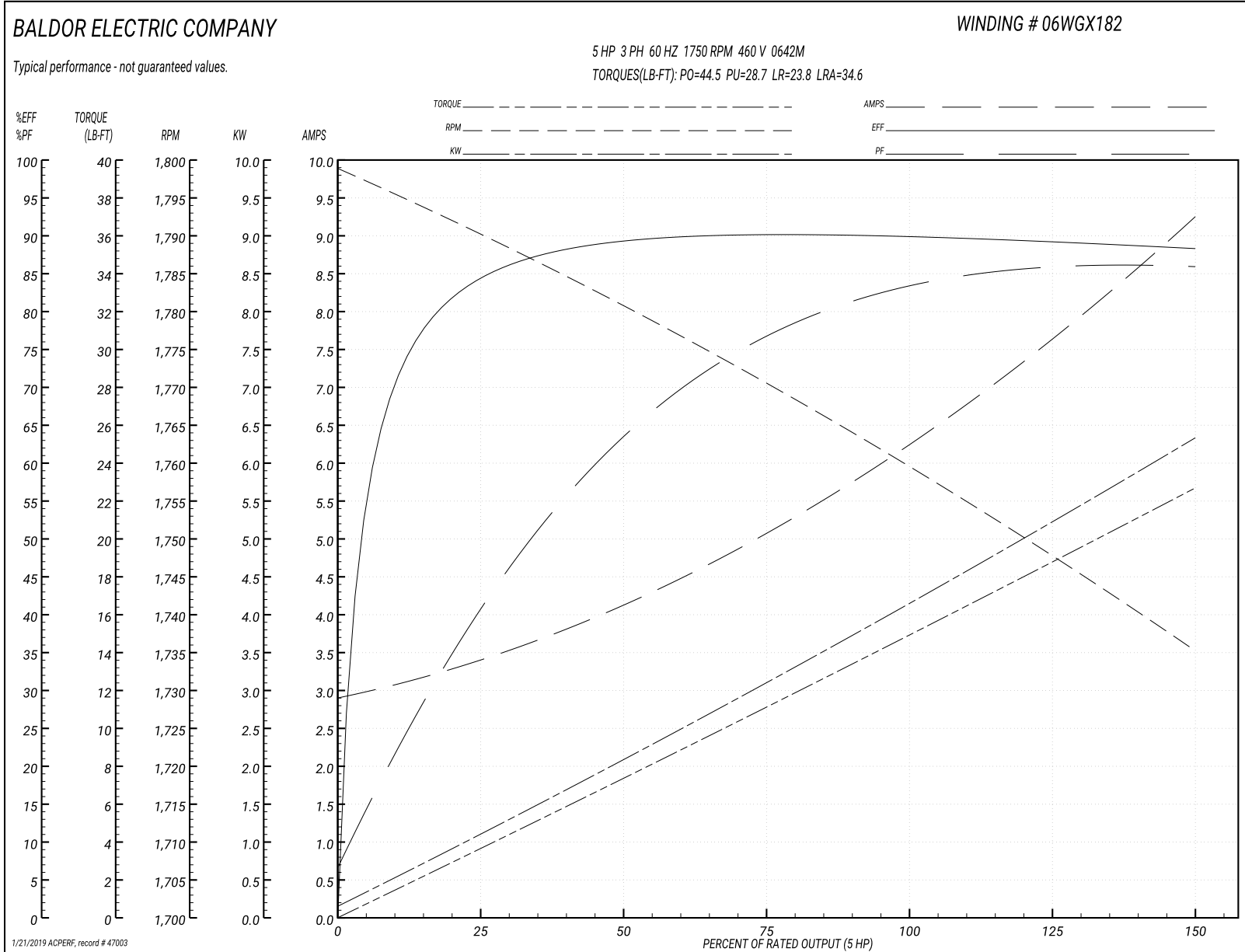
<b>Winding:</b> 06WGX182-R063	<b>Type:</b> 0642M	<b>Enclosure:</b> TEFC
-------------------------------	--------------------	------------------------

Nameplate Data				460 V, 60 Hz: High Voltage Connection	
Rated Output (HP)	5			Full Load Torque	14.9 LB-FT
Volts	208-230/460			Start Configuration	direct on line
Full Load Amps	14-13.2/6.6			Breakdown Torque	44.5 LB-FT
R.P.M.	1750			Pull-up Torque	28.7 LB-FT
Hz	60	Phase	3	Locked-rotor Torque	23.8 LB-FT
NEMA Design Code	B	KVA Code	J	Starting Current	34.6 A
Service Factor (S.F.)	1.15			No-load Current	2.99 A
NEMA Nom. Eff.	89.5	Power Factor	79	Line-line Res. @ 25°C	2.63 Ω
Rating - Duty	40C AMB-CONT			Temp. Rise @ Rated Load	54°C
S.F. Amps				Temp. Rise @ S.F. Load	67°C
				Locked-rotor Power Factor	40.5
				Rotor inertia	0.391 LB-FT <sup>2</sup>

Load Characteristics 460 V, 60 Hz, 5 HP

% of Rated Load	25	50	75	100	125	150	S.F.
Power Factor	42	65	76	82	85	87	81
Efficiency	84.3	89.2	90.2	90.1	89.3	88.3	89.2
Speed	1790	1781	1770	1760	1748	1735	1743
Line amperes	3.3	4.06	5.09	6.32	7.69	9.19	7.48

Performance Graph at 460V, 60Hz, 5.0HP Typical performance - Not guaranteed values



**AC Induction Motor Performance Data**

Record # 49253 - Typical performance - not guaranteed values

<b>Winding:</b> 06WGX182-R063	<b>Type:</b> 0642M	<b>Enclosure:</b> TEFC
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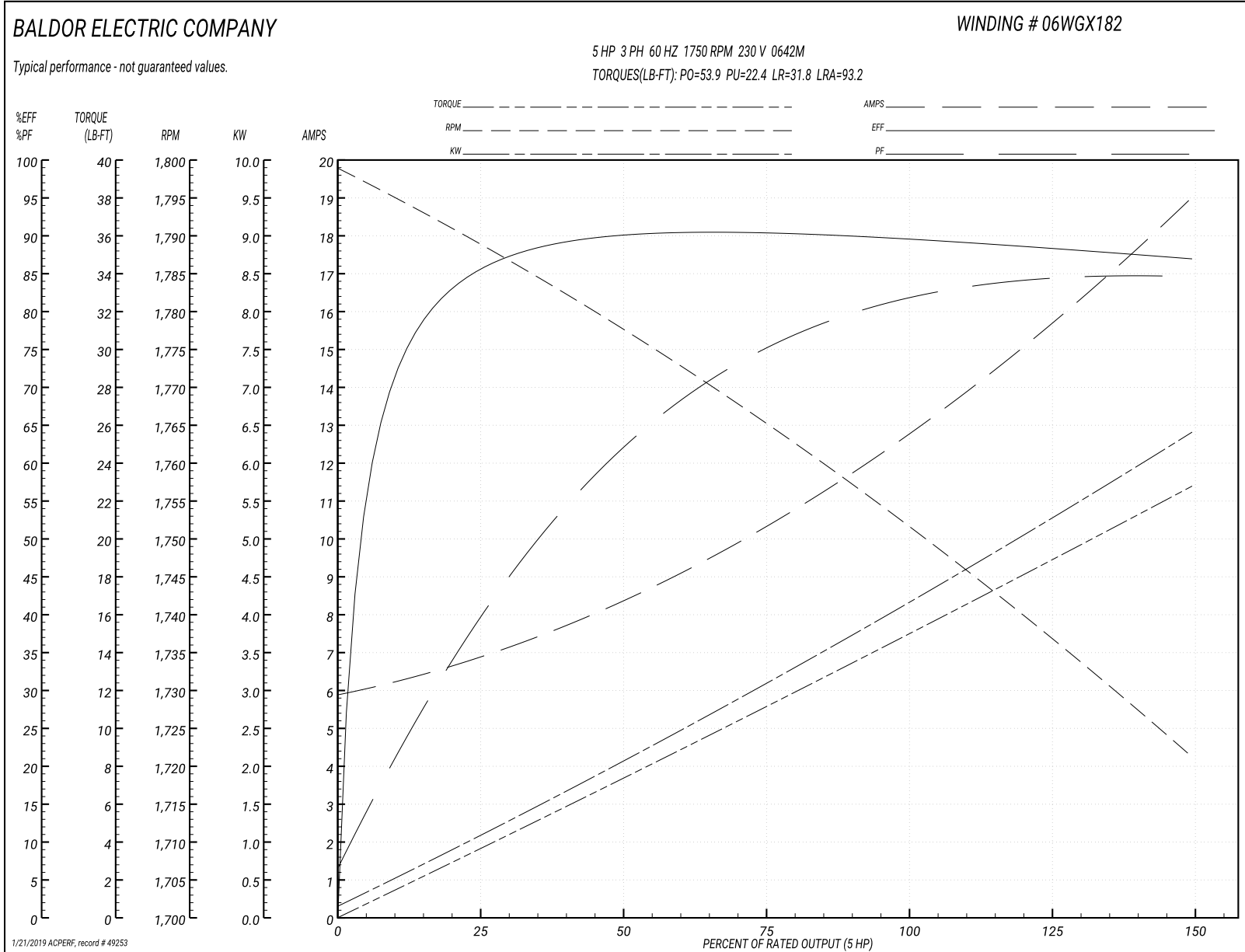
Nameplate Data				230 V, 60 Hz: Low Voltage Connection	
Rated Output (HP)	5			Full Load Torque	15 LB-FT
Volts	208-230/460			Start Configuration	direct on line
Full Load Amps	14-13/6.5			Breakdown Torque	53.9 LB-FT
R.P.M.	1750			Pull-up Torque	22.4 LB-FT
Hz	60	Phase	3	Locked-rotor Torque	31.8 LB-FT
NEMA Design Code	B	KVA Code	J	Starting Current	93.2 A
Service Factor (S.F.)	1.15			No-load Current	6.04 A
NEMA Nom. Eff.	89.5	Power Factor	79	Line-line Res. @ 25°C	0.658 Ω
Rating - Duty	40C AMB-CONT			Temp. Rise @ Rated Load	53°C
S.F. Amps				Temp. Rise @ S.F. Load	65°C
				Locked-rotor Power Factor	40.5
				Rotor inertia	0.391 LB-FT <sup>2</sup>

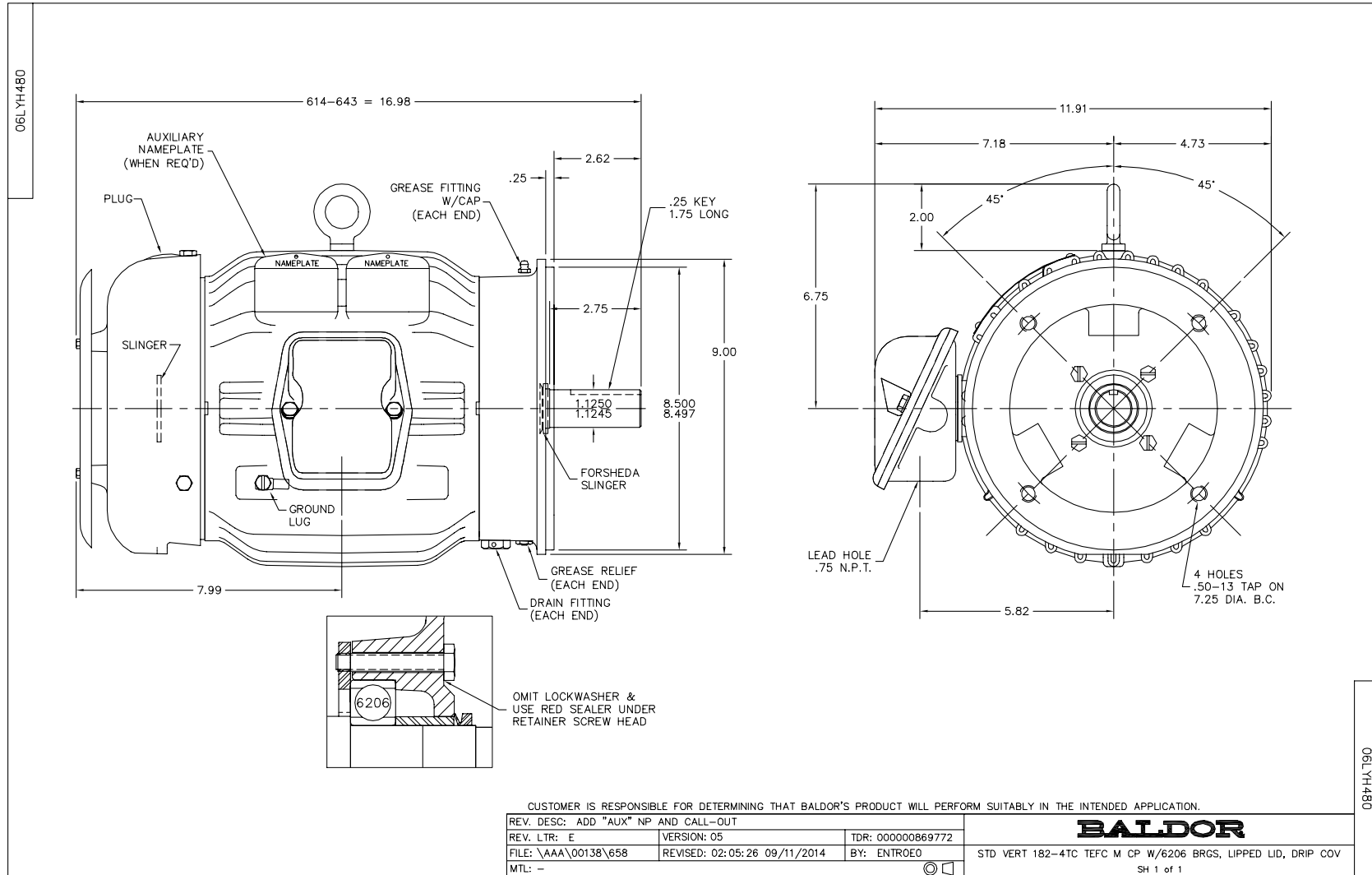
Load Characteristics 230 V, 60 Hz, 5 HP

% of Rated Load	25	50	75	100	125	150	S.F.
Power Factor	41	63	75	81	84	85	81
Efficiency	85.2	89.8	90.4	89.8	88.4	86.9	88.8
Speed	1789	1777	1765	1752	1737	1721	1739
Line amperes	6.7	8.28	10.4	12.9	15.8	18.9	15

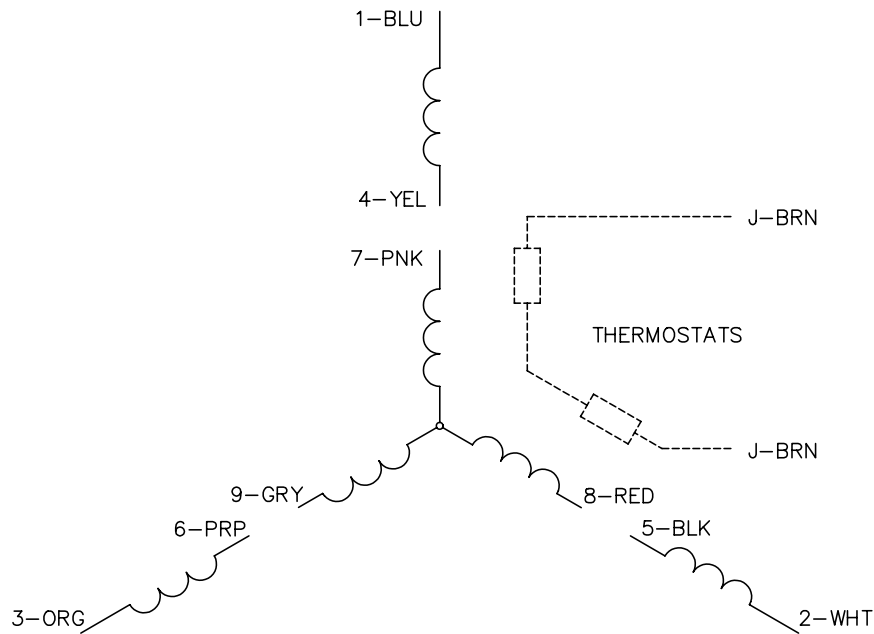


Performance Graph at 230V, 60Hz, 5.0HP Typical performance - Not guaranteed values

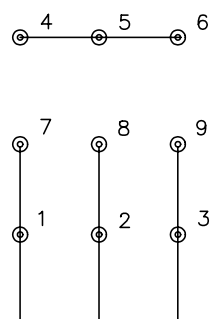




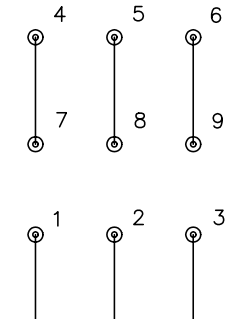
CD0005



LOW VOLTAGE  
(2Y)



HIGH VOLTAGE  
(1Y)



NOTES:

1. INTERCHANGE ANY TWO LINE LEADS TO REVERSE ROTATION.
2. OPTIONAL THERMOSTATS ARE PROVIDED WHEN SPECIFIED.
3. ACTUAL NUMBER OF INTERNAL PARALLEL CIRCUITS MAY BE A MULTIPLE OF THOSE SHOWN ABOVE.
4. LEAD COLORS ARE OPTIONAL. LEADS MUST ALWAYS BE NUMBERED AS SHOWN.

REV. DESC: REVISE TO SHOW OPTIONAL COLORS			
REV. LTR: E	BY: JLP	REVISED: 01/19/99 10:15	TDR: 0171435
90000		FILE: AAA00005140	MDL: -
		MTL: -	

**BALDOR ELECTRIC Co.**

3PH, DV, 9 LEADS

CD0005

**BALDOR • RELIANCE**



**Integral Horsepower  
AC Induction Motors**

**Installation & Operating Manual**

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# Section 1

## General Information

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**Overview** This manual contains general procedures that apply to Baldor Motor products. Be sure to read and understand the Safety Notice statements in this manual. For your protection, do not install, operate or attempt to perform maintenance procedures until you understand the Warning and Caution statements. A Warning statement indicates a possible unsafe condition that can cause harm to personnel. A Caution statement indicates a condition that can cause damage to equipment.

**Important:** **This instruction manual is not intended to include a comprehensive listing of all details for all procedures required for installation, operation and maintenance. This manual describes general guidelines that apply to most of the motor products shipped by Baldor. If you have a question about a procedure or are uncertain about any detail, Do Not Proceed. Please contact your Baldor distributor for more information or clarification.**

Before you install, operate or perform maintenance, become familiar with the following:

- NEMA Publication MG-2, Safety Standard for Construction and guide for Selection, Installation and Use of Electric Motors and Generators.
- The National Electrical Code
- Local codes and Practices

### Limited Warranty

[www.baldor.com/support/warranty\\_standard.asp](http://www.baldor.com/support/warranty_standard.asp)

**Safety Notice:** This equipment contains high voltage! Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt installation, operation and maintenance of electrical equipment.

Be sure that you are completely familiar with NEMA publication MG-2, safety standards for construction and guide for selection, installation and use of electric motors and generators, the National Electrical Code and local codes and practices. Unsafe installation or use can cause conditions that lead to serious or fatal injury. Only qualified personnel should attempt the installation, operation and maintenance of this equipment.

**WARNING:** **Do not touch electrical connections before you first ensure that power has been disconnected. Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt the installation, operation and maintenance of this equipment.**

**WARNING:** **Disconnect all electrical power from the motor windings and accessory devices before disassembly of the motor. Electrical shock can cause serious or fatal injury.**

**WARNING:** **Be sure the system is properly grounded before applying power. Do not apply AC power before you ensure that all grounding instructions have been followed. Electrical shock can cause serious or fatal injury. National Electrical Code and Local codes must be carefully followed.**

**WARNING:** **Avoid extended exposure to machinery with high noise levels. Be sure to wear ear protective devices to reduce harmful effects to your hearing.**

**WARNING:** **Surface temperatures of motor enclosures may reach temperatures which can cause discomfort or injury to personnel accidentally coming into contact with hot surfaces. When installing, protection should be provided by the user to protect against accidental contact with hot surfaces. Failure to observe this precaution could result in bodily injury.**

**WARNING:** **This equipment may be connected to other machinery that has rotating parts or parts that are driven by this equipment. Improper use can cause serious or fatal injury. Only qualified personnel should attempt to install operate or maintain this equipment.**

**WARNING:** **Do not by-pass or disable protective devices or safety guards. Safety features are designed to prevent damage to personnel or equipment. These devices can only provide protection if they remain operative.**

**WARNING:** **Avoid the use of automatic reset devices if the automatic restarting of equipment can be hazardous to personnel or equipment.**

**WARNING:** **Be sure the load is properly coupled to the motor shaft before applying power. The shaft key must be fully captive by the load device. Improper coupling can cause harm to personnel or equipment if the load decouples from the shaft during operation.**

**WARNING:** **Use proper care and procedures that are safe during handling, lifting, installing, operating and maintaining operations. Improper methods may cause muscle strain or other harm.**

**WARNING:** **Thermostat contacts automatically reset when the motor has slightly cooled down. To prevent injury or damage, the control circuit should be designed so that automatic starting of the motor is not possible when the thermostat resets.**



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**Safety Notice** Continued

- WARNING:** UL Listed motors must only be serviced by UL Approved Authorized Baldor Service Centers if these motors are to be returned to a hazardous and/or explosive atmosphere.
- WARNING:** Pacemaker danger – Magnetic and electromagnetic fields in the vicinity of current carrying carrying conductors and permanent magnet motors can result result in a serious health hazard to persons with cardiac pacemakers, metal implants, and hearing aids. To avoid risk, stay way from the area surrounding a permanent magnet motor.
- WARNING:** Before performing any motor maintenance procedure, be sure that the equipment connected to the motor shaft cannot cause shaft rotation. If the load can cause shaft rotation, disconnect the load from the motor shaft before maintenance is performed. Unexpected mechanical rotation of the motor parts can cause injury or motor damage.
- WARNING:** Use only UL/CSA listed explosion proof motors in the presence of flammable or combustible vapors or dust.
- WARNING:** Motors that are to be used in flammable and/or explosive atmospheres must display the UL label on the nameplate along with CSA listed logo. Specific service conditions for these motors are defined in NFPA 70 (NEC) Article 500.
- WARNING:** Guards must be installed for rotating parts such as couplings, pulleys, external fans, and unused shaft extensions, should be permanently guarded to prevent accidental contact by personnel. Accidental contact with body parts or clothing can cause serious or fatal injury.
- Caution:** To prevent premature equipment failure or damage, only qualified maintenance personnel should perform maintenance.
- Caution:** Do not over-lubricate motor as this may cause premature bearing failure.
- Caution:** Do not over tension belts. Excess tension may damage the motor or driven equipment.
- Caution:** Do not lift the motor and its driven load by the motor lifting hardware. The motor lifting hardware is adequate for lifting only the motor. Disconnect the load (gears, pumps, compressors, or other driven equipment) from the motor shaft before lifting the motor.
- Caution:** If eye bolts are used for lifting a motor, be sure they are securely tightened. The lifting direction should not exceed a 20° angle from the shank of the eye bolt or lifting lug. Excessive lifting angles can cause damage.
- Caution:** To prevent equipment damage, be sure that the electrical service is not capable of delivering more than the maximum motor rated amps listed on the rating plate.
- Caution:** If a HI POT test (High Potential Insulation test) must be performed, follow the precautions and procedure in NEMA MG1 and MG2 standards to avoid equipment damage.
- If you have any questions or are uncertain about any statement or procedure, or if you require additional information please contact your Baldor distributor or an Authorized Baldor Service Center.

**Receiving**

Each Baldor Electric Motor is thoroughly tested at the factory and carefully packaged for shipment. When you receive your motor, there are several things you should do immediately.

1. Observe the condition of the shipping container and report any damage immediately to the commercial carrier that delivered your motor.
2. Verify that the part number of the motor you received is the same as the part number listed on your purchase order.

**Handling**

The motor should be lifted using the lifting lugs or eye bolts provided.

- Caution:** Do not lift the motor and its driven load by the motor lifting hardware. The motor lifting hardware is adequate for lifting only the motor. Disconnect the load (gears, pumps, compressors, or other driven equipment) from the motor shaft before lifting the motor.
1. Use the lugs or eye bolts provided to lift the motor. Never attempt to lift the motor and additional equipment connected to the motor by this method. The lugs or eye bolts provided are designed to lift only the motor. Never lift the motor by the motor shaft or the hood of a WP11 motor.
  2. To avoid condensation inside the motor, do not unpack until the motor has reached room temperature. (Room temperature is the temperature of the room in which it will be installed). The packing provides insulation from temperature changes during transportation.
  3. When lifting a WP11 (Weather Proof Type 2) motor, do not lift the motor by inserting lifting lugs into holes on top of the cooling hood. These lugs are to be used for hood removal only. A spreader bar should be used to lift the motor by the cast lifting lugs located on the motor frame.

- 
4. If the motor must be mounted to a plate with the driven equipment such as pump, compressor etc., it may not be possible to lift the motor alone. For this case, the assembly should be lifted by a sling around the mounting base. The entire assembly can be lifted as an assembly for installation.

Do not lift the assembly using the motor lugs or eye bolts provided. Lugs or eye bolts are designed to lift motor only. If the load is unbalanced (as with couplings or additional attachments) additional slings or other means must be used to prevent tipping. In any event, the load must be secure before lifting. If the load is unbalanced (as with couplings or additional attachments) additional slings or other means must be used to prevent tipping. In any event, the load must be secure before lifting.

## **Storage**

Storage requirements for motors and generators that will not be placed in service for at least six months from date of shipment.

Improper motor storage will result in seriously reduced reliability and failure. An electric motor that does not experience regular usage while being exposed to normally humid atmospheric conditions is likely to develop rust in the bearings or rust particles from surrounding surfaces may contaminate the bearings. The electrical insulation may absorb an excessive amount of moisture leading to the motor winding failure.

A wooden crate "shell" should be constructed to secure the motor during storage. This is similar to an export box but the sides & top must be secured to the wooden base with lag bolts (not nailed as export boxes are) to allow opening and reclosing many times without damage to the "shell".

Minimum resistance of motor winding insulation is 5 Meg ohms or the calculated minimum, whichever is greater. Minimum resistance is calculated as follows:  $R_m = kV + 1$

where: (Rm is minimum resistance to ground in Meg-Ohms and  
kV is rated nameplate voltage defined as Kilo-Volts.)

Example: For a 480VAC rated motor  $R_m = 1.48$  meg-ohms (use 5 MΩ).

For a 4160VAC rated motor  $R_m = 5.16$  meg-ohms.

## **Preparation for Storage**

1. Some motors have a shipping brace attached to the shaft to prevent damage during transportation. The shipping brace, if provided, must be removed and stored for future use. The brace must be reinstalled to hold the shaft firmly in place against the bearing before the motor is moved.
2. Store in a clean, dry, protected warehouse where control is maintained as follows:
  - a. Shock or vibration must not exceed 2 mils maximum at 60 hertz, to prevent the bearings from brinelling. If shock or vibration exceeds this limit vibration isolation pads must be used.
  - b. Storage temperatures of 10°C (50°F) to 49°C (120°F) must be maintained.
  - c. Relative humidity must not exceed 60%.
  - d. Motor space heaters (when present) are to be connected and energized whenever there is a possibility that the storage ambient conditions will reach the dew point. Space heaters are optional.  
Note: Remove motor from containers when heaters are energized, reprotect if necessary.
3. Measure and record the resistance of the winding insulation (dielectric withstand) every 30 days of storage.
  - a. If motor insulation resistance decreases below the minimum resistance, contact your Baldor District office.
  - b. Place new desiccant inside the vapor bag and re-seal by taping it closed.
  - c. If a zipper-closing type bag is used instead of the heat-sealed type bag, zip the bag closed instead of taping it. Be sure to place new desiccant inside bag after each monthly inspection.
  - d. Place the shell over the motor and secure with lag bolts.
4. Where motors are mounted to machinery, the mounting must be such that the drains and breathers are fully operable and are at the lowest point of the motor. Vertical motors must be stored in the vertical position. Storage environment must be maintained as stated in step 2.

- 
5. Motors with anti-friction bearings are to be greased at the time of going into extended storage with periodic service as follows:
    - a. Motors marked "Do Not Lubricate" on the nameplate do not need to be greased before or during storage.
    - b. Ball and roller bearing (anti-friction) motor shafts are to be rotated manually every 3 months and greased every 6 months in accordance with the Maintenance section of this manual.
    - c. Sleeve bearing (oil lube) motors are drained of oil prior to shipment. The oil reservoirs must be refilled to the indicated level with the specified lubricant, (see Maintenance). The shaft should be rotated monthly by hand at least 10 to 15 revolutions to distribute oil to bearing surfaces.
    - d. "Provisions for oil mist lubrication" – These motors are packed with grease. Storage procedures are the same as paragraph 5b.
    - e. "Oil Mist Lubricated" – These bearings are protected for temporary storage by a corrosion inhibitor. If stored for greater than 3 months or outdoor storage is anticipated, connected to the oil mist system while in storage. If this is not possible, add the amount of grease indicated under "Standard Condition" in Section 3, then rotate the shaft 15 times by hand.
  6. All breather drains are to be fully operable while in storage (drain plugs removed). The motors must be stored so that the drain is at the lowest point. All breathers and automatic "T" drains must be operable to allow breathing and draining at points other than through the bearings around the shaft. Vertical motors should be stored in a safe stable vertical position.
  7. Coat all external machined surfaces with a rust preventing material. An acceptable product for this purpose is Exxon Rust Ban # 392.

#### **Non-Regreaseable Motors**

Non-regreasable motors with "Do Not Lubricate" on the nameplate should have the motor shaft rotated 15 times to redistribute the grease within the bearing every 3 months or more often.

#### **All Other Motor Types**

Before storage, the following procedure must be performed.

1. Remove the grease drain plug, if supplied, (opposite the grease fitting) on the bottom of each bracket prior to lubricating the motor.
2. The motor with regreasable bearing must be greased as instructed in Section 3 of this manual.
3. Replace the grease drain plug after greasing.
4. The motor shaft must be rotated a minimum of 15 times after greasing.
5. Motor Shafts are to be rotated at least 15 revolutions manually every 3 months and additional grease added every nine months (see Section 3) to each bearing.
6. Bearings are to be greased at the time of removal from storage.

#### **Removal From Storage**

1. Remove all packing material.
2. Measure and record the electrical resistance of the winding insulation resistance meter at the time of removal from storage. The insulation resistance must not be less than 50% from the initial reading recorded when the motor was placed into storage. A decrease in resistance indicates moisture in the windings and necessitates electrical or mechanical drying before the motor can be placed into service. If resistance is low, contact your Baldor District office.
3. Regrease the bearings as instructed in Section 3 of this manual.
4. Reinstall the original shipping brace if motor is to be moved. This will hold the shaft firmly against the bearing and prevent damage during movement.

## Section 2 Installation & Operation

---

### Overview

Installation should conform to the National Electrical Code as well as local codes and practices. When other devices are coupled to the motor shaft, be sure to install protective devices to prevent future accidents. Some protective devices include, coupling, belt guard, chain guard, shaft covers etc. These protect against accidental contact with moving parts. Machinery that is accessible to personnel should provide further protection in the form of guard rails, screening, warning signs etc.

### Location

It is important that motors be installed in locations that are compatible with motor enclosure and ambient conditions. Improper selection of the motor enclosure and ambient conditions can lead to reduced operating life of the motor.

Proper ventilation for the motor must be provided. Obstructed airflow can lead to reduction of motor life.

1. **Open Drip-Proof/WPI** motors are intended for use indoors where atmosphere is relatively clean, dry, well ventilated and non-corrosive.
2. **Totally Enclosed and WPII** motors may be installed where dirt, moisture or dust are present and in outdoor locations.

Severe Duty, IEEE 841 and Washdown Duty enclosed motors are designed for installations with high corrosion or excessive moisture conditions. These motors should not be placed into an environment where there is the presence of flammable or combustible vapors, dust or any combustible material, unless specifically designed for this type of service.

**Hazardous Locations** are those where there is a risk of ignition or explosion due to the presence of combustible gases, vapors, dust, fibers, or flyings. Facilities requiring special equipment for hazardous locations are typically classified in accordance with local requirements. In the US market, guidance is provided by the National Electric Code.

### **Caution:**

**Do not lift the motor and its driven load by the motor lifting hardware. The motor lifting hardware is adequate for lifting only the motor. Disconnect the load (gears, pumps, compressors, or other driven equipment) from the motor shaft before lifting the motor.**

### Mounting

The motor must be securely installed to a rigid foundation or mounting surface to minimize vibration and maintain alignment between the motor and shaft load. Failure to provide a proper mounting surface may cause vibration, misalignment and bearing damage.

Foundation caps and sole plates are designed to act as spacers for the equipment they support. If these devices are used, be sure that they are evenly supported by the foundation or mounting surface.

After installation is complete and accurate alignment of the motor and load is accomplished, the base should be grouted to the foundation to maintain this alignment.

The standard motor base is designed for horizontal or vertical mounting. Adjustable or sliding rails are designed for horizontal mounting only. Consult your Baldor distributor or authorized Baldor Service Center for further information.

### Alignment

Accurate alignment of the motor with the driven equipment is extremely important. The pulley, sprocket, or gear used in the drive should be located on the shaft as close to the shaft shoulder as possible.

It is recommended to heat the pulley, sprocket, or gear before installing on the motor shaft.

Forcibly driving a unit on the motor shaft will damage the bearings.

#### 1. **Direct Coupling**

For direct drive, use flexible couplings if possible. Consult the drive or equipment manufacturer for more information. Mechanical vibration and roughness during operation may indicate poor alignment. Use dial indicators to check alignment. The space between coupling hubs should be maintained as recommended by the coupling manufacturer.

#### 2. **End-Play Adjustment**

The axial position of the motor frame with respect to its load is also extremely important. The motor bearings are not designed for excessive external axial thrust loads. Improper adjustment will cause failure.

#### 3. **Pulley Ratio**

The pulley ratio should not exceed 8:1.

### **Caution:**

**Do not over tension belts. Excess tension may damage the motor or driven equipment.**

#### 4. **Belt Drive**

Align sheaves carefully to minimize belt wear and axial bearing loads (see End-Play Adjustment). Belt tension should be sufficient to prevent belt slippage at rated speed and load. However, belt slippage may occur during starting.

5. Sleeve bearing motors are only suitable for coupled loads.

**Doweling & Bolting** After proper alignment is verified, dowel pins should be inserted through the motor feet into the foundation. This will maintain the correct motor position should motor removal be required. (Baldor motors are designed for doweling.)

1. Drill dowel holes in diagonally opposite motor feet in the locations provided.
2. Drill corresponding holes in the foundation.
3. Ream all holes.
4. Install proper fitting dowels.
5. Mounting bolts must be carefully tightened to prevent changes in alignment. Use a flat washer and lock washer under each nut or bolt head to hold the motor feet secure. Flanged nuts or bolts may be used as an alternative to washers.

**WARNING:** Guards must be installed for rotating parts such as couplings, pulleys, external fans, and unused shaft extensions, should be permanently guarded to prevent accidental contact by personnel. Accidental contact with body parts or clothing can cause serious or fatal injury.

**Guarding** Guards must be installed for rotating parts such as couplings, pulleys, external fans, and unused shaft extensions. This is particularly important where the parts have surface irregularities such as keys, key ways or set screws. Some satisfactory methods of guarding are:

1. Covering the machine and associated rotating parts with structural or decorative parts of the driven equipment.
2. Providing covers for the rotating parts. Covers should be sufficiently rigid to maintain adequate guarding during normal service.

**Power Connection** Motor and control wiring, overload protection, disconnects, accessories and grounding should conform to the National Electrical Code and local codes and practices. Flying leads must be insulated with two full wraps of electrical grade insulating tape or heat shrink tubing.

**Conduit Box** For ease of making connections, an oversize conduit box is provided.

The box can be rotated 360° in 90° increments.

Auxiliary conduit boxes are provided on some motors for accessories such as space heaters, RTD's etc.

**AC Power** Connect the motor leads as shown on the connection diagram located on the name plate or inside the cover on the conduit box. Be sure the following guidelines are met:

1. AC power is within  $\pm 10\%$  of rated voltage with rated frequency. (See motor name plate for ratings).  
**OR**
2. AC power is within  $\pm 5\%$  of rated frequency with rated voltage.  
**OR**
3. A combined variation in voltage and frequency of  $\pm 10\%$  (sum of absolute values) of rated values, provided the frequency variation does not exceed  $\pm 5\%$  of rated frequency.

Performance within these voltage and frequency variations are shown in Figure 2-2.

**Figure 2-1 Accessory Connections**

HEATERS



One heater is installed in each end of motor. Leads for each heater are labeled H1 & H2. (Like numbers should be tied together).

THERMISTORS



Three thermistors are installed in windings and tied in series. Leads are labeled T1 & T2.

WINDING RTDS



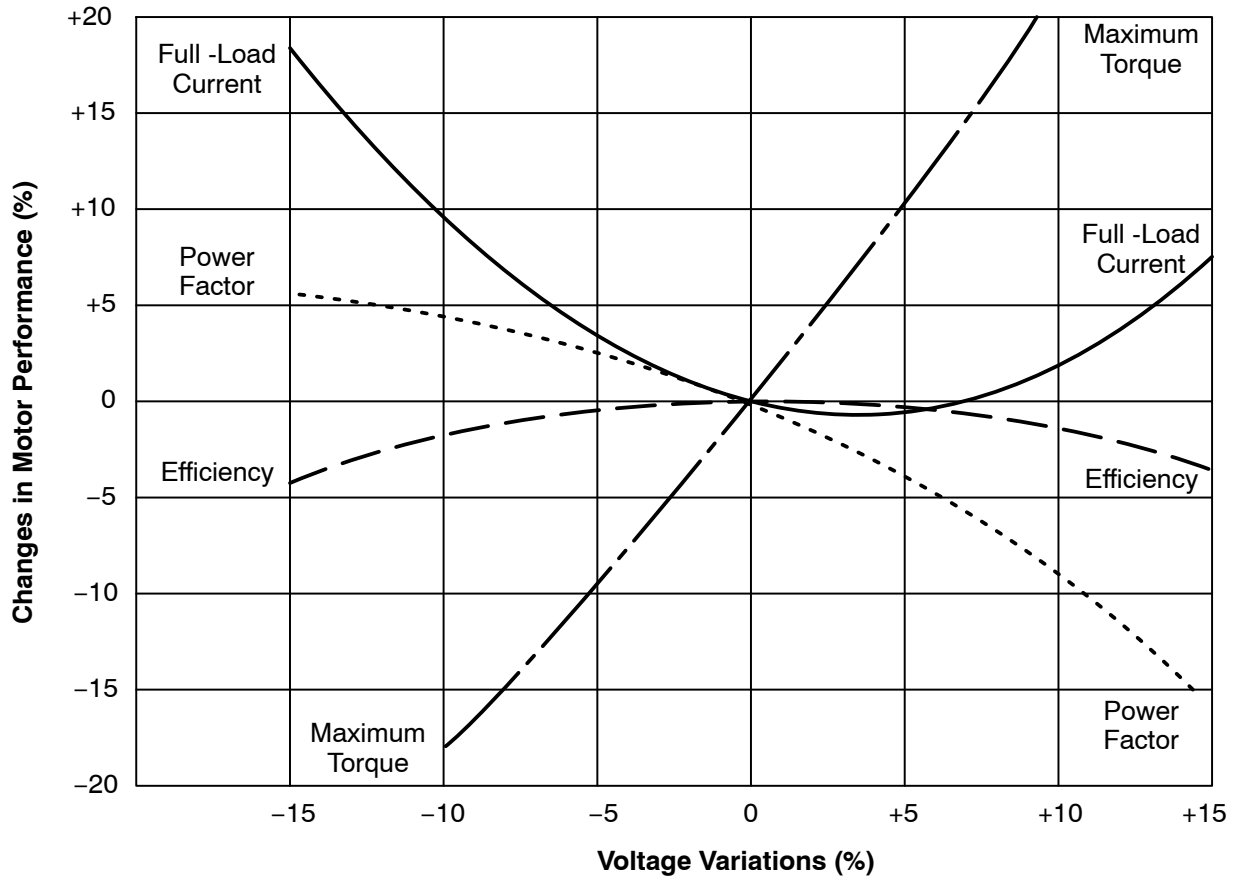
Winding RTDs are installed in windings (2) per phase. Each set of leads is labeled W1, W2, W3, W4, W5, & W6.

BEARING RTD



- \* One bearing RTD is installed in Drive endplate (PUPEP), leads are labeled RTDDE.
- \* One bearing RTD is installed in Opposite Drive endplate (FREPE), leads are labeled RTDODE.
- \* Note RTD may have 2-Red/1-White leads; or 2-White/1-Red Lead.

**Figure 2-2 Typical Motor Performance VS Voltage Variations**



**Rotation** All three phase motors are reversible. To reverse the direction of rotation, disconnect and lock out power and interchange any two of the three line leads for three phase motors. For single phase motors, check the connection diagram to determine if the motor is reversible and follow the connection instructions for lead numbers to be interchanged. Not all single phase motors are reversible.

Adjustable Frequency Power Inverters used to supply adjustable frequency power to induction motors produce wave forms with lower order harmonics with voltage spikes superimposed. Turn-to-turn, phase-to-phase, and ground insulation of stator windings are subject to the resulting dielectric stresses. Suitable precautions should be taken in the design of these drive systems to minimize the magnitude of these voltage spikes. Consult the drive instructions for maximum acceptable motor lead lengths, and proper grounding.

- 
- First Time Start Up** Be sure that all power to motor and accessories is off. Be sure the motor shaft is disconnected from the load and will not cause mechanical rotation of the motor shaft.
1. Make sure that the mechanical installation is secure. All bolts and nuts are tightened etc.
  2. If motor has been in storage or idle for some time, check winding insulation integrity.
  3. Inspect all electrical connections for proper termination, clearance, mechanical strength and electrical continuity.
  4. Be sure all shipping materials and braces (if used) are removed from motor shaft.
  5. Manually rotate the motor shaft to ensure that it rotates freely.
  6. Replace all panels and covers that were removed during installation.
  7. Momentarily apply power and check the direction of rotation of the motor shaft.
  8. If motor rotation is wrong, be sure power is off and change the motor lead connections. Verify rotation direction before you continue.
  9. Start the motor and ensure operation is smooth without excessive vibration or noise. If so, run the motor for 1 hour with no load connected.
  10. After 1 hour of operation, disconnect power and connect the load to the motor shaft. Verify all coupling guards and protective devices are installed. Ensure motor is properly ventilated.

- Coupled Start Up** This procedure assumes a coupled start up. Also, that the first time start up procedure was successful.
1. Check the coupling and ensure that all guards and protective devices are installed.
  2. Check that the coupling is properly aligned and not binding.
  3. The first coupled start up should be with no load. Apply power and verify that the load is not transmitting excessive vibration back to the motor through the coupling or the foundation. Vibration should be at an acceptable level.
  4. Run for approximately 1 hour with the driven equipment in an unloaded condition.

The equipment can now be loaded and operated within specified limits. Do not exceed the name plate ratings for amperes for steady continuous loads.

**Jogging and Repeated Starts** Repeated starts and/or jogs of induction motors generally reduce the life of the motor winding insulation. A much greater amount of heat is produced by each acceleration or jog than by the same motor under full load. If it is necessary to repeatedly start or jog the motor, it is advisable to check the application with your local Baldor distributor or Baldor Service Center.

**Heating** - Duty rating and maximum ambient temperature are stated on the motor name plate. Do not exceed these values. If there is any question regarding safe operation, contact your local Baldor District Office or Baldor Service Center.

## Section 3 Maintenance & Troubleshooting

**WARNING:** UL Listed motors must only be serviced by UL Approved Authorized Baldor Service Centers if these motors are to be returned to a hazardous and/or explosive atmosphere.

**General Inspection** Inspect the motor at regular intervals, approximately every 500 hours of operation or every 3 months, whichever occurs first. Keep the motor clean and the ventilation openings clear. The following steps should be performed at each inspection:

**WARNING:** Do not touch electrical connections before you first ensure that power has been disconnected. Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt the installation, operation and maintenance of this equipment.

1. Check that the motor is clean. Check that the interior and exterior of the motor is free of dirt, oil, grease, water, etc. Oily vapor, paper pulp, textile lint, etc. can accumulate and block motor ventilation. If the motor is not properly ventilated, overheating can occur and cause early motor failure.
2. Use a “Megger” periodically to ensure that the integrity of the winding insulation has been maintained. Record the Megger readings. Immediately investigate any significant drop in insulation resistance.
3. Check all electrical connectors to be sure that they are tight.

**Relubrication & Bearings** Bearing grease will lose its lubricating ability over time, not suddenly. The lubricating ability of a grease (over time) depends primarily on the type of grease, the size of the bearing, the speed at which the bearing operates and the severity of the operating conditions. Good results can be obtained if the following recommendations are used in your maintenance program.

**Type of Grease** A high grade ball or roller bearing grease should be used. Recommended grease for standard service conditions is **Polyrex EM (Exxon Mobil)**. Do not mix greases unless compatibility has been checked and verified.

Equivalent and compatible greases include:

Texaco Polystar, Rykon Premium #2, Pennzoil Pen 2 Lube and Chevron SRI.

**Relubrication Intervals** Recommended relubrication intervals are shown in Table 3-1. It is important to realize that the recommended intervals of Table 3-1 are based on average use.

Refer to additional information contained in Tables 3-2, 3-3 and 3-4.

**Table 3-1 Relubrication Intervals \***

NEMA / (IEC) Frame Size	Rated Speed - RPM					
	10000	6000	3600	1800	1200	900
Up to 210 incl. (132)	**	2700 Hrs.	5500 Hrs.	12000 Hrs.	18000 Hrs.	22000 Hrs.
Over 210 to 280 incl. (180)		**	3600 Hrs.	9500 Hrs.	15000 Hrs.	18000 Hrs.
Over 280 to 360 incl. (225)		**	* 2200 Hrs.	7400 Hrs.	12000 Hrs.	15000 Hrs.
Over 360 to 5800 incl. (300)		**	*2200 Hrs.	3500 Hrs.	7400 Hrs.	10500 Hrs.

\* Relubrication intervals are for ball bearings.

For vertically mounted motors and roller bearings, divide the relubrication interval by 2.

\*\* For motors operating at speeds greater than 3600 RPM, contact Baldor for relubrication recommendations.



**Table 3-2 Service Conditions**

Severity of Service	Hours per day of Operation	Ambient Temperature Maximum	Atmospheric Contamination
Standard	8	40° C	Clean, Little Corrosion
Severe	16 Plus	50° C	Moderate dirt, Corrosion
Extreme	16 Plus	>50° C* or Class H Insulation	Severe dirt, Abrasive dust, Corrosion, Heavy Shock or Vibration
Low Temperature		<-29° C **	

\* Special high temperature grease is recommended (Dow Corning DC44). Note that Dow Corning DC44 grease does not mix with other grease types. Thoroughly clean bearing & cavity before adding grease.

\*\* Special low temperature grease is recommended (Aeroshell 7).

**Table 3-3 Relubrication Interval Multiplier**

Severity of Service	Multiplier
Standard	1.0
Severe	0.5
Extreme	0.1
Low Temperature	1.0

Some motor designs use different bearings on each motor end. This is normally indicated on the motor nameplate. In this case, the larger bearing is installed on the motor Drive endplate. For best relubrication results, only use the appropriate amount of grease for each bearing size (not the same for both).

**Table 3-4 Bearings Sizes and Types**

Frame Size NEMA (IEC)	Bearing Description (These are the "Large" bearings (Shaft End) in each frame size)			
	Bearing	Weight of Grease to add * oz (Grams)	Volume of grease to be added	
			in <sup>3</sup>	teaspoon
56 to 140 (90)	6203	0.08 (2.4)	0.15	0.5
140 (90)	6205	0.15 (3.9)	0.2	0.8
180 (100-112)	6206	0.19 (5.0)	0.3	1.0
210 (132)	6307	0.30 (8.4)	0.6	2.0
250 (160)	6309	0.47 (12.5)	0.7	2.5
280 (180)	6311	0.61 (17)	1.2	3.9
320 (200)	6312	0.76 (20.1)	1.2	4.0
360 (225)	6313	0.81 (23)	1.5	5.2
400 (250)	6316	1.25 (33)	2.0	6.6
440 (280)	6319	2.12 (60)	4.1	13.4
5000 to 5800 (315-450)	6328	4.70 (130)	9.2	30.0
5000 to 5800 (315-450)	NU328	4.70 (130)	9.2	30.0
360 to 449 (225-280)	NU319	2.12 (60)	4.1	13.4
<b>AC Induction Servo</b>				
76 Frame 180 (112)	6207	0.22 (6.1)	0.44	1.4
77 Frame 210 (132)	6210	0.32 (9.0)	0.64	2.1
80 Frame 250(160)	6213	0.49 (14.0)	0.99	3.3

\* Weight in grams = .005 DB of grease to be added

Note: Not all bearing sizes are listed. For intermediate bearing sizes, use the grease volume for the next larger size bearing.

---

**Caution:** To avoid damage to motor bearings, grease must be kept free of dirt. For an extremely dirty environment, contact your Baldor distributor or an authorized Baldor Service Center for additional information.

**Relubrication Procedure** Be sure that the grease you are adding to the motor is compatible with the grease already in the motor. Consult your Baldor distributor or an authorized service center if a grease other than the recommended type is to be used.

**Caution:** Do not over-lubricate motor as this may cause premature bearing failure.

**With Grease Outlet Plug**

1. With the motor stopped, clean all grease fittings with a clean cloth.
2. Remove grease outlet plug.

**Caution:** Over-lubricating can cause excessive bearing temperatures, premature lubrication breakdown and bearing failure.

3. Add the recommended amount of grease.
4. Operate the motor for 15 minutes with grease plug removed.  
This allows excess grease to purge.
5. Re-install grease outlet plug.

**Without Grease Provisions**

**Note:** Only a Baldor authorized and UL or CSA certified service center can disassemble a UL/CSA listed explosion proof motor to maintain it's UL/CSA listing.

1. Disassemble the motor.
2. Add recommended amount of grease to bearing and bearing cavity. (Bearing should be about 1/3 full of grease and outboard bearing cavity should be about 1/2 full of grease.)
3. Assemble the motor.

**Sample Relubrication Determination**

Assume - NEMA 286T (IEC 180), 1750 RPM motor driving an exhaust fan in an ambient temperature of 43° C and the atmosphere is moderately corrosive.

1. Table 3-1 list 9500 hours for standard conditions.
2. Table 3-2 classifies severity of service as "Severe".
3. Table 3-4 shows that 1.2 in<sup>3</sup> or 3.9 teaspoon of grease is to be added.

Note: Smaller bearings in size category may require reduced amounts of grease.

**Table 3-5 Troubleshooting Chart**

Symptom	Possible Causes	Possible Solutions
Motor will not start	Usually caused by line trouble, such as, single phasing at the starter.	Check source of power. Check overloads, fuses, controls, etc.
Excessive humming	High Voltage.	Check input line connections.
	Eccentric air gap.	Have motor serviced at local Baldor service center.
Motor Over Heating	Overload. Compare actual amps (measured) with nameplate rating.	Locate and remove source of excessive friction in motor or load. Reduce load or replace with motor of greater capacity.
	Single Phasing.	Check current at all phases (should be approximately equal) to isolate and correct the problem.
	Improper ventilation.	Check external cooling fan to be sure air is moving properly across cooling fins. Excessive dirt build-up on motor. Clean motor.
	Unbalanced voltage.	Check voltage at all phases (should be approximately equal) to isolate and correct the problem.
	Rotor rubbing on stator.	Check air gap clearance and bearings. Tighten "Thru Bolts".
	Over voltage or under voltage.	Check input voltage at each phase to motor.
	Open stator winding.	Check stator resistance at all three phases for balance.
	Grounded winding.	Perform dielectric test and repair as required.
	Improper connections.	Inspect all electrical connections for proper termination, clearance, mechanical strength and electrical continuity. Refer to motor lead connection diagram.
	Bearing Over Heating	Misalignment.
Excessive belt tension.		Reduce belt tension to proper point for load.
Excessive end thrust.		Reduce the end thrust from driven machine.
Excessive grease in bearing.		Remove grease until cavity is approximately $\frac{3}{4}$ filled.
Insufficient grease in bearing.		Add grease until cavity is approximately $\frac{3}{4}$ filled.
Dirt in bearing.		Clean bearing cavity and bearing. Repack with correct grease until cavity is approximately $\frac{3}{4}$ filled.
Vibration	Misalignment.	Check and align motor and driven equipment.
	Rubbing between rotating parts and stationary parts.	Isolate and eliminate cause of rubbing.
	Rotor out of balance.	Have rotor balance checked and repaired at your Baldor Service Center.
	Resonance.	Tune system or contact your Baldor Service Center for assistance.
Noise	Foreign material in air gap or ventilation openings.	Remove rotor and foreign material. Reinstall rotor. Check insulation integrity. Clean ventilation openings.
Growling or whining	Bad bearing.	Replace bearing. Clean all grease from cavity and new bearing. Repack with correct grease until cavity is approximately $\frac{3}{4}$ filled.

**Suggested bearing and winding RTD setting guidelines**

Most large frame AC Baldor motors with a 1.15 service factor are designed to operate below a Class B (80°C) temperature rise at rated load and are built with a Class H winding insulation system. Based on this low temperature rise, RTD (Resistance Temperature Detectors) settings for Class B rise should be used as a starting point. Some motors with 1.0 service factor have Class F temperature rise.

The following tables show the suggested alarm and trip settings for RTDs. Proper bearing and winding RTD alarm and trip settings should be selected based on these tables unless otherwise specified for specific applications.

If the driven load is found to operate well below the initial temperature settings under normal conditions, the alarm and trip settings may be reduced so that an abnormal machine load will be identified.

The temperature limits are based on the installation of the winding RTDs imbedded in the winding as specified by NEMA. Bearing RTDs should be installed so they are in contact with the outer race on ball or roller bearings or in direct contact with the sleeve bearing shell.

**Winding RTDs – Temperature Limit In °C (40°C Maximum Ambient)**

Motor Load	Class B Temp Rise ≤ 80°C (Typical Design)		Class F Temp Rise ≤ 105°C		Class H Temp Rise ≤ 125°C	
	Alarm	Trip	Alarm	Trip	Alarm	Trip
≤ Rated Load	130	140	155	165	175	185
Rated Load to 1.15 S.F.	140	150	160	165	180	185

Note: • Winding RTDs are factory production installed, not from Mod-Express.  
 • When Class H temperatures are used, consider bearing temperatures and relubrication requirements.

**Bearing RTDs – Temperature Limit In °C (40°C Maximum Ambient)**

Bearing Type Oil or Grease	Anti-Friction		Sleeve	
	Alarm	Trip	Alarm	Trip
Standard*	95	100	85	95
High Temperature**	110	115	105	110

Note: \* Bearing temperature limits are for standard design motors operating at Class B temperature rise.  
 \*\* High temperature lubricants include some special synthetic oils and greases.

Greases that may be substituted that are compatible with Polyrex EM (but considered as “standard” lubricants) include the following:

- Texaco Polystar
- Mobilith SHC-100
- Darmex 707
- Rykon Premium #2
- Pennzoil Pennzlube EM-2
- Darmex 711
- Chevron SRI #2
- Chevron Black Pearl
- Petro-Canada Peerless LLG

See the motor nameplate for replacement grease or oil recommendation.  
 Contact Baldor application engineering for special lubricants or further clarifications.







\* 4 0 0 - 0 2 0 9 \*



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**[www.baldor.com](http://www.baldor.com)**

## INLET PRESSURE SENSOR

IFM PM1707

## APPENDIX INFORMATION

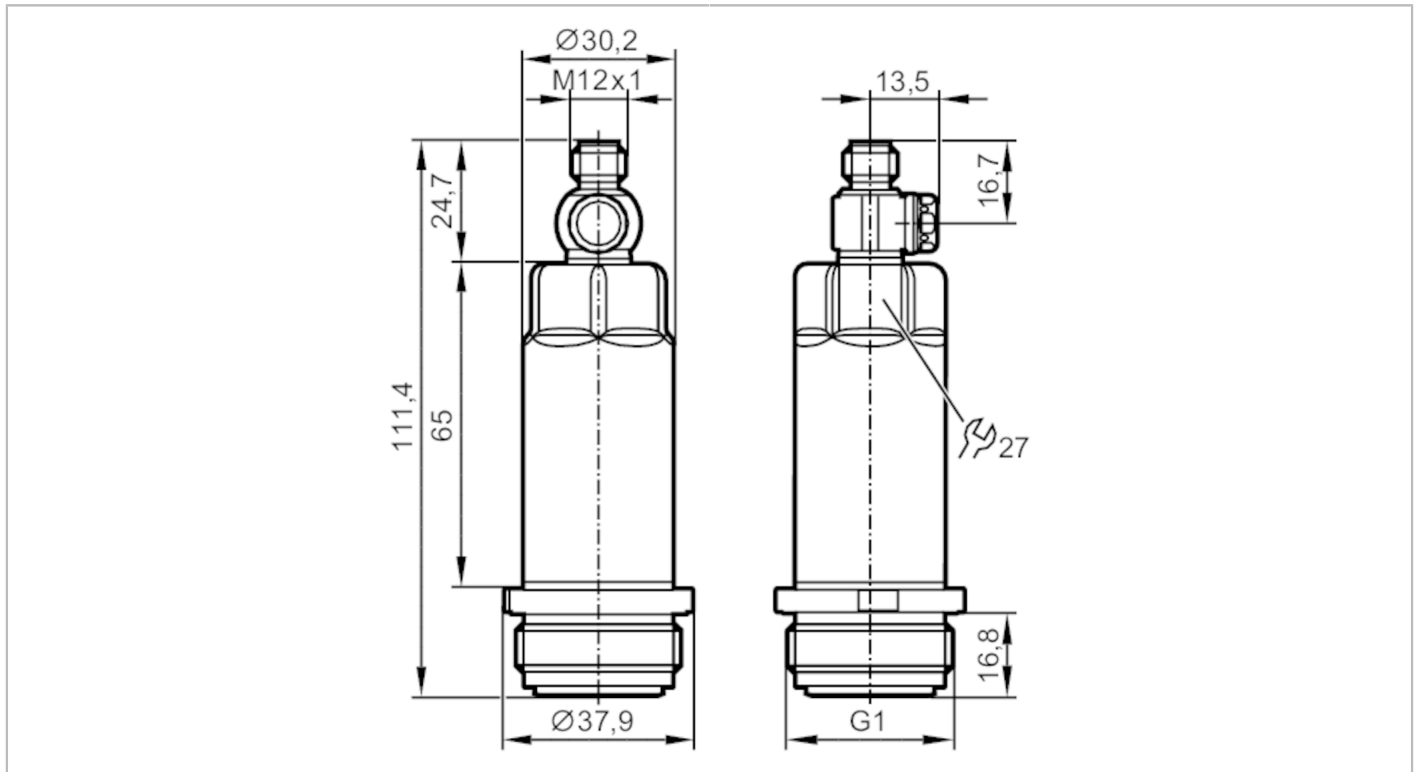


# PM1707



## Electronic pressure sensor

PM-001BREA01-4-ZVG/US



ACS IO-Link Reg31

Application	
Measuring element	ceramic-capacitive pressure measuring cell
Media	viscous media and liquids with suspended particles; liquids and gases
Medium temperature [°C]	-25...125; (150 max. 1h)
Pressure rating	145 psi      1000 kPa      10000 mbar
Min. bursting pressure	435 psi      3000 kPa      30000 mbar
Vacuum resistance [mbar]	-1000
Type of pressure	relative pressure
No dead space	yes
Electrical data	
Operating voltage [V]	18...30 DC
Min. insulation resistance [M $\Omega$ ]	100; (500 V DC)
Protection class	III
Reverse polarity protection	yes
Integrated watchdog	yes
2-wire	
Current consumption [mA]	3.5...21.5
Power-on delay time [s]	1
3-wire	
Current consumption [mA]	< 45
Power-on delay time [s]	0.5

# PM1707



## Electronic pressure sensor

PM-001BREA01-4-ZVG/US

Outputs	
Total number of outputs	1
Output signal	analogue signal
Number of analogue outputs	1
Analogue current output [mA]	4...20; (scalable)
Max. load [ $\Omega$ ]	700; ( $U_b = 24\text{ V}$ ; ( $U_b - 9\text{ V}$ ) / 21.5 mA)
Short-circuit proof	yes
Overload protection	yes

Measuring/setting range			
Measuring range	-0.73...14.5 psi	-5...100 kPa	-50...1000 mbar
Analogue start point	-0.73...11.6 psi	-5...80 kPa	-50...800 mbar
Analogue end point	2.18...14.5 psi	15...100 kPa	150...1000 mbar
In steps of	0.01 psi	0.05 kPa	0.5 mbar
Factory setting	ASP = 0,0 mbar	AEP = 1000 mbar	

Accuracy / deviations	
Repeatability [% of the span]	$< \pm 0,1$ ; (with temperature fluctuations $< 10\text{ K}$ ; Turn down 1:1)
Characteristics deviation [% of the span]	$< \pm 0,2$ (nach DIN EN 61298-2); (incl. drift when overtightened, zero point and span error, non-linearity, hysteresis; Turn down 1:1)
Linearity deviation [% of the span]	$< \pm 0,15$ ; (Turn down 1:1)
Hysteresis deviation [% of the span]	$< \pm 0,15$ ; (Turn down 1:1)
Long-term stability [% of the span]	$< \pm 0,1$ ; (Turn down 1:1; per year)
Temperature coefficient zero point [% of the span / 10 K]	$< \pm 0,05$ ; (0...70 °C)
Temperature coefficient span [% of the span / 10 K]	$< \pm 0,15$ ; (0...70 °C)

Response times	
Damping for the analogue output dAA [s]	0...4
2-wire	
Step response time analogue output [ms]	30
3-wire	
Step response time analogue output [ms]	7


Interfaces	
Communication interface	IO-Link
Transmission type	COM2 (38,4 kBaud)
IO-Link revision	1.1
IO-Link device ID	668 d / 00 02 9c h
Profiles	Digital Measuring Sensor (0x000A), Identification and Diagnosis (0x4000)
SIO mode	no
Required master port type	A
Process data analogue	3
Min. process cycle time [ms]	3.2

# PM1707



## Electronic pressure sensor

PM-001BREA01-4-ZVG/US

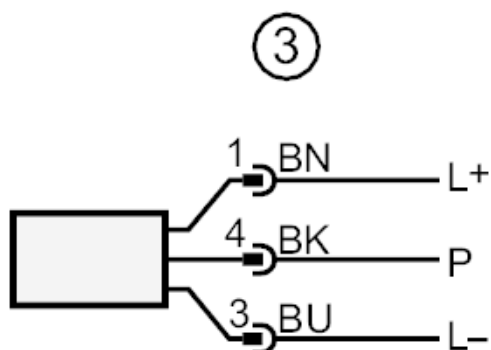
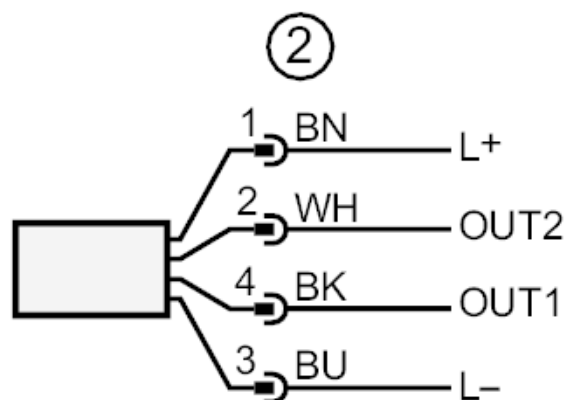
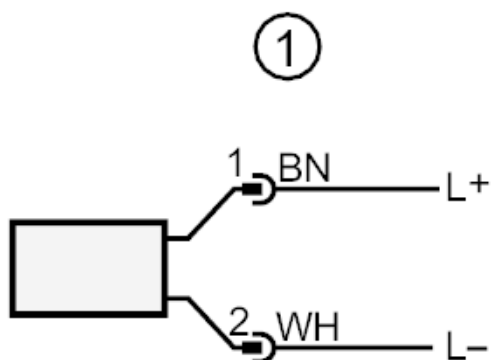
Operating conditions			
Ambient temperature	[°C]	-25...80	
Storage temperature	[°C]	-40...100	
Protection		IP 67; IP 68; IP 69K	
Tests / approvals			
EMC		DIN EN 61326-1	
Shock resistance		DIN EN 60068-2-27	50 g (11 ms)
Vibration resistance		DIN EN 60068-2-6	20 g (10...2000 Hz)
MTTF	[years]	323	
Mechanical data			
Weight	[g]	281.5	
Materials		stainless steel (1.4404 / 316L); PBT	
Materials (wetted parts)		ceramics (99.9 % Al <sub>2</sub> O <sub>3</sub> ); PTFE; stainless steel (1.4435 / 316L); surface characteristics: Ra < 0,4 / Rz 4	
Min. pressure cycles		100 million	
Tightening torque	[Nm]	35; (recommended tightening torque depends on lubrication, seal and pressure rating)	
Process connection		threaded connection G 1 external thread Aseptoflex Vario	
Displays / operating elements			
Display unit		mbar; psi; kPa; mWS; inH <sub>2</sub> O	
Remarks			
Pack quantity		1 pcs.	
Electrical connection			
Connector: 1 x M12; Contacts: gold-plated			
			



## Electronic pressure sensor

PM-001BREA01-4-ZVG/US

### Connection



colours to DIN EN 60947-5-2

- 1 connection for 2-wire operation
- 2 connection for 3-wire operation
- 3 connection for IO-Link parameter setting (P = communication via IO-Link)

Core colours :

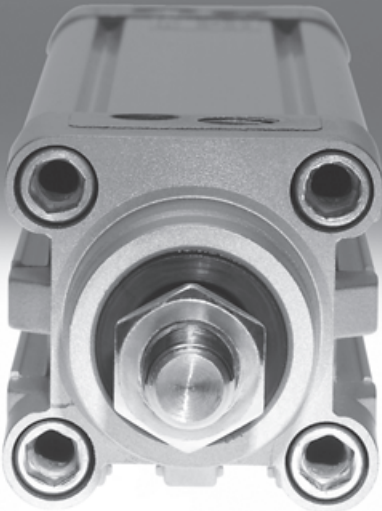
- BK = black
- BN = brown
- BU = blue
- WH = white

## PNEUMATIC CYLINDERS FOR PRESS CONE

(2x) FESTO DNC-125-250-P-A-R3

### APPENDIX INFORMATION

Standard cylinders DNC, ISO 15552



# Standard cylinders DNC, ISO 15552

Key features

FESTO

## At a glance



DIN



- Standards-based cylinders to ISO 15552 (corresponds to the withdrawn standards ISO 6431, DIN ISO 6431, VDMA 24 562, NF E 49 003.1 and UNI 10290)

- The modern design and construction save up to 11% on fitting space compared to ordinary standard cylinders, thus permitting a considerably more compact system design

- An extensive range of accessories makes it possible to install the cylinder virtually anywhere
- The widest range of variants on the market provides the right DNC cylinder for every application

## Cylinder with clamping units

DNC-KP



- Piston rod can be held or clamped in any position
- Piston rod can be held in position for long periods even with alternating loads, fluctuating operating pressure or leaks in the system

DNCKE



- Suitable for use in safety-related control systems in compliance with EN 954-1, EN 1050, EN 292 and EN 983
- Fail-safe
- Piston rod can be clamped in any position

## Cylinder with end-position locking

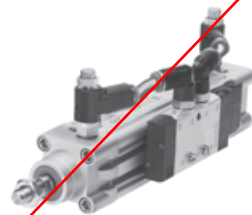
DNC- ... -EL



- Mechanical locking when the end position is reached
- Lock is only automatically released when pressure is supplied to the cylinder
- End-position locking at one or both ends

## Cylinder/valve combination

DNC-V1 ... V6



- The cylinder/valve combination is assembled and fitted with tubing ready for connection
- Particularly suitable for decentralised use in larger systems

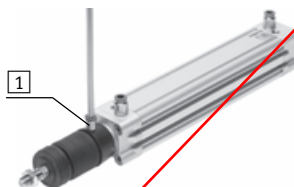
## Tandem cylinder

DNCT



- Connection of 2 cylinders with the same piston diameter and stroke in series
- Double the thrust and return force in comparison to a standard cylinder

## Longer service life thanks to the bellows kit DADB






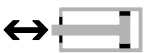







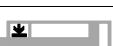
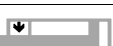
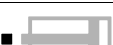

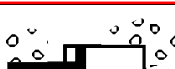
The bellows kit is a leak-free system. To prevent unwanted media being drawn in, the supply and exhaust air must be ducted via a pressure compensation hole in the connection part **1**.

The kit protects the piston rod, seal and bearings from a wide range of media, for example:

- dust,
- chips,
- oil,
- grease,
- fuel.

# Standard cylinders DNC, ISO 15552

Key features

Variants from the modular product system		
Symbol	Key features	Description
	S2 Through piston rod	For working at both ends with the same force in the forward and return stroke, for attaching external stops
	S6 Heat-resistant seals	Temperature resistance up to max. 120 °C
	S10 Constant motion (slow speed) at low piston speeds	Suitable for slow stroke movements at a constant, stick-slip-free speed over the full stroke of the cylinder. Seal contains silicone grease (not free of paint-wetting impairment substances)
	S11 Low friction	Special seals considerably reduce system wear. This means a considerably lower response pressure. Seal contains silicone grease (not free of paint-wetting impairment substances)
	S20 Through, hollow piston rod	For supplying vacuum, small parts, media, etc.
	K2 Extended male piston rod thread	–
	K3 Female piston rod thread	–
	K5 Special piston rod thread	Metric standard thread to ISO
	K7 Piston rod with external hexagon	Special spanner flats
	K8 Extended piston rod	–
	K10 Smooth anodised aluminium piston rod	Ideal for use in welding environments: – Protection against welding spatter – Small working loads – Harder surface compared to steel – Long service life
	KP With clamping unit	Integrated clamping unit on the piston rod
	EL With end-position locking	Positive locking in the end position as a drop guard. If there is a drop in pressure, the piston rod is secured in its end position to prevent it from dropping
	Q Square piston rod	Protection against rotation. For correctly oriented feeding
	R3 High corrosion protection	All external cylinder surfaces comply with corrosion resistance class 3 to Festo standard 940 070. The piston rod is made from corrosion and acid-resistant steel
	R8 Dust protection (wiper seal)	The cylinder is equipped with a hard-chrome plated piston rod and a rigid wiper seal, which protects against dry, dusty media

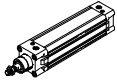
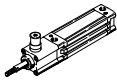
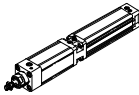
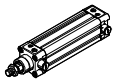
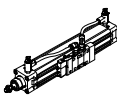
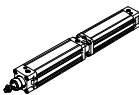
Software tools  
 → [www.festo.com](http://www.festo.com)  
 Configuration of Festo modular products  
 → [www.festo.com](http://www.festo.com)



# Standard cylinders DNC, ISO 15552

Product range overview



Function	Design	Type	Piston Ø	Stroke	Position sensing	Protection against rotation	Through/hollow piston rod	Extended male piston rod thread	Female piston rod thread	Special piston rod thread	
			[mm]	[mm]							A
Double-acting	<b>Basic version</b>										
		DNC	32, 40, 50, 63, 80, 100, 125	20, 25, 30, 40, 50, 60, 70, 80, 100, 125, 150, 160, 200, 250, 300, 320, 400, 500	10 ... 2000	■	■	■	■	■	■
	<b>Standard hole pattern, with clamping unit</b>										
		DNC-KP	32, 40, 50, 63, 80, 100, 125	–	10 ... 2000	■	■	■ S2	■	■	■
		DNCKE	40, 63, 100	–	10 ... 2000	■	–	–	–	–	–
	<b>Standard hole pattern, with end-position locking</b>										
		DNC-...-EL	32, 40, 50, 63, 80, 100	–	10 ... 2000	■	–	■ S2	■	■	■
<b>Standard hole pattern, cylinder/valve combination</b>											
	DNC-V1 ... V6	32, 40, 50, 63, 80, 100	–	100 ... 2000	■	■	■	■	■	■	
<b>Standard hole pattern, tandem cylinder</b>											
	DNCT	32, 40, 50	–	2 ... 500	■	–	–	–	–	–	
		63, 80, 100, 125		3 ... 500							

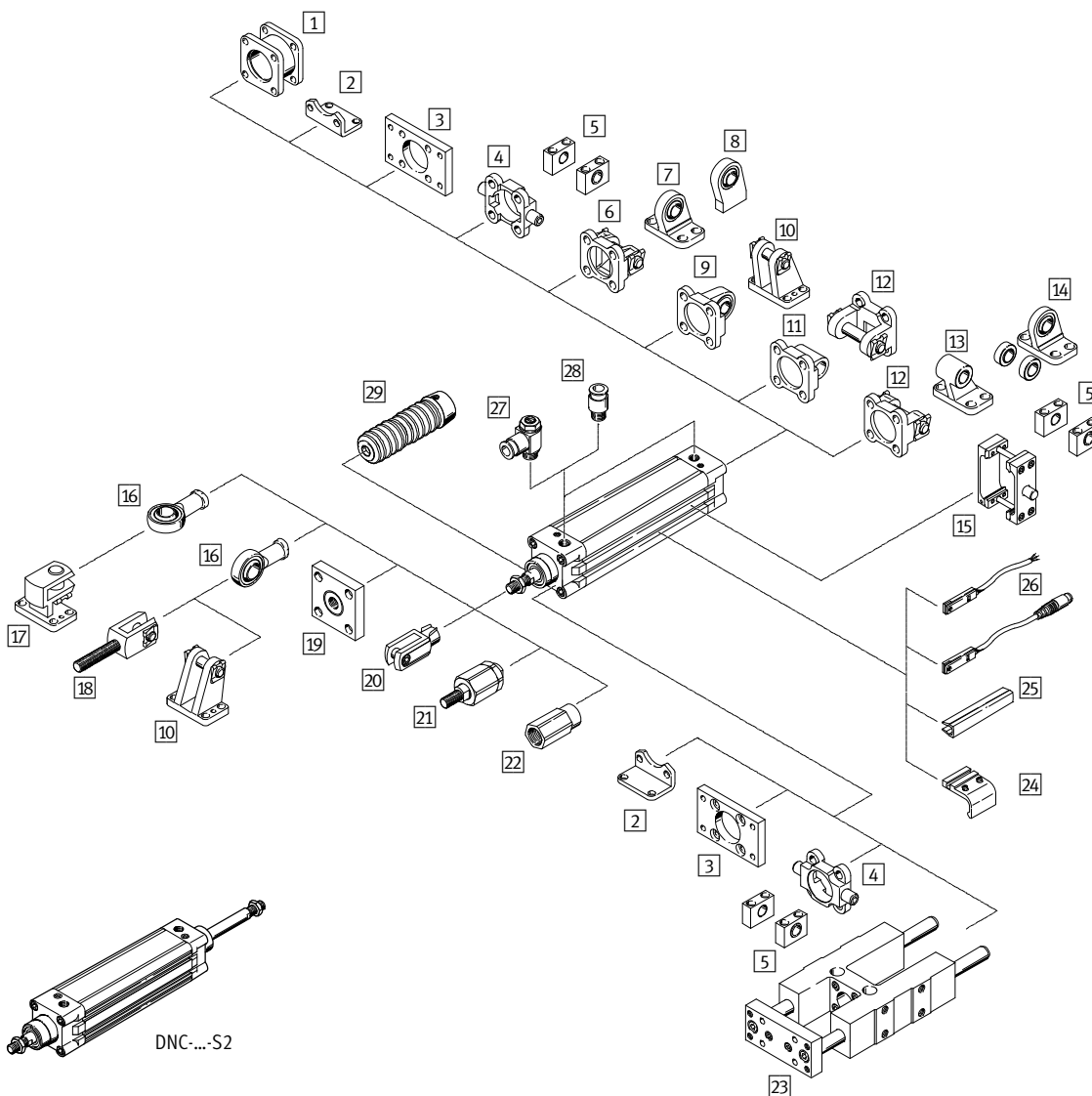
# Standard cylinders DNC, ISO 15552

Product range overview

Type	Special spanner flats	Extended piston rod	Smooth anodised piston rod	Heat-resistant seals to max. 120 °C	Slow speed (constant motion)	Low friction	High corrosion protection	Dust protection	Cylinder/valve combination	→ Page/Internet
	K7	K8	K10	S6	S10	S11	R3	R8	V1 ... V6	
<b>Basic version</b>										
DNC	■	■	■	■	■	■	■	■	-	9
<b>Standard hole pattern, with clamping unit</b>										
DNC-KP	■	■	-	-	-	-	-	-	■	25
DNCKE	-	-	-	-	-	-	-	-	-	2
<b>Standard hole pattern, with end-position locking</b>										
DNC-...-EL	-	■	-	-	-	-	-	-	-	33
<b>Standard hole pattern, cylinder/valve combination</b>										
DNC-V1 ... V6	■	■	■	-	■	■	-	■	■	40
<b>Standard hole pattern, tandem cylinder</b>										
DNCT	-	-	-	■	-	-	-	-	-	2

# Standard cylinders DNC, ISO 15552

Peripherals overview



Mounting attachments and accessories						
	Description	DNC				→ Page/ Internet
		Basic version	KP	EL	V1 ... V6	
1	Multi-position kit DPNC	■ <sup>1)</sup>	■	■	■ <sup>1)</sup>	49
2	Foot mounting HNC/CRHNC	■	■	■	■	50
3	Flange mounting FNC/CRFNG	■	■	■	■	51
4	Trunnion flange ZNCF/CRZNG	■	■	■	■	52
5	Trunnion support LNZG/CRLNZG	■	■	■	■	54
6	Swivel flange SNC	■ <sup>1)</sup>	■ <sup>1)</sup>	■	■ <sup>1)</sup>	55
7	Clevis foot LSNG	■ <sup>1)</sup>	■ <sup>1)</sup>	■	■ <sup>1)</sup>	58
8	Clevis foot LSNSG	■ <sup>1)</sup>	■ <sup>1)</sup>	■	■ <sup>1)</sup>	58

# Standard cylinders DNC, ISO 15552

Peripherals overview

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Mounting attachments and accessories							
	Description	DNC				→ Page/ Internet	
		Basic version	KP	EL	V1 ... V6		
9	Swivel flange SNCS/CRNCS/SNCS-...-R3	With spherical bearing for end caps	■ <sup>1)</sup>	■ <sup>1)</sup>	■	■ <sup>1)</sup>	57
10	Clevis foot LBG/LBG-...-R3	–	■ <sup>1)</sup>	■	■	■ <sup>1)</sup>	58
11	Swivel flange SNCL	For end caps	■ <sup>1)</sup>	■ <sup>1)</sup>	■	■ <sup>1)</sup>	57
12	Swivel flange SNCB/SNCB-...-R3	For end caps	■ <sup>1)</sup>	■ <sup>1)</sup>	■	■ <sup>1)</sup>	56
13	Clevis foot LNG/CRLNG	–	■ <sup>1)</sup>	■ <sup>1)</sup>	■	■ <sup>1)</sup>	58
14	Clevis foot LSN	With spherical bearing	■ <sup>1)</sup>	■ <sup>1)</sup>	■	■ <sup>1)</sup>	58
15	Trunnion mounting kit DAMT	For mounting anywhere along the cylinder profile barrel	■	■	■	■	53
16	Rod eye SGS/CRSGS	With spherical bearing	■	■	■	■	59
17	Right-angle clevis foot LQG	–	■	■	■	■	58
18	Rod clevis SGA	With male thread	■	■	■	■	59
19	Coupling piece KSG	To compensate for radial deviations	■	■	■	■	59
	Coupling piece KSZ	For cylinders with a non-rotating piston rod to compensate for radial deviations	■	■	■	■	59
20	Rod clevis SG/CRSG	Permits a swivelling movement of the cylinder in one plane	■	■	■	■	59
21	Self-aligning rod coupler FK/CRFK	For compensating radial and angular deviations	■	■	■	■	59
22	Adapter AD	For fitting a suction cup on a hollow cylinder piston rod	■	–	–	■	59
23	Guide unit FENG	For protecting standard cylinders against rotation at high torque loads	■	■ ∅ 50 and above	–	–	64
24	Mounting kit SMB-8-FENG	For attaching proximity sensor SMT-8 to cylinders in combination with guide unit FENG	■ <sup>2)</sup>	■ ∅ 50 and above	■	–	64
25	Slot cover ABP-5-S	For protecting the sensor cables and keeping dirt out of the sensor slots	■	■	■	■	65
26	Proximity sensor SME/SMT-8	Can be integrated in the cylinder profile barrel	■	■	■	■	65
27	One-way flow control valve GRLA	For regulating speed	■	■	■	■	66
28	Push-in fitting QS	For connecting compressed air tubing with standard outside diameter	■	■	■	■	quick star
29	Bellows kit DADB	– Protects the cylinder (piston rod, seal and bearings) against a wide range of media and thus prevents premature wear – The kit can only be used in combination with an extended piston rod (K8)	■	–	■	■	60


1) Not with variant S2 or S20

2) For piston ∅ 32, 40 mm only with variant R3

# Standard cylinders DNC, ISO 15552

Type codes

		DNC	-	125	-	250	-	P	-	A
<b>Type</b>										
Double-acting										
DNC	Standard cylinder									
<b>Piston Ø [mm]</b>										
<b>Stroke [mm]</b>										
<b>Cushioning</b>										
P	Flexible cushioning rings/pads at both ends									
PPV	Pneumatic cushioning, adjustable at both ends									
<b>Position sensing</b>										
	Without position sensing									
A	Via proximity sensor									

 - Note

The standard cylinder DNC can be ordered using either a fixed part number and type designation or via the modular product system. The type code listed above only applies to the DNC standard cylinder with fixed part number and type designation. Variants can only be ordered using the modular product system.

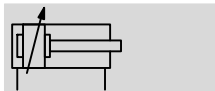
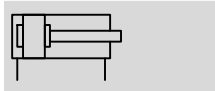
# Standard cylinders DNC, ISO 15552

Technical data

Function

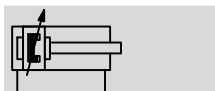
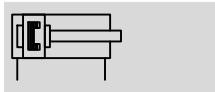
**DNC-...**

Without position sensing



**DNC-...-A-...**

With position sensing



⌀ - Diameter  
32 ... 125 mm

— | — Stroke length  
10 ... 2000 mm

www.festo.com

Wearing parts kits  
→ 24



- Standards-based cylinders to ISO 15552 (corresponds to the withdrawn standards ISO 6431, DIN ISO 6431, VDMA 24 562, NF E 49 003.1 and UNI 10290)



DIN



General technical data							
Piston Ø	32	40	50	63	80	100	125
Pneumatic connection	G $\frac{1}{8}$	G $\frac{1}{4}$	G $\frac{1}{4}$	G $\frac{3}{8}$	G $\frac{3}{8}$	G $\frac{1}{2}$	G $\frac{1}{2}$
Piston rod thread	M10x1.25	M12x1.25	M16x1.5	M16x1.5	M20x1.5	M20x1.5	M27x2
	K3 M6	M8	M10	M10	M12	M12	M16
	K5 M10	M12	M16	M16	M20	M20	M27
Constructional design	Piston						
	Piston rod						
	Profile barrel						
Max. torsional backlash of piston rod [°]	Q ±0.65	±0.6	±0.45	±0.45	±0.45	±0.45	-
Cushioning	Flexible cushioning rings/pads at both ends						
	Pneumatic cushioning, adjustable at both ends						
Cushioning length PPV [mm]	20	20	22	22	32	32	42
Position sensing	Via proximity sensor						
Type of mounting	Via female thread						
	Via accessories						
Mounting position	Any						

Note: This product conforms to ISO 1179-1 and to ISO 228-1

# Standard cylinders DNC, ISO 15552

Technical data

Operating and environmental conditions								
Piston Ø		32	40	50	63	80	100	125
Operating medium		Compressed air in accordance with ISO 8573-1:2010 [7:4:4]						
Note on operating/pilot medium		Operation with lubricated medium possible (in which case lubricated operation will always be required)						
Operating pressure [bar]		0.6 ... 12						0.6 ... 10
	R8	1.5 ... 12						1.5 ... 10
	S11	After 10 strokes						
			0.16 ... 12		0.1 ... 12		0.06 ... 12	0.06 ... 10
	After 24 hours							
		0.3 ... 12		0.2 ... 12		0.1 ... 12	0.1 ... 10	
Ambient temperature <sup>1)</sup> [°C]		-20 ... +80						
	S6	0 ... 120						
Corrosion resistance class		2						
CRC <sup>2)</sup>	R3	3						
Certification		Germanischer Lloyd						
ATEX		Specified types → <a href="http://www.festo.com">www.festo.com</a>						

1) Note operating range of proximity sensors

2) Corrosion resistance class CRC 2 to Festo standard FN 940070

Moderate corrosion stress. Indoor applications in which condensation may occur. External visible parts with primarily decorative requirements for the surface and which are in direct contact with the ambient atmosphere typical for industrial applications.

Corrosion resistance class CRC 3 to Festo standard FN 940070

High corrosion stress. Outdoor exposure under moderate corrosive conditions. External visible parts with primarily functional requirements for the surface and which are in direct contact with a normal industrial environment.

Force [N] and impact energy [J]								
Piston Ø		32	40	50	63	80	100	125
Theoretical force at 6 bar, advancing		483	754	1178	1870	3016	4712	7363
	S2/S20	415	633	990	1682	2721	4418	6881
Theoretical force at 6 bar, retracting		415	633	990	1682	2721	4418	6881
	S2/S20	415	633	990	1682	2721	4418	6881
Max. impact energy at the end positions <sup>1)</sup>		0.1	0.2	0.2	0.5	0.9	1.2	5

1) The permissible impact energy is reduced by approx. 10% for variants K10 and S20


Permissible impact velocity:

$$v_{perm.} = \sqrt{\frac{2 \times E_{perm.}}{m_{dead} + m_{load}}}$$

Maximum permissible load:

$$m_{load} = \frac{2 \times E_{perm.}}{v^2} - m_{dead}$$

$v_{perm.}$  Permissible impact velocity  
 $E_{perm.}$  Max. impact energy  
 $m_{intrinsic}$  Moving load (drive)  
 $m_{load}$  Moving effective load

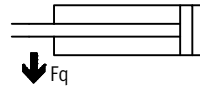
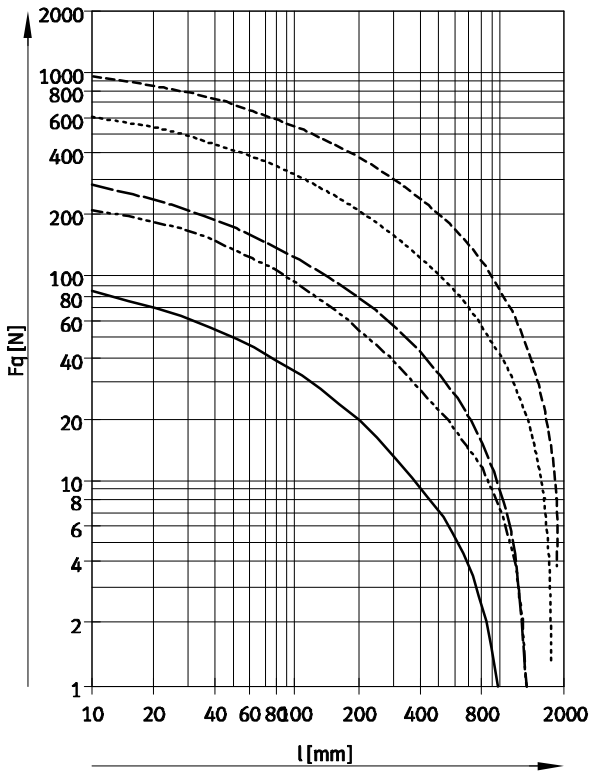
 Note  
 This data represents the maximum values that can be achieved. The maximum permissible impact energy must be observed.

# Standard cylinders DNC, ISO 15552

Technical data

## Lateral force $F_q$ as a function of stroke length $l$

Basic version



- Ø 32
- - - Ø 40
- · - · Ø 50/63
- · · · · Ø 80/100
- - - Ø 125



# Standard cylinders DNC, ISO 15552

Technical data

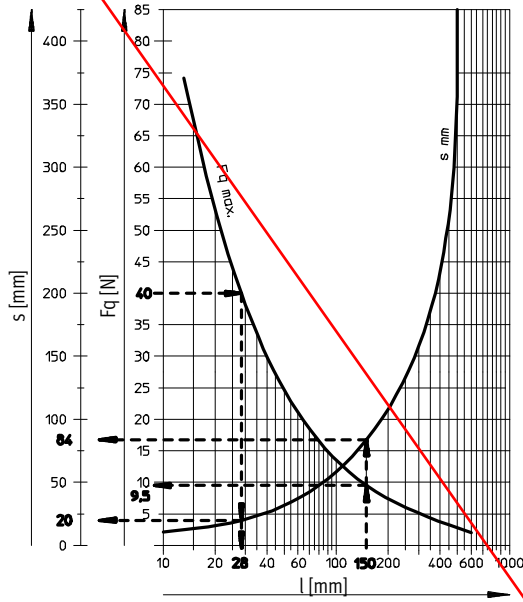
FESTO

## Lateral force $F_q$ as a function of stroke length $l$ and lever arm $s$

Q - Square piston rod

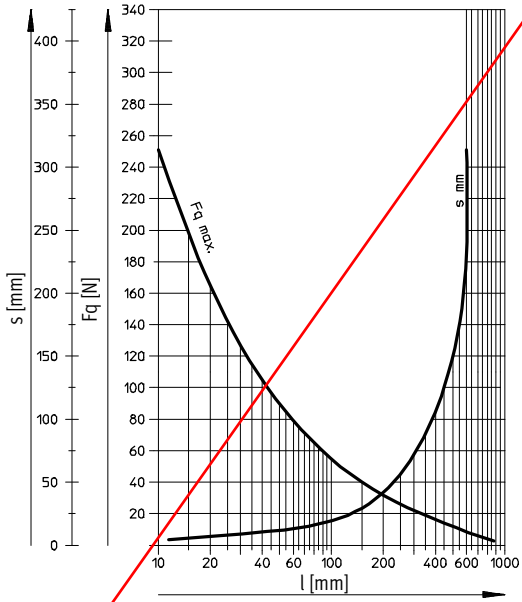
Ø 32

Max. torque = 800 Nmm / Max. stroke = 300 mm



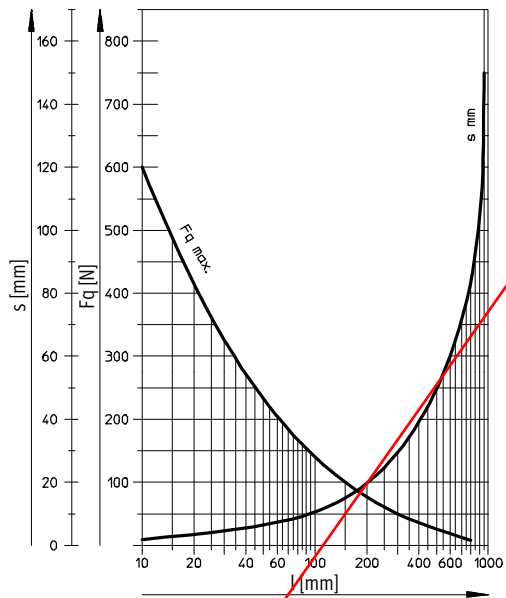
Ø 40

Max. torque = 1100 Nmm / Max. stroke = 400 mm



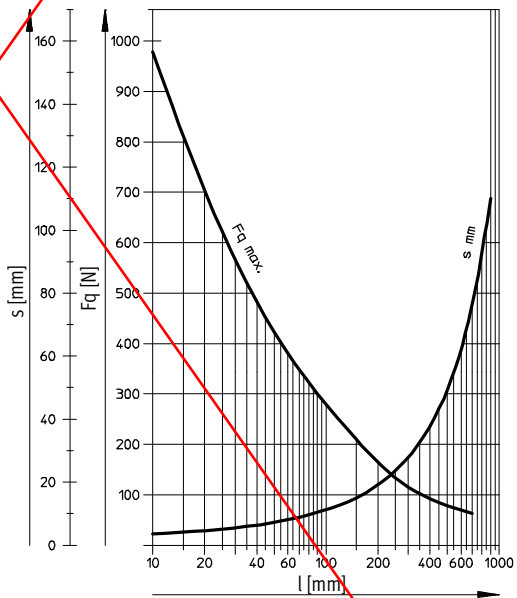
Ø 50/63

Max. torque = 1500 Nmm / Max. stroke = 500 mm



Ø 80/100

Max. torque = 3000 Nmm / Max. stroke = 600 mm



### Examples for piston Ø 32 mm

Example 1:

Stroke length  $l = 150$  mm

Result: permissible

Lateral force  $F_q = 9.5$  N

Lever arm  $s = 84$  mm

Example 2:

Lateral force  $F_q = 40$  N

Result: permissible

Stroke length  $l = 28$  mm

Lever arm  $s = 20$  mm

Example 3:

Stroke length  $l = 150$  mm

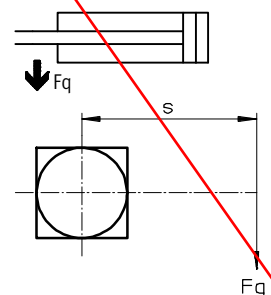
Lever arm  $s = 100$  mm

$F_q = \frac{\text{Max. torque } 800 \text{ Nmm}}{\text{Lever arm } 100 \text{ mm}}$

$= 8$  N

Result: permissible

$F_q = 8 \text{ N} < F_{q\text{max}} = 9.5 \text{ N}$



# Standard cylinders DNC, ISO 15552

Technical data

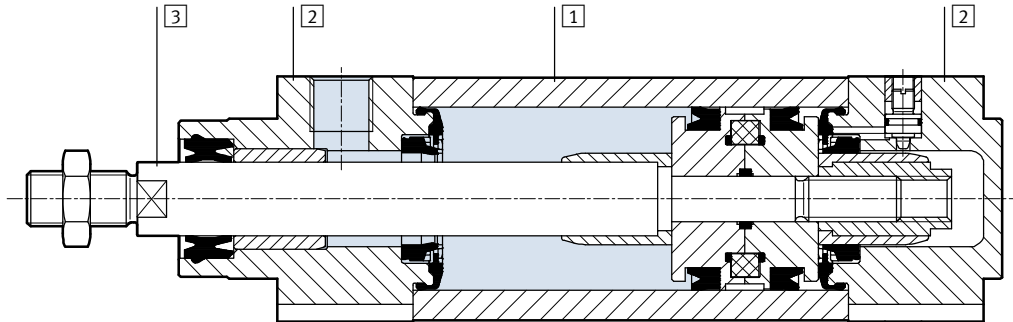
Weight [g]							
Piston $\varnothing$	32	40	50	63	80	100	125
<b>Basic version</b>							
Product weight with 0 mm stroke	517	800	1260	1709	2790	4653	6771
Additional weight per 10 mm stroke	30	45	64	73	106	115	168
Moving load with 0 mm stroke	162	307	538	663	1131	1544	2809
Additional load per 10 mm stroke	9	16	25	25	38	38	63
<b>Q – Square piston rod</b>							
Product weight with 0 mm stroke	504	738	1187	1632	2652	4508	–
Additional weight per 10 mm stroke	29	41	60	68	99	108	–
Moving load with 0 mm stroke	149	244	465	587	994	1399	–
Additional load per 10 mm stroke	8	11	20	20	31	31	–
<b>S2 – Through piston rod</b>							
Product weight with 0 mm stroke	576	895	1390	1917	3114	5297	7529
Additional weight per 10 mm stroke	39	61	89	98	144	153	231
Moving load with 0 mm stroke	170	330	560	711	1200	1660	2925
Additional load per 10 mm stroke	18	32	50	50	76	76	126
<b>K10 – Smooth anodised piston rod</b>							
Product weight with 0 mm stroke	443	655	1001	1437	2302	4138	5719
Additional weight per 10 mm stroke	24	35	47	57	81	90	127
Moving load with 0 mm stroke	88	162	279	391	643	1029	1757
Additional load per 10 mm stroke	3	6	8	9	13	13	22
<b>S2-K10 – Through, smooth anodised piston rod</b>							
Product weight with 0 mm stroke	514	766	1181	1676	2701	4821	6674
Additional weight per 10 mm stroke	27	40	56	65	94	103	148
Moving load with 0 mm stroke	108	201	351	470	787	1184	2070
Additional load per 10 mm stroke	6	11	17	17	26	26	43

# Standard cylinders DNC, ISO 15552

Technical data

## Materials

Sectional view



Standard cylinder	Basic version	K10	R3
1 Profile barrel	Wrought aluminium alloy, smooth anodised	Wrought aluminium alloy, smooth anodised	
2 Bearing and end caps	Die-cast aluminium		
3 Piston rod	High-alloy steel	Wrought aluminium alloy, anodised	High-alloy stainless steel
- Seals	Polyurethane, nitrile rubber		
Note on materials	RoHS compliant		

Standard cylinder	R8	S6	S10	S11
1 Profile barrel	Wrought aluminium alloy, smooth anodised			
2 Bearing and end caps	Die-cast aluminium			
3 Piston rod	Tempered steel, hard-chromium plated	High-alloy steel		
- Seals	Polyurethane, nitrile rubber	Fluoro rubber		
Note on materials	RoHS compliant			

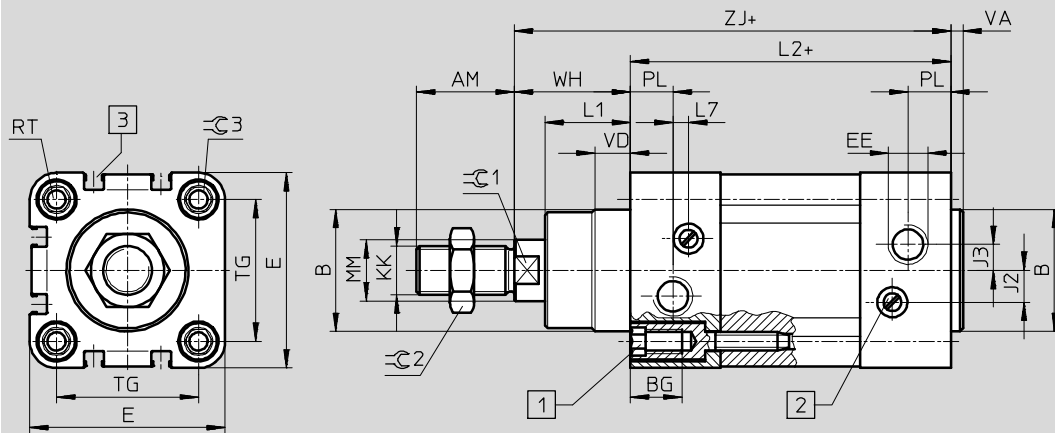
# Standard cylinders DNC, ISO 15552

Technical data

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## Dimensions – Basic version

Download CAD data → [www.festo.com](http://www.festo.com)



- 1 For mounting attachments:  
 Ø 32 ... 100: Socket head screw with female thread  
 Ø 125: Thread in the end cap
- 2 Regulating screw for adjustable end-position cushioning
- 3 Slot for proximity sensor SME/SMT-8
- + = plus stroke length

Ø [mm]	AM	B Ø d11	BG	E	EE	J2	J3	KK	L1	L2
32	22	30	16	45	G1/8	6	5.2	M10x1.25	18	94
40	24	35	16	54	G1/4	8	6	M12x1.25	21.5	105
50	32	40	17	64	G1/4	10.4	8.5	M16x1.5	28	106
63	32	45	17	75	G3/8	12.4	10	M16x1.5	28.5	121
80	40	45	17	93	G3/8	12.5	8	M20x1.5	34.7	128
100	40	55	17	110	G1/2	12	10	M20x1.5	38.2	138
125	54	60	22	134	G1/2	13	8	M27x2	46	160

Ø [mm]	L7	MM Ø	PL	RT	TG	VA	VD	WH	ZJ	∅C1	∅C2	∅C3
32	3.3	12	15.6	M6	32.5	4	10	26	120	10	16	6
40	3.6	16	14	M6	38	4	10.5	30	135	13	18	6
50	5.1	20	14	M8	46.5	4	11.5	37	143	17	24	8
63	6.6	20	17	M8	56.5	4	15	37	158	17	24	8
80	10.5	25	16.4	M10	72	4	15.7	46	174	22	30	6
100	8	25	18.8	M10	89	4	19.2	51	189	22	30	6
125	14	32	18	M12	110	6	20.5	65	225	27	36	8

Note: This product conforms to ISO 1179-1 and to ISO 228-1

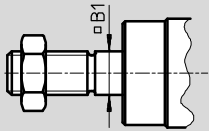
# Standard cylinders DNC, ISO 15552

Technical data

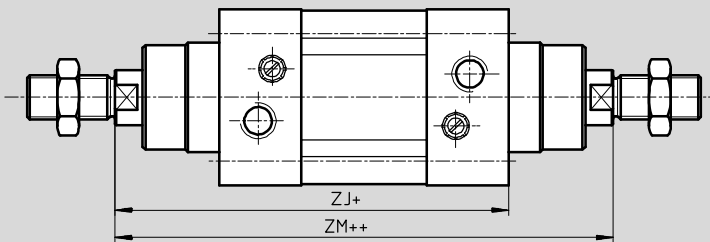
## Dimensions – Variants

Download CAD data → [www.festo.com](http://www.festo.com)

Q – Square piston rod

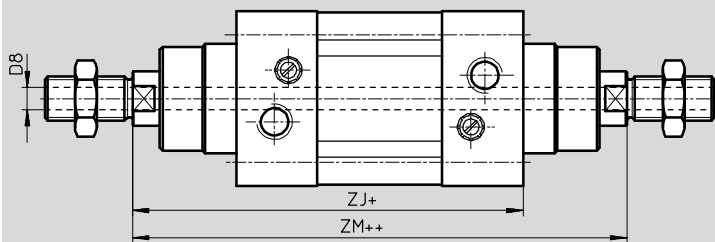


S2 – Through piston rod



+ = plus stroke length  
++ = plus 2x stroke length

S20 – Through hollow piston rod



+ = plus stroke length  
++ = plus 2x stroke length

∅	B1	D8	ZJ	ZM
[mm]	□	∅		
32	10	4.5	120	148
40	12	5.5	135	167
50	16	8 <sup>1)</sup>	143	183
63	16	8	158	199
80	20	11.7	174	222
100	20	11.7	189	240
125	-	13	225	291

1) Internal narrowing to ∅ 5.5 mm  
2) Internal narrowing to ∅ 10.2 mm

# Standard cylinders DNC, ISO 15552

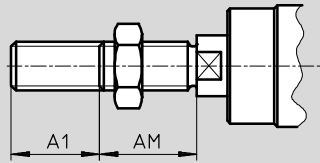
Technical data

FESTO

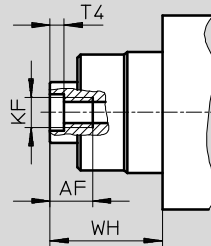
## Dimensions – Variants

Download CAD data → [www.festo.com](http://www.festo.com)

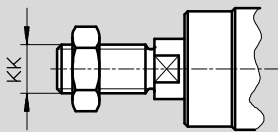
K2 – Extended male piston rod thread



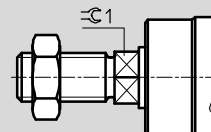
K3 – Female piston rod thread



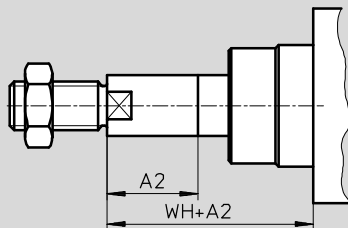
K5 – Special piston rod thread



K7 – Piston rod with external hexagon



K8 – Extended piston rod



 Note

In combination with variant S2/S20, the piston rod is extended at one

end. In combination with variant Q, the square piston rod is extended.

∅ [mm]	A1 max.	A2 max.	AF	AM	KF	KK		T4	WH	≈1
						Basic thread	Special thread <sup>1)</sup>			
32	35	500	12	22	M6	M10x1.25	M10	2.6	26	10
40	35	500	12	24	M8	M12x1.25	M12	3.3	30	13
50	70	500	16	32	M10	M16x1.5	M16	4.7	37	17
63	70	500	16	32	M10	M16x1.5	M16	4.7	37	17
80	70	500	20	40	M12	M20x1.5	M20	6.1	46	22
100	70	500	20	40	M12	M20x1.5	M20	6.1	51	22
125	70	500	32	54	M16	M27x2	M27	8	65	27

1) The special threads are only available as male threads. The mounting nut on the piston rod thread is included in the scope of delivery

# Standard cylinders DNC, ISO 15552

Technical data

Ordering data – Without position sensing							
Piston Ø [mm]	Stroke [mm]	Part No.	Type <sup>1)</sup>	Piston Ø [mm]	Stroke [mm]	Part No.	Type <sup>1)</sup>
32	25	163319	DNC-32-25-PPV	40	25	163351	DNC-40-25-PPV
	40	163320	DNC-32-40-PPV		40	163352	DNC-40-40-PPV
	50	163321	DNC-32-50-PPV		50	163353	DNC-40-50-PPV
	80	163322	DNC-32-80-PPV		80	163354	DNC-40-80-PPV
	100	163323	DNC-32-100-PPV		100	163355	DNC-40-100-PPV
	125	163324	DNC-32-125-PPV		125	163356	DNC-40-125-PPV
	160	163325	DNC-32-160-PPV		160	163357	DNC-40-160-PPV
	200	163326	DNC-32-200-PPV		200	163358	DNC-40-200-PPV
	250	163327	DNC-32-250-PPV		250	163359	DNC-40-250-PPV
	320	163328	DNC-32-320-PPV		320	163360	DNC-40-320-PPV
	400	163329	DNC-32-400-PPV		400	163361	DNC-40-400-PPV
	500	163330	DNC-32-500-PPV		500	163362	DNC-40-500-PPV
50	25	163383	DNC-50-25-PPV	63	25	163415	DNC-63-25-PPV
	40	163384	DNC-50-40-PPV		40	163416	DNC-63-40-PPV
	50	163385	DNC-50-50-PPV		50	163417	DNC-63-50-PPV
	80	163386	DNC-50-80-PPV		80	163418	DNC-63-80-PPV
	100	163387	DNC-50-100-PPV		100	163419	DNC-63-100-PPV
	125	163388	DNC-50-125-PPV		125	163420	DNC-63-125-PPV
	160	163389	DNC-50-160-PPV		160	163421	DNC-63-160-PPV
	200	163390	DNC-50-200-PPV		200	163422	DNC-63-200-PPV
	250	163391	DNC-50-250-PPV		250	163423	DNC-63-250-PPV
	320	163392	DNC-50-320-PPV		320	163424	DNC-63-320-PPV
	400	163393	DNC-50-400-PPV		400	163425	DNC-63-400-PPV
	500	163394	DNC-50-500-PPV		500	163426	DNC-63-500-PPV
80	25	163447	DNC-80-25-PPV	100	25	163479	DNC-100-25-PPV
	40	163448	DNC-80-40-PPV		40	163480	DNC-100-40-PPV
	50	163449	DNC-80-50-PPV		50	163481	DNC-100-50-PPV
	80	163450	DNC-80-80-PPV		80	163482	DNC-100-80-PPV
	100	163451	DNC-80-100-PPV		100	163483	DNC-100-100-PPV
	125	163452	DNC-80-125-PPV		125	163484	DNC-100-125-PPV
	160	163453	DNC-80-160-PPV		160	163485	DNC-100-160-PPV
	200	163454	DNC-80-200-PPV		200	163486	DNC-100-200-PPV
	250	163455	DNC-80-250-PPV		250	163487	DNC-100-250-PPV
	320	163456	DNC-80-320-PPV		320	163488	DNC-100-320-PPV
	400	163457	DNC-80-400-PPV		400	163489	DNC-100-400-PPV
	500	163458	DNC-80-500-PPV		500	163490	DNC-100-500-PPV
125	25	163511	DNC-125-25-PPV				
	40	163512	DNC-125-40-PPV				
	50	163513	DNC-125-50-PPV				
	80	163514	DNC-125-80-PPV				
	100	163515	DNC-125-100-PPV				
	125	163516	DNC-125-125-PPV				
	160	163517	DNC-125-160-PPV				
	200	163518	DNC-125-200-PPV				
	250	163519	DNC-125-250-PPV				
	320	163520	DNC-125-320-PPV				
	400	163521	DNC-125-400-PPV				
	500	163522	DNC-125-500-PPV				

1) The mounting nut on the piston rod thread is included in the scope of delivery

# Standard cylinders DNC, ISO 15552

Technical data

Ordering data – With position sensing							
Piston Ø [mm]	Stroke [mm]	Part No.	Type <sup>1)</sup>	Piston Ø [mm]	Stroke [mm]	Part No.	Type <sup>1)</sup>
32	20	1922617	DNC-32-20-PPV-A	40	20	1922623	DNC-40-20-PPV-A
	25	163305	DNC-32-25-PPV-A		25	163337	DNC-40-25-PPV-A
	30	1922618	DNC-32-30-PPV-A		30	1922624	DNC-40-30-PPV-A
	40	163306	DNC-32-40-PPV-A		40	163338	DNC-40-40-PPV-A
	50	163307	DNC-32-50-PPV-A		50	163339	DNC-40-50-PPV-A
	60	1922619	DNC-32-60-PPV-A		60	1922625	DNC-40-60-PPV-A
	70	1922620	DNC-32-70-PPV-A		70	1922626	DNC-40-70-PPV-A
	80	163308	DNC-32-80-PPV-A		80	163340	DNC-40-80-PPV-A
	100	163309	DNC-32-100-PPV-A		100	163341	DNC-40-100-PPV-A
	125	163310	DNC-32-125-PPV-A		125	163342	DNC-40-125-PPV-A
	150	1922621	DNC-32-150-PPV-A		150	1922627	DNC-40-150-PPV-A
	160	163311	DNC-32-160-PPV-A		160	163343	DNC-40-160-PPV-A
	200	163312	DNC-32-200-PPV-A		200	163344	DNC-40-200-PPV-A
	250	163313	DNC-32-250-PPV-A		250	163345	DNC-40-250-PPV-A
	300	1922622	DNC-32-300-PPV-A		300	1922628	DNC-40-300-PPV-A
320	163314	DNC-32-320-PPV-A	320	163346	DNC-40-320-PPV-A		
400	163315	DNC-32-400-PPV-A	400	163347	DNC-40-400-PPV-A		
500	163316	DNC-32-500-PPV-A	500	163348	DNC-40-500-PPV-A		
50	20	1922629	DNC-50-20-PPV-A	63	20	1922635	DNC-63-20-PPV-A
	25	163369	DNC-50-25-PPV-A		25	163401	DNC-63-25-PPV-A
	30	1922630	DNC-50-30-PPV-A		30	1922636	DNC-63-30-PPV-A
	40	163370	DNC-50-40-PPV-A		40	163402	DNC-63-40-PPV-A
	50	163371	DNC-50-50-PPV-A		50	163403	DNC-63-50-PPV-A
	60	1922631	DNC-50-60-PPV-A		60	1922637	DNC-63-60-PPV-A
	70	1922632	DNC-50-70-PPV-A		70	1922638	DNC-63-70-PPV-A
	80	163372	DNC-50-80-PPV-A		80	163404	DNC-63-80-PPV-A
	100	163373	DNC-50-100-PPV-A		100	163405	DNC-63-100-PPV-A
	125	163374	DNC-50-125-PPV-A		125	163406	DNC-63-125-PPV-A
	150	1922633	DNC-50-150-PPV-A		150	1922639	DNC-63-150-PPV-A
	160	163375	DNC-50-160-PPV-A		160	163407	DNC-63-160-PPV-A
	200	163376	DNC-50-200-PPV-A		200	163408	DNC-63-200-PPV-A
	250	163377	DNC-50-250-PPV-A		250	163409	DNC-63-250-PPV-A
	300	1922634	DNC-50-300-PPV-A		300	1922640	DNC-63-300-PPV-A
320	163378	DNC-50-320-PPV-A	320	163410	DNC-63-320-PPV-A		
400	163379	DNC-50-400-PPV-A	400	163411	DNC-63-400-PPV-A		
500	163380	DNC-50-500-PPV-A	500	163412	DNC-63-500-PPV-A		

1) The mounting nut on the piston rod thread is included in the scope of delivery



# Standard cylinders DNC, ISO 15552

Technical data

Ordering data – With position sensing			
Piston $\varnothing$ [mm]	Stroke [mm]	Part No.	Type <sup>1)</sup>
80	20	1922641	DNC-80-20-PPV-A
	25	163433	DNC-80-25-PPV-A
	30	1922642	DNC-80-30-PPV-A
	40	163434	DNC-80-40-PPV-A
	50	163435	DNC-80-50-PPV-A
	60	1922643	DNC-80-60-PPV-A
	70	1922644	DNC-80-70-PPV-A
	80	163436	DNC-80-80-PPV-A
	100	163437	DNC-80-100-PPV-A
	125	163438	DNC-80-125-PPV-A
	150	1922645	DNC-80-150-PPV-A
	160	163439	DNC-80-160-PPV-A
	200	163440	DNC-80-200-PPV-A
	250	163441	DNC-80-250-PPV-A
	300	1922646	DNC-80-300-PPV-A
320	163442	DNC-80-320-PPV-A	
400	163443	DNC-80-400-PPV-A	
500	163444	DNC-80-500-PPV-A	
100	25	163465	DNC-100-25-PPV-A
	40	163466	DNC-100-40-PPV-A
	50	163467	DNC-100-50-PPV-A
	80	163468	DNC-100-80-PPV-A
	100	163469	DNC-100-100-PPV-A
	125	163470	DNC-100-125-PPV-A
	160	163471	DNC-100-160-PPV-A
	200	163472	DNC-100-200-PPV-A
	250	163473	DNC-100-250-PPV-A
	320	163474	DNC-100-320-PPV-A
	400	163475	DNC-100-400-PPV-A
500	163476	DNC-100-500-PPV-A	
125	25	163497	DNC-125-25-PPV-A
	40	163498	DNC-125-40-PPV-A
	50	163499	DNC-125-50-PPV-A
	80	163500	DNC-125-80-PPV-A
	100	163501	DNC-125-100-PPV-A
	125	163502	DNC-125-125-PPV-A
	160	163503	DNC-125-160-PPV-A
	200	163504	DNC-125-200-PPV-A
	250	163505	DNC-125-250-PPV-A
	320	163506	DNC-125-320-PPV-A
	400	163507	DNC-125-400-PPV-A
	500	163508	DNC-125-500-PPV-A

1) The mounting nut on the piston rod thread is included in the scope of delivery

# Standard cylinders DNC, ISO 15552

Technical data

Ordering data – Variable stroke			
Piston Ø [mm]	Stroke [mm]	Without position sensing	
		Part No.	Type <sup>1)</sup>
32	10 ... 2000	<b>163318</b>	<b>DNC-32-...-PPV</b>
40	10 ... 2000	<b>163350</b>	<b>DNC-40-...-PPV</b>
50	10 ... 2000	<b>163382</b>	<b>DNC-50-...-PPV</b>
63	10 ... 2000	<b>163414</b>	<b>DNC-63-...-PPV</b>
80	10 ... 2000	<b>163446</b>	<b>DNC-80-...-PPV</b>
100	10 ... 2000	<b>163478</b>	<b>DNC-100-...-PPV</b>
125	10 ... 2000	<b>163510</b>	<b>DNC-125-...-PPV</b>

1) The mounting nut on the piston rod thread is included in the scope of delivery

Ordering data – Variable stroke			
Piston Ø [mm]	Stroke [mm]	With position sensing	
		Part No.	Type <sup>1)</sup>
32	10 ... 2000	<b>163304</b>	<b>DNC-32-...-PPV-A</b>
40	10 ... 2000	<b>163336</b>	<b>DNC-40-...-PPV-A</b>
50	10 ... 2000	<b>163368</b>	<b>DNC-50-...-PPV-A</b>
63	10 ... 2000	<b>163400</b>	<b>DNC-63-...-PPV-A</b>
80	10 ... 2000	<b>163432</b>	<b>DNC-80-...-PPV-A</b>
100	10 ... 2000	<b>163464</b>	<b>DNC-100-...-PPV-A</b>
125	10 ... 2000	<b>163496</b>	<b>DNC-125-...-PPV-A</b>

1) The mounting nut on the piston rod thread is included in the scope of delivery

# Standard cylinders DNC, ISO 15552

Ordering data – Modular products

M Mandatory data			O Options →							
Module No.	Function		Stroke		Position sensing		Type of piston rod		Female thread	
	Piston Ø		Cushioning		Protection against rotation		Extended male thread		Special thread	
163302	DNC	32	10 ... 2000	P	A	Q	S2	...K2	K3	...K5
163334		40		PPV			S20			
163366		50								
163398		63								
163430		80								
163462		100								
163494		125								
<b>Order example</b>										
<b>163430</b>	<b>DNC</b>	<b>- 80</b>	<b>- 550</b>	<b>- PPV</b>	<b>- A</b>	<b>- Q</b>	<b>- S2</b>	<b>-</b>	<b>- K3</b>	<b>-</b>

Ordering table											
Size	32	40	50	63	80	100	125	Condi- tions	Code	Enter code	
M Module No.	<b>163302</b>	<b>163334</b>	<b>163366</b>	<b>163398</b>	<b>163430</b>	<b>163462</b>	<b>163494</b>				<b>163494</b>
Function	Standard cylinder, double-acting, based on ISO 15552									<b>DNC</b>	<b>DNC</b>
Piston Ø [mm]	32	40	50	63	80	100	125		-...		125
Stroke [mm]	10 ... 2000								-...		250
Cushioning	Flexible cushioning rings/pads at both ends								-P		P
	Pneumatic cushioning, adjustable at both ends							[15]	-PPV		
O Position sensing	Via proximity sensor								-A		A
Protection against rotation	Square piston rod						-	[2]	-Q		
Type of piston rod	Through piston rod							[3]	-S2		
	Through, hollow piston rod							[4]	-S20		
Extended male thread [mm]	Piston rod with extended male thread										
	1 ... 35	1 ... 70						[5]	-...K2		
Female thread	Piston rod with female thread										
	(M6)	(M8)	(M10)	(M10)	(M12)	(M12)	(M16)	[6]	-K3	K3	
Special thread	Piston rod with special thread										
	M10	M12	M16	M16	M20	M20	M27	[7]	-...K5		

[15] **PPV** For piston Ø 125 not with S11

[2] **Q** Max. stroke: 10 ... 1500 mm.

In combination with S2: square piston rod at bearing cap end only.

Not with S20, K7, K10, S10, S11, R8

[3] **S2** In combination with K2: thread extended at both ends.

In combination with K3: female thread at both ends.

In combination with K5: special thread at both ends.

In combination with K8: piston rod extended at bearing cap end only.

Not with K7, S10, S11

[4] **S20** Max. stroke: 850 mm.

Not with K2, K3, K5, K8, K10, S6, S10, S11, R8

[5] **K2** Not with K3, K10

[6] **K3** With K5: on request.

Not with K7

[7] **K5** Not with K10

### Transfer order code

16505 DNC - 125 - 250 - P - A - - - - - - - -

# Standard cylinders DNC, ISO 15552

Ordering data – Modular products

→  Options

Special spanner flats		Improved running performance		Running characteristics		Wiper seal	
Extended piston rod		Temperature resistance		Slow speed (constant motion)		Corrosion protection	
K7	...K8	K10	S6	S10	S11	R3	R8
-	-	-	-	-	-	-	-
	100K8						

Ordering table										
Size	32	40	50	63	80	100	125	Condi- tions	Code	Enter code
↓ Special spanner flats	Piston rod with external hexagon							<input type="checkbox"/> 8	-K7	
<input type="checkbox"/> Extended piston rod	Extended piston rod								-...K8	
	[mm] 1 ... 500									
Improved running performance	Smooth anodised aluminium coated piston rod						-	<input type="checkbox"/> 9	-K10	
Temperature resistance	Heat-resistant seals for temperatures up to 120 °C							<input type="checkbox"/> 10	-S6	
Slow speed (constant motion)	Slow speed (constant motion at low piston speeds)						-	<input type="checkbox"/> 12	-S10	
Running characteristics	Low friction							<input type="checkbox"/> 13	-S11	
Corrosion protection	High corrosion protection							<input type="checkbox"/> 14	-R3	
Wiper seal	Dust protection								-R8	

- K7** Not with Q, S2, K10
- K10** Max. stroke: 1,000 mm.  
Not with S6, R3, R8
- S6** Not with S10, S11, R8

- S10** Max. stroke: 500 mm; additional strokes on request.  
Not with S11, R3, R8
- S11** Max. stroke: 500 mm; additional strokes on request.  
Not with R3, R8
- CT, R3** Not with R8

Transfer order code

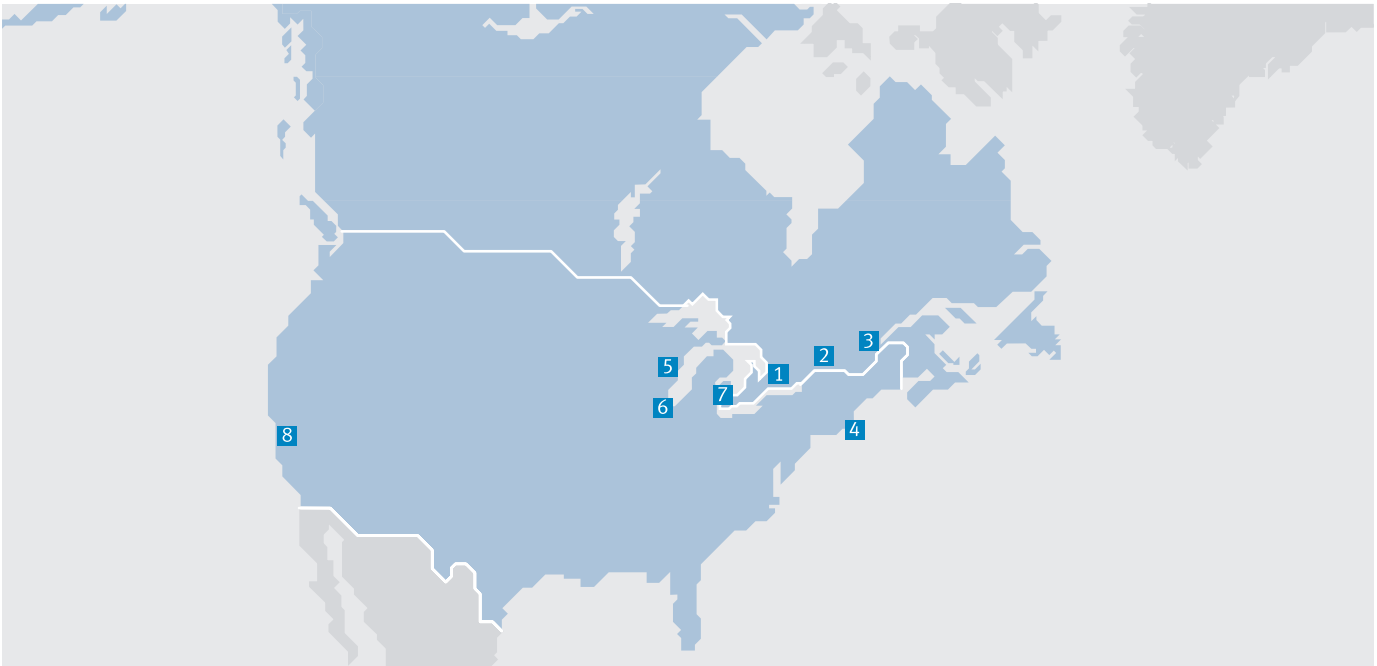
-  -  -  -  -  -  -  -  -  -

# Standard cylinders DNC, ISO 15552

Ordering data

Wearing parts kits			Part No.	Type
Piston Ø	Basic version		S6 – Heat-resistant seals up to max. 120 °C	
32	369195	DNC-32-...-PPV-(A)	384214	DNC-32-...-PPV-(A)-S6
40	369196	DNC-40-...-PPV-(A)	384215	DNC-40-...-PPV-(A)-S6
50	369197	DNC-50-...-PPV-(A)	384216	DNC-50-...-PPV-(A)-S6
63	369198	DNC-63-...-PPV-(A)	384217	DNC-63-...-PPV-(A)-S6
80	369199	DNC-80-...-PPV-(A)	384218	DNC-80-...-PPV-(A)-S6
100	369200	DNC-100-...-PPV-(A)	384219	DNC-100-...-PPV-(A)-S6
125	369201	DNC-125-...-PPV-(A)	384220	DNC-125-...-PPV-(A)-S6

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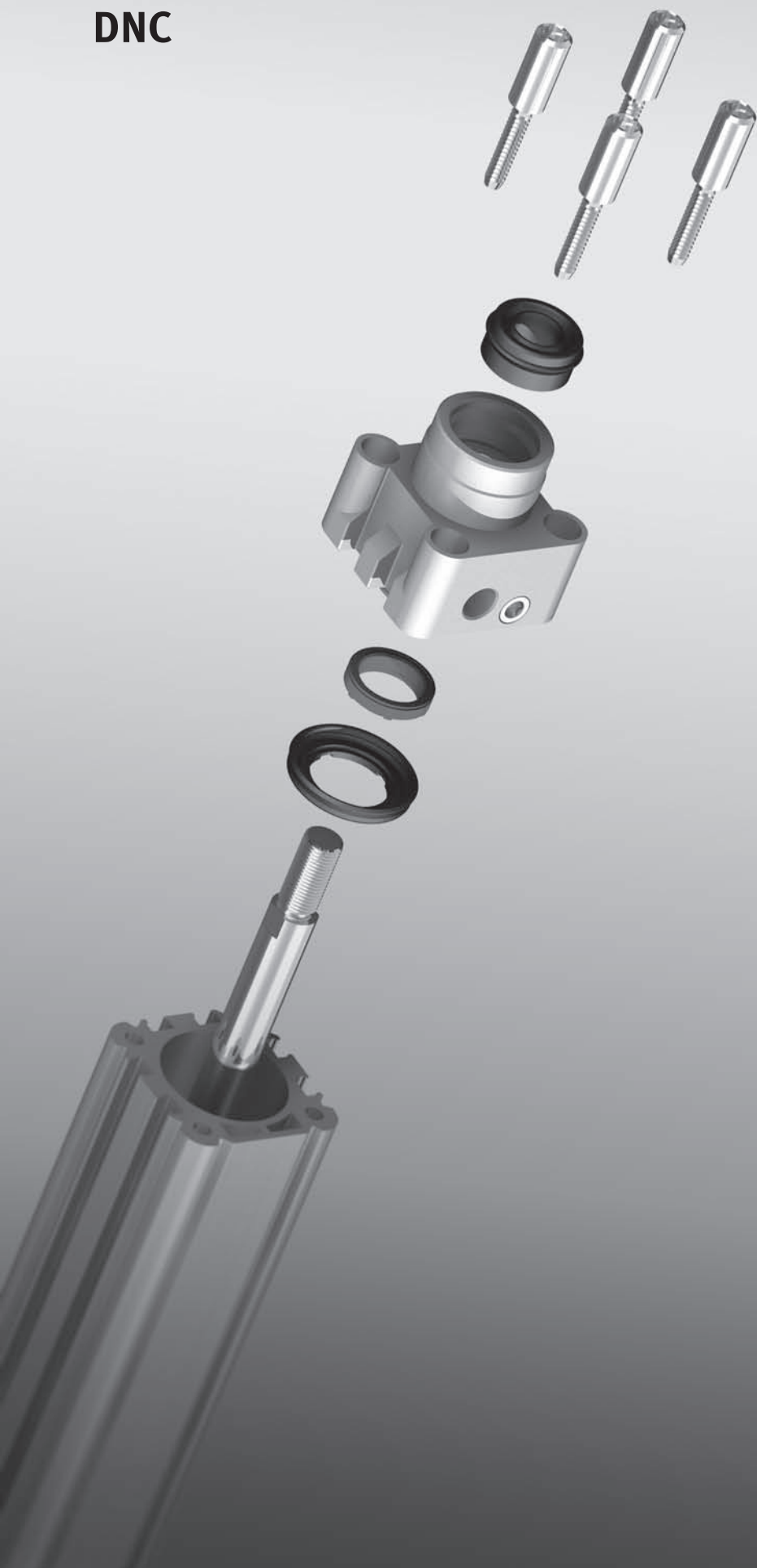
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# Cylinders with piston rod

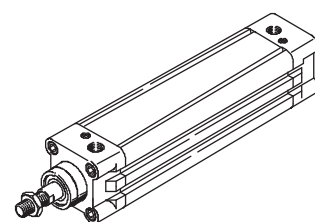
## Standard cylinder to ISO 15552

DNC



**FESTO**

Repair  
instructions (en)



7DNC\_a\_en

## Imprint

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All technical data subject to change according to technical updates.



## Foreword

These repair instructions are valid for the cylinders with piston rod listed on the title page to the exclusion of any liability claims.

Deviations compared to the descriptions in these repair instructions may arise depending on the design and/or modification status of the cylinder with piston rod. The user must check this prior to carrying out the repair and take the deviations into consideration if necessary.

These repair instructions have been prepared with care.

Festo AG & Co. KG does not, however, accept liability for any errors in these repair instructions or their consequences. Likewise, no liability is accepted for direct or consequential damage resulting from improper use of the products.

More detailed information on this can be found in section [8 "Liability"](#).

The relevant regulations on occupational safety, safety engineering and interference suppression as well as the stipulations contained in these repair instructions must be observed when working on the products.

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# 1 Important information

## 1.1 About these repair instructions

This document contains important information about the professional repair of the cylinder with piston rod of the type DNC.

The cylinder with piston rod DNC is fully repairable in the event of damage due to normal wear. The complete cylinder must be repaired in the event of damage to the cylinder barrel.

Before carrying out a repair, the relevant section in these instructions must be read in full and followed consistently.

For reasons of clarity, these repair instructions do not contain complete, detailed information. For that reason, the following documents should also be available when repairing the cylinder with piston rod:

- Operating instructions for the respective cylinder with piston rod**  
 Contain information about the control sections and connections of the cylinder with piston rod as well as the function, structure, application, installation, commissioning, maintenance and care, etc. Can be found on the Festo website ([www.festo.com](http://www.festo.com)).
- Assembly aids**  
 Contain an overview of available assembly aids such as lubricating greases, locking agents, maintenance tools, etc. (aids for assembly and maintenance). Can be found in the online spare parts catalogue on the Festo website ([www.festo.com](http://www.festo.com)).
- Spare parts documentation**  
 Contains an overview of the spare and wearing parts as well as information on their installation. Can be found in the online spare parts catalogue on the Festo website ([spareparts.festo.com](http://spareparts.festo.com)).

## 1.2 Pictograms used in these repair instructions



### Warning

This sign indicates a dangerous situation for persons and/or the product. Failure to observe this warning can result in injury to persons and/or damage to the device.



### Note

This sign provides important tips and information that can make your work easier.



### Environment

This sign provides information on the steps required for environmentally friendly use of materials and equipment, as well as the guidelines and regulations that may need to be observed.



### Accessories

This sign contains information on accessories and attachments relevant to the context.



### Documents

This sign contains references to other sections or documents containing additional information.

### 1.3 General safety information



#### Warning

The cylinder with piston rod must only be repaired by authorised and trained persons in accordance with the specifications in the technical documentation and using genuine spare parts.

Installation and repair by unauthorised and untrained persons, repairs using non-genuine spare parts as well as without the technical documentation required for installation and/or repair are dangerous and therefore not permitted.

Repairs must only be carried out in conjunction with these repair instructions as well as the respective operating instructions for the device.



#### Note

Instead of carrying out the repair yourself, your local Festo sales office offers the option of having the repair carried out by Festo.



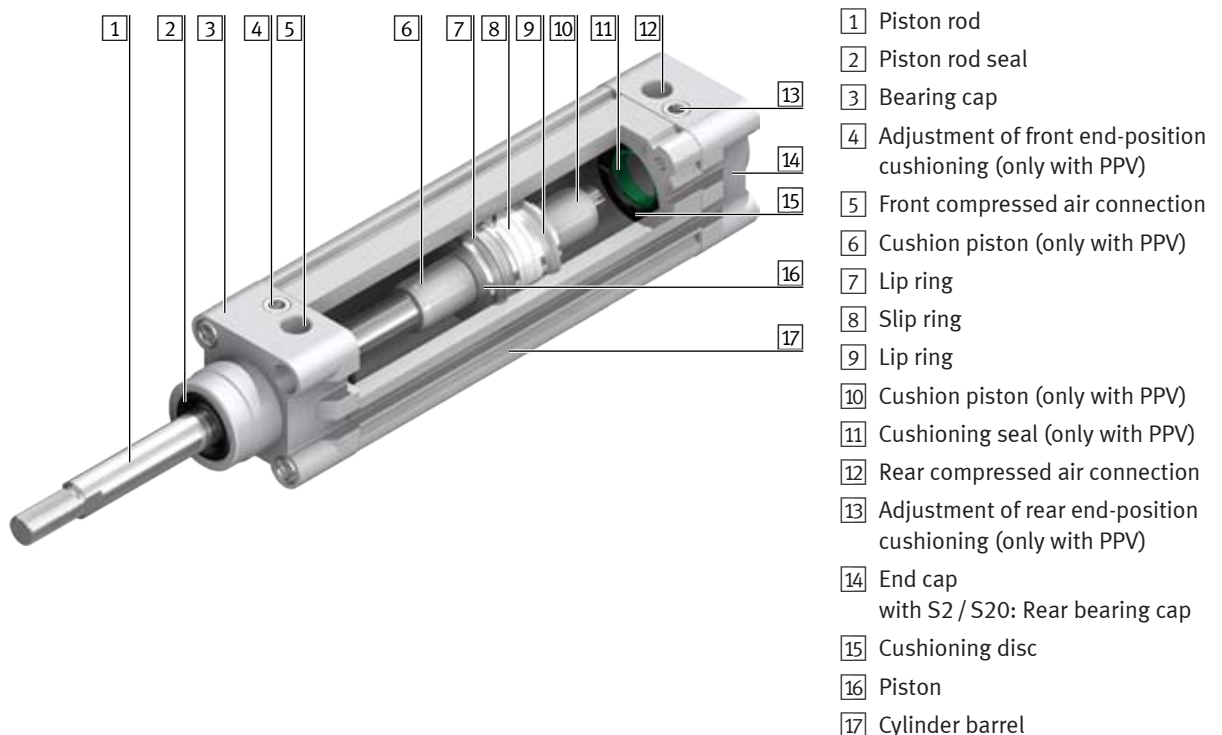
#### Environment

Components and equipment replaced as part of a repair must be disposed of in accordance with the locally valid environmental protection regulations.

## 2 General product description

### 2.1 Functional description

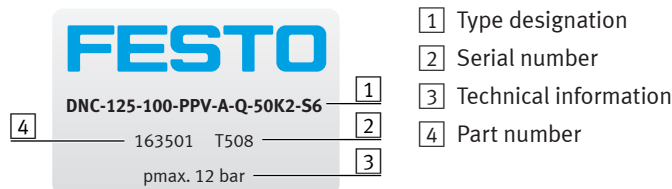
The piston moves in the cylinder barrel when the cylinder chamber is pressurised. The piston rod transmits the movement to the outside. The advanced piston rod is retracted again when the other cylinder chamber is pressurised.



## 2.2 Type codes (ascertaining the features of a cylinder)

The precise features of a cylinder with piston rod can be ascertained with the help of the name plate on the cylinder. The type designation is arranged directly beneath the Festo logo and describes the features contained in the cylinder separated by a hyphen (-).

Example:



The type designation on this name plate provides the following information:

- DNC** Cylinder of the type DNC
- 125** Piston diameter 125 mm
- 100** Stroke 100 mm
- PPV** Adjustable end-position cushioning
- A** Sensing option (magnetic piston)
- Q** Square piston rod (protection against rotation)
- 50K2** Piston rod thread extended by 50 mm
- S6** Heat-resistant seals (repair-relevant feature (see section [2.3 “Repair-relevant feature”](#)))



### Note

A list and description of all possible equipment features of the cylinder with piston rod can be found in the data sheet. It is available on the Festo website ([www.festo.com](http://www.festo.com)).

## 2.3 Repair-relevant feature

Some of the features that the cylinder with piston rod can be equipped with require a different repair approach. These features are called “repair-relevant” and are listed in the left-hand column in the table below.

If the cylinder to be repaired has one of these repair-relevant features, the appropriate repair description (see right-hand column in the table below) must be used.



### Note

A cylinder can only have one repair-relevant feature. It can additionally be equipped with one or more other features (see middle column).

Cylinder and repair-relevant feature	Other features	Described from page
DNC-... without repair-relevant feature	PPV, A, Q, S2, S20, ...K2 – K10, S10, S11, R3	<a href="#">15</a>
DNC-...- <b>S6</b> (heat-resistant seals up to max. 120 °C)	PPV, A, Q, S2, S20, ...K2 – K10, R3	<a href="#">19</a>
DNC-...- <b>TT</b> (resistant to low temperatures down to max. -40 °C)	PPV, A, S2, S20, ...K2, K3, ...K5, ...K8, R3	<a href="#">23</a>
DNC-...- <b>R8</b> (dust protected)	PPV, A, S2, ...K2 – ...K8	<a href="#">28</a>
DNC-...- <b>A3</b> (unlubricated operation)	PPV, A, S2, S20, ...K2 – K10, R3	<a href="#">32</a>

Example for the cylinder in section [2.2 “Type codes \(ascertaining the features of a cylinder\)”](#)

Of the features in the sample cylinder, the feature “S6” is relevant to repair. The description in section [3.2 “DNC-...-S6”](#) on page [19](#) must therefore be used to repair this cylinder with piston rod.

## 2.4 Mounting direction and bearing cap variants

This diagram provides an overview of the direction designations for the cylinder with piston rod as well as the different structure of the bearing cap and seal packs for repair-relevant features.



Orientation:

Festo=product identification (logo) as reference point

O = top

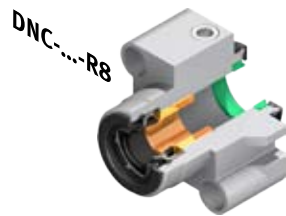
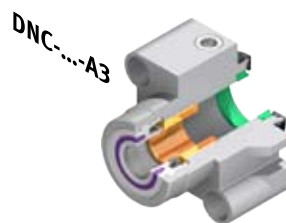
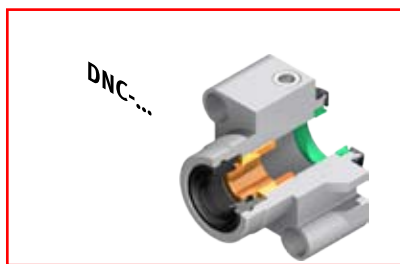
U = underneath

R = right

L = left

V = front

H = rear



Features:

S6 = Heat-resistant seals

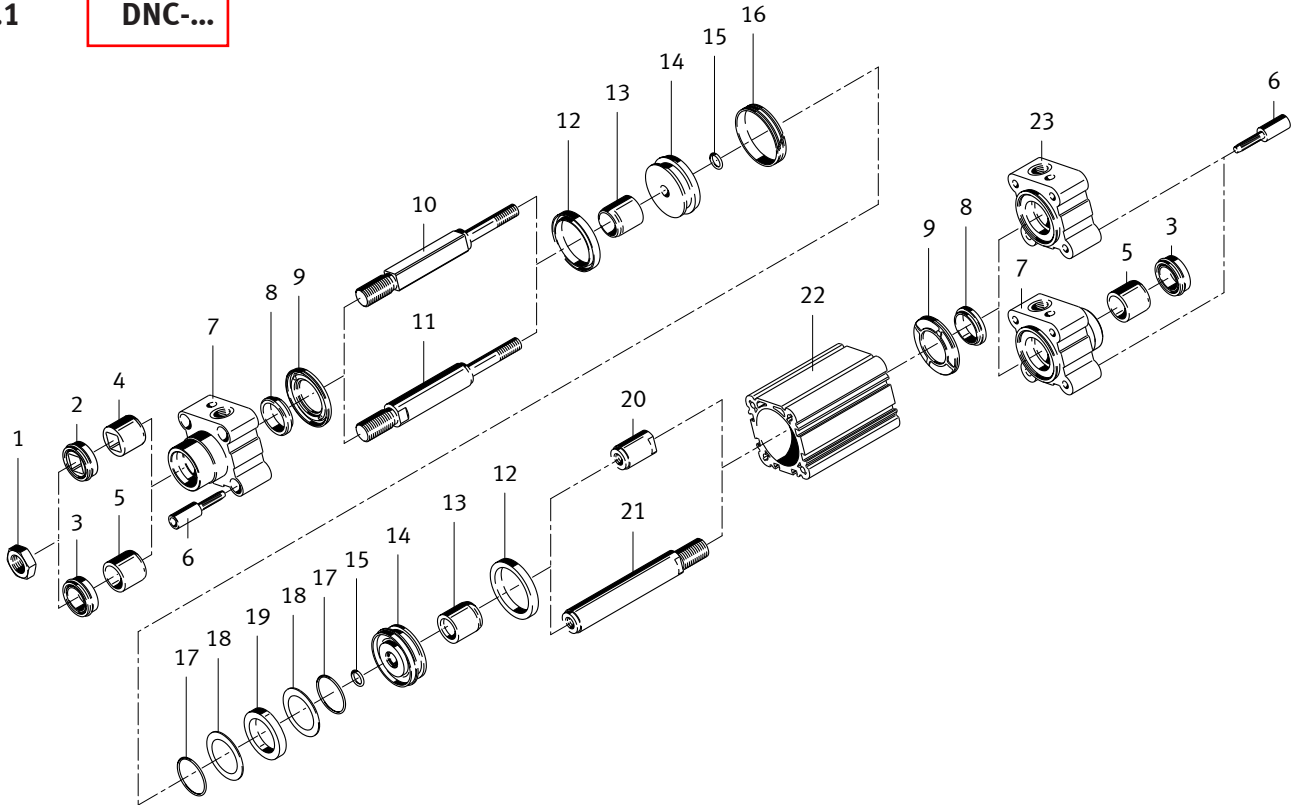
R8 = Dust protection

TT = Low temperature

A3 = Unlubricated operation (PE seal)

### 3 Component overview

#### 3.1 DNC-...

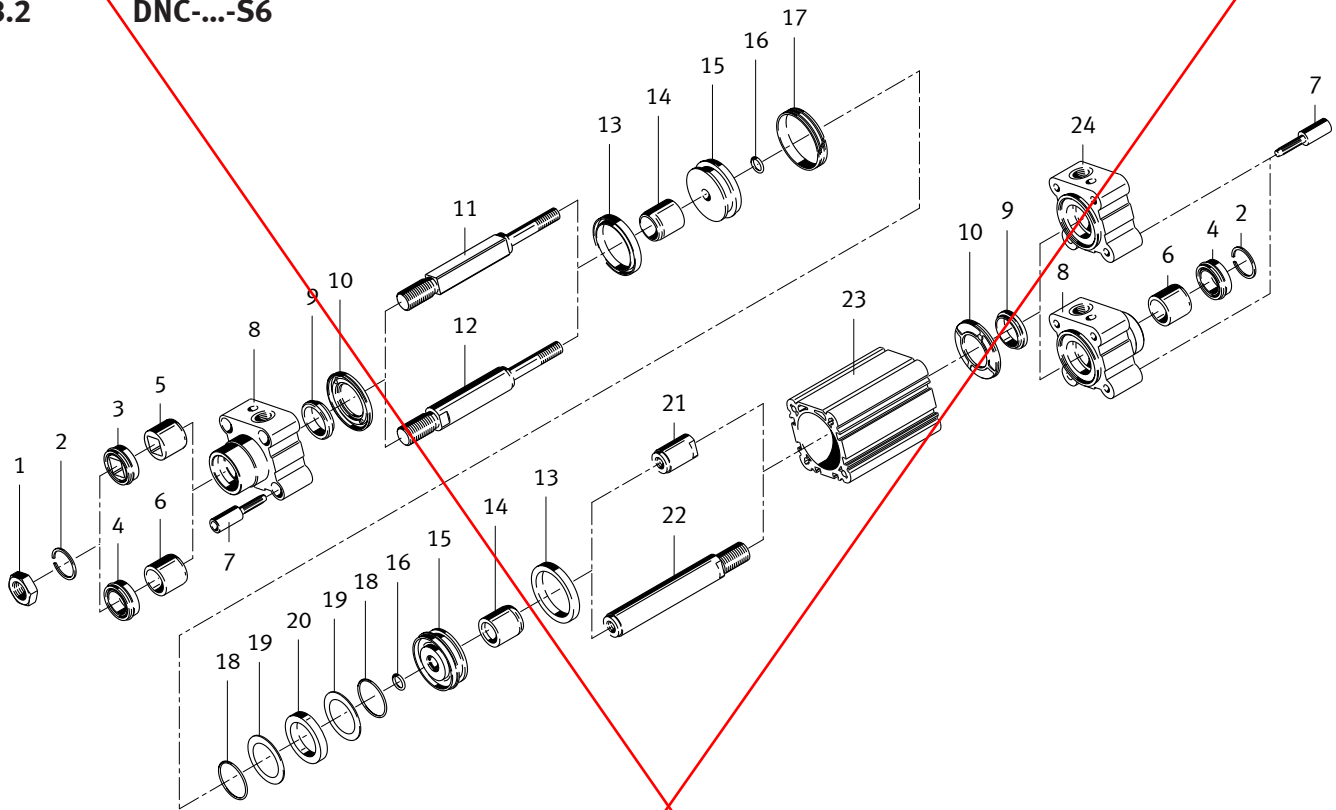


This diagram is intended only to provide an overview of the individual components. To order spare and wearing parts, please use the online spare parts catalogue on the Festo website ([spareparts.festo.com](https://spareparts.festo.com)).

Item	Designation	Note
1	Hex nut	
2	Piston rod seal	For square piston rod
3	Piston rod seal	For round piston rod
4	Bearing	For square piston rod
5	Bearing	For round piston rod
6	Flange screw	Use screw locking agent (wearing parts kit)
7	Bearing cap	
8	Cushioning seal	Only with -PPV-
9	Cushioning disc	
10	Piston rod (square)	
11	Piston rod (round)	
12	Lip ring (piston seal)	
13	Cushion piston	Only with -PPV-
14	Piston	
15	O-ring	
16	Slip ring	
17	O-ring	Only with -A-
18	Washer	Only with -A-
19	Magnet	Only with -A-
20	Threaded coupling	Use screw locking agent (wearing parts kit)
21	Piston rod	With through piston rod
22	Cylinder barrel	
23	End cap	



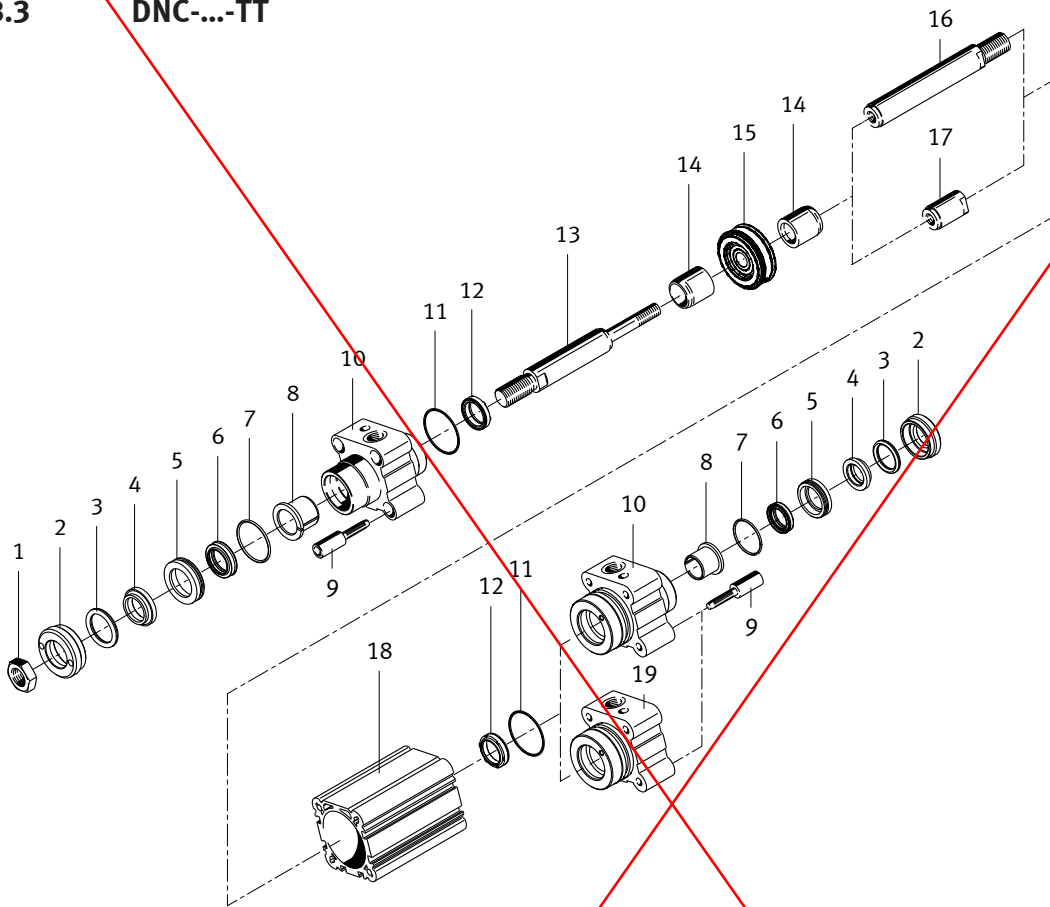
3.2 DNC-...-S6



This diagram is intended only to provide an overview of the individual components. To order spare and wearing parts, please use the online spare parts catalogue on the Festo website ([spareparts.festo.com](http://spareparts.festo.com)).

Item	Designation	Note
1	Hex nut	
2	Retaining ring	
3	Piston rod seal	For square piston rod
4	Piston rod seal	For round piston rod
5	Bearing	For square piston rod
6	Bearing	For round piston rod
7	Flange screw	Use screw locking agent (wearing parts kit)
8	Bearing cap	
9	Cushioning seal	Only with -PPV-
10	Cushioning disc	
11	Piston rod (square)	
12	Piston rod (round)	
13	Lip ring (piston seal)	
14	Cushion piston	Only with -PPV-
15	Piston	
16	O-ring	
17	Slip ring	
18	O-ring	Only with -A-
19	Washer	Only with -A-
20	Magnet	Only with -A-
21	Threaded coupling	Use screw locking agent (wearing parts kit)
22	Piston rod	With through piston rod
23	Cylinder barrel	
24	End cap	

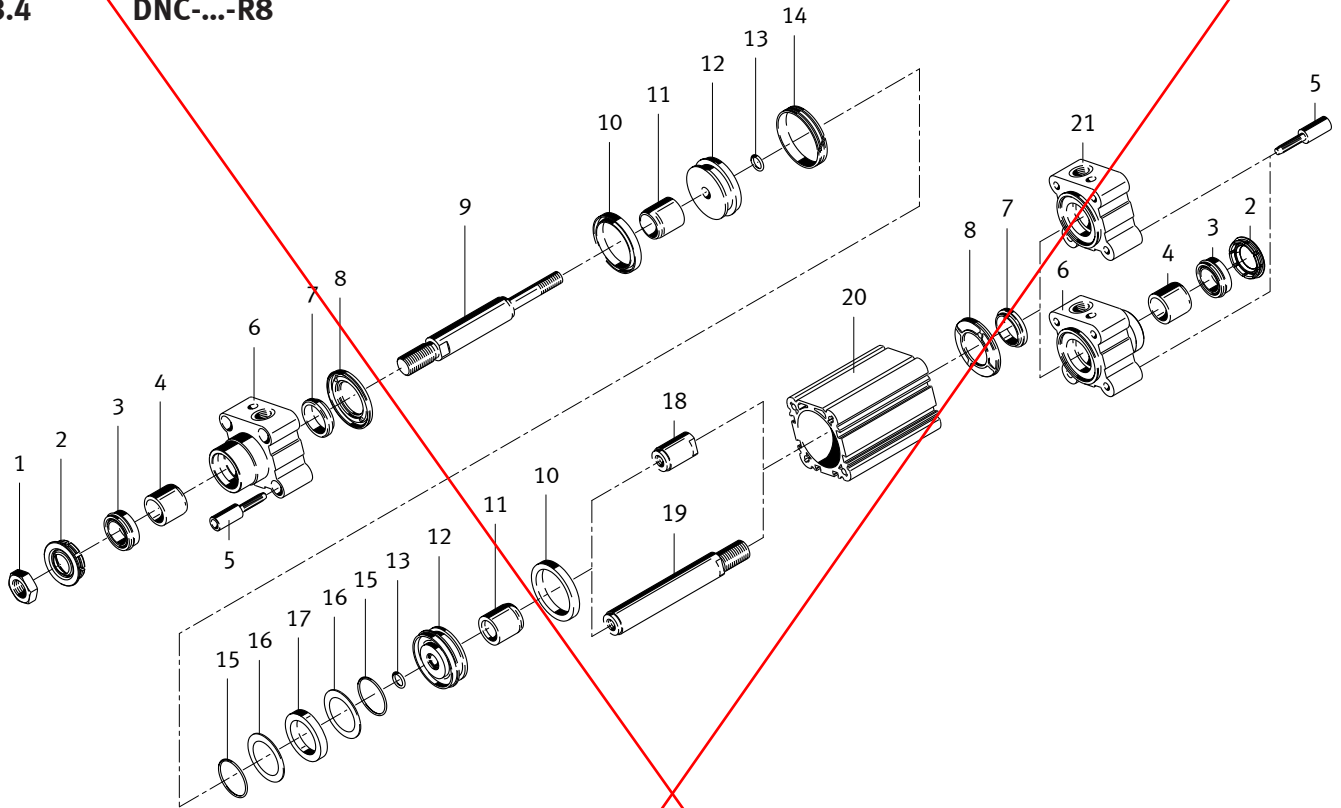
3.3 DNC-...-TT



This diagram is intended only to provide an overview of the individual components. To order spare and wearing parts, please use the online spare parts catalogue on the Festo website ([spareparts.festo.com](http://spareparts.festo.com)).

Item	Designation	Note
1	Hex nut	
2	Screwed insert	
3	O-ring	
4	Excluder	
5	Insert sleeve	
6	Wiper seal	
7	O-ring	
8	Flanged bearing	
9	Flange screw	Use screw locking agent (wearing parts kit)
10	Bearing cap	
11	O-ring	
12	Cushioning seal	
13	Piston rod	
14	Cushion piston	Only with -PPV-
15	Piston	
16	Piston rod	With through piston rod
17	Threaded coupling	Use screw locking agent (wearing parts kit)
18	Cylinder barrel	
19	End cap	

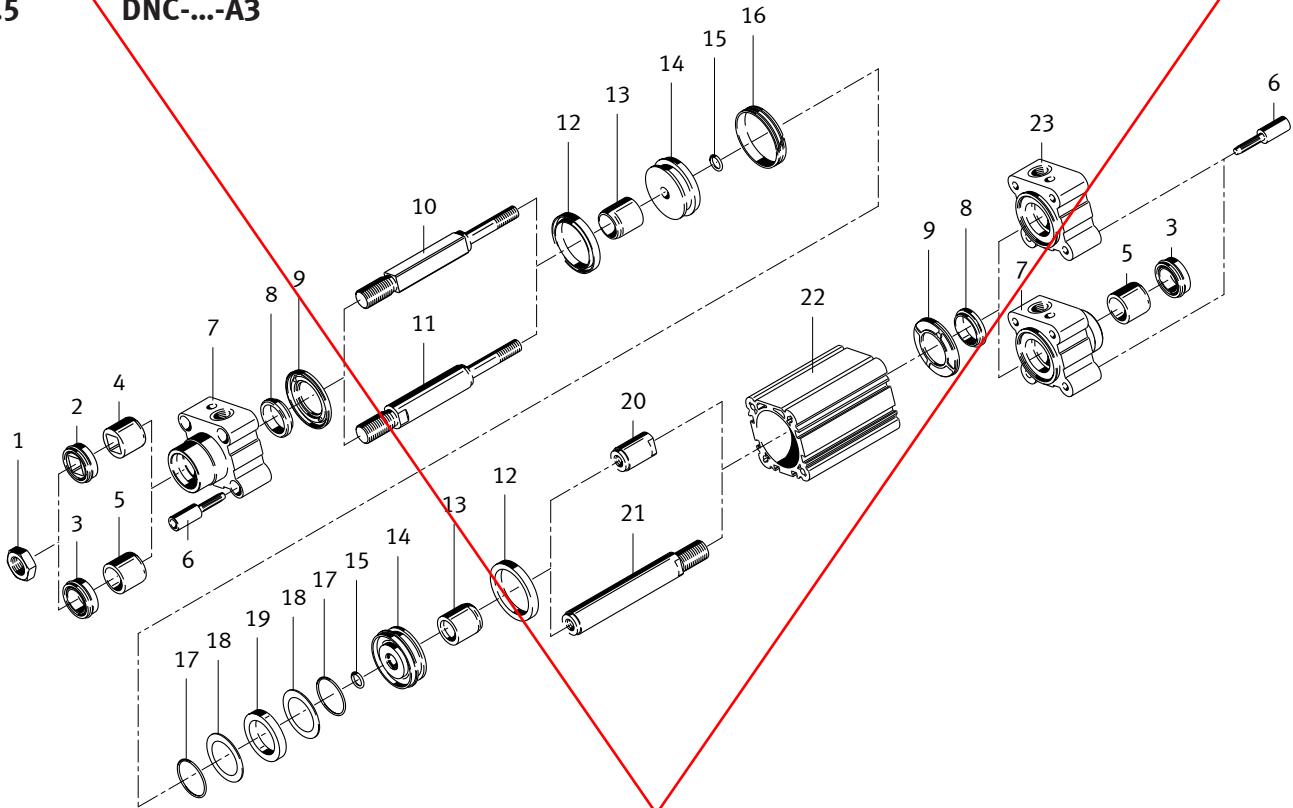
3.4 DNC-...-R8



This diagram is intended only to provide an overview of the individual components. To order spare and wearing parts, please use the online spare parts catalogue on the Festo website ([spareparts.festo.com](http://spareparts.festo.com)).

Item	Designation	Note
1	Hex nut	
2	Wiper seal	
3	Piston rod seal	
4	Bearing	
5	Flange screw	Use screw locking agent (wearing parts kit)
6	Bearing cap	
7	Cushioning seal	Only with -PPV-
8	Cushioning disc	
9	Piston rod	
10	Lip ring (piston seal)	
11	Cushion piston	Only with -PPV-
12	Piston	
13	O-ring	
14	Slip ring	
15	O-ring	Only with -A-
16	Washer	Only with -A-
17	Magnet	Only with -A-
18	Threaded coupling	Use screw locking agent (wearing parts kit)
19	Piston rod	With through piston rod
20	Cylinder barrel	
21	End cap	

3.5 DNC-...-A3



This diagram is intended only to provide an overview of the individual components. To order spare and wearing parts, please use the online spare parts catalogue on the Festo website ([spareparts.festo.com](http://spareparts.festo.com)).

Item	Designation	Note
1	Hex nut	
2	Piston rod seal	For square piston rod
3	Piston rod seal	For round piston rod
4	Bearing	For square piston rod
5	Bearing	For round piston rod
6	Flange screw	Use screw locking agent (wearing parts kit)
7	Bearing cap	
8	Cushioning seal	Only with -PPV-
9	Cushioning disc	
10	Piston rod (square)	
11	Piston rod (round)	
12	Lip ring (piston seal)	
13	Cushion piston	Only with -PPV-
14	Piston	
15	O-ring	
16	Slip ring	
17	O-ring	Only with -A-
18	Washer	Only with -A-
19	Magnet	Only with -A-
20	Threaded coupling	Use screw locking agent (wearing parts kit)
21	Piston rod	With through piston rod
22	Cylinder barrel	
23	End cap	

## 4 Repair steps

### 4.1 Preparatory measures

- Before starting the repair, remove any attachments (clamping device, end-position lock, etc.) in accordance with the instructions in the accompanying operating instructions.
- Keep your working environment tidy.
- Only use the spare parts and assembly aids (grease, locking agent, etc.) provided in the wearing parts kit.



#### Warning

Make sure that the bearing cap cannot suddenly come flying off.

- Remove the non-return valves and tubing connection from the cylinder and depressurise the cylinder completely so that any pressure present is not suddenly released when the cylinder is opened.

To prevent damage to sealing rims or guide surfaces, do not use pointed or sharp-edged assembly aids.

### 4.2 Visual inspection

Check the cylinder for visible damage that might impair its function (e.g. warping of the piston rod) as well as deposits and scoring. The cylinder must be replaced if it is exhibiting significant damage.

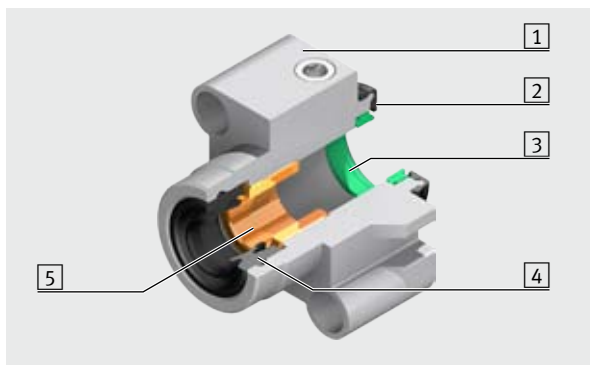
### 4.3 Repairing the cylinder DNC-...

The description in this section can be used to repair cylinders of the type DNC-... with the following features:

Code	Description
P	Elastic cushioning discs
PPV	Adjustable pneumatic cushioning
A	Position sensing
Q	Square piston rod
S2	Through piston rod
S20	Through, hollow piston rod
...K2	Extended male piston rod thread
K3	Female piston rod thread

Code	Description
...K5	Special piston rod thread
K7	Piston rod with external hexagon
...K8	Extended piston rod
K10	Smooth anodised aluminium piston rod
S10	Slow speed
S11	Low friction
R3	High corrosion protection

#### 4.3.1 Structure of the bearing cap



- 1 Bearing cap
- 2 Cushioning disc
- 3 Cushioning seal (only on cylinders with adjustable cushioning PPV)
- 4 Piston rod seal
- 5 Bearing

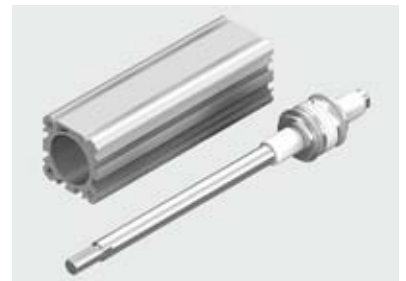
### 4.3.2 Removing the bearing and end caps

- Loosen the screws in the bearing and end caps (the rear bearing cap on cylinders with through piston rod (S2 / S20)) and remove them.
- Remove the bearing and end caps from the cylinder barrel and piston rod.



### 4.3.3 Replacing the piston components

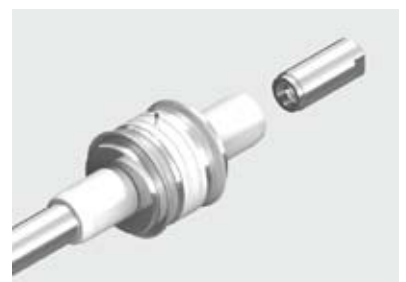
- Pull the piston rod out of the cylinder barrel.
- Check the cylinder barrel and piston rod for damage.  
The entire cylinder must be replaced if the cylinder barrel (particularly the bearing surface) is exhibiting significant damage.



- Unscrew the threaded coupling (the rear part of the piston rod on cylinders with through piston rod (S2 / S20)) from the piston rod.
- Remove the piston components from the piston rod, noting the sequence and alignment.
- Remove any residues of the screw locking agent from the thread of the piston rod and threaded coupling.
- Replace the components contained in the wearing parts kit and reassemble the piston components on the piston rod in the correct sequence.



- Apply the screw locking agent contained in the wearing parts kit to the inside of the threaded coupling (the rear part of the piston rod on cylinders with through piston rod (S2 / S20)) and screw it onto the piston rod with the corresponding torque (see table).



Type	Torque
DNC-32	9 Nm
DNC-40	20 Nm
DNC-50	30 Nm
DNC-63	45 Nm
DNC-80	60 Nm
DNC-100	60 Nm
DNC-125	170 Nm

### 4.3.4 Inserting the piston rod into the cylinder barrel

- Clean the inner surface of the cylinder barrel as described in section [5.1 “Cleaning”](#).
- Apply the grease contained in the wearing parts kit to the following parts:

Component	Cylinder with S10/S11	Other cylinders
Inner surface of cylinder barrel	Extremely thin film <sup>1)</sup>	Thin film <sup>2)</sup>
Surface of piston rod	Extremely thin film <sup>1)</sup>	Thin film <sup>2)</sup>
Piston seal lip rings	Thin film <sup>2)</sup> on outside	Thin film <sup>2)</sup> on outside
Piston surface between lip rings (grease reservoir <sup>3)</sup> )	Fill 1/3 with grease	Fill 2/3 with grease
Cushion piston	Thin film <sup>2)</sup> on outside	Thin film <sup>2)</sup> on outside

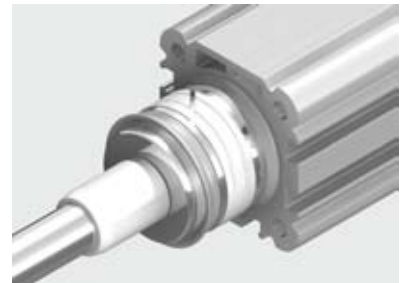
<sup>1)</sup> See section [5.2.1 “Extremely thin grease film”](#)

<sup>2)</sup> See section [5.2.2 “Thin grease film”](#)

<sup>3)</sup> See section [5.2.3 “Grease reservoir”](#)

- Place the piston flat on the front side of the cylinder barrel and insert the lip ring into the cylinder barrel by tilting and turning it slightly.

**The sealing lip must not fold back against the inside of the piston.**



#### Note

If necessary use a flat and blunt-edged object to insert the lip ring into the cylinder barrel.

- Insert the piston fully into the cylinder barrel.
- Push the piston far enough into the cylinder barrel that the first lip ring protrudes slightly at the other end of the cylinder barrel.
- Pull the piston rod back again until the piston is sitting fully in the cylinder barrel.



#### Note

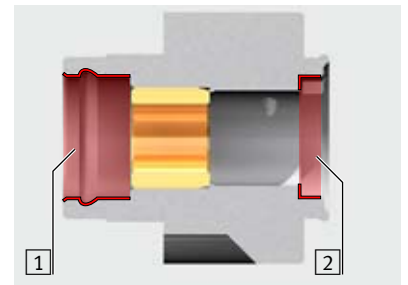
This approach ensures that the sealing lips of the two lip rings sit correctly in the cylinder barrel.

### 4.3.5 Repairing and attaching the bearing and end caps

- Remove the piston rod seal **1** from the bearing cap **2** (the front and rear bearing caps on cylinders with through piston rod (S2 / S20)).
- Remove the cushioning discs **4** from the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2 / S20)).
- **Only on cylinders with adjustable cushioning (PPV)**  
Remove the cushioning seal **3** from the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2 / S20)).



- Clean the seat of the piston rod seal 1.
- **Only on cylinders with adjustable cushioning (PPV)**  
Clean the seat of the cushioning seal 2.

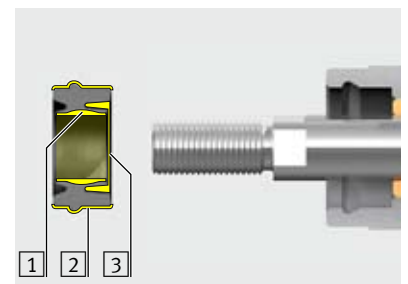


- Grease the new piston rod seal (one per bearing cap on cylinders with through piston rod (S2 / S20)) as follows:

Area	Cylinder with S10/S11	Other cylinders
1 Grease reservoir <sup>1)</sup> with piston rod	Fill 1/3 with grease	Fill 2/3 with grease
2 External surface with bearing cap	Thin film <sup>2)</sup>	Thin film <sup>2)</sup>
3 Grease reservoir <sup>1)</sup> with bearing	Fill 1/3 with grease	Fill 2/3 with grease

<sup>1)</sup> See section [5.2.3 “Grease reservoir”](#)

<sup>2)</sup> See section [5.2.2 “Thin grease film”](#)



- Insert the piston rod seal into the bearing cap (both bearing caps on cylinders with through piston rod (S2 / S20)) using the appropriate insertion tool.



**Note**

Note the mounting direction (labelling facing out).  
Note the mounting orientation on cylinders with square piston rod.

- **Only on cylinders with adjustable cushioning (PPV)**  
Apply a thin film of grease to the new cushioning seals on the front side with the sealing surface and insert them into the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2 / S20)).
- Place the new cushioning discs on the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2 / S20)).



- To protect the bearing and seals, place the appropriate sleeve on the thread of the piston rod to prevent damage.



**Note**

On cylinders with extended piston rod thread, the sleeve may not cover the thread completely. If this happens, an appropriate sleeve must be custom fabricated. See section [7.2 “Special tools”](#) for information.



- Guide the bearing cap (both bearing caps on cylinders with through piston rod (S2 / S20)) over the sleeve onto the piston rod as far as the cylinder barrel.
- Place the end cap at the other end of the cylinder barrel.



- Apply the screw locking agent contained in the wearing parts kit to the screws.
- Fasten the screws through the bearing and end caps into the cylinder barrel.
- Align the bearing and end caps flush with the cylinder barrel.
- Tighten the screws to the appropriate torque (see table).



Type	Torque
DNC-32	7 Nm
DNC-40	7 Nm
DNC-50	13 Nm
DNC-63	13 Nm
DNC-80	35 Nm
DNC-100	35 Nm
DNC-125	40 Nm

- Perform a functional test as per the operating instructions (enclosed with the cylinder or can be called up on the Festo website ([www.festo.com](http://www.festo.com))) and commission the repaired cylinder.

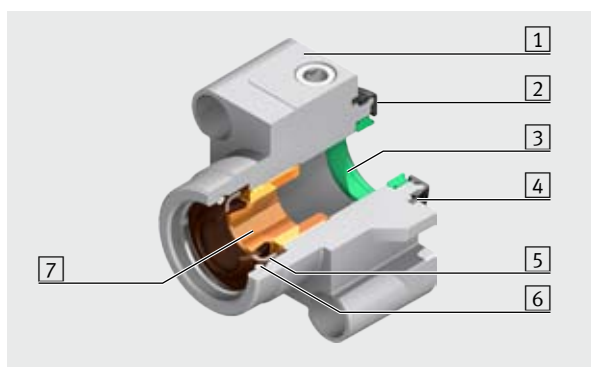
#### 4.4 Repairing the cylinder DNC-...-S6

The description in this section can be used to repair cylinders of the type DNC-...-S6 with the following features:

Code	Description
P	Elastic cushioning discs
PPV	Adjustable pneumatic cushioning
A	Position sensing
Q	Square piston rod
S2	Through piston rod
S20	Through, hollow piston rod
...K2	Extended male piston rod thread

Code	Description
K3	Female piston rod thread
...K5	Special piston rod thread
K7	Piston rod with external hexagon
...K8	Extended piston rod
K10	Smooth anodised aluminium piston rod
R3	High corrosion protection

##### 4.4.1 Structure of the bearing cap



- 1 Bearing cap
- 2 Cushioning disc
- 3 Cushioning seal  
(only on cylinders with adjustable cushioning PPV)
- 4 Sealing ring
- 5 Piston rod seal with metal insert
- 6 Retaining ring
- 7 Bearing

#### 4.4.2 Removing the bearing and end caps

- Loosen the screws in the bearing and end caps (the rear bearing cap on cylinders with through piston rod (S2 / S20)) and remove them.
- Remove the bearing and end caps from the cylinder barrel and piston rod.



#### 4.4.3 Replacing the piston components

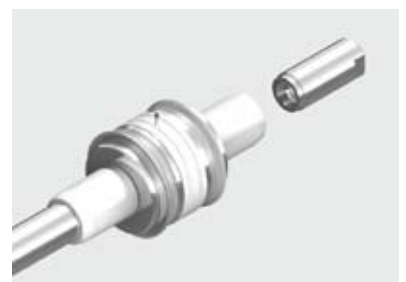
- Pull the piston rod out of the cylinder barrel.
- Check the cylinder barrel and piston rod for damage.  
The entire cylinder must be replaced if the cylinder barrel (particularly the bearing surface) is exhibiting significant damage.



- Unscrew the threaded coupling (the rear part of the piston rod on cylinders with through piston rod (S2 / S20)) from the piston rod.
- Remove the piston components from the piston rod, noting the sequence and alignment.
- Remove any residues of the screw locking agent from the thread of the piston rod and threaded coupling.
- Replace the components contained in the wearing parts kit and reassemble the piston components on the piston rod in the correct sequence.



- Apply the screw locking agent contained in the wearing parts kit to the inside of the threaded coupling (the rear part of the piston rod on cylinders with through piston rod (S2 / S20)) and screw it onto the piston rod with the corresponding torque (see table).



Type	Torque
DNC-32	9 Nm
DNC-40	20 Nm
DNC-50	30 Nm
DNC-63	45 Nm
DNC-80	60 Nm
DNC-100	60 Nm
DNC-125	170 Nm

#### 4.4.4 Inserting the piston rod into the cylinder barrel

- Clean the inner surface of the cylinder barrel as described in section [5.1 “Cleaning”](#).
- Apply the grease contained in the wearing parts kit to the following parts:

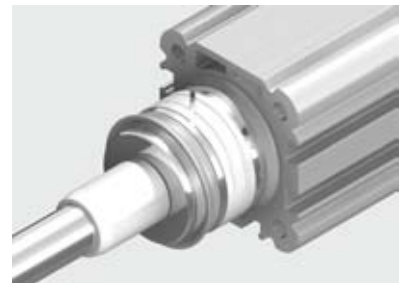
Component	Greasing
Inner surface of cylinder barrel	Thin film <sup>1)</sup>
Surface of piston rod	Thin film <sup>1)</sup>
Piston seal lip rings	Thin film <sup>1)</sup> on outside
Piston surface between lip rings (grease reservoir <sup>2)</sup> )	Fill 2/3 with grease
Cushion piston	Thin film <sup>1)</sup> on outside

<sup>1)</sup> See section [5.2.2 “Thin grease film”](#)

<sup>2)</sup> See section [5.2.3 “Grease reservoir”](#)

- Place the piston flat on the front side of the cylinder barrel and insert the lip ring into the cylinder barrel by tilting and turning it slightly.

**The sealing lip must not fold back against the inside of the piston.**



#### Note

If necessary use a flat and blunt-edged object to insert the lip ring into the cylinder barrel.

- Insert the piston fully into the cylinder barrel.
- Push the piston far enough into the cylinder barrel that the first lip ring protrudes slightly at the other end of the cylinder barrel.
- Pull the piston rod back again until the piston is sitting fully in the cylinder barrel.



#### Note

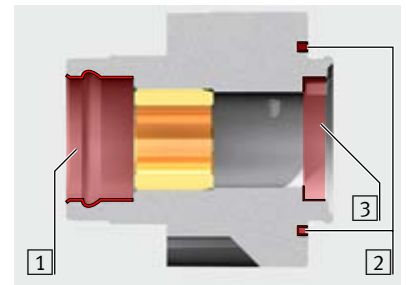
This approach ensures that the sealing lips of the two lip rings sit correctly in the cylinder barrel.

#### 4.4.5 Repairing and attaching the bearing and end caps

- Remove the retaining ring **1** and the piston rod seal **2** from the bearing cap **3** (the front and rear bearing caps on cylinders with through piston rod (S2 / S20)).
- Remove the cushioning discs **6** from the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2 / S20)).
- Remove the sealing ring **5** from the bearing cap **3** and end cap (the front and rear bearing caps on cylinders with through piston rod (S2 / S20)).
- **Only on cylinders with adjustable cushioning (PPV)**  
Remove the cushioning seal **4** from the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2 / S20)).



- Clean the seats of the piston rod seal **1** and the sealing ring **2**.
- **Only on cylinders with adjustable cushioning (PPV)**  
Clean the seat of the cushioning seal **3**.

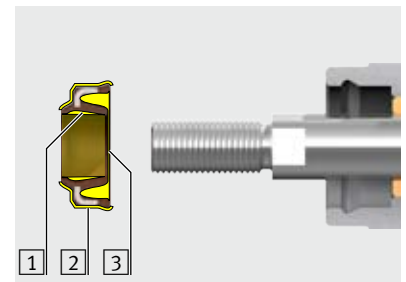


- Grease the new piston rod seal (one per bearing cap on cylinders with through piston rod (S2 / S20)) as follows:

Area	Greasing
<b>1</b> Grease reservoir <sup>1)</sup> with piston rod	Fill 2/3 with grease
<b>2</b> External surface with bearing cap	Thin film <sup>2)</sup>
<b>3</b> Grease reservoir <sup>1)</sup> with bearing	Fill 2/3 with grease

<sup>1)</sup> See section [5.2.3 “Grease reservoir”](#)

<sup>2)</sup> See section [5.2.2 “Thin grease film”](#)



- Insert the piston rod seal into the bearing cap (both bearing caps on cylinders with through piston rod (S2 / S20)) using the appropriate insertion tool.



**Note**

Note the mounting direction (individual sealing lips facing out).  
Note the mounting orientation on cylinders with square piston rod.

- Compress the retaining ring (e.g. using a pliers) and place it on the piston rod seal (in both bearing caps on cylinders with through piston rod (S2 / S20)).



- **Only on cylinders with adjustable cushioning (PPV)**

Apply a thin film of grease to the new cushioning seals on the front side with the sealing surface and insert them into the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2 / S20)).

- Insert the sealing ring in the groove of the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2 / S20)).
- Place the new cushioning discs on the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2 / S20)).



- To protect the bearing and seals, place the appropriate sleeve on the thread of the piston rod to prevent damage.



**Note**

On cylinders with extended piston rod thread, the sleeve may not cover the thread completely. If this happens, an appropriate sleeve must be custom fabricated. See section 7.2 “Special tools” for information.

- Guide the bearing cap (both bearing caps on cylinders with through piston rod (S2 / S20)) over the sleeve onto the piston rod as far as the cylinder barrel.
- Place the end cap at the other end of the cylinder barrel.
- Apply the screw locking agent contained in the wearing parts kit to the screws.
- Fasten the screws through the bearing and end caps into the cylinder barrel.
- Align the bearing and end caps flush with the cylinder barrel.
- Tighten the screws to the appropriate torque (see table).



Type	Torque
DNC-32	7 Nm
DNC-40	7 Nm
DNC-50	13 Nm
DNC-63	13 Nm
DNC-80	35 Nm
DNC-100	35 Nm
DNC-125	40 Nm

- Perform a functional test as per the operating instructions (enclosed with the cylinder or can be called up on the Festo website ([www.festo.com](http://www.festo.com))) and commission the repaired cylinder.

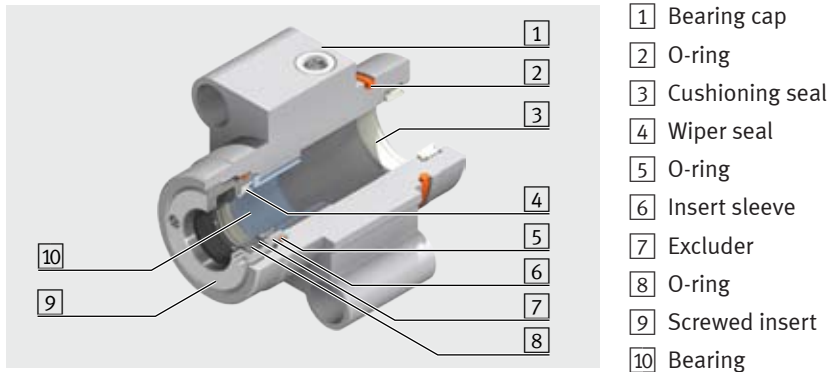
### 4.5 Repairing the cylinder DNC-...-TT

The description in this section can be used to repair cylinders of the type DNC-...-TT with the following features:

Code	Description
PPV	Adjustable pneumatic cushioning
A	Position sensing
S2	Through piston rod
S20	Through, hollow piston rod
...K2	Extended male piston rod thread

Code	Description
K3	Female piston rod thread
K3	Female piston rod thread
...K5	Special piston rod thread
...K8	Extended piston rod
R3	High corrosion protection

### 4.5.1 Structure of the bearing cap



### 4.5.2 Removing the bearing and end caps

- Loosen the screws in the bearing and end caps (the rear bearing cap on cylinders with through piston rod (S2 / S20)) and remove them.
- Remove the bearing and end caps from the cylinder barrel and piston rod.



### 4.5.3 Replacing the piston components

- Pull the piston rod out of the cylinder barrel.
- Check the cylinder barrel and piston rod for damage.  
 The entire cylinder must be replaced if the cylinder barrel (particularly the bearing surface) is exhibiting significant damage.



- Unscrew the threaded coupling (the rear part of the piston rod on cylinders with through piston rod (S2 / S20)) from the piston rod.
- Remove the piston components from the piston rod.
- Remove any residues of the screw locking agent from the thread of the piston rod and threaded coupling.
- Replace the piston and, if applicable, the cushion piston and reassemble the piston components on the piston rod in the correct sequence.



- Apply the screw locking agent contained in the wearing parts kit to the inside of the threaded coupling (the rear part of the piston rod on cylinders with through piston rod (S2 / S20)) and screw it onto the piston rod with the corresponding torque (see table).

Type	Torque
DNC-32	9 Nm
DNC-40	20 Nm
DNC-50	30 Nm
DNC-63	45 Nm
DNC-80	60 Nm
DNC-100	60 Nm



#### 4.5.4 Inserting the piston rod into the cylinder barrel

- Clean the inner surface of the cylinder barrel as described in section [5.1 “Cleaning”](#).
- Apply the grease contained in the wearing parts kit to the following parts:

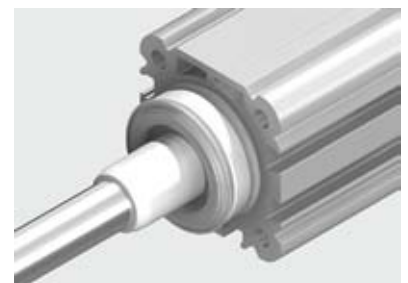
Component	Other cylinders
Inner surface of cylinder barrel	Thin film <sup>1)</sup>
Surface of piston rod	Thin film <sup>1)</sup>
Piston seal lip rings	Thin film <sup>1)</sup> on outside
Piston surface between lip rings (grease reservoir <sup>2)</sup> )	Fill 2/3 with grease
Cushion piston	Thin film <sup>1)</sup> on outside

<sup>1)</sup> See section [5.2.2 “Thin grease film”](#)

<sup>2)</sup> See section [5.2.3 “Grease reservoir”](#)

- Place the piston flat on the front side of the cylinder barrel and insert the lip ring into the cylinder barrel by tilting and turning it slightly.

**The sealing lip must not fold back against the inside of the piston.**



#### Note

If necessary use a flat and blunt-edged object to insert the lip ring into the cylinder barrel.

- Insert the piston fully into the cylinder barrel.
- Push the piston far enough into the cylinder barrel that the first lip ring protrudes slightly at the other end of the cylinder barrel.
- Pull the piston rod back again until the piston is sitting fully in the cylinder barrel.

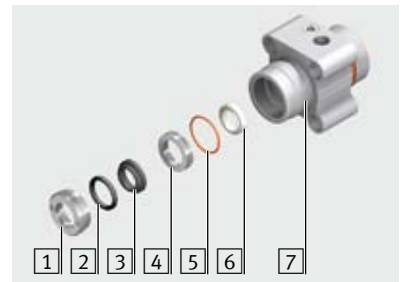


#### Note

This approach ensures that the sealing lips of the two lip rings sit correctly in the cylinder barrel.

### 4.5.5 Repairing and attaching the bearing and end caps

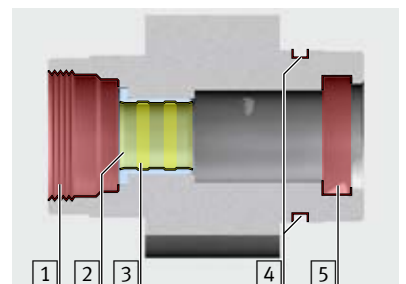
- Unscrew the screwed insert **1** from the bearing cap **7** (the front and rear bearing caps on cylinders with through piston rod (S2 / S20)).
- Remove the excluder **3** and the O-ring **2** from the screwed insert **1**.
- Remove the insert sleeve **4** with the wiper seal **6** and the O-ring **5** from the bearing cap **7** (the front and rear bearing caps on cylinders with through piston rod (S2 / S20)).
- Separate the wiper seal **6** and the O-ring **5** from the insert sleeve **4**.



- Remove the O-ring **2** from the bearing cap **1** and the end cap (the rear bearing cap on cylinders with through piston rod (S2 / S20)).
- Remove the cushioning seal **3** from the bearing cap **1** and the end cap (the rear bearing cap on cylinders with through piston rod (S2 / S20)).



- Remove residues of the screw locking agent from the thread of the bearing cap **1** and the screwed insert.
- Clean the seat of the insert sleeve beneath the thread **1**.
- Apply a thin film of the grease contained in the wearing parts kit to the sliding surfaces of the cylinder bearing **2**.  
If there is a grease reservoir in the cylinder bearing **3**, fill it 2/3 with the grease contained in the wearing parts kit.
- Clean the seat of the cushioning seal **5** and the O-ring **4**.



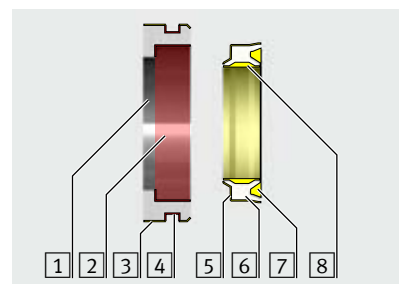
- Clean the seat of the wiper seal **2** and the O-ring **4** at the insert sleeve **1**.
- Grease the outside **3** of the insert sleeve **1**.
- Grease the new wiper seal **6** (one per bearing cap on cylinders with through piston rod (S2 / S20)) as follows:

Area	Other cylinders
<b>5</b> Outer surface with insert sleeve	Thin film <sup>1)</sup>
<b>7</b> Grease reservoir <sup>2)</sup> with bearing	Fill 2/3 with grease
<b>8</b> Grease reservoir <sup>2)</sup> with piston rod	Fill 2/3 with grease

<sup>1)</sup> See section [5.2.2 "Thin grease film"](#)

<sup>2)</sup> See section [5.2.3 "Grease reservoir"](#)

- Insert the greased wiper seal into the insert sleeve.



#### Note

Note the mounting direction (protruding sealing lip facing out, grease reservoir facing in).

- Apply the grease contained in the wearing parts kit to the new O-ring and insert it into the outer groove of the insert sleeve.
- Insert the insert sleeve into the bearing cap.



#### Note

Note the mounting direction (chamfer facing the bearing cap).

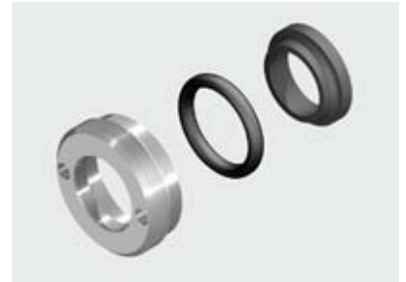


- Apply the grease contained in the wearing parts kit to the excluder and O-ring and insert them both into the screwed insert.



**Note**

Note the mounting direction and sequence (O-ring between screwed insert and excluder).



- Screw the screwed insert into the bearing cap (the front and rear bearing caps on cylinders with through piston rod (S2 / S20)) and tighten it to the corresponding torque (see table).

Type	Torque
DNC-32	4 Nm
DNC-40	8 Nm
DNC-50	11 Nm
DNC-63	11 Nm
DNC-80	15 Nm
DNC-100	15 Nm



- Apply a thin film of the grease contained in the wearing parts kit to the cushioning seals on the front side with the sealing surface and insert them into the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2 / S20)).
- Apply the grease contained in the wearing parts kit to the new O-rings and insert them into the groove of the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2 / S20)).



- To protect the bearing and seals, place the appropriate sleeve on the thread of the piston rod to prevent damage.



**Note**

On cylinders with extended piston rod thread, the sleeve may not cover the thread completely. If this happens, an appropriate sleeve must be custom fabricated. See section 7.2 “Special tools” for information.

- Guide the bearing cap (both bearing caps on cylinders with through piston rod (S2 / S20)) over the sleeve onto the piston rod as far as the cylinder barrel.
- Place the end cap at the other end of the cylinder barrel.



- Apply the screw locking agent contained in the wearing parts kit to the screws.
- Fasten the screws through the bearing and end caps into the cylinder barrel.
- Align the bearing and end caps flush with the cylinder barrel.
- Tighten the screws to the appropriate torque (see table).



Type	Torque
DNC-32	7 Nm
DNC-40	7 Nm
DNC-50	13 Nm
DNC-63	13 Nm
DNC-80	35 Nm
DNC-100	35 Nm

- Perform a functional test as per the operating instructions (enclosed with the cylinder or can be called up on the Festo website ([www.festo.com](http://www.festo.com))) and commission the repaired cylinder.

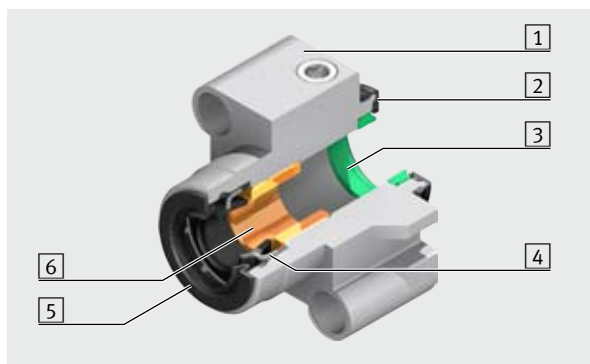
## 4.6 Repairing the cylinder DNC-...-R8

The description in this section can be used to repair cylinders of the type DNC-...-R8 with the following features:

Code	Description
P	Elastic cushioning discs
PPV	Adjustable pneumatic cushioning
A	Position sensing
S2	Through piston rod
...K2	Extended male piston rod thread

Code	Description
K3	Female piston rod thread
...K5	Special piston rod thread
K7	Piston rod with external hexagon
...K8	Extended piston rod

### 4.6.1 Structure of the bearing cap



- 1 Bearing cap
- 2 Cushioning disc
- 3 Cushioning seal (only on cylinders with adjustable cushioning PPV)
- 4 Piston rod seal with metal insert
- 5 Wiper seal
- 6 Bearing

### 4.6.2 Removing the bearing and end caps

- Loosen the screws in the bearing and end caps (the rear bearing cap on cylinders with through piston rod (S2 / S20)) and remove them.
- Remove the bearing and end caps from the cylinder barrel and piston rod.



### 4.6.3 Replacing the piston components

- Pull the piston rod out of the cylinder barrel.
- Check the cylinder barrel and piston rod for damage.  
The entire cylinder must be replaced if the cylinder barrel (particularly the bearing surface) is exhibiting significant damage.



- Unscrew the threaded coupling (the rear part of the piston rod on cylinders with through piston rod (S2 / S20)) from the piston rod.
- Remove the piston components from the piston rod, noting the sequence and alignment.
- Remove any residues of the screw locking agent from the thread of the piston rod and threaded coupling.
- Replace the components contained in the wearing parts kit and reassemble the piston components on the piston rod in the correct sequence.
- Apply the screw locking agent contained in the wearing parts kit to the inside of the threaded coupling (the rear part of the piston rod on cylinders with through piston rod (S2 / S20)) and screw it onto the piston rod with the corresponding torque (see table).



Type	Torque
DNC-32	9 Nm
DNC-40	20 Nm
DNC-50	30 Nm
DNC-63	45 Nm
DNC-80	60 Nm
DNC-100	60 Nm
DNC-125	170 Nm

#### 4.6.4 Inserting the piston rod into the cylinder barrel

- Clean the inner surface of the cylinder barrel as described in section [5.1 “Cleaning”](#).
- Apply the grease contained in the wearing parts kit to the following parts:

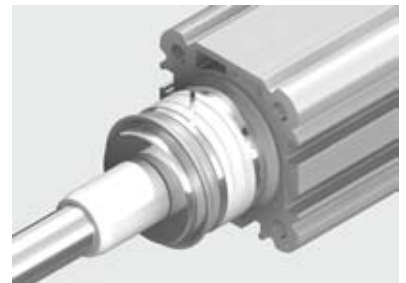
Component	Greasing
Inner surface of cylinder barrel	Thin film <sup>1)</sup>
Surface of piston rod	Thin film <sup>1)</sup>
Piston seal lip rings	Thin film <sup>1)</sup> on outside
Piston surface between lip rings (grease reservoir <sup>2)</sup> )	Fill 2/3 with grease
Cushion piston	Thin film <sup>1)</sup> on outside

<sup>1)</sup> See section [5.2.2 “Thin grease film”](#)

<sup>2)</sup> See section [5.2.3 “Grease reservoir”](#)

- Place the piston flat on the front side of the cylinder barrel and insert the lip ring into the cylinder barrel by tilting and turning it slightly.

**The sealing lip must not fold back against the inside of the piston.**



#### Note

If necessary use a flat and blunt-edged object to insert the lip ring into the cylinder barrel.

- Insert the piston fully into the cylinder barrel.
- Push the piston far enough into the cylinder barrel that the first lip ring protrudes slightly at the other end of the cylinder barrel.
- Pull the piston rod back again until the piston is sitting fully in the cylinder barrel.



#### Note

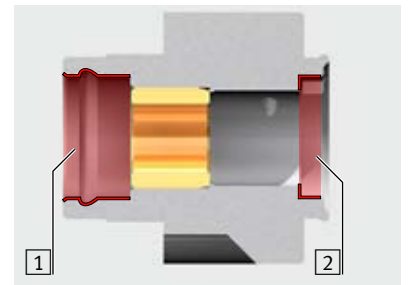
This approach ensures that the sealing lips of the two lip rings sit correctly in the cylinder barrel.

#### 4.6.5 Repairing and attaching the bearing and end caps

- Remove the wiper seal **1** and the piston rod seal **2** from the bearing cap **3** (the front and rear bearing caps on cylinders with through piston rod (S2 / S20)).
- Remove the cushioning discs **5** from the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2 / S20)).
- **Only on cylinders with adjustable cushioning (PPV)**  
Remove the cushioning seal **4** from the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2 / S20)).



- Clean the seats of piston rod seal **1**.
- **Only on cylinders with adjustable cushioning (PPV)**  
Clean the seat of cushioning seal **1**.

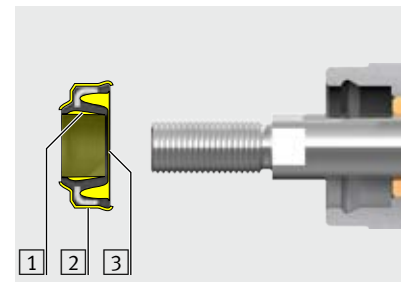


- Grease the new piston rod seal (one per bearing cap on cylinders with through piston rod (S2 / S20)) as follows:

Area	Greasing
<b>1</b> Grease reservoir <sup>1)</sup> with piston rod	Fill 2/3 with grease
<b>2</b> External surface with bearing cap	Thin film <sup>2)</sup>
<b>3</b> Grease reservoir <sup>1)</sup> with bearing	Fill 2/3 with grease

<sup>1)</sup> See section [5.2.3 "Grease reservoir"](#)

<sup>2)</sup> See section [5.2.2 "Thin grease film"](#)



- Insert the piston rod seal into the bearing cap (both bearing caps on cylinders with through piston rod (S2 / S20)) using the appropriate insertion tool.



**Note**

Note the mounting direction (individual sealing lips facing out).  
Note the mounting orientation on cylinders with square piston rod.

- Place the wiper seal on the piston rod seal (in both bearing caps on cylinders with through piston rod (S2 / S20)).



- **Only on cylinders with adjustable cushioning (PPV)**

Apply a thin film of grease to the new cushioning seals on the front side with the sealing surface and insert them into the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2 / S20)).

- Place the new cushioning discs on the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2 / S20)).



- To protect the bearing and seals, place the appropriate sleeve on the thread of the piston rod to prevent damage.



**Note**

On cylinders with extended piston rod thread, the sleeve may not cover the thread completely. If this happens, an appropriate sleeve must be custom fabricated. See section 7.2 “Special tools” for information.



- Guide the bearing cap (both bearing caps on cylinders with through piston rod (S2 / S20)) over the sleeve onto the piston rod as far as the cylinder barrel.
- Place the end cap at the other end of the cylinder barrel.
- Apply the screw locking agent contained in the wearing parts kit to the screws.
- Fasten the screws through the bearing and end caps into the cylinder barrel.
- Align the bearing and end caps flush with the cylinder barrel.
- Tighten the screws to the appropriate torque (see table).



Type	Torque
DNC-32	7 Nm
DNC-40	7 Nm
DNC-50	13 Nm
DNC-63	13 Nm
DNC-80	35 Nm
DNC-100	35 Nm
DNC-125	40 Nm

- Perform a functional test as per the operating instructions (enclosed with the cylinder or can be called up on the Festo website ([www.festo.com](http://www.festo.com))) and commission the repaired cylinder.

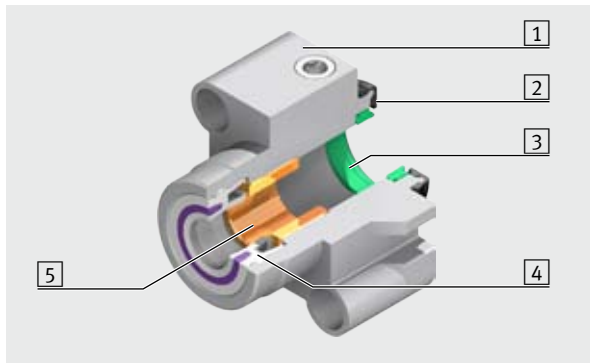
### 4.7 Repairing the cylinder DNC-...-A3

The description in this section can be used to repair cylinders of the type DNC-...-A3 with the following features:

Code	Description
P	Elastic cushioning discs
PPV	Adjustable pneumatic cushioning
A	Position sensing
Q	Square piston rod
S2	Through piston rod
S20	Through, hollow piston rod
...K2	Extended male piston rod thread

Code	Description
K3	Female piston rod thread
...K5	Special piston rod thread
K7	Piston rod with external hexagon
...K8	Extended piston rod
K10	Smooth anodised aluminium piston rod
R3	High corrosion protection

### 4.7.1 Structure of the bearing cap



- 1 Bearing cap
- 2 Cushioning disc
- 3 Cushioning seal  
(only on cylinders with adjustable cushioning PPV)
- 4 Piston rod seal (PE)
- 5 Bearing

### 4.7.2 Removing the bearing and end caps

- Loosen the screws in the bearing and end caps (the rear bearing cap on cylinders with through piston rod (S2 / S20)) and remove them.
- Remove the bearing and end caps from the cylinder barrel and piston rod.



### 4.7.3 Replacing the piston components

- Pull the piston rod out of the cylinder barrel.
- Check the cylinder barrel and piston rod for damage.  
The entire cylinder must be replaced if the cylinder barrel (particularly the bearing surface) is exhibiting significant damage.



- Unscrew the threaded coupling (the rear part of the piston rod on cylinders with through piston rod (S2 / S20)) from the piston rod.
- Remove the piston components from the piston rod, noting the sequence and alignment.
- Remove any residues of the screw locking agent from the thread of the piston rod and threaded coupling.
- Replace the components contained in the wearing parts kit and reassemble the piston components on the piston rod in the correct sequence.



- Apply the screw locking agent contained in the wearing parts kit to the inside of the threaded coupling (the rear part of the piston rod on cylinders with through piston rod (S2 / S20)) and screw it onto the piston rod with the corresponding torque (see table).

Type	Torque
DNC-32	9 Nm
DNC-40	20 Nm
DNC-50	30 Nm
DNC-63	45 Nm
DNC-80	60 Nm
DNC-100	60 Nm
DNC-125	170 Nm



#### 4.7.4 Inserting the piston rod into the cylinder barrel

- Clean the inner surface of the cylinder barrel as described in section [5.1 “Cleaning”](#).
- Apply the grease contained in the wearing parts kit to the following parts:

Component	Greasing
Inner surface of cylinder barrel	Thin film <sup>1)</sup>
Surface of piston rod	Thin film <sup>1)</sup>
Piston seal lip rings	Thin film <sup>1)</sup> on outside
Piston surface between lip rings (grease reservoir <sup>2)</sup> )	Fill 2/3 with grease
Cushion piston	Thin film <sup>1)</sup> on outside

<sup>1)</sup> See section [5.2.2 “Thin grease film”](#)

<sup>2)</sup> See section [5.2.3 “Grease reservoir”](#)

- Place the piston flat on the front side of the cylinder barrel and insert the lip ring into the cylinder barrel by tilting and turning it slightly.

**The sealing lip must not fold back against the inside of the piston.**



#### Note

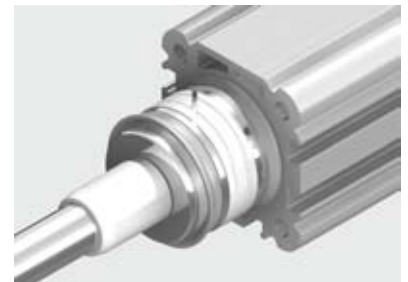
If necessary use a flat and blunt-edged object to insert the lip ring into the cylinder barrel.

- Insert the piston fully into the cylinder barrel.
- Push the piston far enough into the cylinder barrel that the first lip ring protrudes slightly at the other end of the cylinder barrel.
- Pull the piston rod back again until the piston is sitting fully in the cylinder barrel.



#### Note

This approach ensures that the sealing lips of the two lip rings sit correctly in the cylinder barrel.



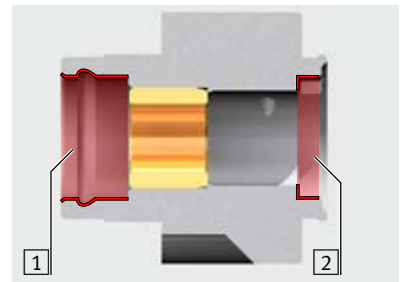


### 4.7.5 Repairing and attaching the bearing and end caps

- Remove the piston rod seal **1** from the bearing cap **2** (the front and rear bearing caps on cylinders with through piston rod (S2 / S20)).
- Remove the cushioning discs **4** from the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2 / S20)).
- Only on cylinders with adjustable cushioning (PPV)**  
Remove the cushioning seal **3** from the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2 / S20)).



- Clean the seat of the piston rod seal **1**.
- Only on cylinders with adjustable cushioning (PPV)**  
Clean the seat of the cushioning seal **4**.

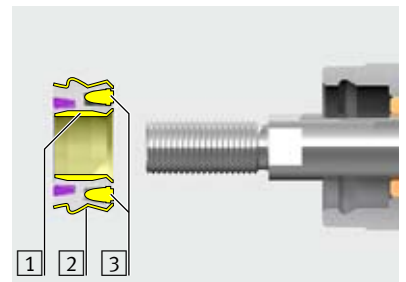


- Grease the new piston rod seal (one per bearing cap on cylinders with through piston rod (S2 / S20)) as follows:

Area	Greasing
<b>1</b> Grease reservoir <sup>1)</sup> with piston rod	Fill 2/3 with grease
<b>2</b> External surface with bearing cap	Thin film <sup>2)</sup>
<b>3</b> Grease reservoir <sup>1)</sup> with bearing	Fill 2/3 with grease

<sup>1)</sup> See section [5.2.3 "Grease reservoir"](#)

<sup>2)</sup> See section [5.2.2 "Thin grease film"](#)



#### Warning

Insert the piston rod seal into the bearing cap using the appropriate insertion sleeve as otherwise it may be damaged.

- Place the appropriate insertion sleeve on the bearing cap. The centring seat must be facing the bearing cap.
- Insert the piston rod seal into the bearing cap (both bearing caps on cylinders with through piston rod (S2 / S20)) using the appropriate insertion tool.



#### Note

Note the mounting direction (purple silicone ring facing out).  
Note the mounting orientation on cylinders with square piston rod.



- **Only on cylinders with adjustable cushioning (PPV)**  
Apply a thin film of grease to the new cushioning seals on the front side with the sealing surface and insert them into the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2 / S20)).
- Place the new cushioning discs on the bearing cap and end cap (the rear bearing cap on cylinders with through piston rod (S2 / S20)).



- To protect the bearing and seals, place the appropriate sleeve on the thread of the piston rod to prevent damage.



**Note**

On cylinders with extended piston rod thread, the sleeve may not cover the thread completely. If this happens, an appropriate sleeve must be custom fabricated. See section 7.2 “Special tools” for information.

- Guide the bearing cap (both bearing caps on cylinders with through piston rod (S2 / S20)) over the sleeve onto the piston rod as far as the cylinder barrel.
- Place the end cap at the other end of the cylinder barrel.
- Apply the screw locking agent contained in the wearing parts kit to the screws.
- Fasten the screws through the bearing and end caps into the cylinder barrel.
- Align the bearing and end caps flush with the cylinder barrel.
- Tighten the screws to the appropriate torque (see table).



Type	Torque
DNC-32	7 Nm
DNC-40	7 Nm
DNC-50	13 Nm
DNC-63	13 Nm
DNC-80	35 Nm
DNC-100	35 Nm
DNC-125	40 Nm

- Perform a functional test as per the operating instructions (enclosed with the cylinder or can be called up on the Festo website ([www.festo.com](http://www.festo.com))) and commission the repaired cylinder.

## 5 Cleaning and greasing

### 5.1 Cleaning

The seals are designed so that the lubricant film applied to them will be effective for the service life of the seal. In order for this so-called life-time lubrication to be retained, the cylinder must be thoroughly cleaned of all foreign particles, machining residues and old lubricants before the cylinders are greased.



#### Warning

Festo recommends Loctite 7063 and Loctite 7070 for cleaning.

When using other cleaning agents, make sure that they do not corrode the seals of the cylinder with piston rod. In case of doubt, check the resistance of the seals using the data on the Festo website ([www.festo.com](http://www.festo.com)).

### 5.2 Greasing

The various components and seals of the cylinder with piston rod require different levels of greasing depending on a number of factors.



#### Warning

To guarantee the life-time lubrication, the piston rod with assembled piston and piston seals must be moved a number of times across the entire stroke of the cylinder barrel to produce an even lubricant film.

#### 5.2.1 Extremely thin grease film

A barely continuous film of grease covers the bearing surface. The grease can give a sheen to the surface, however the colour of the grease must not darken it.

##### Recommendation:

Apply the grease using a cloth or similar dipped in the grease.

Remove the excess grease by drawing the respective seal system components over it once (e.g. by drawing the assembled piston with the piston rod once through the greased cylinder barrel fully) and then remove the excess on the seal components by wiping it off.

#### 5.2.2 Thin grease film

A film of grease covers the bearing surface so that the grease colour darkens the surface slightly.

##### Recommendation:

Apply the grease with a soft brush or similar.

#### 5.2.3 Grease reservoir

There is a defined quantity of oil enclosed between two sealing rims or in enclosed ring volumes.

## 6 Maintenance and care

Clean any dirt from the piston rod using a soft cloth.

All non-abrasive cleaning agents are permitted. Otherwise the cylinders do not require maintenance due to their service life lubrication. Regular removal of the lubricant on the surface of the piston rod reduces its service life.

## 7 Tools

This section provides an overview of the tools and aids required to repair the cylinder with piston rod.



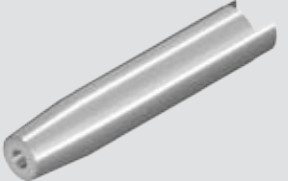
### 7.1 Standard tools

The following standard tools among others are required to repair the cylinder with piston rod:

- Screwdriver
- Wrench
- Flat pliers
- Torque wrench (see tables in the corresponding repair steps for values)
- Face pin wrench (only for cylinders with piston rod with the feature “TT” (low temperature))

### 7.2 Special tools

The following special tools are required to repair and service the cylinder with piston rod

Designation	Additional information	Reference	Photo
Push-in sleeve for piston rod seal	DNC-32	On request	
	DNC-40		
	DNC-50		
	DNC-53		
	DNC-80		
	DNC-100		
	DNC-125		
Insertion sleeve for piston rod seal (only for cylinders with seals for unlubricated operation (A3))	DNC-32		
	DNC-40		
	DNC-50		
	DNC-53		
	DNC-80		
	DNC-100		
	DNC-125		
Mounting sleeve for piston rod	DNC-32		
	DNC-40		
	DNC-50		
	DNC-53		
	DNC-80		
	DNC-100		
	DNC-125		

<sup>1)</sup> See “Assembly aids” in the online spare parts catalogue on the Festo website ([www.festo.com](http://www.festo.com)).

<sup>2)</sup> Dimensional drawings for in-house production can be found on the Festo website ([www.festo.com](http://www.festo.com)).

## 8 Liability

The General Terms and Conditions of Festo AG & Co. KG, which can be viewed on the Festo website ([www.festo.com](http://www.festo.com)) apply.

## Conditions of use for “electronic documentation”

### I. Protection rights and scope of use

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Example: E 2003, Festo AG & Co. KG, D-73726 Esslingen

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### II. Exporting the electronic documentation

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1. Festo products are being continuously developed with regard to hardware and software. The hardware status and, where applicable, the software status of the product can be found on the name plate of the product. If the electronic documentation, in whatever form, is not supplied with the product, i. e. is not supplied on a portable data storage device (floppy disk, CD-ROM, removable disk), Festo does not guarantee that the electronic documentation corresponds to every hardware and software status of the product. In this case, the printed documentation from Festo accompanying the product alone is decisive for ensuring that the hardware and software status of the product matches that of the electronic documentation.

2. The information contained in this electronic documentation can be amended by Festo without prior notice and does not commit Festo in any way.

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The latter applies particularly to extracts of the documents for the user's own documentation. The guarantee and liability for separately available/supplied data storage devices, i. e. except for the electronic documentation available via the Internet/Intranet, is limited exclusively to proper duplication of the software, whereby Festo guarantees that in each case the data storage device or software contains the latest update of the documentation. Concerning electronic documentation available on the Internet/Intranet, there is no guarantee that it will have the same version status as the last printed edition.

2. Furthermore, Festo cannot be held liable for the lack of economic success or for damage or claims by third parties resulting from the use of the documentation by the user, with the exception of claims arising from infringement of the protection rights of third parties concerning the use of the electronic documentation.

3. The limitations of liability as per paragraphs 1 and 2 do not apply if, in cases of intent or gross negligence or the lack of warranted quality, liability is compulsory. In such a case, Festo's liability is limited to the damage discernable by Festo when the definitive circumstances are made known.

### V. Safety guidelines/documentation

Warranty and liability claims in conformity with the aforementioned regulations (items III and IV) may be raised only if the user has observed the safety guidelines of the documentation in conjunction with the use of the machine and its safety guidelines. The user himself is responsible for ensuring that the electronic documentation, when not supplied with the product, matches the product actually used by the user.

**Drive Data Sheet SK13 N56C – 63L/4**

Gearbox:	NORD
Motor:	Baldor
Enclosure:	TEFC
Explosion Proof Rating:	Class 1, Division 2, Group D
Gearbox:	SK13
Motor:	56C
Horsepower (HP):	0.25
Motor Speed (RPM):	1750
Output Shaft Speed (RPM):	11.0
Duty:	Continuous Duty
Output Shaft Torque (lbf-in):	1478
Hertz/Phase/Voltage:	60/3/230/460
Full Current Load (A):	0.8/0.4
Weight (lb):	80
Service Factor:	1.15 @ sine wave
Efficiency:	80%
Maximum Ambient Temperature:	40°C
Winding Material:	Copper
Frame Material:	Steel
Insulation	Class: H
NEMA Design Code:	B
Color:	Sky blue (RAL 5015)

GEARBOX APPENDIX INFORMATION  
TYPE NORD SK 13

# ATEX

## Operating and Maintenance Manual



Explosion-proof gearunits and gearmotors



B2000  
23/2008

GB



# NORD Gear



## Company Overview

Since 1965, NORD Gear has grown to global proportions on the strength of product performance, superior customer service, and intelligent solutions to a never ending variety of industrial challenges.

All mechanical and electrical components of a drive are available from NORD Gear. Our products cover the full range of drive equipment: helical in-line, Clincher™ shaft-mount, helical-bevel, helical-worm gearboxes, motors and AC drives from 1/6 hp to 250 hp, with torques from 90 lb-in to 900,000 lb-in.

But NORD Gear does far more than manufacture the world's finest drive components. We provide our customers with optimum drive configurations for their specific purposes, providing each and every one of them with truly complete and efficient systems at a price/quality ratio unmatched in today's fast-changing markets.

NORD Gear makes its wide range of products easily available through a global network that provides all customers with prompt delivery and expert support services to consistently exceed customer expectations. We are firmly committed to being totally responsive to the ideas and specifications of every customer, anywhere in the world.

### UNICASE™

NORD heavy-duty, one-piece housings are precisely machined to exacting standards. Internal reinforcements further increase strength and rigidity. All bearings and seal seats are contained within the casting, eliminating splits or bolt-on carriers that can weaken the housing and allow oil leakage. Bores and mounting faces are machined in one step, producing extremely precise tolerances — thus ensuring accurate positioning of gear teeth, bearings and seals, and longer life for all components.

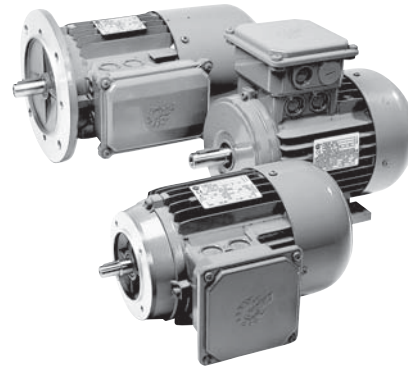


### Benefits

- Leak-free design
- Quiet operation
- High output torque capabilities
- Extended lubrication life
- Longer gear and bearing life
- Superior dependability/low maintenance/longer life

## High-Performance Motors & Brakemotors

NORD motors are designed to run cool for longer service life. Low rotor inertia and high starting torque allow peak performance in the most difficult applications for inverter and vector duty per NEMA MG 1-1998 Section 31.4.4.2 voltage spikes. Our motors are internationally accepted, conforming to North American NEMA MG 1 and international IEC electrical specifications. High performance options include brakes, encoders, and forced cooling fans.



## Short, On-Time Delivery

As a NORD customer, you can rest assured that your order will be delivered on time. Because NORD has both decentralized assembly and manufacturing operations and a linked global network, we offer our customers:

- Fast, reliable responses
- Greater product versatility
- Shorter lead times
- Timely shipping
- Rapid delivery

## Quality

Quality is assured at NORD assembly and manufacturing facilities, based on ISO 9000 standards — from careful inspection of incoming materials to closely monitored machining operations including gear cutting, turning, hardening & grinding as well as finishing & assembly.





## NORD 911

Trouble? Just call 715-NORD-911 (in Canada, 905-796-3606). Emergency service is available 24 hours a day, 7 days a week. We'll answer your call, ship the parts, or build a unit and have it shipped directly to you to provide what you need, when you need it.



## Manufacturing

NORD continually invests in research, manufacturing and automation technology. This is to ensure the highest possible quality at affordable prices. NORD invests heavily in our North American facilities as well as our factories around the world. Recent examples include expanding our Waunakee factory and adding numerous new large gear unit assembly cells. In our Glindede, Germany gear factory we added a state-of-the-art Vacuum multi-chamber carburization system.



## Global Availability

From Shanghai to Charlotte, and all points between, NORD reaches customers around the world. Deliveries, service, and product support are close at hand, regardless of your location.

## Worldwide Standards

NORD products are designed and manufactured based on the latest North American and global standards.



## Increased North American Presence

NORD covers North America with over 30 district offices and over 500 distributor branches. NORD operates a manufacturing and assembly facility in Waunakee, WI, Charlotte, NC, Corona, CA, Brampton, ON, and Monterrey, Mexico, resulting in an ever-increasing capacity in the United States and Canada and giving our customers the shortest lead times in the industry.

## Energy Efficiency

Lowering your operating costs is one of our greatest goals! NORD research and development focuses on energy efficiency, with gearboxes, motors, and frequency inverters designed for lower energy consumption. Our fully diverse line of in-line or right-angle units and motors has been developed to suit your needs.

## Modular Design

NORD's modular design philosophy provides you with a competitive edge by allowing you to configure drive systems to exactly fit your applications.

More than 20,000,000 combinations of totally unique gearmotors and speed reducers are possible – assembled in-line or right-angle, mounted by foot or flange, featuring solid or hollow shafts with either metric or inch shaft extensions – to give you complete freedom to specify a drive solution that's perfect for you.

## Benefits

- More output speeds
- More mounting arrangements/  
Greater flexibility
- Fewer gear stages/Lower cost
- Metric and inch products

NORD engineers stand ready to assist you with your custom applications. Most standard drives can be modified to your purposes, and custom designs can be developed for special applications.

# Engineering NORD Service Factor



## Mass Acceleration Service Factor

The mass acceleration factor ( $m_{af}$ ) uses a ratio of the load inertia to motor inertia. This method of service factor calculation can be used for both gearmotors and speed reducers and is valid for helical and helical-bevel gear units. For helical-worm units additional factors will need to be taken into account including an ambient temperature factor and duty cycle factor.

Short-term and infrequent torque impulses significantly influence the load and selection of a gear unit. The gear unit service factor,  $f_B$ , takes this and other affects on the gear unit into account.

The mass acceleration factor,  $m_{af}$ , represents the relationship between external low-speed output side and high-speed input side masses. The mass acceleration factor significantly influences the level of torque impulses in the gear unit upon start-up and braking procedures, and upon vibration. The external mass moments of inertia also include the load, such as the material transported on conveyor belts. We ask you to consult with NORD if the  $m_{af} > 10$ , if there is a large play in transfer elements, vibration in the system, uncertainty regarding the load classification, or you are in doubt.

For applications with relatively high external mass moments of inertia,  $m_{af} > 2$  (i.e. travel drives, slewing gears, rotary tables, gear drives, agitators, and surface aerators), we recommend breaking torque that does not exceed 1.2 times the rated motor torque. If a higher breaking torque is to be used, this must be considered when selecting the gear unit.

1. Calculate mass acceleration factor:

$$m_{af} = \frac{J_{load}}{J_{motor}} \times \left( \frac{1}{\text{reducer ratio}} \right)^2$$

$J_{load}$  = External load inertia including all components of the system outside of the reducer

$J_{motor}$  = Motor inertia. For NORD motors see pages 712-718

**If  $m_{af} \leq 0.25$  use curve A (uniform operation)**

Light conveyor screws, fans, assembly lines, light conveyor belts, small agitators, elevators, cleaning machines, filling machines, inspection machines, belt conveyors.

**If  $0.25 < m_{af} \leq 3.00$  use curve B (moderate shocks)**

Coilers, feed-mechanism drivers for woodworking machines, dumbwaiters, balancing machines, thread cutting machines, medium-sized agitators and mixers, heavy conveyor belts, winches, sliding doors, manure scrapers, packing machines, concrete mixers, overhead crane traveling mechanisms, mills, bending machines, gear pumps.

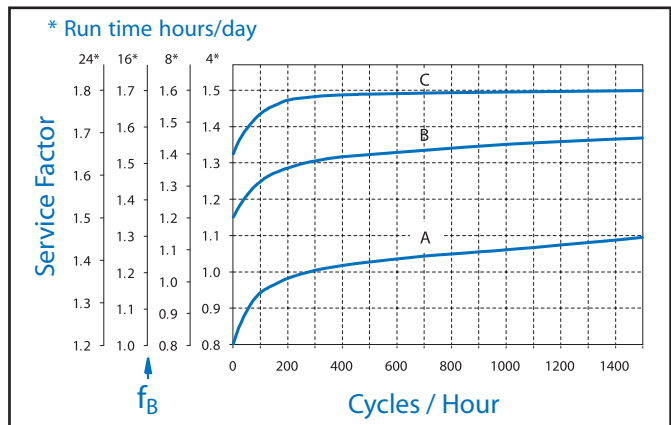
**If  $3.01 \leq m_{af} < 10.00$  use curve C (heavy shocks)**

Heavy mixers, shears, presses, centrifuges, rolling stands, heavy winches and lifts, grinding mills, stone crushers, bucket elevators, punching machines, hammer mills, eccentric presses, folding machines, roller tables, tumbling barrels, vibrators, shredders.

2. Determine the cycles/hour. A cycle is a start or hard stop, where a hard stop decelerates the motion of the system when a mechanical brake is activated.

3. Determine the run time in hours/day.

4. Using the chart; locate the cycles/hour on the horizontal axis and move vertically up to intersect curve A, B, or C based on the  $m_{af}$ . From the intersection point, move horizontally left to the service factor  $f_B$  based on the run time in hours/day.



**EXAMPLE for Inline, Shaft mount, or Bevel gearmotor:**

A smooth running conveyor operates 24 hours/day with 500 cycles/hour. The calculated  $m_{af} = 0.16$ , therefore use curve A for this type of application.

From the chart, find 500 cycles/hour and follow the axis vertically up until you intersect curve A. From the intersection point, move horizontally left to find the service factor  $f_B = 1.4$  based on 24 hours/day operation. Consult the selection pages of the catalog to find a gearmotor with a service factor  $f_B = 1.4$  or greater.



# Engineering NORD Service Factor

### EXAMPLE for Helical-worm gearmotor:

A coiler operates 16 hours/day with 300 cycles/hour with a calculated  $m_{af} = 2.5$ . Ambient temperature is 120°F and the unit operates 18 minutes per hour.

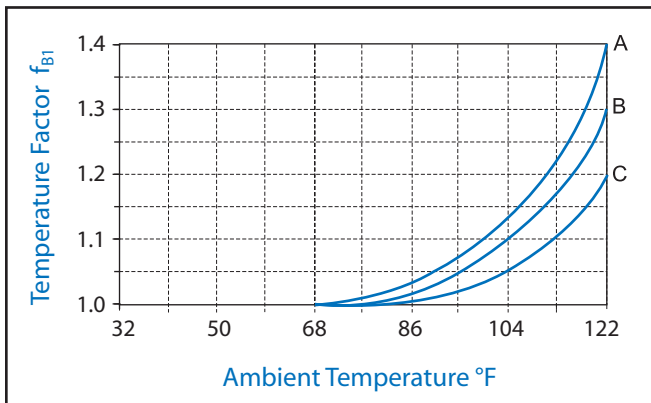
From the chart, find 300 cycles/hour and follow the axis vertically up until you intersect curve B. From the intersection point, move horizontally left to find the service factor  $f_B = 1.5$  based on 16 hours/day operation.

The service factor  $f_B$  for helical-worms must be modified for the ambient temperature factor  $f_{B1}$  and duty cycle factor  $f_{B2}$ .

The combined service factor

$$f_{Bcombined} = f_B \times f_{B1} \times f_{B2}$$

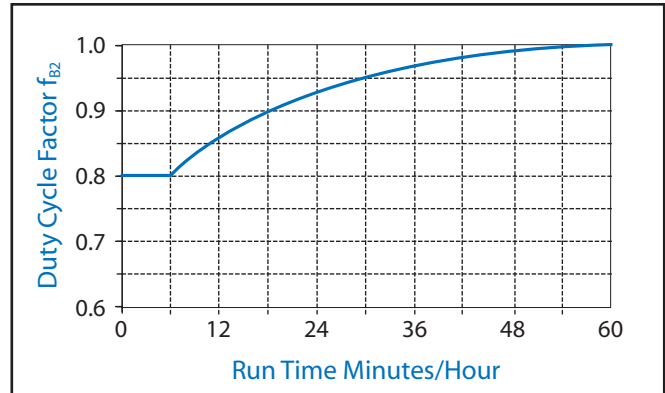
To find the ambient temperature factor  $f_{B1}$  use the following chart based on ambient temperature.



To find the duty cycle factor  $f_{B2}$  use the following chart based on how many minutes per hour the unit is running.

In this example,

$$f_{Bcombined} = (f_B = 1.50) \times (f_{B1} = 1.30) \times (f_{B2} = 0.90) = 1.76$$



When selecting worm gear reducers, multi-thread (multi-start) worms must be used where shock loading exists and where the driven machine may back-drive the gearbox for short periods. Multi-thread worms have  $z_1$  (number of threads) greater than or equal to 2.

- $m_{af} \leq 0.25$  all numbers of worm threads ( $z_1$ ) are possible
- $m_{af} \leq 3.00$   $z_1 \geq 3$  is recommend
- $m_{af} \leq 10.00$   $z_1 \geq 6$  is recommend

Refer to the worm reducer selection pages in this catalog (pages ) and find the any ratio with  $z_1 \geq 3$ . Then refer to the gearmotor selection pages and choose a gearmotor with a service factor of 1.76 or greater.

# Engineering AGMA Service Classes



## AGMA Selection Method

### Germotors

Before a gearmotor is selected, an application class number must be determined. Since application classification represents the normal relationship between gear design power rating and the maximum potential transmitted power, it is suggested that the application class number be applied to the nameplate rating of the electric motor. The application class numbers are I, II, and III. Their relationship to service factor is:

Class Numbers	$f_B$
I	1.0 - 1.39
II	1.4 - 1.99
III	$\geq 2.0$

Application class numbers may be selected from the table. Some operational characteristics that affect an application's classification are:

- **Starting conditions:** Starting conditions where peak loads exceed 200 percent of rated load, applications with frequent starts and stops and reversing applications require special analysis. Rated load is defined as the unit rating with an application class number of I (1.0 - 1.39 service factor).
- **Overloads:** Loads in excess of the rated load are considered overloads. Overload can be of momentary duration, periodic, quasi-steady state, or vibratory in nature. The magnitude and the number of stress cycles require special analysis to prevent low cycle fatigue or yield stress failure. Applications with high torque motors, motors for intermittent operation and applications where extreme repetitive shock occurs or where high-energy loads must be absorbed as when stalling require special consideration.
- **Brake equipped applications:** When a gear drive is equipped with a brake that is used to decelerate the motion of the system, select the drive based on the brake rating or the equivalent power, whichever is greater. If the brake is located on the output shaft of the gear drive, special analysis is required.
- **Reliability and life requirement:** Applications requiring a high degree of reliability or unusually long life should be given careful consideration by the user and NORD GEAR before assigning an application class number. High reliability and life should be addressed by using an increased safety factor agreed to between NORD and the purchaser.

Synchronous motors, certain types of high torque induction motors and generator drives require special analysis. Synchronous motors have high transient torque during starting and restarting after they trip out momentarily.

Induction motors of special high slip design can produce extremely high starting torque. High torque loads are produced when the motor trips out for a very short time and then the trip re-closes.

Generators have extremely high loads when they are out of phase with the main system and when there are across the line short circuits.

Adjustments to the gear drive selection may be necessary when one or more of the following conditions exist:

- Ambient conditions. Extremes of temperature and environment.
- Lubrication. Any lubricant not in accordance with NORD's recommendations.
- Misalignment and distortions due to inadequate foundations.
- Reversing applications.
- High-risk applications involving human safety.

The purpose of this table is to provide a guide in the selection and application of gear drives designed and rated in accordance with AGMA Standard 6009.

The service factor table has been developed from the experience of manufacturers and users of gear drives for use in common applications and has been found to be generally satisfactory for the listed industries when gears are applied using AGMA standards. It is recommended that the user and NORD Gear agree upon class numbers for special applications when variations of the table may be required.



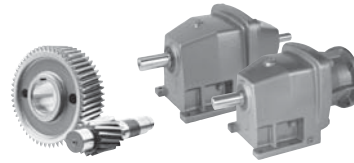
Application	Load Duration		
	Up to 3 hrs per day	3-10 hrs per day	Over 10 hrs per day
<b>PLASTICS INDUSTRY – PRIMARY PROCESSING</b>			
Intensive Internal Mixers			
Batch Mixers	III	III	III
Continuous Mixers	II	II	II
Batch Drop Mill – 2 smooth rolls	II	II	II
Continuous Feed, Holding & Blend Mill Calendars	II	II	II
<b>PLASTICS INDUSTRY – SECONDARY PROCESSING</b>			
Blow Molders	II	II	II
Coating	II	II	II
Film	II	II	II
Pipe	II	II	II
Pre-Plasticizers	II	II	II
Rods	II	II	II
Sheet	II	II	II
Tubing	II	II	II
<b>PULLERS – BARGE HAUL</b>	II	II	II
<b>PUMPS</b>			
Centrifugal	I	I	II
Proportioning	II	II	II
Reciprocating			
Single Acting, 3 or more cylinders	II	II	II
Double Acting, 2 or more cylinders	II	II	II
Rotary			
Gear Type	I	I	II
Lobe	I	I	II
Vane	I	I	II
<b>RUBBER INDUSTRY</b>			
Intensive Internal Mixers			
Batch Mixers	III	III	III
Continuous Mixers	II	II	II
Mixing Mill			
2 smooth rolls	II	II	II
1 or 2 corrugated rolls	III	III	III
Batch Drop Mill – 2 smooth rolls	II	II	II
Cracker Warmer – 2 roll, 1 corrugated roll	III	III	III
Cracker – 2 corrugated rolls	III	III	III
Holding, Feed & Blend Mill – 2 rolls	II	II	II
Refiner – 2 rolls	II	II	II
Calendars	II	II	II
<b>SAND MULLER</b>	II	II	II
<b>SEWAGE DISPOSAL EQUIPMENT</b>			
Bar Screens	II	II	II
Chemical Feeders	II	II	II
Dewatering Screens	II	II	II
Scum Breakers	II	II	II
Slow or Rapid Mixers	II	II	II
Sludge Collectors	II	II	II
Thickener	II	II	II
Vacuum Filters	II	II	II

Application	Load Duration		
	Up to 3 hrs per day	3-10 hrs per day	Over 10 hrs per day
<b>SCREENS</b>			
Air Washing	I	I	II
Rotary – Stone or Gravel	II	II	II
Traveling Water Intake I	I	I	I
<b>SCREW CONVEYORS</b>			
Uniformly loaded or Fed	I	I	II
Heavy Duty	I	II	II
<b>SUGAR INDUSTRY</b>			
Beet Slicer	III	III	III
Cane Knives	II	II	II
Crushers	II	II	II
Mills (low speed end)	III	III	III
<b>TEXTILE INDUSTRY</b>			
Batchers	II	II	II
Calendars	II	II	II
Cards	II	II	II
Dry Cans	II	II	II
Dyeing Machinery	II	II	II
Looms	II	II	II
Mangles	II	II	II
Nappers	II	II	II
Pads	II	II	II
Slashers	II	II	II
Soapers	II	II	II
Spinners	II	II	II
Tenter Frames	II	II	II
Washers	II	II	II
Winders	II	II	II

**Notes to GERMOTOR SERVICE FACTOR table:**

- 1) The class numbers listed for paper mill applications are consistent with those shown in TAPPI (Technical Association of Pulp and Paper Industry) Technical Information Sheet O406-18 1967, Service Factors for Gears on major Equipment in the Paper and Pulp Industry.
- 2) Anti-friction bearings only.
- 3) A Class Number of I may be applied at base speed of a supercalendar operating over a speed range of part-range constant horsepower and part-range constant torque where the constant horsepower speed range is greater than 1.5 to 1. A Class Number of II is applicable to supercalendars operating over the entire speed range at constant torque or where the constant horsepower speed range is less than 1.5 to 1.

# SK 13, SK 12/02 NEMA-C + W Ratings & Combinations



W + NEMA

Model Type	Gear Ratio $i_{tot}$	Output Speed $n_2$ 1750 rpm [rpm]	Output Torque* $T_{2max}$ [lb-in]	Maximum input power <sup>⊠</sup> Solid input shafts type "W"				NEMA C-Face* Available Combinations									
				Input Speed				56C	140TC	180TC	210TC	250TC	280TC	320TC	360TC		
				1750 rpm [hp]	1150 rpm [hp]	875 rpm [hp]	580 rpm [hp]										
<b>SK 13</b>	<b>68.40</b>	26	1735	0.50	0.33	0.25	0.17	X*									
	<b>85.47</b>	20	1558	0.49	0.33	0.25	0.16	X*									
	<b>108.72</b>	16	1566	0.40	0.26	0.20	0.13	X*									
	<b>132.45</b>	13	1310	0.27	0.18	0.14	0.09	X*									
	<b>159.36</b>	11	1478	0.26	0.17	0.13	0.09	X*									
	<b>195.78</b>	8.9	1717	0.24	0.16	0.12	0.08	X*									
	<b>244.62</b>	7.2	1566	0.18	0.12	0.09	0.06	X*									
	<b>275.12</b>	6.4	1558	0.16	0.10	0.08	0.05	X*									
	<b>313.48</b>	5.6	1478	0.13	0.09	0.07	0.04	X*									
	<b>369.34</b>	4.7	1558	0.12	0.08	0.06	0.04	X*									
	<b>420.83</b>	4.2	1478	0.10	0.07	0.05	0.03	X*									
<b>SK 12/02</b>	92.89	19	1451	0.49	0.32	0.25	0.16	X*	X*								
	109.66	16	1451	0.42	0.28	0.21	0.14	X*	X*								
	133.23	13	1451	0.35	0.23	0.18	0.12	X*	X*								
	165.77	11	1593	0.33	0.22	0.17	0.11	X*	X*								
	213.39	8.2	1593	0.26	0.17	0.13	0.09	X*	X*								
	263.96	6.6	1593	0.22	0.15	0.11	0.07	X*	X*								
	339.81	5.1	1593	0.18	0.12	0.09	0.06	X*	X*								
	431.75	4.1	1593	0.16	0.10	0.08	0.05	X*	X*								
	537.49	3.3	1593	0.14	0.09	0.07	0.05	X*	X*								
	<b>619.86</b>	2.8	1593	0.12	0.08	0.06	0.04	X*									
	<b>886.11</b>	2	1593	0.10	0.07	0.05	0.03	X*									
	<b>1054.29</b>	1.7	1593	0.10	0.06	0.05	0.03	X*									
	<b>1280.32</b>	1.4	1593	0.09	0.06	0.04	0.03	X*									
	<b>1592.93</b>	1.1	1593	0.08	0.05	0.04	0.03	X*									
<b>2056.68</b>	0.85	1593	0.08	0.05	0.04	0.02	X*										
<b>2798.93</b>	0.63	1593	0.07	0.05	0.03	0.02	X*										

\* Caution - The motor power may exceed the gear unit's mechanical torque capacity  
 ⊠ The mechanical power limit of the solid input shaft type "W" may limit the reducer rating.  
 All ratings are mechanical. See page 14 for thermal considerations.

	W	56C	140TC
<b>SK 12/02</b>	49	51	60
<b>SK 13</b>	42	44	-



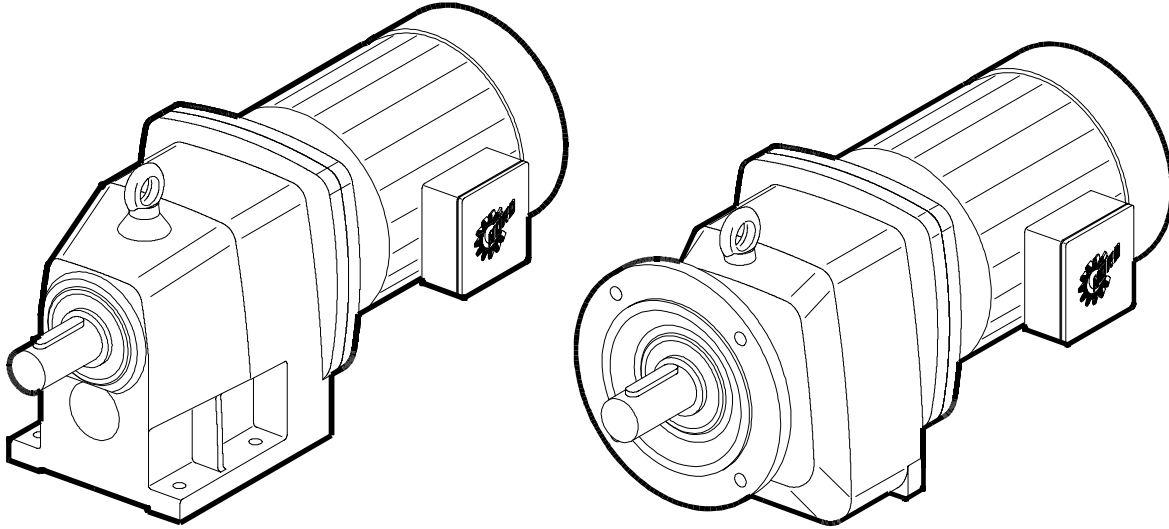
# UNICASE<sup>®</sup> Helical Inline Gearboxes Installation and Maintenance Instructions

BIM 1010

USA

CDN

Retain These Safety Instructions For Future Use



## INSPECTION OF UNIT

Thoroughly inspect the equipment for any shipping and handling damage before accepting shipment from the freight company. If any of the goods called for in the bill of lading or express receipt are damaged or the quantity is short, do not accept until the freight or express agent makes an appropriate notation on your freight bill or express receipt. If any concealed loss or damage is discovered later, notify your freight carrier or express agent at once and request him to make an inspection. We will be very happy to assist you in collecting claims for loss or damage during shipment; however, this willingness on our part does not remove the transportation company's responsibility in reimbursing you for collection of claims or replacement of material. Claims for loss or damage in shipment must not be deducted from the NORD Gear invoice, nor should payment of the NORD Gear invoice be withheld awaiting adjustment of such claims, as the carrier guarantees safe delivery.

If considerable damage has been incurred and the situation is urgent, contact the nearest NORD Gear Sales Office for assistance. Please keep a written record of all communications.

## RECORD NAMEPLATE DATA

Locate the gear reducer nameplate and record all nameplate data for future reference.

SK \_\_\_\_\_ S/N \_\_\_\_\_

RATIO \_\_\_\_\_ MAX TORQUE \_\_\_\_\_ RPM \_\_\_\_\_ MTG. POS \_\_\_\_\_

## STORAGE

### PROPER STORAGE UNTIL INSTALLED

Keep unit in a dry, temperature controlled area. If stored other than said, long term storage methods must be applied to the unit including complete fill with lubricant. Protect machined surfaces and rotate shafts periodically. Prior to putting unit into service, drain lubricant and refill to proper level as determined by the mounting position.

### PROPER HANDLING OF THE UNIT

Exercise care to prevent damage to the unit when moving. Lift only at designed lifting points. Do not attach other machinery and lift by the unit lifting points. The lifting points are to be used to lift the unit only. Insure that adequate safety measures are taken to protect personnel during transportation. Protect the mounting surface from damage.



## INSTALLATION OF UNIT

To ensure long service and dependable performance, an enclosed gear drive must be rigidly supported and the shafts accurately aligned. The following describes the minimum precautions required to accomplish this end.

### FOUNDATION

The responsibility for the design and construction of the foundation lies with the user. The foundation must be adequate to withstand normal operating loads and possible overloads while maintaining alignment to attached system components under such loads.

### MOUNTING POSITION

Unless a unit is specifically ordered for inclined mounting, the foundation must be level and flat. The lubrication system may not operate properly if the unit is not mounted in the position for which it is designed. It may be desirable to elevate the foundation to facilitate oil drainage.

### CONCRETE FOUNDATION

If a concrete foundation is used, steel mounting pads and bolts of sufficient size to distribute the stress into the concrete should be grouted into the foundation.

### STEEL FOUNDATION

If a structural steel foundation is used (i.e. wide flange beams or channels), a base plate or sole plate of suitable thickness should be used and should extend under the entire unit.

### FOOT MOUNTED UNITS

Use shims under the feet of the unit to align the output shaft to the driven equipment. Make sure that all feet are supported so that the housing will not distort when it is bolted down. Improper shimming will reduce the life of the unit and may cause failure. Dowel pins may be installed to prevent misalignment and ensure proper realignment if removed for service.

### FLANGE MOUNTED UNITS

If a structural steel foundation is used (i.e. wide flange beams or channels), a base plate or sole plate of suitable thickness should be used and should extend under the entire unit. If a bulk head plate is used it should be of proper strength to minimize buckling distortions.

### Flange Pilot 'AK' or 'AK1' tolerance

Metric (mm)

- >  $\varnothing 50 \leq \varnothing 80 = +0.012/-0.007$
- >  $\varnothing 80 \leq \varnothing 120 = +0.013/-0.009$
- >  $\varnothing 120 \leq \varnothing 180 = +0.014/-0.011$
- >  $\varnothing 180 \leq \varnothing 230 = +0.016/-0.013$
- >  $\varnothing 230 \leq \varnothing 315 = +0.000/-0.032$
- >  $\varnothing 315 \leq \varnothing 400 = +0.000/-0.036$
- >  $\varnothing 400 \leq \varnothing 500 = +0.000/-0.040$

Inch

- >  $\varnothing 1.969 \leq \varnothing 3.150 = +0.005/-0.0003$
- >  $\varnothing 3.150 \leq \varnothing 4.724 = +0.005/-0.0004$
- >  $\varnothing 4.724 \leq \varnothing 7.087 = +0.006/-0.0004$
- >  $\varnothing 7.087 \leq \varnothing 9.055 = +0.006/-0.0005$
- >  $\varnothing 9.055 \leq \varnothing 12.402 = +0.000/-0.0013$
- >  $\varnothing 12.402 \leq \varnothing 15.748 = +0.000/-0.0014$
- >  $\varnothing 15.748 \leq \varnothing 19.685 = +0.000/-0.0016$

### BOLT STRENGTH

Bolt size, strength and quantity should be verified to insure proper torque reaction capacity whatever the mounting arrangement.

### PRIME MOVER MOUNTING

Align the prime mover to the reducer-input shaft using shims under the feet. Make sure that the feet are supported. Dowel the prime mover to its foundation.

### SHAFT CONNECTIONS

When connecting shafts to either the input or output of the reducer, consider the following instructions.

### FITS

Clearance or interference fits for coupling hubs should be in accordance with ANSI/AGMA 9002-A86 or as follows.

### Output and Input shaft Diameter tolerance

Metric (mm)

- $\leq \varnothing 18 = +0.012/+0.001$
- >  $\varnothing 18 \leq \varnothing 30 = +0.015/+0.002$
- >  $\varnothing 30 \leq \varnothing 50 = +0.018/+0.002$
- >  $\varnothing 50 \leq \varnothing 80 = +0.030/+0.011$
- >  $\varnothing 80 \leq \varnothing 120 = +0.035/+0.013$
- >  $\varnothing 120 \leq \varnothing 180 = +0.040/+0.015$

Inch

- $\leq \varnothing 1.750 = +0.0000/-0.0005$
- >  $\varnothing 1.750 = +0.0000/-0.0010$

### Output and Input shaft Drill and tap shaft end

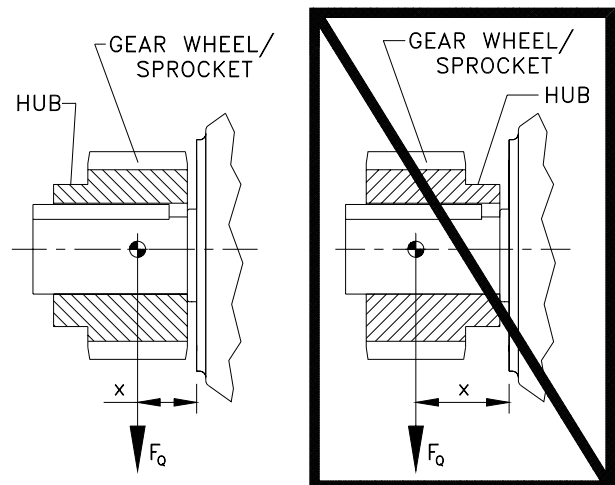
Metric (mm)

- $\leq \varnothing 16 = M5$
- >  $\varnothing 16 \leq \varnothing 21 = M6$
- >  $\varnothing 21 \leq \varnothing 24 = M8$
- >  $\varnothing 24 \leq \varnothing 30 = M10$
- >  $\varnothing 30 \leq \varnothing 38 = M12$
- >  $\varnothing 38 \leq \varnothing 50 = M16$
- >  $\varnothing 50 \leq \varnothing 85 = M20$
- >  $\varnothing 85 \leq \varnothing 130 = M24$

Inch

- $\leq \varnothing 0.438 = \#10-24 \times 0.4 \text{ deep}$
- >  $\varnothing 0.438 \leq \varnothing 0.813 = \#1/4-20 \times 0.6 \text{ deep}$
- >  $\varnothing 0.813 \leq \varnothing 0.938 = 5/16-18 \times 0.7 \text{ deep}$
- >  $\varnothing 0.938 \leq \varnothing 1.125 = 3/8-16 \times 0.9 \text{ deep}$
- >  $\varnothing 1.125 \leq \varnothing 1.375 = 1/2-13 \times 1.1 \text{ deep}$
- >  $\varnothing 1.375 \leq \varnothing 1.875 = 5/8-11 \times 1.4 \text{ deep}$
- >  $\varnothing 1.875 \leq \varnothing 3.250 = 3/4-10 \times 1.7 \text{ deep}$
- >  $\varnothing 3.250 = 1-8 \times 2.2 \text{ deep}$

Outboard pinion and sprocket fits should be as recommended by the pin sprockets with interference fits should be heated according to the manufacturer's recommendations, generally 250°F to 300°F, (120°C to 150°C) before assembling to the shaft.



CORRECT

INCORRECT

## LOCATION

Coupling hubs should be mounted flush with the shaft ends, unless specifically ordered for overhung mounting. Pinions, sprockets and sheaves should be mounted as close as possible to the unit housing to minimize bearing loads and shaft deflections.

## COUPLING ALIGNMENT

Shaft couplings should be installed according to the coupling manufacturer's recommendations for gap, angular and parallel alignment. In many installations, it is necessary to allow for thermal and mechanical shaft movement when determining shaft alignment. The coupling manufacturer's recommendations should be followed.

## AXIAL DISPLACEMENT

The gap between shaft ends should be the same as the specified coupling gap unless overhung mounting of the coupling hub is specified. The coupling gap and shaft gap must be sufficient to accommodate any anticipated thermal or mechanical axial movement.

## ANGULAR ALIGNMENT

Insert a spacer or shim stock equal to the required coupling gap between the coupling hub faces and measure the clearance using feeler gauges. Repeat this at the same depth at 90-degree intervals to determine the amount of angular misalignment.

## PARALLEL ALIGNMENT

Mount a dial indicator to one coupling hub, and rotate this hub, sweeping the outside diameter of the other hub. The parallel misalignment is equal to one-half of the total indicator reading. Another method is to rest a straight edge squarely on the outside diameter of the hubs at 90-degree intervals and measure any gaps with feeler gauges. The maximum gap measurement is the parallel misalignment.

## CHECKING ALIGNMENT

After both angular and parallel alignments are within specified limits, tighten all foundation bolts securely and repeat the above procedure to check alignment. If any of the specified limits for alignment are exceeded, realign the coupling.

## SPROCKET OR SHEAVE ALIGNMENT

Align the sheaves or sprockets square and parallel by placing a straight edge across their faces. Alignment of bushed sheaves and sprockets should be checked after bushings have been tightened. Check horizontal shaft alignment by placing a level vertically against the face of the sheave or sprocket. Adjust belt or chain tension per the manufacturer's specified procedure.

## OUTBOARD PINION ALIGNMENT

Align the pinion by adjusting the gear tooth clearance according to the manufacturer's recommendations and checking for acceptable outboard pinion tooth contact. The foundation bolts may have to be loosened and the unit moved slightly to obtain this contact. When the unit is moved to correct tooth contact, the prime mover should be realigned.

## RECHECK ALIGNMENT

After a period of operation, recheck alignment and adjust as required.

1. Properly install unit on a rigid foundation
  - adequately supported
  - securely bolted into place
  - leveled so as not to distort the gear case
2. Properly install couplings suitable for the application and connected equipment.
3. Ensure accurate alignment with other equipment.
4. Furnish and install adequate machinery guards as needed to protect operating personnel and as required by the applicable standards of the Occupational Safety and Health Administration (OSHA), and by other applicable safety regulations;

5. Ensure that driving equipment is running in the correct direction before coupling to reducers with backstops (designed to operate only in a specific direction) or machinery designed to operate only in one direction.

## CHANGES IN PERFORMANCE SPECIFICATIONS

Owner has the responsibility to consult with NORD GEAR if such items such as applied loads, operating speeds or other operating conditions have changed.



### **WARNING:**

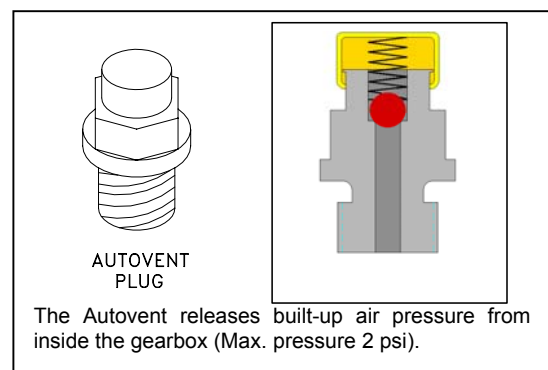
LOCK OUT POWER before any maintenance is performed. Make absolutely sure that no voltage is applied while work is being done on the gearbox.

## START-UP

1. Ensure that switches, alarms, heaters, coolers and other safety and protection devices are installed and operational for their intended purpose.
2. Verify that the installed mounting position is the same as the nametag mounting position. If not, adjust the oil level accordingly and relocate the vent plug, fill plug and drain plug according to the mounting position. See following.

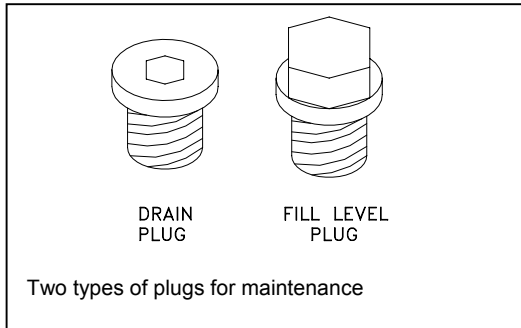
## AUTOVENT PLUG

The Autovent plug is brass in color and will be located at the highest point on the gearbox. It operates like a check-valve to allow the reducer to relieve internal pressure while preventing lubricant contamination during cooling. A spring presses a ball or plunger against a machined orifice until pressure exceeds 2 psi. Above 2 psi the air is allowed to escape depressurizing the gearcase. When internal pressure drops below 2 psi, the autovent re-seals closing the unit to the outside environment. After shutdown, the reducer cools along with the air inside the reducer. The unit will temporarily maintain a slight vacuum until normalization occurs. NORD Gear supplies an Autovent as a standard feature.



### FILL LEVEL & DRAIN PLUGS

The drain plugs are metric socket head cap screws. They will be located at the lowest part of the gearbox for ease of draining. The fill level plug is a hex head cap screw. It will be located between the Autovent and drain plug. Both types of plugs will have gaskets included to prevent oil from leaking.



### LUBRICANT

All NORD reducers are shipped from the factory properly filled with lubricant and all plugs are installed according to the mounting position given on the reducer nametag. Acceptable oil fill level is within ½ inch of the bottom of the fill plug threads.


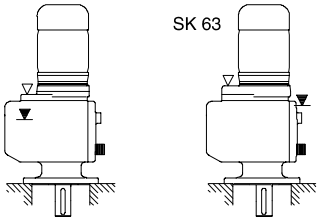
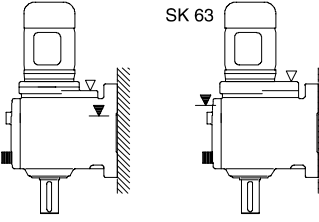
### OPERATION AND MAINTENANCE CHECKLIST


1. Operate the equipment as it was intended to be operated
2. Do not overload.
3. Run at correct speed.
4. Maintain lubricant in good condition and at proper level.
5. Dispose of used lubricant in accordance with applicable laws and regulations.
6. Apply proper maintenance to attached equipment at prescribed intervals recommended by the manufacturer.
7. Perform periodic maintenance of the gear drive as recommended by NORD.

## MOUNTING POSITIONS

These charts detail the mounting positions for horizontal and vertical mounting. The Autovent, oil fill plug and drain plug are indicated on each mounting position picture. The factory set mounting position and plug locations match that shown on the gearbox nametag. For mounting orientations other than shown consult NORD Gear.


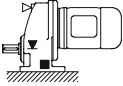
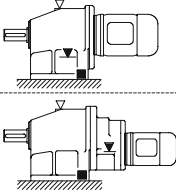
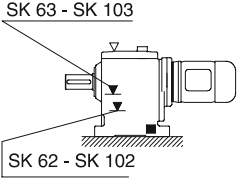
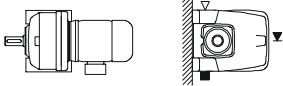
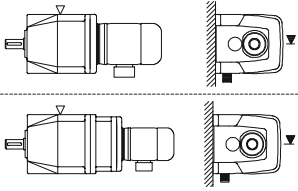
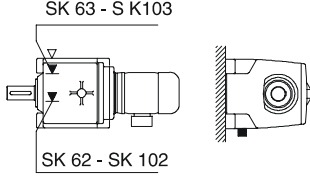
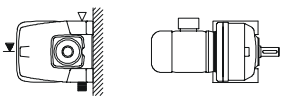
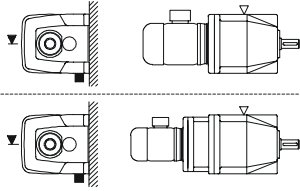
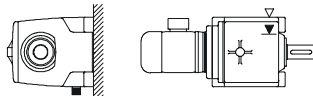
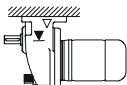
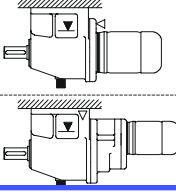
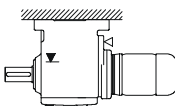
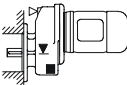
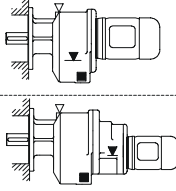
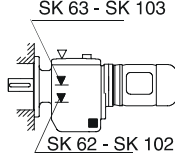

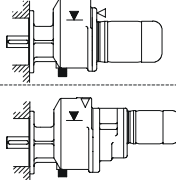
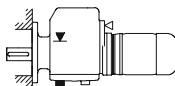
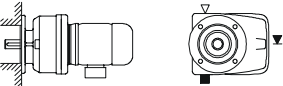
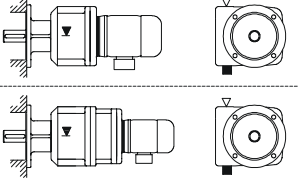
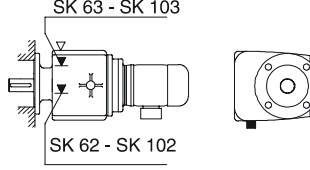
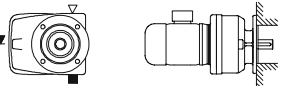
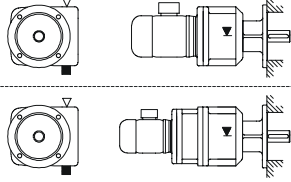
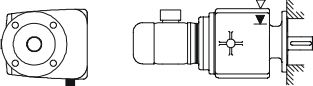
### VERTICAL POSITION

	 SK 11E - SK 51 E	SK 02 - SK 52	SK 03 - SK 53	SK 62 - SK 103
V1 *				 SK 63
V3				
V5 *				 SK 63
V6				

Symbols:  Vent plug       Oil level       Drain plug       Mounting surface

\* Mounting position V1 or V5 with lubricant expansion unit

### HORIZONTAL POSITION

	SK 11 E - SK 51 E	SK 02 - SK 52 SK 03 - SK 53	SK 62 - SK 103
B3			
B6			
B7			
B8			
B5			
B5I			
B5II			
B5III			

Symbols:  Vent plug     Oil level     Drain plug     Mounting surface

## MAINTENANCE

Mineral lubricant should be changed every 10,000 service hours or after two years. For synthetic oils, the lube should be changed every 20,000 service hours or after four years. In case of extreme operating (e.g. high humidity, aggressive environment or large temperature variations), shorter intervals between changes are recommended.







### OIL SPECIFICATIONS

NORD supplies all reducers filled with oil from the factory. Consult the sticker adjacent to the fill plug to determine the type of lubricant installed at the factory. Standard lubricant is ISO VG220 mineral-based oil. However, some units have special lubricants designed to operate in certain environments or to extend the service life of the lubricant. If in doubt about which lubricant is needed, contact NORD Gear.

#### STANDARD OIL – ISO VG220

Ambient Temperature	Formulation
20 to 104°F (-5 to 40°C)	Mineral

#### TYPICAL OILS

Viscosity ISO NLGI	Formulation	Service Temperature Range						
VG 460	Conventional Mineral	20°C to +50°C 68F to +122°F	Mobilgear 634	Omala 460	7EP	Klüberoil GEM 1-460	Energol GR-XP 460	Tribol 1100/460
	Synthetic PAO	-30°C to +80°C -22°F to +176°F	Mobil SHC 634	Omala 460 HD	Isolube EP 460	Klübersynth EG 4-460	N/A	Tribol 1510/460
VG 320	Conventional Mineral	0°C to +30°C 32°F to +86°F	Mobilgear 632	Omala 320	6EP	Klüberoil GEM 1-320	Energol GR-XP 320	Tribol 1100/320
	Synthetic PAO	-35°C to +80°C -31°F to +176°F	Mobil SHC 632	Omala 320 HD	Isolube EP 460	Klübersynth EG 4-320	N/A	Tribol 1510/320
VG 220	Conventional Mineral	-5°C to +40°C +20°F to +104°F	Mobilgear 630	Omala 220	5EP	Klüberoil GEM 1-220	Energol GR-XP 220	Tribol 1100/220
	Synthetic PAO	-34°C to +80°C -30°F to +176°F	Mobil SHC 630	Omala 220 HD	Isolube EP 220	Klübersynth EG 4-220	N/A	Tribol 1510/220
VG 150 & VG 100	Conventional Mineral	-15°C to +25°C 5°F to +77°F	Mobilgear 629	Omala 100	4EP	Klüberoil GEM 1-150	Energol GR-XP 100	Tribol 1100/100
	Synthetic PAO	-37°C to +10°C -35°F to +50°F	Mobil SHC 629	Omala 150 HD	Isolube EP 150	Klübersynth EG 4-150	N/A	N/A
VG 68	Conventional Mineral	-15°C to +25°C 5°F to +77°F	Mobilgear 626	Omala 68	2EP	Klüberoil GEM 1-68	Energol GR-XP 68	Tribol 1100/68
	Synthetic PAO	-40°C to +10°C -40°F to +50°F	Mobil SHC 626	N/A	Isolube EP 68	N/A	N/A	N/A
VG 32	Synthetic PAO	-40°C to +10°C -40°F to +50°F	Mobil SHC 624	N/A	N/A	Klüber-Summit HySyn FG-32	N/A	N/A

PAO = Poly Alpha Olefin

#### SPECIAL PURPOSE LUBRICANTS

Ambient Temperature	Formulation	Manufacturer	Oil Brand Name
20 to 104°F (-5 to 40°C)	Food Grade Oil - Synthetic	Chevron	FM ISO 220
20 to 104°F (-5 to 40°C)	Food Grade Oil - Synthetic	OilJAX	Magnaplate 85W140-FG
5 to 125°F (-20 to 50°C)	Fluid Grease	Mobil	Mobilux EP023
-30 to 140°F (-35 to 60°C)	Fluid Grease - Synthetic	Mobil	Mobilith SHC 007
-30 to 140°F (-35 to 60°C)	Fluid Grease - Synthetic	Shell	Albida LC

#### STANDARD BEARING GREASE – NLGI 2EP Lithium

Ambient Temperature	Formulation
-20 to 140°F (-30 to 60°C)	Mineral

#### OPTIONAL BEARING GREASES

Ambient Temperature	Formulation	Manufacturer	Grease Brand Name
-40 to 230°F (-40 to 110°C)	Synthetic	Shell	Aeroshell 6
-40 to 230°F (-40 to 110°C)	Food Grade - Synthetic	Lubriplate	SFL1

**LUBRICANT CAPACITY**

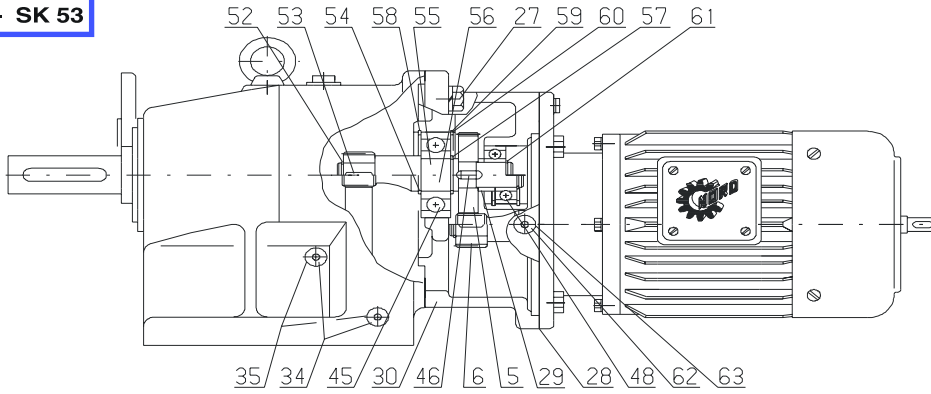
Each reducer has the oil level and oil quantity adjusted according to the mounting position shown in the tables. When replacing the oil, consult the tables below to determine the proper amount of oil to be installed according to the reducer size and mounting position. Note that this is approximate and the final level will be adjusted when the reducer is installed. Acceptable oil fill level is within 1/2 inch of the bottom of the fill plug threads.

<b>LUBRICATION CAPACITY – HELICAL INLINE GEARBOXES</b>													
Mounting position		Horizontal position								Vertical position			
		single reduction											
		B 3	B 6	B 7	B 8	B 5	B 5I	B 5II	B 5III	V 1	V 3	V 5	V 6
SK 11E	quarts	0.26	0.37	0.37	0.58	0.32	0.53	0.42	0.42	0.32	0.37	0.42	0.53
	liters	0.25	0.35	0.35	0.55	0.30	0.50	0.40	0.40	0.30	0.35	0.40	0.50
SK 21E	quarts	0.63	1.06	1.06	1.27	0.53	1.16	0.95	0.95	0.74	1.48	1.06	1.27
	liters	0.60	1.00	1.00	1.20	0.50	1.10	0.90	0.90	0.70	1.40	1.00	1.20
SK 31E	quarts	1.16	1.80	1.80	2.32	0.85	1.74	2.11	2.11	1.16	1.37	2.43	2.85
	liters	1.10	1.70	1.70	2.20	0.80	1.65	2.00	2.00	1.10	1.30	2.30	2.70
SK 41E	quarts	1.80	2.75	2.75	3.49	1.06	2.96	3.49	3.49	1.69	2.75	2.64	2.75
	liters	1.70	2.60	2.60	3.30	1.00	2.80	3.30	3.30	1.60	2.60	2.50	2.60
SK 51E	quarts	2.32	3.59	3.59	4.97	1.90	4.33	4.02	4.02	3.17	3.70	4.23	4.65
	liters	2.20	3.40	3.40	4.70	1.80	4.10	3.80	3.80	3.00	3.50	4.00	4.40
Mounting position		double reduction											
		B 3	B 6	B 7	B 8	B 5	B 5I	B 5II	B 5III	V 1	V 3	V 5	V 6
		SK 02	quarts	0.16	0.42	0.42	0.74	0.26	0.63	0.53	0.53	0.63	0.63
liters	0.15		0.40	0.40	0.70	0.25	0.60	0.50	0.50	0.60	0.60	0.60	0.60
SK 12	quarts	0.26	0.53	0.53	0.90	0.37	0.95	0.63	0.63	0.95	0.90	0.79	0.79
	liters	0.25	0.50	0.50	0.85	0.35	0.90	0.60	0.60	0.90	0.85	0.75	0.75
SK 22	quarts	0.53	1.43	1.43	2.11	0.74	2.11	1.64	1.64	1.90	2.11	1.90	1.90
	liters	0.50	1.35	1.35	2.00	0.70	2.00	1.55	1.55	1.80	2.00	1.80	1.80
SK 32	quarts	0.95	2.11	2.11	3.17	1.37	3.49	2.54	2.54	3.28	3.06	3.06	2.64
	liters	0.90	2.00	2.00	3.00	1.30	3.30	2.40	2.40	3.10	2.90	2.90	2.50
SK 42	quarts	1.37	3.38	3.38	4.76	1.90	4.76	3.91	3.91	4.23	4.65	4.54	6.13
	liters	1.30	3.20	3.20	4.50	1.80	4.50	3.70	3.70	4.00	4.40	4.30	5.80
SK 52	quarts	2.64	5.39	5.39	7.19	3.17	6.55	5.92	5.92	7.82	7.19	7.19	7.40
	liters	2.50	5.10	5.10	6.80	3.00	6.20	5.60	5.60	7.40	6.80	6.80	7.00
SK 62	quarts	6.87	15.85	15.85	13.74	7.40	14.79	16.91	16.91	19.55	15.85	16.91	15.85
	liters	6.50	15.00	15.00	13.00	7.00	14.00	16.00	16.00	18.50	15.00	16.00	15.00
SK 72	quarts	9.51	24.30	24.30	19.02	10.57	19.55	24.30	24.30	29.59	24.30	27.47	24.30
	liters	9.00	23.00	23.00	18.00	10.00	18.50	23.00	23.00	28.00	23.00	26.00	23.00
SK 82	quarts	14.79	33.81	33.81	28.53	15.85	30.64	36.46	36.46	47.55	39.10	46.49	36.98
	liters	14.00	32.00	32.00	27.00	15.00	29.00	34.50	34.50	45.00	37.00	44.00	35.00
SK 92	quarts	26.42	54.95	54.95	49.66	27.47	49.66	54.95	54.95	82.42	77.14	80.31	77.14
	liters	25.00	52.00	52.00	47.00	26.00	47.00	52.00	52.00	78.00	73.00	76.00	73.00
SK 102	quarts	38.04	75.02	75.02	69.74	42.27	69.74	76.08	76.08	109.90	85.59	107.78	83.48
	liters	36.00	71.00	71.00	66.00	40.00	66.00	72.00	72.00	104.00	81.00	102.00	79.00
Mounting position		triple reduction											
		B 3	B 6	B 7	B 8	B 5	B 5I	B 5II	B 5III	V 1	V 3	V 5	V 6
		SK 03	quarts	0.32	0.63	0.63	0.85	0.53	0.95	0.85	0.85	1.16	0.86
liters	0.30		0.60	0.60	0.80	0.50	0.90	0.80	0.80	1.10	0.81	0.90	1.25
SK 13	quarts	0.63	0.74	0.74	1.16	0.85	1.27	1.00	1.00	1.27	1.27	1.27	1.32
	liters	0.60	0.70	0.70	1.10	0.80	1.20	0.95	0.95	1.20	1.20	1.20	1.25
SK 23	quarts	1.37	1.69	1.69	2.43	2.64	1.59	2.96	2.96	2.96	2.75	2.48	2.54
	liters	1.30	1.60	1.60	2.30	2.50	1.50	2.80	2.80	2.80	2.60	2.35	2.40
SK 33	quarts	1.69	2.43	2.43	3.38	2.01	3.70	2.75	2.75	4.65	3.59	4.44	3.06
	liters	1.60	2.30	2.30	3.20	1.90	3.50	2.60	2.60	4.40	3.40	4.20	2.90
SK 43	quarts	3.17	3.80	3.80	5.49	3.70	5.28	4.33	4.33	6.45	6.02	6.97	5.92
	liters	3.00	3.60	3.60	5.20	3.50	5.00	4.10	4.10	6.10	5.70	6.60	5.60
SK 53	quarts	4.76	6.34	6.34	8.14	5.49	7.40	7.08	7.08	9.40	8.88	9.19	9.19
	liters	4.50	6.00	6.00	7.70	5.20	7.00	6.70	6.70	8.90	8.40	8.70	8.70
SK 63	quarts	10.57	13.74	13.74	11.62	11.62	12.68	14.79	14.79	19.02	14.79	16.91	15.32
	liters	10.00	13.00	13.00	11.00	11.00	12.00	14.00	14.00	18.00	14.00	16.00	14.50
SK 73	quarts	14.79	21.13	21.13	18.49	14.79	19.02	21.13	21.13	29.06	23.78	28.53	21.13
	liters	14.00	20.00	20.00	17.50	14.00	18.00	20.00	20.00	27.50	22.50	27.00	20.00
SK 83	quarts	23.25	34.87	34.87	27.47	24.30	28.53	35.93	35.93	42.27	35.93	39.10	32.76
	liters	22.00	33.00	33.00	26.00	23.00	27.00	34.00	34.00	40.00	34.00	37.00	31.00
SK 93	quarts	42.27	51.78	51.78	46.49	42.27	46.49	51.78	51.78	78.19	73.97	76.08	73.97
	liters	40.00	49.00	49.00	44.00	40.00	44.00	49.00	49.00	74.00	70.00	72.00	70.00
SK 103	quarts	58.12	70.80	70.80	58.12	58.12	62.34	70.80	70.80	104.61	82.42	102.50	75.02
	liters	55.00	67.00	67.00	55.00	55.00	59.00	67.00	67.00	99.00	78.00	97.00	71.00

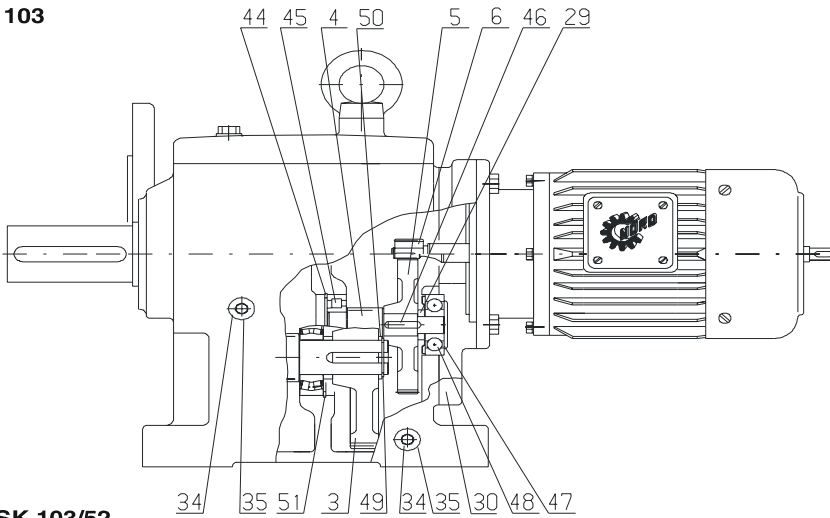
Note: Filling quantities are approximate figures. Oil level must be checked according to oil level plug after final installation. Acceptable oil fill level is within 1/2 inch of the bottom of the fill plug threads. For mounting angles not shown, consult factory.

## PARTS LIST

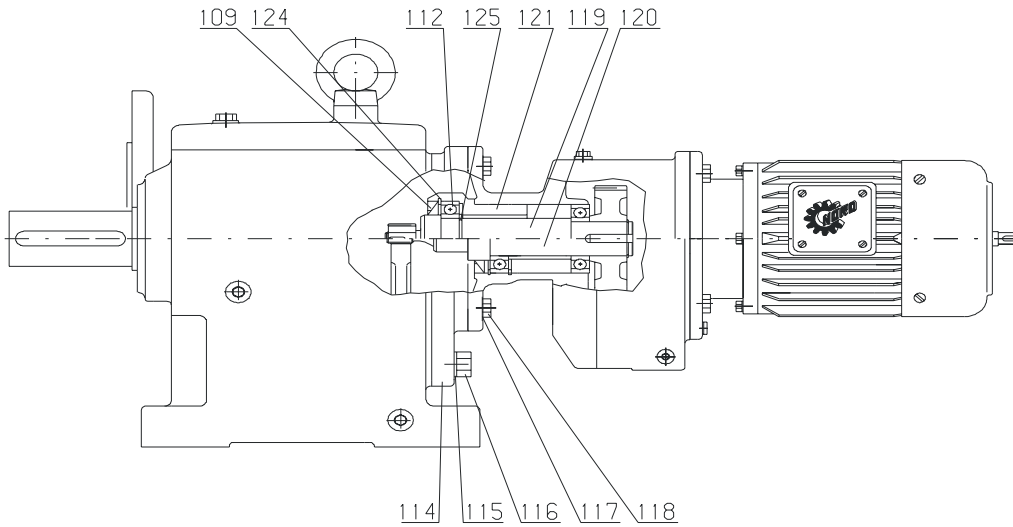
**SK 03 - SK 53**



**SK 63 - SK 103**



**SK 12/02 - SK 103/52**



- 3 Driven gear
- 4 Pinion shaft  
SK 63 - SK 103
- 5 Driving gear
- 6 Driving pinion
- 27 Fixing bolt
- 28 Seal
- 29 Spacer
- 30 Third reduction gearcase
- 34 Drain plug
- 35 Seal
- 44 Circlip
- 45 Ball bearing
- 46 Key
- 47 Shim
- 48 Ball bearing
- 49 Circlip
- 50 Supporting disc
- 51 Circlip
- 52 Circlip
- 53 Key
- 54 Circlip
- 55 Intermediate shaft, plain
- 56 Intermediate shaft, gearcut
- 57 Circlip
- 58 Circlip
- 59 Shim
- 60 Circlip
- 61 Circlip
- 62 Oil-plug
- 63 Seal
- 109 Shaft seal
- 112 Ball bearing
- 114 Intermediate flange
- 115 Spring washer
- 116 Bolt
- 118 Bolt
- 119 Intermediate shaft, plain
- 120 Intermediate shaft, gearcut
- 121 Bearing sleeve
- 124 Circlip
- 125 Circlip



MOTOR APPENDIX INFORMATION  
TYPE BALDOR 0.25HP 56C

**BALDOR® • RELIANCE** 

**Product Information Packet**

**35F785Q779G1**

**.25HP, 1750RPM, 3PH, 60HZ, 56C, 3512M, TEFC, F1**

Part Detail							
Revision:	D	Status:	PRD/A	Change #:		Proprietary:	No
Type:	AC	Elec. Spec:	35WGQ779	CD Diagram:	CD0005	Mfg Plant:	
Mech. Spec:	35F785	Layout:	35LYF785	Poles:	04	Created Date:	05-23-2017
Base:	N	Eff. Date:	03-08-2018	Leads:	9#18		

Specs			
Enclosure:	TEFC	Inverter Code:	Inverter Duty
Frame:	56C	KVA Code:	L
Frame Material:	Steel	Lifting Lugs:	No Lifting Lugs
Output @ Frequency:	.250 HP @ 60 HZ	Locked Bearing Indicator:	Locked Bearing
Synchronous Speed @ Frequency:	1800 RPM @ 60 HZ	Motor Lead Quantity/Wire Size:	9 @ 18 AWG
Voltage @ Frequency:	230.0 V @ 60 HZ	Motor Lead Exit:	Ko Box
	460.0 V @ 60 HZ	Motor Lead Termination:	Flying Leads
XP Class and Group:	None	Motor Type:	3512M
XP Division:	Not Applicable	Mounting Arrangement:	F1
Agency Approvals:	UR	Power Factor:	72
	CSA	Product Family:	General Purpose
Auxillary Box:	No Auxillary Box	Pulley End Bearing Type:	Ball
Auxillary Box Lead Termination:	None	Pulley Face Code:	C-Face
Base Indicator:	No Mounting	Pulley Shaft Indicator:	Standard
Bearing Grease Type:	Polyrex EM (-20F +300F)	Rodent Screen:	None
Blower:	None	RoHS Status:	ROHS COMPLIANT
Constant Torque Speed Range:	12	Shaft Extension Location:	Pulley End
Current @ Voltage:	.400 A @ 460.0 V	Shaft Ground Indicator:	No Shaft Grounding

	.800 A @ 230.0 V	<b>Shaft Rotation:</b>	Reversible
<b>Design Code:</b>	B	<b>Shaft Slinger Indicator:</b>	No Slinger
<b>Drip Cover:</b>	No Drip Cover	<b>Speed Code:</b>	Single Speed
<b>Duty Rating:</b>	CONT	<b>Motor Standards:</b>	NEMA
<b>Electrically Isolated Bearing:</b>	Not Electrically Isolated	<b>Starting Method:</b>	Direct on line
<b>Feedback Device:</b>	NO FEEDBACK	<b>Thermal Device - Bearing:</b>	None
<b>Front Face Code:</b>	Standard	<b>Thermal Device - Winding:</b>	Normally Closed Thermostat
<b>Front Shaft Indicator:</b>	None	<b>Vibration Sensor Indicator:</b>	No Vibration Sensor
<b>Heater Indicator:</b>	No Heater	<b>Winding Thermal 1:</b>	None
<b>Insulation Class:</b>	H	<b>Winding Thermal 2:</b>	None
		<b>XP Temp Code:</b>	T3

Nameplate NP2141L												
CAT NO												
SPEC.	35F785Q779G1					ENCL	TEFC					
FRAME	56C			HP	.25							
VOLTS	230/460											
MAG CUR	.6/.3				FLA	.8/.4						
RPM	1750			RPM MAX	4000							
HZ	60		PH	3		CLASS	H					
SER.F.	1.00		DES	B		SL HZ	1.7					
NEMA-NOM-EFF	80		WK2	0.0712								
RATING	40C AMB-CONT											
DE BRG	6205			ODE BRG	6203							
INV.TYPE	PWM		C HP FR	60		C HP TO	90			T. CODE	T3	
CT HZ FROM	12		CT HZ TO	60		VT HZ FROM	12		VT HZ TO	60		
CC	SER.NO											
	1.15SF SINEWAVE											

Parts List		
Part Number	Description	Quantity
SA339018	SA 35F785Q779G1	1.000 EA
RA327349	RA 35F785Q779G1	1.000 EA
NS2512A01	INSULATOR, CONDUIT BOX X	1.000 EA
35CB3005	CB CAST, W/1.09 DIA. LEAD HOLE	1.000 EA
36GS1000SP	GASKET-CONDUIT BOX, .06 THICK #SV-330 LE	1.000 EA
51XB1016A07	10-16 X 7/16 HXWSSLD SERTYB	2.000 EA
11XW1032G06	10-32 X .38, TAPTITE II, HEX WSHR SLTD U	1.000 EA
35EP3122K00	MASTER ODE,203 BRG,.683SH,#26 DRN,FH MTG	1.000 EA
HW5100A03	WAVY WASHER (W1543-017)	1.000 EA
35EP3307G00	MASTER DE,205 BRG,1.232SH,#26 DRN	1.000 EA
51XN1032A20	10-32 X 1 1/4 HX WS SL SR	2.000 EA
35FH4005A32SP	IEC FH NO GRSR W/3 HOLES - PRIMED	1.000 EA
51XW1032A06	10-32 X .38, TAPTITE II, HEX WSHR SLTD S	3.000 EA
35CB4514GX	CONDUIT BOX LID KIT	1.000 EA
51XW0832A07	8-32 X .44, TAPTITE II, HEX WSHR SLTD SE	4.000 EA
85XU0407S04	4X1/4 U DRIVE PIN STAINLESS	2.000 EA
MJ1000A02	GREASE, POLYREX EM EXXON (USe 4824-15A)	0.050 LB
HW3001B01	BRASS CUP WASHER, FOR #10 SCREW	1.000 EA
MG1000G27	MED CHARCOAL METALLIC GREY 400-0096	0.017 GA
HW2501D13	KEY, 3/16 SQ X 1.375	1.000 EA
HA7000A04	KEY RETAINER 0.625 DIA SHAFTS	1.000 EA
35FN3002A05SP	EXFN, PLASTIC, 6.376 OD, .638 ID	1.000 EA
HA3100A12	THRUBOLT 10-32 X 7.375	4.000 EA
LB1417	LABEL CARTON 6X4 PERFORATED BLANK ROLLS	1.000 EA

<b>Parts List (continued)</b>		
<b>Part Number</b>	<b>Description</b>	<b>Quantity</b>
MN416A01	TAG-INSTAL-MAINT no wire (1100/bx) 11/14	1.000 EA
LB1449	DIV-2/NEC WARNING LABEL	1.000 EA
LB1119N	WARNING LABEL	1.000 EA
LC0145B01	CONNECTION LABEL	1.000 EA
NP2141L	ALUM INV DIV-2 UL CSA-C US CC	1.000 EA
35PA1066	PKG GRP, PRINT PK1008A06	1.000 EA
PK3083T	STYROFOAM PACKING CRADLE	1.000 EA
PK5535A01	MODIFIED STD EURO PALLET 47-1/4 X 31-1/2	1.000 EA
FE-0000001	ZRTG FE ASSEMBLY	1.000 EA
PE-0000001	ZRTG PE ASSEMBLY	1.000 EA

**AC Induction Motor Performance Data**

Record # 16559 - Typical performance - not guaranteed values

<b>Winding:</b> 35WGQ779-R002	<b>Type:</b> 3512M	<b>Enclosure:</b> TEFC
-------------------------------	--------------------	------------------------

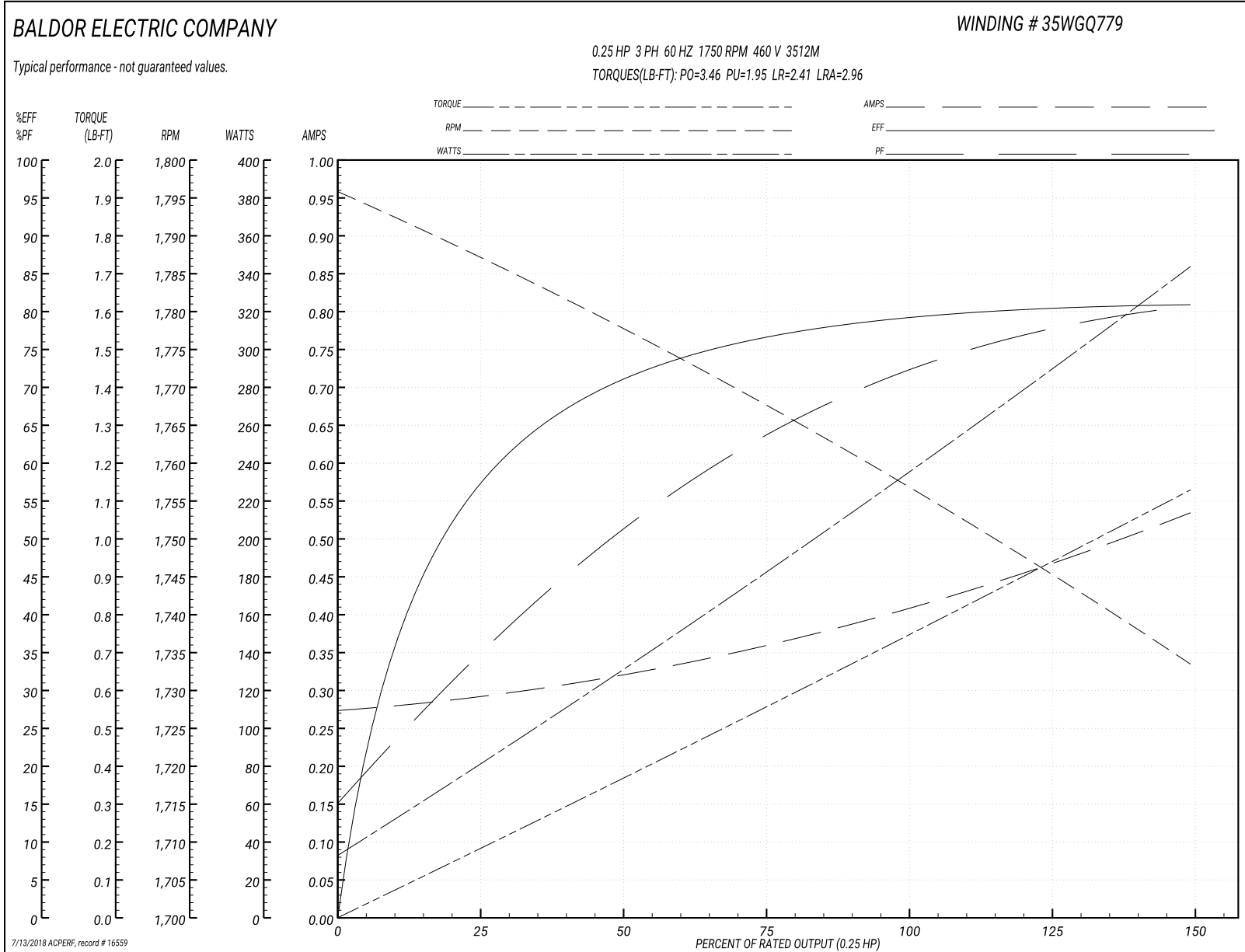
Nameplate Data				460 V, 60 Hz: High Voltage Connection	
Rated Output (HP)	.25			Full Load Torque	0.752 LB-FT
Volts	230/460			Start Configuration	direct on line
Full Load Amps	.8/4			Breakdown Torque	3.46 LB-FT
R.P.M.	1750			Pull-up Torque	1.95 LB-FT
Hz	60	Phase	3	Locked-rotor Torque	2.41 LB-FT
NEMA Design Code	B	KVA Code	L	Starting Current	2.96 A
Service Factor (S.F.)	1			No-load Current	0.273 A
NEMA Nom. Eff.	80	Power Factor	72	Line-line Res. @ 25°C	62 Ω
Rating - Duty	40C AMB-CONT			Temp. Rise @ Rated Load	12°C
				Locked-rotor Power Factor	58.4
				Rotor inertia	0.0712 LB-FT <sup>2</sup>

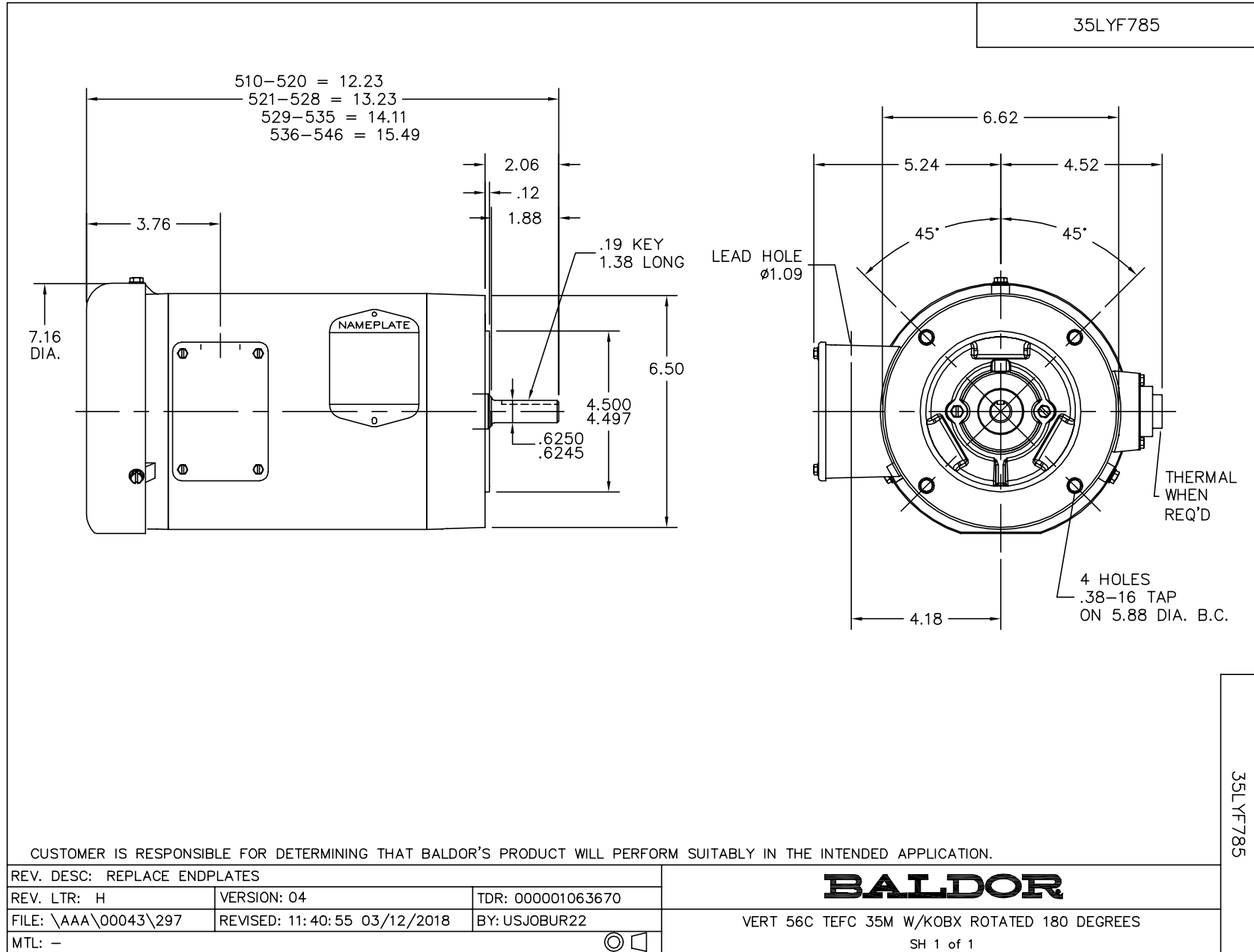
Load Characteristics 460 V, 60 Hz, 0.25 HP

% of Rated Load	25	50	75	100	125	150
Power Factor	36	52	64	73	77	81
Efficiency	57.1	71	76.8	79.9	80.2	80.9
Speed	1787	1777	1767	1757	1746	1733
Line amperes	0.293	0.323	0.362	0.403	0.473	0.533

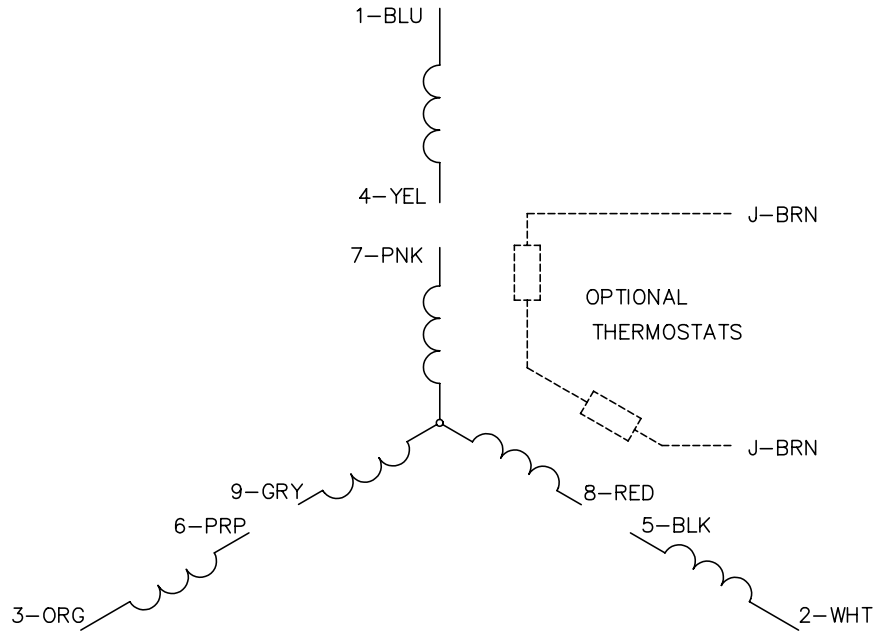


Performance Graph at 460V, 60Hz, 0.25HP Typical performance - Not guaranteed values

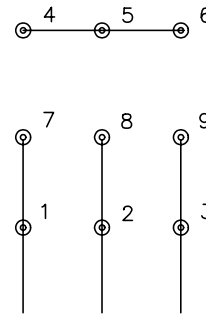




CD0005

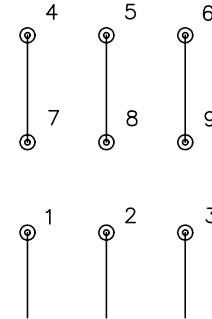


LOW VOLTAGE  
(2Y)



LINE

HIGH VOLTAGE  
(1Y)



LINE

NOTES:

1. INTERCHANGE ANY TWO LINE LEADS TO REVERSE ROTATION.
2. OPTIONAL THERMOSTATS ARE PROVIDED WHEN SPECIFIED.
3. ACTUAL NUMBER OF INTERNAL PARALLEL CIRCUITS MAY BE A MULTIPLE OF THOSE SHOWN ABOVE.
4. LEAD COLORS ARE OPTIONAL. LEADS MUST ALWAYS BE NUMBERED AS SHOWN.

REV. DESC: REVISE TO SHOW OPTIONAL COLORS			
REV. LTR: E	BY: JLP	REVISED: 01/19/99 10:15	TDR: 0171435
900000		FILE: AAA00005140	MDL: -
		MTL: -	

**BALDOR ELECTRIC Co.**

3PH, DV, 9 LEADS

CD0005

**BALDOR • RELIANCE**



**Integral Horsepower  
AC Induction Motors**

**Installation & Operating Manual**

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# Section 1

## General Information

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**Overview** This manual contains general procedures that apply to Baldor Motor products. Be sure to read and understand the Safety Notice statements in this manual. For your protection, do not install, operate or attempt to perform maintenance procedures until you understand the Warning and Caution statements. A Warning statement indicates a possible unsafe condition that can cause harm to personnel. A Caution statement indicates a condition that can cause damage to equipment.

**Important:** **This instruction manual is not intended to include a comprehensive listing of all details for all procedures required for installation, operation and maintenance. This manual describes general guidelines that apply to most of the motor products shipped by Baldor. If you have a question about a procedure or are uncertain about any detail, Do Not Proceed. Please contact your Baldor distributor for more information or clarification.**

Before you install, operate or perform maintenance, become familiar with the following:

- NEMA Publication MG-2, Safety Standard for Construction and guide for Selection, Installation and Use of Electric Motors and Generators.
- The National Electrical Code
- Local codes and Practices

### Limited Warranty

[www.baldor.com/support/warranty\\_standard.asp](http://www.baldor.com/support/warranty_standard.asp)

**Safety Notice:** This equipment contains high voltage! Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt installation, operation and maintenance of electrical equipment.

Be sure that you are completely familiar with NEMA publication MG-2, safety standards for construction and guide for selection, installation and use of electric motors and generators, the National Electrical Code and local codes and practices. Unsafe installation or use can cause conditions that lead to serious or fatal injury. Only qualified personnel should attempt the installation, operation and maintenance of this equipment.

**WARNING:** **Do not touch electrical connections before you first ensure that power has been disconnected. Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt the installation, operation and maintenance of this equipment.**

**WARNING:** **Disconnect all electrical power from the motor windings and accessory devices before disassembly of the motor. Electrical shock can cause serious or fatal injury.**

**WARNING:** **Be sure the system is properly grounded before applying power. Do not apply AC power before you ensure that all grounding instructions have been followed. Electrical shock can cause serious or fatal injury. National Electrical Code and Local codes must be carefully followed.**

**WARNING:** **Avoid extended exposure to machinery with high noise levels. Be sure to wear ear protective devices to reduce harmful effects to your hearing.**

**WARNING:** **Surface temperatures of motor enclosures may reach temperatures which can cause discomfort or injury to personnel accidentally coming into contact with hot surfaces. When installing, protection should be provided by the user to protect against accidental contact with hot surfaces. Failure to observe this precaution could result in bodily injury.**

**WARNING:** **This equipment may be connected to other machinery that has rotating parts or parts that are driven by this equipment. Improper use can cause serious or fatal injury. Only qualified personnel should attempt to install operate or maintain this equipment.**

**WARNING:** **Do not by-pass or disable protective devices or safety guards. Safety features are designed to prevent damage to personnel or equipment. These devices can only provide protection if they remain operative.**

**WARNING:** **Avoid the use of automatic reset devices if the automatic restarting of equipment can be hazardous to personnel or equipment.**

**WARNING:** **Be sure the load is properly coupled to the motor shaft before applying power. The shaft key must be fully captive by the load device. Improper coupling can cause harm to personnel or equipment if the load decouples from the shaft during operation.**

**WARNING:** **Use proper care and procedures that are safe during handling, lifting, installing, operating and maintaining operations. Improper methods may cause muscle strain or other harm.**

**WARNING:** **Thermostat contacts automatically reset when the motor has slightly cooled down. To prevent injury or damage, the control circuit should be designed so that automatic starting of the motor is not possible when the thermostat resets.**



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## Safety Notice Continued

- WARNING:** UL Listed motors must only be serviced by UL Approved Authorized Baldor Service Centers if these motors are to be returned to a hazardous and/or explosive atmosphere.
- WARNING:** Pacemaker danger – Magnetic and electromagnetic fields in the vicinity of current carrying carrying conductors and permanent magnet motors can result result in a serious health hazard to persons with cardiac pacemakers, metal implants, and hearing aids. To avoid risk, stay way from the area surrounding a permanent magnet motor.
- WARNING:** Before performing any motor maintenance procedure, be sure that the equipment connected to the motor shaft cannot cause shaft rotation. If the load can cause shaft rotation, disconnect the load from the motor shaft before maintenance is performed. Unexpected mechanical rotation of the motor parts can cause injury or motor damage.
- WARNING:** Use only UL/CSA listed explosion proof motors in the presence of flammable or combustible vapors or dust.
- WARNING:** Motors that are to be used in flammable and/or explosive atmospheres must display the UL label on the nameplate along with CSA listed logo. Specific service conditions for these motors are defined in NFPA 70 (NEC) Article 500.
- WARNING:** Guards must be installed for rotating parts such as couplings, pulleys, external fans, and unused shaft extensions, should be permanently guarded to prevent accidental contact by personnel. Accidental contact with body parts or clothing can cause serious or fatal injury.
- Caution:** To prevent premature equipment failure or damage, only qualified maintenance personnel should perform maintenance.
- Caution:** Do not over-lubricate motor as this may cause premature bearing failure.
- Caution:** Do not over tension belts. Excess tension may damage the motor or driven equipment.
- Caution:** Do not lift the motor and its driven load by the motor lifting hardware. The motor lifting hardware is adequate for lifting only the motor. Disconnect the load (gears, pumps, compressors, or other driven equipment) from the motor shaft before lifting the motor.
- Caution:** If eye bolts are used for lifting a motor, be sure they are securely tightened. The lifting direction should not exceed a 20° angle from the shank of the eye bolt or lifting lug. Excessive lifting angles can cause damage.
- Caution:** To prevent equipment damage, be sure that the electrical service is not capable of delivering more than the maximum motor rated amps listed on the rating plate.
- Caution:** If a HI POT test (High Potential Insulation test) must be performed, follow the precautions and procedure in NEMA MG1 and MG2 standards to avoid equipment damage.
- If you have any questions or are uncertain about any statement or procedure, or if you require additional information please contact your Baldor distributor or an Authorized Baldor Service Center.

## Receiving

Each Baldor Electric Motor is thoroughly tested at the factory and carefully packaged for shipment. When you receive your motor, there are several things you should do immediately.

1. Observe the condition of the shipping container and report any damage immediately to the commercial carrier that delivered your motor.
2. Verify that the part number of the motor you received is the same as the part number listed on your purchase order.

## Handling

The motor should be lifted using the lifting lugs or eye bolts provided.

- Caution:** Do not lift the motor and its driven load by the motor lifting hardware. The motor lifting hardware is adequate for lifting only the motor. Disconnect the load (gears, pumps, compressors, or other driven equipment) from the motor shaft before lifting the motor.
1. Use the lugs or eye bolts provided to lift the motor. Never attempt to lift the motor and additional equipment connected to the motor by this method. The lugs or eye bolts provided are designed to lift only the motor. Never lift the motor by the motor shaft or the hood of a WP11 motor.
  2. To avoid condensation inside the motor, do not unpack until the motor has reached room temperature. (Room temperature is the temperature of the room in which it will be installed). The packing provides insulation from temperature changes during transportation.
  3. When lifting a WP11 (Weather Proof Type 2) motor, do not lift the motor by inserting lifting lugs into holes on top of the cooling hood. These lugs are to be used for hood removal only. A spreader bar should be used to lift the motor by the cast lifting lugs located on the motor frame.

- 
4. If the motor must be mounted to a plate with the driven equipment such as pump, compressor etc., it may not be possible to lift the motor alone. For this case, the assembly should be lifted by a sling around the mounting base. The entire assembly can be lifted as an assembly for installation.

Do not lift the assembly using the motor lugs or eye bolts provided. Lugs or eye bolts are designed to lift motor only. If the load is unbalanced (as with couplings or additional attachments) additional slings or other means must be used to prevent tipping. In any event, the load must be secure before lifting. If the load is unbalanced (as with couplings or additional attachments) additional slings or other means must be used to prevent tipping. In any event, the load must be secure before lifting.

## **Storage**

Storage requirements for motors and generators that will not be placed in service for at least six months from date of shipment.

Improper motor storage will result in seriously reduced reliability and failure. An electric motor that does not experience regular usage while being exposed to normally humid atmospheric conditions is likely to develop rust in the bearings or rust particles from surrounding surfaces may contaminate the bearings. The electrical insulation may absorb an excessive amount of moisture leading to the motor winding failure.

A wooden crate “shell” should be constructed to secure the motor during storage. This is similar to an export box but the sides & top must be secured to the wooden base with lag bolts (not nailed as export boxes are) to allow opening and reclosing many times without damage to the “shell”.

Minimum resistance of motor winding insulation is 5 Meg ohms or the calculated minimum, whichever is greater. Minimum resistance is calculated as follows:  $R_m = kV + 1$

where: (Rm is minimum resistance to ground in Meg-Ohms and  
kV is rated nameplate voltage defined as Kilo-Volts.)

Example: For a 480VAC rated motor  $R_m = 1.48$  meg-ohms (use 5 MΩ).

For a 4160VAC rated motor  $R_m = 5.16$  meg-ohms.

## **Preparation for Storage**

1. Some motors have a shipping brace attached to the shaft to prevent damage during transportation. The shipping brace, if provided, must be removed and stored for future use. The brace must be reinstalled to hold the shaft firmly in place against the bearing before the motor is moved.
2. Store in a clean, dry, protected warehouse where control is maintained as follows:
  - a. Shock or vibration must not exceed 2 mils maximum at 60 hertz, to prevent the bearings from brinelling. If shock or vibration exceeds this limit vibration isolation pads must be used.
  - b. Storage temperatures of 10°C (50°F) to 49°C (120°F) must be maintained.
  - c. Relative humidity must not exceed 60%.
  - d. Motor space heaters (when present) are to be connected and energized whenever there is a possibility that the storage ambient conditions will reach the dew point. Space heaters are optional.  
Note: Remove motor from containers when heaters are energized, reprotect if necessary.
3. Measure and record the resistance of the winding insulation (dielectric withstand) every 30 days of storage.
  - a. If motor insulation resistance decreases below the minimum resistance, contact your Baldor District office.
  - b. Place new desiccant inside the vapor bag and re-seal by taping it closed.
  - c. If a zipper-closing type bag is used instead of the heat-sealed type bag, zip the bag closed instead of taping it. Be sure to place new desiccant inside bag after each monthly inspection.
  - d. Place the shell over the motor and secure with lag bolts.
4. Where motors are mounted to machinery, the mounting must be such that the drains and breathers are fully operable and are at the lowest point of the motor. Vertical motors must be stored in the vertical position. Storage environment must be maintained as stated in step 2.

- 
5. Motors with anti-friction bearings are to be greased at the time of going into extended storage with periodic service as follows:
    - a. Motors marked "Do Not Lubricate" on the nameplate do not need to be greased before or during storage.
    - b. Ball and roller bearing (anti-friction) motor shafts are to be rotated manually every 3 months and greased every 6 months in accordance with the Maintenance section of this manual.
    - c. Sleeve bearing (oil lube) motors are drained of oil prior to shipment. The oil reservoirs must be refilled to the indicated level with the specified lubricant, (see Maintenance). The shaft should be rotated monthly by hand at least 10 to 15 revolutions to distribute oil to bearing surfaces.
    - d. "Provisions for oil mist lubrication" – These motors are packed with grease. Storage procedures are the same as paragraph 5b.
    - e. "Oil Mist Lubricated" – These bearings are protected for temporary storage by a corrosion inhibitor. If stored for greater than 3 months or outdoor storage is anticipated, connected to the oil mist system while in storage. If this is not possible, add the amount of grease indicated under "Standard Condition" in Section 3, then rotate the shaft 15 times by hand.
  6. All breather drains are to be fully operable while in storage (drain plugs removed). The motors must be stored so that the drain is at the lowest point. All breathers and automatic "T" drains must be operable to allow breathing and draining at points other than through the bearings around the shaft. Vertical motors should be stored in a safe stable vertical position.
  7. Coat all external machined surfaces with a rust preventing material. An acceptable product for this purpose is Exxon Rust Ban # 392.

#### **Non-Regreaseable Motors**

Non-regreaseable motors with "Do Not Lubricate" on the nameplate should have the motor shaft rotated 15 times to redistribute the grease within the bearing every 3 months or more often.

#### **All Other Motor Types**

Before storage, the following procedure must be performed.

1. Remove the grease drain plug, if supplied, (opposite the grease fitting) on the bottom of each bracket prior to lubricating the motor.
2. The motor with regreaseable bearing must be greased as instructed in Section 3 of this manual.
3. Replace the grease drain plug after greasing.
4. The motor shaft must be rotated a minimum of 15 times after greasing.
5. Motor Shafts are to be rotated at least 15 revolutions manually every 3 months and additional grease added every nine months (see Section 3) to each bearing.
6. Bearings are to be greased at the time of removal from storage.

#### **Removal From Storage**

1. Remove all packing material.
2. Measure and record the electrical resistance of the winding insulation resistance meter at the time of removal from storage. The insulation resistance must not be less than 50% from the initial reading recorded when the motor was placed into storage. A decrease in resistance indicates moisture in the windings and necessitates electrical or mechanical drying before the motor can be placed into service. If resistance is low, contact your Baldor District office.
3. Regrease the bearings as instructed in Section 3 of this manual.
4. Reinstall the original shipping brace if motor is to be moved. This will hold the shaft firmly against the bearing and prevent damage during movement.

## Section 2 Installation & Operation

---

### Overview

Installation should conform to the National Electrical Code as well as local codes and practices. When other devices are coupled to the motor shaft, be sure to install protective devices to prevent future accidents. Some protective devices include, coupling, belt guard, chain guard, shaft covers etc. These protect against accidental contact with moving parts. Machinery that is accessible to personnel should provide further protection in the form of guard rails, screening, warning signs etc.

### Location

It is important that motors be installed in locations that are compatible with motor enclosure and ambient conditions. Improper selection of the motor enclosure and ambient conditions can lead to reduced operating life of the motor.

Proper ventilation for the motor must be provided. Obstructed airflow can lead to reduction of motor life.

1. **Open Drip-Proof/WPI** motors are intended for use indoors where atmosphere is relatively clean, dry, well ventilated and non-corrosive.
2. **Totally Enclosed and WPII** motors may be installed where dirt, moisture or dust are present and in outdoor locations.

Severe Duty, IEEE 841 and Washdown Duty enclosed motors are designed for installations with high corrosion or excessive moisture conditions. These motors should not be placed into an environment where there is the presence of flammable or combustible vapors, dust or any combustible material, unless specifically designed for this type of service.

**Hazardous Locations** are those where there is a risk of ignition or explosion due to the presence of combustible gases, vapors, dust, fibers, or flyings. Facilities requiring special equipment for hazardous locations are typically classified in accordance with local requirements. In the US market, guidance is provided by the National Electric Code.

### **Caution:**

**Do not lift the motor and its driven load by the motor lifting hardware. The motor lifting hardware is adequate for lifting only the motor. Disconnect the load (gears, pumps, compressors, or other driven equipment) from the motor shaft before lifting the motor.**

### Mounting

The motor must be securely installed to a rigid foundation or mounting surface to minimize vibration and maintain alignment between the motor and shaft load. Failure to provide a proper mounting surface may cause vibration, misalignment and bearing damage.

Foundation caps and sole plates are designed to act as spacers for the equipment they support. If these devices are used, be sure that they are evenly supported by the foundation or mounting surface.

After installation is complete and accurate alignment of the motor and load is accomplished, the base should be grouted to the foundation to maintain this alignment.

The standard motor base is designed for horizontal or vertical mounting. Adjustable or sliding rails are designed for horizontal mounting only. Consult your Baldor distributor or authorized Baldor Service Center for further information.

### Alignment

Accurate alignment of the motor with the driven equipment is extremely important. The pulley, sprocket, or gear used in the drive should be located on the shaft as close to the shaft shoulder as possible.

It is recommended to heat the pulley, sprocket, or gear before installing on the motor shaft.

Forcibly driving a unit on the motor shaft will damage the bearings.

#### 1. **Direct Coupling**

For direct drive, use flexible couplings if possible. Consult the drive or equipment manufacturer for more information. Mechanical vibration and roughness during operation may indicate poor alignment. Use dial indicators to check alignment. The space between coupling hubs should be maintained as recommended by the coupling manufacturer.

#### 2. **End-Play Adjustment**

The axial position of the motor frame with respect to its load is also extremely important. The motor bearings are not designed for excessive external axial thrust loads. Improper adjustment will cause failure.

#### 3. **Pulley Ratio**

The pulley ratio should not exceed 8:1.

### **Caution:**

**Do not over tension belts. Excess tension may damage the motor or driven equipment.**

#### 4. **Belt Drive**

Align sheaves carefully to minimize belt wear and axial bearing loads (see End-Play Adjustment). Belt tension should be sufficient to prevent belt slippage at rated speed and load. However, belt slippage may occur during starting.

5. Sleeve bearing motors are only suitable for coupled loads.

**Doweling & Bolting** After proper alignment is verified, dowel pins should be inserted through the motor feet into the foundation. This will maintain the correct motor position should motor removal be required. (Baldor motors are designed for doweling.)

1. Drill dowel holes in diagonally opposite motor feet in the locations provided.
2. Drill corresponding holes in the foundation.
3. Ream all holes.
4. Install proper fitting dowels.
5. Mounting bolts must be carefully tightened to prevent changes in alignment. Use a flat washer and lock washer under each nut or bolt head to hold the motor feet secure. Flanged nuts or bolts may be used as an alternative to washers.

**WARNING:** Guards must be installed for rotating parts such as couplings, pulleys, external fans, and unused shaft extensions, should be permanently guarded to prevent accidental contact by personnel. Accidental contact with body parts or clothing can cause serious or fatal injury.

**Guarding** Guards must be installed for rotating parts such as couplings, pulleys, external fans, and unused shaft extensions. This is particularly important where the parts have surface irregularities such as keys, key ways or set screws. Some satisfactory methods of guarding are:

1. Covering the machine and associated rotating parts with structural or decorative parts of the driven equipment.
2. Providing covers for the rotating parts. Covers should be sufficiently rigid to maintain adequate guarding during normal service.

**Power Connection** Motor and control wiring, overload protection, disconnects, accessories and grounding should conform to the National Electrical Code and local codes and practices. Flying leads must be insulated with two full wraps of electrical grade insulating tape or heat shrink tubing.

**Conduit Box** For ease of making connections, an oversize conduit box is provided.

The box can be rotated 360° in 90° increments.

Auxiliary conduit boxes are provided on some motors for accessories such as space heaters, RTD's etc.

**AC Power** Connect the motor leads as shown on the connection diagram located on the name plate or inside the cover on the conduit box. Be sure the following guidelines are met:

1. AC power is within  $\pm 10\%$  of rated voltage with rated frequency. (See motor name plate for ratings).  
**OR**
2. AC power is within  $\pm 5\%$  of rated frequency with rated voltage.  
**OR**
3. A combined variation in voltage and frequency of  $\pm 10\%$  (sum of absolute values) of rated values, provided the frequency variation does not exceed  $\pm 5\%$  of rated frequency.

Performance within these voltage and frequency variations are shown in Figure 2-2.

**Figure 2-1 Accessory Connections**

HEATERS



One heater is installed in each end of motor. Leads for each heater are labeled H1 & H2. (Like numbers should be tied together).

THERMISTORS



Three thermistors are installed in windings and tied in series. Leads are labeled T1 & T2.

WINDING RTDS



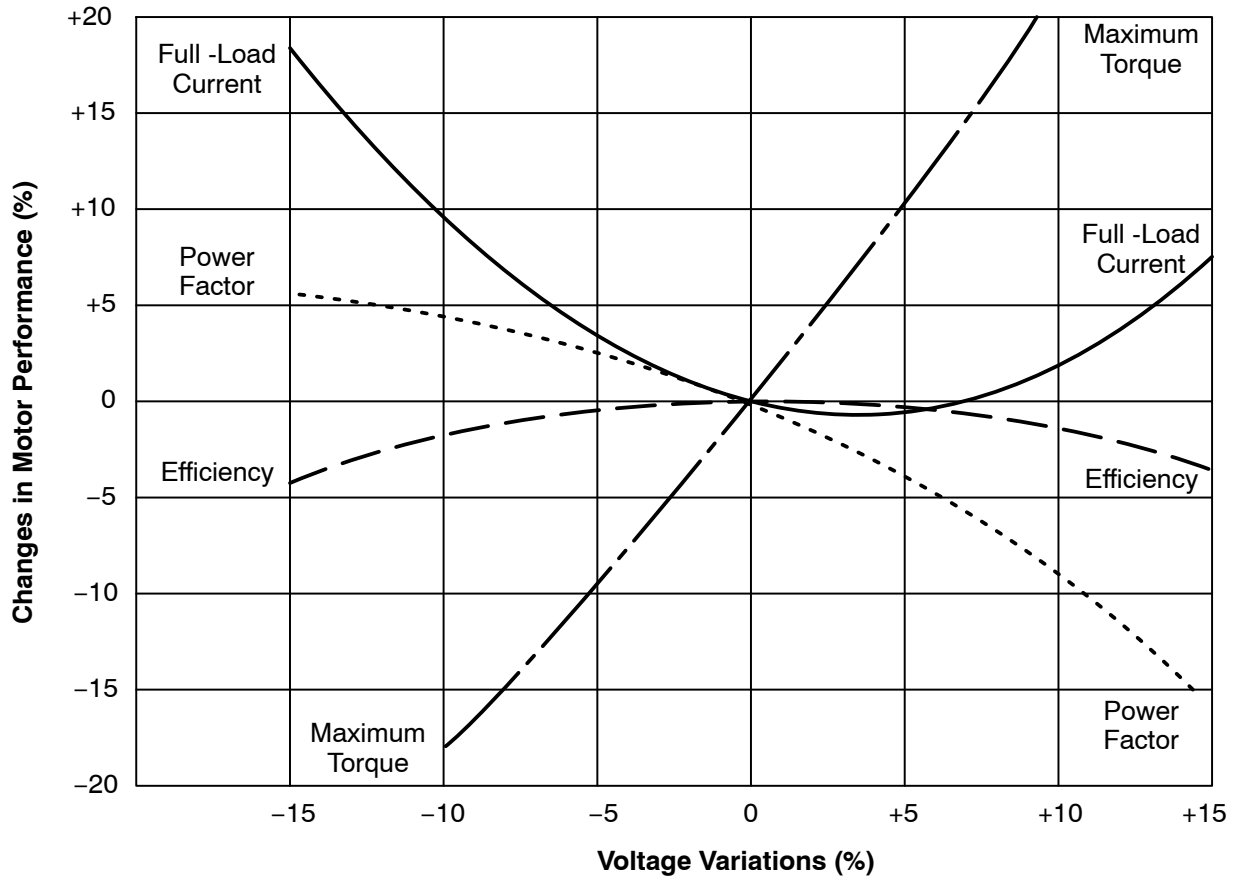
Winding RTDs are installed in windings (2) per phase. Each set of leads is labeled W1, W2, W3, W4, W5, & W6.

BEARING RTD



- \* One bearing RTD is installed in Drive endplate (PUEP), leads are labeled RTDDE.
- \* One bearing RTD is installed in Opposite Drive endplate (FREP), leads are labeled RTDODE.
- \* Note RTD may have 2-Red/1-White leads; or 2-White/1-Red Lead.

**Figure 2-2 Typical Motor Performance VS Voltage Variations**



**Rotation** All three phase motors are reversible. To reverse the direction of rotation, disconnect and lock out power and interchange any two of the three line leads for three phase motors. For single phase motors, check the connection diagram to determine if the motor is reversible and follow the connection instructions for lead numbers to be interchanged. Not all single phase motors are reversible.

Adjustable Frequency Power Inverters used to supply adjustable frequency power to induction motors produce wave forms with lower order harmonics with voltage spikes superimposed. Turn-to-turn, phase-to-phase, and ground insulation of stator windings are subject to the resulting dielectric stresses. Suitable precautions should be taken in the design of these drive systems to minimize the magnitude of these voltage spikes. Consult the drive instructions for maximum acceptable motor lead lengths, and proper grounding.

- 
- First Time Start Up** Be sure that all power to motor and accessories is off. Be sure the motor shaft is disconnected from the load and will not cause mechanical rotation of the motor shaft.
1. Make sure that the mechanical installation is secure. All bolts and nuts are tightened etc.
  2. If motor has been in storage or idle for some time, check winding insulation integrity.
  3. Inspect all electrical connections for proper termination, clearance, mechanical strength and electrical continuity.
  4. Be sure all shipping materials and braces (if used) are removed from motor shaft.
  5. Manually rotate the motor shaft to ensure that it rotates freely.
  6. Replace all panels and covers that were removed during installation.
  7. Momentarily apply power and check the direction of rotation of the motor shaft.
  8. If motor rotation is wrong, be sure power is off and change the motor lead connections. Verify rotation direction before you continue.
  9. Start the motor and ensure operation is smooth without excessive vibration or noise. If so, run the motor for 1 hour with no load connected.
  10. After 1 hour of operation, disconnect power and connect the load to the motor shaft. Verify all coupling guards and protective devices are installed. Ensure motor is properly ventilated.

- Coupled Start Up** This procedure assumes a coupled start up. Also, that the first time start up procedure was successful.
1. Check the coupling and ensure that all guards and protective devices are installed.
  2. Check that the coupling is properly aligned and not binding.
  3. The first coupled start up should be with no load. Apply power and verify that the load is not transmitting excessive vibration back to the motor through the coupling or the foundation. Vibration should be at an acceptable level.
  4. Run for approximately 1 hour with the driven equipment in an unloaded condition.

The equipment can now be loaded and operated within specified limits. Do not exceed the name plate ratings for amperes for steady continuous loads.

**Jogging and Repeated Starts** Repeated starts and/or jogs of induction motors generally reduce the life of the motor winding insulation. A much greater amount of heat is produced by each acceleration or jog than by the same motor under full load. If it is necessary to repeatedly start or jog the motor, it is advisable to check the application with your local Baldor distributor or Baldor Service Center.

**Heating** - Duty rating and maximum ambient temperature are stated on the motor name plate. Do not exceed these values. If there is any question regarding safe operation, contact your local Baldor District Office or Baldor Service Center.

## Section 3 Maintenance & Troubleshooting

**WARNING:** UL Listed motors must only be serviced by UL Approved Authorized Baldor Service Centers if these motors are to be returned to a hazardous and/or explosive atmosphere.

**General Inspection** Inspect the motor at regular intervals, approximately every 500 hours of operation or every 3 months, whichever occurs first. Keep the motor clean and the ventilation openings clear. The following steps should be performed at each inspection:

**WARNING:** Do not touch electrical connections before you first ensure that power has been disconnected. Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt the installation, operation and maintenance of this equipment.

1. Check that the motor is clean. Check that the interior and exterior of the motor is free of dirt, oil, grease, water, etc. Oily vapor, paper pulp, textile lint, etc. can accumulate and block motor ventilation. If the motor is not properly ventilated, overheating can occur and cause early motor failure.
2. Use a "Megger" periodically to ensure that the integrity of the winding insulation has been maintained. Record the Megger readings. Immediately investigate any significant drop in insulation resistance.
3. Check all electrical connectors to be sure that they are tight.

**Relubrication & Bearings** Bearing grease will lose its lubricating ability over time, not suddenly. The lubricating ability of a grease (over time) depends primarily on the type of grease, the size of the bearing, the speed at which the bearing operates and the severity of the operating conditions. Good results can be obtained if the following recommendations are used in your maintenance program.

**Type of Grease** A high grade ball or roller bearing grease should be used. Recommended grease for standard service conditions is **Polyrex EM (Exxon Mobil)**. Do not mix greases unless compatibility has been checked and verified.

Equivalent and compatible greases include:

Texaco Polystar, Rykon Premium #2, Pennzoil Pen 2 Lube and Chevron SRI.

**Relubrication Intervals** Recommended relubrication intervals are shown in Table 3-1. It is important to realize that the recommended intervals of Table 3-1 are based on average use.

Refer to additional information contained in Tables 3-2, 3-3 and 3-4.

**Table 3-1 Relubrication Intervals \***

NEMA / (IEC) Frame Size	Rated Speed - RPM					
	10000	6000	3600	1800	1200	900
Up to 210 incl. (132)	**	2700 Hrs.	5500 Hrs.	12000 Hrs.	18000 Hrs.	22000 Hrs.
Over 210 to 280 incl. (180)		**	3600 Hrs.	9500 Hrs.	15000 Hrs.	18000 Hrs.
Over 280 to 360 incl. (225)		**	* 2200 Hrs.	7400 Hrs.	12000 Hrs.	15000 Hrs.
Over 360 to 5800 incl. (300)		**	*2200 Hrs.	3500 Hrs.	7400 Hrs.	10500 Hrs.

\* Relubrication intervals are for ball bearings.

For vertically mounted motors and roller bearings, divide the relubrication interval by 2.

\*\* For motors operating at speeds greater than 3600 RPM, contact Baldor for relubrication recommendations.



**Table 3-2 Service Conditions**

Severity of Service	Hours per day of Operation	Ambient Temperature Maximum	Atmospheric Contamination
Standard	8	40° C	Clean, Little Corrosion
Severe	16 Plus	50° C	Moderate dirt, Corrosion
Extreme	16 Plus	>50° C* or Class H Insulation	Severe dirt, Abrasive dust, Corrosion, Heavy Shock or Vibration
Low Temperature		<-29° C **	

\* Special high temperature grease is recommended (Dow Corning DC44). Note that Dow Corning DC44 grease does not mix with other grease types. Thoroughly clean bearing & cavity before adding grease.

\*\* Special low temperature grease is recommended (Aeroshell 7).

**Table 3-3 Relubrication Interval Multiplier**

Severity of Service	Multiplier
Standard	1.0
Severe	0.5
Extreme	0.1
Low Temperature	1.0

Some motor designs use different bearings on each motor end. This is normally indicated on the motor nameplate. In this case, the larger bearing is installed on the motor Drive endplate. For best relubrication results, only use the appropriate amount of grease for each bearing size (not the same for both).

**Table 3-4 Bearings Sizes and Types**

Frame Size NEMA (IEC)	Bearing Description (These are the "Large" bearings (Shaft End) in each frame size)			
	Bearing	Weight of Grease to add * oz (Grams)	Volume of grease to be added	
			in <sup>3</sup>	teaspoon
56 to 140 (90)	6203	0.08 (2.4)	0.15	0.5
140 (90)	6205	0.15 (3.9)	0.2	0.8
180 (100-112)	6206	0.19 (5.0)	0.3	1.0
210 (132)	6307	0.30 (8.4)	0.6	2.0
250 (160)	6309	0.47 (12.5)	0.7	2.5
280 (180)	6311	0.61 (17)	1.2	3.9
320 (200)	6312	0.76 (20.1)	1.2	4.0
360 (225)	6313	0.81 (23)	1.5	5.2
400 (250)	6316	1.25 (33)	2.0	6.6
440 (280)	6319	2.12 (60)	4.1	13.4
5000 to 5800 (315-450)	6328	4.70 (130)	9.2	30.0
5000 to 5800 (315-450)	NU328	4.70 (130)	9.2	30.0
360 to 449 (225-280)	NU319	2.12 (60)	4.1	13.4
<b>AC Induction Servo</b>				
76 Frame 180 (112)	6207	0.22 (6.1)	0.44	1.4
77 Frame 210 (132)	6210	0.32 (9.0)	0.64	2.1
80 Frame 250(160)	6213	0.49 (14.0)	0.99	3.3

\* Weight in grams = .005 DB of grease to be added

Note: Not all bearing sizes are listed. For intermediate bearing sizes, use the grease volume for the next larger size bearing.

---

**Caution:** To avoid damage to motor bearings, grease must be kept free of dirt. For an extremely dirty environment, contact your Baldor distributor or an authorized Baldor Service Center for additional information.

**Relubrication Procedure** Be sure that the grease you are adding to the motor is compatible with the grease already in the motor. Consult your Baldor distributor or an authorized service center if a grease other than the recommended type is to be used.

**Caution:** Do not over-lubricate motor as this may cause premature bearing failure.

**With Grease Outlet Plug**

1. With the motor stopped, clean all grease fittings with a clean cloth.
2. Remove grease outlet plug.

**Caution:** Over-lubricating can cause excessive bearing temperatures, premature lubrication breakdown and bearing failure.

3. Add the recommended amount of grease.
4. Operate the motor for 15 minutes with grease plug removed.  
This allows excess grease to purge.
5. Re-install grease outlet plug.

**Without Grease Provisions**

**Note:** Only a Baldor authorized and UL or CSA certified service center can disassemble a UL/CSA listed explosion proof motor to maintain it's UL/CSA listing.

1. Disassemble the motor.
2. Add recommended amount of grease to bearing and bearing cavity. (Bearing should be about 1/3 full of grease and outboard bearing cavity should be about 1/2 full of grease.)
3. Assemble the motor.

**Sample Relubrication Determination**

Assume - NEMA 286T (IEC 180), 1750 RPM motor driving an exhaust fan in an ambient temperature of 43° C and the atmosphere is moderately corrosive.

1. Table 3-1 list 9500 hours for standard conditions.
2. Table 3-2 classifies severity of service as "Severe".
3. Table 3-4 shows that 1.2 in<sup>3</sup> or 3.9 teaspoon of grease is to be added.

Note: Smaller bearings in size category may require reduced amounts of grease.

**Table 3-5 Troubleshooting Chart**

<b>Symptom</b>	<b>Possible Causes</b>	<b>Possible Solutions</b>
Motor will not start	Usually caused by line trouble, such as, single phasing at the starter.	Check source of power. Check overloads, fuses, controls, etc.
Excessive humming	High Voltage.	Check input line connections.
	Eccentric air gap.	Have motor serviced at local Baldor service center.
Motor Over Heating	Overload. Compare actual amps (measured) with nameplate rating.	Locate and remove source of excessive friction in motor or load. Reduce load or replace with motor of greater capacity.
	Single Phasing.	Check current at all phases (should be approximately equal) to isolate and correct the problem.
	Improper ventilation.	Check external cooling fan to be sure air is moving properly across cooling fins. Excessive dirt build-up on motor. Clean motor.
	Unbalanced voltage.	Check voltage at all phases (should be approximately equal) to isolate and correct the problem.
	Rotor rubbing on stator.	Check air gap clearance and bearings. Tighten "Thru Bolts".
	Over voltage or under voltage.	Check input voltage at each phase to motor.
	Open stator winding.	Check stator resistance at all three phases for balance.
	Grounded winding.	Perform dielectric test and repair as required.
	Improper connections.	Inspect all electrical connections for proper termination, clearance, mechanical strength and electrical continuity. Refer to motor lead connection diagram.
	Bearing Over Heating	Misalignment.
Excessive belt tension.		Reduce belt tension to proper point for load.
Excessive end thrust.		Reduce the end thrust from driven machine.
Excessive grease in bearing.		Remove grease until cavity is approximately $\frac{3}{4}$ filled.
Insufficient grease in bearing.		Add grease until cavity is approximately $\frac{3}{4}$ filled.
Dirt in bearing.		Clean bearing cavity and bearing. Repack with correct grease until cavity is approximately $\frac{3}{4}$ filled.
Vibration	Misalignment.	Check and align motor and driven equipment.
	Rubbing between rotating parts and stationary parts.	Isolate and eliminate cause of rubbing.
	Rotor out of balance.	Have rotor balance checked and repaired at your Baldor Service Center.
	Resonance.	Tune system or contact your Baldor Service Center for assistance.
Noise	Foreign material in air gap or ventilation openings.	Remove rotor and foreign material. Reinstall rotor. Check insulation integrity. Clean ventilation openings.
Growling or whining	Bad bearing.	Replace bearing. Clean all grease from cavity and new bearing. Repack with correct grease until cavity is approximately $\frac{3}{4}$ filled.

**Suggested bearing and winding RTD setting guidelines**

Most large frame AC Baldor motors with a 1.15 service factor are designed to operate below a Class B (80°C) temperature rise at rated load and are built with a Class H winding insulation system. Based on this low temperature rise, RTD (Resistance Temperature Detectors) settings for Class B rise should be used as a starting point. Some motors with 1.0 service factor have Class F temperature rise.

The following tables show the suggested alarm and trip settings for RTDs. Proper bearing and winding RTD alarm and trip settings should be selected based on these tables unless otherwise specified for specific applications.

If the driven load is found to operate well below the initial temperature settings under normal conditions, the alarm and trip settings may be reduced so that an abnormal machine load will be identified.

The temperature limits are based on the installation of the winding RTDs imbedded in the winding as specified by NEMA. Bearing RTDs should be installed so they are in contact with the outer race on ball or roller bearings or in direct contact with the sleeve bearing shell.

**Winding RTDs – Temperature Limit In °C (40°C Maximum Ambient)**

Motor Load	Class B Temp Rise ≤ 80°C (Typical Design)		Class F Temp Rise ≤ 105°C		Class H Temp Rise ≤ 125°C	
	Alarm	Trip	Alarm	Trip	Alarm	Trip
≤ Rated Load	130	140	155	165	175	185
Rated Load to 1.15 S.F.	140	150	160	165	180	185

Note: • Winding RTDs are factory production installed, not from Mod-Express.  
• When Class H temperatures are used, consider bearing temperatures and relubrication requirements.

**Bearing RTDs – Temperature Limit In °C (40°C Maximum Ambient)**

Bearing Type Oil or Grease	Anti-Friction		Sleeve	
	Alarm	Trip	Alarm	Trip
Standard*	95	100	85	95
High Temperature**	110	115	105	110

Note: \* Bearing temperature limits are for standard design motors operating at Class B temperature rise.  
\*\* High temperature lubricants include some special synthetic oils and greases.

Greases that may be substituted that are compatible with Polyrex EM (but considered as “standard” lubricants) include the following:

- Texaco Polystar
- Mobilith SHC-100
- Darmex 707
- Rykon Premium #2
- Pennzoil Pennzlube EM-2
- Darmex 711
- Chevron SRI #2
- Chevron Black Pearl
- Petro-Canada Peerless LLG

See the motor nameplate for replacement grease or oil recommendation.  
Contact Baldor application engineering for special lubricants or further clarifications.







\* 4 0 0 - 0 2 0 9 \*




**BALDOR ELECTRIC COMPANY**  
**World Headquarters**  
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**(479) 646-4711 Fax (479) 648-5792**  
**[www.baldor.com](http://www.baldor.com)**

SPRAY BAR PROXIMITY SENSOR  
(2x) NAMUR NG5003

APPENDIX INFORMATION



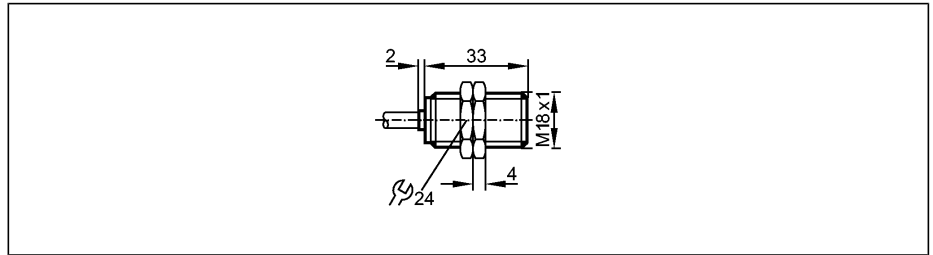
Inductive sensors  
NAMUR EN 60947-5-6 

**NG5003**

IG-2008-N/1D/2G  
Inductive sensor  
Plastic thread M18 x 1  
Cable

ATEX approval  
Group II, category 1D  
Group II, category 1G/2G

Sensing range 8mm [nf]  
non-flush mountable









Made in Germany

**Electrical design**  
**Output**

Nominal voltage	[V]
Supply voltage	[V]
Current rating	[mA]
Current consumption	[mA]
Internal capacitance	[nF]
Internal inductance	[µH]
Real sensing range (Sr)	[mm]
Switch-point drift	[% of Sr]
Hysteresis	[% of Sr]
Switching frequency	[Hz]
Correction factors	
Ambient temperature	[°C]
Protection	
Shock / vibration resistance	
EMC	
Approval	
Marking of the unit	
Housing materials	
Connection	
Weight	[kg]
Remarks	
Accessories (included)	

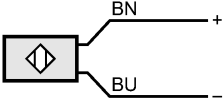
**Connection to certified intrinsically safe circuits with the max. values U = 15 V / I = 50 mA / P = 120 mW normally closed**

	8.2 DC (1kΩ)
	7.5...30 DC when used outside the hazardous area
	< 30 when used outside the hazardous area
	< 1 *)
	< 155
	< 50
	8 ± 10 %
	-10...10
	1...15
	300
	mild steel = 1 / stainless steel approx. 0.7 / brass approx. 0.5 / Al approx. 0.4 / Cu approx. 0.3
	-20...80
	IP 67, II
	30g (11 ms) / 10-55 Hz (1 mm)
	EN 60947-5-6
	PTB 01 ATEX 2191 BVS 04 ATEX E153 TIIS TC16108
	 II 1D Ex iaD 20 T 90°C Ta: -20...70°C  II 1D Ex iaD 20 T 100°C Ta: -20...80°C  II 1G Ex ia IIB T6 Ta: -20...55°C  II 1G Ex ia IIB T5 Ta: -20...65°C  II 2G Ex ia IIC T6 Ta: -20...70°C  II 2G Ex ia IIC T5 Ta: -20...80°C
	PBT
	PVC cable / 2 m; 2 x 0.5 mm <sup>2</sup>
	0.148
	*) damped; (> 2.1 mA undamped)
	2 lock nuts

**NG5003**

**Wiring**

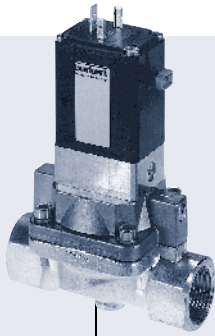
Core colors  
BN brown  
BU blue



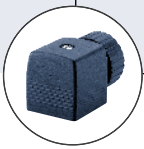
SOLENOID VALVE  
(4x) BUERKERT 5282 1”

APPENDIX INFORMATION

## 2/2-way Solenoid Valve with servo diaphragm



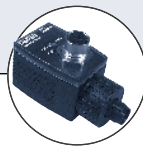
Type 5282 can be combined with...



**Type 2508**  
Cable plug







**Type 1078**  
Timer unit



**Type 2511**  
ASI cable plug



**Type 8600**  
Dosing control

- Pivoted armature pilot drive with emergency manual operation
- Media separated
- Circuit function can be modified
- Adjustable switching times (waterhammer-free)
- Threaded port or flange connections
- Approvals:     

The Type 5282 is a pilot-controlled normally closed solenoid valve with a servo-diaphragm, media separated, for universal use with liquid and gaseous media corresponding to the material resistance. As standard, the 3-way pivoted armature pilot drive has an emergency manual operation. The closing and opening times are continuously adjustable.

Power consumption		
Inrush	Hold	
AC [VA]	AC [VA/W]	DC [W]
24	14/8	8

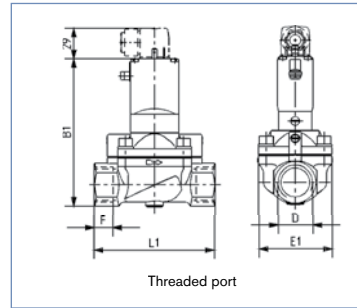
A differential pressure of 7 PSI (0.5 bar) is required to open the full orifice. The response times can be changed by turning the restrictor screws (in the body cover).

Technical data	
<b>Orifice</b>	1/2" - 2" (DN 13 - 65 mm)
<b>Body material</b>	
Threaded port	Brass, stainless steel 1.4581
Flange	Stainless steel 1.4541
<b>Seal material</b>	NBR, FKM, EPDM (on request)
<b>Media</b>	
NBR	Neutral media, such as compressed air, water, hydraulic oil Oil and fat-free media, incl. alkalis, hot water Hot air, oxygen, per-solutions, hot oil
EPDM	
FKM	
<b>Media temperature</b>	
NBR	14°F to 194°F (-10°C to +90°C)
EPDM	-22°F to 194°F (-30°C to +90°C)
FKM	32°F to 194°F (0°C to +90°C)
<b>Ambient temperature</b>	Max. 131°F (+55°C)
<b>Voltage tolerance</b>	±10%
<b>Duty cycle</b>	100% continuous rating
<b>Electrical connection</b>	Tag connector acc. DIN 43650 Form A for cable plug Type 2508
<b>Protection class</b>	IP 65 with cable plug
<b>Installation</b>	As required, preferably with actuator upright

\* See our HazEx™ guide for ATEX and for FM Class 1, Div. 1 versions

**Solenoid valve dimensions**

Dimensions [mm]								
Threaded port						Flange port		
DN	D	B1	E1	F	L1	B2	G	L2
13	NPT 1/2	123.0	40	14	65	-	-	-
20	NPT 3/4	131.0	60	16	100	-	-	-
25	NPT 1	141.0	70	18	115	184.5	120	160
32	NPT 1 1/4	147.0	85	20	126	192.0	140	180
40	NPT 1 1/2	156.0	85	22	126	201.0	150	200
50	NPT 2	177.5	115	24	164	225.0	165	230
65	NPT 2 1/2	185.0	115	27	180	-	-	-



Threaded port

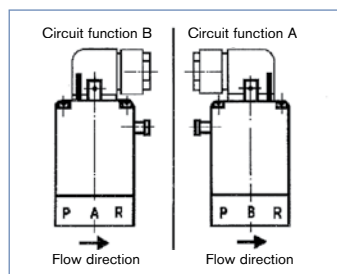
**Ordering chart for valves** (other versions on request) UL recognized / CSA/ CE  
Manual override, supplied without cable plug, different seal materials on request

Circuit function	Orifice [mm]	Port connection [NPT]	Cv value water [GPM]	Nominal pressure [psi]	Voltage/frequency [V/Hz]	Item no. Seal material NBR Seal Brass Body	Item no. Seal material FKM Seal Stainless Steel Body
<b>A</b> 2/2-way valve, NC 	13.0 (Brass) 20.0 (Stainless steel)	NPT 1/2	4.7	2.8 - 145	024/DC	456 890	456 914
					024/50-60	456 891	456 915
					120/50-60	456 892	456 916
					240/50-60	456 893	456 917
or <b>B</b> 2/2-way valve, NO 	20.0	NPT 3/4	5.8	2.8 - 145	024/DC	456 894	456 918
					024/50-60	456 895	456 919
					120/50-60	456 896	456 920
					240/50-60	456 897	456 921
	25.0	NPT 1	11.7	2.8 - 145	024/DC	456 898	456 922
					024/50-60	456 899	456 923
					120/50-60	456 900	456 924
					240/50-60	456 901	456 925
	32.0	NPT 1 1/4	23.5	2.8 - 145	024/DC	456 902	456 926
					024/50-60	456 903	456 927
					120/50-60	456 904	456 928
					240/50-60	456 905	456 929
	40.0	NPT 1 1/2	23.5	2.8 - 145	024/DC	456 906	456 930
					024/50-60	456 907	456 931
					120/50-60	456 908	56 932
					240/50-60	456 909	456 933
50.0	NPT 2	47.0	2.8 - 145	024/DC	456 910	456 934	
				024/50-60	456 911	456 935	
				120/50-60	456 912	456 936	
				240/50-60	456 913	456 937	

Delivered as circuit function A  
Change to the circuit function B by turning the pilot drive through 180°

**Mounting instructions:**

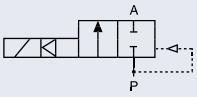
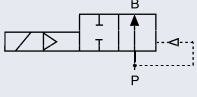
Arrangement of the pilot control



**Solenoid valve ordering chart**

**Ordering chart for valves** (other versions on request) UL listed / FM class / Division 2 / CSA / CE

Manual override, supplied with cable plug type 2509, different seal materials on request

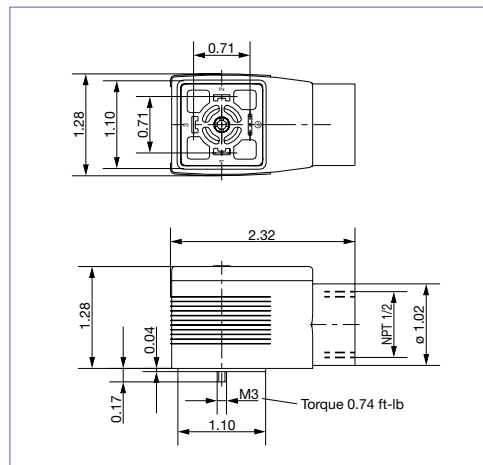
Circuit function	Orifice [mm]	Port connection [NPT]	Cv value water [GPM]	Pressure range [psi]	Voltage/frequency [V/Hz]	Item no. Threaded port NBR Brass	Item no. Threaded port FKM Stainless Steel
<b>A</b> 2/2-way valve NC 	13.0 (Brass)	NPT 1/2	4.7	2.8 - 145	024/DC	457 870	457 894
					024/50-60	457 871	457 895
	20.0 (Stainless steel)	NPT 3/4	5.8	2.8 - 145	120/50-60	457 872	457 896
					240/50-60	457 873	457 897
or  <b>B</b> 2/2-way valve NO 	20.0	NPT 3/4	5.8	2.8 - 145	024/DC	457 874	457 898
					024/50-60	457 875	457 899
					120/50-60	457 876	457 900
					240/50-60	457 877	457 901
	25.0	NPT 1	11.7	2.8 - 145	024/DC	457 878	457 902
					024/50-60	457 879	457 903
					120/50-60	457 880	457 904
					240/50-60	457 881	457 905
	32.0	NPT 1 1/4	23.5	2.8 - 145	024/DC	457 882	457 906
					024/50-60	457 883	457 907
					120/50-60	457 884	457 908
					240/50-60	457 885	457 909
	40.0	NPT 1 1/2	23.5	2.8 - 145	024/DC	457 886	457 910
					024/50-60	457 887	457 911
					120/50-60	457 888	457 912
					240/50-60	457 889	457 913
50.0	NPT 2	47.0	2.8 - 145	024/DC	457 890	457 914	
				024/50-60	457 891	457 915	
				120/50-60	457 892	457 916	
				240/50-60	457 893	457 917	

Delivered as circuit function A

Change to circuit function B by turning the pilot drive through 180°.

**NOTE:** All UL listed valves include type 2509 1/2" conduit cable plug

**Type 2509 Dimensions [mm]**

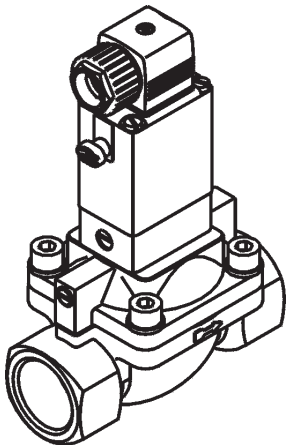


DTS 1000082431 EN Version: - Status: RL (released | freigegeben | validé) printed: 13.08.2008



# Type 5282


2/2-way solenoid valve with servomembrane




**bürkert**  
Fluid Control Systems

**Sicherheit** (D)

**Bestimmungsgemäße Verwendung**

 Bitte beachten Sie die Hinweise dieser Betriebsanleitung sowie die Einsatzbedingungen und zulässigen Daten gemäß Datenblatt Typ 5282, damit das Gerät einwandfrei funktioniert und lange einsetzbar bleibt. Bei Nichtbeachtung dieser Hinweise sowie bei unzulässigen Eingriffen in das Gerät entfällt jegliche Haftung unsererseits, ebenso erlischt die Garantie auf Geräte u. Zubehörteile! Das Gerät dient ausschließlich als 2/2-Wege-Magnetventil für die lt. Datenblatt zulässigen Medien. Eine andere oder darüber hinausgehende Benutzung gilt als **nicht bestimmungsgemäß**. Für hieraus resultierende Schäden haftet Bürkert nicht. Das Risiko trägt allein der Anwender.

 **ACHTUNG!**


- Halten Sie sich bei Einsatzplanung und Betrieb des Gerätes an die einschlägigen allgemein anerkannten sicherheitstechnischen Regeln.
- Treffen Sie geeignete Maßnahmen, um unbeabsichtigtes Betätigen oder unzulässige Beeinträchtigungen auszuschließen.
- Beachten Sie, daß in Systemen, die unter Druck stehen, Leitungen und Ventile nicht gelöst werden dürfen. Schalten Sie vor Eingriffen in das System in jedem Fall die Spannung ab!
- Achten Sie auf den einwandfreien Sitz der Dichtung beim Verschrauben der Spule mit der Gerätesteckdose.
- Verstellen Sie auf keinen Fall die mit roter Farbe gesicherten Schrauben!
- Bei Ausführungen mit Explosionsschutz sind zusätzlich die Angaben der Konformitätsbescheinigung PTB Nr. Ex-89.C.1041 zu beachten.


**Warnung!**

- Verletzungsgefahr! Bei Dauerbetrieb kann die Spule sehr heiß werden.

**Safety** (GB)

**Proper Usage**

 To ensure the proper function of the device and promote long service life, you must comply with the information in these Operating Instructions and the application conditions and specifications provided in the Type 5282 Data Sheet. Usage of the device in a manner that is contrary to these Operating Instructions or the application conditions and specifications provided in the Type 5282 Data Sheet is improper and will void your warranty. This device serves exclusively as a 2/2-way solenoid valve for the media stated to be permissible on the data sheet. Any other use is considered improper use. **Bürkert will not be responsible for any improper use of the device.**

 **ATTENTION!**

- Be sure to observe generally accepted safety rules when planning, installing and using this device. For example, take suitable measures to prevent unintentional operations of the device.
- Do not impair the operation of the device.
- Do not attempt to detach or unscrew any lines or valves in the system that are under pressure, and always be sure to switch off the voltage supply before working on the system.
- When attaching the coil to the plug socket, be sure the seal is properly seated.
- Never adjust the screws which are sealed with red paint, for any reason!
- For explosion-proof models, data from the conformity certificate PTB No. Ex-89.C.1041 must also be complied with!


**WARNING!**


- Do not touch the coil during use as it becomes very hot.



**Sécurité** (F)

**Utilisation conforme aux prescriptions**

 Afin que l'appareil puisse fonctionner parfaitement pendant longtemps, veuillez observer les instructions contenues dans cette notice d'utilisation ainsi que les conditions d'utilisation et les données admissibles mentionnées dans la fiche technique du type 5282. En cas d'observation de ces instructions et d'interventions non autorisées dans l'appareil, nous déclinons toute responsabilité et la garantie couvrant l'appareil et les accessoires s'éteint! L'appareil sert uniquement d'électrovanne 2/2 voies pour les fluides admis selon la fiche technique. Une autre utilisation ou une utilisation excédant ce contexte sera considérée comme **non conforme aux prescriptions**. Pour les dommages qui en résulteraient, le fabricant/fournisseur décline toute responsabilité. L'utilisateur seul en assume le risque.

 **ATTENTION!**


- Pour la planification de l'utilisation et l'exploitation de l'appareil, veuillez vous en tenir aux règles applicables et généralement reconnues en matière de technique de sécurité.
- Prenez les mesures nécessaires pour exclure tout actionnement involontaire ou des altérations inadmissibles.
- Notez qu'il n'est pas permis de desserrer des conduites ou des vannes se trouvant sous pression dans des systèmes! Avant d'intervenir dans le système, coupez l'alimentation électrique dans tous les cas!
- Veillez à ce que le joint repose parfaitement lorsque vous viserez la bobine avec le connecteur.
- Ne déréglez en aucun cas les vis assurées avec de la peinture rouge!
- Dans les exécutions antidéflagrantes, les indications de l'attestation de conformité PTB N° Ex-89.C.104, doivent être observées en plus.


**AVERTISSEMENT!**

- Risque de blessure! En cas de fonctionnement permanent, la bobine peut devenir très chaude.

**Seguridad** (E)

**Utilización con arreglo a las disposiciones**

 Se ruega observar las indicaciones contenidas en este Manual de instrucciones así como las condiciones de uso y datos admisibles con arreglo a la hoja de servicio Tipo 5282, de modo que el aparato funcione impecablemente y permanezca durante largo tiempo apto para el empleo. La inobservancia de estas indicaciones así como las intervenciones inadmisibles en el aparato suponen la declinación por nuestra parte de toda clase de responsabilidad, además de la extinción de la garantía de los aparatos y de las piezas de los accesorios. El aparato sirve exclusivamente como válvula magnética de 2/2 pasos para los medios autorizados según la hoja de datos. Cualquier otra utilización que vaya más allá **no será conforme a las disposiciones**. El fabricante / suministrador no es responsable de los daños que de ello pudieran resultar. El riesgo corresponde únicamente al usuario.

 **ATENCIÓN!**




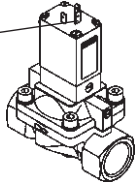
- Para la planificación y operación del aparato atenerse a las correspondientes reglas generales y reconocidas de la técnica de seguridad.
- Tomar las medidas apropiadas para excluir accionamientos no intencionados o perjuicios inadmisibles; prestar atención a que en el caso de sistemas que se encuentren bajo presión no deben desconectarse conducciones y válvulas.
- Antes de proceder a intervenciones en el sistema desconectar siempre la tensión.
- Prestar atención al asiento impecable de la empaquetadura al atornillar la válvula con la caja de enchufe para aparatos eléctricos.
- En ningún caso desajustar los tornillos asegurados con color rojo!
- En las ejecuciones con protección debe tenerse adicionalmente en cuenta los datos de la declaración de conformidad PTB n° Ex-89.C.104.

**¡AVISO!**



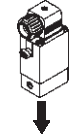
- ¡Peligro de lesiones! En estado de operación continua la bobina puede ponerse muy caliente.



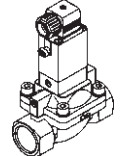
**Safety** (D, GB, F, E)

**① Voltage-free assembly**

 →  →  

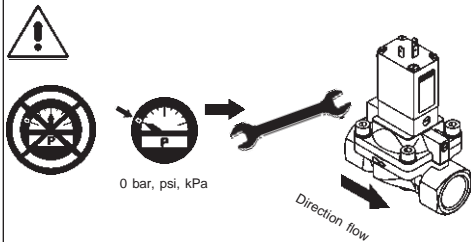
**② Electrical connection**

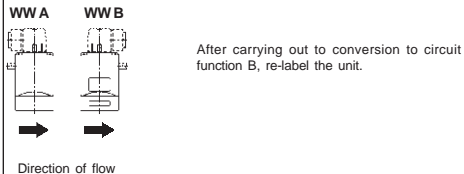
  

### Safety

③ Fluid connection



④ Conversion from Function A to Function B



### Technical Data

Temperature

Messing/brass

Sealing material	Temp. Medium
NBR	0 ... +80 °C
EPDM	-30 ... +90 °C
FPM	-10 ... +50 °C

Nominal size

Circuit function

Type

Example

**burkert**  
MADE IN GERMANY

5282 A 13,0 FPM MS  
PN 0,2 -10 bar  
24V 50-60Hz 8W  
450000Y W14UN

Id. No.

Voltage (±10 %) - Frequency - Power  
Nominal pressure

A

B

We reserve the right to make technical changes without notice

### Technische Daten

### Caractéristiques techniques / Datos técnicos

Température d' ambiante / Temperatura de ambiente

Boîtier/Caja / Laiton/Latón / Acier fin/Acero inoxidable

Matériau d'étanchéité / Material de estanqueidad	Temp. Fluide/Medio
NBR	0 ... +80 °C
EPDM	-30 ... +90 °C
FPM	-10 ... +50 °C

Dimension nominale / Anchura nominal

Fonctionnement / Funcionamiento

Type/Typo

Exemple/ Ejemplo

**burkert**  
MADE IN GERMANY

5282 A 13,0 FPM MS  
PN 0,2 -10 bar  
24V 50-60Hz 8W  
450000Y W14UN

N° id. / N° de pedido

Tension (±10%) - fréquence - puissance / Tensión (±10 %) - frecuencia - potencia

Pression nominale/Presión nominal

A

B

Sous réserve de modification techniques. / Nos reservamos el derecho de llevar a cabo modificaciones técnicas sin previo aviso.

## Branch Offices

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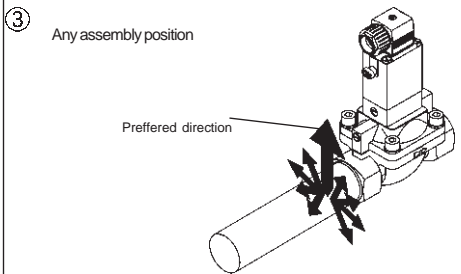
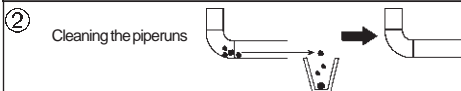
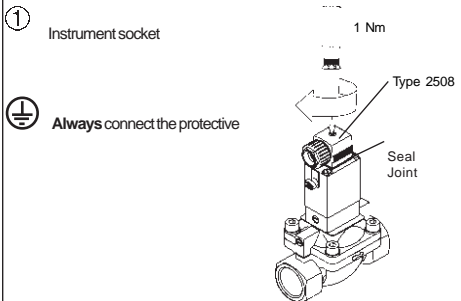
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<b>F</b>	Ph. (01) 48 10 31 10	Fax (01) 48 91 90 93
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<b>I</b>	Ph. (02) 95 90 71	Fax (02) 95 90 72 51
<b>IRE</b>	Ph. (021) 86 13 36	Fax (021) 86 13 37
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<b>KOR</b>	Ph. (02) 34 62 55 92	Fax (02) 34 62 55 94
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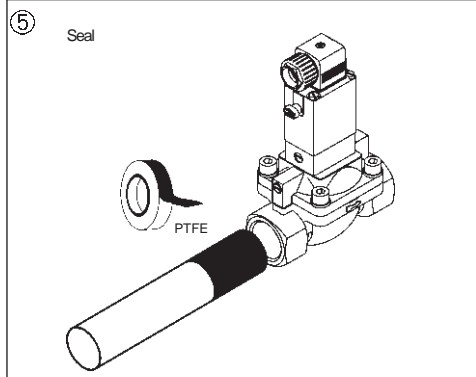
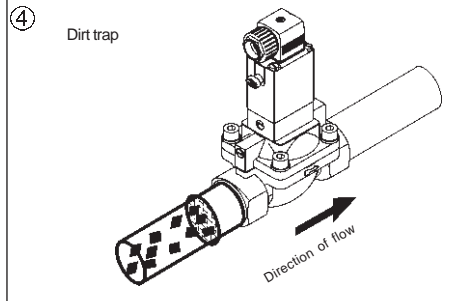
(D) (GB) (F) (E)

## Assembly



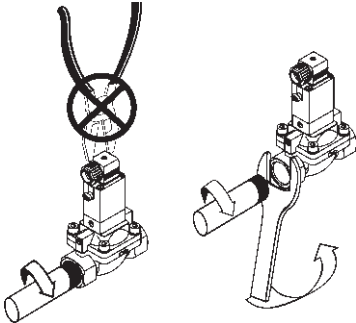
(D) (GB) (F) (E)

## Assembly



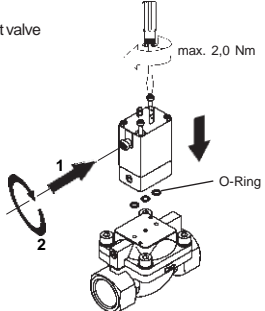
### Assembly

⑥ Screwing in the pipe connections



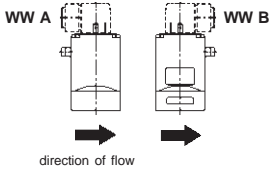
⑦ Assembly of pilot valve

Manual locking

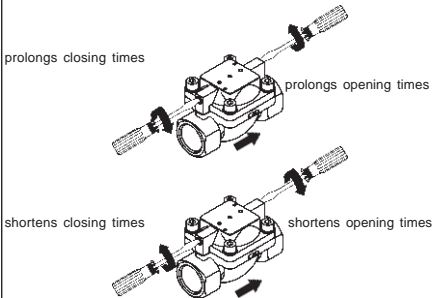


### Assembly

⑧ Configuration of the pilot control



⑧ Opening and closing times



Do not move screws that are locked with red paint!

### Troubleshooting

☞ Check the voltage!



☞ Check the pressure!



bar, psi, kPa

☞ Check the piperun!



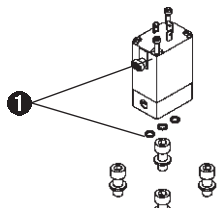
Spare parts

1

(D)

(GB)

Set of pilot controls



(F)

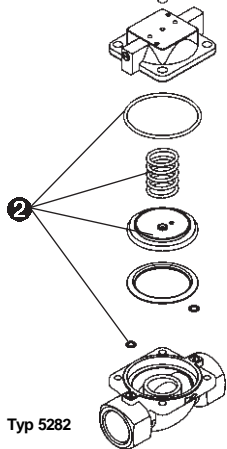
(E)

2

(D)

(GB)

Set of Wearing Parts



Typ 5282

(F)

(E)

Spare parts

1 Set of pilot controls

Sealing material	Voltage	Order no.	
NBR	24 V/DC	138 109 A	138 117 R
NBR	24 V/56 Hz	138 112 L	138 114 N
NBR	110 V/56 Hz	138 111 K	138 115 P
NBR	230 V/56 Hz	138 110 W	138 116 Q
FPM	24 V/DC	138 120 Y	138 129 V
FPM	24 V/56 Hz	138 122 N	138 124 Q
FPM	110 V/56 Hz	138 123 P	138 126 J
FPM	230 V/56 Hz	138 118 S	138 125 R
EPDM	24 V/DC	138 100 D	138 106 X
EPDM	24 V/56 Hz	138 095 P	138 104 V
EPDM	110 V/56 Hz	138 096 Q	138 103 U
EPDM	230 V/56 Hz	138 097 R	138 101 S

1 Set of pilot controls

NBR	24 V/DC	138 109 A	-
NBR	24 V/56 Hz	138 112 L	-
NBR	110 V/56 Hz	138 109 H	-
NBR	110 V/56 Hz	138 111 K	-
NBR	200 V/56 Hz	138 107 T	-
NBR	230 V/56 Hz	138 110 W	-
FPM	24 V/DC	-	138 129 V
FPM	24 V/56 Hz	-	138 124 Q
FPM	110 V/56 Hz	-	138 128 U
FPM	110 V/56 Hz	-	138 126 J
FPM	200 V/56 Hz	-	138 127 K
FPM	230 V/56 Hz	-	138 125 R

2 Set of Wearing Parts

DN \ Sealing material	Sealing material	Order no.	
13	NBR	624 031 M	-
13	FPM	624 032 N	-
13	EPDM	624 033 P	-
20	NBR	624 034 Q	624 037 K
20	FPM	624 035 R	624 038 U
20	EPDM	624 036 J	624 039 V
25	NBR	624 040 A	624 043 Z
25	FPM	624 041 X	624 044 S
25	EPDM	624 042 Y	624 045 T
32, 40	NBR	624 046 U	624 049 F
32, 40	FPM	624 047 V	624 050 C
32, 40	EPDM	624 048 E	624 051 Z
50, 65	NBR	624 052 S	624 055 V
50, 65	FPM	624 053 T	624 056 W
50, 65	EPDM	624 054 U	624 057 X

SPRAY BAR NOZZLES

LECHLER SERIES 632

APPENDIX INFORMATION



# Flat fan nozzles

- Belt cleaning
- Coating
- Steam cleaning
- Degreasing
- High pressure cleaning
- Gravel washing
- Cooling
- Surface treatment
- Phosphating
- Rain curtains
- Foam control
- Foam spraying
- Lubrication
- Filter cleaning
- Spray cleaning
- Washing processes
- and many others...



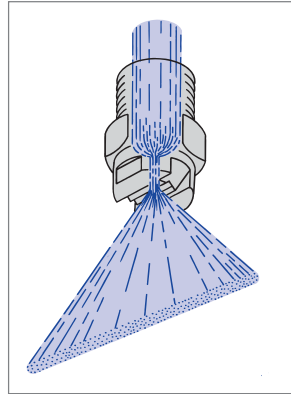
## Flat fan nozzles

Lechler flat fan nozzles stand for uniform liquid distribution and jet pressures. Particularly powerful jets are generated with spray angles up to 60°. Nozzles with small flow rates are especially suited for humidifying and spraying in general. The flow geometry of the nozzle allows to produce accurate, compact jets, available with different liquid distribution patterns.

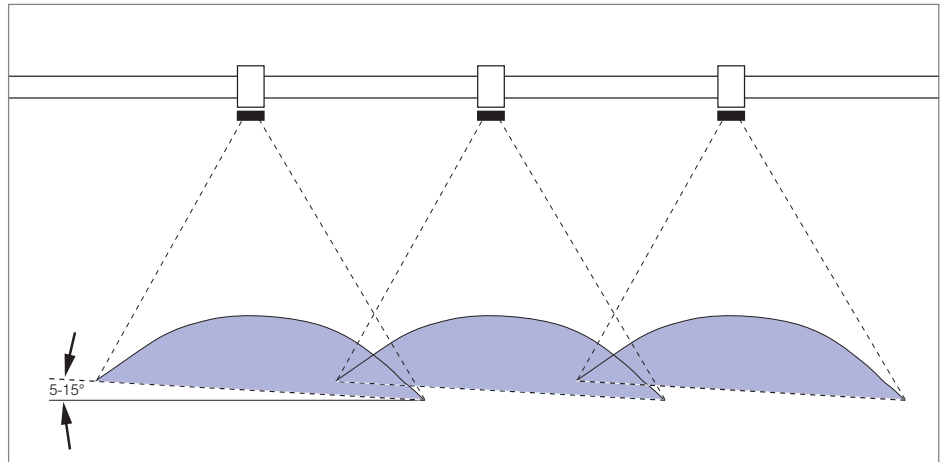
Basically, Lechler flat fan nozzles are designed for parabolic liquid distribution. Unaffected by transient pressures, they are suited for universal application. Their performance data are exactly defined. Operational values, such as flow rates, spray width, jet thickness and liquid distribution are readily available for a great variety of feed pressures. There are also special-design nozzles with rectangular or trapezoidal distribution of liquid.

Simple and cost-saving fixing attachments, as for instance dove-tail guides and eyelet clamps, considerably facilitate assembling and aligning of the nozzles.

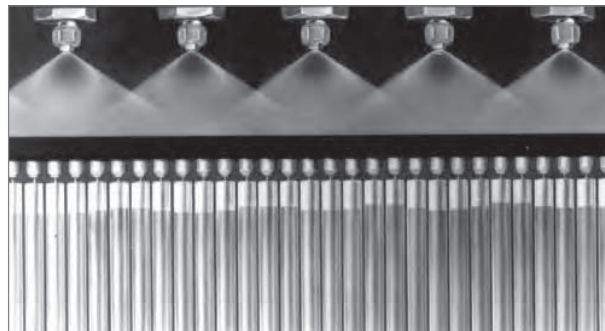
For all cleaning operations, in steelmaking and in many other fields of surface treatment, in short, wherever powerful, uniform water jets are required, Lechler flat fan nozzles constitute a decisive basis for achieving reliable process results.



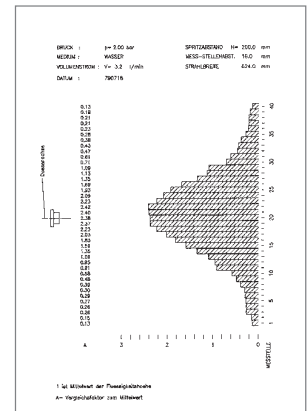
The **tongue-type nozzle** design represents a special kind of flat fan nozzle. With this nozzle type, the flat fan spray pattern is produced by a solid stream, impinging upon and deflecting from an outside deflector plate. As a result, a powerful, sharply delimited flat jet is shaped. The deflector plate has the form of a tongue, which determines the spray angle formation. Due to large free cross-sections, tongue-type nozzles are particularly clog-proof.



Arrangement of nozzles



Total liquid distribution



Liquid distribution single nozzle





## Flat fan nozzles

### Series 632



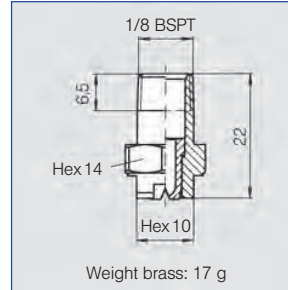
**Standard design with conical, self-sealing thread connection. Stable spray angle. Uniform, parabolical distribution of liquid. Spray pipes equipped with these nozzles show an extremely uniform total distribution of liquid.**

Applications:

Spray cleaning, surface treatment, filter cleaning, belt cleaning, lubricating, coating.



PVDF





# Flat fan nozzles

## Series 632



Spray angle	Ordering no.						A Ø [mm]	E Ø [mm]	V̇ [l/min]							Spray width B at p = 2 bar	
	Type	Material-no.				Code			p [bar]								
		16	17	30	5E				[US gal./min] at 40 psi								
		1.4305/303 SS	1.4571/316 SS	Brass	PVDF				1/8 BSPT	1/4 BSPT	0,5	1,0	2,0	3,0	5,0		
60°	632. 304	○	○	○	○	CA CC	0,70	0,40	0,16*	0,23*	0,32	0,10	0,39	0,51	0,72	215	425
	632. 334	○	○	○	○	CA CC	0,90	0,50	0,22*	0,32*	0,45	0,14	0,55	0,71	1,01	220	440
	632. 364	○	○	○	○	CA CC	1,00	0,60	0,31*	0,44*	0,63	0,20	0,77	1,00	1,40	230	460
	632. 404	○	○	○	○	CA CC	1,20	0,80	0,50*	0,71	1,00	0,31	1,23	1,58	2,24	245	485
	632. 444	○	○	○	○	CA CC	1,35	0,90	0,62*	0,88	1,25	0,39	1,53	1,98	2,80	255	495
	632. 484	○	○	○	○	CA CC	1,50	1,00	0,80*	1,13	1,60	0,50	1,96	2,53	3,58	260	510
	632. 514	○	○	○	○	CA CC	1,65	1,10	0,95*	1,34	1,90	0,59	2,33	3,00	4,25	270	520
	632. 564	○	○	○	○	CA CC	2,00	1,30	1,25	1,77	2,50	0,78	3,06	3,95	5,59	280	535
	632. 604	○	○	○	○	CA CC	2,20	1,50	1,58	2,23	3,15	0,98	3,86	4,98	7,04	290	550
	632. 644	○	○	○	-	CC	2,50	1,60	2,00	2,83	4,00	1,24	4,90	6,33	8,94	295	565
	632. 674	○	○	○	-	CC	2,70	1,80	2,38	3,36	4,75	1,47	5,82	7,51	10,62	300	575
	632. 724	○	○	○	-	CC	3,00	2,10	3,15	4,46	6,30	1,95	7,72	9,96	14,09	305	590
	632. 764	○	○	○	-	CC	3,50	2,30	4,00	5,66	8,00	2,48	9,80	12,65	17,89	310	595
	632. 804	○	-	○	-	CC	4,00	2,60	5,00	7,07	10,00	3,10	12,25	15,81	22,36	310	595
	632. 844	○	-	○	-	CC	4,50	3,00	6,25	8,84	12,50	3,88	15,31	19,76	27,95	310	590
632. 884	○	-	○	-	CC	5,00	3,40	8,00	11,31	16,00	4,96	19,60	25,30	35,78	300	570	
632. 944	-	-	○	-	CC	5,70	4,40	11,20	15,84	22,40	6,95	27,43	35,42	50,09	300	570	
75°	632. 145	○	-	○	-	CA CC	0,16	0,30	-	0,04*	0,05	0,02	0,06	0,08	0,11	280	550
	632. 165	○	-	○	-	CA CC	0,20	0,34	-	0,05*	0,07	0,02	0,08	0,10	0,15	290	560
	632. 185	○	-	○	-	CA CC	0,35	0,20	-	0,06*	0,08*	0,02	0,10	0,13	0,18	300	575
	632. 215	○	-	○	-	CA CC	0,40	0,20	-	0,08*	0,11	0,03	0,14	0,18	0,25	300	580
	632. 245	○	-	○	-	CA CC	0,50	0,30	-	0,12*	0,16*	0,05	0,20	0,26	0,36	310	585
	632. 275	○	-	○	-	CA CC	0,60	0,30	0,11*	0,16*	0,22	0,07	0,27	0,35	0,49	310	590
90°	632. 216	○	-	○	-	CA CC	0,40	0,20	-	0,08*	0,11*	0,03	0,14	0,18	0,25	370	700
	632. 276	○	-	○	-	CA CC	0,60	0,30	0,11*	0,16*	0,22	0,07	0,27	0,35	0,49	375	720
	632. 306	○	○	○	○	CA CC	0,70	0,40	0,16*	0,23*	0,32	0,10	0,39	0,51	0,72	380	740
	632. 336	○	○	○	○	CA CC	0,90	0,50	0,22*	0,32*	0,45	0,14	0,55	0,71	1,01	415	800
	632. 366	○	○	○	○	CA CC	1,00	0,50	0,31*	0,44*	0,63	0,20	0,77	1,00	1,41	420	810
	632. 406	○	○	○	○	CA CC	1,20	0,70	0,50*	0,71	1,00	0,31	1,23	1,58	2,24	430	820
	632. 446	○	○	○	○	CA CC	1,35	0,80	0,62*	0,88	1,25	0,39	1,53	1,98	2,80	435	830
	632. 486	○	○	○	○	CA CC	1,50	0,80	0,80*	1,13	1,60	0,50	1,96	2,53	3,58	440	835
	632. 516	○	○	○	○	CA CC	1,65	0,90	0,95*	1,34	1,90	0,59	2,33	3,00	4,25	440	840
	632. 566	○	○	○	○	CA CC	2,00	1,10	1,25	1,77	2,50	0,78	3,06	3,95	5,59	445	850
	632. 606	○	○	○	○	CA CC	2,20	1,20	1,58	2,23	3,15	0,98	3,86	4,98	7,04	450	860
	632. 646	○	○	○	-	CC	2,50	1,30	2,00	2,83	4,00	1,24	4,90	6,33	8,94	455	865
	632. 676	○	○	○	-	CC	2,70	1,40	2,38	3,36	4,75	1,47	5,82	7,51	10,62	465	875
	632. 726	○	○	○	-	CC	3,00	1,70	3,15	4,46	6,30	1,95	7,72	9,96	14,09	470	885
	632. 766	○	○	○	-	CC	3,50	1,90	4,00	5,66	8,00	2,48	9,80	12,65	17,89	475	890
632. 806	○	-	○	-	CC	4,00	2,40	5,00	7,07	10,00	3,10	12,25	15,81	22,36	480	900	
632. 886	○	-	○	-	CC	5,00	3,10	8,00	11,31	16,00	4,96	19,60	25,30	35,78	480	910	

A = Equivalent bore diameter · E = narrowest free cross section  
 \*Differing spray pattern  
 Subject to technical modifications.

Continued on next page.

<b>Example</b>	<b>Type</b>	<b>+</b>	<b>Material no.</b>	<b>+</b>	<b>Code</b>	<b>=</b>	<b>Ordering no.</b>
for ordering:	632. 304.	+	16	+	CA	=	632. 304. 16. CA

The folded page at the end of the catalogue will give you a survey on the various assembly possibilities. For complete assembly accessories, please refer to „Accessories“.

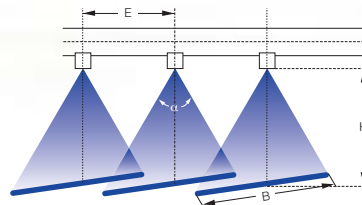
Conversion formula for the above series:  $\dot{V}_2 = \dot{V}_1 \cdot \sqrt{\frac{p_2}{p_1}}$



## Examples for nozzle arrangement.

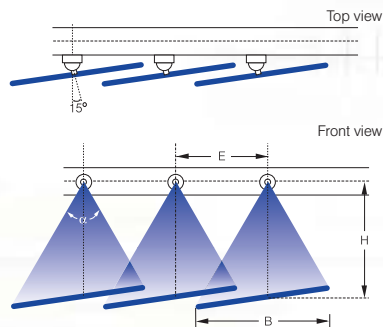
### Arrangement of flat fan nozzles with parabolic liquid distribution

Lechler flat fan nozzles provide a consistent, uniform coverage over the impact area. For this purpose, the spray widths B ought to overlap each other by 1/3 to 1/4. To avoid interferences of the sprays, the nozzle orifices must be offset 5°-15° to the pipe axis.



### Alignment of tongue-type Nozzles

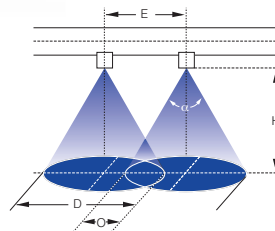
Lechler tongue-type nozzles have a rectangular liquid distribution. In order to achieve an even surface coverage the nozzles need to be aligned in such a way that spray widths B overlap by 50%. Therefore the nozzles should be inclined in an angle of 15° to the vertical of the horizontal axis of the tube (either with a weld base at an angle or a Lechler ball joint nozzle mount) in order to prevent a disturbance of the spray.



### Arrangement of full cone and hollow cone nozzles

For full cone and hollow cone nozzles, the distance E should be sized so that the spray cones overlap by about 1/3 to 1/4.

- O = Overlap of spray angles
- D = Spray diameter
- E = Nozzle distance
- H = Installation distance of nozzles
- $\alpha$  = Spray angle



### Square or offset arrangement of full cone or hollow cone nozzles

#### Square arrangement

#### Offset arrangement

Nozzle distance:  $E = \frac{D}{\sqrt{2}}$

Overlap:  $O = D - E$

#### Square arrangement

#### Offset arrangement

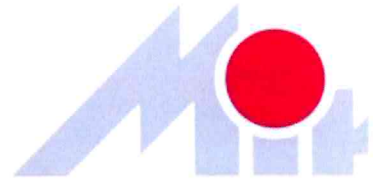
Nozzle distance:  $E_1 = \frac{D}{2} \times \sqrt{3}$

Nozzle distance:  $E_2 = \frac{3}{4} D$

Overlap:  $O = D - E_1$

## MIXING VALVE DN65

## APPENDIX INFORMATION



## swing check valve

RKF13-special



### Base properties:

<i>base type:</i>	RKF13
<i>connection:</i>	flange DIN2501
<i>nominal pressure:</i>	PN16
<i>body material:</i>	EN-JL1040-GG25 RAL5015
<i>material inlying parts:</i>	1.4021-SS
<i>sealing material:</i>	metallic
<i>temperature medium:</i>	0 up to +150°C

### Description:

one-piece valve

exterior shaft

flange according to  
DIN2501

### Options:

- rubber-Niro sealing
- brass – sealing brass

### Product properties:

A high quality swing type check valve with lever and weight, designed for high demands for industrial use.

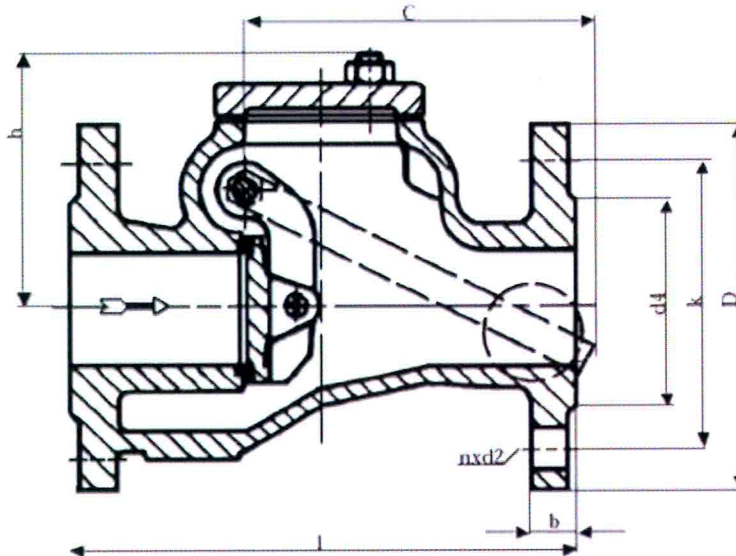
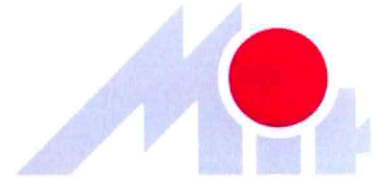
### special design:

free of grease and oil

flange according to ANSI

custom sealings

Other special design on request.



The article is deliverable in default sizes (special sizes on demand):

Artikel-Nr	size	nominal size	one-side shaft	double-sided shaft	l	D	k	d4	h	n	d2	b	weight (kg)
110956	DN40	40mm	170		180	150	110	88	119	4	18	18	22,6
103212	DN50	50mm	180		200	165	125	102	120	4	18	20	24,8
103214	DN65	65mm		380	240	185	145	122	141	4	18	20	24,5
103213	DN80	80mm		400	260	200	160	138	168	8	18	22	33,2
103215	DN100	100mm		420	300	220	180	158	175	8	18	24	43,9
109537	DN125	125mm		450	350	250	210	188	199	8	18	26	59,2

**Declarations:**

**material:**

**grey cast iron (GG-25)**, material-No.: **EN-JL1040**, short name: EN-GJL-250, AISI: A48-40B

**stainless steel (V2A)**, material-No.: **1.4021**, short name: X20Cr13

Revision: 09/2009

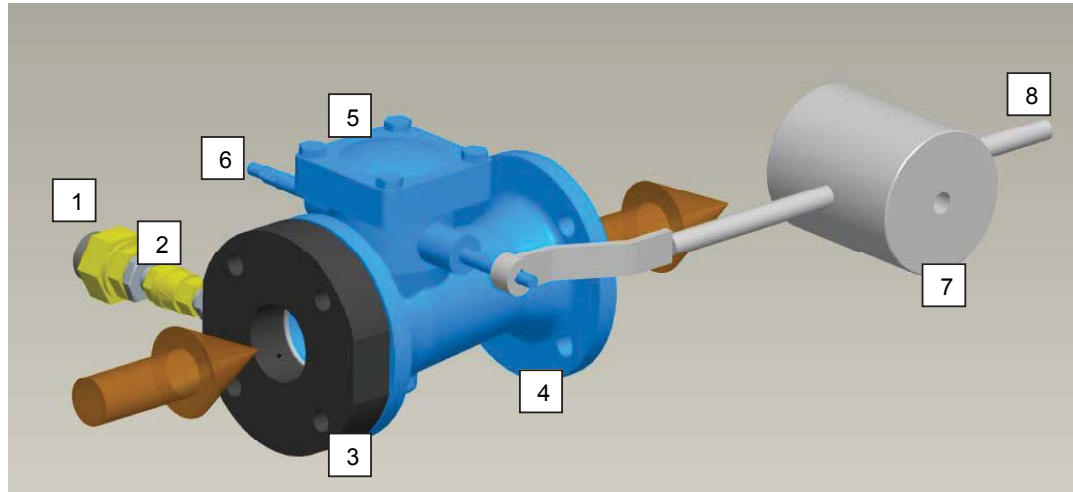
Irrtum und Änderungen vorbehalten. © 2006 – MIT Moderne Industrie Technik GmbH.

## INJECTION RING DN65

## APPENDIX INFORMATION

## Injection and mixing unit

### Product specification



1 connection for polymer	5 cleaning opening
2 back valve	6 mixing valve shaft
3 injection ring	7 weight
4 mixing unit	8 lever

### Design and function

The injection and mixing unit is a 2-part connection flange fitting. Via an injection ring the polymers are introduced into the sludge flow. Mixing of the sludge and polymers is achieved by means of a special mixing unit. A movable mixing valve inside reduces the pipeline cross section and generates a turbulent sludge flow.

The mixing valve is fitted on a projecting shaft with packing glands. The load on the mixing valve, and thus the mixing energy, is infinitely adjustable via a lever with displaceable weight.

Flock formation takes place in the following pressure pipeline running to the sludge treatment unit.

Both sludge and polymers must be forced through the injection and mixing unit by appropriate pumps.

Both the nominal width of the injection and mixing unit and the distance to the sludge treatment unit are very important for the formation of stable sludge flocks.

When selecting the pumps it is important to take into consideration that both the injection ring and mixing valve cause pressure losses, which are dependent on the material viscosity.

### Transport and storage

The fittings require protection against external influences, such as damage or adverse weather conditions. The individual equipments components must be protected against shifting.



### Installation

#### Preliminary work

Align inaccurate pipelines prior to starting any installation work. This will prevent stresses or breakage of the valve housing.

Check the ex works corrosion protection for transport damage and repair it if necessary.

#### Installation position

The selected installation position should ensure that the fitting is at any time easily accessible and dismantable for inspection or repair.

Especially the pivoting area of the lever and the area around the cleaning opening of the mixing unit should be kept free.

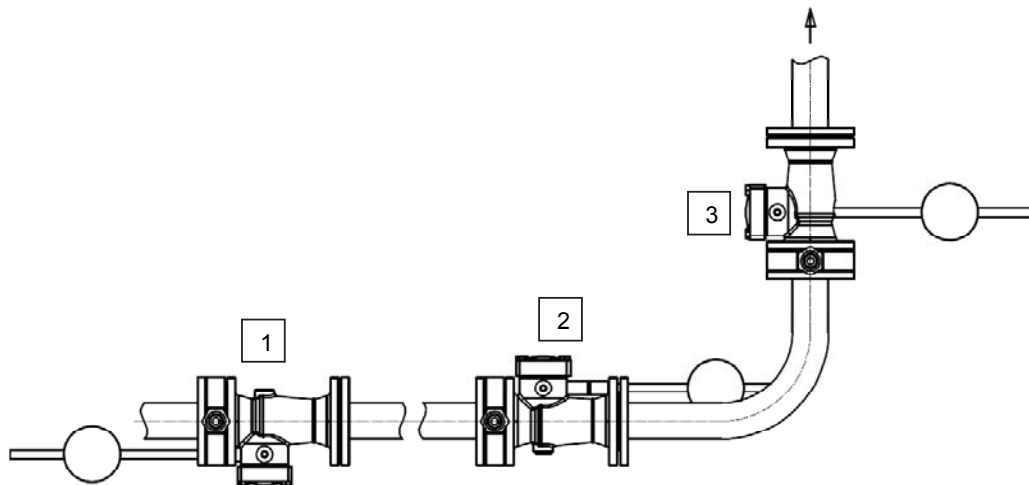
If installed outdoors protect the fitting with a cover against extreme weather, such as snow or ice.

#### Installation options

The injection and mixing unit must be installed in a completely filled pressure pipeline.	<b>Note!</b>
---	--------------

Partially filled pipelines are inappropriate for a sufficient flock formation due to the undefined flow conditions and residence times.

The following three installation options are recommendable.



<p>The sludge flows at first through the injection ring and then through the mixing unit.          The metal cover ring of the injection ring points to the mixing unit.          The mixing valve opens with the sludge flow.          The weight-loaded lever closes the mixing valve against the sludge flow.          The mixing valve shaft must be horizontal.</p>	<b>Note!</b>
--	--------------

The installation position of the injection ring around the pipeline axis is selectable according to the flange bore hole pattern.

The lever with weight can be mounted on both sides of the shaft.

### Start-up:

The mixing energy is adjustable by displacing (or removing) the weight.  
 The weight must be fixed reliably on the lever by means of the fixing screw.  
 After start-up the weight fixing screw on the lever should point downwards in order to prevent water retention inside the weight.


When varying the sludge throughput or switching on or off the pumps the lever with weight may insignificantly move up and down.	<b>Note!</b>
Mixing different types of polymers (emulsions and dispersions) may produce lumps inside the injection ring or screwed in back valve. Please refer to the polymer suppliers' recommendations.	<b>Note!</b>
Depending on the type of pre-treatment, the intensive mixing may lead to gasing within the mixing unit. In order to prevent gas retention inside the pipeline, a venting valve should be installed at the following high point of the sludge pipeline.	<b>Note</b>

### Maintenance and repair:

The only maintenance required for the injection and mixing unit is regular visual inspection for leakage.  
 If required, the packing glands of the mixing unit can be re-adjusted, but be careful to maintain the movability of the mixing valve.

### Cleaning:

The cause for a changing flock pattern on the sludge treatment unit may be dirt on the injection ring or mixing unit.

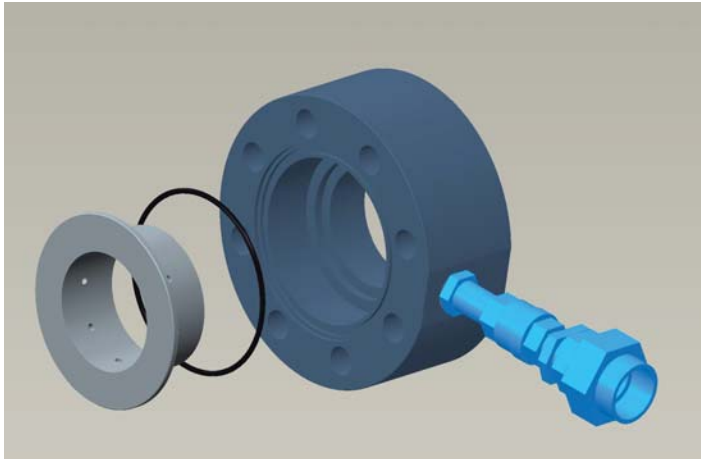
<p>Always stop the sludge treatment process on the plant's mains isolator prior to starting with any cleaning work.</p> <p>Sludge or polymers may exit when opening plant components.</p>	
---	---

### Mixing valve:

- Open the cleaning openings of the mixing unit.
- Remove sediments from the mixing valve.
- Check the movability of the mixing valve.
- Close the cleaning openings.
- Repair the paint damage on the mixing unit.

### Injection ring:

- Loosen the polymer feed line.
- Loosen the flange connection of the injection ring.
- Remove the injection ring from the pipeline.
- Remove the stub ring and O-ring from the injection ring.



- Check the channels in the injection ring for sedimentation.
- Clean the channels and back valve.

Polymers on an oil basis (emulsions) should not be washed off with water due to their agglutination tendency.

**Attention!**

- Insert new O-ring.
- Remount the injection and mixing unit.

When mounted, the stub ring must point against mixing direction.

**Attention!**

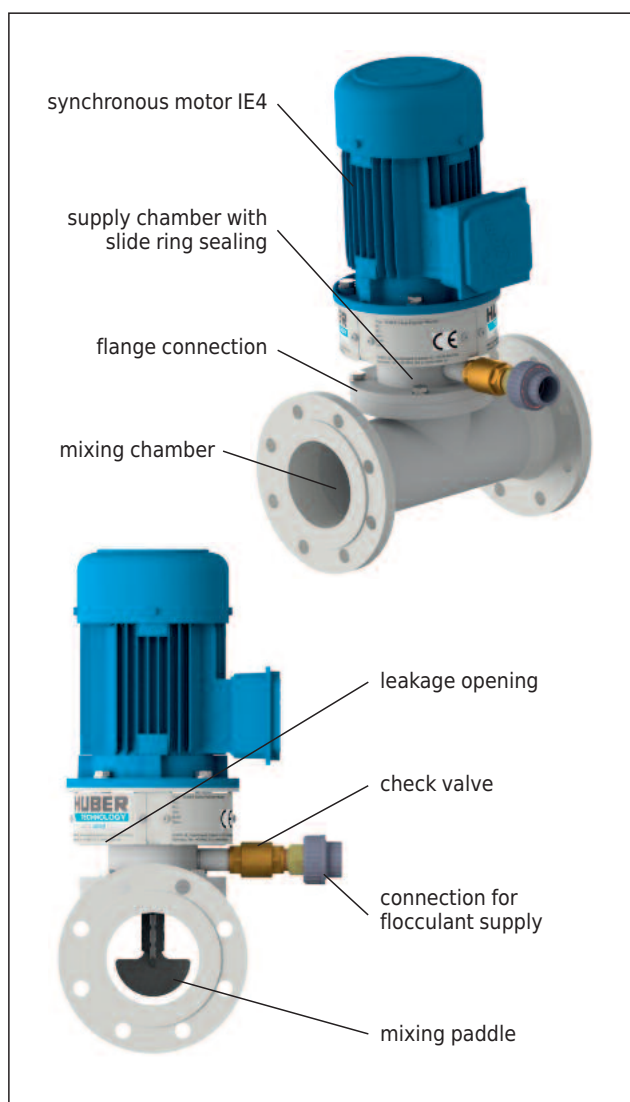
# HUBER Inline Polymer Mixer IPM



- Optimized sludge thickening and dewatering
- Reduced operating costs
- Increased operating reliability

## ►► Design and function

The HUBER Inline Polymer Mixer IPM serves for the optimal admixture of flocculant when thickening and dewatering municipal or industrial sludge. The inline mixer continuously introduces the required mixing energy into the sludge flow and generates turbulent flow conditions at the entry point. It is also suitable to be applied when dewatering solids-rich and highly viscous sludge. With the use of the HUBER Inline Polymer Mixer IPM it is possible to increase the dewatering degree and/or reduce the specific polymer demand.



## ►► Technical data

- Motor power 2.2 to 4 kW
- Thin sludge throughput 0 - 12 m<sup>3</sup>/h
- Maximum DR content of thin sludge 5%
- Concentration of flocculant solution 0.1 - 0.4%

## ►► The user's benefits

- Optimized introduction of energy through flexible control and continuous adjustment of the mixing energy
- Reduced specific polymer demand through turbulent admixture of flocculant to the sludge
- Increased dewatering degree with optimal polymer consumption
- Clog-free operation through adapted stirrer configuration and automatically controlled reversal of rotation direction
- No additional operating media (lubrication by polymer)
- Suitable for highly viscous and fibre-containing sludge
- Low pump wear due to low counterpressure
- Reduced amount of preparation water due to increased concentration of polymer diluting solution



Mobile test unit of a HUBER Inline Polymer Mixer IPM

## HUBER SE

Industriepark Erasbach A1 · D-92334 Berching  
Phone: + 49 - 84 62 - 201 - 0 · Fax: + 49 - 84 62 - 201 - 810  
info@huber.de · Internet: www.huber.de

Subject to technical modification  
0,15 / 1 - 5.2018 - 4.2018

HUBER Inline Polymer Mixer IPM

**HUBER Inline-Polymer-Mixer IPM 150**

The HUBER Inline-Polymer-Mixer IPM serves for the optimal admixture of flocculant when thickening and dewatering municipal or industrial sludge.

Polymer solution is fed through a supply chamber along the vertical shaft of the rotating paddle. As the speed of the paddle can be controlled mixing energy can be varied to suit high viscous sludges and concentrated polymer solutions. The shaft seal is located in the supply chamber so it is lubricated and cooled by polymer continuously. The paddle is designed and controlled to prevent accumulation of rag.

Operating pressure	0.2 - 0,5 bar max. 1 bar
Head loss	~ 0.2 bar
Polymer solution	0.3 – 0.5 % <sub>active substance</sub>
Drive	direct gear drive with 3-PTC thermocouples, permanent-magnet motor, start type: VFD (VFD recommendation: Danfoss VLT FC 280)
Efficiency class	IE4
Efficiency	92 %
Performance	P = 4,0 kW
Current	I <sub>max</sub> = 10.5 A
Voltage	U = 380-460 V
Frequency	f = 10-70 Hz
Protection class	IP 66
Ex protection class	without ex-protection

Dimensions and weight	
Flanges	DN 150 / PN 16
Motor connection	IEC 100 B5
Polymer connection	32 mm PVC gluing sleeve
Length	450 mm
Width	373 mm
Height	705 mm
Weight empty	59 kg
Mounting position:	vertical, motor on top

Materials	
Housing, shaft, paddle	1.4571 (316Ti) or equal
O-rings	NBR
Painted drive	Resin priming 40 µm , 2-K-PUR finish 40 – 60 µm, RAL 5015

Frequency convertor and control logics are not included in this item.  
 For optimized flocculation a maturation time of 60 seconds between IPM and dewaterer is recommended. IPM requires a straight inlet length of  $\geq 3 \times DN$ .

## Messprotokoll zur Schallpegelmessung

### Measurement protocol for sound level measurement

**Untersuchte Maschine:*****measured machine:***

Maschine:	IPM	Machine:
Baugröße:	150	Size:
Länge:	---	Length:
Breite:	---	Width:
Höhe:	---	Height:
Motortyp:	SK100T5/4 TF SH	Motor type:
Motordrehzahl / Frequenz:	300 r/min (10Hz) 600 r/min (20Hz) 1500 r/min (50 Hz) 2100 r/min (70 Hz) 3000 r/min (100 Hz)	Motor speed / frequency:
Auftrags-Nr. / Zeichnungs-Nr:	13007649-10129420	Order number / Drawing number:

**Messbedingungen:*****measurement conditions:***

Die Maschine wurde liegend im Leer-/Trockenlauf in einer großen, ruhigen Werkshalle der Firma Wolf betrieben und gemessen. In der Halle war geringer Fremdlärm und Reflektionen von Decke und Wänden vorhanden.

The machine was lying operated and measured at idle / dry run in a large, quiet production hall of company Wolf. In the hall was low noise and reflections of ceiling and walls available.

Messposition des Messgerätes: Höhe	1,55m (ca. 0,6 m über Motoroberkante / approx. 0,6m above the upper edge of the motor)	Measuring position of the measuring instrument: Height
Messposition des Messgerätes: Abstand	1,00 m	Measuring position of the measuring instrument: Distance

**Hinweis:**

Es wurde keine Messung bei ruhender Maschine durchgeführt. Deshalb wird der Umgebungskorrekturfaktor Hintergrundlärm  $K_{1A}$  bei dieser Messung nicht berücksichtigt.

**Note:**

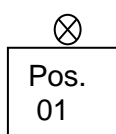
No measurement was taken while stationary machine. Therefore, the environmental correction factor background noise  $K_{1A}$  is not taken into calculation in this measurement.

**Messpositionen:**

Die Messungen wurden an folgenden Positionen rund um die Maschine durchgeführt.

**measuring positions:**

The measurements were made at the following locations around the machine.





**Messergebnisse und Auswertung**  
**Schallpegelmessung:**

**Measurement results and evaluation**  
**of sound level measurement:**

Schallpegelmessung bei laufender Maschine:

Sound level measurement while the machine is running:

Pos. Nr.	Motor speed frequency:	Datei Nr.	Day	Hour	Profile	Filter	Time	Units	Leq
			dd.MM.yy	HH:mm:ss			hh:mm:ss		
01	300 r/min (10Hz)	@R541	29.04.2019	13:44:42	P1	A	00:00:11	dB	55.3
01	600 r/min (20Hz)	@R543	29.04.2019	13:46:30	P1	A	00:00:08	dB	65.9
01	1500 r/min (50 Hz)	@R544	29.04.2019	13:46:54	P1	A	00:00:08	dB	73.1
01	2100 r/min (70 Hz)	@R545	29.04.2019	13:47:26	P1	A	00:00:12	dB	79.1
01	3000 r/min (100 Hz)	@R546	29.04.2019	13:47:58	P1	A	00:00:10	dB	75.2

Schalldruckpegel nach Maschinenrichtlinie:

Sound pressure level according to Machinery Directive:

$$L_{PA} = L_{eq} - K_{1A} - K_{3A}$$

mit

$L_{PA}$  → Schalldruckpegel nach MRL

$L_{eq}$  → Mittelwert der Schallpegelmessung

$K_{1A}$  → Umgebungskorrekturfaktor Hintergrundlärm

$K_{2A}$  → Umgebungskorrekturfaktor Reflexion

with

$L_{PA}$  → Sound pressure level according to Machinery Directive

$L_{eq}$  → Mean value of the sound level measurement

$K_{1A}$  → Environmental correction factor background noise

$K_{2A}$  → Environmental correction factor reflection

Pos. Nr.	Datei Nr.	Units	Leq, Grundlärm <i>stationary machine</i>	Leq, laufende Maschine <i>while the machine is running</i>	$\Delta L$	$K_{1A}^{1)}$	$K_{3A}^{2)}$	$L_{PA}$
01	@R541	dB	---	55.3	---	0	1,5	53,8
01	@R543	dB	---	65.9	---	0	1,5	64,4
01	@R544	dB	---	73.1	---	0	1,5	71,6
01	@R545	dB	---	79.1	---	0	1,5	77,6
01	@R546	dB	---	75.2	---	0	1,5	73,7

1)

$\Delta L = 3\text{dB} \rightarrow K1 = 3,0\text{ dB}$	$\Delta L = 4\text{dB} \rightarrow K1 = 2,2\text{ dB}$	$\Delta L = 5\text{dB} \rightarrow K1 = 1,7\text{ dB}$	$\Delta L = 6\text{dB} \rightarrow K1 = 1,3\text{ dB}$
$\Delta L = 7\text{dB} \rightarrow K1 = 1,0\text{ dB}$	$\Delta L = 8\text{dB} \rightarrow K1 = 0,8\text{ dB}$	$\Delta L = 10\text{dB} \rightarrow K1 = 0,4\text{ dB}$	$\Delta L = 15\text{dB} \rightarrow K1 = 0,1\text{ dB}$

2) Annahme nach EN ISO 11202:  
 maximal erlaubt 2,5dBA, bei Halle HSE 1,5dBA

2) Adoption according to EN ISO 11202:  
 maximum permitted 2.5dBA, at hall HSE 1.5dBA

## Die Maschine hat einen Schalldruckpegel von

**$L_{PAmax,10Hz} = 53,8\text{ dBA}$**

**$L_{PAmax,20Hz} = 64,4\text{ dBA}$**

**$L_{PAmax,50Hz} = 71,6\text{ dBA}$**

**$L_{PAmax,70Hz} = 77,6\text{ dBA}$**

**$L_{PAmax,100Hz} = 73,7\text{ dBA}$**

**$\Rightarrow L_{PA} < 80,0\text{ dBA}$**

**Verwendetes Schallpegel-Messgerät:****Used sound level meter:**

Digitaler Echtzeit-Schallpegelmesser der Genauigkeitsklasse 1 (IEC 61672)

Digital real-time sound level meter of accuracy class 1 (IEC 61672)

Digitaler Echtzeit-Oktav und Terz-analysator der Genauigkeitsklasse 1 (IEC 1260)

Digital real-time octave and third octave analyzer of accuracy class 1 (IEC 1260)

Gerätetyp	SVAN 957			Device type
Seriennummer	15342			Serial No.
Interne Softwareversion	6.16.3			Internal software version
Dateisystemversion	6.15			Filesystem version
Original Dateiname	@R541			Original file name
Uhrzeit Messung	13:44:42			Measurement hour
Datum Messung	29.04.2019			Measurement day
Gerätfunktion	Oktavband			Device function
Leq/RMS integration	Exponential			Leq/RMS integration
Startverzögerung	2.0 s			Start delay
Integrationszeitraum	8 h			Integration period
Wiederholungszyklus	Infinity			Repetition cycle
Kalibrierungstyp	By measurement			Calibration type
Datum Kalibrierung	29.04.2019			Calibration date
Uhrzeit Kalibrierung	09:08:36			Calibration time
Profil	P1	P2	P3	Profile
Frequenzbewertung	A	C	Z	Weighting filter
Detektortyp	Fast	Fast	Fast	Detector type
Frequenzbereich:	10 Hz – 20.000 Hz			Frequency range
Messfehler:	< ± 0,7 dB			Measuring tolerance

**Verwendeter Schallpegel-Kalibrator:****Used sound level calibrator:**

Gerätetyp	SV31	Device type
Serien Nr.	17655	Serial No.
Kalibrierpegel:	114,02 dB	Calibration level

Die Messung wurde durchgeführt durch:	Harald Neumann	The measurement was carried out by:
Die Auswertung wurde durchgeführt durch:	Josef Ramsenthaler	The evaluation was carried out by:
Die Auswertung wurde durchgeführt am:	30.04.2019	The evaluation was carried out on:

Unterschrift

Revision 0; Freigabe rj 14.06.2018 Seite 5 von 5

HUBER SE

**Motor Data Sheet - 100T5/4**

Motor:	Nord
Enclosure:	TEFC
Motor:	100T5/4
Horsepower (kW):	4.0
Motor Speed (RPM):	2100
Motor Type:	Permanent Magnet
Duty:	Inverter Duty VFD
Output Shaft Torque (Nm):	18.2
Hertz/Phase/Voltage:	60/3/460
Full Current Load (A):	7.1
Weight (lb):	20
Color:	Sky blue (RAL 5015)

Intelligent Drivesystems, Worldwide Services

# IE4 SYNCHRONOUS MOTORS SUPER PREMIUM EFFICIENCY



## PRODUCT INFORMATION IE4 MOTORS 1.1 – 5.5 kW

TI60-0001



# NORD IE4 SYNCHRONOUS MOTORS

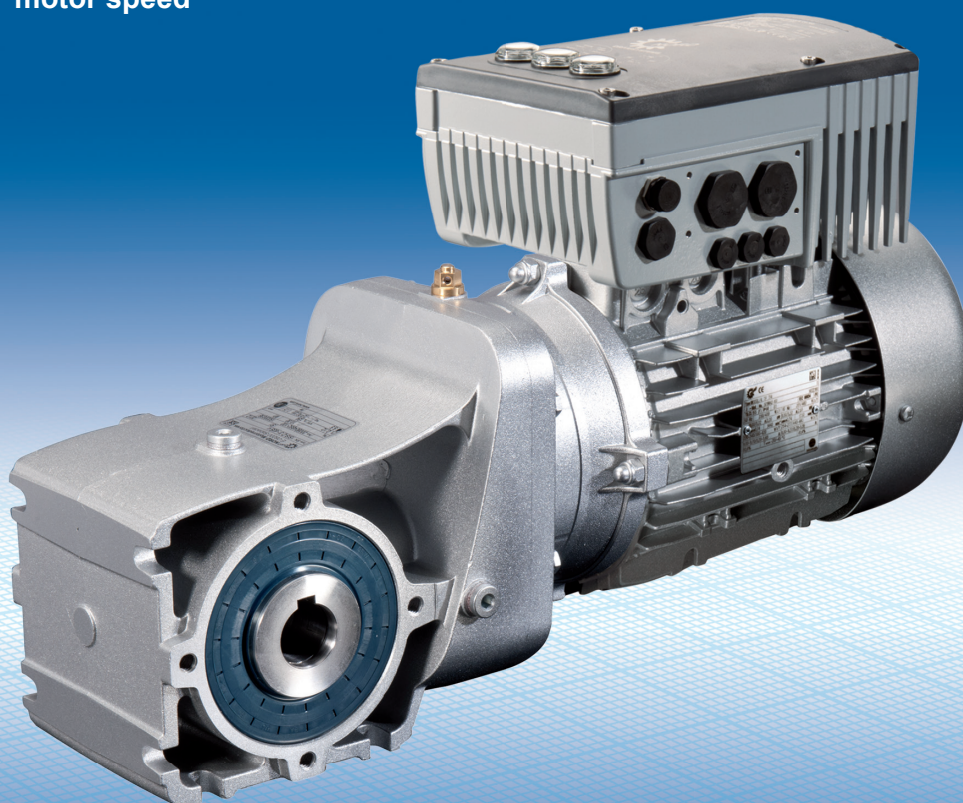


## High efficiency IE4 motors

The IEC 60034-30 standard defines the efficiency requirements for IE4 motors by means of efficiency levels. Such high efficiency levels are provided by NORD DRIVESYSTEMS synchronous motors, which are based on permanent magnet technology. NORD has designed these specially for operation with gear units. Even at low speeds, these systems achieve high torques and excellent efficiency (IE4 and better). Because of this, the gear unit input speeds are within the normal range. These 4-pole motors for energy-optimised systems are exclusively designed for operation with frequency inverters.

NORD supplies synchronous motors with output shaft axis heights from 60 to 100 mm and power ratings between 1.1 and 5.5 kW.

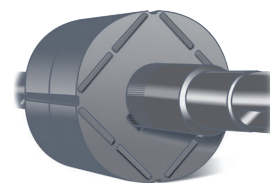
- Lower operating costs thanks to high efficiency synchronous motors with permanent magnet technology
- Simple and highly flexible combination through full compatibility with the NORD modular system
- Simplified control of applications thanks to almost constant motor speed



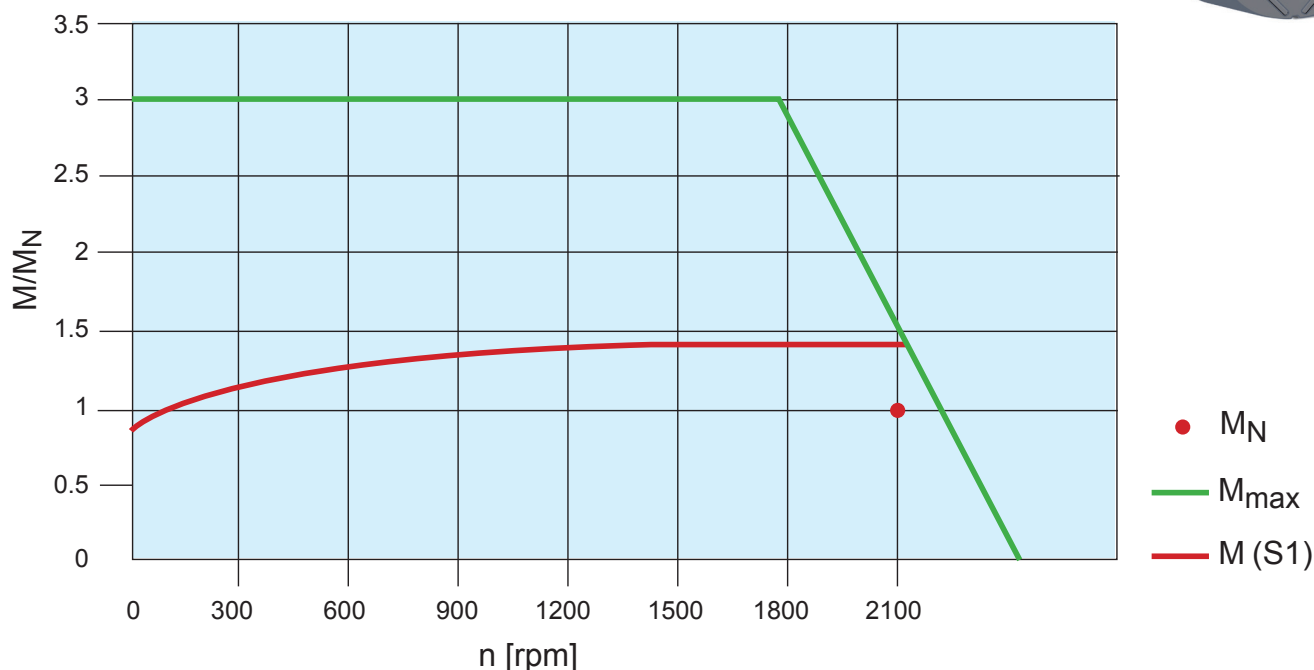
# NORD IE4 SYNCHRONOUS MOTORS

## Torque-speed curve

The graph shows the theoretical torque-speed curve for a NORD synchronous motor.



Information



### Abbreviations

n	Speed
M	Torque
$M_N$	Rated torque
$M_{max}$	Maximum permissible torque
M (S1)	Torque in continuous operation

The speed of the motor is limited by its self-induced voltage. The rotating permanent magnet rotor induces a voltage in the motor windings, which increases with the speed. By changing the circuit type from Y to  $\Delta$  this induced voltage can be reduced by a factor of 1.73, so that the motor can be operated within a larger speed range. However, as a result, 1.73 times the amount of current must be supplied. As standard the motors are supplied as self-ventilated versions. At low speeds below 5 Hz or 150 rpm, cooling by the built-in fan is no longer sufficient. The torque then has to be reduced. Because of this the motors are equipped with PTC resistor temperature monitoring (TF) or an optional bimetallic switch type (TW).

# NORD IE4 MOTOR DATA


Axis height: 80, 90, 100

T=2100 rpm in delta circuit or star circuit, 3000 rpm in delta circuit

Package length: 1..9 The code depends on the length and axis height

Number of poles

80 T 1 /4

Size	M <sub>N</sub> [Nm]	P <sub>N</sub> [kW]	n <sub>N</sub> [rpm]	I [A]	η	J [kgm <sup>2</sup> ]	 [kg]	M <sub>max</sub> [Nm]	K <sub>T</sub> [Nm/A]	K <sub>E</sub> [mV/rpm]
80T1/4	5.0	1.1	2,100	2.03	90.5	0.0011	8.0	14.4	2.5	154
80T1/4 Δ	4.8	1.5	3,000	3.44	90.4				1.4	89
90T1/4	6.8	1.5	2,100	2.82	89.9	0.0019	10.0	21.0	2.4	156
90T1/4 Δ	7.0	2.2	3,000	5.09	89.6				1.4	90
90T3/4	10.0	2.2	2,100	4.13	90.5	0.0024	12.0	29.0	2.4	158
90T3/4 Δ	9.5	3.0	3,000	6.84	92.3				1.4	91
100T2/4	13.6	3.0	2,100	5.4	91.4	0.0046	18.0	42.0	2.6	161
100T2/4 Δ	12.7	4.0	3,000	8.9	92.1				1.5	93
100T5/4	18.2	4.0	2,100	7.1	92.1	0.0060	21.0	57.0	2.6	165
100T5/4 Δ	17.5	5.5	3,000	11.9	92.2				1.5	95

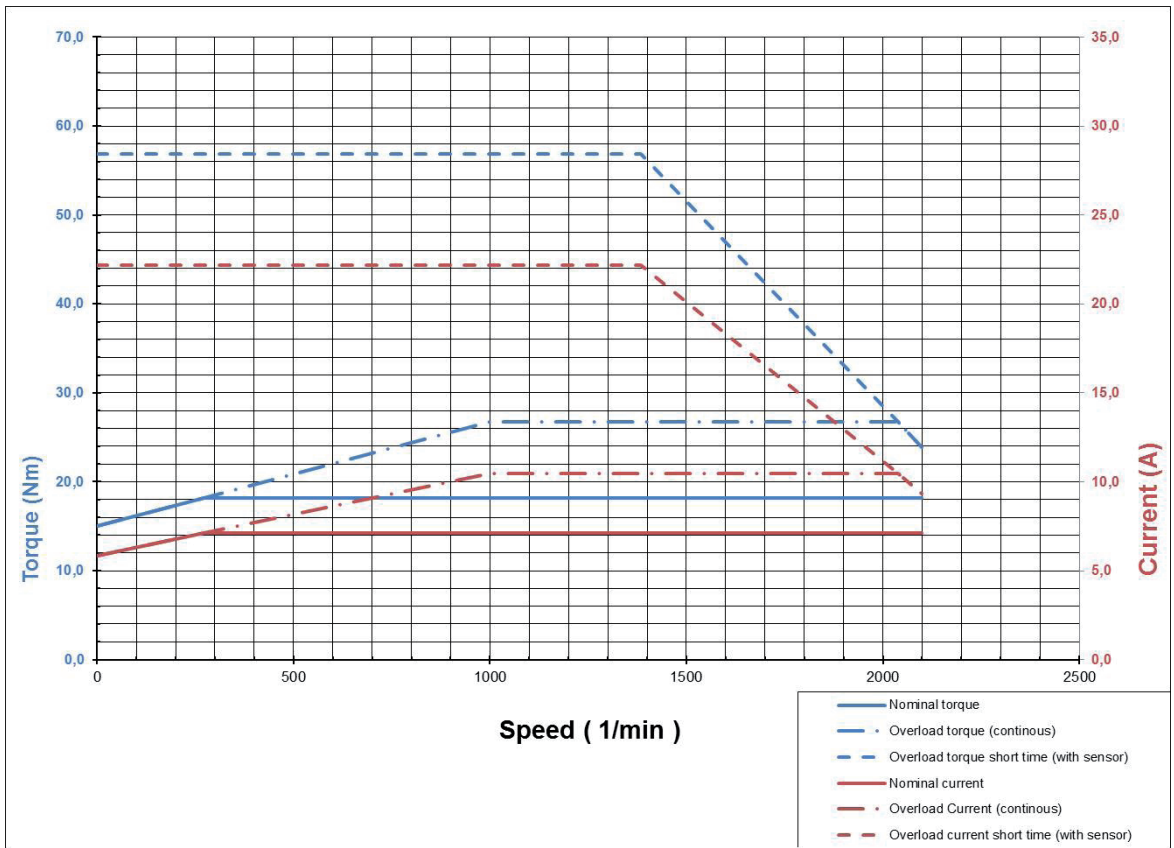
## Frequency inverter assignment

Size	M <sub>N</sub> [Nm]	P <sub>N</sub> [kW]	n <sub>N</sub> [rpm]	I [A]	η	SK 180E*	SK 540E*
80T1/4	5.0	1.1	2,100	2.03	90.5	-111-323-B -111-340-B	-111-323-A -111-340-A
80T1/4 Δ	4.8	1.5	3,000	3.44	90.4	-151-340-B	-151-340-A
90T1/4	6.8	1.5	2,100	2.82	89.9	-151-340-B	-151-323-B -151-340-B
90T1/4 Δ	7.0	2.2	3,000	5.09	89.6	–	-221-340-A
90T3/4	10.0	2.2	2,100	4.13	90.5	-221-340-B	-221-323-A -221-340-A
90T3/4 Δ	9.5	3.0	3,000	6.84	92.3	–	-301-340-A
100T2/4	13.6	3.0	2,100	5.4	91.4	–	-301-340-A
100T2/4 Δ	12.7	4.0	3,000	8.9	92.1	–	-401-340-A
100T5/4	18.2	4.0	2,100	7.1	92.1	–	-401-340-A
100T5/4 Δ	17.5	5.5	3,000	11.9	92.2	–	-551-340-A

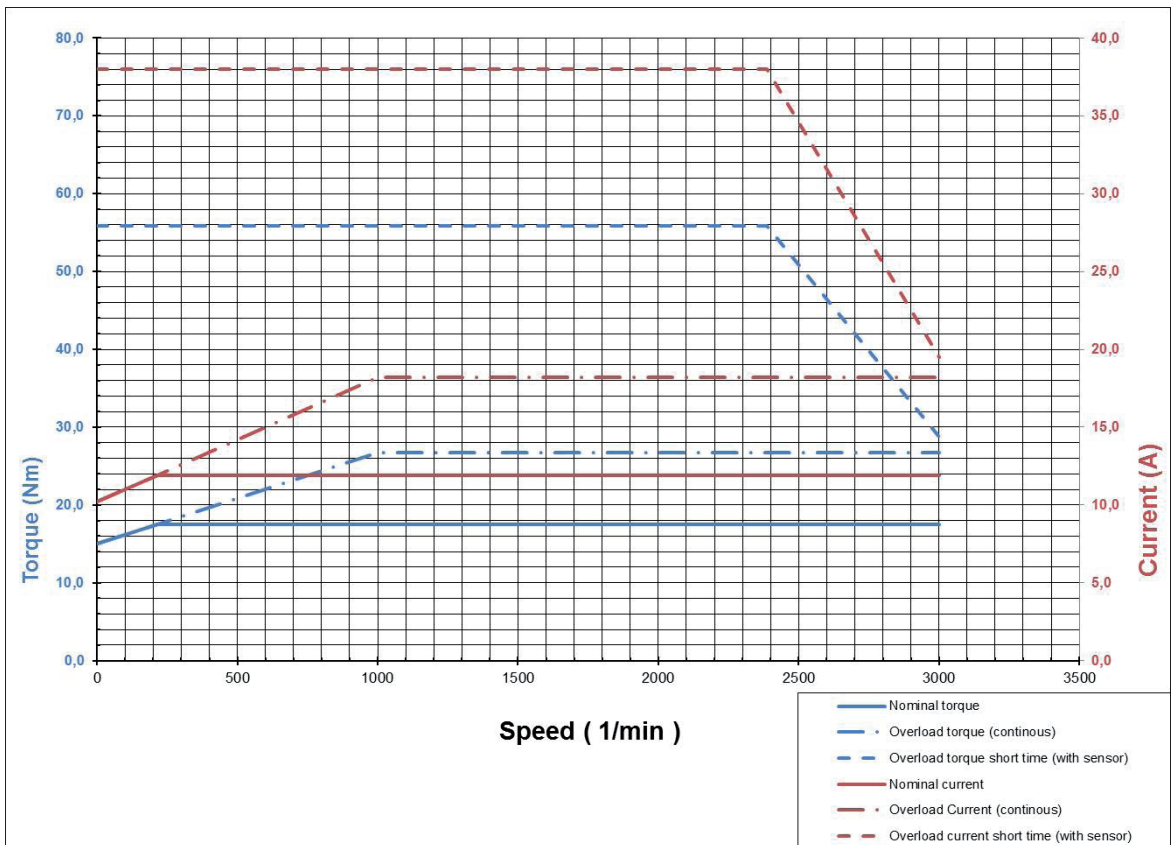
\* From 1st January 2015 field testing will begin with all SK 200E and SK 500E inverters  
The assignment of the motors to the particular frequency inverters applies for operation up to the nominal speed.  
Higher speeds and overloads require corresponding application planning.



**100 T5/4**



**100 T5/4D**



Motor data

# CERTIFICATE OF COMPLIANCE

**Certificate Number** 20170210-E469872  
**Report Reference** E469872-20150428  
**Issue Date** 2017-FEBRUARY-10

**Issued to:** NORD MOTORIDUTTORI SRL  
VIA NEWTON 22  
40017 S GIOVANNI PERSICETO BO ITALY

**This is to certify that  
representative samples of**

SERVO AND STEPPER MOTORS

Models:

80T1/4, 80T1/4 , 90T1/4, 90T1/4 , 90T3/4, 90T3/4 ,  
100T2/4, 100T2/4, 100T5/4, 100T5/4 , 80T1/4 HM, 90T3/4  
HM, 100T5/4 HM

Have been investigated by UL in accordance with the  
Standard(s) indicated on this Certificate.

**Standard(s) for Safety:** UL 1004-1 - Rotating Electrical Machines - General  
Requirements  
UL 1004-6 - Servo and Stepper Motors

**Additional Information:** See the UL Online Certifications Directory at  
[www.ul.com/database](http://www.ul.com/database) for additional information

Only those products bearing the UL Certification Mark should be considered as being covered by UL's  
Certification and Follow-Up Service.

Look for the UL Certification Mark on the product.

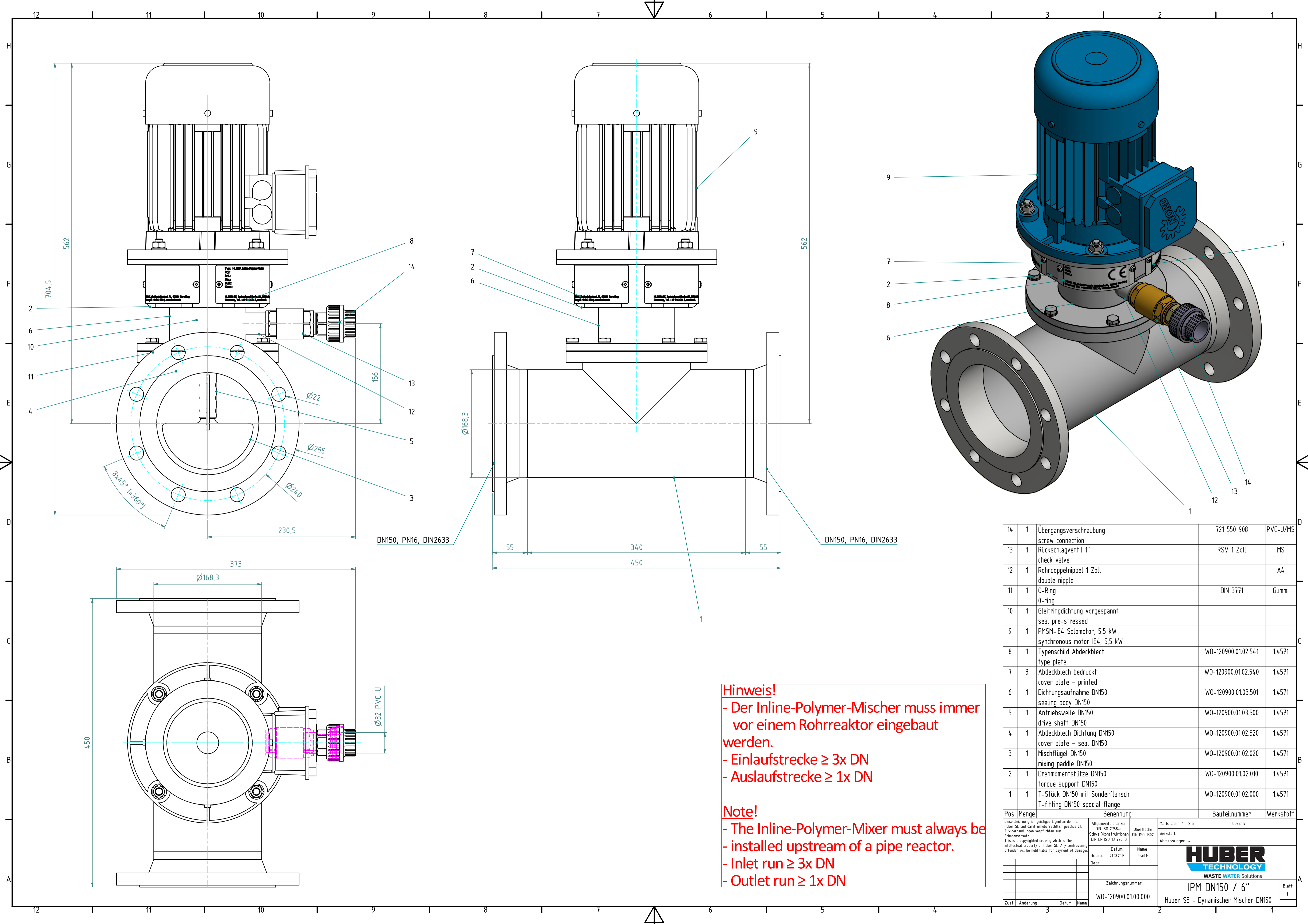


Bruce Mahrenholz, Director North American Certification Program

UL LLC

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contact a local UL Customer Service Representative at <http://ul.com/aboutul/locations/>





**Hinweis!**  
- Der Inline-Polymer-Mischer muss immer vor einem Rohrreaktor eingebaut werden.  
- Einlaufstrecke  $\geq 3x$  DN  
- Auslaufstrecke  $\geq 1x$  DN

**Note!**  
- The Inline-Polymer-Mixer must always be installed upstream of a pipe reactor.  
- Inlet run  $\geq 3x$  DN  
- Outlet run  $\geq 1x$  DN

Pos.	Menge	Benennung	Bauteilnummer	Werkstoff
14	1	Übergangsverschraubung screw connection	721 550 908	PVC-U/MS
13	1	Rückschlagventil 1" check valve	RSV 1 Zoll	MS
12	1	Rohrdoppelnippel 1 Zoll double nipple		A4
11	1	O-Ring O-ring	DIN 3771	Gummi
10	1	Gleitringdichtung vorgespannt seal pre-stressed		
9	1	PMSM-IE4 Solomotor, 5,5 kW synchronous motor IE4, 5,5 kW		
8	1	Typenschild Abdeckblech type plate	WO-120900.01.02.541	1.4571
7	3	Abdeckblech bedruckt cover plate - printed	WO-120900.01.02.540	1.4571
6	1	Dichtungsaufnahme DN150 sealing body DN150	WO-120900.01.03.501	1.4571
5	1	Antriebswelle DN150 drive shaft DN150	WO-120900.01.03.500	1.4571
4	1	Abdeckblech Dichtung DN150 cover plate - seal DN150	WO-120900.01.02.520	1.4571
3	1	Mischflügel DN150 mixing paddle DN150	WO-120900.01.02.020	1.4571
2	1	Drehmomentstütze DN150 torque support DN150	WO-120900.01.02.010	1.4571
1	1	T-Stück DN150 mit Sonderflansch T-fitting DN150 special flange	WO-120900.01.02.000	1.4571

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Zeichnungsnummer: WO-120900.01.00.000		Datum: 21.08.2018	Name: Grad M.	<p><b>HUBER TECHNOLOGY</b> WASTE WATER Solutions</p> <p>IPM DN150 / 6" Huber SE - Dynamischer Mischer DN150</p>
Blatt: 1		Gepr.:		

## AIR COMPRESSOR

## APPENDIX INFORMATION

- | Portable Electric Air Compressors
- | 2.0 HP, 120/240VAC, 15 gal. Portable Electric Air Compressor, 135 psi

# 2.0 HP, 120/240VAC, 15 gal. Portable Electric Air Compressor, 135 psi

Item # **52YM09** Mfr. Model # **52YM09** Catalog Page # **2567** UNSPSC # **40151601**



## TECHNICAL SPECS

Lubrication Type - Air compressor	<b>Oil Lubricated</b>	Cylinder Material	<b>Steel</b>
Item - Air Compressor	<b>Portable Air Compressor</b>	Motor RPM	<b>3450</b>
HP - Air Compressor	<b>2.00</b>	Motor Type	<b>Induction ODP</b>
Input Voltage - Air Compressor	<b>120VAC, 240VAC</b>	Avg. Pump Life	<b>5,000 hr.</b>
		dBA @ 3 Feet	<b>82.0</b>
		Standards	<b>ASME</b>

Tank Style - Air Compressor	<b>Horizontal</b>
Tank Size - Air Compressor	<b>15 gal.</b>
Free Air CFM @ 90 PSI - Air Compressor	<b>5.50</b>
Weight - Air Compressor	<b>136 lb.</b>
Free Air CFM @ Max. Pressure - Air Compressor	<b>4.90</b>
Max. Pressure - Air Compressor	<b>135 psi</b>
Full Load Amps	<b>15.0</b>
(F)NPT Outlet	<b>1/4"</b>

Overall Length	<b>32-1/2"</b>
Overall Width	<b>19-1/2"</b>
Overall Height	<b>29-1/2"</b>
Includes	<b>Oil, Handle, Wheels, Regulator, Pressure Switch</b>
Item	<b>Portable Electric Air Compressor</b>



# SPEEDAIR®



## 15 Gallon Horizontal Portable Air Compressor

Model **52YM09**

IN573500 8/17



# SPEEDAIRE

**PLEASE READ AND SAVE  
THESE INSTRUCTIONS.  
READ CAREFULLY  
BEFORE ATTEMPTING  
TO ASSEMBLE, INSTALL,  
OPERATE OR MAINTAIN THE  
PRODUCT DESCRIBED.**

**PROTECT YOURSELF AND  
OTHERS BY OBSERVING ALL  
SAFETY INFORMATION. FAILURE  
TO COMPLY WITH INSTRUCTIONS  
COULD RESULT IN PERSONAL  
INJURY AND/OR PROPERTY  
DAMAGE! RETAIN INSTRUCTIONS  
FOR FUTURE REFERENCE.**

**PLEASE REFER TO BACK COVER  
FOR INFORMATION REGARDING  
SPEEDAIRE'S WARRANTY AND  
OTHER  
IMPORTANT INFORMATION.**

**Model #:** \_\_\_\_\_

**Serial #:** \_\_\_\_\_

**Purch. Date:** \_\_\_\_\_

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### Introduction

Air compressor units are intended to provide compressed air to power pneumatic tools, operate spray guns and supply air for pneumatic valves and actuators. The pumps supplied with these units have oil lubricated bearings. A small amount of oil carryover is present in the compressed air stream. Applications requiring air free of oil vapor should have the appropriate filters installed. The air compressor units are to be mounted per the instructions provided on a solid floor. Any other use of these units will void the warranty and the manufacturer will not be responsible for problems or damages resulting from such misuse.

QUICK REFERENCE
Recommended Oil (2 Options)
Single viscosity SAE30 ISO100 nondetergent compressor oil. Part number 4ZF21 or 1WG50.
10W30 synthetic oil such as Mobile 1 or 1WG49.
Oil Capacity
Approximately 8.5 oz.

### UNPACKING

**⚠ CAUTION** *Do not lift or move unit without appropriately rated equipment. Be sure the unit is securely attached to lifting device used. Do not lift unit by holding onto tubes or coolers. Do not use unit to lift other attached equipment.*

After unpacking the unit, inspect carefully for any damage that may have occurred during transit. Check for loose, missing or damaged parts. Check to be sure all supplied accessories are enclosed with the unit. In case of questions, damaged or missing parts, please call 1-855-504-5678 for customer assistance.

**⚠ WARNING** *Do not operate unit if damaged during shipping, handling or use. Damage may result in bursting and cause injury or property damage.*

## GENERAL SAFETY INSTRUCTIONS

### Safety Guidelines

This manual contains information that is very important to know and understand. This information is provided for SAFETY and to PREVENT EQUIPMENT PROBLEMS. To help recognize this information, observe the following symbols.

#### **⚠ DANGER**

*Danger indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.*

#### **⚠ WARNING**

*Warning indicates a potentially hazardous situation which, if not avoided, COULD result in death or serious injury.*

#### **⚠ CAUTION**

*Caution indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.*

#### **NOTICE**

*Notice indicates important information, that if not followed, may cause damage to equipment.*

IMPORTANT: Information that requires special attention.

### Safety Symbols

The following Safety Symbols appear throughout this manual to alert you to important safety hazards and precautions.



*Wear Eye and Mask Protection*



*Read Manual First*



*Risk of Fire*



*Risk of Moving Parts*



*Risk of Hot Parts*



*Risk of Explosion*



*Risk of Fumes*



*Risk of Pressure*



*Risk of Shock*

### California Proposition 65

#### **⚠ WARNING**

***This product can expose you to chemicals including lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).***



#### **⚠ WARNING**

***You can create dust when you cut, sand, drill or grind materials such as wood, paint, metal, concrete, cement, or other masonry. This dust often contains chemicals known to cause cancer, birth defects, or other reproductive harm. Wear protective gear.***

### Illinois Lead Poisoning Prevention Act

#### **⚠ WARNING**

***CONTAINS LEAD. MAY BE HARMFUL IF EATEN OR CHEWED. COMPLIES WITH FEDERAL STANDARDS.***

### Important Safety Information

*Please read and save these instructions. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage! Retain instructions for future reference.*

This manual contains important safety, operational and maintenance information. If you have any questions, call 1-855-504-5678 for customer assistance.

Since the air compressor and other components (material pump, spray guns, filters, lubricators, hoses, etc.) used make up a high pressure pumping system, the following safety precautions must be observed at all times:

## Important Safety Information (Continued)

### **⚠ DANGER**

#### BREATHABLE AIR WARNING

This compressor/pump is not equipped and should not be used “as is” to supply breathing quality air. For any application of air for human consumption, the air compressor/pump will need to be fitted with suitable in-line safety and alarm equipment. This additional equipment is necessary to properly filter and purify the air to meet minimal specifications for Grade D breathing as described in Compressed Gas Association Commodity Specification G 7.1, OSHA 29 CFR 1910. 134, and/or Canadian Standards Associations (CSA).

#### DISCLAIMER OF WARRANTIES

In the event the compressor is used for the purpose of breathing air application and proper in-line safety and alarm equipment is not simultaneously used, existing warranties shall be voided, and the manufacturer disclaims any liability whatsoever for any loss, personal injury or damage.



### General Safety

- Read all manuals included with this product carefully. Be thoroughly familiar with the controls and the proper use of the equipment.
- Follow all local electrical and safety codes as well as the United States National Electrical Codes (NEC) and Occupational Safety and Health Act (OSHA).
- Only persons well acquainted with these rules of safe operation should be allowed to use the compressor.
- Keep visitors away and NEVER allow children in the work area.
- Wear safety glasses and use hearing protection when operating the unit.
- Do not stand on or use the unit as a handhold.
- Before each use, inspect compressed air system and electrical components for signs of damage, deterioration, weakness or leakage. Repair or replace defective items before using.
- Check all fasteners at frequent intervals for proper tightness.



**⚠ WARNING** *Motors, electrical equipment and controls can cause electrical arcs that will ignite a flammable gas or vapor. Never operate or repair in or near a flammable gas or vapor. Never store flammable liquids or gases in the vicinity of the compressor.*



**⚠ WARNING** *Never operate compressor without a beltguard. This unit can start automatically without warning. Personal injury or property damage could occur from contact with moving parts.*

- Do not wear loose clothing or jewelry that will get caught in the moving parts of the unit.



**⚠ CAUTION** *Compressor parts may be hot even if the unit is stopped.*

- Keep fingers away from a running compressor; fast moving and hot parts will cause injury and/or burns.
- If the equipment should start to vibrate abnormally, STOP the engine/motor and check immediately for the cause. Vibration is generally an indication of trouble.
- To reduce fire hazard, keep engine/motor exterior free of oil, solvent, or excessive grease.

**⚠ WARNING** *An ASME code safety relief valve with a setting no higher than 150 PSI MUST be installed in the tank for this compressor. The ASME safety valve must have sufficient flow and pressure ratings to protect the pressurized components from bursting.*

**⚠ CAUTION** *See compressor specification decal for maximum operating pressure. Do not operate with pressure switch or pilot valves set higher than the maximum operating pressure.*

Important Safety Information (Continued)**⚠ WARNING**

*Maximum operating pressure is 135 PSI for single stage compressors. Do not operate with pressure switch or pilot valves set higher than 135 PSI (single stage).*

- Never attempt to adjust ASME safety valve. Keep safety valve free from paint and other accumulations.

**⚠ WARNING**

*Never attempt to repair or modify a tank! Welding, drilling or any other modification will weaken the tank resulting in damage from rupture or explosion. Always replace worn, cracked or damaged tanks.*

**NOTICE**

*Drain liquid from tank PSI.*

- Tanks rust from moisture build-up, which weakens the tank. Make sure to drain tank regularly and inspect periodically for unsafe conditions such as rust formation and corrosion.
- Fast moving air will stir up dust and debris which may be harmful. Release air slowly when draining moisture or depressurizing the compressor system.

Spraying Precautions**⚠ WARNING**

*Do not spray flammable materials in vicinity of open flame or near ignition sources including the compressor unit.*



- Do not smoke when spraying paint, insecticides, or other flammable substances.
- Use a face mask/respirator when spraying and spray in a well ventilated area to prevent health and fire hazards.
- Do not direct paint or other sprayed material at the compressor. Locate compressor as far away from the spraying area as possible to minimize overspray accumulation on the compressor.
- When spraying or cleaning with solvents or toxic chemicals, follow the instructions provided by the chemical manufacturer.



Save These Instructions  
Do Not Discard

The **DANGER, WARNING, CAUTION, and NOTICE** notifications and instructions in this manual cannot cover all possible conditions and situations that may occur. It must be understood by the operator that caution is a factor which cannot be built into this product, but must be supplied by the operator.

Getting To Know Your Compressor

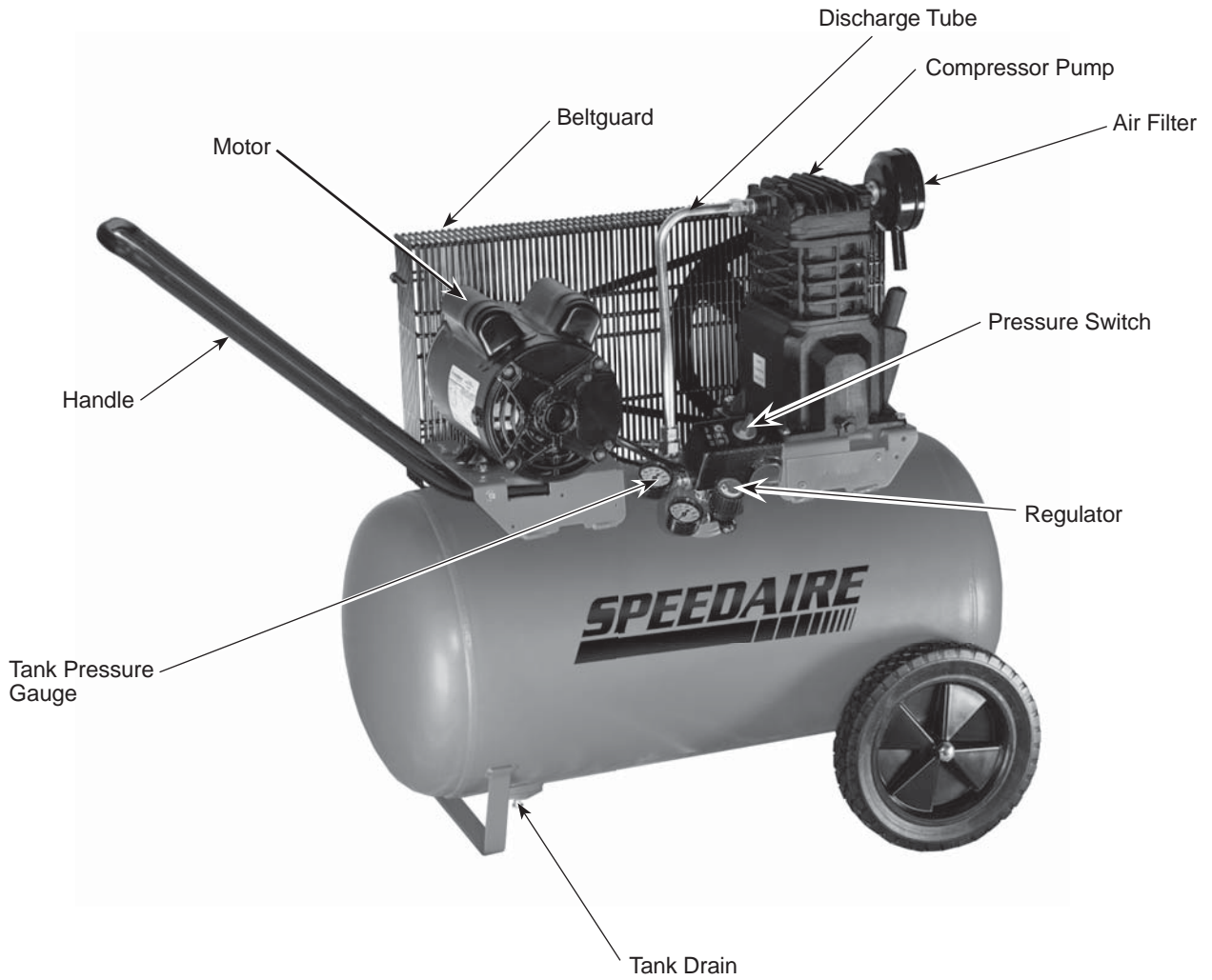


Figure 1 - Horizontal Unit Identification



## SPECIFICATIONS

52YM09	
Motor HP	2
Power	120V/240V
Phase	1 (single)
Displacement CFM	7.2
Air Delivery CFM @ 90 PSI	5.5
Air Delivery CFM @ 135 PSI	4.9
Max PSI	135
Pump RPM	880
Tank Capacity	15 gallons
Unit Weight	136 lbs
Amp Draw	15A / 7.5A
Max Duty Cycle	75%
Tank Outlet	1/4 inch NPT

## DIMENSIONS

52YM09	
Length	28 in.
Width	18 in.
Height	26.5 in.

INSTALLATION INSTRUCTIONS

GROUNDING

This product must be grounded. In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electric current. This product is equipped with a cord having a grounding wire with an appropriate grounding plug. The plug must be plugged into an outlet that is properly installed and grounded in accordance with all local codes and ordinances. Do not use grounding adapter.

**⚠ WARNING** *Risk of electric shock. Improper use of grounding plug can result in a risk of electrical shock. Plug must be plugged into an outlet that is properly installed and grounded in accordance with local codes and ordinances by a qualified electrician.*

This product comes from the factory ready for use on a nominal 120 volt circuit and has a grounding plug similar to the plug illustrated in Figure 2. If the listed conditions cannot be met or if nuisance tripping of the current protection device occurs, it may be possible to operate the compressor from a 120 volt 20 amp circuit. See Figure 2.

Check motor data plate for 240 volt compatibility. A 240 volt unit must be operated on a 240 volt circuit. The cord must only plug into a 240 volt grounded outlet and may require a new cord and plug. See Figure 3. This product may be modified to operate at 240V. To do so, a 240V power cord needs to be purchased and installed on the unit and wired into the pressure switch just like the 120V cord. The panel on the back of the motor needs to be opened and the flag terminals need to be moved so that the brown wire that is on terminal #1 is on terminal #7 and the white wire that is on terminal #3 needs to be moved to terminal #1 (where the brown wire was originally). See Figure 4.

**⚠ WARNING** *All wiring and electrical connections should be performed by a qualified electrician. Installation must be in accordance with local codes and national electrical codes. If not properly grounded, this tool can cause an electrical shock, particularly when used in damp locations, in proximity of plumbing, outdoors.*

**⚠ WARNING** *Installation of grounding plug can result in electric shock. When repair or replacement of the cord or plug is required, do not connect the grounding wire to either flat blade terminal. The wire with insulation having an outer surface that is green with or without yellow stripes is the grounding wire. Never connect green (or green and yellow) wire to a live terminal.*

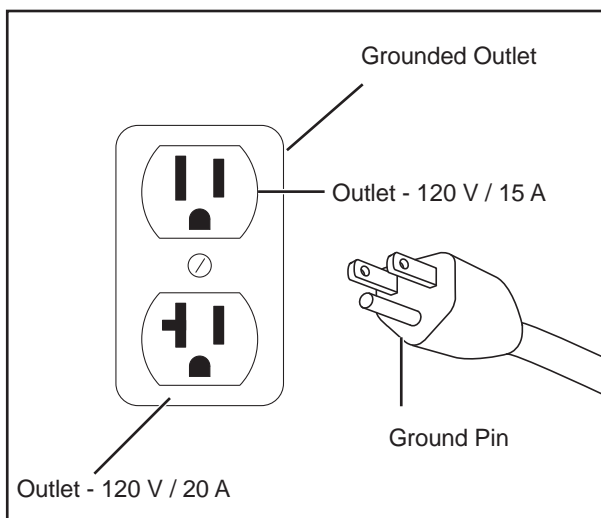


Figure 2 - 120V

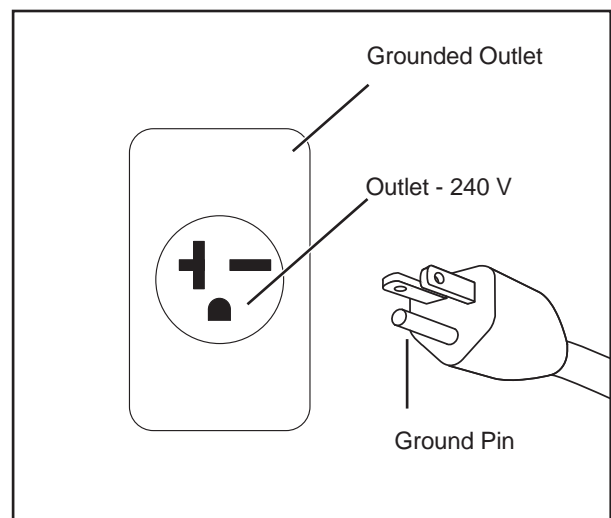


Figure 3 - 240V

## INSTALLATION INSTRUCTIONS (CONTINUED)

Use only a 3-wire extension cord that has a 3-blade grounding plug and a 3-slot receptacle that accepts the plug on the product. Make sure your extension cord is not damaged. When using an extension cord, be sure to use one heavy enough to carry the current your product draws. For lengths less than 25 ft. 16-3 AWG extension cords shall be used. An undersized cord results in a drop in the voltage and loss of power and overheating. (NOTICE: Table below shows the correct size to use depending on cord length. When in doubt, use the next heavier gauge. The smaller the gauge number, the heavier the cord.)

Use of an extension cord may cause excess heat to motor. This could lead to tripped breaker (at electrical panel) or tripped thermal overload (on compressor motor). If this occurs, eliminate extension cord and plug compressor directly into electrical outlet. Avoid using extension cords; use longer air hose(s) instead.

Check with a qualified electrician or serviceman when the grounding instructions are not completely understood, or when in doubt as to whether the product is properly grounded. Do not modify the plug provided; if it does not fit the outlet, have the proper outlet installed by a qualified electrician. Only connect the product to an outlet having the same configuration as the plug. Do not use an adapter with this product.

Amp Rating Range	Voltage	Cord Length in Feet								
		25 ft.	50 ft.	100 ft.	150 ft.	200 ft.	250 ft.	300 ft.	400 ft.	500 ft.
	120V	50 ft.	100 ft.	200 ft.	300 ft.	400 ft.	500 ft.	600 ft.	800 ft.	500 ft.
8 - 10		14	10	8	6	6	6	4	4	2
10 - 12		12	10	8	6	6	4	4	2	2
12 - 14		12	8	8	6	6	4	4	2	0
14 - 16		12	8	8	4	4	4	2	2	0

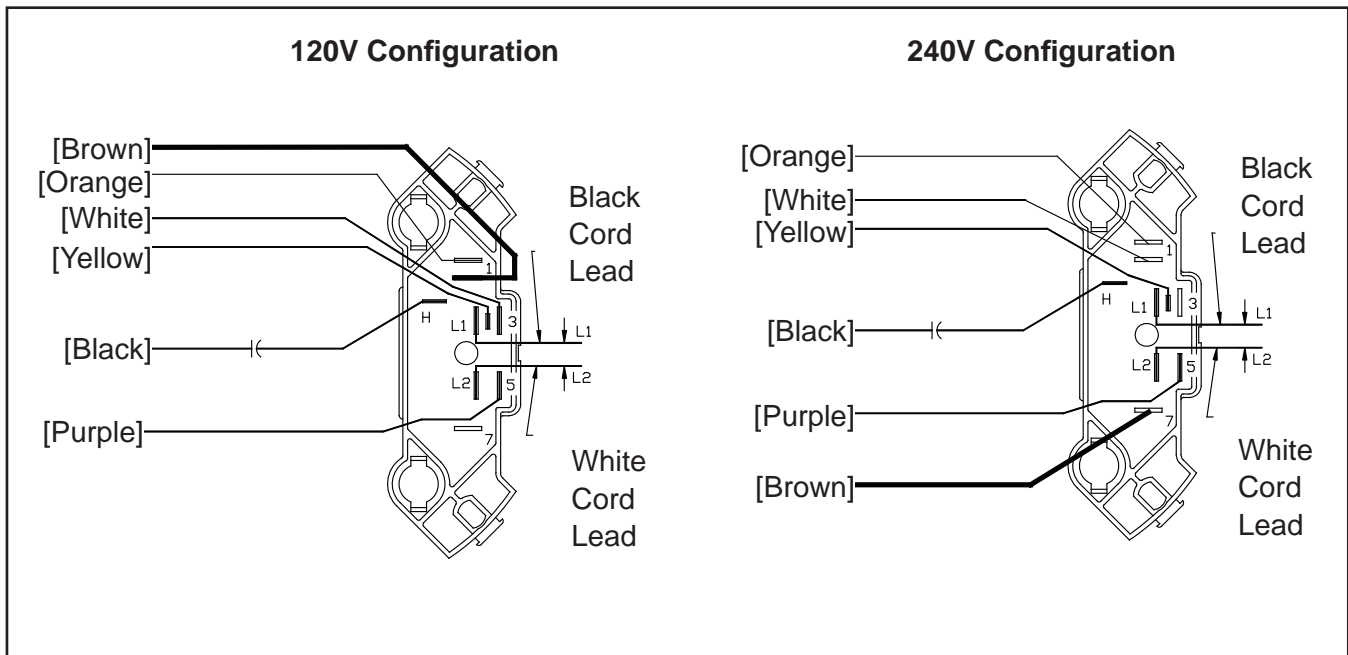


Figure 4 - 120V and 240 Configuration



INSTALLATION INSTRUCTIONS (CONTINUED)

Lubrication

**CAUTION** Before operating compressor, ensure oil is filled to the center of the sight gauge (See Figure 5).

**CAUTION** Using any other type of oil may shorten pump life and damage valves.

Recommended Oil (2 Options)
Single viscosity SAE30 ISO100 nondetergent compressor oil. Part number 4ZF21 or 1WG50.
10W30 synthetic oil such as Mobile 1 or 1WG49.
Oil Capacity
Approximately 8.5 oz.

Remove cap from oil fill opening. Install breather (found in parts bag with this manual). Check oil level. See specification label on compressor pump for the proper oil capacity and oil type. All lubricated compressor pumps discharge some condensed water and oil with the compressed air. Install appropriate water/oil removal equipment and controls as necessary for the intended application.

Do not use regular automotive oil. Additives in regular motor oil can cause valve deposits and reduce pump life. For maximum pump life, drain and replace oil after the first fifty (50) hours of operation. Then perform oil changes every three (3) months.

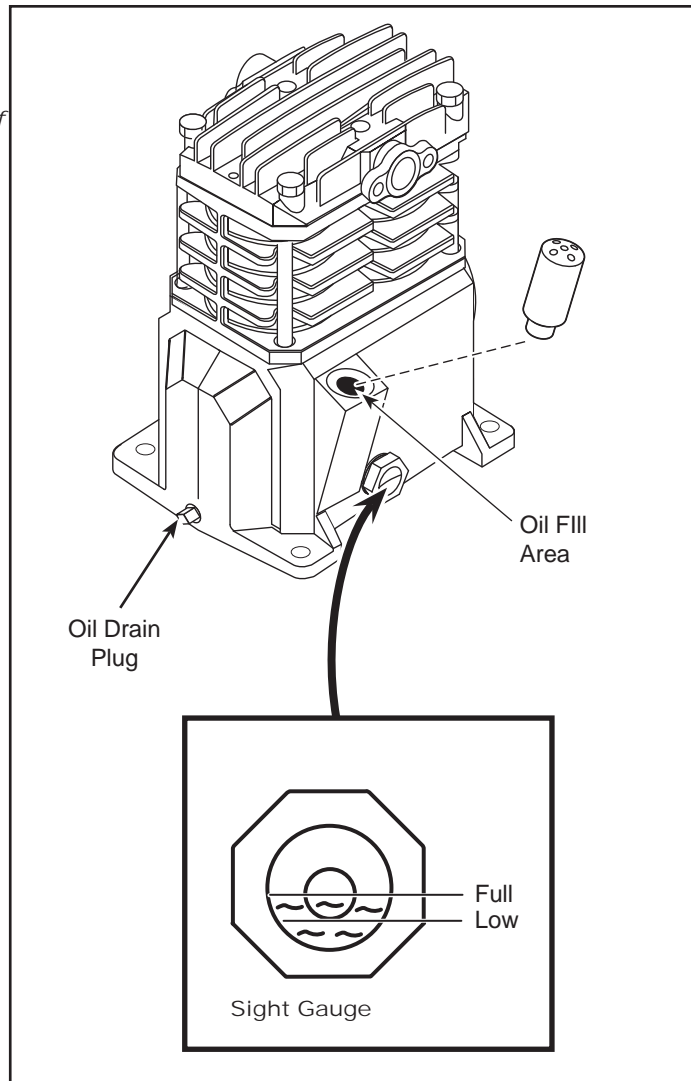


Figure 5 - Lubrication

## OPERATING INSTRUCTIONS

All lubricated compressor pumps discharge some condensed water and oil with the compressed air. Install appropriate water/oil removal equipment and controls as necessary for the intended application.

**NOTICE**

*Failure to install appropriate water/oil removal equipment may result in damage to machinery or workpiece.*

### Start-up/Break-in Procedure

**WARNING**

*Risk of Personal Injury. Do not attach air tools to open end of the hose until start-up is completed and the unit checks okay.*

**WARNING**

*Risk of Personal Injury. Never disconnect threaded joints with pressure in tank!*

1. Check oil level per the Lubrication Section of this manual.
2. Open the bottom tank drain valve (see Figure 6). Turn outlet valve to open air flow.
3. Plug unit in.
4. Move pressure switch to the AUTO position to run the unit (see Figure 7).
5. Run the unit for thirty (30) minutes at zero (0) PSI (under no load) to break in pump parts.
6. Move the pressure switch lever or knob to OFF and turn tank drain valve to shut off air flow. The compressor is now ready for use.
7. Change oil after first fifty (50) hours of operation. Then perform oil changes every three (3) months or two hundred (200) hours of run time, whichever comes first.

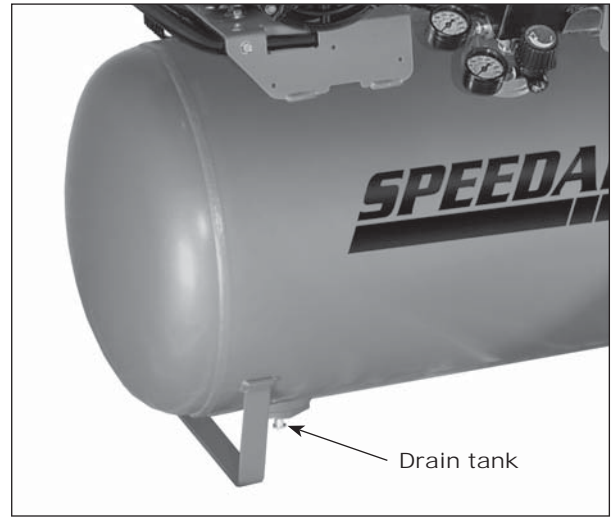


Figure 6

### Compressor Use

It is extremely important to operate the compressor in a clean, well-ventilated area where the surrounding air temperature will not be more than 100°F. Do not locate the compressor air inlet near steam, paint spray, sandblast areas or any other source of contamination.

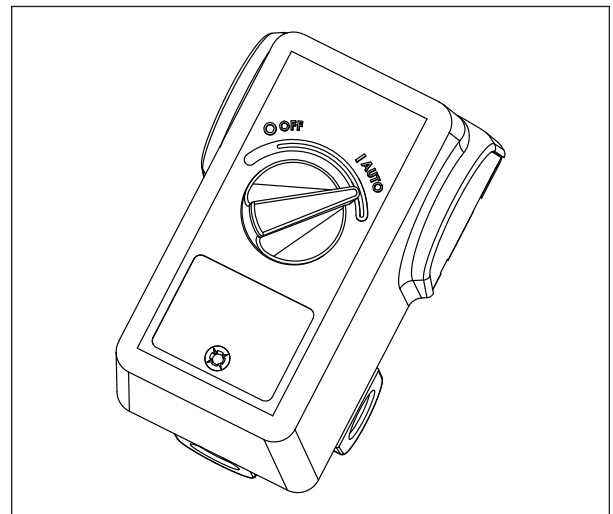


Figure 7

## OPERATING INSTRUCTIONS

On/Off Cycling of Compressor

**▲ WARNING** *Risk of Bursting. Drain tank every day to prevent corrosion and possible injury due to tank damage. Do not operate drain with more than 40 PSI in tank or drain valve may be damaged. Drain tank of moisture daily using the drain valve in the bottom of the tank.*

**NOTICE** *Unit care and maintenance. Drain liquid from tank daily.*

In the AUTO position, the compressor pumps air into the tank. When a shut-off (preset “cut-out”) pressure is reached, the compressor automatically shuts off.

If the compressor is left in the AUTO position and air is depleted from the tank by use of a tire chuck, tool, etc., the compressor will restart automatically at its preset “cut-in” pressure. When a tool is being used continuously, the compressor will cycle on and off automatically.

In the OFF position, the compressor will not operate.

Drain Tank. Disconnect, tag, unplug and lock out power source; release pressure. Drain moisture from tank by opening drain valve underneath tank (See Figure 8).

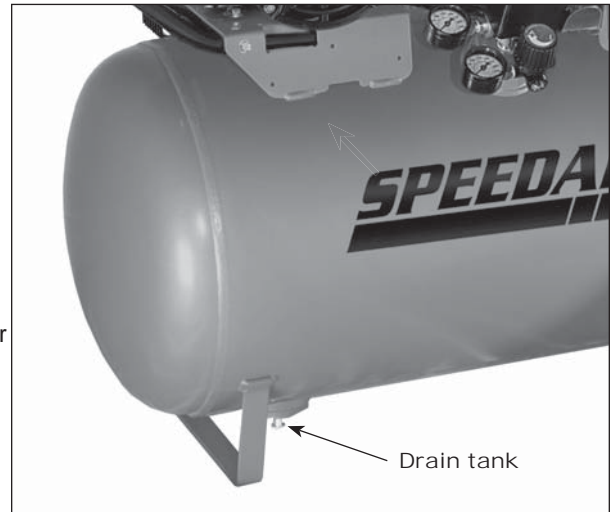


Figure 8

MOISTURE IN COMPRESSED AIR

Moisture in compressed air will form into droplets as it comes from an air compressor pump. When humidity is high or when a compressor is in continuous use for an extended period of time, this moisture will collect in the tank. When using a paint spray or sandblast gun, this water will be carried from the tank through the hose, and out of the gun as droplets mixed with the spray material.

**IMPORTANT:** This condensation will cause water spots in a paint job, especially when spraying other than water based paints. If sandblasting, it will cause the sand to cake and clog the gun, rendering it ineffective. A filter in the air line, located as near to the gun as possible, will help eliminate this moisture.

## TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Low discharge pressure	<ol style="list-style-type: none"> <li>1. Air demand exceeds pump capacity</li> <li>2. Restricted air intake</li> <li>3. Air leaks (fittings, tubing on compressor, or plumbing outside of system)</li> <li>4. Blown gaskets</li> <li>5. Leaking or damaged valves</li> </ol>	<ol style="list-style-type: none"> <li>1. Reduce air demand or use a compressor with more capacity.</li> <li>2. Clean or replace the air filter element.</li> <li>3. Listen for escaping air. Apply soap solution to all fittings and connections. Bubbles will appear at points of leakage. Tighten or replace leaking fittings or connections. Use pipe thread sealant.</li> <li>4. Replace any gaskets proven faulty on inspection.</li> <li>5. Remove head and inspect for valve breakage, misaligned valves, damaged valve seats, etc. Replace defective parts and reassemble.</li> </ol> <p><b>CAUTION</b> <i>Unit care and maintenance. Install a new head gasket each time the head is removed.</i></p>
Excessive noise (knocking)	<ol style="list-style-type: none"> <li>1. Loose motor pulley or flywheel</li> <li>2. Loose fasteners on pump or motor</li> <li>3. Lack of oil in crankcase</li> <li>4. Worn connecting rod</li> <li>5. Worn piston pin bores</li> <li>6. Piston hitting the valve plate</li> <li>7. Noisy check valve in compressor system</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten pulley/flywheel clamp bolts and set-screws.</li> <li>2. Tighten fasteners.</li> <li>3. Check for proper oil level; if low, check for possible damage to bearings. Dirty oil can cause excessive wear.</li> <li>4. Replace connecting rod. Maintain oil level and change oil more frequently.</li> <li>5. Remove piston assemblies from the compressor and inspect for excess wear. Replace excessively worn piston pin or pistons, as required. Maintain oil level and change oil more frequently.</li> <li>6. Remove the compressor head and valve plate and inspect for carbon deposits or other foreign matter on top of piston. Replace head and valve plate using new gasket. See Lubrication section for recommended oil.</li> <li>7. Replace check valve.</li> </ol> <p><b>DANGER</b> <i>Risk of Explosion. Do not disassemble check valve with air pressure in tank.</i></p>
Large quantity of oil in the discharge air NOTE: In an oil-lubed compressor there will always be a small amount of oil in the air stream.	<ol style="list-style-type: none"> <li>1. Worn piston rings</li> <li>2. Compressor air intake restricted</li> <li>3. Excessive oil in compressor</li> <li>4. Wrong oil viscosity</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace with new rings. Maintain oil level and change oil more frequently.</li> <li>2. Clean or replace filter. Check for other restrictions in the intake system.</li> <li>3. Drain down to full level.</li> <li>4. Use Mobil 1® 10W-30 or full synthetic.</li> </ol>
Water in discharge air/tank	Normal operation. The amount of water increases with humid weather	<ol style="list-style-type: none"> <li>1. Drain tank more often. At least daily.</li> <li>2. Add a filter to reduce the amount of water in the air line.</li> </ol>
Motor hums and runs slowly or not at all	<ol style="list-style-type: none"> <li>1. Low voltage</li> <li>2. Use of extension cord</li> <li>3. Too many devices on same circuit</li> <li>4. Loose electrical connections</li> <li>5. Malfunctioning pressure switch - contacts will not close</li> <li>6. Malfunctioning check valve</li> </ol>	<ol style="list-style-type: none"> <li>1. Check incoming voltage. It should be approximately 230 volts. Motor will not run properly on 208 volts. Low voltage could be due to wires (from electrical source to compressor) being too small in diameter and / or too long. Have a qualified electrician check these conditions and make repairs as needed.</li> <li>2. Do not use an extension cord. Use longer air hose with larger diameter.</li> <li>3. Limit the circuit to the use of compressor only.</li> <li>4. Check all electrical connections.</li> <li>5. Replace pressure switch.</li> <li>6. Replace check valve.</li> </ol> <p><b>DANGER</b> <i>Risk of Explosion. Do not disassemble check valve with air pressure in tank.</i></p>

TROUBLESHOOTING GUIDE (CONTINUED)

SYMPTOM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Motor hums and runs slowly or not at all (Continued)	<ul style="list-style-type: none"> <li>7. Defective unloader valve on pressure switch</li> <li>8. Defective motor capacitor(s)</li> <li>9. Defective motor</li> </ul>	<ul style="list-style-type: none"> <li>7. Replace unloader valve.</li> <li>8. Replace capacitor(s).</li> <li>9. Replace motor.</li> </ul>
Reset mechanism cuts out repeatedly or circuit breaker trips repeatedly	<ul style="list-style-type: none"> <li>1. Lack of proper ventilation/room temperature too high</li> <li>2. Too many devices on same circuit</li> <li>3. Restricted air intake</li> <li>4. Loose electrical connection</li> <li>5. Pressure switch shut-off pressure set too high</li> <li>6. Malfunctioning check valve</li> </ul>	<ul style="list-style-type: none"> <li>1. Move compressor to well-ventilated area.</li> <li>2. Limit the circuit to the use of only the air compressor.</li> <li>3. Clean or replace filter element.</li> <li>4. Check all electrical connections.</li> <li>5. Replace pressure switch.</li> <li>6. Replace check valve.</li> </ul> <p><b>⚠ DANGER</b> <i>Risk of Explosion. Do not disassemble check valve with air pressure in tank.</i></p> <ul style="list-style-type: none"> <li>7. Replace unloader valve.</li> <li>8. Replace capacitor(s).</li> <li>9. Replace motor.</li> </ul>
Tank does not hold pressure when compressor is off and the shut off valve is closed	<ul style="list-style-type: none"> <li>1. Air leaks (fittings, tubing on compressor, or plumbing outside system)</li> <li>2. Worn check valve</li> <li>3. Check tank for cracks or pin holes</li> </ul>	<ul style="list-style-type: none"> <li>1. Check all connections with soap and water solution. Tighten; or remove and apply sealant to threads, then reassemble.</li> <li>2. Replace check valve.</li> <li>3. Replace tank. Never repair a damaged tank.</li> </ul> <p><b>⚠ DANGER</b> <i>Risk of Explosion. Do not disassemble check valve with air pressure in tank.</i></p>
Pressure switch continuously blows air out the unloader valve	Malfunctioning check valve	<p>Replace the check valve if the unloader valve on the pressure switch bleeds off constantly when unit shuts off.</p> <p><b>⚠ DANGER</b> <i>Risk of Explosion. Do not disassemble check valve with air pressure in tank.</i></p>
Excessive vibration	<ul style="list-style-type: none"> <li>1. Loose fasteners on pump or motor</li> <li>2. Belt needs replaced</li> <li>3. Belt alignment</li> </ul>	<ul style="list-style-type: none"> <li>1. Tighten fasteners.</li> <li>2. Replace with correct size.</li> <li>3. Align flywheel and pulley.</li> </ul>
Pressure switch does not release air when the unit shuts off	Malfunctioning unloader valve on pressure switch	<p>Replace the unloader valve if it does not release the pressure for a short period of time when the unit shuts off.</p> <p><b>⚠ DANGER</b> <i>Risk of Explosion. Do not disassemble unloader valve with air pressure in tank.</i></p>

## MAINTENANCE AND INSPECTION INSTRUCTIONS



### **WARNING**

*Disconnect, tag and lock out power source then release all pressure from the system before attempting to install, service, relocate or perform any maintenance.*

In order to maintain efficient operation of the compressor system, check the air filter and oil level before each use. The ASME safety valve should also be checked daily (see Figure 9). Pull ring on safety valve and allow the ring to snap back to normal position. This valve automatically releases air if the tank pressure exceeds the preset maximum. If air leaks after the ring has been released, or the valve is stuck and cannot be actuated by the ring, the ASME safety valve must be replaced.

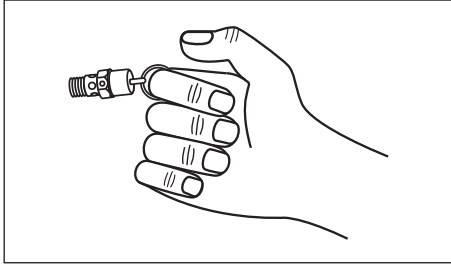


Figure 9 - ASME Safety Valve

### **WARNING**

*Do not tamper with the ASME safety valve.*

### Tank



### **WARNING**

*Never attempt to repair or modify a tank! Welding, drilling or any other modification will weaken the tank resulting in damage from rupture or explosion. Always replace worn, cracked or damaged tanks.*

### **NOTICE**

*Drain liquid from tank daily.*

The tank should be carefully inspected at a minimum of once a year. Look for cracks forming near the welds. If a crack is detected, remove pressure from tank immediately and replace.

### Compressor Lubrication

See Installation. Add oil as required. The oil should be changed every three months or after every 200 hours of operation; whichever comes first.

If the compressor is run under humid conditions for short periods of time, the humidity will condense in the crankcase and cause the oil to look creamy. Oil contaminated by condensed water will not provide adequate lubrication and must be changed immediately. Using contaminated oil will damage bearings, pistons, cylinders and rings and is not covered under warranty. To avoid water condensation in the oil, periodically run the compressor with tank pressure near 120 PSI for single stage compressors by opening the drain cock or an air valve connected to the tank or hose. Run the pump for an hour at a time at least once a week or more often if the condensation reoccurs.

**IMPORTANT:** Change oil after first 50 hours of operation.

### Air Filter

Never run the compressor pump without an intake air filter or with a clogged intake air filter. The air filter element should be checked monthly (see Figure 10). Operating compressor with a dirty filter can cause high oil consumption and increase oil contamination in the discharge air. If the air filter is dirty it must be replaced.



Figure 10 - Air Filter Element

### Components

Turn off all power and clean the cylinder head, motor, fan blades, air lines, aftercooler and tank on a monthly basis.

## MAINTENANCE AND INSPECTION INSTRUCTIONS (CONTINUED)

### Belts

**⚠ WARNING**

Lock out and tag the power then release all pressure from the tank to prevent unexpected movement of the unit.

Check belt tension every 3 months. Adjust belt tension to allow 3/8 inch to 1/2 inch deflection with normal thumb pressure. Also, align belts using a straight edge against the face of the flywheel and touching the rim on both sides of the face. The belts should be parallel to this straight edge (see Figure 11). Dimension A should be the same as B and C to ensure proper alignment of the belts.

Slots in the bed-plate allow for sliding the motor back and forth to adjust belt tension.

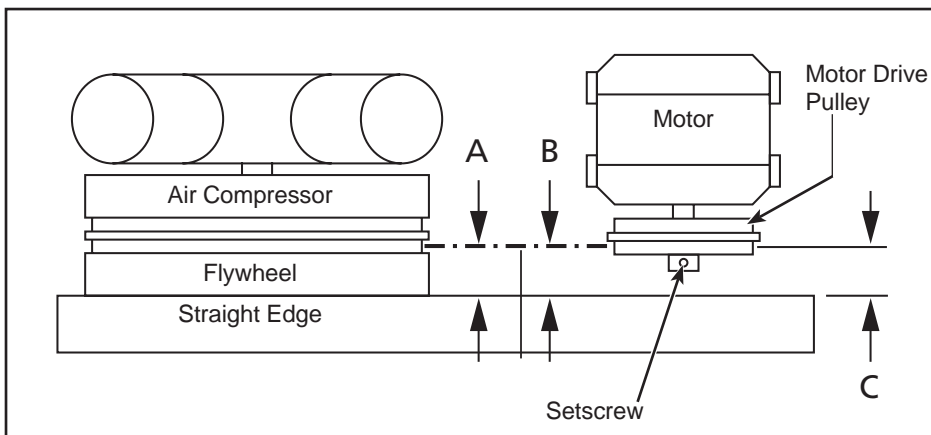


Figure 11 - Top View

### Removing Belt Guard

**⚠ WARNING**

When removing belt guard front to inspect or replace belts, inspect plastic retaining clips and replace if damaged or if clip can be removed without a tool.

1. Using crescent wrench on pliers, rotate clip 90°.
2. Pull clip out and away from beltguard.
3. Reverse process to reinstall after inspecting the clip.

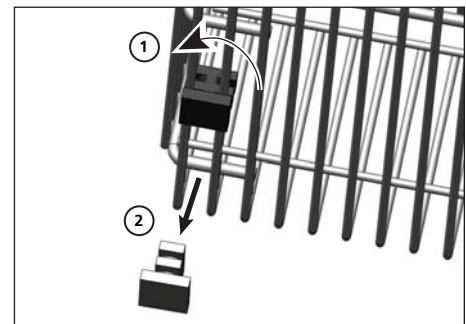


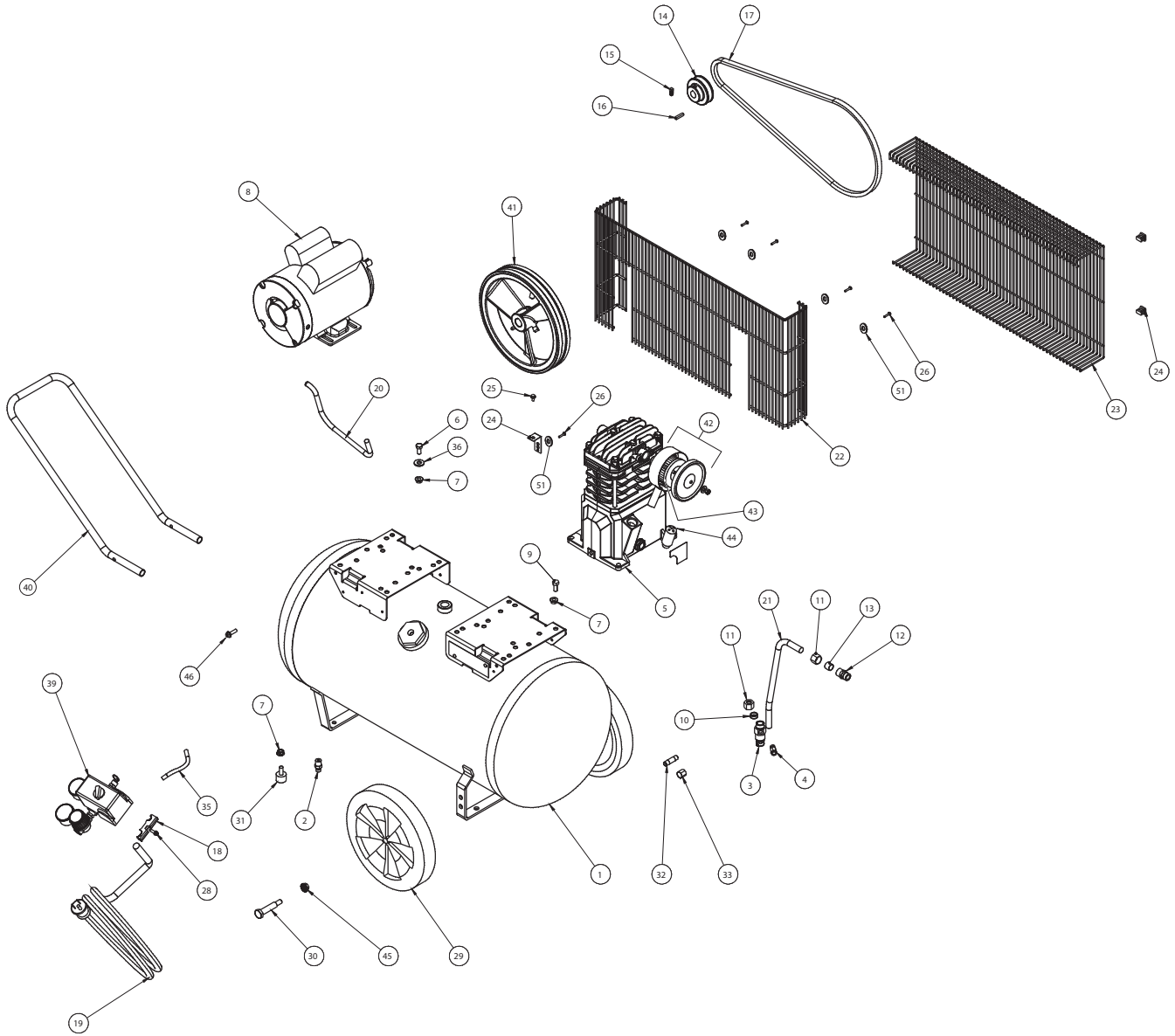
Figure 12

### Storage

If compressor is to be stored for a short period of time, make sure that it is stored in a normal position and in a cool protected area.

### Maintenance Schedule

OPERATION	DAILY	MONTHLY	3 MONTHS
Check Safety Valve	●		
Drain Tank (see Figure 6)	●		
Check Oil Level	●		
Clean or Change Air Filter		●	
Check Intercooler		●	
Clean Unit Components		●	
Check Belt Tightness			●
Change Oil (see Figure 5)			●



**For Repair Parts, call 1-800-Grainger**  
**24 hours a day – 365 days a year**

Please provide following information:

- Model number
- Serial number (if any)
- Part description and number as shown in parts list



REPAIR PARTS LIST FOR 52YM09

Ref No	Description	Part Number	Qty
1	TANK, 15 GALLONS	AR053500CG	1
2	DRAIN VALVE, 1/4 IN.	D-1403	1
3	CHECK VALVE	CV221500SJ	1
4	QUICK CONNECT FITTING, 1/4 IN. TUBE X 1/8 IN. NPT	ST081301AV	1
5	PUMP, 2HP	2WGX6	1
6	SELF TAPPING SCREW, 5/16 IN.-12	ST070692AV	4
7	SPINLOCK NUT, 5/16 IN.-18	ST146001AV	10
8	MOTOR, 2HP 120/240V	MC019800SJ	1
9	HEX HEAD BOLT, 5/16 IN.-18 X 3/4 IN.	ST016000AV	4
10	RUBBER FERRULE, 1/2 IN. TUBE	ST085200AV	1
11	COMPRESSION NUT, 1/2 IN.	ST033001AV	2
12	COMPRESSION FITTING	ST159001AV	1
13	BRASS FERRULE, 1/2 IN. TUBE	ST032900AV	1
14	MOTOR PULLEY	PU015200AV	1
15	1/4 IN. SET SCREW	ST012200AV	1
16	MOTOR KEY	KE000903AV	1
17	BELT, AX48	BT020401AV	1
18	STRAIN RELIEF	CW209500AV	1
19	POWER CORD, 120V	EC012601AV	1
20	MOTOR POWER CORD	EC012800AV	1
21	EXHAUST TUBE , 1/2 IN.	VT035900AP	1
22	BELT GUARD BACK	BG313200AV, ◆	1
23	BELT GUARD FRONT	BG313300AV, ◆	1
24	BELT GUARD BRACKET	BG313500AV, ◆	1
25	SELF TAPPING SCREW, #10-3/8 IN.	ST073278AV, ◆	1
26	SELF TAPPING SCREW, #5-5/8 IN.	ST073277AV, ◆	5
27	HEX HEAD SELF TAPPING SCREW 1/4 IN. X 7/8 IN. (NOT SHOWN)	ST074407AV	2
28	STRAIN RELIEF SCREW	ST209800AV	1
29	WHEEL, 10 IN.	WA004000AV	2
30	AXLE BOLT, 1/2 IN.-18 X 1-7/8 IN.	ST033400AV	2
31	RUBBER FOOT	ST162602AV	2
32	2 IN. X 1/8 IN. NPT PIPE NIPPLE	ST083800AV	1
33	1/8 IN. NPT PIPE CAP	ST150100AV	1
34	PLASTIC RETAINING CLIP	ST199700AV, ◆	4

Ref No	Description	Part Number	Qty
35	PTFE TUBE, 1/4 IN. X 9 IN.	ST117801AV	1
36	WASHER, 5/16 IN.	ST011200AV	4
39	PRESSURE SWITCH ASSEMBLY	MY000500AJ	1
	REDUCING BUSHING, 1/4 IN. X 1/8 IN. NPT	ST071407AV	1
	HEX PIPE NIPPLE, 1/4 IN. NPT	HF002401AV	2
	ASME SAFETY VALVE, 150 PSI	V-215105AV	1
	PRESSURE GAUGE, 300 PSI	GA016306AV	2
	PRESSURE SWITCH	CW209000AV	1
	REGULATOR	RE206202AV	1
40	HANDLE	HL001801BH	1
41	PUMP FLYWHEEL	4B253	1
42	AIR FILTER HOUSING WITH ELEMENT	VH901700AV	1
43	AIR FILTER ELEMENT	VH901800AV	1
44	CRANK CASE BREATHER	VH901100AV	1
45	FLANGE NUT, 3/8 - 16	ST033500AV	2
46	HANDLE SCREW	ST073236AV	1
48	FLYWHEEL SET SCREW (NOT SHOWN)	ST199800AV	2
49	FLYWHEEL KEY (NOT SHOWN)	KE000900AV	1
50	UNLOADER VALVE (NOT SHOWN)	CW210001AV	1
51	WASHER	ST070928AV, ◆	5
<b>Repair Parts Kits</b>			
◆	BELT GUARD KIT	BG313700SJ	
—	NOT AVAILABLE		

GETTING STARTED

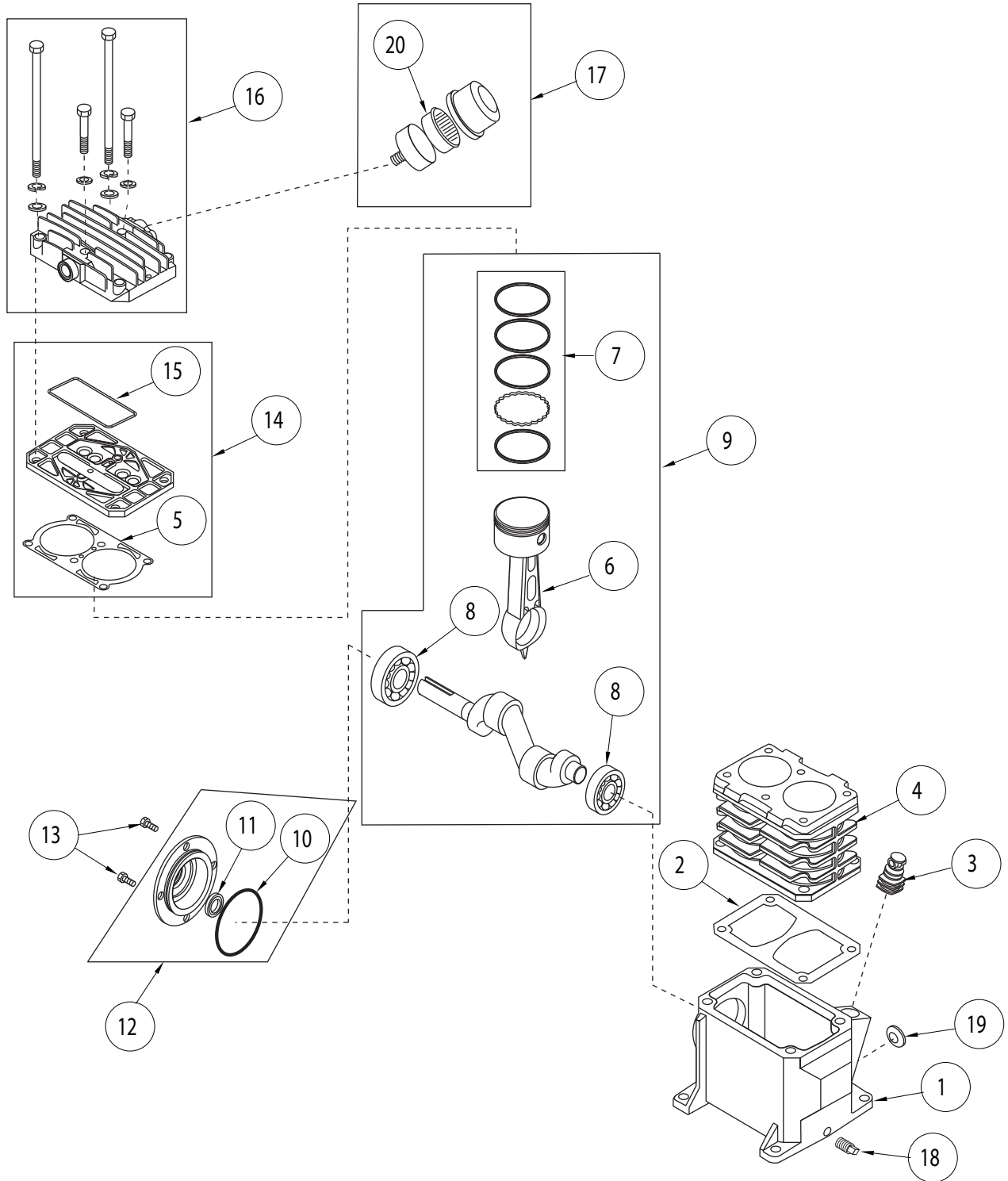
SAFETY / SPECIFICATIONS

ASSEMBLY / INSTALLATION

OPERATION

TROUBLESHOOTING

MAINTENANCE / REPAIR



**For Repair Parts, call 1-800-Grainger**  
**24 hours a day – 365 days a year**

*Please provide following information:*

- Model number
- Serial number (if any)
- Part description and number as shown in parts list

REPAIR PARTS LIST FOR 2WGX6

Ref. No.	Description	Part Number:	Qty.
1	CRANKCASE	VT040300AV	1
2	CRANKCASE GASKET	●	1
3	BREATHER	VH901100AV	1
4	CYLINDER	--	1
5	CYLINDER GASKET	●	1
6	CONNECTING ROD AND PISTON ASSEMBLY (MODEL 2WGX6)	VT020500AV	2
7	PISTON RING SET	VT911200AV	2
8	BALL BEARING	ST084202AV	2
9	CRANKSHAFT, BEARINGS, RODS, PISTON ASSEMBLY	VT040650AV	1
10	O-RING	●	1
11	OIL SEAL	ST129700AV, ●	1
12	BEARING CAP ASSEMBLY	VT040200AJ	1
13	M6 X 10 MM SCREW	†	4
14	VALVE PLATE ASSEMBLY	VT491100AV	1
15	VALVE PLATE MOLDED SEAL	●	1
16	CYLINDER HEAD AND FASTENERS	TQ900800AJ	1
17	AIR FILTER ASSEMBLY	VH901700AV	1
18	1/8 IN.-27 OIL DRAIN PLUG	ST022300AV	1
19	SIGHT GLASS	ST191700AV	1
20	AIR FILTER ELEMENT	VH901800AV	1
<b>REPAIR PARTS KITS</b>			
●	GASKET KIT	VT470900AJ	
--	NOT AVAILABLE		
†	AVAILABLE AT LOCAL HARDWARE STORE		

GETTING STARTED

SAFETY / SPECIFICATIONS

ASSEMBLY / INSTALLATION

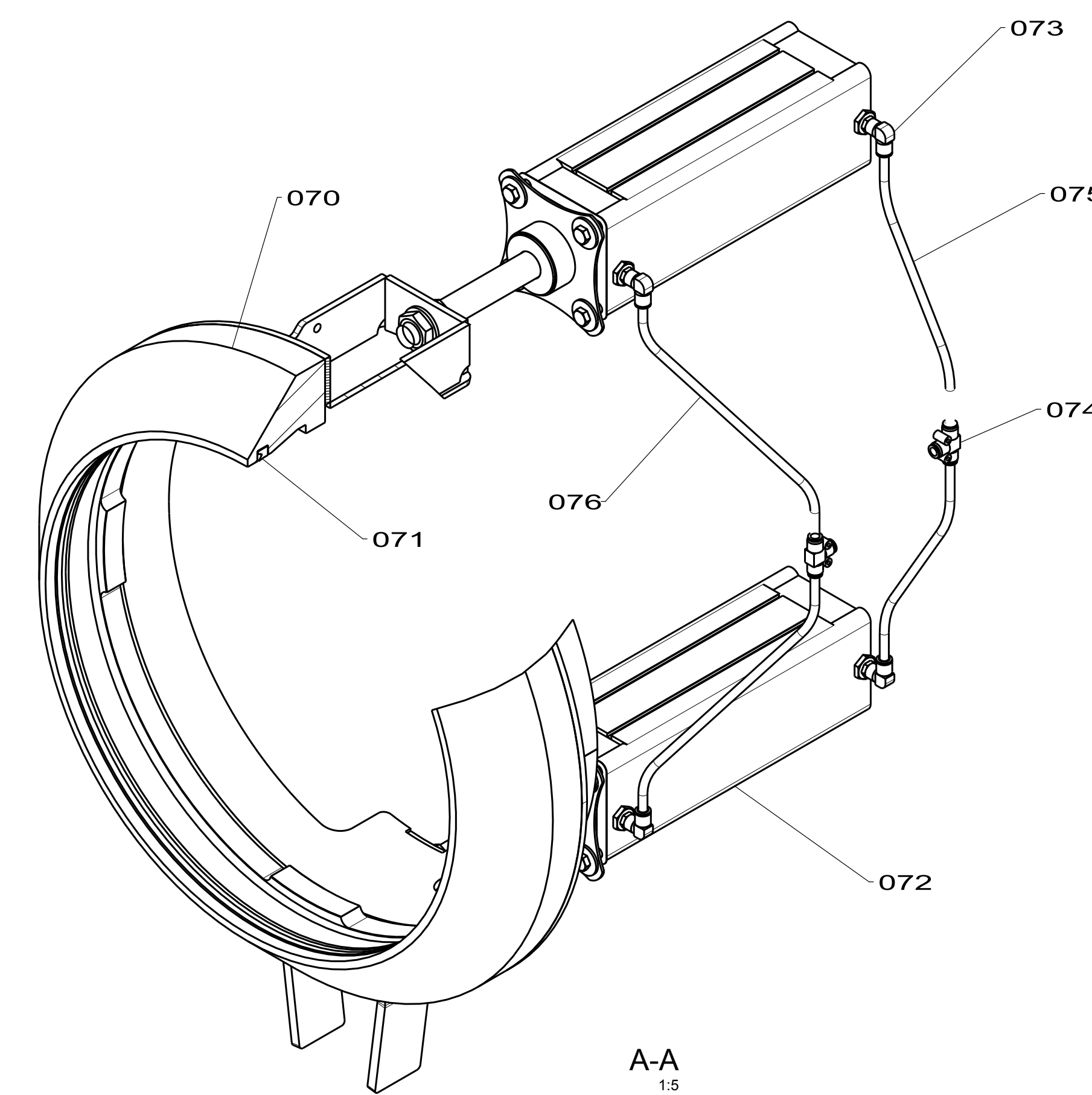
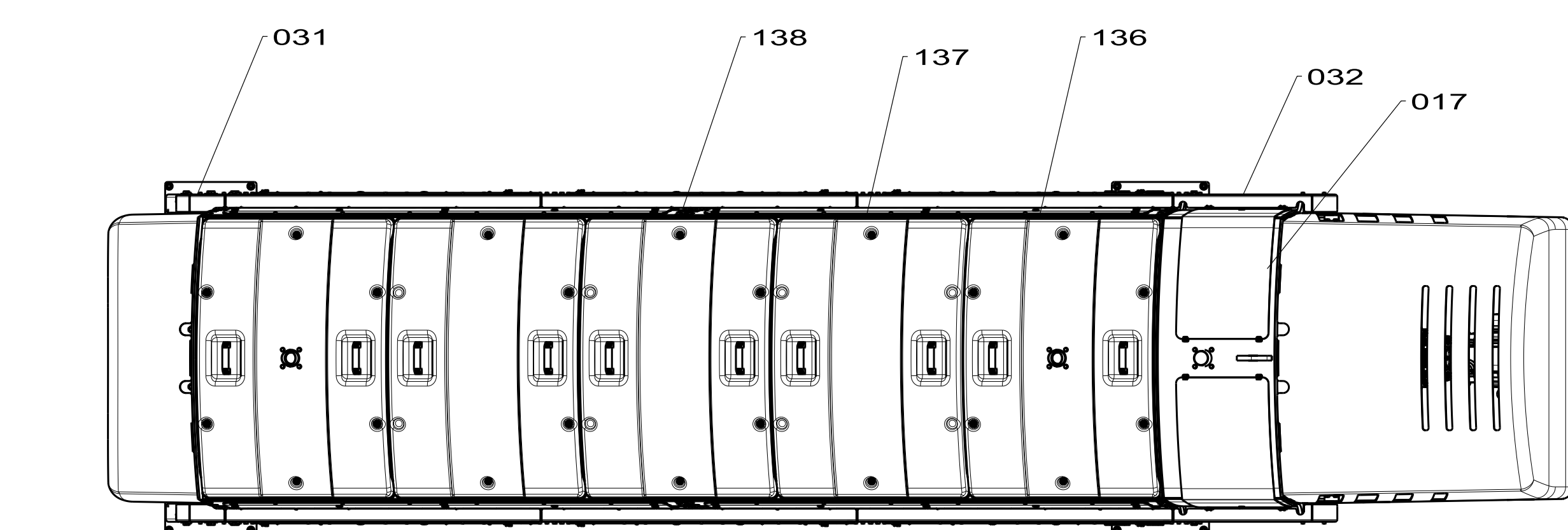
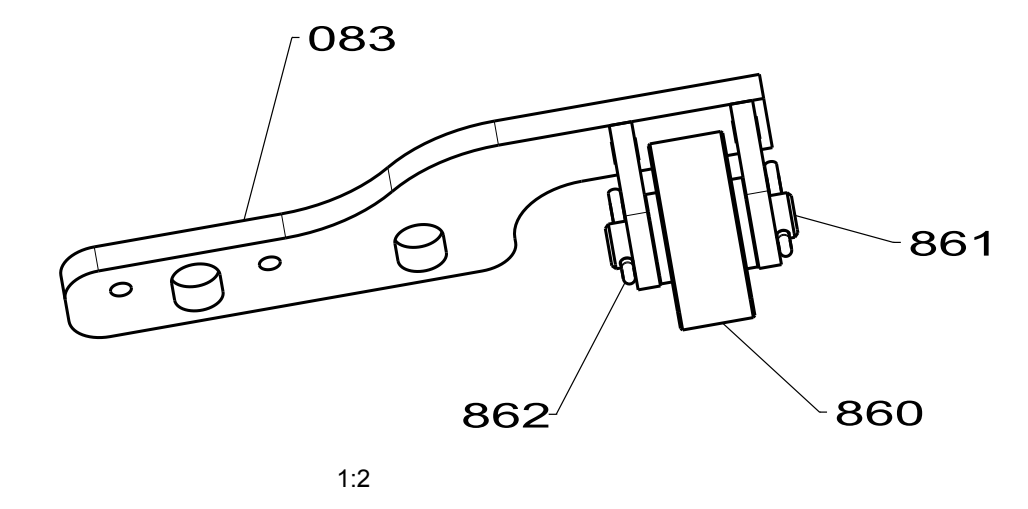
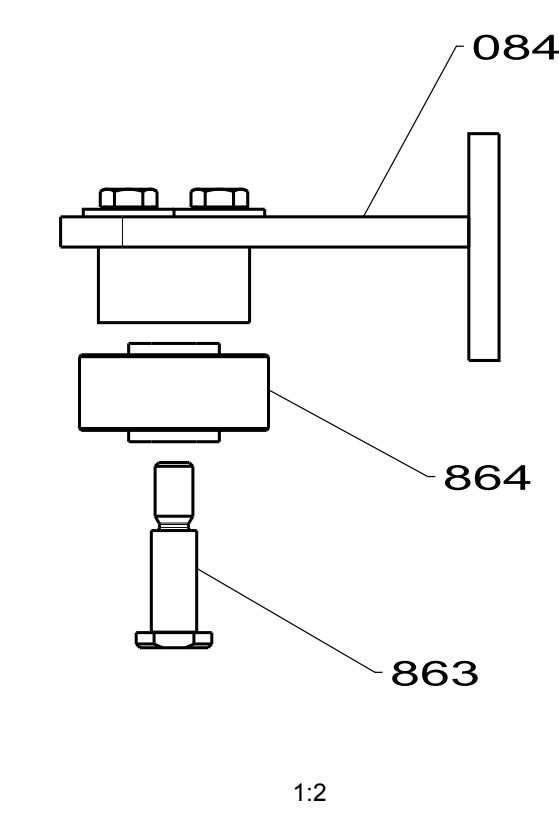
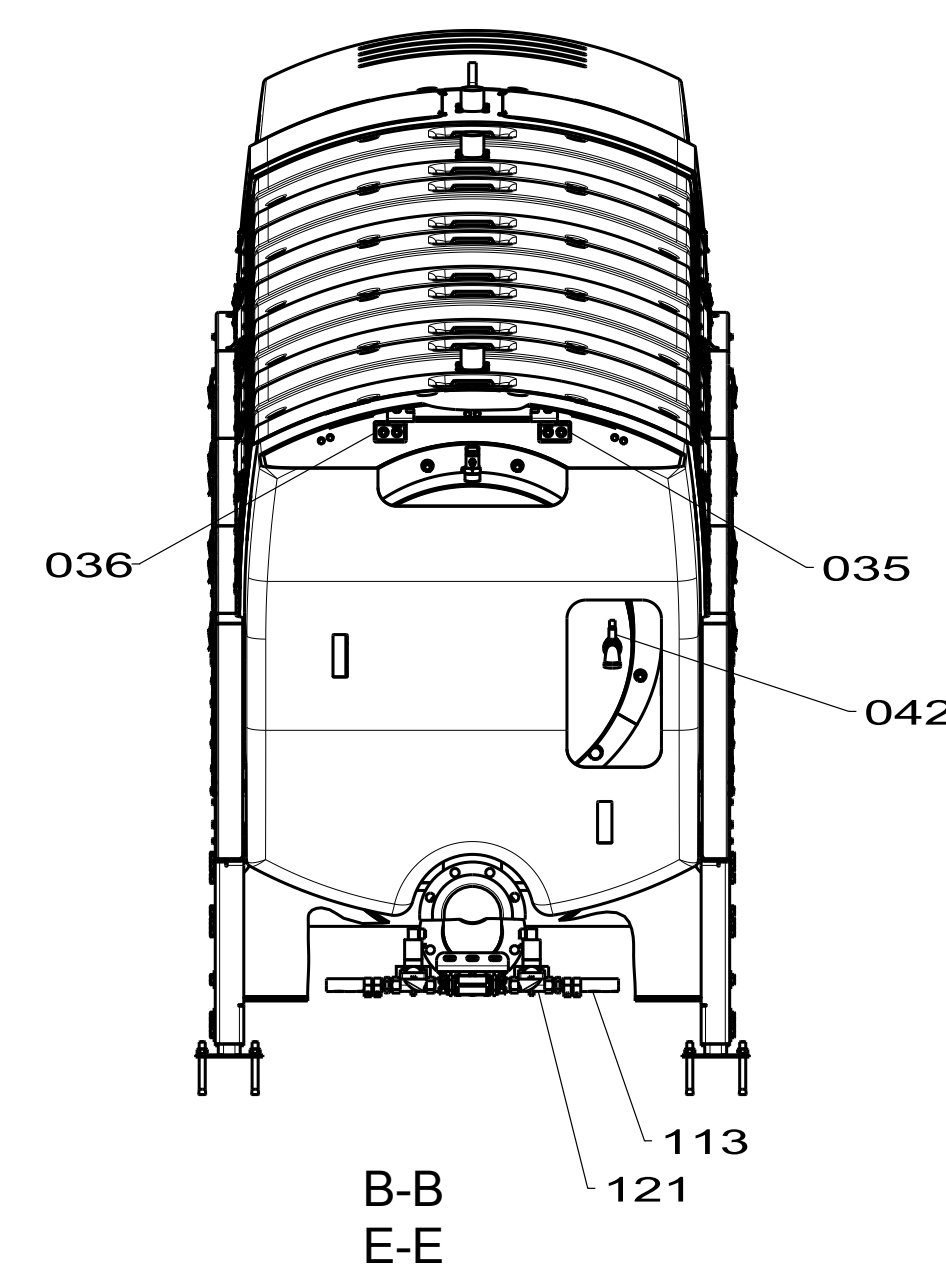
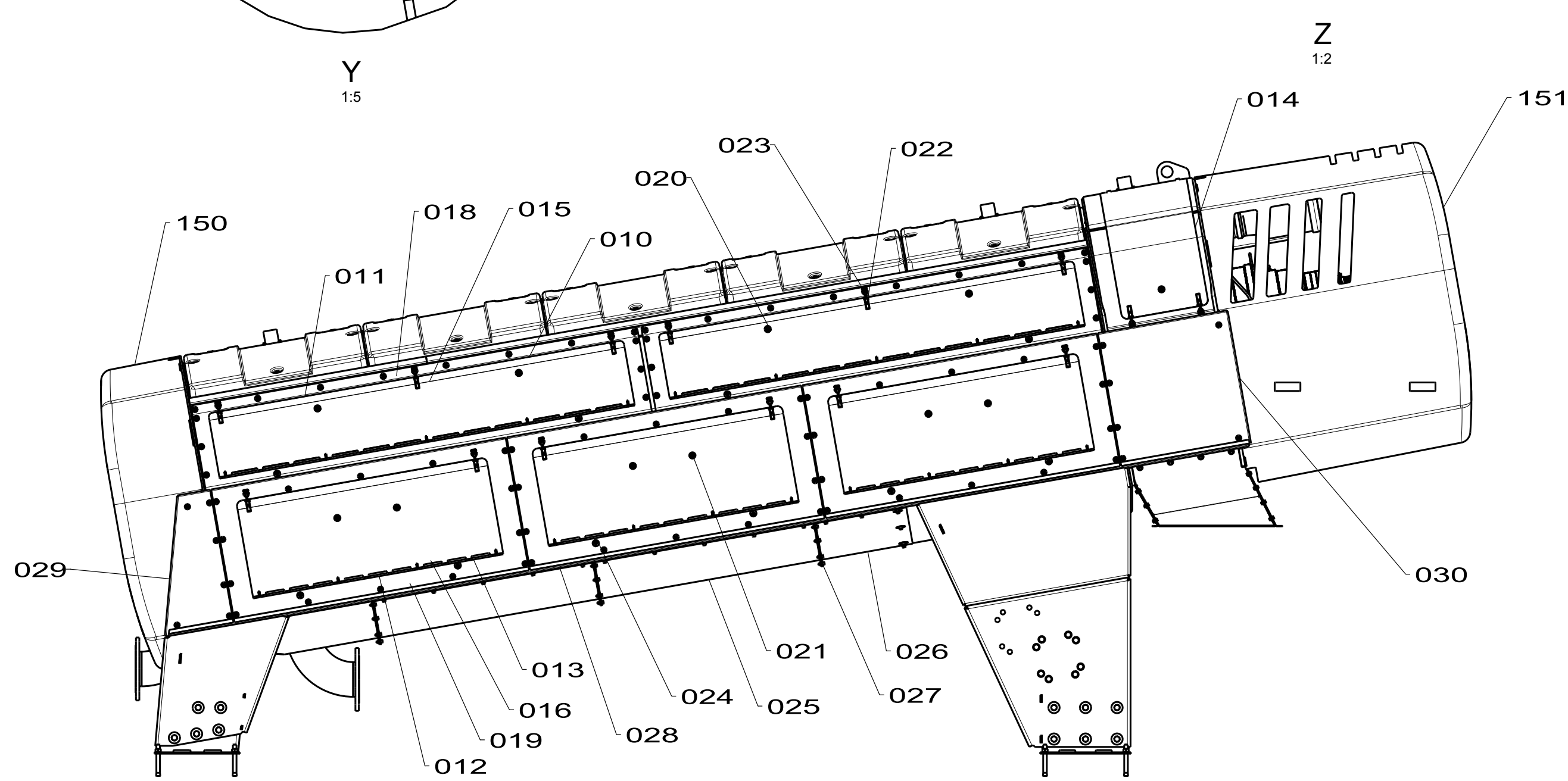
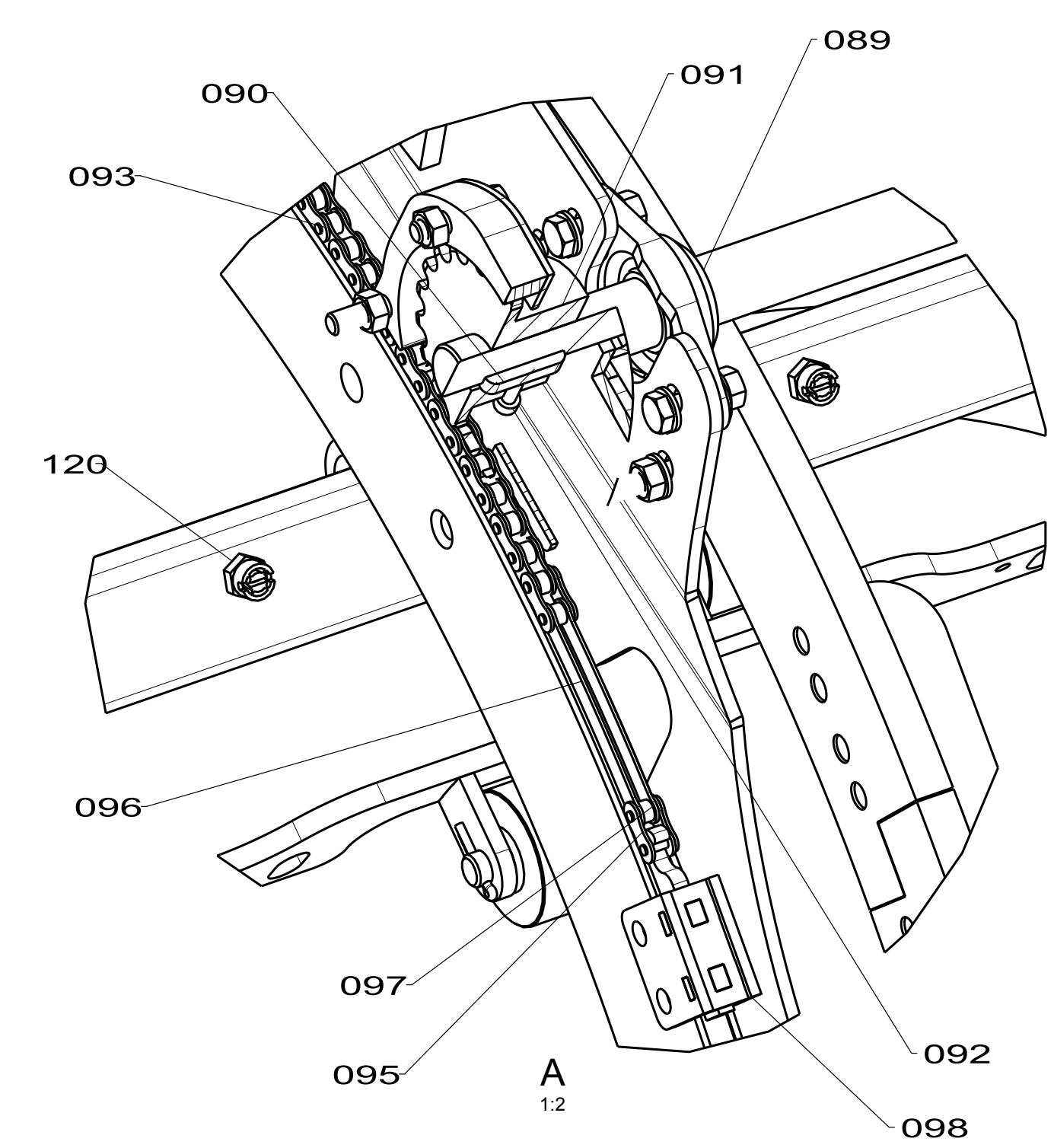
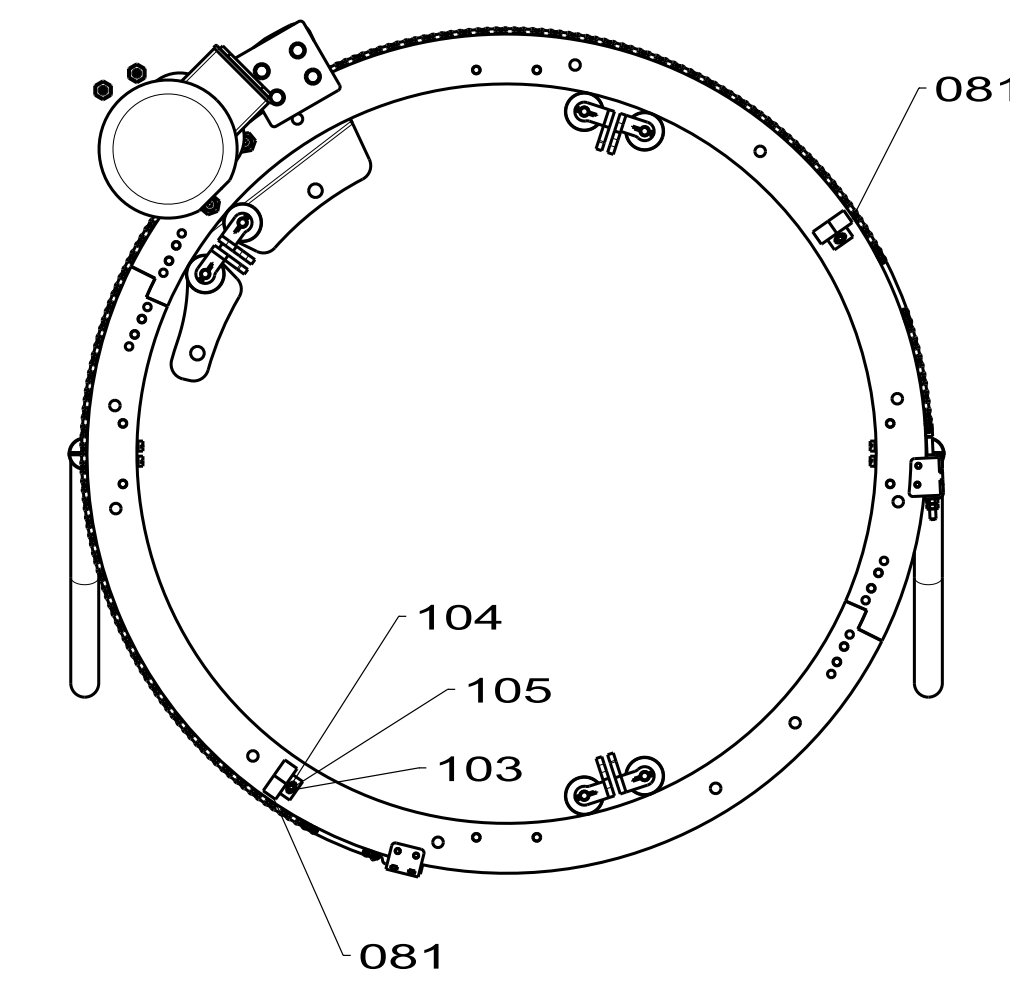
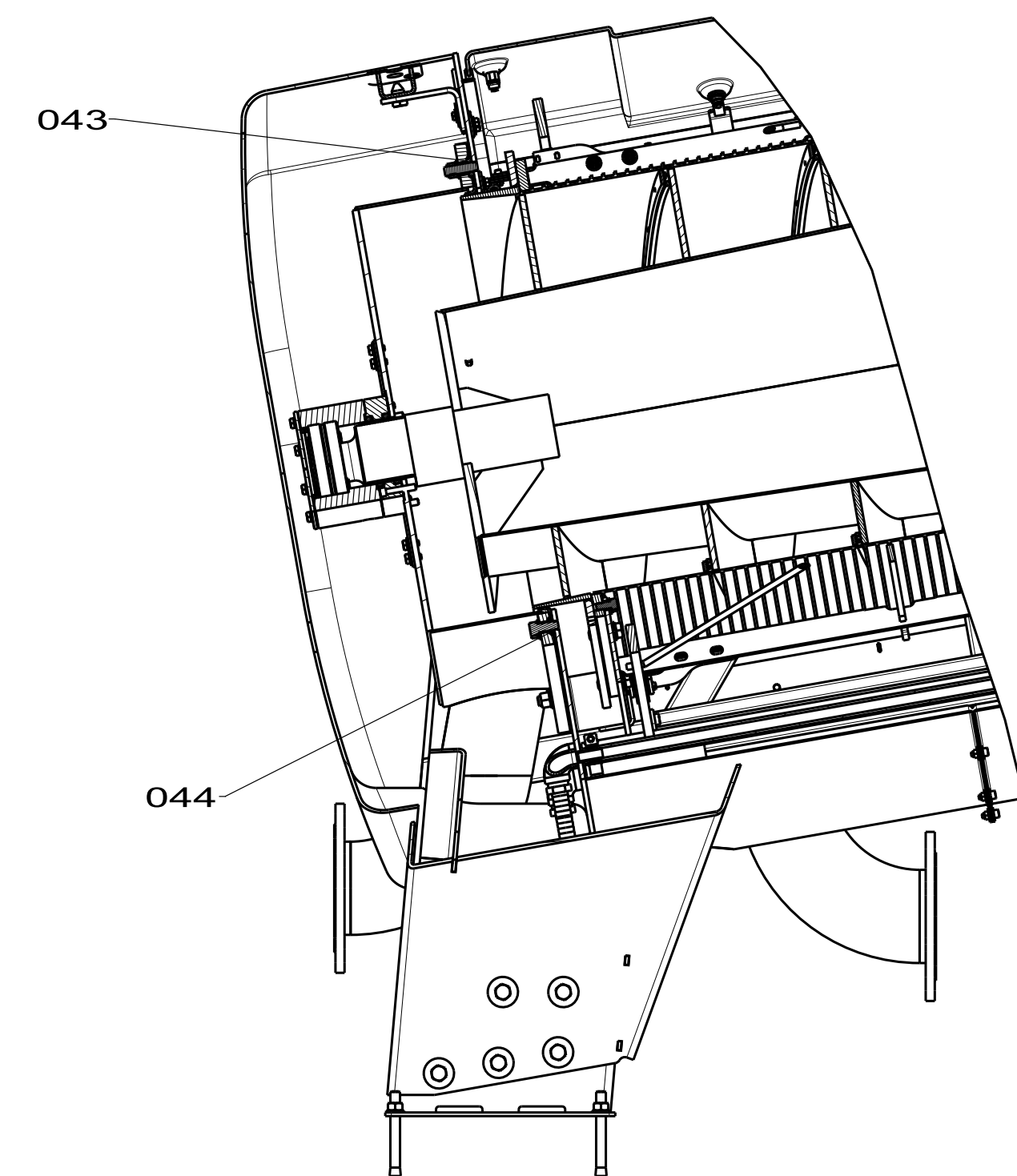
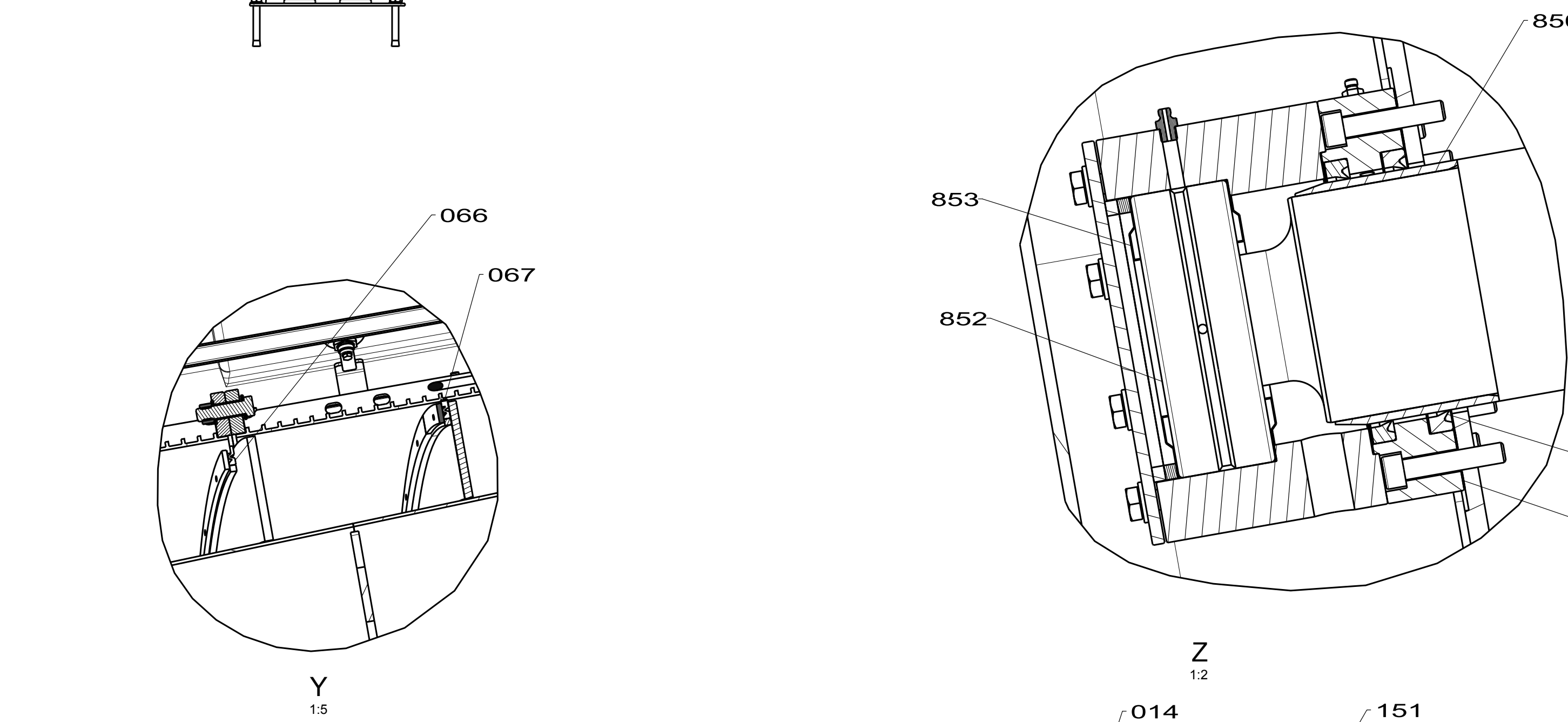
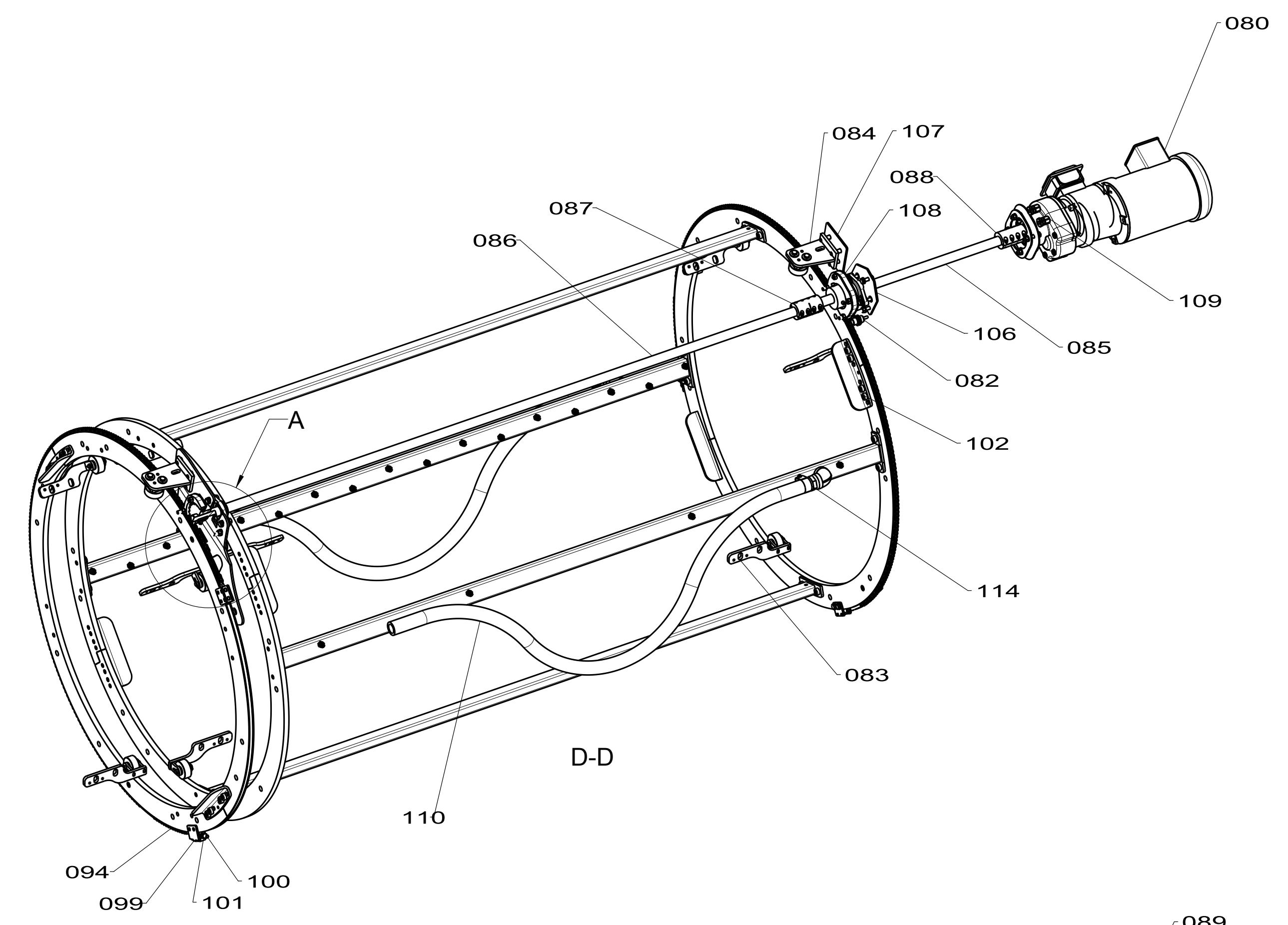
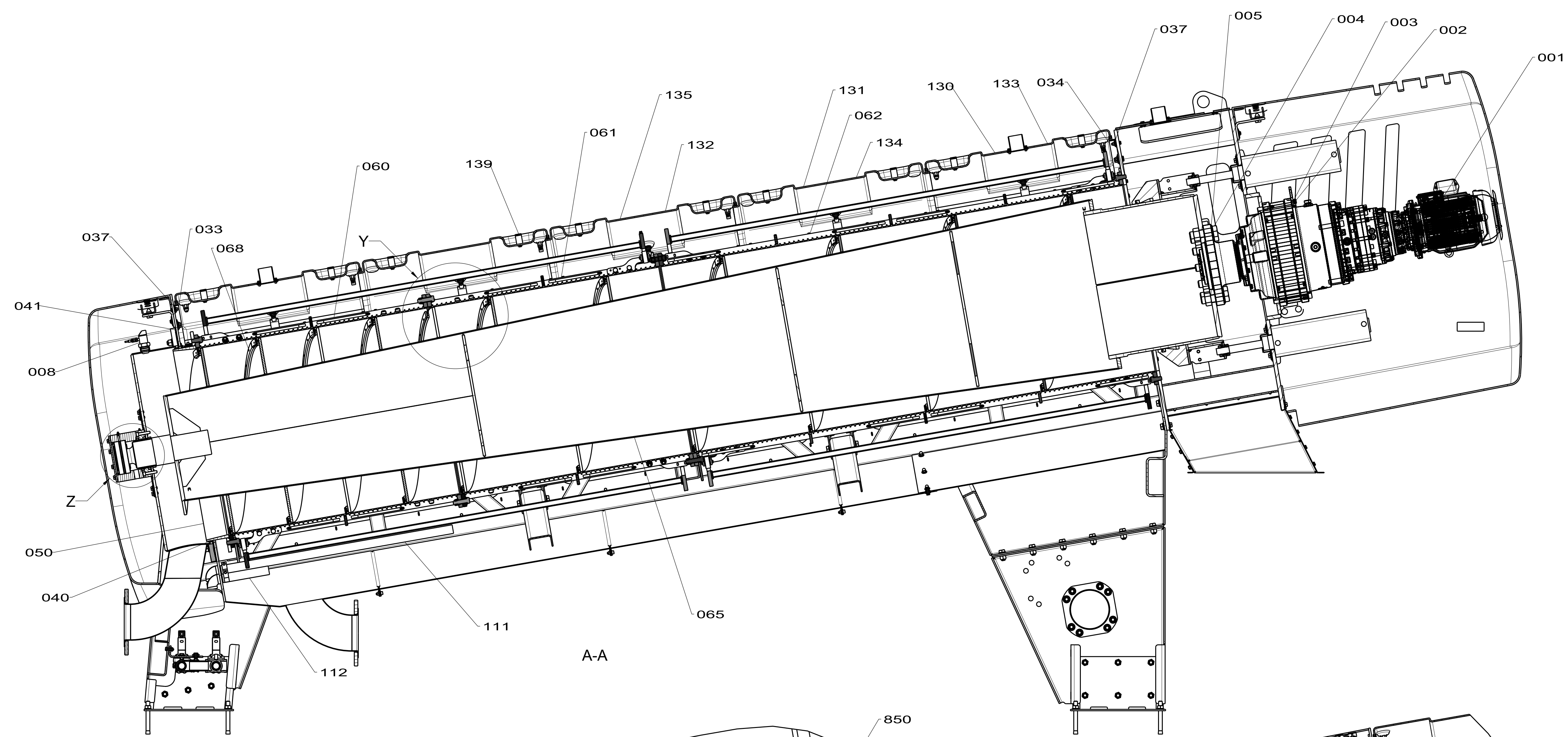
OPERATION

TROUBLESHOOTING

MAINTENANCE / REPAIR

# Section 5.0

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HUBER TECHNOLOGY HUBER Screw Press										HUBER TECHNOLOGY	
Q-PRESS® 800.2										50994709	
Spare part drawing										Blatt 1/1	
Section 5, page 1										1/1	

## Spare and wear parts

### ROTAMAT® Screw Press Q-PRESS® 800.2

Wearing parts are parts that are subject to increased wear due to their specific function. Such wear depends to a great extent on:

- Application conditions (such as an increased grit rate, or abrasive materials)
- Running hours
- Maintenance

spare part: s  
wear part: w

recommended 2 years	recommended 5 years	Pos item	Description	
		001	geared engine	s
		002	cylinder screw M14x150	s
		003	washer A15,0	s
		004	hexagon bolt M30x100	s
		005	washer A31,0	s
		008	pressure Sensor PF2657	s
		010	cover	s
		011	cover welding assembly	s
		012	cover	s
		013	cover welding assembly	s
		014	lid	s
		015	edge protection profile	s
		016	edge protection profile	s
		017	strip sealing	s
		018	strip sealing	s
		019	strip sealing	s
		020	turning bolt	s
		021	turning bolt	s
		022	excentric lock	s
		023	door latch	s
		024	excentric disk	s
		025	tub	s
		026	tub	s
		027	strip sealing tub	s
		028	strip sealing tub	s
		029	cover f. l.	s
		030	cover r. l.	s
		031	cover f. r.	s
		032	cover r. r.	s
		033	support top lids front	s
		034	support top lids rear	s
		035	attachment left	s
		036	attachment right	s

	recommended 2 years	recommended 5 years	Pos item	Description	
			037	strip sealing	s
			040	sealing	s
			041	strip sealing half round	s
			042	ball valve	s
			043	distance ring 30/17x8	s
			044	distance ring 34/21x8	s
			050	clamping ring	s
			060	screen basket 0,4	s
			061	screen basket 0,25	s
			062	screen basket 0,15	s
			065	screw shaft	s
X			066	scraper lip short	w
X			067	scraper lip long	w
X			068	threaded pin	w
			070	cone	s
	X		071	grooved ring	w
			072	pneumatic cylinder	s
			073	L-plug screw connection	s
			074	T-plug connection	s
			075	pneumatic hose short	s
			076	pneumatic hose long	s
			080	geared engine	s
			081	contact	s
			082	proximity switch	s
			083	radial bearing	s
			084	axial bearing	s
			085	shaft short	s
			086	shaft long	s
			087	cupling engine/shaft	s
			088	cupling shaft/shaft	s
			089	flange bearing	s
			090	feather key	s
			091	pinion	s
			092	cylindric screw M5x20	s
			093	chain RF332 long	s
			094	chain RF332 short	s
			095	connection link	s
			096	link plate freerun	s
			097	sleeve freerun	s
			098	chain attachment	s
			099	chain attachment	s
			100	chain tightener	s
			101	hexagon nut	s
			102	cylindric screw M12x20	s
			103	countersunk screw M6x30	s
			104	washer A7,0	s
			105	hexagon nut M6	s
			106	sealing	s

	recommended 2 years	recommended 5 years	Pos item	Description	
			107	sealing	s
			108	pinion protection	s
			109	cable screw connection	s
			110	hose pivoting	s
			111	hose housing long	s
			112	hose housing short	s
			113	hose distributor	s
			114	hose clip	s
			120	nozzle	s
			121	solenoid valve	s
			130	lid front/back	s
			131	lid transition	s
			132	lid line	s
			133	lip part front/back	s
			134	lip part transition	s
			135	lid part line	s
			136	edge protection profile lid front/back	s
			137	edge protection profile lid transition	s
			138	edge protection profile lid line	s
			139	bow type handle	s
			150	GFP cover front	s
			151	GFP cover back	s
	X		850	bush	w
	X		851	oil-seal	w
	X		852	self aligning roller bearing	w
	X		853	seal ring	w
			854	paper sealing	s
X			860	roller radial	w
X			861	roller axial	w
X			862	cotter pin	w
X			863	roller axes axial bearing	w
X			864	roller axes radial bearing	w



---

**LIST OF SPARE PARTS SUPPLIED  
BY HUBER WITH EQUIPMENT**

**City of Cheyenne, WY – Dry Creek WRF Improvements**

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**No spare parts will be supplied by Huber Technology for this project.**

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## **LIST OF SPECIAL TOOLS**

**City of Cheyenne, WY – Dry Creek WRF Improvements**

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**Huber verifies that no special tools are required for maintenance or repair of this equipment.**

## STORAGE PROCEDURE

City of Cheyenne, WY – Dry Creek WRF Improvements

---

### **Mechanical Equipment Storage:**

When selecting the location for storage, take care that the components cannot be damaged due to vehicles or careless working. The components may not become dirty due to splashes of concrete or mortar. There should be no spark fountains from angle grinders etc. Exposed electrical components of the equipment (sensors and motors) must be wrapped with a waterproof bag. The equipment may not be stored externally near the coast. The storage location must be vibration free. Do not store organic dissolvents at the location of storage. Avoid ultraviolet radiation as well as ambient air containing ozone, hydrogen sulfide, and chloride. If equipment is stored for longer than 6 months, the gearbox oil should be drained and refilled with new oil. Please contact Huber on the project specific external storage strategy for approval.

### **Control Panel Storage:**

When selecting the storage place take care that the components cannot be damaged due to vehicles or careless working. The components may not become dirty due to splashes of concrete or mortar. There are no spark fountains from angle grinders etc. The control panel must be stored internally in a climate controlled environment within a non-classified environment. The storage temperature shall not drop below 35°F and shall not exceed 95°F. Specific external storage strategies are allowed upon prior written permission by Huber. In these cases, please provide detailed storage plan, in writing, so that a component by component evaluation can be completed for the control system.

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## **NUMBER OF DAYS AND TRIPS FOR START-UP**

**City of Cheyenne, WY – Dry Creek WRF Improvements**

---

**Huber verifies:**

- **Sixteen (16) total days onsite for Phase 1-3 services**
- **Five (5) total trips for Phase 1-3 services**

**have been allocated for the City of Cheyenne, WY – Dry Creek WRF Improvements Project. Additional services are available upon request on a per diem rate.**

# Section 6.0

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## *Product Catalog Information*

**Customer:**

Huber Technology

**Job Name:**

Cheyenne, WY

Q-Press Control Panel

**Arranged By:**

EleMech, Inc.

2275 White Oak Circle

Aurora, IL, 60502

**Project Engineer:**

Adam Juodis

**Date:**

07/17/20



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Rev: 0

Date: 7/17/2020

By: AJ

Section:

A

Job Number: HBR8191

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Section Name:

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# Submittal Comments

**B**



Rev: 0

Date: 7/17/2020

By: AJ

Section:

**B**

Job Number: HBR8191

Page # 1/1

Section Name: Submittal Comments



**Project Name:** Cheyenne, WY  
**Project Number:** HBR8191  
**Customer Project:** 73005896  
**Panel Type:** Q-Press Control Panel

July 15, 2020

The following comments are based on the Cheyenne, WY Q-Press control panel revision 0 submittal:

1. The control panel drawings are typical of (2) control panels.
2. The Q-Press control panel can be remotely monitored via Ethernet/IP or hardwire dry contacts. The list of Ethernet monitoring signals provided can be found on sheet HBR8191A14 of the control drawings. The list of provided hardwire dry contacts can be found on sheet HBR8191A12 of the control drawings. Advise if any additional dry contact or Ethernet monitoring signals are required.
3. Specification 444626-2.08.B.1 and 444626-2.08.C.1 list IP addresses for the control panel PLCs and OIUs. In addition to the PLC and OIU, each control panel will need (3) additional IP addresses for the Press and Flocc Mixer VFDs and the managed Ethernet switch (6 total for both panels). Please specify the IP addresses that should be used for these devices.
4. An Allen Bradley CompactLogix PLC and a PanelView Plus 12" operator interface (OIU) has been provided and will be programmed with the following software:
  - PLC: Studio 5000 (Latest Version)
    - Ladder Diagram Programming Type, including EleMech standard Add On Instructions (AOI's).
  - OIU: FTView ME (Latest Version)
    - Developed utilizing EleMech's standard Global Object library.
5. Quantity (2) NEMA 4X 304 stainless steel local control station has been provided for the screw press. The local control station will include the 12" operator interface and an E-stop pushbutton. The local control station will not be suitable for installation in a classified/hazardous area.
6. Advise if the local control station will be mounted in an area that will be exposed to direct sunlight.
7. Per specification 444626-2.08.A.4, the control panel voltages have been isolated and separated between a metal barrier that runs through the center of the control panel between the control panel enclosure doors. The left side of the enclosure subpanel will include the 24VDC devices. The right side of the enclosure subpanel will include the rest

of the devices that are greater than 24V. The enclosure will have independently operable doors to access each of the low/high voltage compartments. The high voltage door will be interlocked with the main disconnect circuit breaker.

8. The low voltage side of the enclosure currently includes 24VDC control relays (CR1-9) that include 120VAC connections to the control relay's contacts. These relays are used for motor and solenoid control. Advise if CR1-9 should be located on the high voltage side of the enclosure.
9. Specification 444626-2.08.B.6.e/f specifies a separate door mounted GFCI receptacle and door mounted Ethernet port installed on the high voltage and low voltage side, respectively. A single receptacle that includes both a GFCI and an Ethernet port has been provided. This receptacle will be installed on the high voltage side of the control panel. Please note that the Ethernet cable that will be used is rated for 600V and is shielded. The Ethernet cables will be routed outside the wire ducts to the low voltage side of the control panel.
10. Specification 444626-2.08.E.3 lists indications for motors/instrumentation that are currently not accounted for in the control panel design:
  - Screw Conveyor – Start/Stop command and ON indication
  - Screw Press Sludge Chute – Level indication
  - Screw Press Sludge Chute – High Level Alarm

Note that the Q-Press control panel is not currently providing control or monitoring for a screw conveyor, or monitoring a sludge chute level sensor. There are no additional references to a screw conveyor or sludge chute level sensor within specification 444626. If this control and monitoring is required, please provide additional details to assist EleMech in implementing these items into the control system.

11. The Q-Press control panel will provide a call to run dry contact and hardwire speed command 4-20mA signal (0-100%) for the sludge feed pump operation. The Q-Press PLC will require the following status signals from the sludge feed pump via hardwire connection:
  - Sludge Pump in Remote
  - Sludge Pump Running
  - Sludge Pump Fault

Advise if the monitoring and control for the sludge feed pump will be through the Ethernet network.

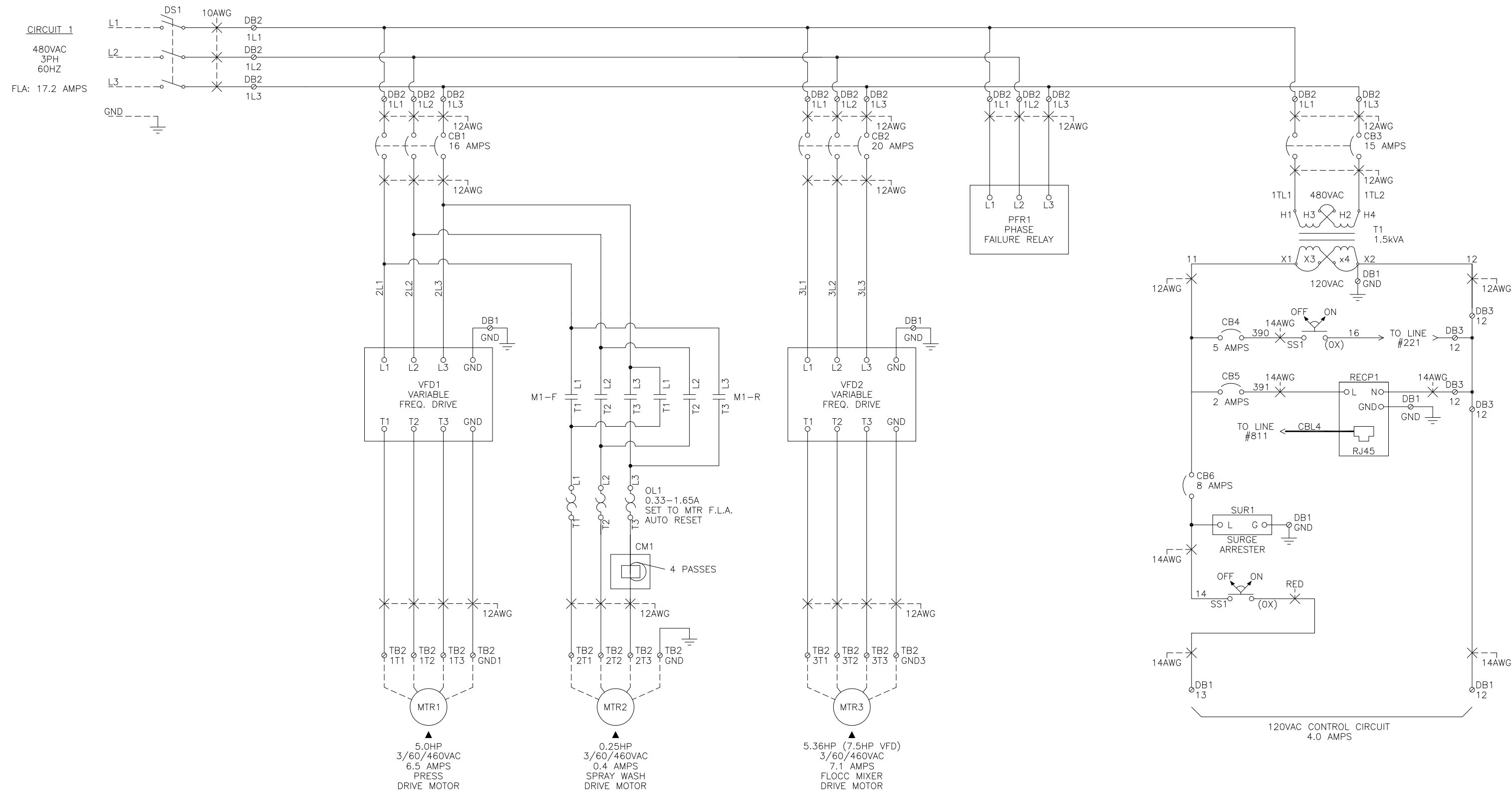
12. The Q-Press control panel will provide a call to run dry contact and hardwire speed command 4-20mA signal (0-100%) for the polymer system operation. Advise if the monitoring and control for the polymer system will be through the Ethernet network.

13. VFD driven motors are required in the design. If the cable length is expected to exceed 100 feet, additional filtering may need to be provided by the contractor.

# Electrical Drawings



<b>ELEMECH</b> INC. 630-499-7080 · www.elemechinc.com	Rev: 0	Section: C	
	Date: 7/17/2020		
Section Name: Electrical Drawings	By: AJ	Job Number: HBR8191	Page # 1/1



- NOTES:**
- ▲ DEVICES LOCATED OUTSIDE CONTROL PANEL.
  - ⊙ TERMINAL BLOCK (TB) OR DISTRIBUTION BLOCK (DB) LOCATED IN CONTROL PANEL.
  - FIELD WIRING.
  - CONTROL PANEL WIRING SHALL BE MTW TYPE, TINNED COPPER, 600V, 105°C, UL1015/CSA.
  - NAMEPLATES SHALL BE ENGRAVED, WHITE WITH BLACK LETTERS.
  - WIRE LABELS SHALL BE HEAT SHRINK TYPE.
  - ELEMECH RESERVES THE RIGHT TO CHANGE, AS NECESSARY, THE SPACING, ORIENTATION, AND PHYSICAL LOCATION OF DEVICES IN ORDER TO OPTIMIZE THE DESIGN.
  - LOCAL MOTOR DISCONNECT SWITCHES SHALL BE PROVIDED BY OTHERS IF REQUIRED BY LOCAL REGULATIONS.
  - JUNCTION BOXES ARE NOT SHOWN AND SHALL BE PROVIDED BY OTHERS AS NECESSARY.
  - THIS DRAWING IS TYPICAL OF (2) CONTROL PANELS.

**WIRE COLORS:**

BLK - POWER  
 BLK - 120VAC HOT  
 WHT - 120VAC NEUTRAL  
 RED - 120VAC CONTROL  
 YEL - REMOTE  
 GRN - GROUND  
 BLU - DC POSITIVE/CONTROL  
 WHT/BLU - DC NEUTRAL

DATE	REVISION	NO.	BY	CK	APP	DATE
					DESIGNED	AJ
					DETAILED	
					CHECKED	MSN
					APPROVED	
						07/14/20

**HUBER**  
**TECHNOLOGY**

1009 Airlie Parkway  
 Denver, NC 28037  
 Tel. 704-949-1010  
 info@hhusa.net

Q-PRESS  
 CONTROL PANEL

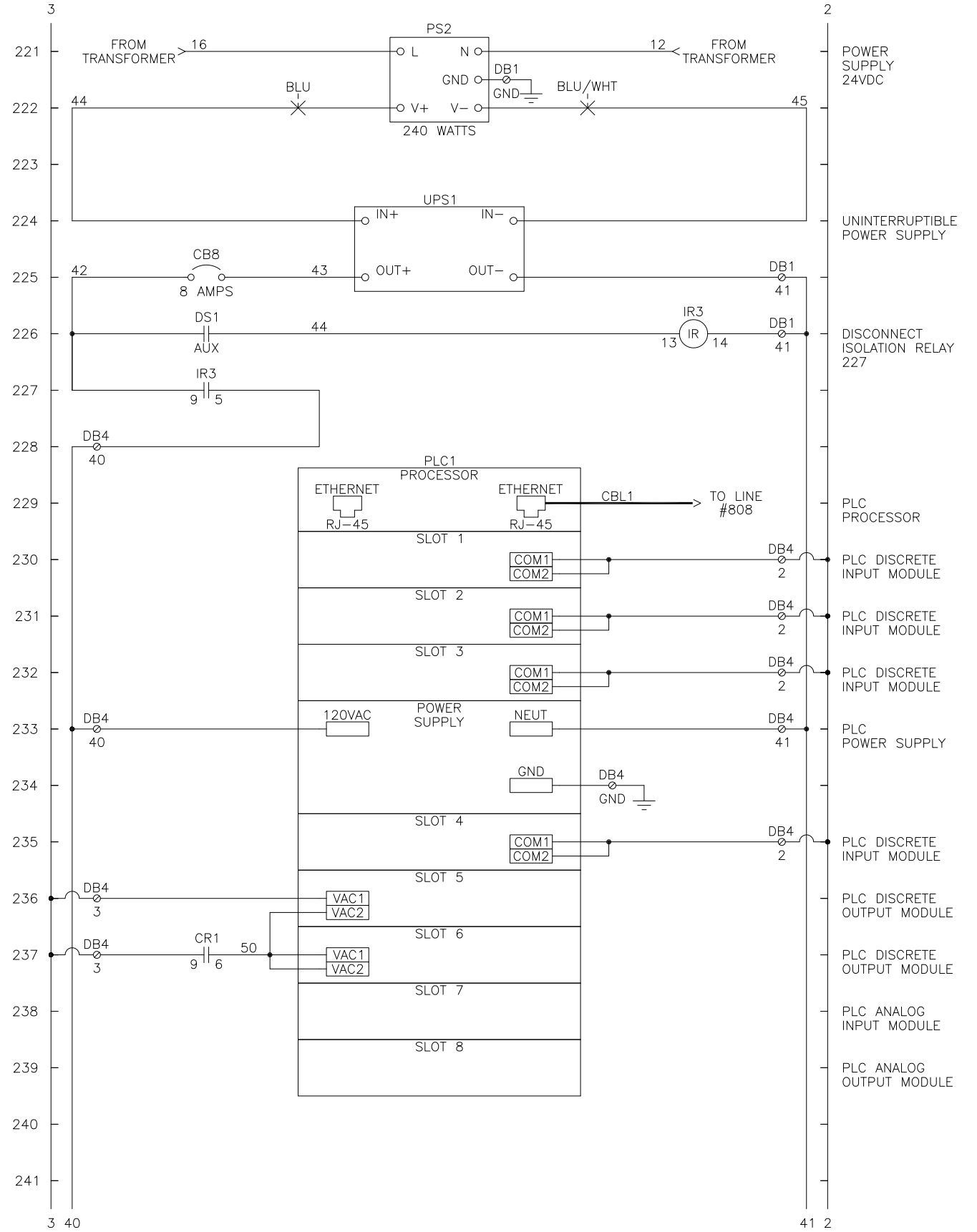
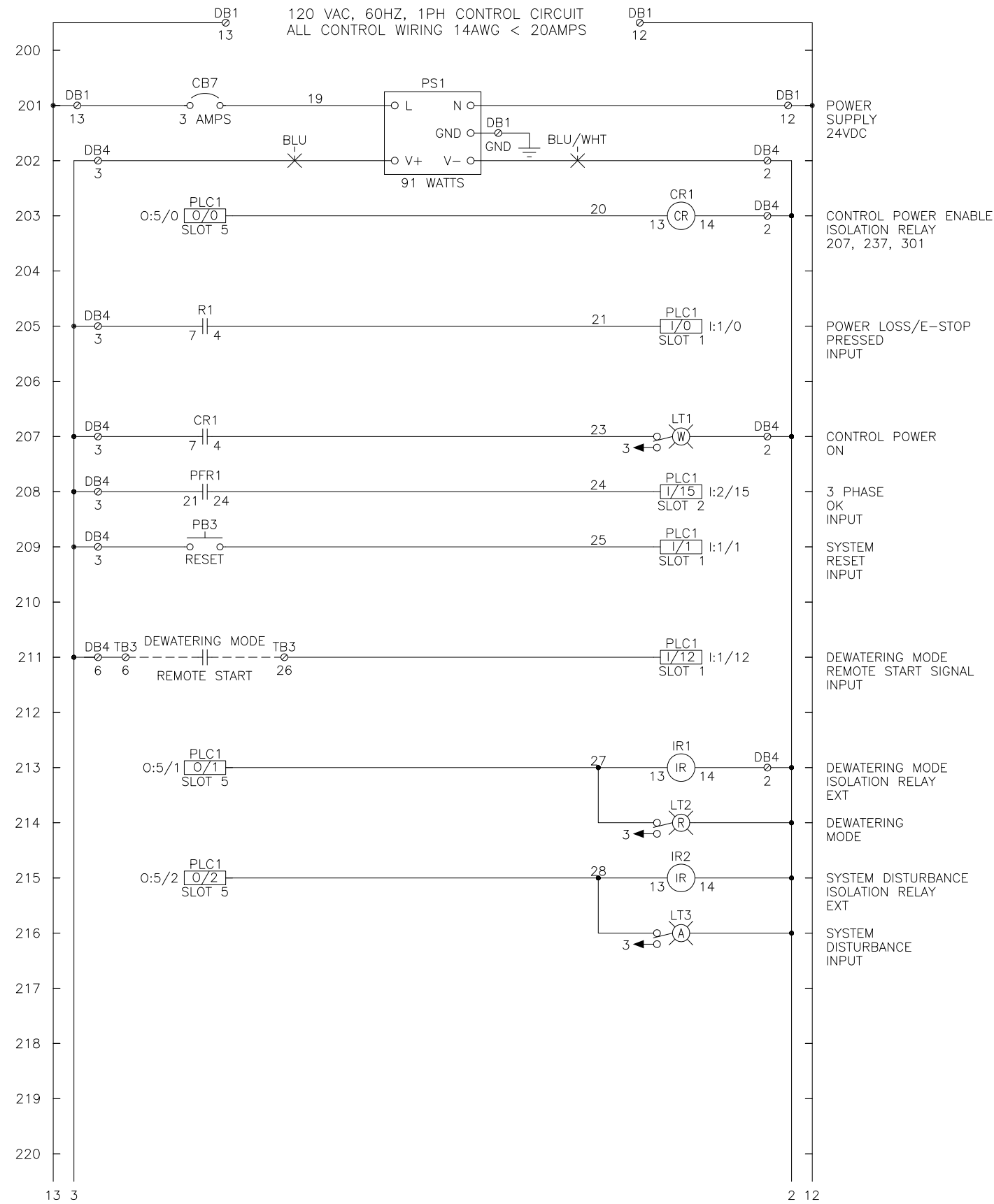
CHEYENNE, WY

SCALE:  
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PROJECT NUMBER:  
 73005896

DRAWING NO:  
 HBR8191A1

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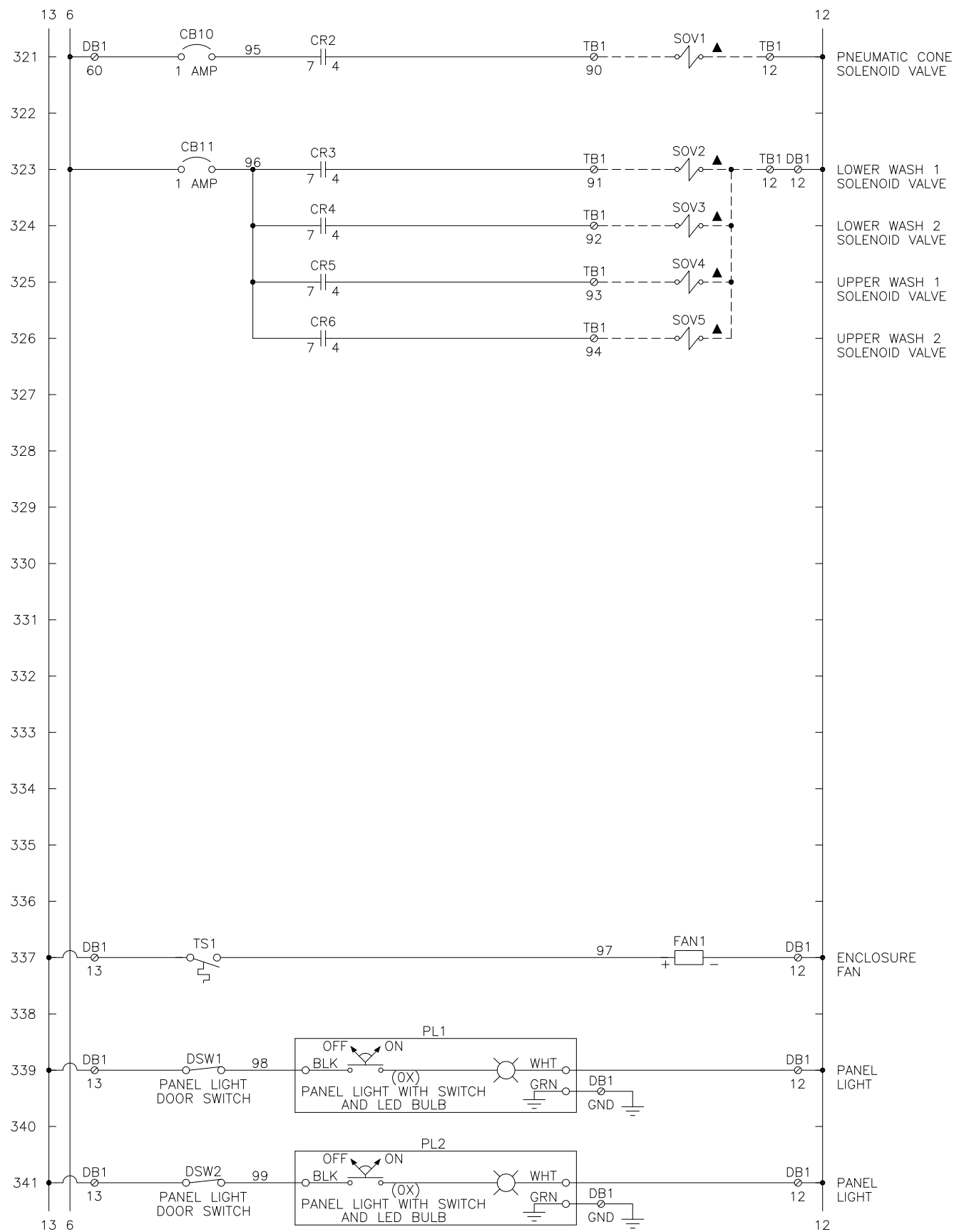
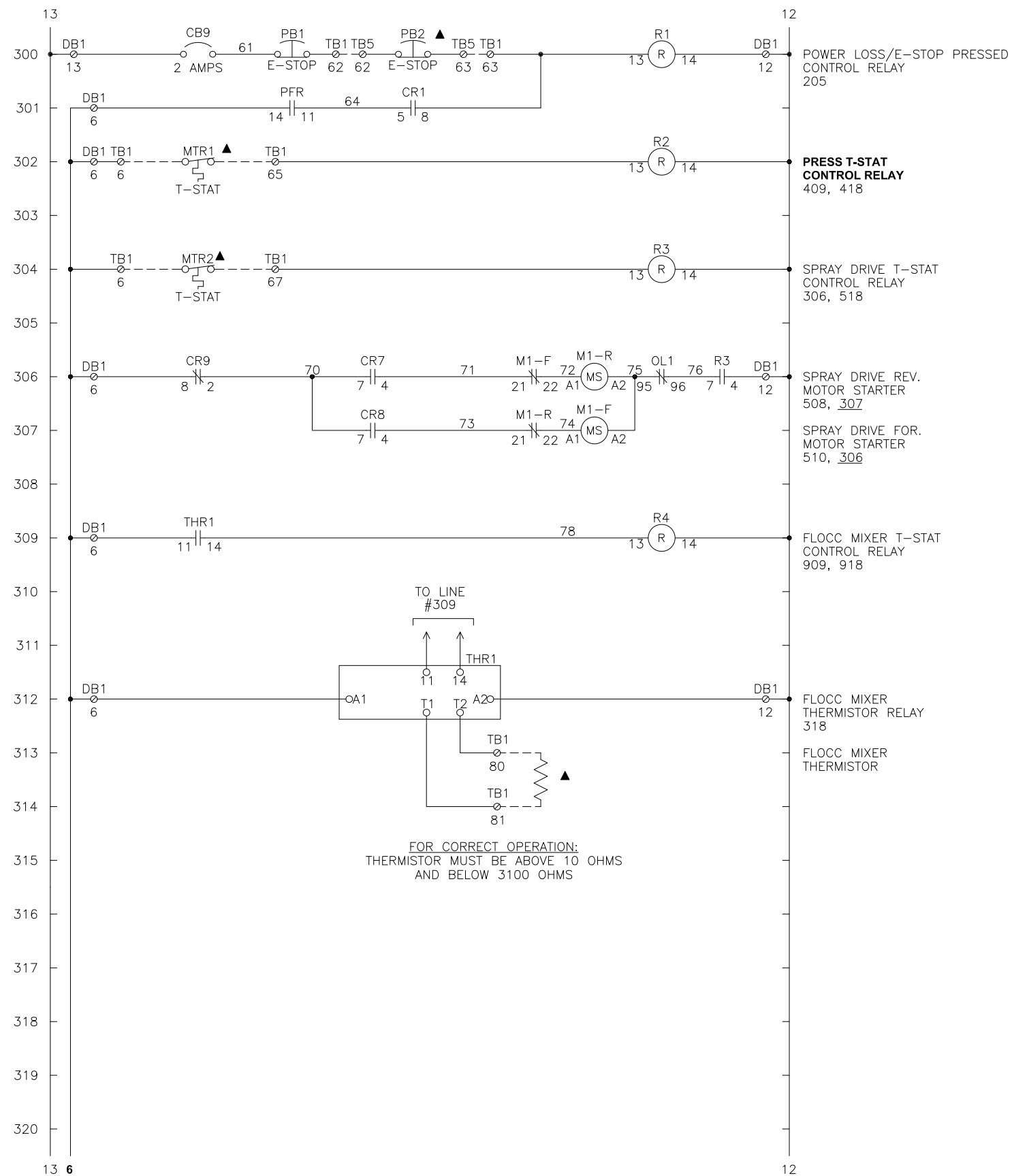
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DATE	07/14/20

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Q-PRESS CONTROL PANEL  
CHEYENNE, WY  
SCALE: NONE

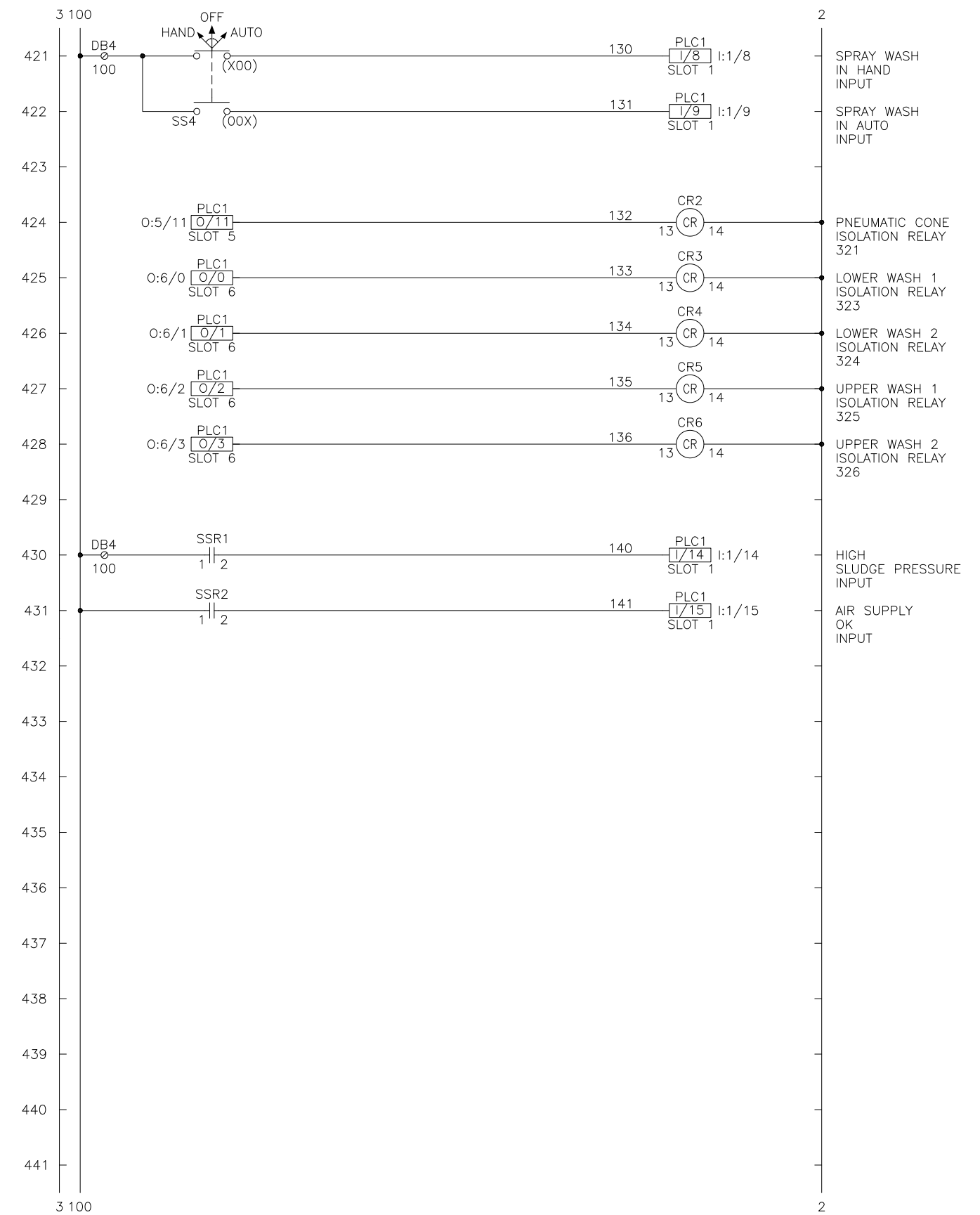
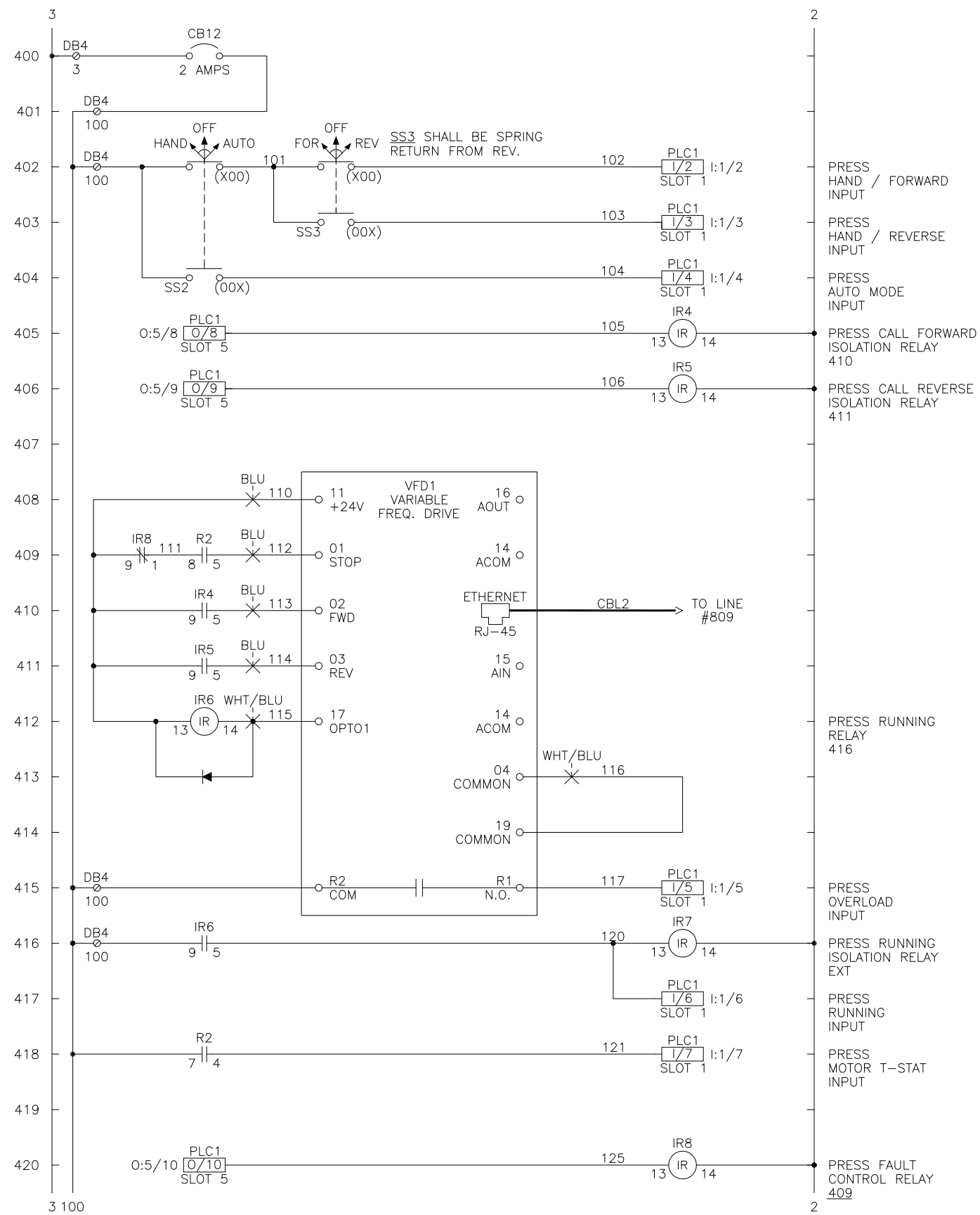
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DRAWING NO: HBR8191A2  
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Q-PRESS CONTROL PANEL  
CHEYENNE, WY SCALE: NONE  
PROJECT NUMBER: 73005896 DRAWING NO: HBR8191A3  
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Q-PRESS CONTROL PANEL

CHEYENNE, WY

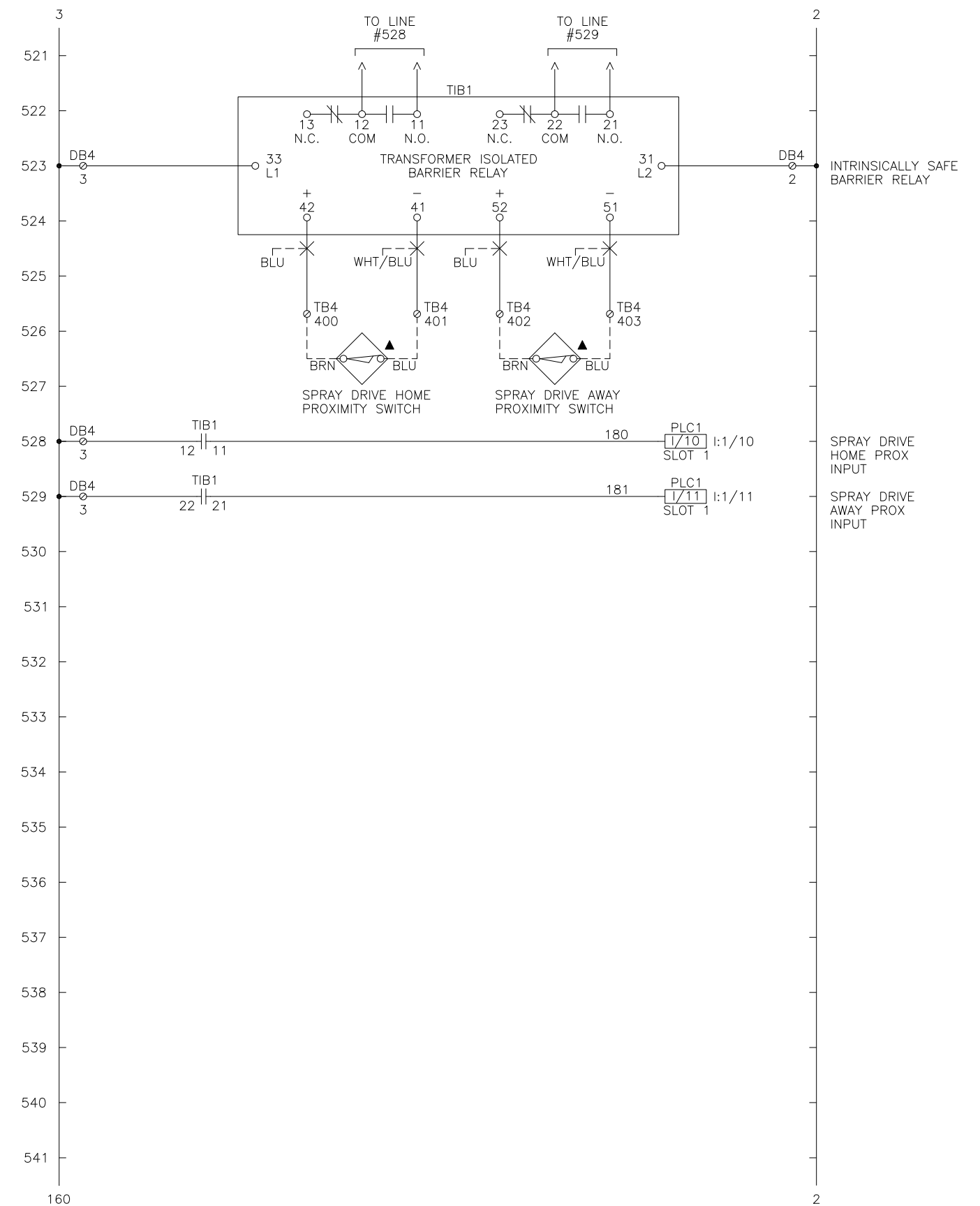
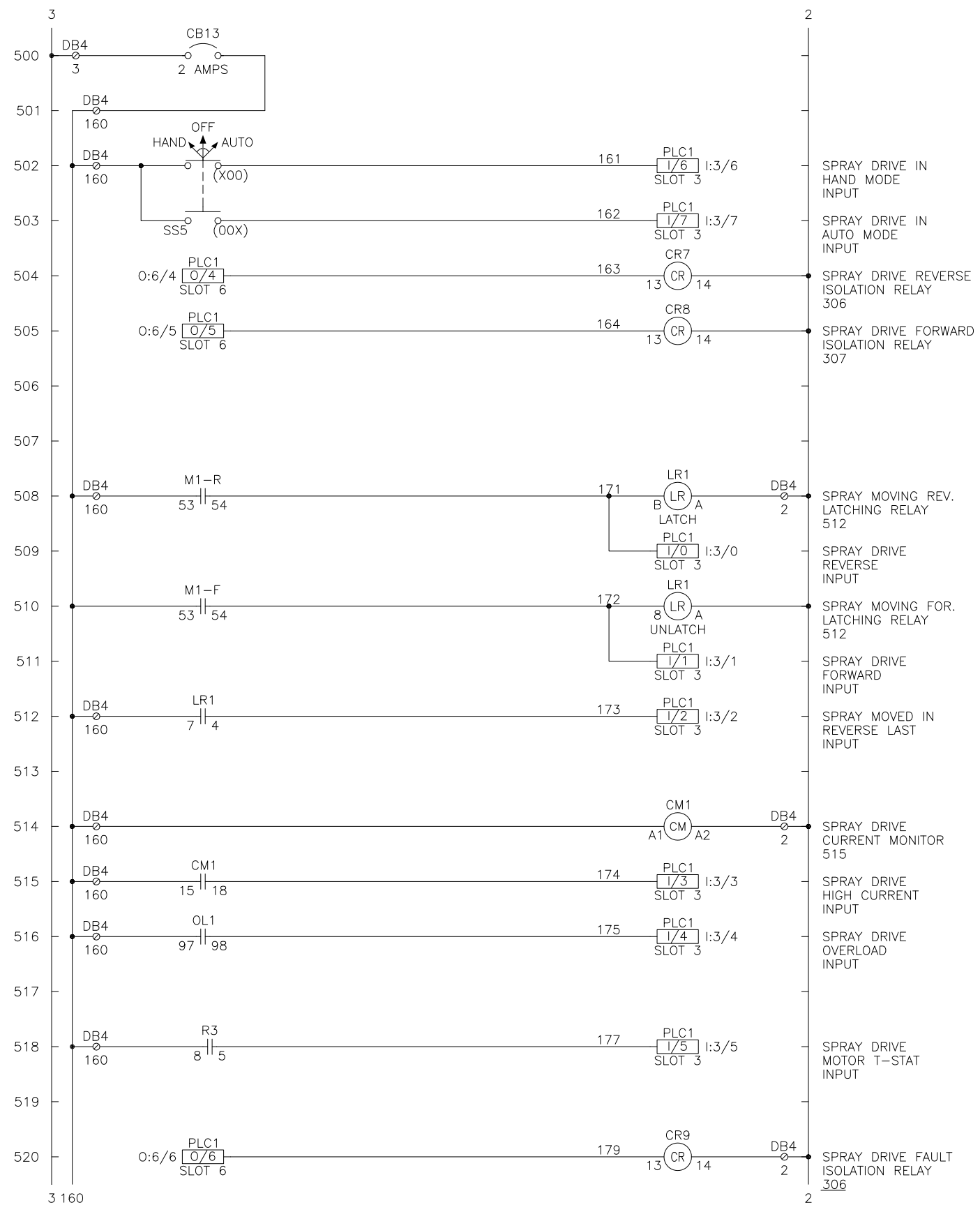
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SCALE: NONE





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Q-PRESS  
CONTROL PANEL

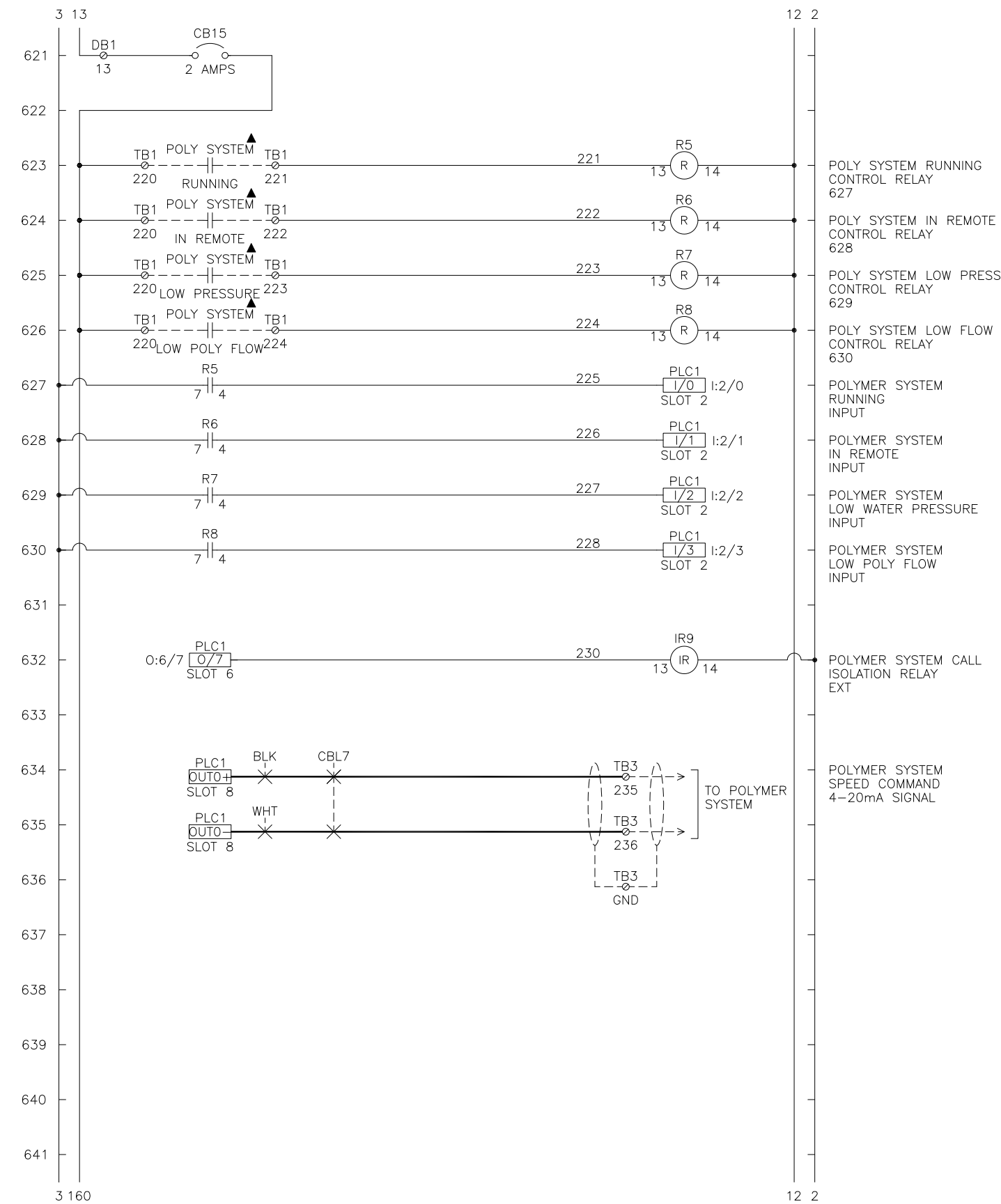
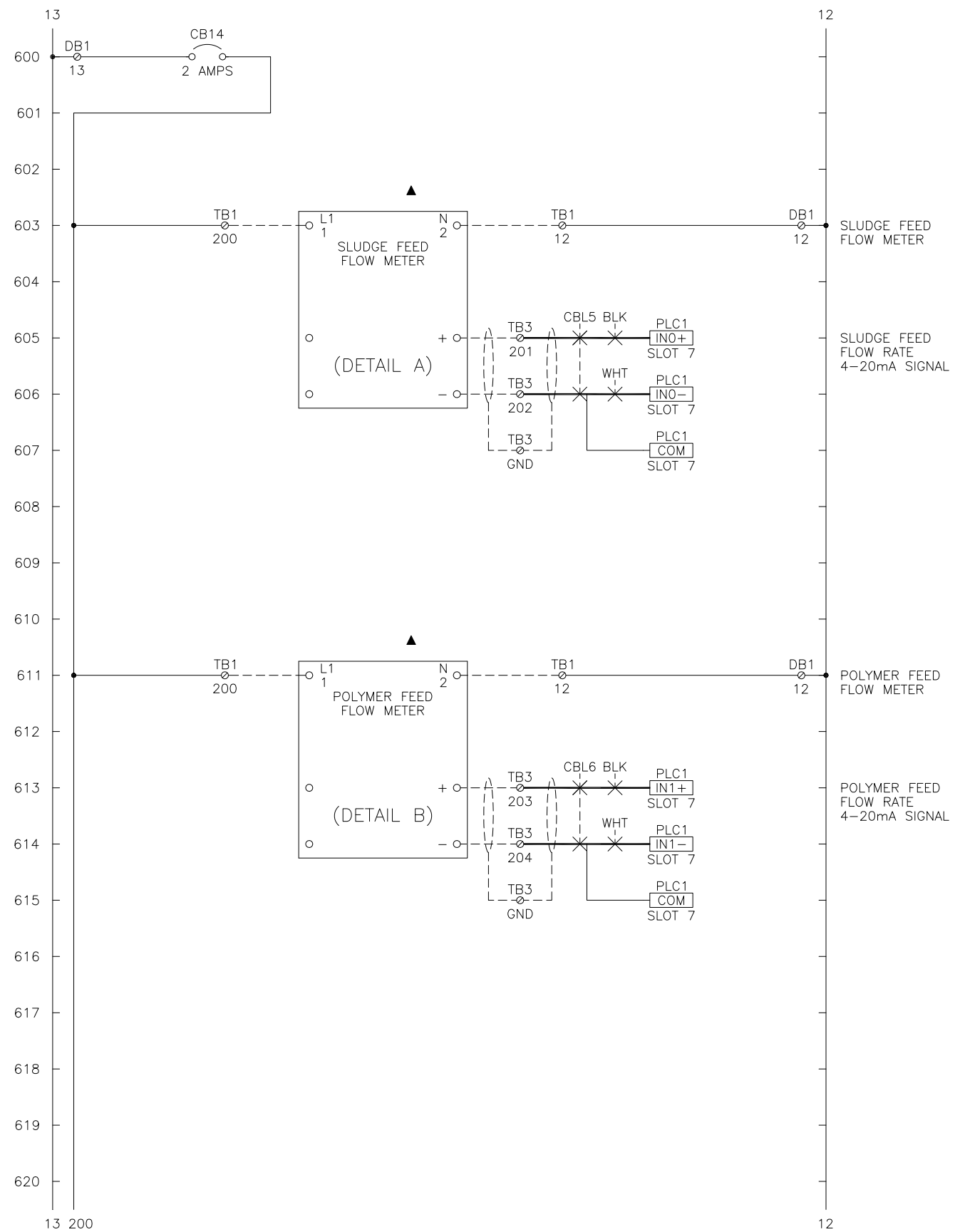
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PROJECT NUMBER:  
73005896

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SCALE:  
NONE



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CK	APP
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Q-PRESS CONTROL PANEL

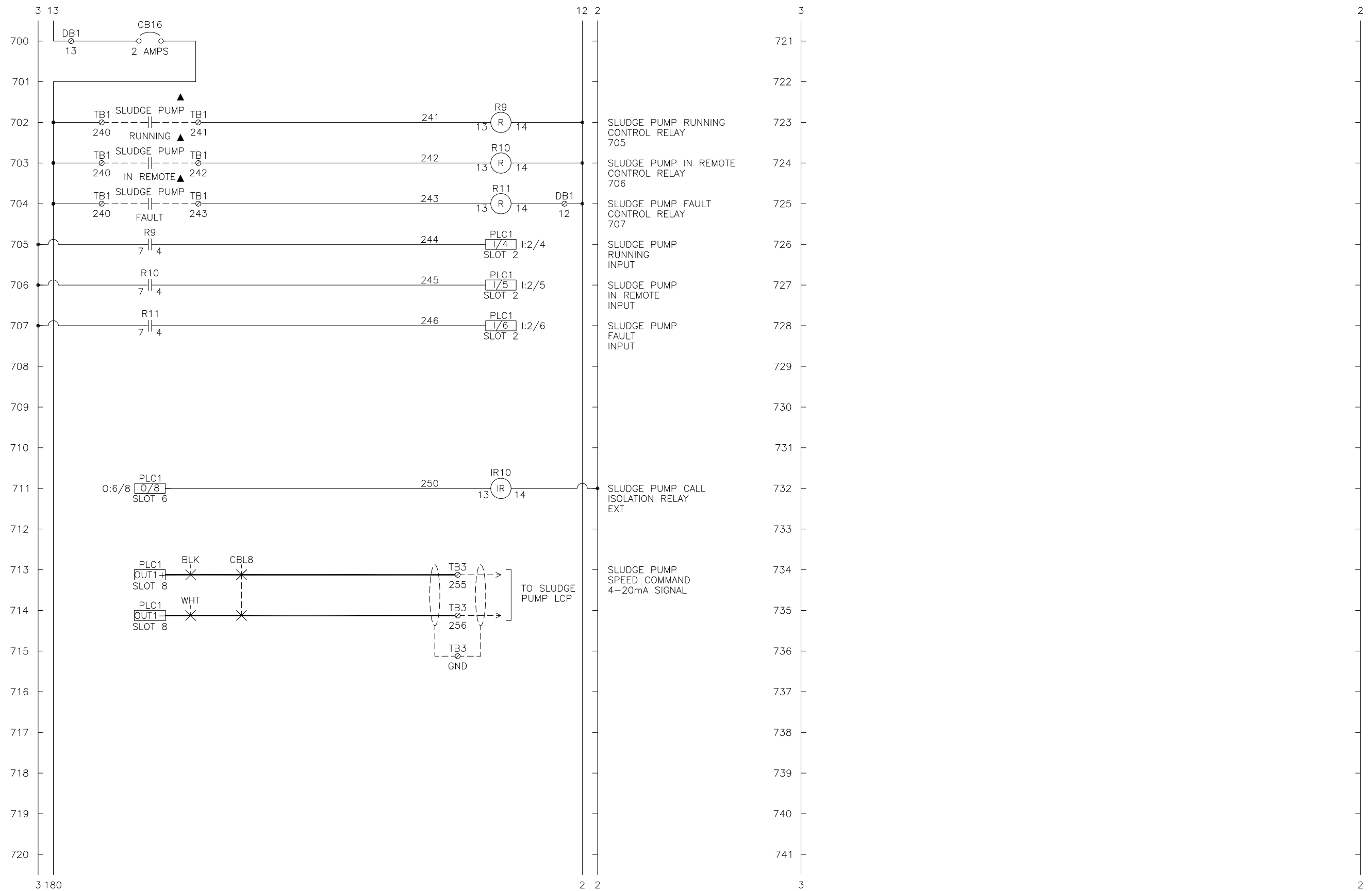
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PROJECT NUMBER: 73005896

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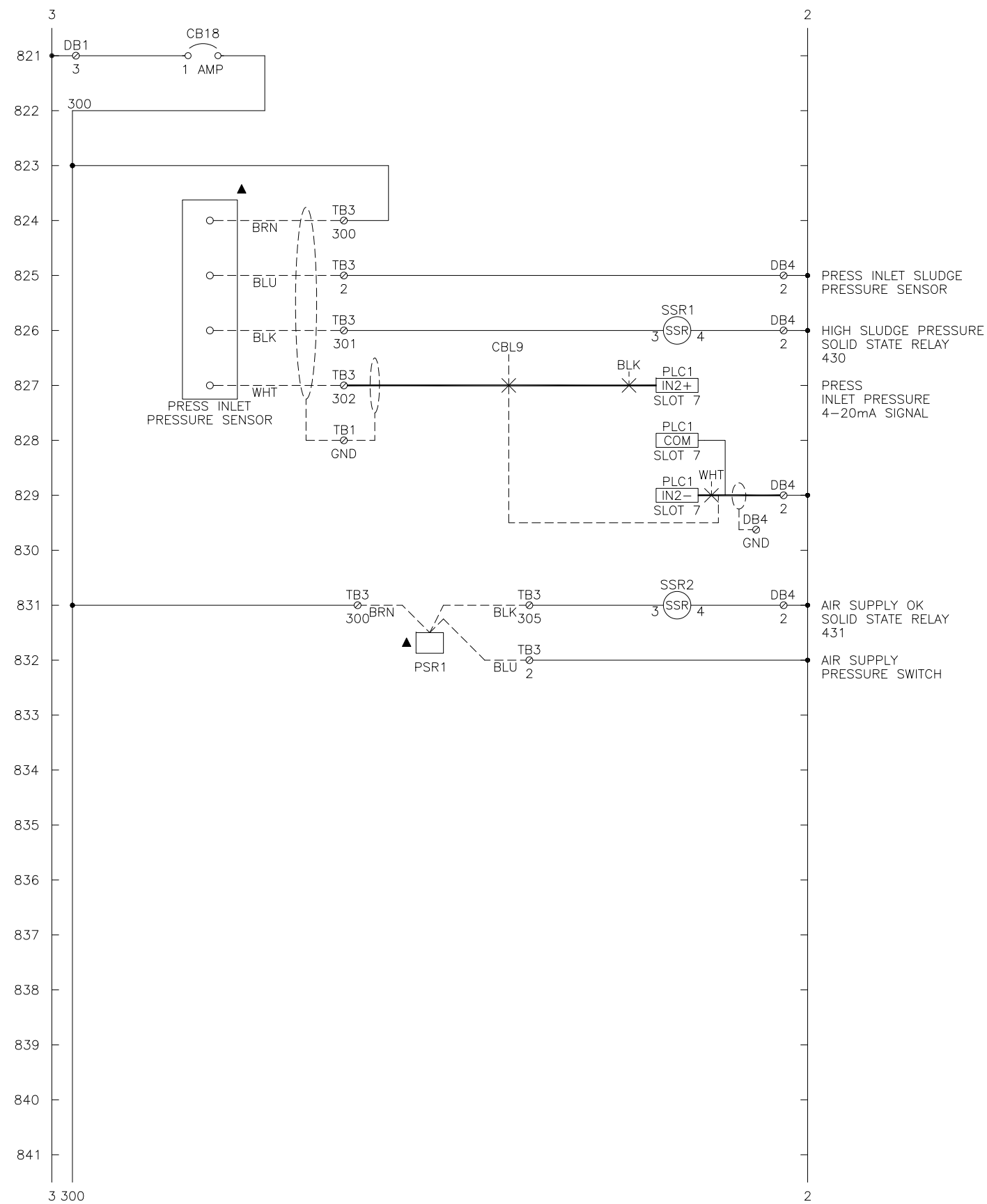
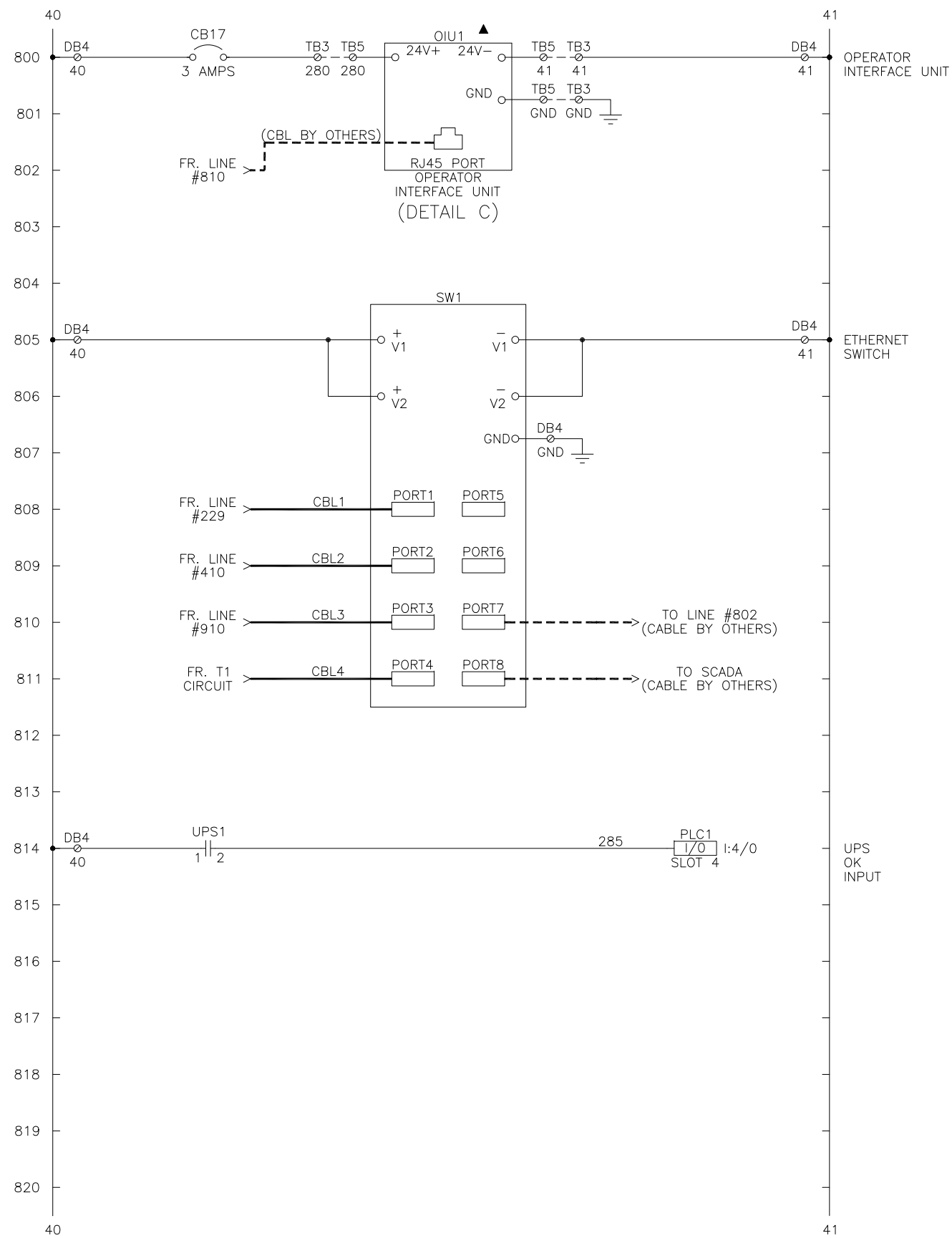
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Q-PRESS CONTROL PANEL	
CHEYENNE, WY	SCALE: NONE
PROJECT NUMBER: 73005896	DRAWING NO: HBR8191A7 7 OF 18



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Q-PRESS CONTROL PANEL

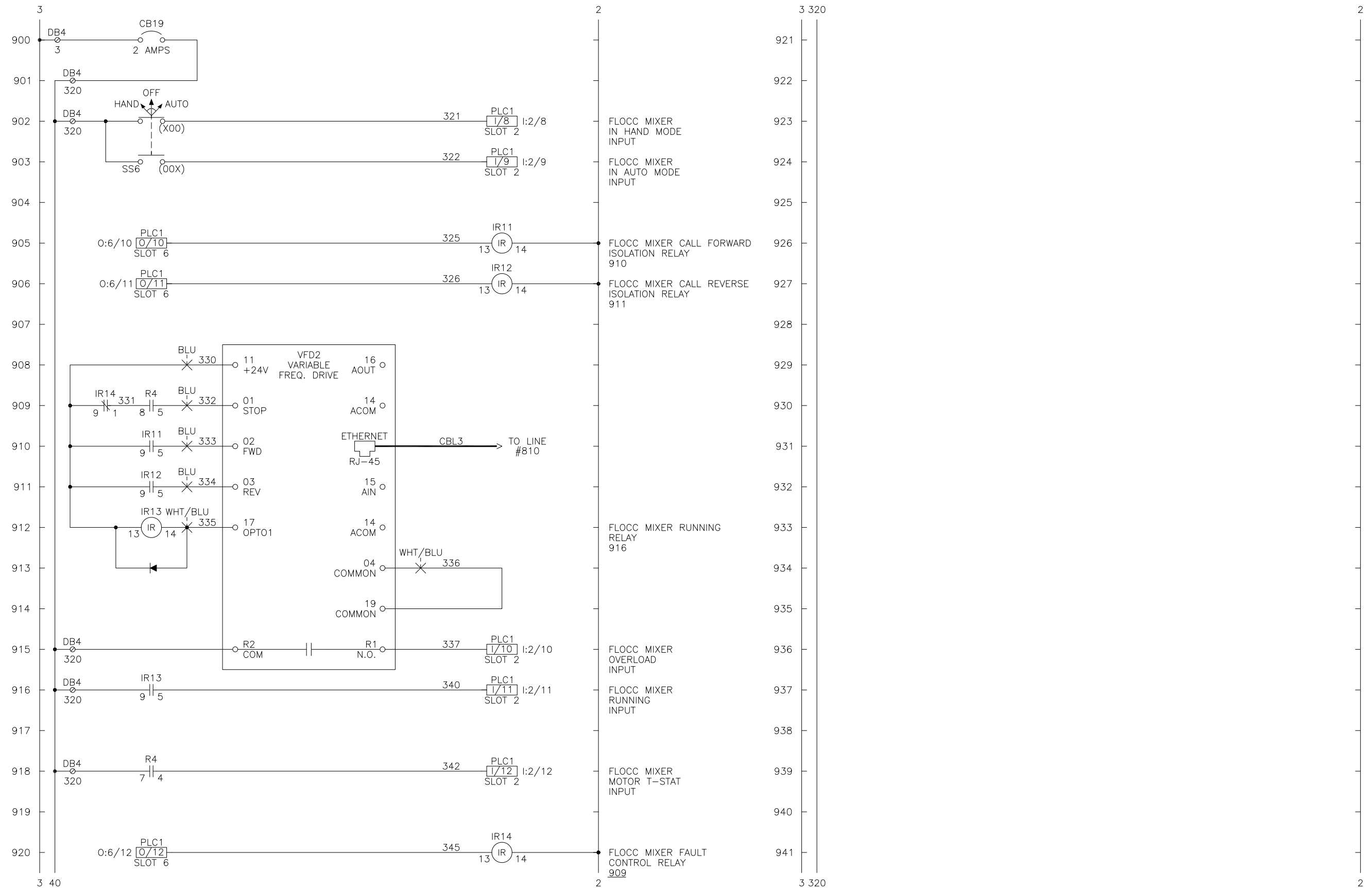
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PROJECT NUMBER: 73005896

DRAWING NO: HBR8191A8

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SCALE: NONE



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Q-PRESS  
CONTROL PANEL

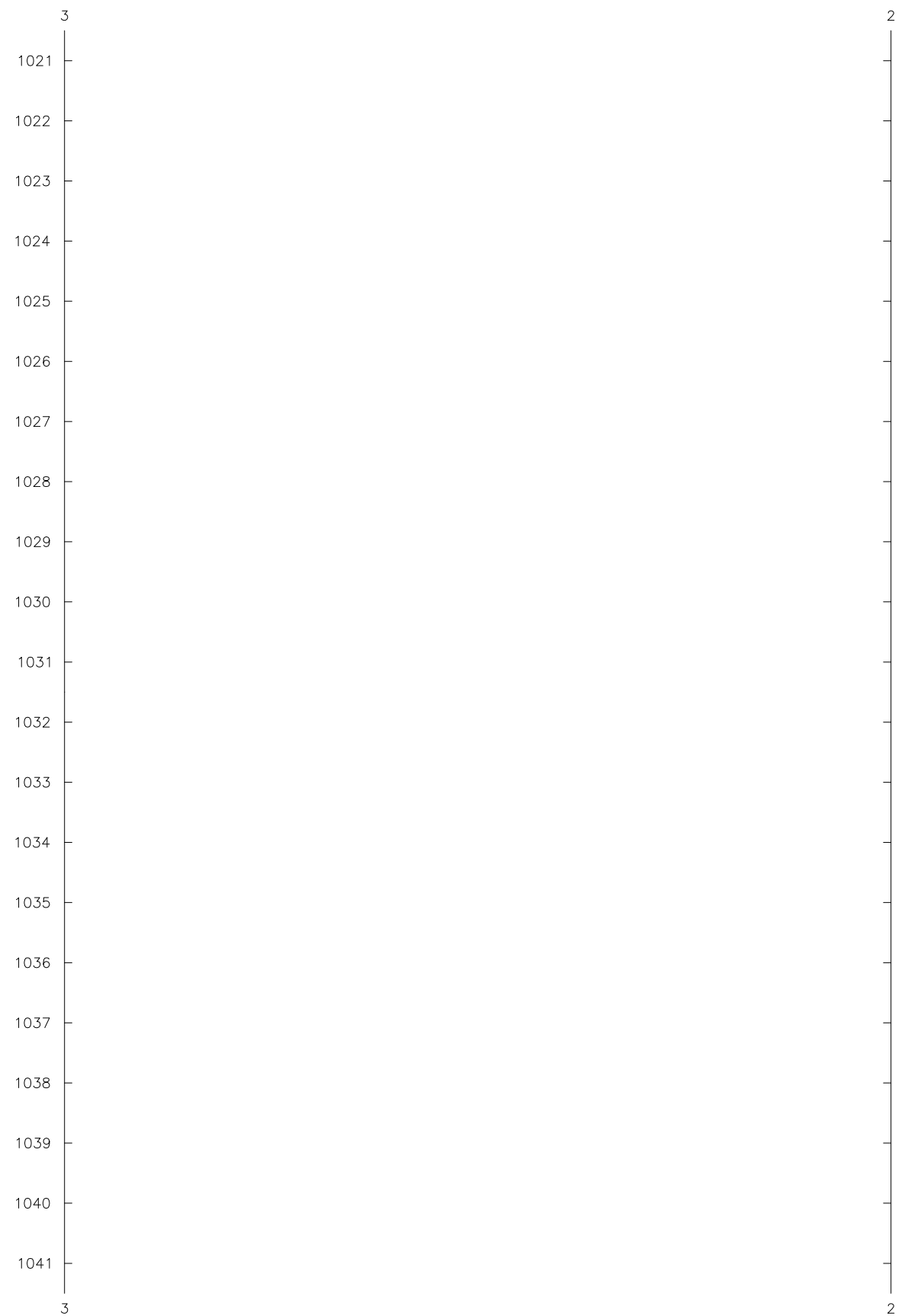
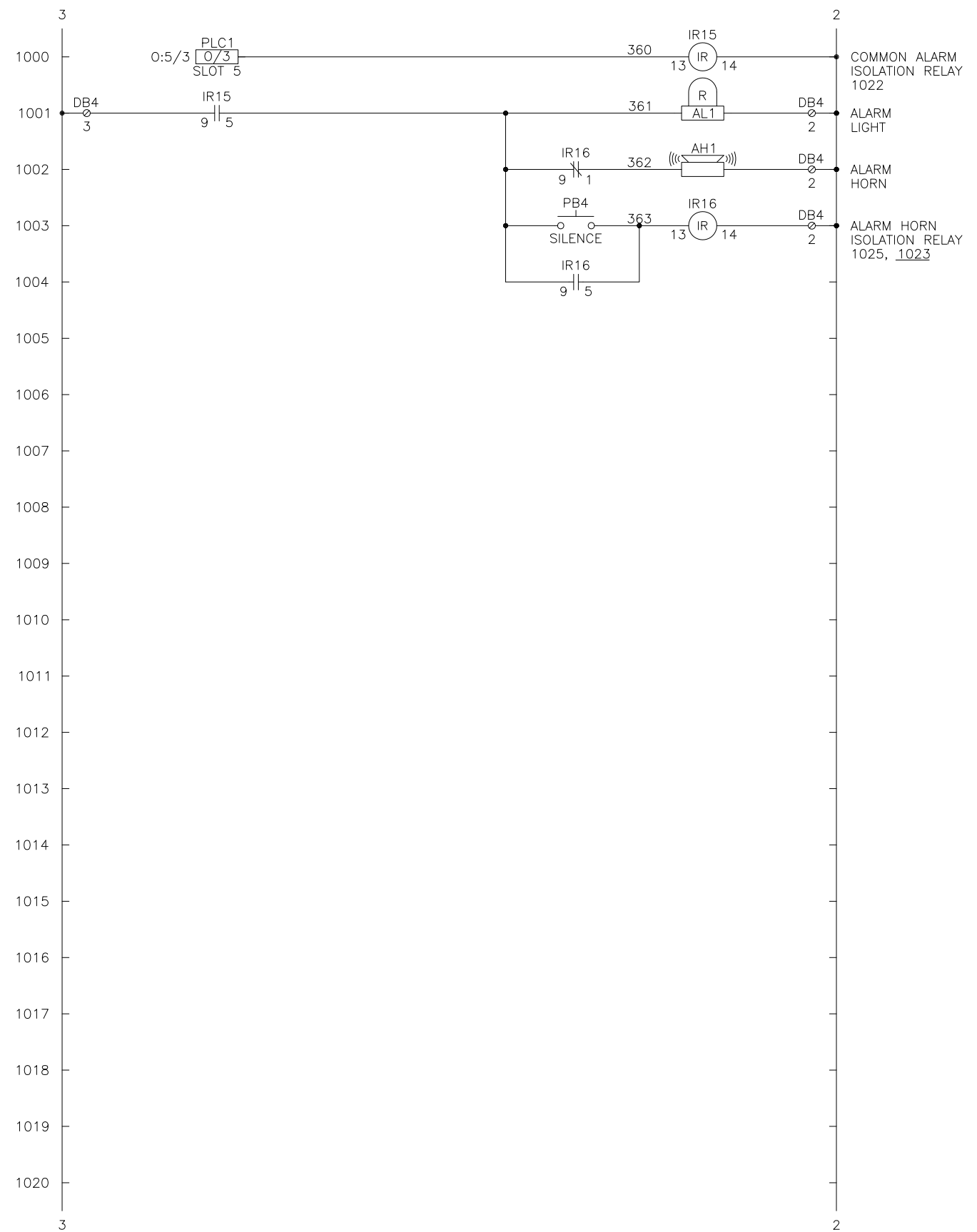
CHEYENNE, WY

SCALE:  
NONE

PROJECT NUMBER:  
73005896

DRAWING NO:  
HBR8191A9

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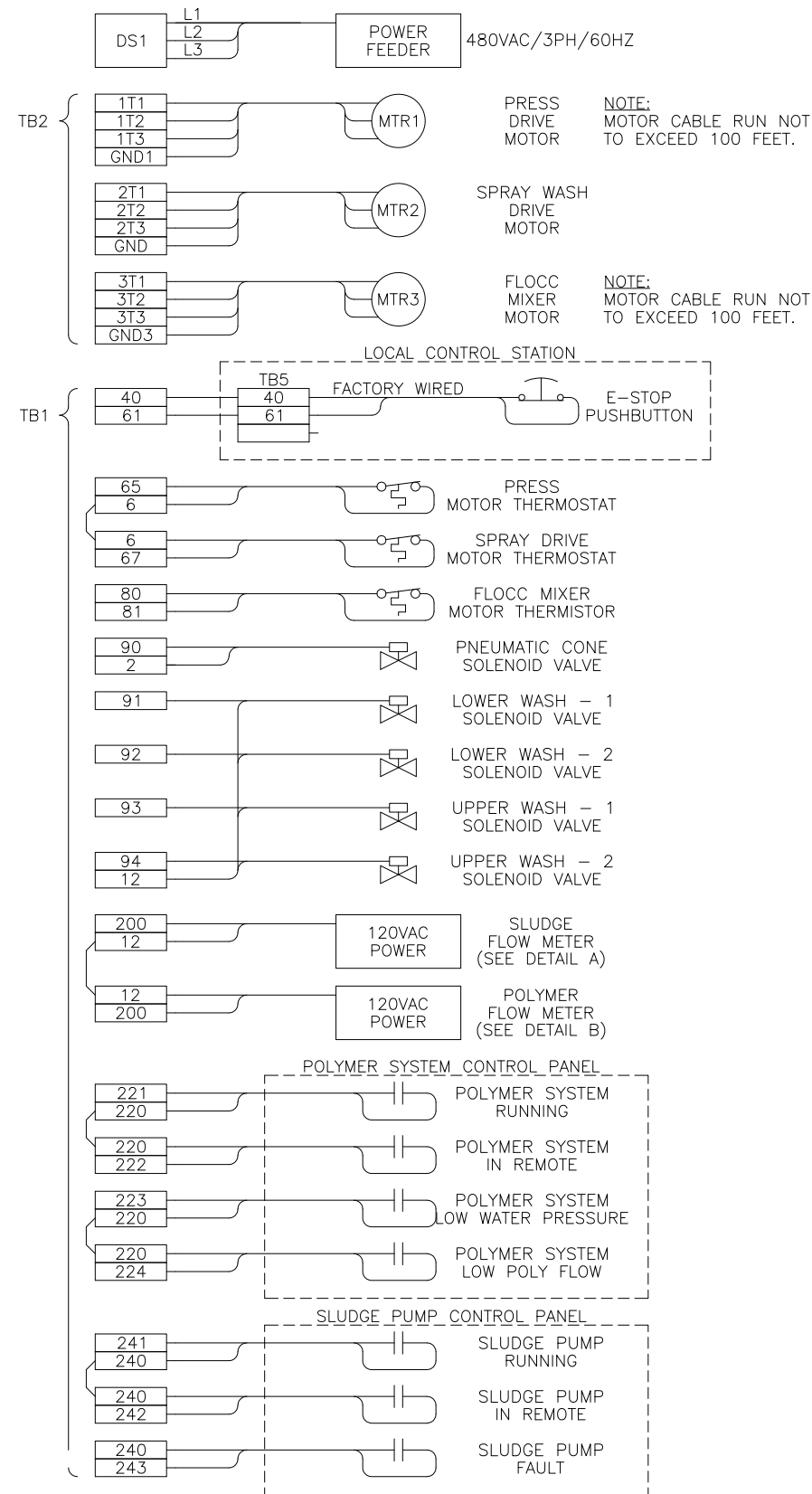
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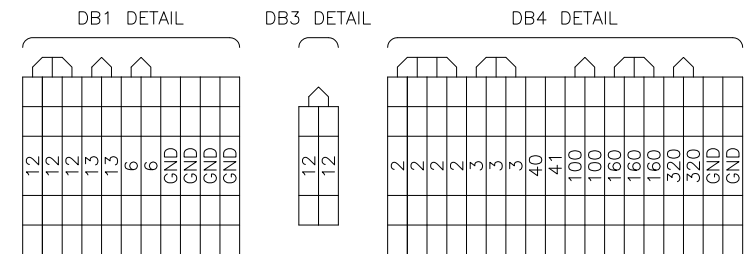
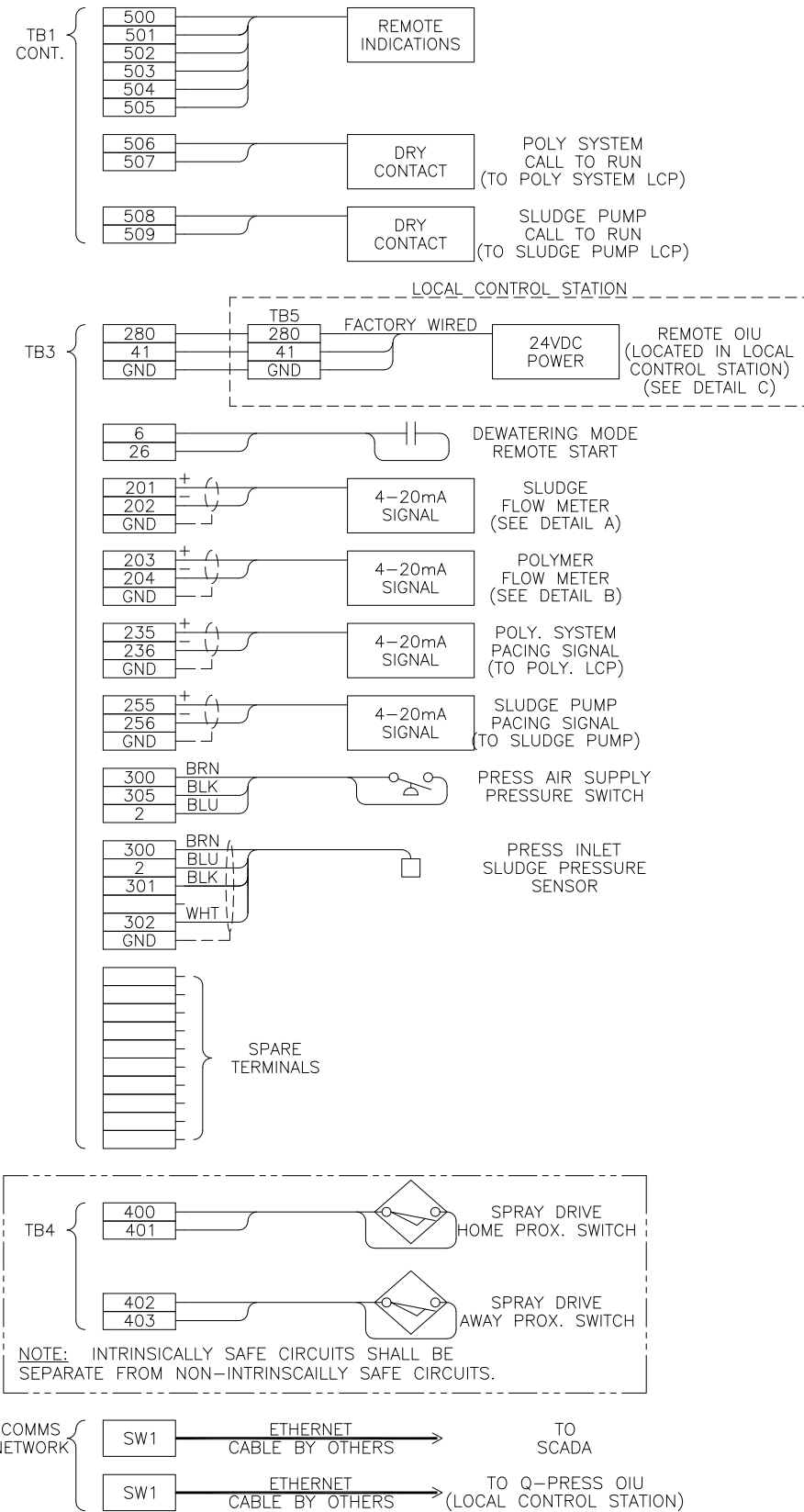
Q-PRESS CONTROL PANEL	
CHEYENNE, WY	SCALE: NONE
PROJECT NUMBER: 73005896	DRAWING NO: HBR8191A10
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# FIELD WIRING DIAGRAM

**WARNING:**  
 DAMAGE RESULTING FROM INSTALLATION OF TOP ENTRY CONDUIT WILL VOID WARRANTY  
 - USE PROPER FITTINGS, MYERS TYPE 4 OR EQUAL  
 - PROTECT INTERIOR DEVICES FROM INSTALLATION DEBRIS  
 - CONDUIT MUST BE SEALED WATERTIGHT TO PREVENT WATER ENTRY



# FIELD WIRING DIAGRAM

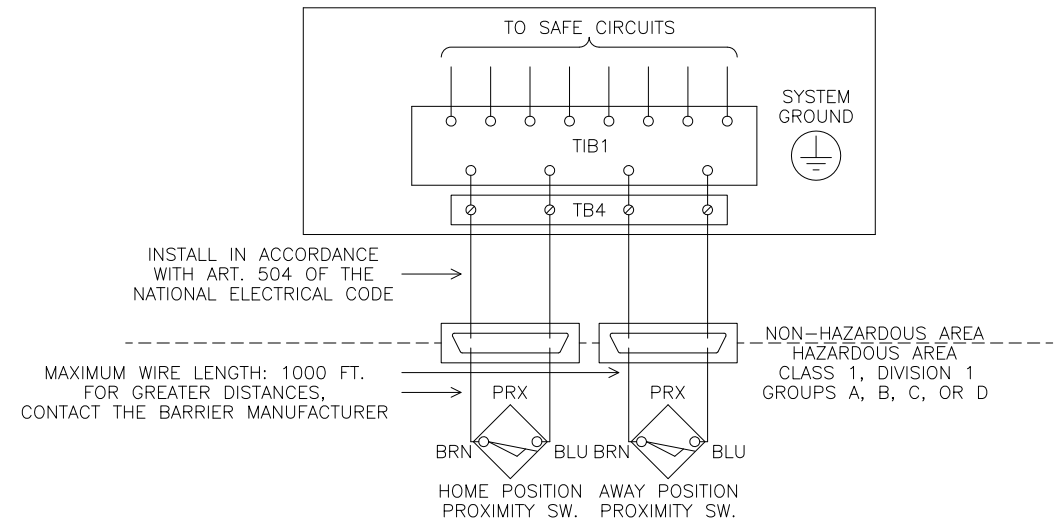


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Detailed	
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APPROVED	
DATE	07/14/20
NO.	
BY	
CK	
APP	
DATE	
REVISION	

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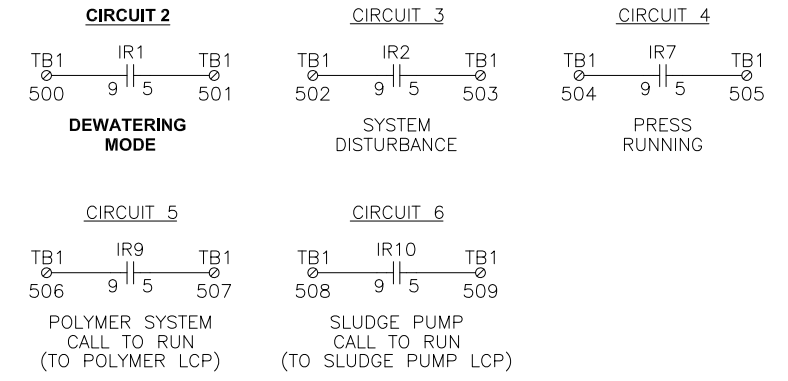
**Q-PRESS CONTROL PANEL**  
 CHEYENNE, WY  
 SCALE: NONE  
 PROJECT NUMBER: 73005896  
 DRAWING NO: HBR8191A11  
 11 OF 18

TIB1 WIRING DETAIL



- NOTES:
1. ENSURE CONTROL PANEL IS CONNECTED TO GROUND.
  2. CAUTION: MAINTAIN SEPARATION BETWEEN INTRINSICALLY SAFE WIRING AND OTHER WIRING.

DRY CONTACTS FOR PLANT USE



MAX. CONTROLLED LOAD: 10A @ 120VAC

NOTE: BRANCH CIRCUIT PROTECTION PROVIDED BY OTHERS PER N.E.C.

DESIGNED	AJ			
DETAILED				
CHECKED	MSN			
APPROVED				
DATE	07/14/20			
NO.	BY	CK	APP	DATE
DATE	REVISION			

**HUBER**  
TECHNOLOGY

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Q-PRESS  
CONTROL PANEL

CHEYENNE, WY

SCALE:  
NONE

PROJECT NUMBER:  
73005896

DRAWING NO:  
HBR8191A12

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## PLC/OIU SETTINGS

L33ER CPU RUN <input type="checkbox"/> I/O FORCE <input type="checkbox"/> RS232 BATT <input type="checkbox"/> OK RUN REM PROG <div style="text-align: center;"> <input type="checkbox"/> KEY                 </div>	DISCRETE IN <table border="1" style="width: 100%; text-align: center;"> <tr><td>0</td><td>1</td><td>2</td><td>3</td></tr> <tr><td>4</td><td>5</td><td>6</td><td>7</td></tr> </table> QTY: 4 SLOT 1-4	0	1	2	3	4	5	6	7	DISCRETE OUT <table border="1" style="width: 100%; text-align: center;"> <tr><td>0</td><td>1</td><td>2</td><td>3</td></tr> <tr><td>4</td><td>5</td><td>6</td><td>7</td></tr> </table> QTY: 2 SLOT 5,6	0	1	2	3	4	5	6	7	ANALOG IN <input type="checkbox"/> POWER QTY: 1 SLOT 7	ANALOG OUT <input type="checkbox"/> POWER QTY: 1 SLOT 8
0	1	2	3																	
4	5	6	7																	
0	1	2	3																	
4	5	6	7																	

### PLC INPUTS – SLOT NO.1

- I/0 E-STOP PRESSED
- I/1 SYSTEM RESET
- I/2 PRESS IN HAND/FORWARD
- I/3 PRESS IN HAND/REVERSE
- I/4 PRESS IN AUTO
- I/5 PRESS OVERLOAD
- I/6 PRESS RUNNING
- I/7 PRESS MOTOR T-STAT
- I/8 SPRAY WASH IN HAND
- I/9 SPRAY WASH IN AUTO
- I/10 SPRAY DRIVE HOME POSITION
- I/11 SPRAY DRIVE AWAY POSITION
- I/12 PRESS REMOTE START
- I/13 SPARE
- I/14 HIGH SLUDGE PRESSURE
- I/15 AIR SUPPLY OK

### PLC OUTPUTS – SLOT NO.5

- O/0 CONTROL POWER ENABLE
- O/1 PRESS DEWATERING MODE
- O/2 PRESS SYSTEM DISTURBANCE
- O/3 COMMON ALARM
- O/4 SPARE
- O/5 SPARE
- O/6 SPARE
- O/7 SPARE
- O/8 PRESS CALL TO RUN FORWARD
- O/9 PRESS CALL TO RUN REVERSE
- O/10 PRESS FAULT
- O/11 PRESS PNEUMATIC CONE ENGAGE
- O/12 SPARE
- O/13 SPARE
- O/14 SPARE
- O/15 SPARE

### PLC INPUTS – SLOT NO.2

- I/0 POLYMER SYSTEM RUNNING
- I/1 POLYMER SYSTEM IN REMOTE
- I/2 POLYMER SYSTEM LOW WATER PRESSURE
- I/3 POLYMER SYSTEM LOW POLY FLOW
- I/4 SLUDGE PUMP RUNNING
- I/5 SLUDGE PUMP IN REMOTE
- I/6 SLUDGE PUMP FAULT
- I/7 SPARE
- I/8 FLOCC MIXER IN HAND
- I/9 FLOCC MIXER IN AUTO
- I/10 FLOCC MIXER OVERLOAD
- I/11 FLOCC MIXER RUNNING
- I/12 FLOCC MIXER MOTOR T-STAT
- I/13 SPARE
- I/14 SPARE
- I/15 3 PHASE OK

### PLC OUTPUTS – SLOT NO.6

- O/0 PRESS LOWER WASH 1 CALL
- O/1 PRESS LOWER WASH 2 CALL
- O/2 PRESS UPPER WASH 1 CALL
- O/3 PRESS UPPER WASH 2 CALL
- O/4 SPRAY DRIVE CALL REVERSE
- O/5 SPRAY DRIVE CALL FORWARD
- O/6 SPRAY DRIVE FAULT
- O/7 POLYMER SYSTEM CALL TO RUN
- O/8 SLUDGE PUMP CALL TO RUN
- O/9 SPARE
- O/10 FLOCC MIXER CALL FORWARD
- O/11 FLOCC MIXER CALL REVERSE
- O/12 FLOCC MIXER FAULT
- O/13 SPARE
- O/14 SPARE
- O/15 SPARE

### PLC INPUTS – SLOT NO.3

- I/0 SPRAY DRIVE RUN REVERSE
- I/1 SPRAY DRIVE RUN FORWARD
- I/2 SPRAY DRIVE MOVED REV LAST
- I/3 SPRAY DRIVE HIGH CURRENT
- I/4 SPRAY DRIVE OVERLOAD
- I/5 SPRAY DRIVE MOTOR TSTAT
- I/6 SPRAY DRIVE IN HAND
- I/7 SPRAY DRIVE IN AUTO
- I/8 SPARE
- I/9 SPARE
- I/10 SPARE
- I/11 SPARE
- I/12 SPARE
- I/13 SPARE
- I/14 SPARE
- I/15 SPARE

### PLC ANALOG INPUTS – SLOT NO.7

- IN0 SLUDGE FEED FLOW RATE
- IN1 POLYMER FLOW RATE
- IN2 PRESS INLET PRESSURE
- IN3 SPARE

### PLC OUTPUTS – SLOT NO.8

- OUT0 POLYMER SYSTEM SPEED COMMAND
- OUT1 SLUDGE PUMP SPEED COMMAND
- OUT2 SPARE
- OUT3 SPARE

### PLC INPUTS – SLOT NO.4

- I/0 UPS OK
- I/1 SPARE
- I/2 SPARE
- I/3 SPARE
- I/4 SPARE
- I/5 SPARE
- I/6 SPARE
- I/7 SPARE
- I/8 SPARE
- I/9 SPARE
- I/10 SPARE
- I/11 SPARE
- I/12 SPARE
- I/13 SPARE
- I/14 SPARE
- I/15 SPARE

## PLC/OIU SETTINGS

### PLC1 – COMMUNICATIONS SETUP

ETHERNET PORT PARAMETERS	VALUE
PANEL 1 IP ADDRESS	172.24.1.100
PANEL 2 IP ADDRESS	172.24.1.102
SUBNET MASK	255.255.255.0
GATEWAY ADDRESS	0.0.0.0
BOOTP ENABLE	NO

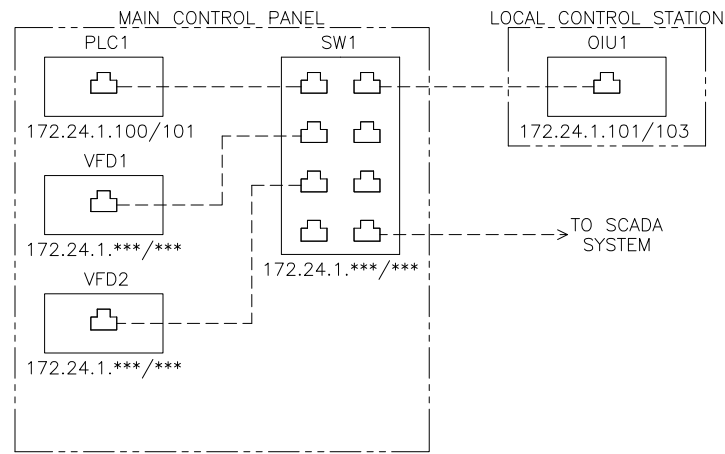
### OIU1 – COMMUNICATIONS SETUP

ETHERNET PORT PARAMETERS	VALUE
PANEL 1 IP ADDRESS	172.24.1.101
PANEL 2 IP ADDRESS	172.24.1.103
SUBNET MASK	255.255.255.0
GATEWAY ADDRESS	0.0.0.0
BOOTP ENABLE	NO

### SW1 – COMMUNICATIONS SETUP

ETHERNET PORT PARAMETERS	VALUE
PANEL 1 IP ADDRESS	172.24.1.101
PANEL 2 IP ADDRESS	172.24.1.103
SUBNET MASK	255.255.255.0
GATEWAY ADDRESS	0.0.0.0
BOOTP ENABLE	NO

### ETHERNET NETWORK MAP



#### NOTES:

1. --- CAT6 ETHERNET CABLE

SUBNET MASK: 255.255.255.0

## PLC/OIU SETTINGS

### Q-PRESS SYSTEM OIU MAINTENANCE REMINDERS

PART DESCRIPTION	OPERATING TIME (HOURS)
LUBRICATE FEED-END BEARING & OIL SEAL	500
WIPER	2000
FEED-END AUGER SHAFT BEARING	2000
SPRAY BAR SPROCKET	8000
SPRAY BAR CHAIN	8000
SPRAY BAR ROLLERS	8000
SOLENOID VALVE REPAIR KIT	5000
SPRAY NOZZLES	5000
WASH SYSTEM HOSES	10000
GEARBOX OIL	10000

DESIGNED	AJ	CHECKED	MSN	APPROVED	
DATE	REVISION	NO.	BY	CK	APP DATE
					07/14/20

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Q-PRESS  
CONTROL PANEL

CHEYENNE, WY

SCALE:  
NONE

PROJECT NUMBER:  
73005896

DRAWING NO:  
HBR8191A13

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## PLC/OIU SETTINGS

### PLC1 - SETPOINTS

REGISTER	DESCRIPTION	UNITS	DEFAULT	MIN	MAX
SP1[0].INT	EQUIPMENT STARTUP DELAY	SEC.	3	0	10
SP1[1].INT	DURATION MODE RUN DURATION	MIN.	900	1	9999
SP1[2].INT	VOLUME MODE PROCESS VOLUME	GAL	100	1	99999
SP1[3].INT	DATALOGGER INTERVAL	SEC.	10	1	999
SP1[10].INT	PRESS SHUTDOWN DURATION	MIN.	10	0	120
SP1[11].INT	PRESS DIRECTION CHANGE DWELL	SEC.	3	1	60
SP1[12].REAL	PRESS HAND SPEED	%	50	1	100
SP1[13].REAL	PRESS MIN SPEED	%	20	1	100
SP1[14].REAL	PRESS MAX SPEED	%	100	1	100
SP1[15].REAL	PRESS SHUTDOWN SPEED	%	100	1	100
SP1[20].INT	PNEUMATIC CONE AIR FAILURE FAULT DELAY	SEC.	10	1	20
SP1[40].INT	SPRAY WASH CYCLE DELAY	MIN.	15	1	60
SP1[41].INT	SPRAY WASH SHORT CYCLE COUNTER	COUNTS	2	1	10
SP1[42].INT	MAXIMUM TIME BETWEEN PROX. FAULT DELAY	SEC.	1	1	999
SP1[43].REAL	SPRAY DRIVE DIRECTION CHANGE DWELL	SEC.	1	0.5	999
SP1[44].REAL	SPRAY DRIVE INITIAL MOVE PROX. DELAY	SEC.	1	0.1	999
SP1[45].INT	SPRAY DRIVE FINAL FORWARD MOVE TIME	SEC.	5	1	30
SP1[50].REAL	HIGH CURRENT INTERRUPT CURRENT	AMPS.	6.5	0	10
SP1[51].REAL	CURRENT INTERRUPT HYSTERISIS	%	10	1	50
SP1[52].INT	CURRENT INTERRUPT OFF DELAY	SEC.	10	1	60
SP1[53].INT	MAINTAINED HIGH CURRENT SHUTDOWN DELAY	SEC.	10	1	60
SP1[54].REAL	CURRENT INTERRUPT SPEED	%	100	1	100
SP1[55].INT	CURRENT INTERRUPT COUNTS BEFORE SHUTDOWN	COUNTS	5	1	10
SP1[56].INT	CURRENT INTERRUPT COUNT RESET TIME	MIN.	60	1	600
SP1[57].REAL	CURRENT OVERLOAD VALUE	AMPS.	6.8	0	10
SP1[60].REAL	INLET PRESSURE AT MIN SPEED	PSI	3	0	30
SP1[61].REAL	INLET PRESSURE AT MAX SPEED	PSI	15	0	30
SP1[62].REAL	INLET PRESSURE AT 4MA	PSI	0	0	30
SP1[63].REAL	INLET PRESSURE AT 20MA	PSI	14.7	0	30
SP1[64].REAL	HIGH PRESSURE INTERRUPT PRESSURE	PSI	12	0	30
SP1[65].INT	HIGH PRESSURE INTERRUPT OFF DELAY	SEC.	10	1	60
SP1[66].INT	MAINTAINED HIGH PRESSURE SHUTDOWN DELAY	SEC.	10	1	60
SP1[67].INT	HIGH PRESSURE COUNTS BEFORE SHUTDOWN	COUNTS	5	1	10
SP1[68].INT	HIGH PRESSURE COUNT RESET TIME	MIN.	60	1	600
SP1[70].REAL	SLUDGE CONCENTRATION	%	3	0	10
SP1[71].REAL	REQUIRED SLUDGE FLOW RATE	GPM	30	5	150
SP1[72].REAL	SLUDGE PUMP MINIMUM SPEED	%	20	0	100
SP1[73].REAL	SLUDGE PUMP PID INITIAL SPEED	%	20	0	100
SP1[74].INT	SLUDGE PUMP PID ON DELAY	SEC.	10	0	999
SP1[75].REAL	SLUDGE PUMP PID GAIN (P) X 100	N/A	50	1	1000
SP1[76].REAL	SLUDGE PUMP PID TIME (I) X 10	N/A	12	1	1000
SP1[77].INT	SLUDGE ZERO FLOW FAULT DELAY	SEC.	300	1	999
SP1[78].INT	SLUDGE PUMP FAIL TO RUN FAULT DELAY	SEC.	10	1	999
SP1[79].REAL	SLUDGE FLOW AT 4MA	GPM	0	0	500
SP1[80].REAL	SLUDGE FLOW AT 20MA	GPM	100	0	500
SP1[85].INT	GENERAL FAULT DELAY	SEC.	1	0	999
SP1[90].REAL	POLYMER CONCENTRATION	%	100	0.05	100
SP1[91].REAL	LBS POLY PER TON OF SLUDGE	LB/TON	10	0.1	199.9
SP1[92].REAL	POLYMER PUMP MINIMUM CAPACITY	GPH	0	0	9.9
SP1[93].REAL	POLYMER PUMP MAXIMUM CAPACITY	GPH	3	0	999.9
SP1[94].INT	POLYMER PUMP FAIL TO RUN FAULT DELAY	SEC.	10	1	999
SP1[95].INT	POLYMER FLOW AT 4MA	GPH	0	0	2400
SP1[96].INT	POLYMER FLOW AT 20mA	GPH	5	0	2400
SP1[101].INT	POLYMER LOW WATER PRESSURE FAULT DELAY	SEC.	10	1	999
SP1[103].INT	POLYMER LOW POLY FLOW FAULT DELAY	SEC.	10	1	999
SP1[105].REAL	POLYMER SYSTEM INITIAL SPEED	%	20	0	100
SP1[106].INT	POLYMER SYSTEM DOSING CALC ON DELAY	SEC.	5	1	999
SP1[120].INT	FLOCC MIXER DIRECTION RUN TIME	MIN.	5	1	999
SP1[121].INT	FLOCC MIXER DIRECTION CHANGE DWELL TIME	SEC.	5	1	999

## PLC/OIU SETTINGS

### PLC1 - SCADA COMMUNICATIONS

REGISTER NUMBER	DESCRIPTION	DATA TYPE	NORMAL STATE	ACTIVE STATE	SCADA FUNCTION
<b>PLC IO STATUS</b>					
S_INT[1]	PLC SLOT 1 DISCRETE INPUTS	(BIT)	0	1	READ
S_INT[2]	PLC SLOT 2 DISCRETE INPUTS	(BIT)	0	1	READ
S_INT[3]	PLC SLOT 3 DISCRETE INPUTS	(BIT)	0	1	READ
S_INT[4]	PLC SLOT 4 DISCRETE INPUTS	(BIT)	0	1	READ
S_INT[5]	PLC SLOT 5 DISCRETE OUTPUTS	(BIT)	0	1	READ
S_INT[6]	PLC SLOT 6 DISCRETE OUTPUTS	(BIT)	0	1	READ
<b>SCREW PRESS</b>					
S_INT[9].0	PRESS RUNNING FORWARD	(BIT)	0	1	READ
S_INT[9].1	PRESS RUNNING REVERSE	(BIT)	0	1	READ
S_INT[9].2	PRESS IN AUTO	(BIT)	0	1	READ
S_INT[9].3	PRESS FAULT	(BIT)	0	1	READ
S_INT[9].4	PRESS IN DEWATERING MODE	(BIT)	0	1	READ
S_INT[9].5	SPRAY WASH ON	(BIT)	0	1	READ
S_INT[9].6	SPRAY IN AUTO	(BIT)	0	1	READ
S_INT[9].7	SPRAY DRIVE RUNNING	(BIT)	0	1	READ
S_INT[9].8	SPRAY DRIVE IN AUTO	(BIT)	0	1	READ
S_INT[9].9	SPRAY DRIVE FAULT	(BIT)	0	1	READ
S_INT[9].10	SYSTEM DISTURBANCE	(BIT)	0	1	READ
S_REAL[0]	PRESS MOTOR CURRENT (AMPS)	(REAL)	-	-	READ
S_REAL[1]	PRESS INLET PRESSURE (PSI)	(REAL)	-	-	READ
S_INT[100].0	DEWATERING REMOTE START	(BIT)	0	1	WRITE
<b>POLYMER SYSTEM</b>					
S_INT[11].0	POLYMER SYSTEM RUNNING	(BIT)	0	1	READ
S_INT[11].1	POLYMER SYSTEM IN REMOTE	(BIT)	0	1	READ
S_INT[11].2	POLYMER SYSTEM LOW WATER PRESSURE	(BIT)	0	1	READ
S_INT[11].3	POLYMER SYSTEM LOW POLY FLOW	(BIT)	0	1	READ
S_REAL[15]	POLYMER FLOW RATE (GPH)	(REAL)	-	-	READ
<b>SLUDGE PUMP</b>					
S_INT[12].0	SLUDGE PUMP RUNNING	(BIT)	0	1	READ
S_INT[12].1	SLUDGE PUMP IN REMOTE	(BIT)	0	1	READ
S_INT[12].2	SLUDGE PUMP FAULT	(BIT)	0	1	READ
S_REAL[10]	SLUDGE FEED FLOW RATE (GPM)	(REAL)	0	1	READ
<b>FLOCC MIXER</b>					
S_INT[13].0	FLOCC MIXER IN AUTO	(BIT)	0	1	READ
S_INT[13].1	FLOCC MIXER RUNNING	(BIT)	0	1	READ
S_INT[13].2	FLOCC MIXER FAULT	(BIT)	0	1	READ
<b>PANEL STATUS</b>					
S_INT[14].0	E-STOP PRESSED	(BIT)	0	1	READ
S_INT[14].1	UTILITY POWER ON	(BIT)	0	1	READ
S_INT[14].2	3 PHASE FAULT	(BIT)	0	1	READ
S_INT[14].3	UPS FAULT	(BIT)	0	1	READ

DESIGNED	AJ			
DETAILED				
CHECKED	MSN			
APPROVED				
DATE	07/14/20			
REVISION				
NO.	BY	CK	APP	DATE

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Q-PRESS  
CONTROL PANEL

CHEYENNE, WY

SCALE:  
NONE

PROJECT NUMBER:  
73005896

DRAWING NO:  
HBR8191A14

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## DEVICE SETTINGS

### CM1 - CURRENT MONITOR SETTINGS

#### DIP SETTINGS

1	ON
2	OFF
3	ON
4	OFF
5	OFF
6	ON

HYSTERESIS	MIN
LEVEL	MIN
DELAY	MIN

#### NOTES:

- THE CURRENT MONITOR DIAL SHALL BE SET TO MINIMUM FROM FACTORY.
- FIELD CONFIGURATION SHALL BE PERFORMED BY THE STARTUP TECHNICIAN PER THE APPROPRIATE TECHNICAL DOCUMENTS.

### IS1 - SETTINGS

FAN OFF/ON	60 *F
------------	-------

### IIB1 - SETTINGS

JUMPER NUMBER	SET AT	
CH1	JP11	2-3 (INVERTED)
	JP12	1-2 (ON)
CH2	JP21	2-3 (INVERTED)
	JP22	1-2 (ON)
	JP23	2-3 (IN. 2 ACTIVE)

### AL1 - ALARM LIGHT

SWITCH	SINGLE FLASH SETTING
1	SWITCH 1 = ON
2	SWITCH 2 = OFF



## DEVICE SETTINGS

### VFD1,2 - POWERFLEX 525 SETTINGS

PARAMETER NUMBER	DESCRIPTION	DEFAULT	VFD1 SETTING	VFD2 SETTING
31	MOTOR VOLTAGE	460	460	460
32	MOTOR FREQUENCY	60 HZ	60 HZ	60 HZ
33	MOTOR OL CURRENT	*	*	***
34	MOTOR NP FLA	*	*	***
35	MOTOR NP POLES	4	*	***
36	MOTOR NP RPM	1750	*	***
37	MOTOR NP POWER (kW)	*	*	***
40	TORQUE PERF MODE	1=SVC	1=SVC	4=PM MOTOR
41	ACCEL TIME 1	10 SEC.	5 SEC.	5 SEC.
42	DECEL TIME 1	10 SEC.	5 SEC.	5 SEC.
45	STOP MODE	0=RAMP	5=COAST	5=COAST
46	START SOURCE	KEYPAD	2 (TERM)	2 (TERM)
47	SPEED REFERENCE 1	0=DRIVE POT	15=ETHERNET/IP	15=ETHERNET/IP

#### TERMINAL BLOCK GROUP

76	RELAY OUT 1	0	7=ABOVE CURRENT	7=ABOVE CURRENT
77	RELAY OUT 1 LEVEL	0	62%*	62%*

#### COMMUNICATIONS GROUP

125	COMM LOSS ACTION	0	1	1
128	EN ADDR SEL	0=BOOTP	1=PARAMETERS	1=PARAMETERS
129	EN IP ADDR CFG 1	0	172	172
130	EN IP ADDR CFG 2	0	24	24
131	EN IP ADDR CFG 3	0	1	1
132	EN IP ADDR CFG 4	0	***/***	***/***
133	EN SUBNET CFG 1	0	255	255
134	EN SUBNET CFG 2	0	255	255
135	EN SUBNET CFG 3	0	255	255
136	EN SUBNET CFG 4	0	0	0
137	EN GATEWAY CFG 1	0	0	0
138	EN GATEWAY CFG 2	0	0	0
139	EN GATEWAY CFG 3	0	0	0
140	EN GATEWAY CFG 4	0	0	0
143	EN COMM FLT ACTN	0	1	1
144	EN IDLE FLT ACTN	0	3	3
157	EN DATA OUT 1	0	3	3

#### ADVANCED PROGRAM GROUP

501	PM IR VOLTAGE	11.50 V		*** V
502	PM IXd VOLTAGE	17.91 V		*** V
503	PM IXq VOLTAGE	53.21 V		*** V
504	PM BEMF VOLTAGE	1640.0 DRV		*** DRV

#### NOTES:

- THE ABOVE IS A PARTIAL LISTING OF SETPOINTS. ONLY THE SETPOINTS THAT ARE SHOWN ABOVE MARKED WITH A \* SHALL BE ALTERED IN THE FIELD. REFER TO THE DRIVE MANUAL FOR A FULL LIST OF SETPOINTS AND ADDITIONAL DETAILS.
- PARAMETER 77 MUST BE SET TO THE MOTOR OVERLOAD TRIP POINT WHICH IS A PERCENT OF THE MAXIMUM DRIVE OUTPUT CURRENT. (MAX DRIVE OUTPUT CURRENT VFD1 = 10.5A, VFD2 = 13.0A)
- VERIFY ALL MOTOR PARAMETERS TO THE ACTUAL MOTOR NAMEPLATE.

#### VFD1 - ETHERNET PORT

PARAMETERS	VALUE
PANEL 1 IP ADDRESS	172.24.1.***
PANEL 2 IP ADDRESS	172.24.1.***
SUBNET MASK	255.255.255.0
GATEWAY ADDRESS	0.0.0.0

#### VFD2 - ETHERNET PORT

PARAMETERS	VALUE
PANEL 1 IP ADDRESS	172.24.1.***
PANEL 2 IP ADDRESS	172.24.1.***
SUBNET MASK	255.255.255.0
GATEWAY ADDRESS	0.0.0.0

DESIGNED	AJ				
DETAILED					
CHECKED	MSN				
APPROVED					
DATE	07/14/20				
NO.		BY	CK	APP	DATE
REVISION					

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Q-PRESS  
CONTROL PANEL

CHEYENNE, WY

SCALE:  
NONE

PROJECT NUMBER:  
73005896

DRAWING NO:  
HBR8191A15

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SEQUENCE OF OPERATION

CONTROL POWER ON-DELAY:

EACH TIME THE CONTROL PANEL POWER SUPPLY IS CYCLED, THE EQUIPMENT STARTUP DELAY TIMER IN PLC WILL ALLOW ALL SOLID STATE DEVICES TO FULLY ENERGIZE BEFORE ENABLING THE CONTROL POWER CIRCUIT.

POLYMER SYSTEM MODES OF OPERATION:

WHEN THE POLYMER SYSTEM IS IN REMOTE, THE DEWATERING CONTROL PANEL WILL PROVIDE A CALL TO RUN SIGNAL AS WELL AS A CALCULATED PACING SIGNAL. THE CALL TO RUN AND PACING SIGNALS WILL BE ACTIVE WHILE THE SYSTEM IS IN DEWATERING MODE. THE POLYMER SYSTEM WILL START TO OPERATE AT THE INITIAL SPEED SETPOINT FOR THE TIME SET IN THE DOSING CALCULATION ON DELAY TIMER. THE POLYMER SYSTEM SPEED WILL THEN VARY BASED ON THE SLUDGE CALCULATIONS VARIABLES EXPLAINED BELOW. THESE SIGNALS WILL BE DE-ACTIVATED WHEN THE SYSTEM ENTERS SHUTDOWN MODE.

SLUDGE PUMP OPERATION:

WHEN THE SLUDGE FEED PUMP IS IN REMOTE, THE DEWATERING CONTROL PANEL WILL PROVIDE A CALL TO RUN SIGNAL AS WELL AS A USER SET PACING SIGNAL. THE CALL TO RUN AND PACING SIGNALS WILL BE ACTIVE WHILE THE SYSTEM IS IN DEWATERING MODE. THE SLUDGE PUMP WILL START TO OPERATE AT THE PID MINIMUM SPEED SETPOINT FOR THE TIME SET IN THE PID ON DELAY TIMER. THE SLUDGE PUMP SPEED WILL THEN VARY BASED ON THE SLUDGE FLOW FEEDBACK RECEIVED FROM THE FLOW METER. THESE SIGNALS WILL BE DE-ACTIVATED WHEN THE SYSTEM ENTERS SHUTDOWN MODE.

SLUDGE CALCULATIONS:

THE USER WILL BE RESPONSIBLE FOR ENTERING THE FOLLOWING PARAMETERS TO ENSURE THE CORRECT AMOUNT OF POLYMER IS DOSED WITH THE SLUDGE:

1. SLUDGE FEED FLOW RATE (GPM)
2. SLUDGE CONCENTRATION (% SOLIDS CONCENTRATION)
3. POLYMER DOSING RATE (LBS. NEAT POLYMER / TON DRY SOLIDS)
4. POLYMER CONCENTRATION (%)

PRESS MODES OF OPERATION:

HAND: WHEN THE PRESS SELECTOR IS IN THE HAND POSITION, THE PRESS WILL RUN IN THE DIRECTION SELECTED BY THE PRESS FOR-OFF-REV SELECTOR AT A CONSTANT SPEED ENTERED BY THE OPERATOR INTO THE OIU.

NOTE: IN HAND MODE, THE PRESS WILL RUN FORWARD ONCE THE PNEUMATIC CONE HAS BEEN ACTUATED.

AUTO: WHEN THE PRESS SELECTOR IS IN THE AUTO POSITION THE PRESS WILL BEGIN TO CYCLE IN THE FORWARD DIRECTION AS DESCRIBED IN THE SYSTEM START SEQUENCE. ONCE RUNNING, THE PRESS WILL OPERATE AT SPEED PER INLET PRESSURE. THE PRESS WILL CONTINUE TO CYCLE UNTIL THE CYCLE IS INTERRUPTED BY A SPRAY WASH CYCLE OR WHEN SYSTEM ENTERS THE SHUTDOWN MODE.

NOTE: AS THE INLET PRESSURE INCREASES, THE PRESS SPEED WILL INCREASE. AS THE INLET PRESSURE DECREASES, THE PRESS SPEED WILL DECREASE. THE PRESS WILL OPERATE AT THE MINIMUM SPEED SETPOINT WHEN THE MEASURED INLET PRESSURE IS AT THE INLET PRESSURE AT MINIMUM SPEED SETPOINT. THE PRESS WILL OPERATE AT THE MAXIMUM SPEED SETPOINT WHEN THE MEASURED INLET PRESSURE IS AT THE INLET PRESSURE AT MAXIMUM SPEED SETPOINT.

PRESS INTERLOCKS:

OPERATING THE PRESS, IN HAND OR AUTOMATIC, WILL REQUIRE THE FOLLOWING:

1. PRESSURIZED AIR SUPPLY TO BE ABOVE THE REQUIRED PRESSURE AS MEASURED BY THE PRESSURE SWITCH IN THE AIR SUPPLY LINE.
2. THE SOLENOID VALVE FOR THE PNEUMATIC ACTUATED CONE MUST ALSO BE ENERGIZED, UNLESS IN SLUDGE DEWATERING SYSTEM SHUTDOWN SEQUENCE.

SPRAY DRIVE MODES OF OPERATION:

HAND: WHEN THE SPRAY DRIVE SELECTOR IS IN THE HAND POSITION, THE SPRAY DRIVE WILL DWELL, THEN MOVE IN THE OPPOSITE DIRECTION OF ITS LAST MOVEMENT. IT WILL CONTINUE IN THIS DIRECTION UNTIL THE SPRAY DRIVE PROXIMITY SWITCH IS ACTIVATED. ONCE THE PROXIMITY SWITCH IS ACTIVATED, THE SPRAY DRIVE WILL STOP, DWELL, AND START TO RUN IN THE OPPOSITE DIRECTION. THE DWELL-FORWARD-DWELL-REVERSE CYCLES WILL CONTINUE UNTIL THE SPRAY DRIVE SELECTOR IS PLACED IN THE OFF POSITION.

AUTO: WHEN THE SPRAY DRIVE SELECTOR IS IN THE AUTO POSITION, THE SPRAY DRIVE WILL OPERATE AS DESCRIBED IN THE SPRAY WASH SYSTEM SEQUENCE.

SPRAY WASH MODES OF OPERATION:

HAND: WHEN THE SPRAY WASH SELECTOR IS IN THE HAND POSITION, ALL SPRAY WASH SOLENOID VALVES WILL ENERGIZE AND REMAIN ENERGIZED UNTIL THE SELECTOR IS PLACED IN THE OFF POSITION.

AUTO: WHEN THE SPRAY WASH SELECTOR IS IN THE AUTO POSITION, THE SPRAY WASH SOLENOID VALVES WILL OPERATE AS DESCRIBED IN THE SPRAY WASH SYSTEM SEQUENCE.

FLOCC MIXER MODES OF OPERATION:

HAND: WHEN THE FLOCC MIXER SELECTOR IS IN THE HAND POSITION, THE FLOCC MIXER WILL RUN CONTINUOUSLY.

AUTO: WHEN THE FLOCC MIXER SELECTOR IS IN THE AUTO POSITION, THE FLOCC MIXER WILL START TO RUN AS DESCRIBED IN THE DEWATERING MODE START SEQUENCE. THE FLOCC MIXER WILL RUN FORWARD FOR TIME SET FOR THE FLOCC MIXER DIRECTION RUN TIME. ONCE THE DIRECTION RUN TIME HAS ELAPSED, THE FLOCC MIXER WILL DWELL FOR THE TIME SET FOR THE FLOCC MIXER DIRECTION CHANGE DWELL TIMER, AND THEN START RUNNING IN THE REVERSE DIRECTION FOR THE TIME SET IN THE FLOCC MIXER DIRECTION RUN TIME. THE SEQUENCE WILL REPEAT ITSELF FOR AS LONG AS THE SYSTEM IS IN DEWATERING MODE. THE FLOCC MIXER WILL CONTINUE TO RUN UNTIL THE SYSTEM ENTERS SHUTDOWN MODE.

NOTE: THE FLOCC MIXER CAN BE ENABLED/DISABLED THROUGH THE OIU. WHEN ENABLED, THE FLOCC MIXER WILL OPERATE WITH THE DEWATERING SYSTEM. WHEN DISABLED, THE FLOCC MIXER WILL NOT BE CALLED TO RUN WHEN AN AUTOMATIC DEWATERING SEQUENCE IS OCCURRING.

SEQUENCE OF OPERATION

DEWATERING MODE START SEQUENCE:

A DEWATERING MODE WILL BEGIN WHEN THE USER PRESSES THE START PUSHBUTTON ON THE OIU. THE EQUIPMENT WILL START UP IN THE FOLLOWING ORDER:

1. LONG WASH CYCLE WILL INITIATE
2. THE PNEUMATIC ACTUATED CONE IS ACTIVATED
3. PRESS WILL START TO RUN
4. FLOCC MIXER AND POLYMER SYSTEM WILL BE CALLED TO RUN
5. SLUDGE PUMP WILL BE CALLED TO RUN

NOTE:

1. THERE WILL BE AN ADJUSTABLE DELAY BETWEEN THE START-UP OF EACH STEP.
2. A DEWATERING SYSTEM MAY ALSO BE STARTED BY RECEIVING A REMOTE START SIGNAL.
3. IF THE SYSTEM HAS STARTED DUE TO A REMOTE START SIGNAL, THE START PUSHBUTTON ON THE OIU WILL BE REPLACED WITH INDICATION THAT THE SYSTEM IS "IN REMOTE".
4. IF POWER IS LOST AND RESTORED TO THE SYSTEM AFTER A DEWATERING MODE HAS STARTED VIA THE START PUSHBUTTON ON THE OIU, THE OPERATOR WILL NEED TO RESTART THE SYSTEM FROM THE OIU ONCE AGAIN.
5. IF POWER IS LOST AND RESTORED TO THE SYSTEM AFTER A DEWATERING MODE HAS STARTED VIA THE REMOTE START SIGNAL AND THE SIGNAL IS STILL PRESENT, THE SYSTEM WILL AUTOMATICALLY START BACK UP.
6. IN THE PRESS SETTING MENU ON THE OIU, THE OPERATOR WILL FIND MULTIPLE MODES OF OPERATION FOR THE DEWATERING MODE WHICH CAN BE ENABLED OR DISABLED:
  - 6.1. START-STOP OPERATION. STARTING AND STOPPING THE SYSTEM BASED OFF PRESSING THE START AND STOP SOFT PUSHBUTTONS.
  - 6.2. TIME ON AND TIME OFF OPERATION. STARTING AND STOPPING THE SYSTEM AT USER SET TIMES OF THE DAY.
  - 6.3. RUN TIME OPERATION. STOPPING THE SYSTEM AFTER A USER SET TIME HAS ELAPSED.
  - 6.4. PROCESSED VOLUME OPERATION. STOPPING THE SYSTEM AFTER A USER SET AMOUNT OF VOLUME HAS BEEN PROCESSED.

PNEUMATIC PRESSURE CONE:

THE PNEUMATIC PRESSURE CONE IS OPERATED BY A SOLENOID VALVE. PRIOR TO EACH OPERATION OF THE PRESS, THE SOLENOID VALVE WILL BE ENERGIZED. THE ACTIVATION OF THE PNEUMATIC PRESSURE CONE IS REQUIRED PRIOR TO ANY OPERATION OF THE PRESS.

SPRAY WASH SYSTEM SEQUENCE:

ONCE A SPRAY WASH CYCLE IS INITIATED, THE SPRAY DRIVE WILL RETURN TO THE HOME POSITION. ONCE AT HOME, A SHORT SPRAY WASH CYCLE WILL BEGIN. AFTER COMPLETING THE SHORT SPRAY WASH CYCLE, A USER ENTERED TIME BETWEEN WASH CYCLES WILL BEGIN TIMING. AFTER THIS TIME HAS EXPIRED, THE SYSTEM WILL INITIATE ANOTHER SHORT SPRAY WASH CYCLE. THESE CYCLES WILL CONTINUE UNTIL THE SYSTEM HAS COMPLETED THE USER ENTERED NUMBER OF SHORT SPRAY WASH CYCLES. ONCE THE NUMBER OF SHORT SPRAY WASH CYCLES HAS REACHED THE USER ENTERED SETTING, AND THE SPRAY WASH DWELL TIMER HAS EXPIRED, THE SYSTEM WILL INITIATE A LONG SPRAY WASH CYCLE. ONCE THE LONG SPRAY WASH CYCLE IS COMPLETE, THE SEQUENCE WILL REPEAT ITSELF.

SHORT SPRAY WASH CYCLE:

THE FIRST LOWER WASH WILL OPEN AND THE SPRAY DRIVE WILL DWELL. AFTER DWELLING, THE SPRAY DRIVE WILL ROTATE IN THE FORWARD DIRECTION UNTIL THE AWAY PROXIMITY SWITCH IS ACTIVATED. AFTER ACTIVATING THE AWAY PROXIMITY SWITCH, THE SPRAY DRIVE WILL STOP, LOWER WASH 1 WILL CLOSE, AND THE SECOND LOWER WASH WILL OPEN. THE SPRAY DRIVE WILL AGAIN DWELL. AFTER DWELLING, THE SPRAY DRIVE WILL ROTATE IN THE REVERSE DIRECTION UNTIL THE HOME PROXIMITY SWITCH IS ACTIVATED. AFTER ACTIVATING THE HOME PROXIMITY SWITCH, THE SPRAY DRIVE WILL STOP AND LOWER WASH 2 WILL CLOSE.

LONG SPRAY WASH CYCLE: A LONG SPRAY WASH CYCLE CONSISTS OF A SHORT SPRAY WASH CYCLE IN ADDITION TO THE FOLLOWING SEQUENCE. ONCE THE SHORT SPRAY WASH CYCLE IS COMPLETE, THE FIRST UPPER WASH WILL OPEN, AND THE SPRAY DRIVE MOTOR WILL DWELL. AFTER DWELLING, THE SPRAY DRIVE WILL ROTATE IN THE FORWARD DIRECTION UNTIL THE AWAY PROXIMITY SWITCH IS ACTIVATED. AFTER ACTIVATING THE AWAY PROXIMITY SWITCH, THE SPRAY DRIVE WILL STOP, UPPER WASH 1 WILL CLOSE, AND THE SECOND UPPER WASH, WILL OPEN. THE SPRAY DRIVE WILL AGAIN DWELL. AFTER DWELLING THE SPRAY DRIVE WILL ROTATE IN THE REVERSE DIRECTION UNTIL THE HOME PROXIMITY SWITCH IS ACTIVATED. AFTER ACTIVATING THE HOME PROXIMITY SWITCH, THE SPRAY DRIVE WILL STOP AND UPPER WASH 2 WILL CLOSE.

NOTES:

1. THE DEWATERING SYSTEM WILL CONTINUE TO INITIATE SPRAY WASH CYCLES WHILE THE SYSTEM IS IN SHUTDOWN MODE.
2. THE HOME POSITION WILL BE DEFINED AS THE FULLY REVERSED PROXIMITY POSITION.
3. THE AWAY POSITION WILL BE DEFINED AS THE FULLY FORWARD PROXIMITY POSITION.
4. THE SPRAY DRIVE OVER TRAVEL FAULT OCCURS WHEN THE HOME PROXIMITY SWITCH IS ACTIVATED WHEN OPERATING IN THE FORWARD DIRECTION, OR THE AWAY PROXIMITY SWITCH IS ACTIVATED WHEN OPERATING IN THE REVERSE DIRECTION.
5. AT THE END OF EACH WASH CYCLE, THE SPRAY DRIVE WILL RUN FORWARD FOR THE TIME SET IN THE FINAL FORWARD MOVEMENT TIMER SETPOINT.

SEQUENCE OF OPERATION

PRESS HIGH PRESSURE FEED INTERRUPT:

WHEN HIGH PRESSURE IS SENSED WITHIN THE PRESS, THE SLUDGE PUMP AND POLYMER FEED SIGNAL WILL SHUT DOWN IMMEDIATELY. THE PUMPS WILL AUTOMATICALLY RESTART AFTER THE HIGH INLET PRESSURE FEED INTERRUPT DURATION HAS ELAPSED, AND THE ALARM WILL AUTOMATICALLY RESET AFTER NORMAL SYSTEM PRESSURE RETURNS AND HOLDS FOR THE TIME SET IN THE HIGH PRESSURE INTERRUPT OFF DELAY TIMER.

PRESS HIGH PRESSURE SHUTDOWN:

HIGH PRESSURE SHUTDOWN WILL OCCUR IF THE NUMBER OF COUNTS OF HIGH PRESSURE INTERRUPTS, SET IN THE HIGH INLET PRESSURE INTERRUPT COUNTER, OCCUR WITHIN A USER DEFINED AMOUNT OF TIME. A HIGH PRESSURE SHUTDOWN WILL ALSO OCCUR IF THE HIGH PRESSURE SIGNAL IS REACHED AND MAINTAINED FOR A TIME SET IN THE HIGH INLET PRESSURE SHUTDOWN DELAY TIMER. DURING A HIGH PRESSURE SHUTDOWN CONDITION, THE SYSTEM WILL ENTER SHUTDOWN MODE IMMEDIATELY.

NOTE: TO RESET A HIGH PRESSURE SHUTDOWN, PRESS THE RESET PUSHBUTTON.

PRESS HIGH CURRENT INTERRUPT:

WHEN THE PRESS CURRENT MEASURED REACHES THE HIGH CURRENT INTERRUPT CURRENT SETPOINT, THE SLUDGE PUMP AND POLYMER FEED SIGNAL WILL SHUT DOWN IMMEDIATELY, BOTH UPPER SPRAY WASHES WILL BE CALLED TO RUN, THE PRESS WILL RUN AT THE USER SET SPEED, AND THE PRESSURE CONE WILL DE-ENERGIZE. THE PUMPS WILL AUTOMATICALLY RESTART, THE SPRAY WASHES WILL SHUT OFF, THE PRESS WILL RETURN TO ITS REGULAR SPEED, THE PRESSURE CONE WILL ENERGIZE, AND THE ALARM WILL AUTOMATICALLY RESET AFTER THE MOTOR CURRENT HAS DROPPED PAST THE USER SET HYSTERESIS AND HOLDS FOR THE TIME SET ON THE CURRENT INTERRUPT OFF DELAY.

PRESS HIGH CURRENT SHUTDOWN:

HIGH CURRENT SHUTDOWN WILL OCCUR IF THE NUMBER OF COUNTS OF HIGH CURRENT INTERRUPTS, SET IN THE HIGH CURRENT INTERRUPT COUNTER, OCCUR WITHIN A USER DEFINED AMOUNT OF TIME. A HIGH CURRENT SHUTDOWN WILL ALSO OCCUR IF THE HIGH CURRENT SIGNAL IS REACHED AND MAINTAINED FOR A TIME SET IN THE PLC, OR IF THE HIGH CURRENT OVERLOAD SETPOINT IS REACHED. DURING A HIGH CURRENT SHUTDOWN CONDITION, THE SYSTEM WILL ENTER SHUTDOWN MODE IMMEDIATELY.

NOTE: TO RESET A HIGH CURRENT SHUTDOWN, PRESS THE RESET PUSHBUTTON.

ALARM HORN AND ALARM SILENCE PUSHBUTTON:

THE ALARM HORN WILL ENERGIZE IF ANY OF THE SYSTEM FAULTS OCCUR. THE ALARM HORN CAN BE SILENCED AT ANY TIME BY PRESSING THE ALARM SILENCE PUSHBUTTON. THE ALARM SILENCE PUSHBUTTON WILL NOT RESET THE FAULT.


ALARM BEACON:

THE ALARM BEACON WILL ENERGIZE IF ANY OF THE SYSTEM FAULTS OCCUR. THE ALARM BEACON WILL REMAIN ENERGIZED UNTIL THE FAULT IS CLEARED AND THE SYSTEM RESET PUSHBUTTON IS PRESSED.

EMERGENCY STOP:

ALL DEWATERING EQUIPMENT WILL STOP IMMEDIATELY IF THE E-STOP PUSHBUTTON IS ACTIVATED. THE DEWATERING SYSTEM WILL NOT RESUME OPERATION UNTIL THE E-STOP IS RESET AND THE SYSTEM RESET PUSHBUTTON IS PRESSED.

DESIGNED	AJ				
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APPROVED					
DATE	07/14/20				
DATE	REVISION	NO.	BY	CK	APP

		Q-PRESS CONTROL PANEL	
1009 Airline Parkway Denver, NC 28037 Tel. 704-949-1010 info@hhusa.net		CHEYENNE, WY	SCALE: NONE
PROJECT NUMBER: 73005896		DRAWING NO: HBR8191A16	
		16 OF 18	

SEQUENCE OF OPERATION

DEWATERING SYSTEM SHUTDOWN MODE CONDITIONS:

1. REMOTE CALL TO RUN SIGNAL REMOVED
  2. STOP PUSHBUTTON PRESSED ON THE OIU
  3. THE SPRAY WASH SELECTOR IS SWITCHED TO THE HAND OR OFF POSITION
  4. THE FLOCC MIXER SELECTOR IS SWITCHED TO THE HAND OR OFF POSITION (IF FLOCC MIXER IS ENABLED)
  5. THE SLUDGE PUMP IN REMOTE SIGNAL IS LOST
  6. THE POLYMER SYSTEM IN REMOTE SIGNAL IS LOST
- WHEN SHUTDOWN MODE CONDITIONS 1–6 OCCUR, THE SYSTEM WILL ENTER SHUTDOWN MODE.
7. SLUDGE PUMP FAULT INDICATION RECEIVED FOR THE TIME SET IN THE SLUDGE PUMP GENERAL FAULT DELAY TIMER
  8. SLUDGE PUMP RUNNING INDICATION NOT RECEIVED WHILE CALLED TO RUN FOR THE TIME SET IN THE SLUDGE PUMP FAIL TO RUN FAULT DELAY TIMER
  9. POLYMER SYSTEM FAULT INDICATION RECEIVED FOR THE TIME SET IN THE POLYMER SYSTEM GENERAL FAULT DELAY TIMER
  10. POLYMER SYSTEM RUNNING INDICATION NOT RECEIVED WHILE CALLED TO RUN FOR THE TIME SET IN THE POLYMER SYSTEM FAIL TO RUN FAULT DELAY TIMER
  11. ZERO SLUDGE FLOW INDICATION RECEIVED WHILE THE SYSTEM IS IN DEWATERING MODE FOR THE TIME SET IN THE SLUDGE ZERO FLOW FAULT DELAY TIMER
  12. FLOCC MIXER VFD DETECTS OVERLOAD
  13. FLOCC MIXER MOTOR THERMISTOR IS TRIPPED
  14. FLOCC MIXER RUNNING INDICATION NOT RECEIVED WHILE CALLED TO RUN
  15. AIR SUPPLY LOW PRESSURE INDICATION RECEIVED
  16. PRESS HIGH PRESSURE SIGNAL MAINTAINED FOR THE TIME SET IN THE HIGH PRESSURE SHUTDOWN DELAY TIMER
  17. PRESS HIGH PRESSURE SIGNAL RECEIVED FOR THE AMOUNT OF TIMES SET IN THE HIGH PRESSURE COUNTS BEFORE SHUTDOWN COUNTER
  18. PRESS HIGH CURRENT MAINTAINED FOR THE TIME SET IN THE HIGH CURRENT SHUTDOWN DELAY TIMER
  19. PRESS HIGH CURRENT RECEIVED FOR THE AMOUNT OF TIMES SET IN THE CURRENT INTERRUPT COUNTS BEFORE SHUTDOWN COUNTER
- WHEN ANY OF SHUTDOWN MODE CONDITIONS 7 – 19 OCCUR, THE SYSTEM DISTURBANCE PILOT LIGHT WILL ENERGIZE AND THE SYSTEM WILL ENTER SHUTDOWN MODE. THE SYSTEM DISTURBANCE PILOT LIGHT WILL REMAIN ENERGIZED UNTIL THE CONDITION IS CORRECTED.

ONCE THE SYSTEM IS IN SHUTDOWN MODE, THE EQUIPMENT WILL POWER DOWN IN THE FOLLOWING ORDER:

1. SLUDGE SYSTEM AND POLYMER SYSTEM CALL TO RUN SIGNALS WILL BE REMOVED AND THE PNEUMATIC CONE WILL DISENGAGE.
2. THE PRESS AND SPRAY WASH WILL CONTINUE UNTIL THE SHUTDOWN TIMER HAS COMPLETED.
3. ONCE THE SHUTDOWN TIMER HAS EXPIRED THE SPRAY WASH WILL COMPLETE ONE LAST LONG SPRAY WASH CYCLE. DURING THE FINAL SPRAY WASH CYCLE THE PNEUMATIC CONE WILL BE RE-ENGAGED.
4. THE SYSTEM WILL REMAIN OFF UNTIL THE NEXT DEWATERING MODE IS ACTIVATED

SYSTEM FAULTS:

1. PRESS VFD DETECTS OVERLOAD
  2. PRESS MOTOR THERMOSTAT IS TRIPPED
  3. PRESS RUNNING INDICATION NOT RECEIVED WHILE CALLED TO RUN
  4. PRESS HIGH CURRENT OVERLOAD SETPOINT REACHED
  5. SPRAY DRIVE HIGH CURRENT DETECTED
  6. SPRAY DRIVE MOTOR OVERLOAD DETECTED
  7. SPRAY DRIVE MOTOR THERMOSTAT IS TRIPPED
  8. SPRAY DRIVE IS RUNNING REVERSE AND TRIGGERS THE AWAY PROXIMITY SWITCH.
  9. SPRAY DRIVE IS RUNNING FORWARD AND TRIGGERS THE HOME PROXIMITY SWITCH.
  10. SPRAY DRIVE IS RUNNING AND NEITHER PROXIMITY SWITCH IS TRIGGERED IN THE TIME SET IN THE FORWARD RUN PROXIMITY FAULT DELAY TIMER
- WHEN ANY OF FAULTS 1 THROUGH 7 OCCUR, THE ALARM HORN, BEACON, AND SYSTEM DISTURBANCE PILOT LIGHT WILL ENERGIZE AND THE ENTIRE SYSTEM WILL SHUT DOWN IMMEDIATELY. THE ALARM BEACON AND SYSTEM DISTURBANCE PILOT LIGHT WILL REMAIN ENERGIZED UNTIL THE CONDITION IS CORRECTED.
- WHEN ANY OF FAULTS 8 THROUGH 10 OCCUR, THE ALARM HORN, BEACON, AND SYSTEM DISTURBANCE PILOT LIGHT WILL ENERGIZE AND THE ENTIRE SYSTEM WILL SHUT DOWN IMMEDIATELY. THE ALARM BEACON AND SYSTEM DISTURBANCE PILOT LIGHT WILL REMAIN ENERGIZED UNTIL THE OPERATOR ACKNOWLEDGES THE FOLLOWING PROMPTS:
- ALARM ANNUNCIATION MESSAGE
  - SPRAY DRIVE HAS MANUALLY BEEN ADJUSTED FROM THE OIU TO A SAFE POSITION
  - HOME AND AWAY PROXIMITY SWITCHES ARE WORKING PROPERLY

NOTES:


1. FOR SYSTEM FAULTS 8 – 10, THE SYSTEM RESET PUSHBUTTON WILL NOT BE ACTIVE UNTIL THE ABOVE THREE PROMPTS HAVE BEEN ACKNOWLEDGED BY THE OPERATOR.
2. IF THE PRESS OR SPRAY DRIVE SELECTORS ARE SWITCHED TO THE HAND OR OFF POSITION WHEN THE SYSTEM IS IN THE DEWATERING MODE, THE SYSTEM WILL SHUTDOWN IMMEDIATELY AND A MESSAGE WILL BE DISPLAYED ON THE OIU.

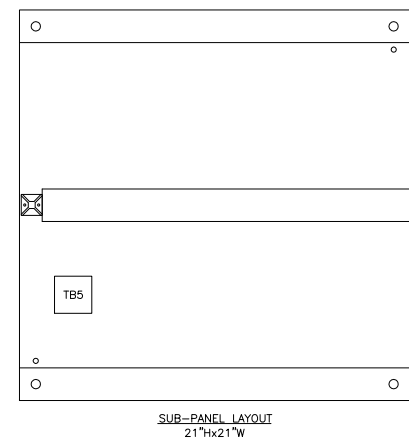
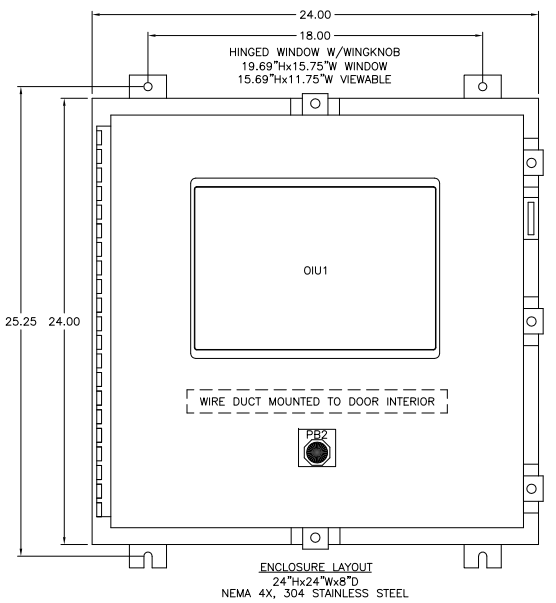
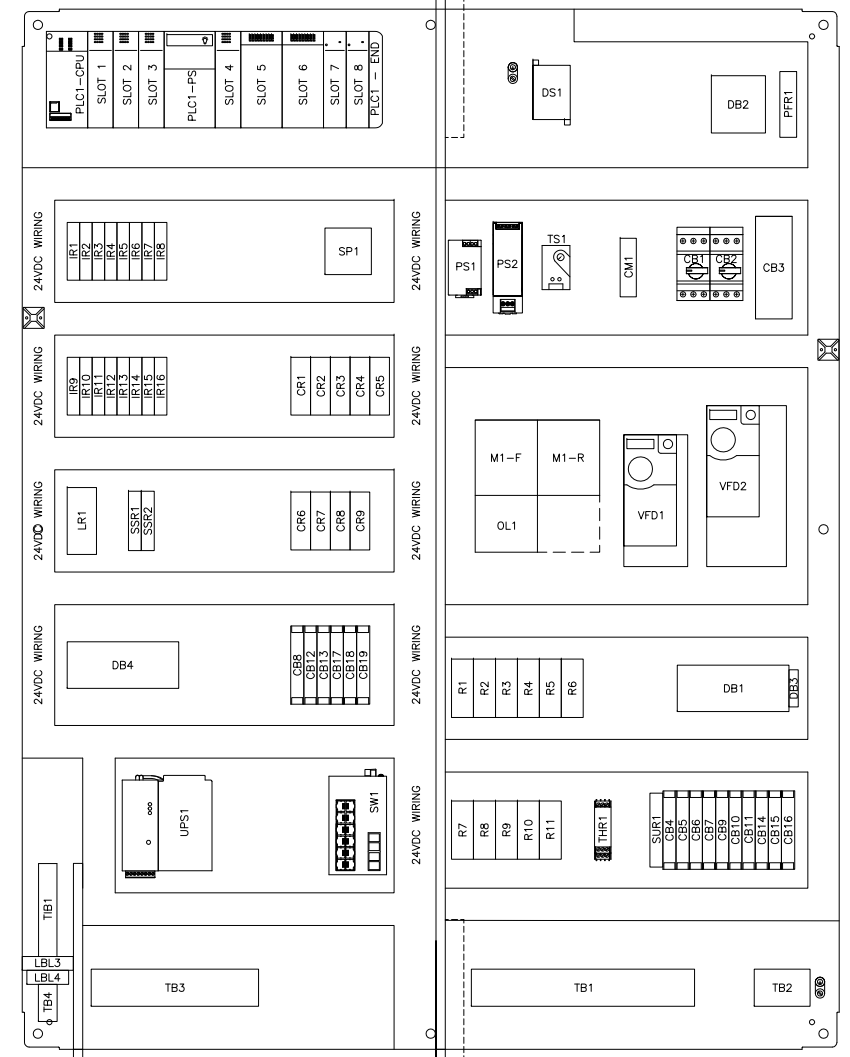
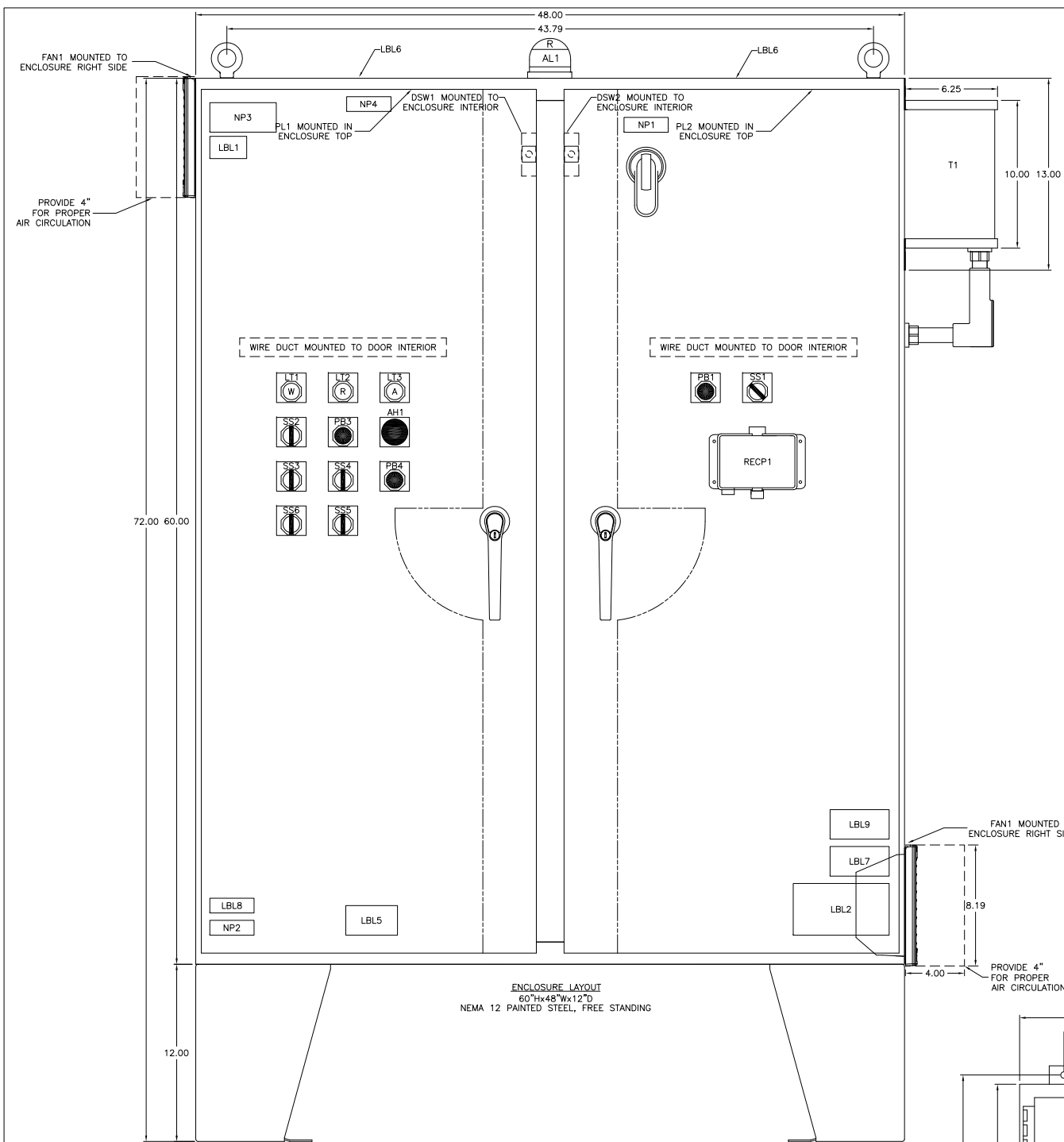
SEQUENCE OF OPERATION

OIU – INFORMATION:

1. THE OIU WILL DISPLAY THE ELAPSED MOTOR RUN TIMES.
2. ALL ADJUSTABLE SETPOINTS CAN BE ACCESSED AND ADJUSTED THROUGH THE OIU.
3. THE PRESENT FAULT WILL BE DISPLAYED ON THE OIU.
4. THE HISTORY OF ALL PAST FAULTS CAN BE ACCESSED THROUGH THE OIU.
5. FLOW INDICATION AND AMOUNT SHALL BE DISPLAYED ON THE OIU.
6. RUNNING AND FAULTED STATUS FOR ALL MOTORS AND PUMPS WILL BE DISPLAYED ON THE OIU.
7. VFD SPEEDS MAY BE ADJUSTED THROUGH THE OIU.
8. THE FLOCC MIXER MAY BE ENABLED/DISABLED THROUGH THE OIU.

DESIGNED	AJ				
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CHECKED	MSN				
APPROVED					
DATE	07/14/20				
NO.	BY	CK	APP	DATE	
REVISION					

 <p>1009 Airlie Parkway Denver, NC 28037 Tel. 704-949-1010 info@hhusa.net</p>		Q-PRESS CONTROL PANEL	
		CHEYENNE, WY	SCALE: NONE
PROJECT NUMBER: 73005896	DRAWING NO: HBR8191A17		
	17 OF 18		



- ENGRAVED PILOT DEVICE LEGEND PLATES:**
- LT1 - CONTROL POWER ON
  - LT2 - DEWATERING MODE
  - LT3 - SYSTEM DISTURBANCE
  - PB1 - EMERGENCY STOP
  - PB2 - EMERGENCY STOP
  - PB3 - SYSTEM RESET
  - PB4 - ALARM SILENCE
  - SS1 - CONTROL POWER OFF-ON
  - SS2 - PRESS HAND-OFF-AUTO
  - SS3 - PRESS FOR-OFF-REV
  - SS4 - SPRAY WASH HAND-OFF-AUTO
  - SS5 - SPRAY DRIVE HAND-OFF-AUTO
  - SS6 - FLOCC MIXER HAND-OFF-AUTO

- ENGRAVED NAMEPLATES:**
- NP1 - 480VAC-3PH-60HZ
  - NP2 - INTRINSICALLY SAFE CIRCUITS
  - NP3 - CONTROL PANEL PROVIDES INTRINSICALLY SAFE CIRCUIT EXTENSIONS FOR USE IN CLASS I, GROUPS A, B, C, D; CLASS II, GROUPS E, F, G; CLASS III HAZARDOUS LOCATIONS WHEN CONNECTED PER P&F INSTALLATION DRAWING NO. 116-0145D
  - NP4 - LCP-SP1  
LCP-SP2

- LABEL DESCRIPTION:**
- LBL1 - WARNING: MULTIPLE SUPPLY SOURCES OPEN ALL DISCONNECTS BEFORE SERVICING EQUIPMENT OR OTHER UNIT WIRING
  - LBL2 - DANGER HIGH VOLTAGE ENTRY BY QUALIFIED PERSON ONLY
  - LBL3 - WARNING SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY
  - LBL4 - INTRINSICALLY SAFE FIELD WIRING TERMINALS
  - LBL5 - ELEMECH ELECTRICAL CONTROL SYSTEMS DAMAGE RESULTING FROM INSTALLATION OF TOP ENTRY CONDUIT WILL VOID WARRANTY - USE PROPER FITTINGS, MYERS TYPE 4 OR EQUAL - PROTECT INTERIOR DEVICES FROM INSTALLATION DEBRIS - CONDUIT MUST BE SEALED WATERTIGHT TO PREVENT WATER ENTRY
  - LBL6 - WARNING ARC FLASH AND SHOCK HAZARD FOLLOW ALL REQUIREMENTS NFPA 70E FOR SAFE WORK PRACTICES AND FOR PERSONAL PROTECTIVE EQUIPMENT.
  - LBL7 - DANGER TO PREVENT IGNITION OF FLAMMABLE OR COMBUSTIBLE ATMOSPHERES, DISCONNECT POWER BEFORE SERVICING.
  - LBL8 - WARNING UPS VOLTAGE PRESENT WHEN POWER IS OFF. CONTACT MAY CAUSE ELECTRICAL SHOCK OR BURN. TURN OFF AND LOCK-OUT UPS OUTPUT POWER BEFORE SERVICING.
  - LBL9 - WARNING

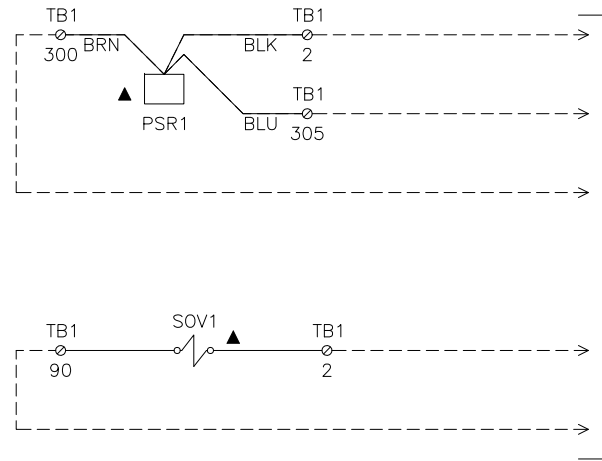
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					DETAILED	
					CHECKED	MSN
					APPROVED	
					DATE	07/14/20

**HUBER**  
TECHNOLOGY

1009 Airlie Parkway  
Denver, NC 28037  
Tel. 704-949-1010  
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Q-PRESS CONTROL PANEL	
CHEYENNE, WY	SCALE: NONE
PROJECT NUMBER: 73005896	DRAWING NO: HBR8191A18 18 OF 18

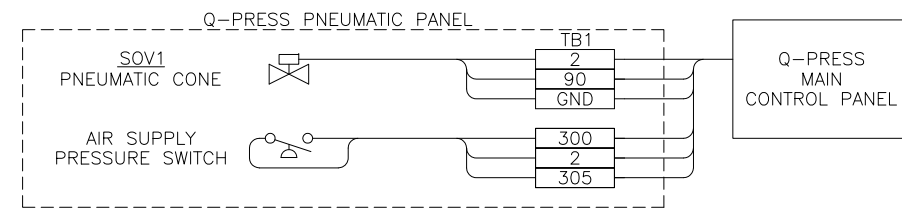
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TO Q-PRESS MAIN CONTROL PANEL

2  
AIR SUPPLY OK PRESURE SWITCH  
PNEUMATIC CONE SOLENOID VALVE  
2

FIELD WIRING DIAGRAM



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DATE	REVISION	NO.	BY	CK	APP	DATE
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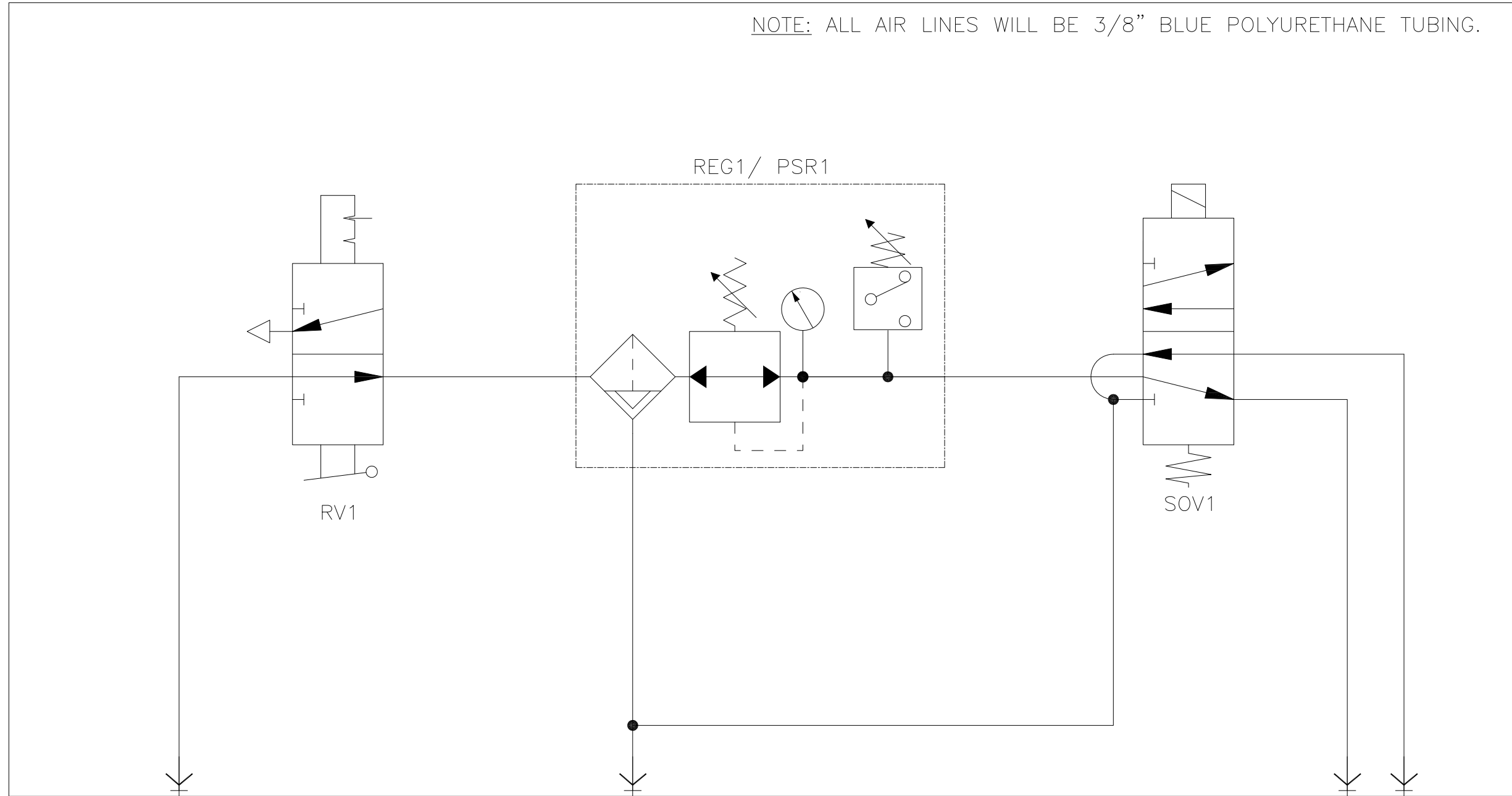
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Denver, NC 28037  
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Q-PRESS PNEUMATIC CONTROL PANEL	
CHEYENNE, WY	SCALE: NONE
PROJECT NUMBER: 73005896	DRAWING NO: HBR8191B1
1 OF 3	

PNEUMATIC  
CONTROL PANEL

NOTE: ALL AIR LINES WILL BE 3/8" BLUE POLYURETHANE TUBING.



AIR SUPPLY  
CONNECTION  
STAINLESS STEEL  
BULKHEAD  
3/8"OD TUBE FITTING

DRAIN / EXHAUST  
CONNECTION  
STAINLESS STEEL  
BULKHEAD  
3/8"OD TUBE FITTING

CONTROL  
CONNECTION  
STAINLESS STEEL  
BULKHEAD  
3/8"OD TUBE FITTING

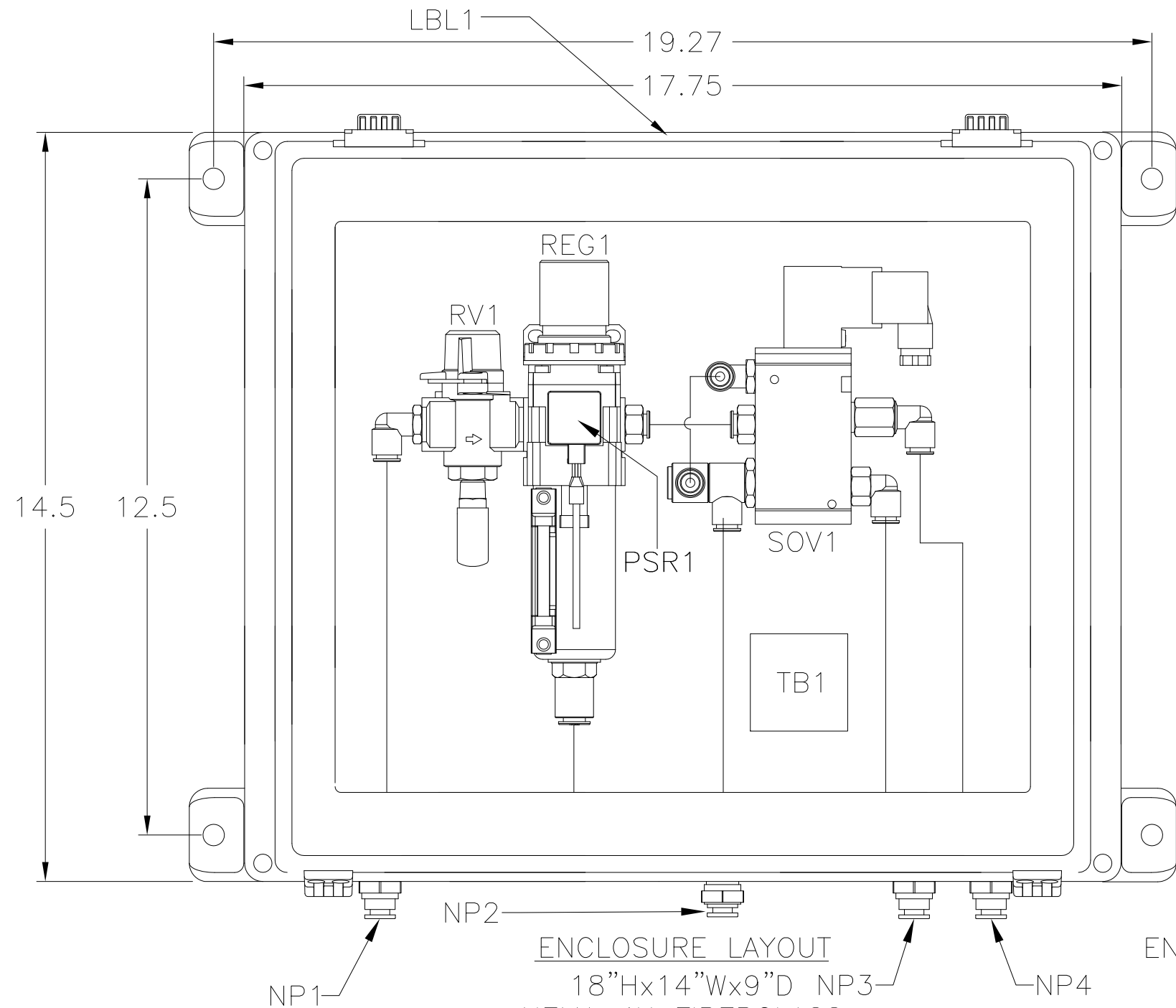
CONTROL  
CONNECTION  
STAINLESS STEEL  
BULKHEAD  
3/8"OD TUBE FITTING

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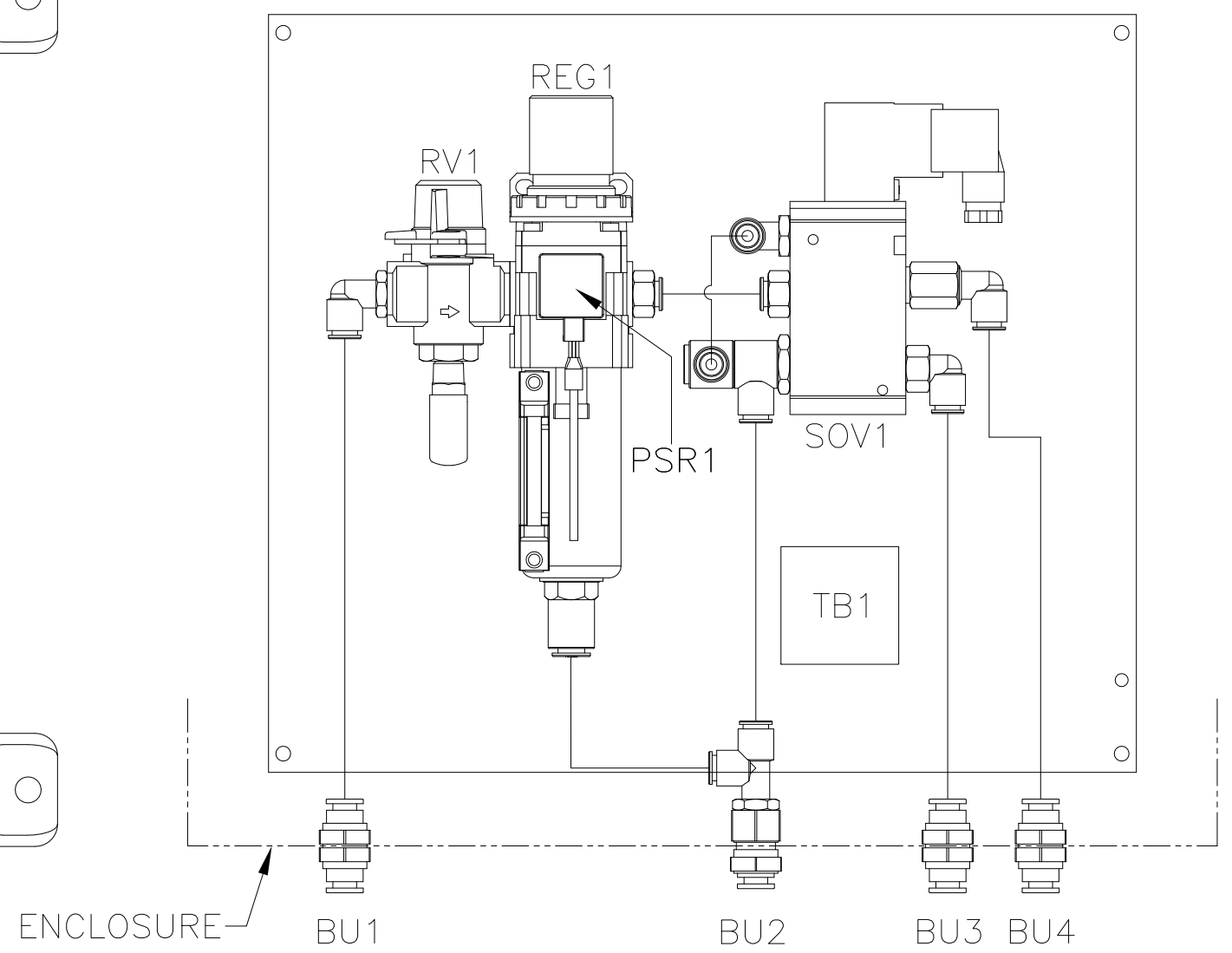
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**TECHNOLOGY**  
1009 Airlie Parkway  
Denver, NC 28037  
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Q-PRESS PNEUMATIC CONTROL PANEL	
CHEYENNE, WY	SCALE: NONE
PROJECT NUMBER: 73005896	DRAWING NO: HBR8191B2
	2 OF 3





**ENCLOSURE LAYOUT**  
 18"Hx14"Wx9"D  
 NEMA 4X FIBERGLASS  
 14.45"Hx11.06"W WINDOW



**SUB-PANEL LAYOUT**  
 14.75"Hx12.88"W

**LEGEND:**  
 NP1 - AIR SUPPLY CONNECTION  
 NP2 - DRAIN CONNECTION  
 NP3 - CONTROL CONNECTION  
 NP4 - CONTROL CONNECTION

LBL1 - WARNING  
 DAMAGE RESULTING FROM  
 INSTALLATION OF TOP ENTRY  
 CONDUIT WILL VOID WARRANTY  
 - USE PROPER FITTINGS, MYERS  
 TYPE 4 OR EQUAL  
 - PROTECT INTERIOR DEVICES  
 FROM INSTALLATION DEBRIS  
 - CONDUIT MUST BE SEALED  
 WATERTIGHT TO PREVENT WATER  
 ENTRY

DATE	REVISION	NO.	BY	CK	APP	DATE
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**HUBER**  
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Q-PRESS PNEUMATIC CONTROL PANEL	
CHEYENNE, WY	SCALE: NONE
PROJECT NUMBER: 73005896	DRAWING NO: HBR8191B3
3 OF 3	

# Bill of Materials



Rev: 0

Date: 7/17/2020

By: AJ

Section:

D

Job Number: HBR8191

Page # 1/1

Section Name: Bill of Materials

Item No	Component	Description	Manufacturer Part Number	QTY	Device
<b>Q-Press Control Panel (Quantity: 2)</b>					
1	00-000-000	Wire, Hardware, Wire labels, etc.	EleMech: Miscellaneous	2	
2	10-069-000	Wireway Duct Cover, 1.5"W, 6 Ft. Section, w/Panduit F Series	Panduit: C1.5WH6	6	
3	10-069-002	Wireway Duct Cover, 2"W, 6 Ft. Section, w/Panduit F Series	Panduit: C2WH6	9	
4	10-069-005	Wireway Duct, 1.5"Wx3"H, 6 Foot Section	Panduit: F1.5X3WH6	6	
5	10-069-008	Wireway Duct, 2"Wx3"H, 6 Foot Section	Panduit: F2X3WH6	9	
6	25-000-A001	Legendplate Assembly, Yellow E-Stop, Standard Encl.	EleMech: 25-000-A001 Assembly	1	
7	25-000-A002	Legendplate Assembly, White, Black Text, Standard Encl.	EleMech: 25-000-A002 Assembly	12	
8	25-000-A019	Nameplate Assembly, White: Power Supply - 3/60/480VAC	EleMech: 25-000-A019 Assembly	1	
9	42-063-007	Terminal Block, Din Rail, 35MM Wide, 15 High, 2 Meters Long	Iboco: Omega 3 AF	2	
10	51-000-062	Wire, MTW Type, 600V, 105°C, CSA/UL1015, Tinned Copper	EleMech: 51-000-062	1	
11	52-000-003	Label, Underwriters Laboratories 698A, w/Decal Set	EleMech: 698A	1	
12	01-005-008	Alarm Horn, Panel Mount, 24VDC, 45mm front, 22.5mm, NEMA 4X	Allen-Bradley: 855P-B30ME22	1	AH1
13	56-097-005	Beacon, Steady/Stobe, LED, NEMA 4X, 24VDC, Red, 1/2" Male -NS	Federal: LP22LED-012-024R	1	AL1
14	18-000-002	Steel Barrier, 14Ga., 0.5"Wx10.0"x6.0"D, Standard	EleMech: 18-000-002	1	BAR1
15	11-000-269	Enclosure, Voltage Barrier, SS, 39"x10"x1", Qty. (1)set Req.	EleMech: 11-000-269	1	BAR2
16	23-005-007	Motor Starter Protector, 3PH, 600V, 10-16 Amp Range	Allen-Bradley: 140M-C2E-C16	1	CB1
17	03-058-118	Circuit Breaker, 1 Pole, 240VAC, 1A, 14kA, UL489, Type C	Square D: M9F42101	3	CB10,11,18
18	23-005-010	Motor Starter Protector, Aux. Contact, 1NO, 1NC, w/140M	Allen-Bradley: 140M-C-AFA11	2	CB1-2
19	23-005-011	Motor Starter Protector, Line Terminal Adapter, w/140M-C,D	Allen-Bradley: 140M-C-TE1	2	CB1-2
20	23-005-026	Motor Starter Protector, 3PH, 600V, 14.5-20 Amp Range, D/FRM	Allen-Bradley: 140M-D8E-C20	1	CB2
21	03-018-264	Circuit Breaker, 2 Pole, 480VAC, 15A, 65K AIC, PD1 Series	Eaton: PDG12M0015TFFJ	1	CB3
22	03-058-122	Circuit Breaker, 1 Pole, 240VAC, 5A, 14kA, UL489, Type C	Square D: M9F42105	1	CB4
23	03-058-119	Circuit Breaker, 1 Pole, 240VAC, 2A, 14kA, UL489, Type C	Square D: M9F42102	8	CB5,9,12-
24	03-058-124	Circuit Breaker, 1 Pole, 240VAC, 8A, 14kA, UL489, Type C	Square D: M9F42108	2	CB6,8
25	03-058-120	Circuit Breaker, 1 Pole, 240VAC, 3A, 14kA, UL489, Type C	Square D: M9F42103	2	CB7,17
26	57-000-A031	Cable, Comm., Ethernet, CAT6, 600V, RJ45M to RJ45M, Shielded	EleMech: 57-000-A031	4	CBL1-4
27	04-094-000	Current Monitor, Selectable, SPDT, 120/24V ,2-100A, w/Delay	Gavazzi: DIB01CM24100A	1	CM1
28	06-058-012	Control Relay, Bus Jumper, 2-Pole, w/Telemec. RXM Relay	Square D: RXZ S2	7	CR1-9
29	06-058-015	Control Relay, 3PDT,24VDC, 11Pin Spade, Indicator, Operator	Square D: RXM3AB2BD	9	CR1-9

Item No	Component	Description	Manufacturer Part Number	QTY	Device
30	38-058-003	Socket, 11 Pin Spade, Din, Screw Term., 3Tier, 250V w/3-Pole	Square D: RXZE2S111M	9	CR1-9
31	07-063-000	Distribution Block, End Cover, 4 Pole, 300V,10A, w/WK4E\U\VB	Wieland: 07.311.4053.1	2	DB1,4
32	07-063-001	Distribution Block, Jumper, 4 Pole, 300V,10A, w/WK4E\U\VB	Wieland: Z7.210.3427	6	DB1,4
33	07-063-002	Distribution Block, Single Pole, 10A, 300V, WK4E\U\VB	Wieland: 57.404.6955.1	23	DB1,4
34	07-030-A004	Distribution Block Assembly, 3PH, 85A, 4-14AWG, 1 In, 4 Out	Mersen: MPDB62161 Assembly	1	DB2
35	09-001-023	Disconnect Switch, Aux. Contact NO, w/OT45E3, NF, Mtd. Right	ABB: OA1G10	1	DS1
36	09-001-A014	Disconnect Assembly, Non-Fused, 60 Amp, NEMA 4X, 12" Depth	ABB: OT63F3 Assembly	1	DS1
37	11-035-240	Enclosure, Lighting Package, 115VAC, Door Switch	Hoffman: A-LFSWD	2	DSW1,2
38	11-055-057	Sub-Panel, Painted Steel, 56"Hx44"W Saginaw	Saginaw: SCE-60P48	1	EN1
39	11-055-092	Enclosure, NEMA 4/12, 60"Hx48"Wx12"D, C-Hinge, 3PT	Saginaw: SCE-60EL4812LPPL	1	EN1
40	11-035-837	Enclosure Filter Fan, Series HF, 70CFM w/Filter, 115VAC, 9"	Hoffman: HF0916414	1	FAN1
41	11-035-838	Enclosure Exhaust Grill , Series HG, 9"	Hoffman: HG0900504	1	FAN1
42	15-011-000	Ground Lug, 14AWG - 4AWG	Blackburn: L70	2	GND
43	06-058-027	Control Relay Retension Clip, w/Telemec. RPM 1-Pole Relay	Square D: RPZR235	16	IR1-16
44	06-058-028	Control Relay, SPDT, 24VDC, 5Pin Spade, Operator, 15A	Square D: RPM12BD	16	IR1-16
45	38-058-009	Socket, 5 Pin Spade, Din Mount, Screw Term., w/ RPM 1-Pole	Square D: RPZF1	16	IR1-16
46	06-058-040	Diode, 6-250VDC, w/ RXM Sockets, RPZF1/2 Sockets	Square D: RXM040W	2	IR6,13
47	52-137-002	Label, Multiple Supply Sources, Warning, 2.5"Wx1.5"H, Yellow	Nameplate Tech: 52-137-002	1	LBL1
48	52-137-001	Label, High Voltage, Danger, 6.5"Wx3.5"H, White/Black/Red	Nameplate Tech: 52-137-001	1	LBL2
49	52-000-066	Nameplate, Warning UPS Power Present	EleMech: J5331	1	LBL9
50	06-005-077	Latching Relay, DPDT,24VDC, 11Pin Spade, Dual Coil	Allen-Bradley: 700HJD32Z24	1	LR1
51	38-005-002	Socket, 11 Pin Spade, Din Rail Mount, Guarded Screw Terminal	Allen-Bradley: 700-HN153	1	LR1
52	32-005-A000	Pilot light, PTT, NEMA 4X, Universal, LED, White	Allen-Bradley: 800H-QRTH2W	1	LT1
53	32-005-A002	Pilot light, PTT, NEMA 4X, Universal, LED, Red	Allen-Bradley: 800H-QRTH2R	1	LT2
54	32-005-A003	Pilot light, PTT, NEMA 4X, Universal, LED, Amber	Allen-Bradley: 800H-QRTH2A	1	LT3
55	22-018-007	Aux. Contact, Top mounted, 3NO/1NC, w/C-H Freedom	Cutler-Hammer: C320KGT14	1	M1-F/R
56	22-018-077	Motor Starter, Rev., NEMA 1, 120VAC, C440, 0.33-1.6A, Auto	Cutler-Hammer: AN59DNOA5G1P6	1	M1-F/R
57	25-000-A010	Nameplate Assembly, White, Black Text, 1"Hx3"W	EleMech: 25-000-A010 Assembly	3	NP1,2,4
58	25-000-A058	Nameplate Assembly, Yellow: Intrinsically Safe Circ: PR5202	EleMech: 25-000-A058 Assembly	1	NP3
59	29-005-117	Pushbutton, E-Stop, NEMA 4X, Oper+1NC, Twist Rel. Red Head	Allen-Bradley: 800H-TFRXT6D2	1	PB1

Item No	Component	Description	Manufacturer Part Number	QTY	Device
60	02-005-002	Contact Block, 2NC, w/A-B 800 Series	Allen-Bradley: 800T-XA4	1	PB3
61	29-005-002	Pushbutton, NEMA 4X, Oper+1NO, Flush Head, Black	Allen-Bradley: 800H-AR2D1	2	PB3,4
62	30-183-000	Phase Failure, Voltage Monitoring Relay,380-480VAC, 2 SPDT	Telemecanique: RM22TR33	1	PFR1
63	54-035-006	Panel Light, LED, 90-260VAC, Off-On Switch, Screw Mount	Hoffman: LEDA1S35	2	PL1,2
64	33-005-023	Compact I/O, End Cap	Allen-Bradley: 1769-ECR	1	PLC1
65	33-005-044	Compact I/O, Discrete Input Module, 16 Point, 24VDC	Allen-Bradley: 1769-IQ16	4	PLC1
66	33-005-108	Compact I/O, Analog Output, 4 Chnl, Current, Isolated	Allen-Bradley: 1769-OF4CI	1	PLC1
67	33-005-129	Compact I/O, Discrete Output Module,16 Pt Relay,120VAC/24VDC	Allen-Bradley: 1769-OW16	2	PLC1
68	33-005-140	Compact Logix, Power Supply, 19.2-31.2VDC, 0.8A-24V, PB2	Allen-Bradley: 1769-PB2	1	PLC1
69	33-005-170	Compact I/O, Analog Input, 4 Chnl., Isolated	Allen-Bradley: 1769-IF4I	1	PLC1
70	33-005-201	CompactLogix, CPU 2MB Mem, SD, 2-Ether, USB, 2 Bank/16 Cards	Allen-Bradley: 1769-L33ER	1	PLC1
71	HBR-170-P008	Program, PLC, Compact Logix, Standard	EleMech: HBR-170-P008	1	PLC1
72	37-323-011	Power Supply, 91W, 85-264VAC IN, 24VDC OUT, NEC Class 2	Delta: DRS-24V100W1NZ	1	PS1
73	37-323-021	Power Supply, 240W, 100-240VAC 2.6A In, 24VDC 10A Out, Aux	Delta: DRP24V240W1CAN	1	PS2
74	06-058-013	Control Relay Retension Clip, w/Telemec. RXM Relay	Square D: RXZ 400	11	R1-11
75	06-058-021	Control Relay, DPDT,120VAC, 8Pin Spade, Operator, 15A	Square D: RPM22F7	11	R1-11
76	38-058-008	Socket, 8 Pin Spade, Din Mount, Screw Term., w/ RPM 2-Pole	Square D: RPZF2	11	R1-11
77	14-135-009	Receptacle, Panel Mount, Nema 4/12, GFCI Recp, RJ45	Grace: P-R2-K3RF0	1	RECP1
78	13-000-A000	Spare Parts Box Assembly, Din Rail Mount	EleMech: 13-000-A000 Assembly	1	SP1
79	02-005-000	Contact Block, 1NO/1NC, w/A-B 800 Series	Allen-Bradley: 800T-XA	1	SS1
80	39-005-001	Selector Switch, NEMA 4X, 2 Pos. Maintained, 1NO-1NC	Allen-Bradley: 800H-HR2A	1	SS1
81	39-005-009	Selector Switch, NEMA 4X, 3 Pos. Maintained, 1NO-1NC	Allen-Bradley: 800H-JR2A	4	SS2,4-6
82	39-005-011	Selector Switch, Nema 4X, 3 Pos. Spring Fr. Right, 1NO-1NC	Allen-Bradley: 800H-JR5A	1	SS3
83	06-109-002	Control Relay, Solid State, 4-32VDC IN, 4-32VDC Out SPST	Crouzet: 84 130 104	2	SSR1,2
84	40-030-002	Surge Suppressor, 1 Pole, 120VAC, 200kA SCCR, DIN	Mersen: STP120P07	1	SUR1
85	33-371-007	Ethernet Switch, 8 Gigabit TX Ports, 24VDC, Managed, DIN	Moxa: EDS-G508E	1	SW1
86	41-018-A050	Transformer Assembly, 480/240-120VAC, 1.5KVA, NEMA 3R, Steel	Cutler-Hammer: S20N11P16P Assemb	1	T1
87	42-063-000	Terminal Block, Labels, Custom Printed, w/WK4/U	Wieland: 04.242.6353-CUSTOM	262	TB,DB
88	42-063-004	Terminal Block, Ground, 30A, 600V, 6MM Wide, w/WK4/U	Wieland: 57.504.9055.0	13	TB,DB
89	42-063-009	Terminal Block, End Clamp, w/WKN10/U	Wieland: Z5.522.8553	15	TB,DB,TIB

Item No	Component	Description	Manufacturer Part Number	QTY	Device
90	42-063-001	Terminal Block, End Plate, Gray, w/WK4/U	Wieland: 07.311.0155.0	4	TB,DB3
91	42-063-003	Terminal Block, Single Pole Gray, 30A, 600V, 6MM Wide, WK4/U	Wieland: 57.504.0055.0	90	TB,DB3
92	42-063-008	Terminal Block, Labels, Blank, w/WK4/U-(600 tags per box)	Wieland: Z4.242.6353	28	TB1
93	42-063-015	Terminal Block, Jumper, w/WK4/U, 02 pole, Insulated	Wieland: Z7.281.1227	5	TB1
94	06-005-067	Thermistor Relay, SPDT, 115VAC, 1650-3100 Ohm	Allen-Bradley: 817S-PTC-115	1	THR1
95	18-247-001	Transformer Isolated Barrier, Dual Channel, 120VAC/24VDC	PR Electronics: 5202B2	1	TIB1
96	46-034-001	Thermostat, for fan control, N.O.contact, 6 amp,30-140 F.	Stego: 01141.9-00	1	TS1
97	48-312-000	UPS, U Series, 24VDC In, 24VDC Out, 240W	PULS: UBC10.241	1	UPS1
98	50-005-075	Variable Freq. Drive, Open, 5HP, 480VAC, 3PH, Powerflex 525	Allen-Bradley: 25B-D010N104	1	VFD1
99	50-005-083	Variable Freq. Drive, Open, 7.5HP, 480VAC, 3PH, Powerflex525	Allen-Bradley: 25B-D013N104	1	VFD2
<b>Q-Press Pressure Cone Pneumatic Panel (Standard) (Quantity: 2)</b>					
100	51-000-062	Wire, MTW Type, 600V, 105°C, CSA/UL1015, Tinned Copper	EleMech: 51-000-062	1	
101	94-255-009	Tubing, 3/8"OD, Polyurethane, Blue, 100 Foot Roll	SMC USA: TIUB11BU-33	1	
102	94-255-008	Fitting, Bulkhead, Union, SS, w/ 3/8"OD Tube x 3/8"OD Tube	SMC USA: KQG2E11-00	3	BU1,3,4
103	94-255-042	Fitting, Bulkhead Union Connector 3/8"OD Tubex3/8"NPT 316SS	SMC USA: KQG2E11-N03	1	BU2
104	11-035-129	Sub-Panel, Painted Steel, w/16"Hx14"W Junction Box	Hoffman: A-16P14	1	EN1
105	11-035-176	Enclosure Mounting Feet, Fiberglass, J box	Hoffman: A-50MFKR	1	EN1
106	11-035-338	Enclosure, Nema 4X, Fiberglass, 17.5"Hx14"Wx8.78"D, w/Window	Hoffman: A-18149JFGQRPWR	1	EN1
107	94-255-005	Fitting, Male Connector, Straight, 3/8"OD Tube x 3/8"MNPT	SMC USA: KQ2H11-36AS	2	FIT
108	94-255-006	Fitting, Male Elbow, 3/8"OD Tube x 3/8"MNPT	SMC USA: KQ2L11-36AS	2	FIT
109	94-255-015	Fitting, Male Elbow, Extended, 3/8" OD Tube x 3/8" MNPT	SMC USA: KQ2W11-36AS	1	FIT
110	94-255-020	Fitting, Male Run Tee, 3/8"OD x 3/8" OD x 3/8" NPT	SMC USA: KQ2Y11-36AS	1	FIT
111	94-255-048	Fitting, Male Double Rotating Elbow, 3/8"OD Tube x 1/4"MNPT	SMC USA: KQ2VD11-35AS	1	FIT
112	94-255-049	Fitting, Male Elbow, 3/8"OD Tube x 1/4"MNPT	SMC USA: KQ2L11-35AS	1	FIT
113	94-255-004	Regulator, 0-120PSI, 3/8"NPT, w/ Filter and pressure switch	SMC USA: AW30-NO3BDE3-8Z	1	REG1
114	74-255-004	Solenoid Valve, Muffler, 1/4" NPT Port, 30 dB Reduction	SMC USA: AN20-NO2	1	RV1
115	94-255-016	Relief Valve, 3-Port, Locking Holes, 3/8"NPT	SMC USA: VHS30-N03-Z	1	RV1
116	94-255-017	Relief Valve, Spacer, w/ Bracket	SMC USA: Y300T	1	RV1
117	74-255-006	Solenoid Valve, 2 Pos, Single, (3) 3/8"/(2) 1/4" NPT, 120VAC	SMC USA: VFS3120-3DZ-03T	1	SOV1
118	94-215-004	Fitting, Tube Connector, Straight, 3/8" OD x 10mm OD	McMaster-Carr: 5779K259	2	SPARE

Item No	Component	Description	Manufacturer Part Number	QTY	Device
119	42-063-000	Terminal Block, Labels, Custom Printed, w/WK4/U	Wieland: 04.242.6353-CUSTOM	12	TB1
120	42-063-001	Terminal Block, End Plate, Gray, w/WK4/U	Wieland: 07.311.0155.0	1	TB1
121	42-063-003	Terminal Block, Single Pole Gray, 30A, 600V, 6MM Wide, WK4/U	Wieland: 57.504.0055.0	5	TB1
122	42-063-004	Terminal Block, Ground, 30A, 600V, 6MM Wide, w/WK4/U	Wieland: 57.504.9055.0	1	TB1
123	42-063-007	Terminal Block, Din Rail, 35MM Wide, 15 High, 2 Meters Long	Iboco: Omega 3 AF	1	TB1
124	42-063-009	Terminal Block, End Clamp, w/WKN10/U	Wieland: Z5.522.8553	2	TB1
<b>Q-Press Local OIU, E-Stop Control Station (Quantity: 2)</b>					
125	00-000-000	Wire, Hardware, Wire labels, etc.	EleMech: Miscellaneous	1	
126	10-069-000	Wireway Duct Cover, 1.5"W, 6 Ft. Section, w/Panduit F Series	Panduit: C1.5WH6	6	
127	10-069-005	Wireway Duct, 1.5"Wx3"H, 6 Foot Section	Panduit: F1.5X3WH6	6	
128	25-000-A001	Legendplate Assembly, Yellow E-Stop, Standard Encl.	EleMech: 25-000-A001 Assembly	1	
129	51-000-062	Wire, MTW Type, 600V, 105°C, CSA/UL1015, Tinned Copper	EleMech: 51-000-062	1	
130	52-000-000	Label, Underwriters Laboratories 508A, w/Decal Set	EleMech: 508A	1	
131	11-000-340	Enclosure Drip Shield, Stainless Steel, Per Inch	EleMech: 11-000-340	24	EN
132	11-035-026	Enclosure, NEMA 4X, 304SS, 24"Hx24"Wx8"D, C. Hinge	Hoffman: A-24H2408SSLP	1	EN
133	11-035-133	Sub-Panel, Painted Steel, w/24"Hx24"W C. Hinge Encl	Hoffman: A-24P24	1	EN
134	26-005-091	OIU, PVP 7 Standard, 12" Display, 24VDC, Touch, Ethernet	Allen Bradley: 2711P-T12W21D8S	1	OIU1
135	HBR-170-P017	Program, OIU, Panelview Plus 1250, Standard	EleMech: HBR-170-P017	1	OIU1
136	29-005-117	Pushbutton, E-Stop, NEMA 4X, Oper+1NC, Twist Rel. Red Head	Allen-Bradley: 800H-TFRXT6D2	1	PB2
137	42-063-000	Terminal Block, Labels, Custom Printed, w/WK4/U	Wieland: 04.242.6353-CUSTOM	8	TB
138	42-063-001	Terminal Block, End Plate, Gray, w/WK4/U	Wieland: 07.311.0155.0	1	TB
139	42-063-003	Terminal Block, Single Pole Gray, 30A, 600V, 6MM Wide, WK4/U	Wieland: 57.504.0055.0	5	TB
140	42-063-004	Terminal Block, Ground, 30A, 600V, 6MM Wide, w/WK4/U	Wieland: 57.504.9055.0	1	TB
141	42-063-008	Terminal Block, Labels, Blank, w/WK4/U-(600 tags per box)	Wieland: Z4.242.6353	2	TB
142	42-063-009	Terminal Block, End Clamp, w/WKN10/U	Wieland: Z5.522.8553	2	TB
<b>Spare Parts / Ship Loose (Total Quantity Provided)</b>					
143	61-000-012	Labor, Engineering, Submittal, Schematics, BOM	EleMech: 61-000-012	1	

## Catalog Cuts

**5SJ4 1 10 - 7 HG41** **SIEMENS**

a b c d e

a Frame Style	
Code	Description
5SJ4	Standard Frame

b Poles	
Code	Description
1	1-Pole
2	2-Pole
3	3-Pole

c Rated Current	
Code	Rated Current (I <sub>n</sub> )
14	0.3
05	0.5
01	1
15	1.6
02	2
03	3
04	4
11	5
06	6
08	8
10	10
13	13
18	15
16	16
20	20
25	25
30	30
32	32
25	35
40	40
45	45
50	50
60	60
63	63

d Trip Curve (Characteristic)			
Code	Trip Curve	Magnetic Trip Point	Thermal Trip Point
6	B	3 to 5 I <sub>n</sub>	1.13 to 1.45 Breaker Rating
7	C	5 to 10 I <sub>n</sub>	
8	D	10 to 20 I <sub>n</sub>	

e Version	
Code	Description
HG40	240 VAC, Same Priority
HG41	240 VAC
HG42	480Y/277 VAC

**Certifications:**  
CE  
UL Listed and Certified to Canadian Standards  
HACR Rated

5SJ4 ... HG40

Rev: 0	Device Tag: CB5
Date: MM/DD/YYYY	Job Number: ELE 5000
By: Engineer initials	Page # 1/1

Manuf. Pts: SIEMENS: 5SJ4102-7HG40

03-056-035  
 EleMech Part Number  
 Refer to Bill of Materials  
 for more information

03-056-\*\*\*  
 A '\*\*\*' Suffix indicates  
 this information is for  
 multiple devices.

Refer to  
 Electrical Drawings

Manufacturer: Model Number

Reference  
 Job #



C2WH6



PANDUIT

- Base and covers sold separately
- Non-slip cover design incorporates integral high friction lining to inhibit cover movement
- Cover flush with base provides greater wire capacity and improves aesthetics
- Easy cover removal makes changes to wiring quick and easy
- Available in various colors



10-069-002

• Part Number	C2WH6
• RoHS Compliancy Status	Compliant
• Part Description	Covers duct to protect wires, improve aesthetics and provides greater wire capacity.
• Material	Lead-free PVC
• Color	White
• Length (ft.)	6
• Length (m)	1.82
• Pricing Description	Duct Cover, PVC, 2"W X 6', White
• Min. Order UOM	FT
• Min. Order Qty.	6
• BOM Qty. (# of Pkgs.)	

### Panduit Wiring Duct Approvals and Compliances



Rev: 0

Date: 7/17/2020

By: AJ

Device Tag:

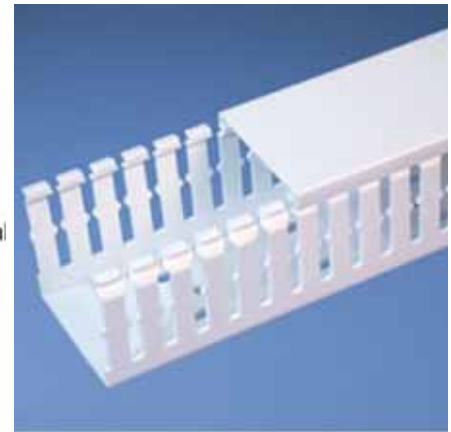
Job Number: HBR8191

Page # 1/1

Manuf.: PNo: Panduit: C2WH6

**Specifications**

- Made of lead-free PVC
- UL Recognized continuous use temperature: 122°F (50°C)
- UL94 Flammability Rating of V-0
- Conforms with NFPA 79-2002 section 14.3.1 requirement for flame retardant material
- Available in Light Gray and White
- Provided with mounting holes



• Part Number	F2X3WH6
• RoHS Compliancy Status	Compliant
• Part Description	Narrow finger, slotted wiring duct.
• Material	Lead-Free PVC
• Color	White
• CSA Certified	Yes
• Length (ft.)	6
• CE Marking	Yes
• Duct Size W x H (In.)	2.25 x 3.12
• Duct Size W x H (mm)	57.2 x 79.2
• Mounting Method	Standard Mounting Holes
• Pricing Description	Slotted Duct,PVC,2"X3"X6',White
• Slot Width (In.)	0.20
• Slot Width (mm)	5.0

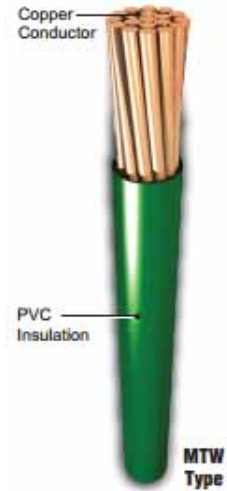


Rev:	0	Device Tag:	
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By:	AJ	HBR8191	Page # 1/1

Manuf.: . PNo: Panduit: F2X3WH6

# Wire – MTW Type

- CONDUCTORS:**
  - 22 AWG - 8AWG Stranded Tinned Copper per ASTM B-33
  - 22 AWG - 10 AWG Solid Tinned Copper per ASTM M-33
- INSULATION:**
  - Color-Coded Polyvinyl Chloride (PVC)
- TEMPERATURE RANGE/  
VOLTAGE RATING:**
  - UL 1011/1015/1028/BC-5W2: 105°C/600V
  - UL MTW: 90°C/600V
  - CSA AWM I A/B & TEW: 105°C/600V
- FLAME COMPLIANCES:**
  - UL VW-1
  - CSA FT-1
- INDUSTRY APPROVALS:**
  - UL Standard 758 - Styles 1011/1015/1028/1032/1230/1231/1335/1344
  - UL Standard 1063 - MTW
  - UL Standard 1426 - BC-5W2: 16 AWG - 8 AWG
  - CSA AWM I A/B & TEW
  - UL THHW
  - UL CT Tray Rated
  - SAE J378
- STANDARD COLORS:**
  - Black, Orange, Blue, Violet, White, Yellow, Brown, Green/Yellow, Red, Green, Gray
- OPTIONS:**
  - Stripes available upon request (minimums may apply)
  - Other copper constructions available upon request (minimums may apply)



51-000-062

Catalog Number	Description
F22027	22 AWG (7/.0096) TC AWM 1015
F20037	20 AWG (10/30) TC AWM 1015
F18054	18 AWG (16/30) TC AWM 1015
F16032	16 AWG (26/30) TC AWM 1015
F14037	14 AWG (41/30) TC AWM 1015
F12024	12 AWG (65/30) TC AWM 1015
F10012	10 AWG (105/30) TC AWM 1015
F08010	8 AWG (7X19/29) TC AWM 1028

**TEW/MTW Wire (Tinned Copper) Applications:**

► This tinned copper hook up wire may be used for wiring of machine tools, appliances, and control cabinets.



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Date: 7/17/2020	Job Number: HBR8191	Page # 1/1
By: AJ		

Manuf.: . PNo: EleMech: 51-000-062

# Bulletin 855P Panel Mount Alarms Signaling Solutions...Loud and Clear



www.rockwellautomation.com

### Advantages

- Mount in a standard 22.5 mm or 30 mm hole (with adapter ring)
- UL Type 4/4X/13, IP65 rated
- Sound output range from 80 dB to 105 dB @ 1 meter
- Selectable continuous or pulsing sounders and flashing or steady LED available
- Panel mount strobe light version available
- Combination sounder and LED products available to reduce your panel space
- Adjustable volume (ME and LE units)
- 12V AC/DC, 24V AC/DC, 120V AC, and 240V AC available
- Plug-in Terminal Block - IP2X Rated
- Rear securing eliminates unauthorized product removal
- cULus listed and CE Marked

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855P - **B**  
*a*   *b*   *c*   *d*

*b*

Voltage	
Code	Description
30	12...24V AC/DC
10	120V AC
20	240V AC

*c*

Size	
Code	Description
SE	30 mm
ME	45 mm
LE	65 mm

*d*

Mounting Hole	
Code	Description
22	22.5 mm



30 mm Panel Mount  
Sounder



45 mm Panel Mount  
Sounder



65 mm Panel Mount  
Sounder



Manuf.: PNo:

Allen-Bradley: 855P-B30ME22

Rev:

0

Date:

7/17/2020

By:

AJ

Device Tag:

AH1

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01-005-008



Model LP22LED

# StreamLine® Low Profile LED Light

Perfect size meets superior performance.

A B C G R



Model LP22LED is a unique, multi-pattern LED light ideal for a variety of industrial applications requiring low profile signaling. The unit can be flush mounted or mounted on a 1/2" NPT pipe with the integrated pipe mount. The enclosure consists of a polycarbonate dome in five colors (Amber, Blue, Clear, Green and Red) and is rated Type 4X.

The LP22LED has four flash patterns (steady light, single flash, double flash and triple flash) selectable via dip-switch.

## FEATURES

- Available in 12-24V AC/DC and 90-240VAC
- 1/2" NPT or flush mount
- Four flash patterns
- Five lamp/lens colors: Amber, Blue, Clear, Green and Red
- IP65, NEMA Type 4X enclosure
- Low profile — only 2.71" tall x 2.99" diameter (69mm x 76mm)
- UL and cUL Listed and CE Compliant

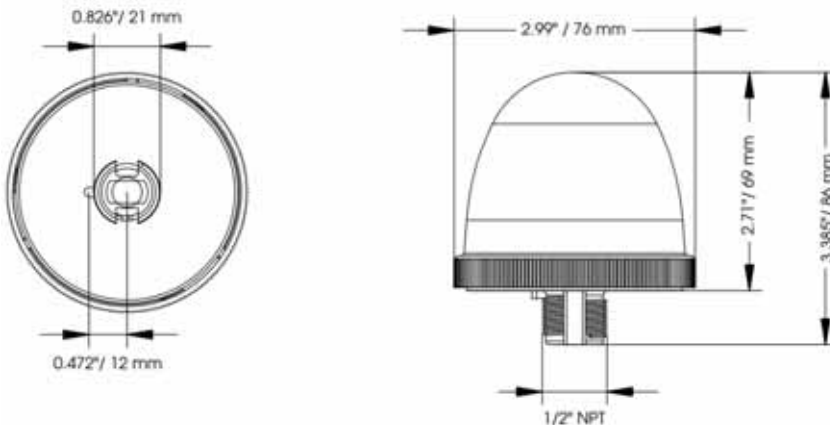
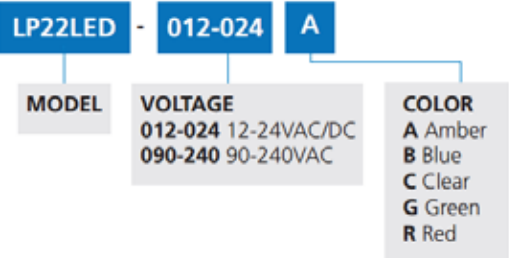
MODEL	VOLTAGE	FLASH RATE/MINUTE			
		STEADY	SINGLE FLASH	DOUBLE FLASH	TRIPLE FLASH
LP22LED-012-024*	12-24VAC/DC	N/A	120 (+/-10)	90 (+/-10)	140 (+/-10)
LP22LED-090-240*	90-240VAC	N/A	120 (+/-10)	90 (+/-10)	140 (+/-10)

\* Indicates color: (A) Amber, (B) Blue, (C) Clear, (G) Green or (R) Red

## SPECIFICATIONS

Lamp Life:	100,000 Hours
Light Source:	LED Array
Operating Temperature Range:	-22°F to 122°F -30°C to 50°C
Net Weight:	5.29 oz.      0.15 kg
Height — above surface:	2.71"      69 mm
Diameter:	2.99"      76 mm

## HOW TO ORDER



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AL1

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Page # 1/1

Manuf.: . PNo: Federal: LP22LED-012-024R

# Motor Protectors

## Description

The Bulletin 140M Motor Protector provides short circuit and overload protection for individual motor loads. A wide range of accessories makes installation and wiring easy. Motor protectors may be applied as Manual Starters, Group Motor Starters, Motor Disconnects, and Manual Self-Protected Combination Starters.

### Conformity to Standards:

IEC 947-1/2/4/5

IEC 204-1

CSA, C22.2 No.14

UL 508

### Approvals:

CE

CSA Certified

UL Listed



(Construction Type E) Manual Self-Protected Combination Motor Controller.

Manual Motor Controller suitable for Group Installation.

Meets IEC Circuit Breaker requirements per IEC 947-2.

23-005-007

## Motor Protectors

Rated Operational Current [A] (Ie)	Motor Current Adjustment Range [A]	Magnetic Trip Current [A]	1-phase HP Ratings [HP] □		3-phase HP Ratings [HP] □				Cat. No.
			115V	230V	200V	230V	460V	575V	
<b>140M-C, 25A High Break (45mm x 90mm x 74mm)</b>									
0.16	0.10...0.16	2.1	—	—	—	—	—	—	140M-C2E-A16
0.25	0.16...0.25	3.3	—	—	—	—	—	—	140M-C2E-A25
0.40	0.25...0.40	5.2	—	—	—	—	—	—	140M-C2E-A40
0.63	0.40...0.63	8.2	—	—	—	—	—	—	140M-C2E-A63
1.0	0.63...1.0	13	—	—	—	—	1/2	3/4	140M-C2E-B10
1.6	1.0...1.6	21	—	1/10	—	—	1	1	140M-C2E-B16
2.5	1.6...2.5	33	1/10	1/6	1/2	3/4	1-1/2	2	140M-C2E-B25
4	2.5...4	52	1/8	1/3	1	1	3	3	140M-C2E-B40
6.3	4...6.3	82	1/4	3/4	1-1/2	2	5	5	140M-C2E-B63
10	6.3...10	130	1/2	1-1/2	3	3	7-1/2	10	140M-C2E-C10
16	10...16	208	1	3	3	5	10	15	140M-C2E-C16
20	14.5...20	260	1-1/2	3	5	7-1/2	15	20	140M-C2E-C20
25	18...25	325	2	3	7-1/2	7-1/2	15	20	140M-C2E-C25
<b>140M-D, 25A High Break PLUS (45mm x 90mm x 84mm)</b>									
2.5	1.6...2.5	33	1/10	1/6	1/2	3/4	1-1/2	2	140M-D8E-B25
4.0	2.5...4	52	1/8	1/3	1	1	3	3	140M-D8E-B40
6.3	4...6.3	82	1/4	3/4	1-1/2	2	5	5	140M-D8E-B63
10	6.3...10	130	1/2	1-1/2	3	3	7-1/2	10	140M-D8E-C10
16	10...16	208	1	3	3	5	10	15	140M-D8E-C16
20	14.5...20	260	1-1/2	3	5	7-1/2	15	20	140M-D8E-C20
25	18...25	325	2	3	7-1/2	7-1/2	15	20	140M-D8E-C25
<b>140M-F, 45A High Break PLUS (54mm x 110mm x 114mm)</b>									
10	6.3...10	130	1/2	1-1/2	3	3	7-1/2	10	140M-F8E-C10
16	10...16	208	1	3	3	5	10	15	140M-F8E-C16
20	14.5...20	260	1-1/2	3	5	7-1/2	15	20	140M-F8E-C20
25	18...25	325	2	3	7-1/2	10	20	25	140M-F8E-C25
32	23...32	416	2	5	10	10	25	30	140M-F8E-C32
45	32...45	585	3	7-1/2	15	15	30	40	140M-F8E-C45

**ELEMECH**  
INC.  
630-499-7080 · www.elemechinc.com

Rev:

0

Date:

7/17/2020

By:

AJ

Device Tag:

CB1

Job Number:

HBR8191

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Manuf.: . PNo:

Allen-Bradley: 140M-C2E-C16

# Multi 9



UL 489 / CSA C22.2 No 5 / IEC/EN 60947-2 / GB 14048-2

C60BP are multi-standard miniature circuit breakers and branch circuit protection as defined by UL 489. It combines following functions:

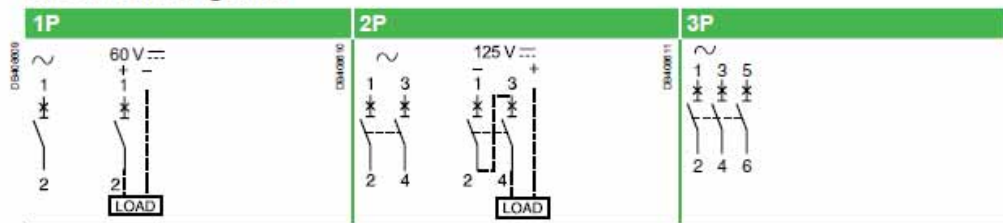
- circuit protection against short-circuit currents
- circuit protection against overload currents
- tripping and fault indication by the addition of auxiliaries.



Number of 18 mm (0.71 in.) poles	Rating (A) 25°C/77°F	Breaking capacity (kA rms) AIR				Icu IEC 60947-2			
		UL 489 / CSA C22.2 No 5				IEC 60947-2			
1P	Voltage (Ue)	277 V ~	240 V ~	120 V ~	60 V ∴	440 V ~	415 V ~	240 V ~	60 V ∴
	0.5 to 35	10	14	14	10	-	3	10	20
	40 to 63	-	10	10	10	-	3	10	20
2P	Voltage (Ue)	480Y/277 V ~		240 V ~	125 V ∴	440 V ~	415 V ~	240 V ~	125 V ∴
	1 to 25	10		14	10	6	10	20	-
	30 to 35	10		14	-	6	10	20	-
3P	1 to 35	10		14	-	6	10	20	-
2P/3P	40 to 63	-		10	-	6	10	20	-



## Electrical diagrams



## Catalogue numbers

Tunnel terminal connection											
Type	UL489 and CSA voltages	1P			2P			3P			
Auxiliaries		Remote indication and tripping, see page 43									
Rating (In)		Curve			Width in 9 mm modules	Curve		Width in 9 mm modules	Curve		Width in 9 mm modules
		Z	C	D (=K)		C	D (=K)		C	D (=K)	
<b>C60BP</b>											
0.5	480Y/277 V and 240 V	M9F44170	M9F42170	M9F43170	2	-	-	4	-	-	6
1		M9F44101	M9F42101	M9F43101		M9F42201	M9F43201		M9F42301	M9F43301	
2		M9F44102	M9F42102	M9F43102		M9F42202	M9F43202		M9F42302	M9F43302	
3		M9F44103	M9F42103	M9F43103		M9F42203	M9F43203		M9F42303	M9F43303	
4		M9F44104	M9F42104	M9F43104		M9F42204	M9F43204		M9F42304	M9F43304	
5		M9F44105	M9F42105	M9F43105		M9F42205	M9F43205		M9F42305	M9F43305	
6		M9F44106	M9F42106	M9F43106		M9F42206	M9F43206		M9F42306	M9F43306	
8		M9F44108	M9F42108	M9F43108		M9F42208	M9F43208		M9F42308	M9F43308	
10		M9F44110	M9F42110	M9F43110		M9F42210	M9F43210		M9F42310	M9F43310	
15		M9F44115	M9F42115	M9F43115		M9F42215	M9F43215		M9F42315	M9F43315	
20		M9F44120	M9F42120	M9F43120		M9F42220	M9F43220		M9F42320	M9F43320	
25		M9F44125	M9F42125	M9F43125		M9F42225	M9F43225		M9F42325	M9F43325	
30		M9F44130	M9F42130	M9F43130		M9F42230	M9F43230		M9F42330	M9F43330	
35	M9F44135	M9F42135	M9F43135		M9F42235	M9F43235		M9F42335	M9F43335		
40	240 V only	M9F44140	M9F42140	M9F43140	2	M9F42240	M9F43240	4	M9F42340	M9F43340	6
45		M9F44145	M9F42145	M9F43145		M9F42245	M9F43245		M9F42345	M9F43345	
50		M9F44150	M9F42150	M9F43150		M9F42250	M9F43250		M9F42350	M9F43350	
55		M9F44155	M9F42155	M9F43155		M9F42255	M9F43255		M9F42355	M9F43355	
63		M9F44163	M9F42163	M9F43163		M9F42263	M9F43263		M9F42363	M9F43363	



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By: AJ

Device Tag:

CB10,11,18

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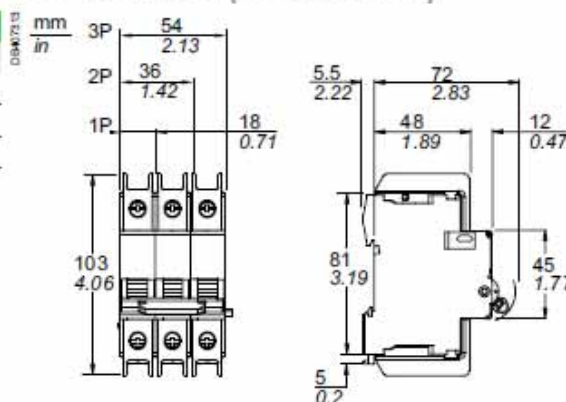
Manuf.: PNO:

Square D: M9F42101

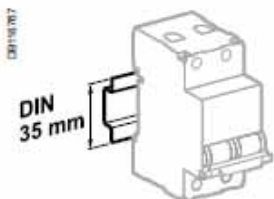
**Weight (g / oz)**

Circuit-breaker	
Type	C60BP
1P	130 g / 4.58 oz
2P	260 g / 9.17 oz
3P	390 g / 13.76 oz

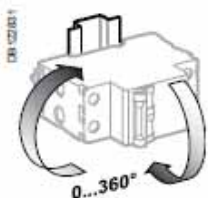
**Dimensions (mm / inches)**



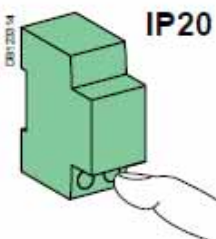
C60BP Tunnel terminal



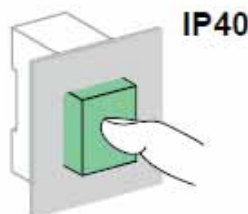
Clip on DIN rail 35 mm.



Indifferent position of installation.



IP20



IP40

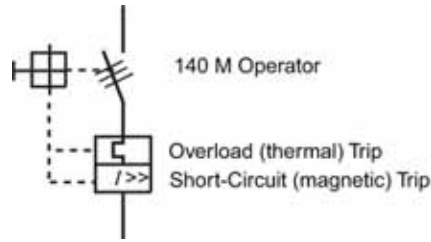
**Technical data**

Main characteristics			
Insulation voltage (Ui)		500 V	
Service breaking capacity (Ics)	In alternating current	75 % of Icu	
	In direct current	100 % of Icu	
Pollution degree		3	
Rated impulse withstand voltage (Uimp)		6 kV	
Thermal tripping	Reference temperature	25°C / 77°F	
Magnetic tripping	Z curve	In alternating current	3 In ± 20 %
		In direct current	4.2 In ± 20 %
	C curve	In alternating current	8.5 In ± 20 %
		In direct current	12 In ± 20 %
D curve (=K curve)	In alternating current	12 In ± 20 %	
	In direct current	17 In ± 20 %	
Additional characteristics			
Degree of protection (IEC 60529)	Device only	IP20	
	Device in modular enclosure	IP40	
Endurance (O-C)	Electrical	10,000 cycles	
	Mechanical	20,000 cycles	
Operating temperature		-30°C to +70°C / -22°F to 158°F	
Storage temperature		-40°C to +80°C / -40°F to 176°F	
Tropicalization (IEC 60068-1)		Treatment 2 (relative humidity 95 % at 55°C / 131°F)	
Dissipated power		See page 68	



# Front-Mounted Auxiliary Contact

- 1-pole or 2-pole
- No additional space required
- For use with 140M



23-005-010

		Description			Term. No.	Description	Connection Diagram	For Use With	Cat. No.		
		Operator Position *									
		OFF	ON	Tripped							
					13-14	N.O. Aux		140M-C, D, F; 140U-D (UL489 only in combination with 140M-C-AFC)	140M-C-AFA10		
					11-12	N.C. Aux			140M-C-AFA01		
	<b>Front-Mounted Auxiliary Contact</b> • 1-pole or 2-pole • No additional space required • Only 1 per device				13-14	N.O. Aux		140M-C, D, F; 140U-D (UL489 only in combination with 140M-C-AFC)	140M-C-AFA11		
					21-22	N.C. Aux			140M-C-AFA20		
					13-14	N.O. Aux			140M-C, D, F	140M-C-AFA02	
					23-24	N.O. Aux					
					11-12	N.C. Aux					
					21-22	N.C. Aux					
			<b>Right Side-Mounted Auxiliary Contact</b> • 2-pole • Adds 9 mm to the width of the device • Two per MPCB				33-34		N.O. Aux		140M-C, D, F
					43-44	N.O. Aux					
					31-32	N.C. Aux		140M-C, D, F	140M-C-ASA02		
					41-42	N.C. Aux					
					33-34	N.O. Aux		140M-C, D, F	140M-C-ASA11		
					41-42	N.C. Aux					

\* X = Contact Closed; O = Contact Open



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By: AJ

Device Tag:

CB1-2

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Manuf.: . PNO: Allen-Bradley: 140M-C-AFA11

# 140M-C-TE1

# 140M-F-TE



### Installation instruction

**Attention:** To prevent electrical shock, disconnect from power source before installing or servicing. Install in suitable enclosure. Keep free from contaminants.

### Montageanleitung

**Achtung:** Vor Installations- oder Servicearbeiten Stromversorgung unterbrechen, um Unfälle zu vermeiden. Die Geräte müssen in einem passenden Gehäuse eingebaut und gegen Verschmutzung geschützt werden.

### Instruction de montage

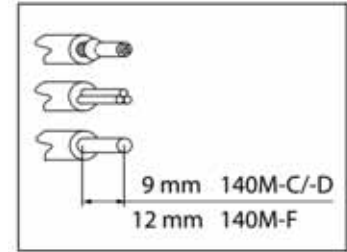
**Attention:** Avant le montage et la mise en service, couper l'alimentation secteur afin d'éviter tout accident. Prévoir une mise en coffret ou armoire appropriée. Protéger le produit contre les environnements agressifs.

### Istruzione per il montaggio

**Attenzione:** Per prevenire infortuni, togliere tensione prima dell'installazione o manutenzione. Installare in custodia idonea. Tenere lontano da contaminanti.

### Instrucción de montaje

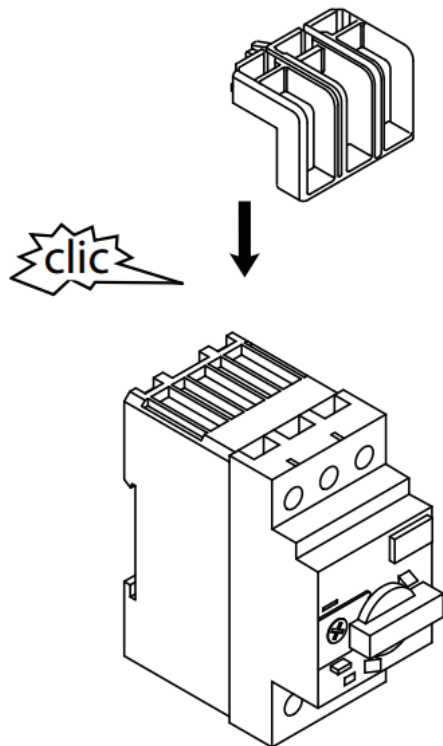
**Atención:** Desconectar la alimentación eléctrica antes de realizar el montaje y la puesta en servicio, con el objeto de evitar accidentes. Instalado en una caja o armario apropiado. Proteger el producto de los ambientes agresivos.



IEC 60947  
EN 60947  
UL 508  
CSA C22.2 No. 14

23-005-011

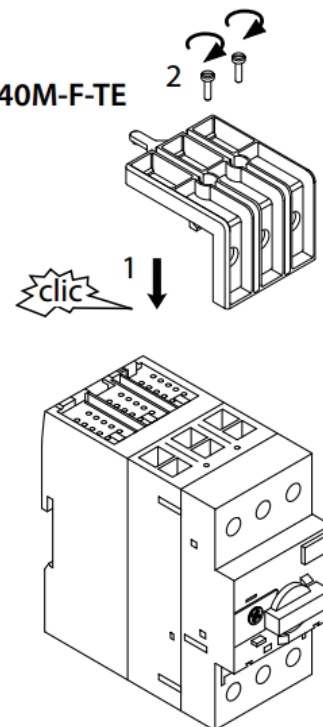
## 140M-C-TE1



140M-C, 140M-D  
(Ser B or later)

Nr. 2  
T8  
Md = 0,6 Nm max. (5,3 lb-in)

## 140M-F-TE



140M-F  
(Ser B or later)



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CB1-2

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Manuf.: PNo:

Allen-Bradley: 140M-C-TE1

## Power Defense Molded Case Circuit Breakers—Frame Size 1

### Product Description

Frame Size 1 covers a range of 15 A through 125 A with fixed-fixed thermal-magnetic trip units. PD-1 is available in 1-, 2-, 3- and 4-pole configurations, with the 4-pole configuration available with no protection on the neutral pole, or fully protected.

### Application Description

Frame Size 1 can be used to meet a wide range of circuit protection and power distribution needs, including current limiting applications. PD-1 is a cable-in / cable-out MCCB.

### Features and Benefits

Frame Size 1 breakers are available in multiple ratings from 15 A through 125 A. They are of a modular design with field installable accessories and terminals, which may also be factory installed.

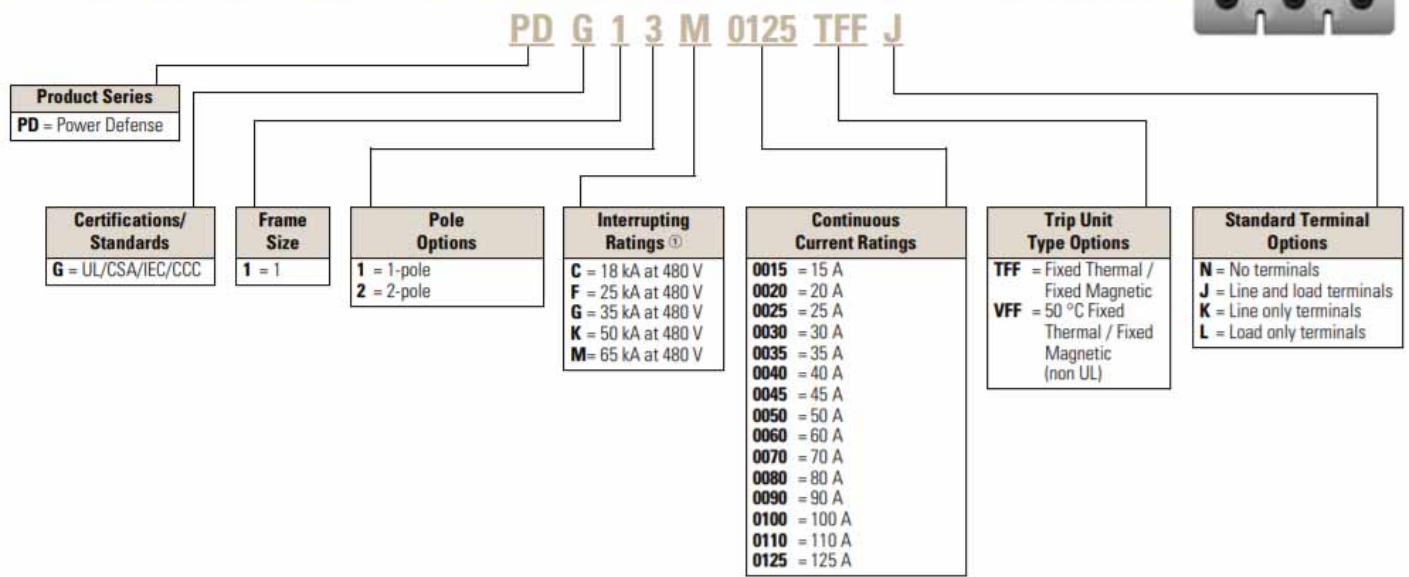
### Standards and Certifications

Power Defense breakers are designed and tested to meet stringent requirements for:

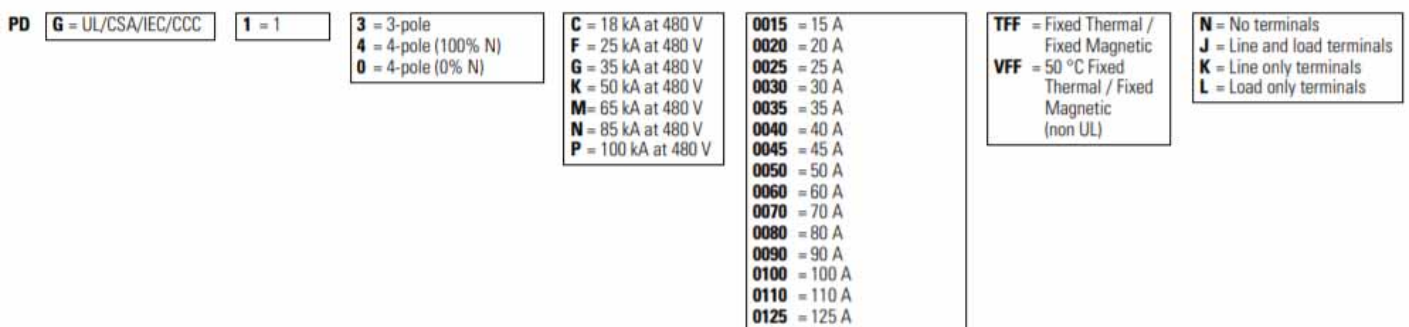
- UL
- CSA
- IEC (CE)
- CB (CCC)



## Molded Case Circuit Breakers (Single- and Two-Pole) with Thermal-Magnetic Trip Units—Globally Rated



## Molded Case Circuit Breakers (Three- and Four-Pole) with Thermal-Magnetic Trip Units—Globally Rated



Rev: 0

Date: 7/17/2020

By: AJ

Device Tag:

CB3

Job Number: HBR8191

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Manuf.: PNo:

Eaton: PDG12M0015TFFJ

DataTuff® 6, 4 Bonded-Pr #23 Sol BC, PO Ins, OS, PVC Jkt, PVC Jkt, MSHA, CMX-Outdoor 600V AWM 21047



57-000-A031

Physical Characteristics (Overall)

Conductor

Element	AWG	Stranding	Material	No. of Pairs
	23	Solid	BC - Bare Copper	4
No Ground				

Conductor Count:	8
Total Number of Pairs:	4

Insulation

Material	Nominal Diameter	Nominal Wall Thickness
Polyolefin	0.043 in	0.01 in

Bonded-Pair:	Yes
--------------	-----

Color Chart

Number	Color
1	White/Blue Stripe & Blue
2	White/Orange Stripe & Orange
3	White/Green Stripe & Green
4	White/Brown Stripe & Brown

Inner Jacket Material

Material	Nominal Diameter	Nominal Wall Thickness	Ripcord
PVC - Polyvinyl Chloride	0.258 in	0.02 in	Yes

Outer Shield Material

Type	Material	Material Trade Name	Coverage [%]	Drainwire Material	Drainwire AWG	Drainwire Construction n x D
Tape	Alum / Poly	Beldfoil®	100 %	TC - Tinned Copper	24	7x32

Outer Jacket Material

Material	Nominal Diameter	Nominal Wall Thickness	Ripcord
PVC - Polyvinyl Chloride	0.335 in	0.03 in	No

Voltage

UL Description	UL Voltage Rating
	300 V RMS
Appliance Wiring Material	600 V RMS

Temperature Range

Installation Temp Range:	-25°C To +75°C
UL Temp Rating:	75°C
Storage Temp Range:	-40°C To +80°C
Operating Temp Range:	-40°C To +75°C

Mechanical Characteristics

Bulk Cable Weight:	44 lbs/1000ft
Max Recommended Pulling Tension:	40 lbs
Min Bend Radius/Minor Axis:	4 in

Standards

NEC(UL) Specification:	CMR, CMX-Outdoor
CEC/C(UL) Specification:	CMG
UL AWM Style:	UL Style 21047
ISO/IEC Compliance:	ISO/IEC 11801 ed 2.1 (2008) Class E
CPR Euroclass:	Eca
Data Category:	Category 6
Telecommunications Standards:	Category 6 - TIA 568.C.2
Other Specification:	NEMA WC-63.1 Category 6,

Suitability

Suitability - Aerial:	Yes
Suitability - Burial:	No
Suitability - Indoor:	Yes
Suitability - Oil Resistance:	Yes
Suitability - Outdoor:	Yes
Suitability - Sunlight Resistance:	Yes

Flammability, LSOH, Toxicity Testing

C(UL) Flammability:	FT4
UL Flammability:	UL1666 Riser
CSA Flammability:	FT4
ISO/IEC Flammability:	IEC 60332-1-2
IEEE Flammability:	1202
UL voltage rating:	300 V RMS



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Date: 7/17/2020

By: AJ

Device Tag:

CBL1-4

Job Number: HBR8191

Page # 1/1

Manuf.: . PNo: EleMech: 57-000-A031

# Monitoring Relays 1-Phase True RMS AC Over or Under Current Type DIB01 100A



04-094-000

## Ordering Key **DIB 01 C M24 100A**



### Input Specifications

<b>Input (current level)</b> DIB01 100A	Built-in current transformer	<b>Contact input</b> DIB01 Disabled Enabled Latch disable	Terminals A1, Y1 Open < 10 kΩ > 500 ms
<b>Measuring ranges</b> Selectable by DIP-switch	<b>Max current</b>		
2 to 20 A AC	120 A		
5 to 50 A AC	120 A		
10 to 100 A AC	120 A		
Max. current for 30 s	250 A		
Max. current for 1 s	2000 A		

### Supply Specifications

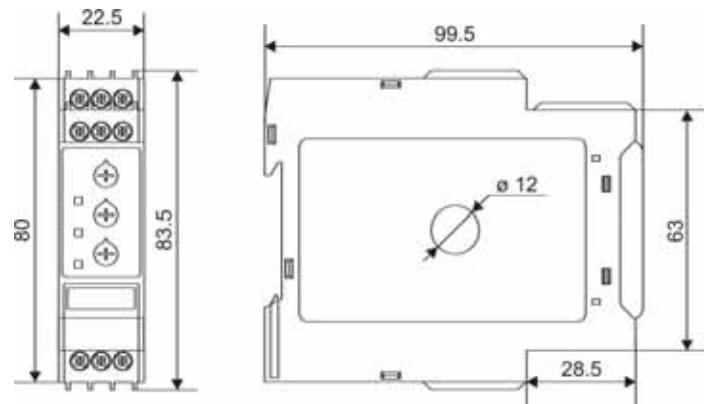
<b>Power supply</b> Rated operational voltage through terminals: A1, A2	Overvoltage cat. III (IEC 60664, IEC 60038)  24 VDC - 15% +10% 24 to 240 VAC ± 15% 45 to 65 Hz
<b>Dielectric voltage</b> Supply to input Supply to output Input to output	4 kV 4 kV 4 kV
<b>Rated operational power</b> DC AC	1 W 1 W / 35 VA

### Output Specifications

<b>Output</b> Rated insulation voltage	SPDT relay 250 VAC
<b>Contact ratings (AgSnO<sub>2</sub>)</b>	μ
Resistive loads AC 1	8 A @ 250 VAC
DC 12	5 A @ 24 VDC
Small inductive loads AC 15	2.5 A @ 250 VAC
DC 13	2.5 A @ 24 VDC
<b>Mechanical life</b>	≥ 30 x 10 <sup>6</sup> operations
<b>Electrical life</b>	≥ 10 <sup>5</sup> operations (at 8 A, 250 V, cos φ = 1)
<b>Operating frequency</b>	≤ 7200 operations/h
<b>Dielectric strength</b>	
Dielectric voltage	≥ 2 kVAC (rms)
Rated impulse withstand volt.	4 kV (1.2/50 μs)

Approvals

UL, CSA



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Date: 7/17/2020  
By: AJ

Device Tag: CM1  
Job Number: HBR8191

Page # 1/1

Manuf.: . PNo: Gavazzi: DIB01CM24100A

# RXZS2

bus jumper for Zelio Relay RXZ sockets with separate contacts



06-058-012

## Main

Commercial Status	Commercialised
Range of product	Zelio Relay
Accessory / separate part type	Jumper
Accessory / separate part designation	Bus jumper
Sale per indivisible quantity	10

## Complementary

Product compatibility	Socket RXZ
Accessory / separate part destination	All RXZ sockets with separate contacts
[Ith] conventional free air thermal current	5 A
Product weight	0.005 kg

## Ordering and shipping details

Category	21128 - ZELIO ICE CUBE RELAY ACCESSORIES
Discount Schedule	CP2
GTIN	00785901924098
Nbr. of units in pkg.	10
Package weight(Lbs)	0.01
Stock Code	Stock - Normally stocked in distribution facility
Returnability	Y
Country of origin	CN



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0

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By:

AJ

Device Tag:

CR1-9

Job Number:

HBR8191

Page #

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Manuf.: . PNo:

Square D: RXZ S2



RXM3AB2F7

### RXM Miniature Relays (page 4)

- 2 pole relays; 12 A, 1/2 hp (IEC rating = 12 A)
- 3 pole relays; 10 A, 1/3 hp (IEC rating = 10 A)
- 4 pole relays; 8 A, 1/3 hp (IEC rating = 6 A)
- 4 pole relays; 3 A (low level), 1/16 hp (IEC rating = 3 A)

- Mechanical "relay status" indicator on all relays
- Pilot light option available
- Manual operator optional for all relays
- Built-in marking area

### Insulation characteristics

Rated insulation voltage (Ui)	250 V (IEC), 300 V (UL, CSA)	
Rated impulse withstand voltage (Uimp)	3.6 kV (1.2/50 µs)	
Dielectric strength (rms voltage)	Between coil and contact	2,500 Vac
	Between poles	2,500 Vac
	Between contacts	1,500 Vac



### Contact characteristics

Relay type		RXM2AB***	RXM3AB***	RXM4AB***
Number and type of contacts (see page 12)		DPDT	3PDT	4PDT
Contact materials		AgNi		
Conventional thermal current (Ith)	For ambient temperature < 131 °F (55 °C)	12 A	10 A	6 A
	Conforming to IEC in utilization category AC-1	N.O. 6 A	10 A 5 A	6 A 3 A
	Conforming to UL Resistive @ 277 Vac, hp @ 120 Vac	12 A, 1/2 hp	10 A, 1/3 hp	8 A, 1/3 hp
Maximum operating rate In operating cycles/hour	No load	18,000		
	Under load	1,200		
Switching voltage	Maximum	250 Vac/Vdc		
	Minimum	10 mA on 17 V		
Switching capacity	Maximum	3,000 VA	2,500 VA	1,500 VA
	Utilization coefficient	20%		
Mechanical durability in millions of operating cycles		10		
Electrical durability in millions of operating cycles	Resistive load	0.1		

### Coil characteristics

Average consumption	AC	1.2 VA									
	DC	0.9 W									
Drop-out voltage threshold	AC	> 0.15 U <sub>c</sub>									
	DC	> 0.1 U <sub>c</sub>									
Operating time (response time)	Between coil energization and making of the N.O. contact	AC	20 ms								
		DC	20 ms								
	Between coil de-energization and making of the N.C. contact	AC	20 ms								
		DC	20 ms								
Coil voltage U <sub>c</sub>		12 V	24 V	48 V	110 V	120 V	125 V	220 V	230 V	240 V	
Relay coil voltage codes		JD	BD	ED	FD	—	GO	MD	—	—	
DC	Average resistance at 68 °F (20 °C) ± 10%	160 Ω	650 Ω	2,600 Ω	11,000 Ω	—	11,000 Ω	14,000 Ω	—	—	
	Operating voltage limits	Min.	9.6 V	19.2 V	38.4 V	88 V	—	100 V	176 V	—	—
		Max.	13.2 V	26.4 V	52.8 V	121 V	—	138 V	242 V	—	—
Relay coil voltage codes		—	B7	E7	—	F7	—	M7	P7	U7	
AC	Average resistance at 68 °F (20 °C) ± 15%	—	180 Ω	770 Ω	—	4,430 Ω	—	15,000 Ω	15,000 Ω	15,500 Ω	
	Operating voltage limits	Min.	—	19.2 V	38.4 V	—	96 V	—	176 V	184 V	192 V
		Max.	—	26.4 V	52.8 V	—	132 V	—	242 V	253 V	264 V

### Environment

Dielectric strength	2000 V AC (between poles) 2000 V AC (between coil and contact) 1300 V AC (between contacts)
Product certifications	CSA GOST Lloyds UL
Standards	EN/IEC 61810-1 UL 508 CSA C22.2 No 14



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CR1-9

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Manuf.: PNo:

Square D: RXM3AB2BD

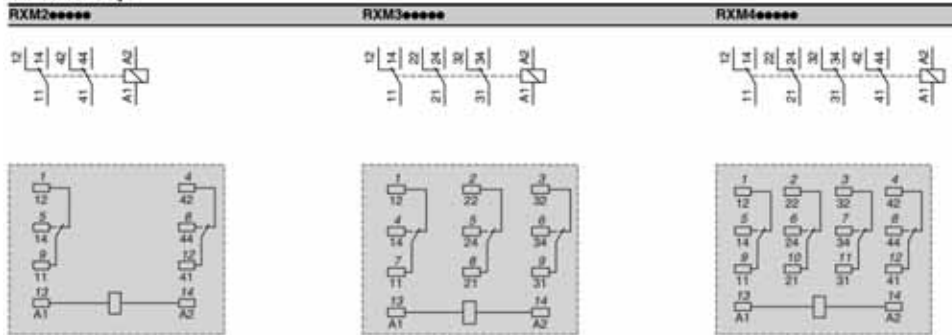
Miniature relays with lockable test button, without LED

Coil Voltage	Number and type of contacts - Thermal current (Ith)								
	DPDT - 12 A			3PDT - 10 A			4PDT - 6 A		
	Catalog Number	Weight		Catalog Number	Weight		Catalog Number	Weight	
		lb.	kg		lb.	kg		lb.	kg
12 Vdc	RXM2AB1JD	0.082	0.037	RXM3AB1JD	0.084	0.038	RXM4AB1JD	0.080	0.036
24 Vdc	RXM2AB1BD	0.082	0.037	RXM3AB1BD	0.084	0.038	RXM4AB1BD	0.080	0.036
48 Vdc	RXM2AB1ED	0.082	0.037	RXM3AB1ED	0.084	0.038	RXM4AB1ED	0.080	0.036
110 Vdc	RXM2AB1FD	0.082	0.037	RXM3AB1FD	0.084	0.038	RXM4AB1FD	0.080	0.036
220 Vdc	—	—	—	—	—	—	RXM4AB1MD	0.080	0.036
24 Vac	RXM2AB1B7	0.082	0.037	RXM3AB1B7	0.084	0.038	RXM4AB1B7	0.080	0.036
48 Vac	RXM2AB1E7	0.082	0.037	RXM3AB1E7	0.084	0.038	RXM4AB1E7	0.080	0.036
120 Vac	RXM2AB1F7	0.082	0.037	RXM3AB1F7	0.084	0.038	RXM4AB1F7	0.080	0.036
230 Vac	RXM2AB1P7	0.082	0.037	RXM3AB1P7	0.084	0.038	RXM4AB1P7	0.080	0.036
240 Vac	—	—	—	—	—	—	RXM4AB1U7	0.080	0.036

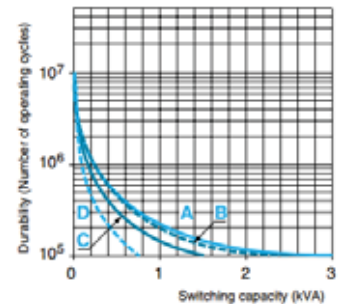
Miniature relays with lockable test button, with LED

12 Vdc	RXM2AB2JD	0.082	0.037	RXM3AB2JD	0.084	0.038	RXM4AB2JD	0.080	0.036
24 Vdc	RXM2AB2BD	0.082	0.037	RXM3AB2BD	0.084	0.038	RXM4AB2BD	0.080	0.036
48 Vdc	RXM2AB2ED	0.082	0.037	RXM3AB2ED	0.084	0.038	RXM4AB2ED	0.080	0.036
110 Vdc	RXM2AB2FD	0.082	0.037	RXM3AB2FD	0.084	0.038	RXM4AB2FD	0.080	0.036
125 Vdc	—	—	—	—	—	—	RXM4AB2GD	0.080	0.036
24 Vac	RXM2AB2B7	0.082	0.037	RXM3AB2B7	0.084	0.038	RXM4AB2B7	0.080	0.036
48 Vac	RXM2AB2E7	0.082	0.037	RXM3AB2E7	0.084	0.038	RXM4AB2E7	0.080	0.036
120 Vac	RXM2AB2F7	0.082	0.037	RXM3AB2F7	0.084	0.038	RXM4AB2F7	0.080	0.036
230 Vac	RXM2AB2P7	0.082	0.037	RXM3AB2P7	0.084	0.038	RXM4AB2P7	0.080	0.036

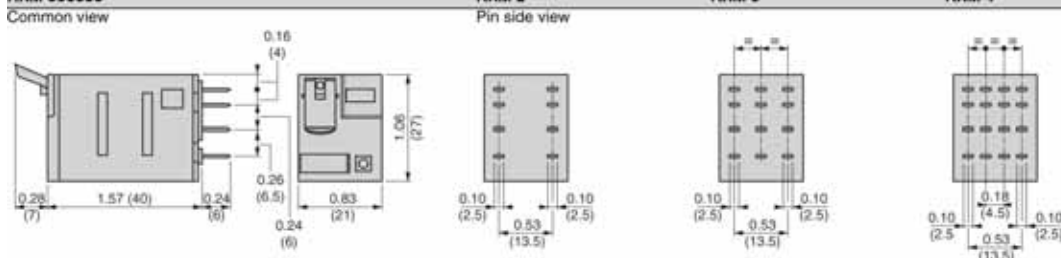
Miniature relays



Resistive load AC



RXM 2, 3, 4



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Date: 7/17/2020

By: AJ

Device Tag:

CR1-9

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Manuf.: PNO:

Square D: RXM3AB2BD

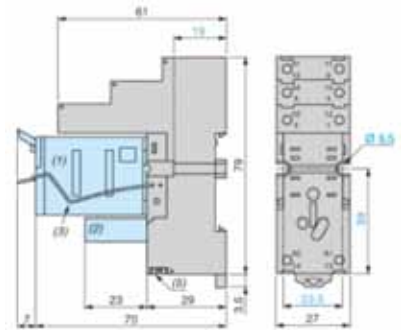


RXZE2S108M



Complementary	
[Ith] conventional free air thermal current	12 A 5 A with bus jumper
[Ue] rated operational voltage	< 250 V
Tightening torque	<= 1 N.m (M3 screw(s))
Fixing mode	By screw mounting on panel Clip-on mounting on 35 mm symmetrical DIN rail
Marking	CE
Width	27 mm
Product weight	0.058 kg 0.07 kg

Environment	
Standards	IEC 61984
Product certifications	CSA UL
Ambient air temperature for storage	-40...85 °C
Ambient air temperature for operation	-40...55 °C
IP degree of protection	IP20 conforming to EN/IEC 60529
Dielectric strength	2500 V
RoHS EUR status	Compliant
RoHS EUR conformity date	0801



- 1 Relay
- 2 Protection Module
- 3 Carriage Stirrup
- 5 2 Links connection

Approvals for Sockets:



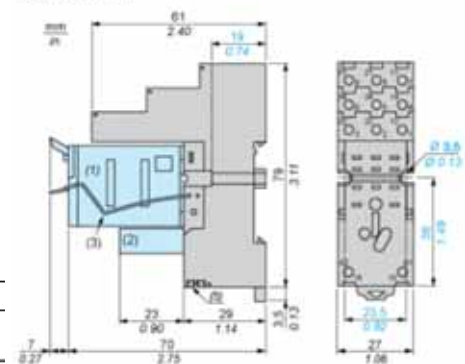
RXZE2S111M



Complementary	
[Ith] conventional free air thermal current	10 A 5 A with bus jumper
[Ue] rated operational voltage	< 250 V
Tightening torque	<= 1 N.m (M3 screw(s))
Fixing mode	By screw mounting on panel Clip-on mounting on 35 mm symmetrical DIN rail
Marking	CE
Width	27 mm
Product weight	0.066 kg

Environment	
Standards	IEC 61984
Product certifications	CSA UL
Ambient air temperature for storage	-40...85 °C
Ambient air temperature for operation	-40...55 °C
IP degree of protection	IP20 conforming to EN/IEC 60529
Dielectric strength	2500 V
RoHS EUR status	Compliant
RoHS EUR conformity date	0801

Dimensions



- (1) Relays
- (2) Protection module
- (3) Maintaining clamp
- (4) 2 elongated holes  $\varnothing 3.5 \text{ mm} \times 6.5 \text{ mm} / \varnothing 0.13 \text{ in.} \times 0.25 \text{ in.}$
- (5) 2 bus jumpers

Approvals for Sockets:

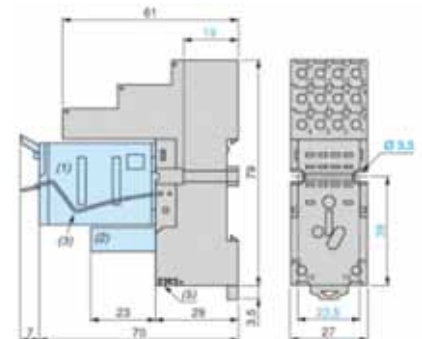


RXZE2S114M



Complementary	
[Ith] conventional free air thermal current	10 A 5 A with bus jumper
[Ue] rated operational voltage	< 250 V
Tightening torque	<= 1 N.m (M3 screw(s))
Fixing mode	By screw mounting on panel Clip-on mounting on 35 mm symmetrical DIN rail
Marking	CE
Width	27 mm
Product weight	0.058 kg 0.07 kg

Environment	
Standards	IEC 61984
Product certifications	CSA UL
Ambient air temperature for storage	-40...85 °C
Ambient air temperature for operation	-40...55 °C
IP degree of protection	IP20 conforming to EN/IEC 60529
Dielectric strength	2500 V
RoHS EUR status	Compliant
RoHS EUR conformity date	0801



- 1 Relay
- 2 Protection Module
- 3 Carriage Stirrup
- 5 2 Links connection

Approvals for Sockets:



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Date: 7/17/2020

By: AJ

Device Tag:

CR1-9

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Manuf.: . PNo:

Square D: RXZE2S111M

**General Data**

Part No: 07.311.4053.1

Description: End Cover – Black

Type of end plate – Yes

Snap in - Yes

Inflammability Class of insulation material acc. With UL94 – V0



07-063-000



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Manuf.: . PNo:

Wieland: 07.311.4053.1

# Cross connectors, (jumper bars) uninsulated



07-063-001

Type	Part no.	Std. pack
<b>WKM 4/15</b>	<b>6 mm spacing</b>	<b>Screw: M 3</b>
2pole 9215 - 2	Z7.210.3227.0	50
3pole 9215 - 3	Z7.210.3327.0	50
4pole 9215 - 4	Z7.210.3427.0	50
5pole 9215 - 5	Z7.210.3527.0	50
6pole 9215 - 6	Z7.210.3627.0	50
70pole 9215 M-70	Z7.210.3027.0	10



### General

Colour	Other
Type	Cross connector
Modular spacing	6 mm
Number of bridged clamps	4
Mounting method	Screwable
Insulated	No

### Accessories

Type	Cross connector
Mounting method	Screwable
Insulated	No
Colour	Other
Number of bridged clamps	4
Modular spacing	6 mm



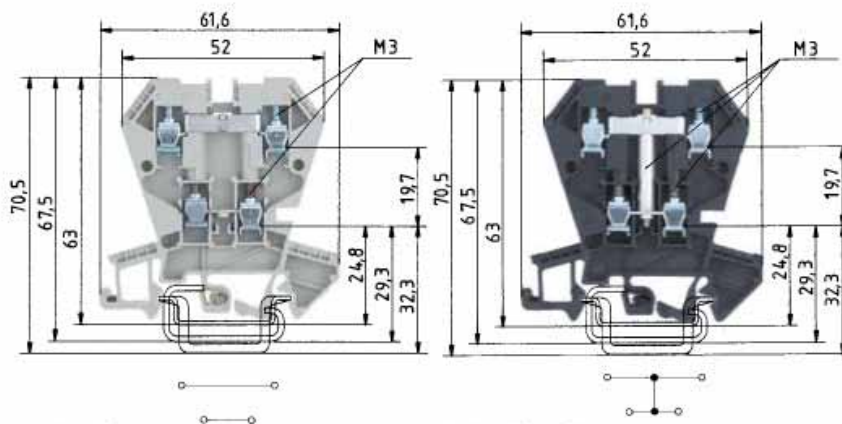
Rev:	0	Device Tag:	
Date:	7/17/2020	DB1,4	
By:	AJ	Job Number:	HBR8191
		Page #	1/1

Manuf.: . PNo: **Wieland: Z7.210.3427**



Multi-tier blocks  
with screw connection

selos<sup>10S</sup>



0344 Ex II 2GD IM2  
Ex e I/II  
EN 60947-7-1:2002  
EN 60947-7-2:2002  
UL ratings  
CSA ratings  
KEMA 02 ATEX 2114 U<sup>1)</sup> EN 60079-0/EN 60079-7  
Width  
Approvals

Field/factory wiring  
Wire strip length

**WK 4 E/U**

fine-stranded solid	V	A
0.5-4mm <sup>2</sup> 0.5-4mm <sup>2</sup>	400V/6kV/3 <sup>1)</sup>	32
No. 22-10 AWG	300V	20
No. 20-12 AWG	300V	10
0.5-4mm <sup>2</sup> 0.5-4mm <sup>2</sup>	275V 24/24 <sup>2)</sup>	24
6mm	9mm	9mm

**WK 4 E/U/VB**

fine-stranded solid	V	A
0.5-4mm <sup>2</sup> 0.5-4mm <sup>2</sup>	400V/6kV/3	32
No. 22-10 AWG	300V	20
No. 20-12 AWG	300V	10
0.5-4mm <sup>2</sup> 0.5-4mm <sup>2</sup>	275V	24
6mm	9mm	9mm



	Type	Part No.	Std. Pack	Type	Part No.	Std. Pack	
<b>Multi-tier block</b>	gray	WK 4 E/U	57.404.7055.0	100			
<b>Multi-tier block, vert. connected</b>	black				WK 4 E/UVB SCHWARZ	57.404.6955.1 100	
<b>Multi-tier ground block</b>	green/yellow						
<b>Function block</b>	red						
<b>Function block</b>	orange						
<b>Accessories</b>							
1. Mounting rail TS 35, DIN rail 7.5 mm high L = 2 m	35 x 27 x 7,5 EN 60715	98.300.0000.0	1	35 x 27 x 7,5 EN 60715	98.300.0000.0	1	
Mounting rail TS 35, DIN rail, 15 mm high L = 2 m	35 x 24 x 15 EN 60715	98.360.0000.0	1	35 x 24 x 15 EN 60715	98.360.0000.0	1	
Mounting rail TS 32, G rail* L = 2 m	9006 EN 60715 G-32	98.190.0000.0	1	9006 EN 60715 G-32	98.190.0000.0	1	
2. End clamp with U-foot* 10mm wide	WE 1/U	Z5.523.5753.0	100	WE 1/U	Z5.523.5753.0	100	
End clamp TS 35, with screw 8mm wide	9708/2 S35	Z5.522.8553.0	100	9708/2 S35	Z5.522.8553.0	100	
End clamp TS 35, without screw 8mm wide	9708	Z5.522.7053.0	100	WEF 1/35	Z5.523.9353.0	100	
3. End plate	AP 4 E	07.311.4055.0	10	AP 4 E	07.311.4055.0	10	
	gray						
	blue						
4. Partition	TW 4 E	07.311.5055.0	10	TW 4 E	07.311.5055.0	10	
	gray						
	blue						
5. Cross connector with screws	9215-2	Z7.210.3227.0	50	9215-2	07.210.3227.0	1	
for top tier	9215-3	Z7.210.3327.0	50	9215-3	07.210.3327.0	1	
	9215-6	Z7.210.3627.0	50	9215-6	07.210.3627.0	1	
Jumper comb for lower tier block	IVBS WK 4 E-2	Z7.256.4227.0	10	IVBS WK 4 E-2	Z7.256.4227.0	10	
insulated, angled	up to 6 pole	IVBS WK 4 E-6	Z7.256.4627.0	10	IVBS WK 4 E-6	Z7.256.4627.0	10
Jumper comb for lower tier block	2 pole	IVB WK 4 E-2	Z7.255.2227.0	10	IVB WK 4 E-2	Z7.255.2227.0	10
insulated, straight	up to 6 pole	IVB WK 4 E-6	Z7.255.2627.0	10	IVB WK 4 E-6	Z7.255.2627.0	10
6. Partition plate with marking facility							
7. Single cover with marking facility	AD VB 4/15 GELB	04.326.2953.8	10	AD VB 4/15 GELB	04.326.2953.8	10	
8. Cover with warning symbol over 4 blocks							
For more accessories see pages 60-77	<sup>1)</sup> Please note the mounting instructions on the cover page.		<sup>2)</sup> With/without jumper				
For marking systems see pages 70-75	<sup>3)</sup> With end plates 500V/6 kV/3		<sup>4)</sup> Do not use in Ex environments.				
	<sup>5)</sup> Ratings to adjacent feed-through blocks of the same series and size		<sup>6)</sup> For the current carrying capability of the mounting rail see AT catalog section <b>facts &amp; DATA</b> .				



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DB1,4

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Manuf.: . PNo:

Wieland: 57.404.6955.1

**Ratings:**  
 Volts 1000VAC/DC  
 Amps 65 to 2260A  
 based on NEC table  
 310.15(B)(16) 75°C  
 ampacities  
 SCCR 100kA with properly  
 sized fuse  
 (See Mersen's PDB SCRR  
 guide at ep.mersen.com or  
 contact Mersen technical  
 services)

**Approvals:**

- UL Listed to subject 1953,  
File E352417
- CSA Certified Class 6228 01

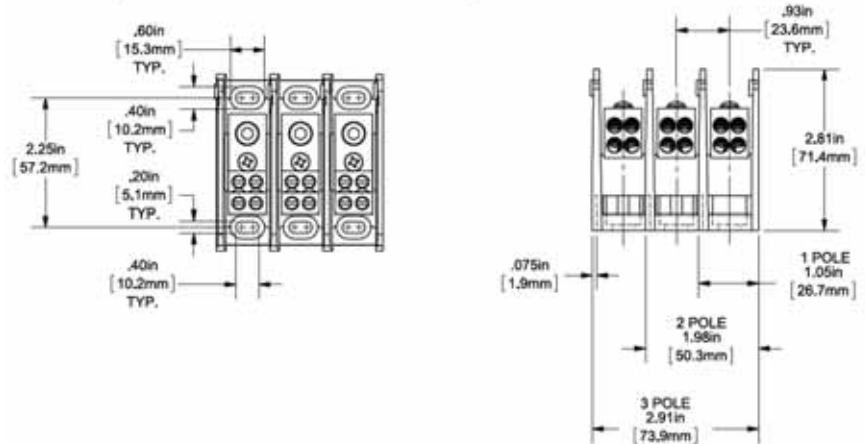


07-030-A004

# MPDB62 and MPDB63 Open-Style PDBs

## Catalog Numbers (Miniature)

Miniature (MPDB63133 shown for reference)



Line Wire Range	Open- ings per Pole	Load Wire Range	Open- ings per Pole	Catalog Numbers - Aluminum				Catalog Numbers - Copper				Amp Rating per Pole		
				ADDER	1-P	2-P	3-P	ADDER	1-P	2-P	3-P	Al Wire	Cu Wire	
<b>Box-Box Configuration</b>														
4 - 14	1	4 - 14	1	MPDB63100	MPDB63101	MPDB63102	MPDB63103	MPDB62100	MPDB62101	MPDB62102	MPDB62103	65	85	
			4	MPDB63160	MPDB63161	MPDB63162	MPDB63163	MPDB62160	MPDB62161	MPDB62162	MPDB62163			
2/0 - 14	1	2/0 - 14	1	MPDB63150	MPDB63151	MPDB63152	MPDB63153	MPDB62150	MPDB62151	MPDB62152	MPDB62153	135	175	
		2 - 14	2	MPDB63190	MPDB63191	MPDB63192	MPDB63193	MPDB62190	MPDB62191	MPDB62192	MPDB62193			
		4 - 14	4	MPDB63130	MPDB63131	MPDB63132	MPDB63133	MPDB62130	MPDB62131	MPDB62132	MPDB62133			
<b>Box-Stud Configuration</b>														
2/0 - 14	1	1/4-20 x 5/8	1	MPDB63140	MPDB63141	MPDB63142	MPDB63143	-	-	-	-	135	175	
<b>Stud-Stud Configuration</b>														
1/4-20 x 5/8	1	1/4-20 x 5/8	1	-	-	-	-	MPDB62200	MPDB62201	MPDB62202	MPDB62203	240	240	

Hinged Safety Cover for MPDB62 and MPDB63 series: Catalog number **MPDBC6263**

End Barrier for MPDB62 and MPDB63 series: Catalog Number **MPDBE6263**



Rev: 0

Date: 7/17/2020

By: AJ

Device Tag:

DB2

Job Number: HBR8191

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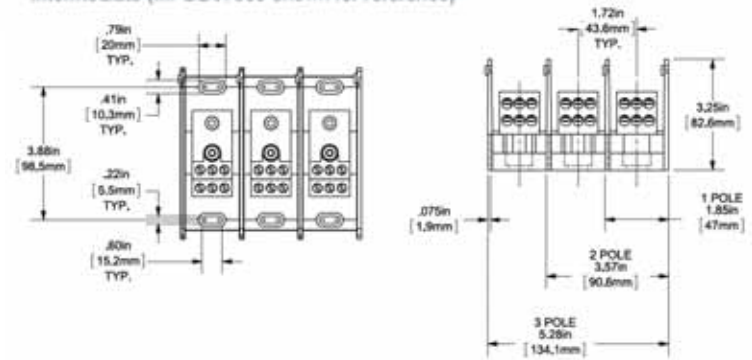
Manuf.: PNO: Mersen: MPDB62161 Assembly

# MPDB66 and MPDB67 Open-Style PDBs



## Catalog Numbers (Intermediate)

Intermediate (MPDB67563 shown for reference)



07-030-A004

Line	Wire Range	Open-ings per Pole	Load	Wire Range	Open-ings per Pole	Catalog Numbers - Aluminum				Catalog Numbers - Copper				Amp Rating per Pole	
						ADDER	1-P	2-P	3-P	ADDER	1-P	2-P	3-P	Al Wire	Cu Wire
<b>Box-Box Configuration</b>															
2/0 - 14	1	2/0 - 14	1	MPDB67050	MPDB67051	MPDB67052	MPDB67053	MPDB66050	MPDB66051	MPDB66052	MPDB66053	135	175		
		2 - 14	4	MPDB67570	MPDB67571	MPDB67572	MPDB67573	MPDB66570	MPDB66571	MPDB66572	MPDB66573				
		2 - 14	6	MPDB67560	MPDB67561	MPDB67562	MPDB67563	MPDB66560	MPDB66561	MPDB66562	MPDB66563				
		2 - 14	8	MPDB67580	MPDB67581	MPDB67582	MPDB67583	MPDB66580	MPDB66581	MPDB66582	MPDB66583				
		6 - 14	10	MPDB67590	MPDB67591	MPDB67592	MPDB67593	MPDB66590	MPDB66591	MPDB66592	MPDB66593				
350 - 6	1	10 - 14	12	MPDB67110	MPDB67111	MPDB67112	MPDB67113	MPDB66110	MPDB66111	MPDB66112	MPDB66113	250	310		
		350 - 6	1	MPDB67000	MPDB67001	MPDB67002	MPDB67003	MPDB66000	MPDB66001	MPDB66002	MPDB66003				
		2/0 - 14	2	MPDB67010	MPDB67011	MPDB67012	MPDB67013	MPDB66010	MPDB66011	MPDB66012	MPDB66013				
		2 - 14	4	MPDB67670	MPDB67671	MPDB67672	MPDB67673	MPDB66670	MPDB66671	MPDB66672	MPDB66673				
		2 - 14	6	MPDB67660	MPDB67661	MPDB67662	MPDB67663	MPDB66660	MPDB66661	MPDB66662	MPDB66663				
		2 - 14	8	MPDB67630	MPDB67631	MPDB67632	MPDB67633	MPDB66630	MPDB66631	MPDB66632	MPDB66633				
500 - 4	1	6 - 14	10	MPDB67650	MPDB67651	MPDB67652	MPDB67653	MPDB66650	MPDB66651	MPDB66652	MPDB66653	310	380		
		10 - 14	15	MPDB67620	MPDB67621	MPDB67622	MPDB67623	MPDB66620	MPDB66621	MPDB66622	MPDB66623				
		500 - 4	1	MPDB67400	MPDB67401	MPDB67402	MPDB67403	MPDB66400	MPDB66401	MPDB66402	MPDB66403				
		350-6 & 2-14	1 & 3	MPDB67450	MPDB67451	MPDB67452	MPDB67453	MPDB66450	MPDB66451	MPDB66452	MPDB66453				
		4/0 - 10	2	MPDB67420	MPDB67421	MPDB67422	MPDB67423	-	-	-	-				
		2/0 - 14	4	MPDB67410	MPDB67411	MPDB67412	MPDB67413	MPDB66410	MPDB66411	MPDB66412	MPDB66413				
		2 - 14	6	MPDB67460	MPDB67461	MPDB67462	MPDB67463	MPDB66460	MPDB66461	MPDB66462	MPDB66463				
		2 - 14	8	MPDB67430	MPDB67431	MPDB67432	MPDB67433	-	-	-	-				
2/0 - 14	2	6 - 14	10	MPDB67480	MPDB67481	MPDB67482	MPDB67483	-	-	-	-	270	350		
		10-14	18	MPDB67490	MPDB67491	MPDB67492	MPDB67493	MPDB66490	MPDB66491	MPDB66492	MPDB66493				
		2/0 - 14	2	MPDB67020	MPDB67021	MPDB67022	MPDB67023	MPDB66020	MPDB66021	MPDB66022	MPDB66023				
		2 - 14	6	MPDB67510	MPDB67511	MPDB67512	MPDB67513	MPDB66510	MPDB66511	MPDB66512	MPDB66513				
		2 - 14	8	MPDB67610	MPDB67611	MPDB67612	MPDB67613	MPDB66610	MPDB66611	MPDB66612	MPDB66613				
4/0 - 6	2	6 - 14	10	MPDB67530	MPDB67531	MPDB67532	MPDB67533	MPDB66530	MPDB66531	MPDB66532	MPDB66533	350	460		
		10 - 14	15	MPDB67550	MPDB67551	MPDB67552	MPDB67553	MPDB66550	MPDB66551	MPDB66552	MPDB66553				
4/0 - 6	2	4/0 - 10	2	MPDB67520	MPDB67521	MPDB67522	MPDB67523	MPDB66520	MPDB66521	MPDB66522	MPDB66523	350	460		
		2 - 14	6	MPDB67540	MPDB67541	MPDB67542	MPDB67543	MPDB66540	MPDB66541	MPDB66542	MPDB66543				

Hinged Safety Cover for MPDB66 and MPDB67 series: Catalog number **MPDBC6667**

End Barrier for MPDB66 and MPDB67 series: Catalog Number **MPDBE6667**



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By: AJ

Device Tag:

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Job Number: HBR8191

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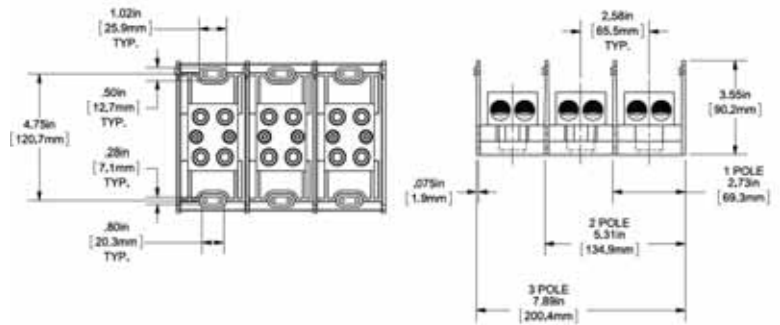
Manuf.: PNO:

Mersen: MPDB62161 Assembly

# MPDB68 and MPDB69 Open-Style PDBs **Mersen**

## Catalog Numbers (Large)

Large (MPDB69123 shown for reference)



07-030-A004

Line	Wire Range	Openings per Pole	Load Wire Range	Openings per Pole	Catalog Numbers - Aluminum			Catalog Numbers - Copper				Amp Rating per Pole		
					ADDER	1-P	2-P	3-P	ADDER	1-P	2-P	3-P	Al Wire	Cu Wire
Box-Box Configuration														
350 - 6	1	1	2/0 - 14	6	MPDB69170	MPDB69171	MPDB69172	MPDB69173	-	-	-	-	250	310
			4 - 14	12	MPDB69150	MPDB69151	MPDB69152	MPDB69153	MPDB68150	MPDB68151	MPDB68152	MPDB68153		
500 - 4	1	1	500 - 4	1	MPDB69050	MPDB69051	MPDB69052	MPDB69053	-	-	-	-		
			350 - 6	2	MPDB69060	MPDB69061	MPDB69062	MPDB69063	MPDB68060	MPDB68061	MPDB68062	MPDB68063		
			4/0 - 6	4	MPDB69510	MPDB69511	MPDB69512	MPDB69513	-	-	-	-	310	380
			2/0 - 14	6	MPDB69070	MPDB69071	MPDB69072	MPDB69073	-	-	-	-		
600 - 2	1	1	4 - 14	12	MPDB69080	MPDB69081	MPDB69082	MPDB69083	-	-	-	-		
			600 - 2	1	MPDB69640	MPDB69641	MPDB69642	MPDB69643	-	-	-	-	340	420
1000 - 250	1	1	1000 - 250	1	MPDB69000	MPDB69001	MPDB69002	MPDB69003	-	-	-	-		
			500 - 4	2	MPDB69010	MPDB69011	MPDB69012	MPDB69013	-	-	-	-		
			350 - 6	2	MPDB69020	MPDB69021	MPDB69022	MPDB69023	-	-	-	-	445	545
			2/0 - 14	6	MPDB69030	MPDB69031	MPDB69032	MPDB69033	-	-	-	-		
4 - 14	2	2	4 - 14	12	MPDB69040	MPDB69041	MPDB69042	MPDB69043	-	-	-	-		
			4 - 14	12	MPDB69180	MPDB69181	MPDB69182	MPDB69183	-	-	-	-	130	170
2/0 - 14	2	2	4 - 14	12	MPDB69160	MPDB69161	MPDB69162	MPDB69163	MPDB68160	MPDB68161	MPDB68162	MPDB68163	270	350
			10 - 14	20	MPDB69600	MPDB69601	MPDB69602	MPDB69603	-	-	-	-		
350 - 6	2	2	350 - 6	2	MPDB69120	MPDB69121	MPDB69122	MPDB69123	MPDB68120	MPDB68121	MPDB68122	MPDB68123		
			4/0 - 10	4	-	-	-	-	MPDB68320	MPDB68321	MPDB68322	MPDB68323	500	620
			2/0 - 14	6	MPDB69130	MPDB69131	MPDB69132	MPDB69133	MPDB68130	MPDB68131	MPDB68132	MPDB68133		
			4 - 14	12	MPDB69140	MPDB69141	MPDB69142	MPDB69143	MPDB68140	MPDB68141	MPDB68142	MPDB68143		
500 - 4	2	2	500 - 4	2	MPDB69090	MPDB69091	MPDB69092	MPDB69093	MPDB68090	MPDB68091	MPDB68092	MPDB68093		
			4/0 - 6	4	MPDB69310	MPDB69311	MPDB69312	MPDB69313	-	-	-	-		
			4/0 - 10	4	-	-	-	-	MPDB68310	MPDB68311	MPDB68312	MPDB68313	620	760
			2/0 - 14	6	MPDB69100	MPDB69101	MPDB69102	MPDB69103	MPDB68100	MPDB68101	MPDB68102	MPDB68103		
600 - 2	2	2	2/0 - 14	8	MPDB69350	MPDB69351	MPDB69352	MPDB69353	-	-	-	-		
			4 - 14	12	MPDB69110	MPDB69111	MPDB69112	MPDB69113	MPDB68110	MPDB68111	MPDB68112	MPDB68113		
			600 - 2	2	MPDB69650	MPDB69651	MPDB69652	MPDB69653	-	-	-	-	680	840
4 - 14 & 3/0 - 10	2	2	4 & 4		MPDB69540	MPDB69541	MPDB69542	MPDB69543	-	-	-	-		
			4 & 4		MPDB69540	MPDB69541	MPDB69542	MPDB69543	-	-	-	-		

Hinged Safety Cover for MPDB68 and MPDB69 series: Catalog number **MPDBC6869**

End Barrier for MPDB68 and MPDB69 series: Catalog Number **MPDBE6869**



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Device Tag:

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Manuf.: PNo:

Mersen: MPDB62161 Assembly

# Base & DIN rail mounted ①

## 16A - 3150A



For a complete assembly, please select one of each:

- 1 switch (page 19.11)
- 1 handle (page 19.30)
- 1 shaft (page 19.32)
- 1 terminal lug kit (page 19.34)

NOTE: For additional accessories, see pages 19.29 - 19.40.

(Lug kits only necessary on switches 200A and above)



OT200U03



OXP6X210



OHE80U6



OZXA-200

09-001-023

UL only	UL general purpose amp rating	IEC AC21 amp rating	2 Pole	3 Pole	4 Pole ②	6 Pole ③			
			Catalog number	Catalog number	Catalog number	Catalog number			
UL 508	20	16	—	OT16F3	—	OT16F6			
	30	25	—	OT25F3	—	OT25F6			
	40	40	—	OT40F3	—	OT40F6			
	60	63	—	OT63F3	—	OT63F6			
	80	80	—	OT80F3	—	OT80F6			
UL 98	30	40	—	OT30F3	—	OT30F6			
	60	63	—	OT60F3	—	OT60F6			
	100	115	—	OT100F3	—	OT100F6			
	200	250	250	OT200U02	OT200U03 OT200U30 OT200U12	OT200U04 OT200U40 OT200U22	— — —		
				400	630	OT400U02	OT400U03 OT400U30 OT400U12	OT400U04 OT400U40 OT400U22	— — —
							600	800	OT600U02
	800	1250	OT800U02	OT800U03	OT800U04	—			
				1200	1600	OT1200U02	OT1200U03	OT1200U04	—
	1600	2500 ④	OETL-NF16002SW				OETL-NF1600SW	OETL-NF16004SW	—
				2000	2500 ④	OETL-NF20002SW	OETL-NF2000SW	OETL-NF20004SW	—
	-	3150 ④	OETL-NF31502SW				OETL-NF3150SW	OETL-NF31504SW	—

Approvals:

- OT16...80: UL 508, CSA 22-2 # 14
- OT30...100: UL 98, CSA 22-2 # 4
- IEC 60947-3

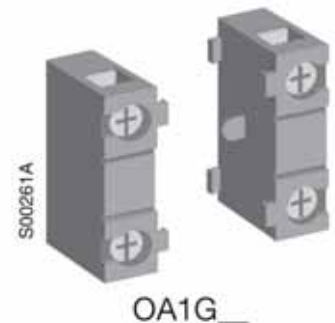
### Bulk packed 3 Pole, 600V Switches ⑤

UL only	UL general purpose amp rating	IEC AC21 amp rating	Bulk pack Quantity	Catalog number
UL508	20	16	50	OT16F3/B50
	30	25	50	OT25F3/B50
	40	40	50	OT40F3/B50
	60	63	50	OT63F3/B50
	80	80	50	OT80F3/B50
UL98	30	40	25	OT30F3/B25
	60	63	25	OT60F3/B25
	100	115	25	OT100F3/B25

Description	Catalog number
Fourth Pole	OTPS40FPN1
	OTPS60FP
	OTPS80FP
	OTPS125FP
Late-break/ early-make	OTPL40FP
	OTPL60FP
	OTPL80FP
	OTPL125FP

### Terminal lug kits and accessories

For use on:	Description	Wire size	Wire type	Qty.	Catalog number
OS30_	Lug	#18 - #8	Cu	--	Integral
OS60_	Lug	#14 - #4	Cu	--	Integral
OS100_	Lug	#14 - 2/0	Cu/Al	6	OZXA-24
OS30_ - OS100_	Aux. Contact	1 NO		1	OA1G10
	Aux. Contact	1 NC		1	OA3G01
OS30_	Adapter	Needed for mounting aux. Contacts on OS30_		1	OSZ4
OS100_	Shroud	Includes one set of 3 for use on line or load side		1	OSS160GG1L/3 OSS160GG1S/3



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Manuf.: PNO:

ABB: OA1G10





**SwitchLine**  
Non-fusible disconnect switches  
Compact, Heavy duty  
16A – 2000A, 600V



09-001-A014

Catalog number	3 pole	OT16F3	OT25F3	OT40F3	OT63F3	OT80F3	OT30F3	OT60F3	OT100F3
<b>General purpose amp rating</b>	<b>A</b>	<b>20</b>	<b>30</b>	<b>40</b>	<b>60</b>	<b>80</b>	<b>30</b>	<b>60</b>	<b>100</b>
Catalog reference	Page #	1.10	1.10	1.10	1.10	1.10	1.11	1.11	1.11
Approvals <sup>Ⓞ</sup>	2 pole 3 pole 4 pole	— CSA C22.2 No.14 CSA C22.2 No.14	— CSA C22.2 No.14 CSA C22.2 No.14	— CSA C22.2 No.14 CSA C22.2 No.14	— CSA C22.2 No.14 CSA C22.2 No.14	— CSA C22.2 No.14 CSA C22.2 No.14	— CSA C22.2 No.4 CSA C22.2 No.4	— CSA C22.2 No.4 CSA C22.2 No.4	— CSA C22.2 No.4 CSA C22.2 No.4
<b>Technical ratings</b> CSA,UL <sup>Ⓞ</sup>									
Max operating voltage	V	600	600	600	600	600	600VAC / 250VDC	600VAC / 250VDC	600VAC / 250VDC
Max horsepower rating	Three phase								
	208V HP	3	7.5	10	15	20	10	20	25
	240V HP	5	7.5	10	15	20	10	20	30
	480V HP	10	15	20	30	40	20	40	50
	600V HP	10	20	25	30	40	30	40	50
Single phase									
	120V HP	1	1.5	2	2	2	2	3	5
	240V HP	2	3	5	7.5	10	5	7.5	15
<b>Technical ratings</b> IEC <sup>Ⓞ</sup>									
Rated insulation and operational voltage, AC20 and DC20 <sup>Ⓞ</sup>	V	750	750	750	750	750	750	750	750
Rated thermal current, I <sub>th</sub>									
AC 20/DC 20 open	A	25	32	40	63	80	40	63	115
AC 20/DC 20 enclosed	A	25	32	40	63	80	40	63	115
AC 21A ≤ 500V	A	16	25	40	63	80	40	63	100
690V	A	16	25	40	63	80	40	63	100
Rated operational power AC23									
400/415V	kW	7.5	9	11	22	37	15	18.5	37
690V	kW	7.5	9	11	15	18.5	15	15	37
<b>Physical characteristics</b>									
Weight <sup>Ⓞ</sup> 3 pole	Kg	0.11	0.11	0.11	0.27	0.27	0.36	0.36	0.36
Dimension 3 pole	H mm	68	68	68	91	91	100	100	100
	W mm	35	35	35	53	53	70	70	70
	D mm	56	56	56	72	72	75	75	75
<b>Accessories</b>									
Terminal lug kit		Integral	Integral	Integral	Integral	Integral	Integral	Integral	Integral
Terminal shroud		•	•	•	•	•	•	•	•
Auxiliary contact		•	•	•	•	•	•	•	•
Handle CSA/UL/NEMA type									
Type 1, 3R, 12		•	•	•	•	•	•	•	•
Type 1, 3R, 4, 4X, 12		•	•	•	•	•	•	•	•
Handle type									
Selector		•	•	•	•	•	•	•	•
Pistol		•	•	•	•	•	•	•	•
Conversion kits									
6 pole		•	•	•	•	•	•	•	•
Transfer		•	•	•	•	•	•	•	•
Bypass		•	•	•	•	•	•	•	•
Mechanical interlock		•	•	•	•	•	•	•	•
Electrical interlock		—	—	—	—	—	—	—	—

CSA approved, UL listed, IEC rated, CE marked

Ⓞ CSA 22.2 No.4 (UL98) —CSA File #LR58077, UL File # E101914, CSA 22.2 No. 14 (UL508) —CSA File #LR58247, UL File # E63822



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Manuf.: . PNO: ABB: OT63F3 Assembly

# PANELITE™ Remote Door Switches



- Remote door switch activates the light when the enclosure door is opened
- Mounts on enclosure frame and includes mounting hardware
- Mounting plate is 14 gauge steel with a plated finish
- Can be hard-wired to the PANELITE™ LED or Fluorescent light or connected via the PANELITE Door Switch Cable



11-035-240

Catalog Number	Description
ALFSWD	Door switch assembly (order connection cable separately)
PLFSWD	Door switch assembly for PROLINE® (order connection cable separately)



Rev:	0	Device Tag:	
Date:	7/17/2020	DSW1,2	
By:	AJ	Job Number:	HBR8191
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Manuf.: PNo: Hoffman: A-LFSWD

# Part Information - SCE-APB



11-055-057

## Product Specifications -

Height: A"

Width: B"

Depth: 0.88"

Edge Flanges: Four

Description: Subpanel, Bent



### Options -

Sub-plates can be special ordered in Stainless Steel or Galvanized material. Please consult a factory representative for assistance.

### Finish -

Powder Coated White inside and out.

### Industry Standards - (N/A)

N/A



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EN1

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Manuf.: . PNo: Saginaw: SCE-60P48

# Product Specifications:

**Part Number:** SCE-60EL4812LPPL

**Description:** 2DR EL LPPL Enclosure

**Height:** 60.00"

**Width:** 48.00"

**Depth:** 12.00"

## Construction

- ✦ 0.104 In. carbon steel.
- ✦ Seams continuously welded and ground smooth.
- ✦ Flange trough collar around all sides of door opening.
- ✦ Removable centerpost.
- ✦ Heavy duty lifting eyes anchored into reinforced top.
- ✦ Body stiffeners.
- ✦ Concealed hinges.
- ✦ Black keylocking padlocking handles.
- ✦ 3-point latching mechanism.
- ✦ Removable print pocket.
- ✦ 12 In. removable floor stands.
- ✦ Panel Supports.
- ✦ Provisions for mechanical interlock.
- ✦ Pour in place oil & water resistant gasket
- ✦ Ground stud on door and body.
- ✦ Provisions for light kit.
- ✦ Hole plugs provided to seal holes in bottom of enclosure.
- ✦ Collar studs 3/8-16 provided for mounting optional panels.

## Industry Standards - (IS4)

- ✦ NEMA Type 3R, 4, 12 and Type 13
- ✦ UL Listed Type 3R, 4 and 12
- ✦ CSA Type 3R, 4 and 12
- ✦ IEC 60529
- ✦ IP 66



11-055-092

 630-499-7080 · www.elemechinc.com	Rev: 0	Device Tag:	
	Date: 7/17/2020	EN1	
Manuf.: PNo: Saginaw: SCE-60EL4812LPPL	By: AJ	Job Number: HBR8191	Page # 1/1

# HF SIDE-MOUNT FILTER FANS



**HF09**  
70 CFM (119 m<sup>3</sup>/Hr.)

11-035-837

## Performance Data HF09 70 CFM (119 m<sup>3</sup>/hr.) Side-Mount Filter Fans

<b>ELECTRICAL DATA</b>			
Rated Voltage	115	230	24
Frequency (Hz)	50/60	50/60	—
Nominal Current Maximum (Amps)	.16/.14	.12/.10	.35
Power Consumption Maximum (Watts)	11.0/10.0	15.0/14.0	8.4
Power Connection	Terminal Block		
<b>TYPE 12 / IP54 FILTER FANS</b>			
RAL 7035 Light Gray:			
Catalog Number	HF0916414	HF0926414	HF0924414
<b>FILTER FAN UNIT CONSTRUCTION</b>			
Fan RPM	2600/2900	2600/2900	3200
Sound Pressure (dBA at 50/60 Hz)	43/46	43/46	43/46
Operating Temperature Range:			
Maximum (°F / °C)	131/55	131/55	149/65
Minimum (°F / °C)	14/-10	14/-10	-4/-20
Service Life (hours)	40,000	40,000	100,000
Unit Dimensions - H x W x D (in. / mm)	8.19 x 8.21 x 4.15/208 x 209 x 105		
Cutout Dimensions - H x W (in. / mm)	6.97 x 6.97/177 x 177		
Weight (lb. / kg)	2.13/1.0		
<b>TYPE 12 / IP54 EXHAUST GRILLES</b>			
RAL 7035 Light Gray:			
Catalog Number	HG0900404	HG0900404	HG0900404
<b>ACCESSORIES</b>			
Replacement Filters:			
Type 12 / IP54 Catalog Number	89134425R	89134425R	89134425R
Type 12 / IP55 Catalog Number	89136409R	89136409R	89136409R
Thermostat Catalog Number	TWR60	TWR60	TWR60
Shroud Catalog Number	HH09G535001, HH09G561001, HH09S504001		

UL/cUL Listed; File No. E482010

 630-499-7080 · www.elemechinc.com	Rev: 0	Device Tag:	
	Date: 7/17/2020	FAN1	
Manuf.: . PNo: Hoffman: HF0916414	By: AJ	Job Number: HBR8191	Page # 1/1

# HF SIDE-MOUNT FILTER FANS



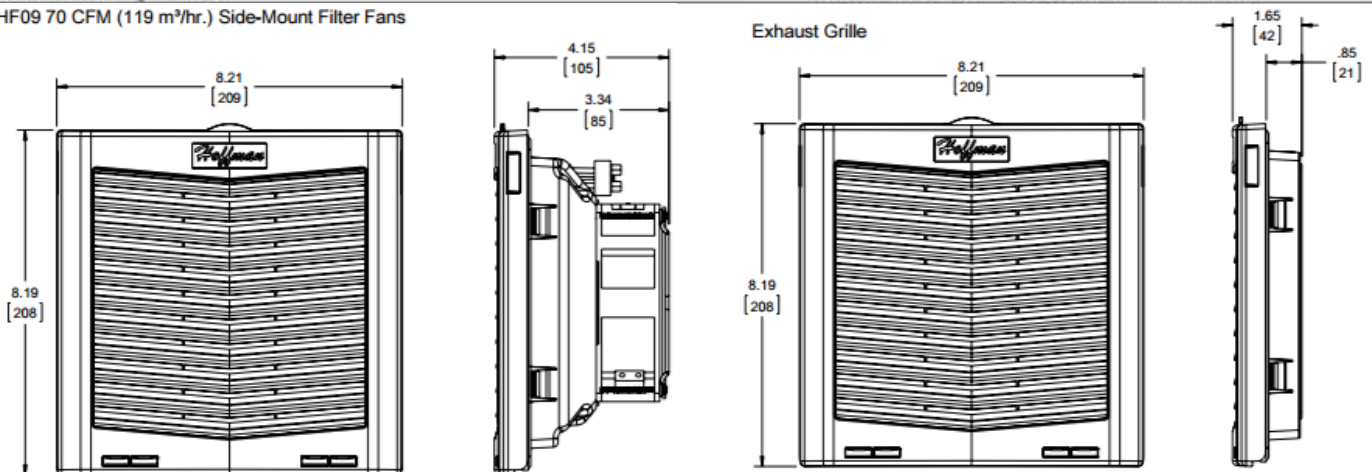
*Hoffman*

11-035-838

## Performance Data HF09 70 CFM (119 m<sup>3</sup>/hr.) Side-Mount Filter Fans

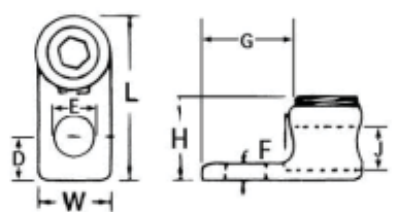
<b>ELECTRICAL DATA</b>			
Rated Voltage	115	230	24
Frequency (Hz)	50/60	50/60	—
Nominal Current Maximum (Amps)	.16/14	.12/10	.35
Power Consumption Maximum (Watts)	11.0/10.0	15.0/14.0	8.4
Power Connection	Terminal Block		
<b>TYPE 12 / IP54 FILTER FANS</b>			
RAL 7035 Light Gray:			
Catalog Number	HF0916414	HF0926414	HF0924414
RAL 9011 Black:			
Catalog Number	HF0916413	HF0926413	HF0924413
Free Airflow (CFM / m <sup>3</sup> /hr.)	70/119	70/119	70/119
Airflow with 1 Exhaust Grille (CFM / m <sup>3</sup> /hr.)	44/75	44/75	44/75
Airflow with 2 Exhaust Grilles (CFM / m <sup>3</sup> /hr.)	55/93	55/93	55/93
<b>TYPE 12 / IP55 FILTER FANS</b>			
RAL 7035 Light Gray:			
Catalog Number	HF0916514	HF0926514	HF0924514
RAL 9011 Black:			
Catalog Number	HF0916513	HF0926513	HF0924513
Free Airflow (CFM / m <sup>3</sup> /hr.)	33/56	33/56	33/56
Airflow with 1 Exhaust Grille (CFM / m <sup>3</sup> /hr.)	23/39	23/39	23/39
Airflow with 2 Exhaust Grilles (CFM / m <sup>3</sup> /hr.)	26/44	26/44	26/44
<b>FILTER FAN UNIT CONSTRUCTION</b>			
Fan RPM	2600/2900	2600/2900	3200
Sound Pressure (dBA at 50/60 Hz)	43/46	43/46	43/46
Operating Temperature Range:			
Maximum (°F / °C)	131/55	131/55	149/65
Minimum (°F / °C)	14/-10	14/-10	-4/-20
Service Life (hours)	40,000	40,000	100,000
Unit Dimensions - H x W x D (in. / mm)	8.19 x 8.21 x 4.15/208 x 209 x 105		
Cutout Dimensions - H x W (in. / mm)	6.97 x 6.97/177 x 177		
Weight (lb. / kg)	2.13/1.0		
<b>TYPE 12 / IP54 EXHAUST GRILLES</b>			
RAL 7035 Light Gray:			
Catalog Number	HG0900404	HG0900404	HG0900404
RAL 9011 Black:			
Catalog Number	HG0900403		
<b>TYPE 12 / IP55 EXHAUST GRILLES</b>			
RAL 7035 Light Gray:			
Catalog Number	HG0900504		
RAL 9011 Black:			
Catalog Number	HG0900503		
<b>ACCESSORIES</b>			
Replacement Filters:			
Type 12 / IP54 Catalog Number	89134425R	89134425R	89134425R
Type 12 / IP55 Catalog Number	89136409R	89136409R	89136409R
Thermostat Catalog Number	TWR60	TWR60	TWR60
Shroud Catalog Number	HH09GS35001, HH09GS61001, HH09SS04001		

HF09 70 CFM (119 m<sup>3</sup>/hr.) Side-Mount Filter Fans



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By:	AJ	Job Number:	HBR8191
		Page #	1/1

Manuf.: . PNo:  
Hoffman: HG0900504



**Copper Connectors**  
**T&B Catalog Number:**

**UPC Number:** L70  
 78378613002  
**Status:** Active  
**Description:**

Type L - Copper Single Conductor, One-Hole Mount for Conductor Range 14 Sol.-4 Str.

**Features**

Cold forged from pure electrolytic copper with 99 percent conductivity.

**General**

Style	Type L - Copper Single Conductor, One-Hole Mount
Material	Copper
Wire Range	14 Sol.-4 Str.

**Dimension Information**

Length (inches)	1 1/8
Width (inches)	17/32
Height (inches)	35/64
D (inches)	9/32
E (inches)	9/32
F (inches)	3/32
G (inches)	21/32
J (inches)	9/32

**Packaging**

T&B Inner Pack	100
Package in Units	1000
T&B Sold in UOM	Each
T&B Weight Per UOM	3.32 lbs. per 100

**Notes**

Available with screwdriver slot head screws only.  
 UL 486A tested.

**Certifications**

RoHS Compliance	Yes
-----------------	-----

**Certifications**



File Nbr:  
 E9809

For further technical assistance, please contact us...

Thomas & Betts - USA  
 8155 T&B Blvd.  
 Memphis, TN 38125  
 www.tnb.com

T&B Technical Support  
 MS 3B-50  
 8155 T&B Blvd.  
 Memphis, TN 38125

Hours: 7AM - 6PM CDT  
 Monday-Friday  
 Phone: (888) 862-3289  
 Fax: (901) 252-1321  
 Email: techsupport@tnb.com

 630-499-7080 · www.elemechinc.com	Rev: 0	GND	
	Date: 7/17/2020		
Manuf.: . PNo: Blackburn: L70	By: AJ	Job Number: HBR8191	Page # 1/1

# Zelio® Plug-In Relays

## RPM power relays



RPZF2 + relay RPM22F7



RUW24



RPZ1DA



RPZ3FA

Sockets					
Contact terminal arrangement	Connection	Relay type	Sold in lots of	Catalog number	Weight kg
Mixed	Screw clamp terminals	RPM1	10	RPZF1	0.042
		RPM2	10	RPZF2	0.054
		RPM3	10	RPZF3	0.072
		RPM4	10	RPZF4	0.094

Protection modules					
Description	Voltage	Socket type	Sold in lots of	Catalog number	Weight kg
<b>V</b>					
Diode	--- 6...250	RPZF1RPZF2	20	RXM040W	0.003
		RPZF3 RPZF4	10	RUW240BD	0.004
		RPZF1RPZF2	20	RXM041BN7	0.010
RC circuit	~ 24...60	RPZF1RPZF2	20	RXM041FU7	0.010
	~ 110...240	RPZF1RPZF2	20	RXM041FU7	0.010
		RPZF3 RPZF4	10	RUW241P7	0.004
Varistor	~--- 6...24	RPZF1RPZF2	20	RXM021RB	0.030
	~--- 24...60	RPZF1RPZF2	20	RXM021BN	0.030
	~--- 110...240	RPZF1RPZF2	20	RXM021FP	0.030
	~--- 24	RPZF3 RPZF4	10	RUW242B7	0.004
	~--- 240	RPZF3 RPZF4	10	RUW242P7	0.004
		RPZF3 RPZF4	10	RUW242P7	0.004

Timer module (1)					
Description	Voltage	Socket type		Catalog number	Weight kg
<b>V</b>					
Multifunction	~--- 24... 240	RPZF3 RPZF4		RUW101MW	0.020

Accessories					
Description	For use with	Sold in lots of	Catalog number	Weight kg	
Metal hold-down clip (for single-pole relays)	RPZF1	20	RPZR235	0.001	
Mounting adapters for DIN rail (2)	RPM1	20	RPZ1DA	0.004	
	RPM2	20	RXZE2DA	0.004	
	RPM3	20	RPZ3DA	0.004	
	RPM4	20	RPZ4DA	0.006	
Mounting adapters with fixing lugs for panel	RPM1	20	RPZ1FA	0.002	
	RPM2	20	RXZE2FA	0.002	
	RPM3	20	RPZ3FA	0.003	
	RPM4	20	RPZ4FA	0.004	
Clip-in ID tags (sheet of 108 ID tags)	All relays	10	RXZL520	0.080	

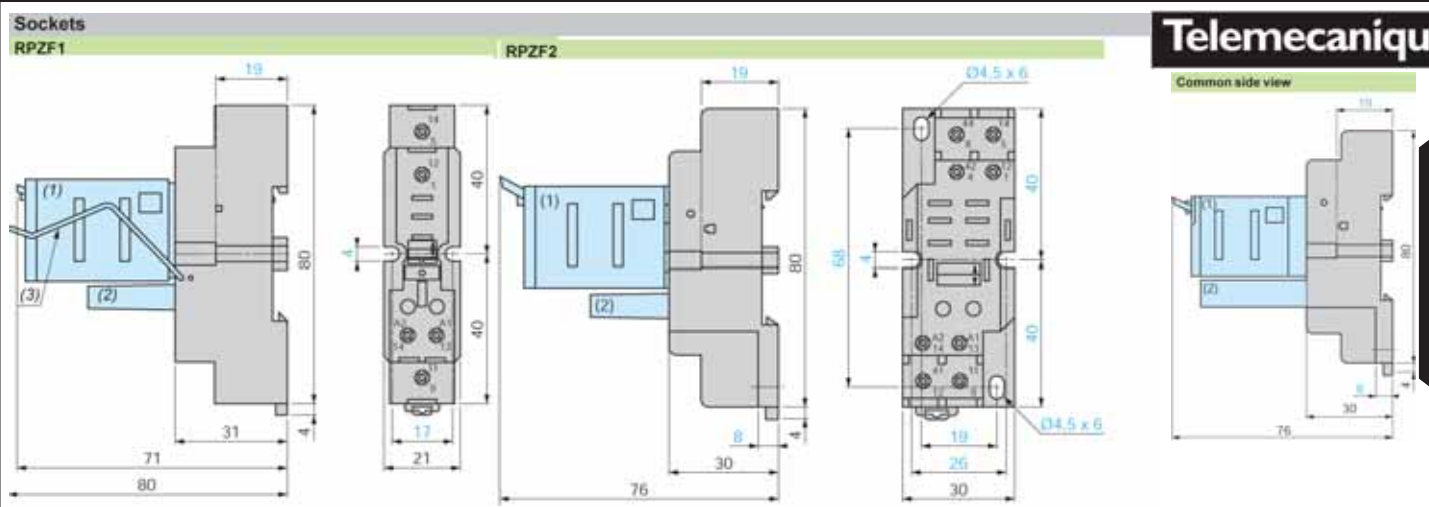
(1) See timer module description (selection of functions and time delays) on page 41  
 (2) Test button becomes inaccessible.



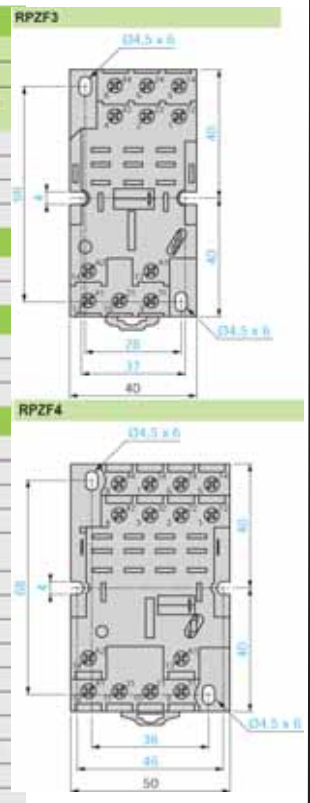
Rev: 0	Device Tag: IR1-16	
Date: 7/17/2020		
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Manuf.: . PNo: Square D: RPZR235





Socket characteristics		RPZF1	RPZF2	RPZF3	RPZF4
Socket type		RPZF1	RPZF2	RPZF3	RPZF4
Relay types used		RPM1●●●	RPM2●●●	RPM3●●●	RPM4●●●
Protection module types used		RXM02●●● RXM04●●●	RXM02●●● RXM04●●●	RUW24●●●	RUW24●●●
Contact terminal arrangement		Mixed			
Wire connection method		Screw clamp terminals			
Product certifications		cURus File E172326 CCN SWIV2, SWIV8; CSA; CE; RoHS compliant			
Conforming to standards		IEC 61984, CE			
Electrical characteristics					
Conventional thermal current (Ith)	A	16			
Maximum operating voltage	V	250 (IEC)			
Insulation characteristics					
Between adjacent output contacts	Vrms	2500			
Between input and output contacts	Vrms	2500			
Between contacts and DIN rail	Vrms	2500			
General characteristics					
Ambient air temperature around the device	Operation	°C -40...+55			
	Storage	°C -40...+85			
Degree of protection	Conforming to IEC/EN 60529	IP 20			
Connection	Solid wire	1 conductor	0.5...1.5 mm <sup>2</sup> - AWG 20...AWG 16	0.5...2.5 mm <sup>2</sup> - AWG 20...AWG 14	
	without cable end	2 conductors	0.5...1.5 mm <sup>2</sup> - AWG 20...AWG 16	0.5...2.5 mm <sup>2</sup> - AWG 20...AWG 14	
	Flexible wire	1 conductor	0.25...1 mm <sup>2</sup> - AWG 22...AWG 17	0.25...1.5 mm <sup>2</sup> - AWG 22...AWG 16	
	with cable end	2 conductors	0.25...1 mm <sup>2</sup> - AWG 22...AWG 17	0.25...1.5 mm <sup>2</sup> - AWG 22...AWG 16	
Maximum tightening torque / Screw size	Nm	1 / M3 screw			
Mounting		35 mm DIN rail / panel mount			
Mounting on DIN rail		By red plastic clip			
Terminal referencing		IEC, NEMA			
Compatibility with the metal hold-down clip		Yes	No		
Timer module compatibility		No		Yes	
Protection module		RXM040W, RXM041●●, RXM021●●		RUW24●●	
Clip-in ID tags		No			
Wire connection method	Screw clamp terminals				



Sockets		Relay type	Sold in lots of	Catalog number	Weight kg
Mixed	Screw clamp terminals	RPM1●●●	10	RPZF1	0.042
		RPM2●●●	10	RPZF2	0.054
		RPM3●●●	10	RPZF3	0.072
		RPM4●●●	10	RPZF4	0.094



<p>630-499-7080 · www.elemechinc.com</p>	Rev: 0	Device Tag: IR1-16	
	Date: 7/17/2020		
Manuf.: . PNo: Square D: RPZF1	By: AJ	Job Number: HBR8191	Page # 1/1

# RXM040W

Telemecanique

diode - 6..250 V DC - for RPZ/RXZ sockets

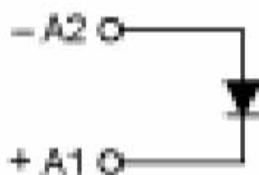


06-058-040

## Main

Range of product	Zelio Relay
Accessory / separate part category	Protection accessories
Accessory / separate part type	Protection module
Accessory / separate part designation	Diode
Product compatibility	Socket RPZ (1 C/O) Socket RPZ (2 C/O) Socket RXZ (2 C/O) Socket RXZ (3 C/O) Socket RXZ (4 C/O)
Accessory / separate part destination	Zelio Relay RXM Zelio Relay RPM
[Uc] control circuit voltage	6...250 V DC
Sale per indivisible quantity	20

## Wiring Diagram



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IR6,13

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Manuf.: PNo:

Square D: RXM040W

**Power relays without LED (sold in lots of 10)**

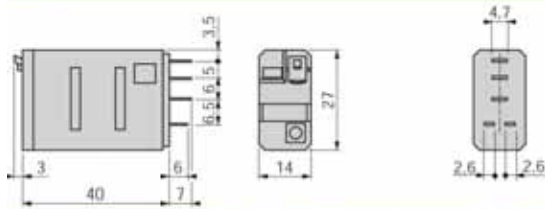
Control circuit voltage	Number and type of contacts - Thermal current (Ith)							
	1 C/O - 15 A		2 C/O - 15 A		3 C/O - 15 A		4 C/O - 15 A	
	Catalog number	Weight	Catalog number	Weight	Catalog number	Weight	Catalog number	Weight
V		kg		kg		kg		kg
≡ 12	RPM11JD	0.026	RPM21JD	0.036	RPM31JD	0.054	RPM41JD	0.071
≡ 24	RPM11BD	0.026	RPM21BD	0.036	RPM31BD	0.054	RPM41BD	0.071
≡ 48	RPM11ED	0.026	RPM21ED	0.036	RPM31ED	0.054	RPM41ED	0.071
≡ 110	RPM11FD	0.026	RPM21FD	0.036	RPM31FD	0.054	RPM41FD	0.071
~ 24	RPM11B7	0.026	RPM21B7	0.036	RPM31B7	0.054	RPM41B7	0.071
~ 48	RPM11E7	0.026	RPM21E7	0.036	RPM31E7	0.054	RPM41E7	0.071
~ 120	RPM11F7	0.026	RPM21F7	0.036	RPM31F7	0.054	RPM41F7	0.071
~ 230	RPM11P7	0.026	RPM21P7	0.036	RPM31P7	0.054	RPM41P7	0.071

**Power relays with LED (sold in lots of 10)**

≡ 12	RPM12JD	0.026	RPM22JD	0.036	RPM32JD	0.054	RPM42JD	0.071
≡ 24	RPM12BD	0.026	RPM22BD	0.036	RPM32BD	0.054	RPM42BD	0.071
≡ 48	RPM12ED	0.026	RPM22ED	0.036	RPM32ED	0.054	RPM42ED	0.071
≡ 110	RPM12FD	0.026	RPM22FD	0.036	RPM32FD	0.054	RPM42FD	0.071
~ 24	RPM12B7	0.026	RPM22B7	0.036	RPM32B7	0.054	RPM42B7	0.071
~ 48	RPM12E7	0.026	RPM22E7	0.036	RPM32E7	0.054	RPM42E7	0.071
~ 120	RPM12F7	0.026	RPM22F7	0.036	RPM32F7	0.054	RPM42F7	0.071
~ 230	RPM12P7	0.026	RPM22P7	0.036	RPM32P7	0.054	RPM42P7	0.071

**Dimensions (mm):**

Power relays  
RPM 1

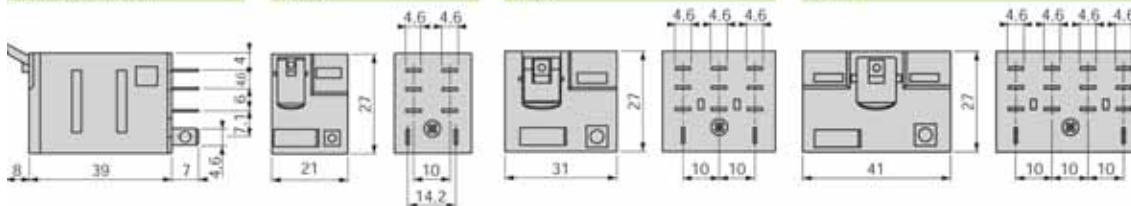


Common side view

RPM2

RPM3

RPM4



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By: AJ

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Job Number: HBR8191

# 700-HJ Magnetic Latching Relay


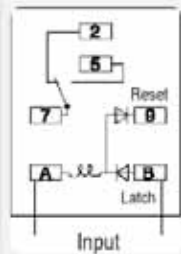
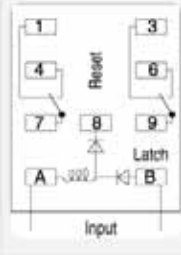
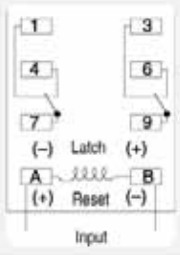


Allen-Bradley

- Magnetic Latching Relay
- 10 A Contact Rating
- SPDT
- DPDT Single Coil
- DPDT Dual Coil
- Blade Style Quick Connect Terminals



06-005-077

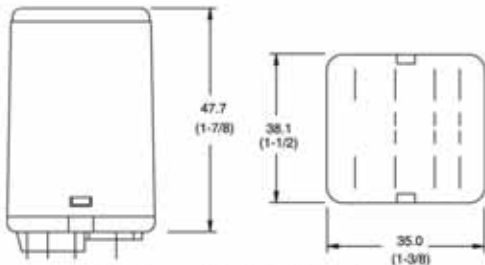
	Description	Contact Rating	Wiring Diagrams		Coil Voltage	Cat. No.
			AC*	DC‡		
	SPDT 1-Pole 1 Form C AgCdO Contacts (Single Coil AC or DC)	10 A			24V AC 120V AC 24V DC	700-HJ36A24 700-HJ36A1 700-HJ36Z24
	Sockets		700-HN153	700-HN154		
	DPDT 2-Pole 2 Form C AgCdO Contacts (Single Coil AC or DC)	10 A			24V AC 120V AC 240V AC 12V DC	700-HJ32A24 700-HJ32A1 700-HJ32A2 700-HJ32Z12
	Sockets		700-HN153	700-HN154	24V DC	700-HJ32Z24
	DPDT 2-Pole 2 Form C AgCdO Contacts (Dual Coil)5	10 A	DC Only		24V DC	700-HJD32Z24
	TYPE HJ	Sockets		700-HN153 or 700-HN154		

Certifications

CSA Certified, File LR700026, UL Recognized, File E3125, Guide NLDX 2

Standards

UL 508, CSA 22.2 No. 14, EN/IEC 60947-4-1, -5-1



Bulletin 700-HJ Relay

Relay Type	Socket Cat. No.	Retainer Clip Cat. No.
700-HJ	700-HN153	700-HN159
	700-HN154	700-HN159



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Rev:

0

Device Tag:

LR1

Date:

7/17/2020

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HBR8191

Page #

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Manuf.: PNo:

Allen-Bradley: 700HJD32Z24

By:

AJ



Cat. No. 700-HJ...

Electrical Ratings

Pilot Duty Rating -

Rated Thermal Current (I<sub>th</sub>) 10 A

Rated Insulation Voltage (U<sub>i</sub>) 250V IEC, 300V UL/CSA

Contacts	Inductive	Make	Break	Hp
		►  ◄	◄  ►	
	120V AC 240V AC	30 A 15 A	3 A 1.5 A	1/4 1/3
	DC	24V DC, 10 A		

Permissible Coil Voltage Variation 85...110% of Nominal Voltage at 50 Hz  
85...110% of Nominal Voltage at 60 Hz  
80...110% of Nominal Voltage at DC

Coil Consumption ±10%		AC Coils	Inrush Sealed	Single AC Coil	Single DC Coil	Dual DC Coil
				1.44 VA 1.44 VA	-	-
		DC Coils		-	1.2 W	12V 1.63 W 24V 1.67 W

Design Specification/Test Requirements

Dielectric Withstand Voltage	Pole-to-Pole	1500V AC
	Contact-to-Pole	1500V AC
	Contact-to-Frame	1500V AC

Mechanical

Degree of Protection Open Type (Guarded Terminal Sockets)

Mechanical Life Operations 10 x 10<sup>6</sup>

Switching Frequency Operations 1800/HR

Coil Voltages See Product Selection

Operating Time at Nominal Voltage at 20 °C Pickup 25 ms  
Dropout 25 ms

Maximum Operating Rate -

Environmental

Temperature	Operating	-45...+50 °C (-49...+122 °F)
	Storage	-45...+100 °C (-49...+212 °F)



Rev: 0	Device Tag:	
Date: 7/17/2020	LR1	
By: AJ	Job Number: HBR8191	Page # 2/2

Manuf.: PNo: Allen-Bradley: 700HJD32Z24

# Pilot Light Devices 30.5 mm



# Allen-Bradley



800 T - P T 16 G  
a b c d e f g

**a**

Protection Rating	
Code	Description
T	Metal, Type 4/13
H	Plastic, Type 4/4X/13

**b**

Finger-Safe Guards	
Code	Description
Blank	No guards
C	Guards on terminals

**c**

Power Module Type		
800T Type 4/13	Description	800H Type 4/4X/13
Code		Code
P	Transformer (or dual input)	PR
Q	Full voltage/ Universal	QR

**d**

Lamp Test Options	
Code	Description
Blank	No test option
T	Push-to-test
D	Dual input — diode▲
DT	Dual input — transformer relay

**Note:** Push-to-test supplied with factory jumpered contact block.

**e**

Illumination Options	
Code	Description
Blank	Incandescent
H	LED▲

**f**

Voltage	
Transformer	
Code	Description
16	120V AC 50/60 Hz
26	240V AC 50/60 Hz
46	480V AC 50/60 Hz
56	600V AC 50/60 Hz
Full Voltage — Incandescent	
12	12V AC/DC
24	24V AC/DC
48	48V AC/DC
10	120V AC/DC
20	240V AC/DC
Universal — LED	
2	12...130V AC/DC
Dual Input	
16	120V AC
24	24V AC/DC (Dual input diode only)



**g**

Lens Color		
Code	Color	Glass Code ▲
Blank	No lens	Blank
A	Amber	D
B	Blue	E
C	Clear	F
G	Green	H
R	Red	J
W	White	K

32-005-A000

### Specifications\*

Electrical Ratings		
Contact ratings	Refer to the contact ratings tables on page 10-4.	
Dielectric strength	2200V for one minute, 1300V for one minute (Logic Reed)	
Electrical design life cycles	1 000 000 at max. rated load, 200 000 at max. rated load (Logic Reed)	
Mechanical Ratings		
Vibration	10...2000 Hz, 1.52 mm displacement (peak-to-peak) max./ 10 G max. (except Logic Reed)	
Shock	1/2 cycle sine wave for 11 ms ≥ 25 G (contact fragility) and no damage at 100 G	
Degree of protection	Type 1/4/12/13 (800T); Type 1/4/4X/12/13 (800H); EN/IEC 60529 IP66/65	
Mechanical design life cycles		
Push buttons	(Momentary, non-illuminated)	10 000 000 min.
	(Momentary, illuminated)	250 000 min.
	(Push-pull/twist-to-release)	250 000 min.
Selector switches	(Non-illuminated)	1 000 000 min.
	(Illuminated, key-operated)	200 000 min.
Potentiometers	25 000 min.	
All other devices	200 000 min.	
Contact operation	Shallow, mini, and low-voltage contact blocks: Slow, double make and break Logic Reed and sealed switch contact blocks: Single break magnetic	
Wire gauge/Terminal screw torque	#18...14 AWG (#18...10 Max Duty) / 6...8 lb•in	
Typical operating forces		
Operators without contact blocks	Flush, extended button, standard mushroom, jumbo plastic mushroom: 2 lbs max. Jumbo and extended aluminum mushroom head: 3.95 lbs max. Maintained selector switch: 3.6 in•lb max.	
Spring return selector switches	3.6 in•lb to stop, 0.2 in•lb to return	
Illuminated push buttons and push-to-test pilot lights	5 lb max.	
2-position push-pull	8.0 lb max. push or pull	
3-position push-pull	8 lb max. push to in position or pull to center position (15 lb max. pull to out position)	
Twist-to-release or push-pull	9 lbs max. push or pull 30 in•oz max. twist, 6 in•oz minimum return	
Potentiometer	Rotational torque 3...12 in•oz; stopping torque 12 in•lb (minimum)	
Contact blocks	Standard	1 lb
	Logic Reed	1 lb max.
	Sealed switch	3 lb max. at 0.205 in. plunger travel
	Stackable sealed switch	1 lb max.
	MaxDuty	1.4 lb max.
	PenTUFF	1.4 lb max.
Self Monitoring	1.6 lb	
Environment		
Temperature range	Operating	-40...+131 °F (-40...+55 °C)
	Storage	-40...+185 °F (-40...+85 °C)
<b>Note:</b> Operating temperatures below freezing are based on the absence of moisture and liquids. Consult your local Rockwell Automation sales office or Allen-Bradley distributor for use in lower temperature applications.		
Humidity	50...95% RH from 77...140 °F (25...60 °C) per Procedure IV of MIL-STD-810C, Method 507.1 cycling test	

**Certifications**  
 UL Listed  
 (File No. E14840, E10314  
 Guide No. NKCR, NOIV)  
 CSA Certified  
 (File No. LR1234, LR11924)  
 CSA C22.2, No. 14



Rev: 0

Date: 7/17/2020

By: AJ

Device Tag:

LT1

Job Number: HBR8191

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Manuf.: PNo:

Allen-Bradley: 800H-QRTH2W

# Freedom Series Auxiliary Contacts



### Contact Configuration Code

This two-digit code is found on the auxiliary contact to assist in identifying the specific contact configuration. The first digit indicates the quantity of NO contacts and the second indicates the quantity of NC contacts.

### NEMA Sizes 00-2—IEC Sizes A-K

The auxiliary contacts listed on this page are designed for installation on Freedom Series starters and contactors. Snap-on design facilitates quick, easy installation.

These bifurcated design contact blocks, featuring silver cadmium alloy contacts, are well suited for use in very low energy (logic level) circuits.

Side Mounted



Top Mounted



### Side Mounted

1NO	10	C320KGS1
1NC	01	C320KGS2
1NO-1NC	11	C320KGS3
2NO	20	C320KGS4
2NC	02	C320KGS5
1NO-1NCI	N/A	C320KGS6
1NO (EC)-1NC (LO)	N/A	C320KGS7
1NCI	N/A	C320KGS8

### Top Mounted

1NO	10	C320KGT1
1NC	01	C320KGT2
1NO-1NC	11	C320KGT3
2NO	20	C320KGT4
2NC	02	C320KGT5
1NO-1NCI	N/A	C320KGT6
1NO (EC)-1NC (LO)	N/A	C320KGT7
1NCI	N/A	C320KGT8
3NO	30	C320KGT9
2NO-1NC	21	C320KGT10
1NO-2NC	12	C320KGT11
3NC	03	C320KGT12
4NO	40	C320KGT13
3NO-1NC	31	C320KGT14
2NO-2NC	22	C320KGT15
1NO-3NC	13	C320KGT16
4NC	04	C320KGT17
3NO-1NCI	N/A	C320KGT18
2NO-1NCI-1NC	N/A	C320KGT19
2NO-1NO (EC)-1NC (LO)	N/A	C320KGT20
1NO-1NC-1NO (EC)-1NC (LO)	N/A	C320KGT21

### Auxiliary Contact Ratings (Amperes)

#### Ratings—NEMA A600

Current	AC Volts 120V
Make and interrupting	60
Break	6
Continuous	10

UL listed: UL File #E1491, Guide #NLDX—Open and NEMA 1, 4, 12 Enclosed  
CSA Certified: CSA File #LR353, Class #321104  
Open and NEMA 1 Enclosed



22-018-007



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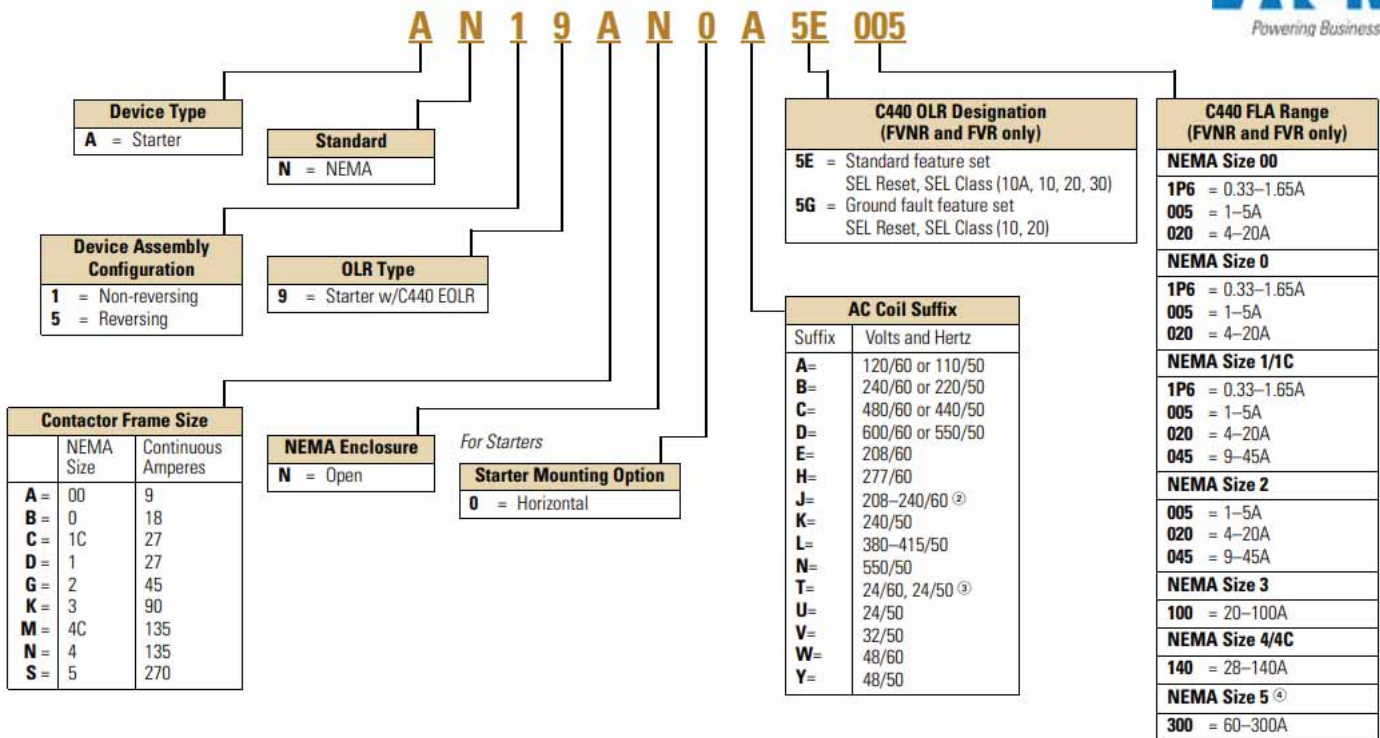
M1-F/R

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Manuf.: PNo:

Cutler-Hammer: C320KGT14



**Type AN19/59 Freedom Series Starters with C440 with Ground Fault Electronic Overload Relays**

**NEMA Starter with Ground Fault**



**Non-Reversing and Reversing**

NEMA Size	Continuous Ampere Rating	Service Limit Current Rating (Amps)	Maximum UL Horsepower						Three-Pole Non-Reversing ①②	Three-Pole Reversing ①②
			Single-Phase		Three-Phase		480V	600V		
			115V	230V	208V	240V			Catalog Number	Catalog Number
00	9	11	1/3	1	1-1/2	1-1/2	2	2	AN19AN0_5G_	AN59AN0_5G_
0	18	21	1	2	3	3	5	5	AN19BN0_5G_	AN59BN0_5G_
1	27	32	2	3	7-1/2	7-1/2	10	10	AN19DN0_5G_	AN59DN0_5G_
2	45	52	3	7-1/2	10	15	25	25	AN19GN0_5G_	AN59GN0_5G_
3	90	104	—	—	25	30	50	50	AN19KN0_5G_	AN59KN0_5G_
4	135	156	—	—	40	50	100	100	AN19NN0_5G_	AN59NN0_5G_
5 ③	270	311	—	—	75	100	200	200	AN19SN0_5G_	AN59SN0_5G_

**Coil Suffix Codes**

Suffix	Coil Volts and Hertz	Suffix	Coil Volts and Hertz
A	120/60 or 110/50	L	380-415/50
B	240/60 or 220/50	N	550/50
C	480/60 or 440/50	T	24/60, 24/50
D	600/60 or 550/50	U	24/50
E	208/60	V	32/50
H	277/60	W	48/60
J	208-240/60	Y	48/50
K	240/50		

**C440 FLA Range (FVNR and FVR Starters Only)**

NEMA Size	OLR Code	FLA Range	OLR Code	FLA Rating
00	1P6	0.33-1.65A	020	4.0-20A
	005	1.0-5.0A	—	—
0	1P6	0.33-1.65A	020	4.0-20A
	005	1.0-5.0A	—	—
1	1P6	0.33-1.65A	020	4.0-20A
	005	1.0-5.0A	045	9.0-45A
2	005	1.0-5.0A	045	9.0-45A
	020	4.0-20A	—	—
3	100	20-100A	—	—
4	140	28-140A	—	—
5 ③	300	60-300A	—	—

**Notes**

- ① Underscore ( \_ ) indicates coils suffix required, see Coil Suffix table above.
- ② Underscore ( \_ ) indicates OLR designation required, see C440 FLA Range table above.
- ③ NEMA Size 5 starter available with 60-300A panel mounted CTs. Starter shipped as an assembled unit with 1-5A C440 overload relay (C440A1A005SELAX or C440A2A005SELAX).

 630-499-7080 · www.elemechinc.com	Rev: 0	Device Tag: M1-F/R	
	Date: 7/17/2020		
Manuf.: . PNo: Cutler-Hammer: AN59DN0A5G1P6	By: AJ	Job Number: HBR8191	Page # 1/1

22-018-077



Bulletin 800T/H  
**30.5 mm Push Buttons**  
 Emergency Stop Operators



**2-Position Red Trigger Action Twist-to-Release, Non-Illuminated**

- Tamper resistant – front-of-panel mounting and non-removable operator head
- Compliant with global E-stop standards, including EN ISO 13850 and EN 60947-5-5



Cat. No. 800T-TFXJET6



Cat. No. 800T-TFXLET6



Cat. No. 800T-TFXK6



Cat. No. 800H-TFRXT6

Contact Type	Operator Position		Type 4/13			Type 4/4X/13
			45 mm Plastic	63 mm Metal	Key Release	45 mm Plastic
No contacts	—	—	Cat. No.* <b>‡</b>	Cat. No.* <b>§</b>	Cat. No.* <b>‡</b>	Cat. No.* <b>‡</b>
1 N.C.	X	O	800T-TFXT6D2	800T-TFXLT6D2	800T-TFXK6D2	800H-TFRXT6D2
1 N.O. - 1 N.C.	O	X	800T-TFXT6A	800T-TFXLT6A	800T-TFXK6A	800H-TFRXT6A
1 S.M.C.B.➤	X	O	800TC-TFXT6D4S	800TC-TFXLT6D4S	800TC-TFXK6D4S	800HC-TFRXT6D4S

**Standards Compliance**

UL 508

CCC

**Certifications**

UL Listed

(File No. E14840, E10314  
 Guide No. NKCR, NOIV)

CSA Certified

(File No. LR1234, LR11924)

CSA C22.2, No. 14

EN/IEC: 60947-5-1

\* For finger-safe contact block terminals, add a **C** to the cat. no. Example: Cat. No. 800TC-TFXT6 or 800HC-TFRXT6.

‡ To order a device with a jumbo (60 mm) plastic head add the letter **J** after **X**. Example: Cat. No. 800T-TFXJT6A or 800H-TFRXT6A.

§ To order a jumbo head device with "E-STOP" printed on the cap add the letters **JE** after **X**. Example: Cat. No. 800T-TFXJET6 or 800H-TFRXT6A.

➤ To order a device with "E-STOP" engraved on the cap add the letter **E** after **L**. Example: Cat. No. 800TC-TFXLET6D4S.

‡ Provided with two DO18 keys.

➤ Self-monitoring contact block.



Protection Rating	
Code	Description
T	Metal, Type 4/13
H	Plastic, Type 4/4X/13

Finger-Safe Guards	
Code	Description
Blank	No guards
C	Guards on terminals

Head Type‡		
800T Type 4/13	Description	800H Type 4/4X/13
Code		Code
FX	Standard (45 mm) mushroom head	FRX
FXJ	Jumbo (60 mm) mushroom head	FRXJ
FXJE	Jumbo (60 mm) mushroom head with "E-STOP"	FRXJE
FXK	45 mm mushroom head key release	—
FXL	63 mm anodized aluminum head	—
FXLE	63 mm anodized aluminum head with "E-STOP"	—

Release Function	
Code	Color
Blank	Key release‡
T	Twice release

**Note:** X = Closed/O = Open

‡ Configurable only with **FXK** head type.

Contact Block(s)			
Code	Operator Position		Description
Blank	—	—	No contacts on operator
<b>Standard</b>			
D1	O	X	1 N.O.
D2	X	O	1 N.C.
D4	X	O	1 N.C.L.B.
A	O	X	1 N.O. - 1 N.C.
A1	O	X	1 N.O. - 1 N.C.L.B.
A5	X	O	2 N.C.L.B.
<b>PenTUFF (Low Voltage)</b>			
D1V	O	X	1 N.O.
D2V	X	O	1 N.C.
D4V	X	O	1 N.C.L.B.
AV	O	X	1 N.O. - 1 N.C.
<b>Class 1, Div. 2/Zone 2</b>			
<b>Logic Reed</b>			
D1R	O	X	1 N.O.
D2R	X	O	1 N.C.
AR	O	X	1 N.O. - 1 N.C.
<b>Sealed Switch</b>			
D1P	O	X	1 N.O.
D2P	X	O	1 N.C.
AP	O	X	1 N.O.
	X	O	1 N.C.
<b>Stackable Sealed Switch</b>			
D1Y	O	X	1 N.O.
D2Y	X	O	1 N.C.
AY	O	X	1 N.O. - 1 N.C.
	X	O	



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Manuf.: PNO: Allen-Bradley: 800H-TFRXT6D2

29-005-117

# 30.5 mm Push Buttons



# Allen-Bradley

800 T - A 1 A

*a*     *b*     *c*     *d*     *e*     *f*

Protection Rating	
Code	Description
T	Metal, Type 4/13
H	Plastic, Type 4/4X/13

Finger-Safe Guards	
Code	Description
Blank	No guards
C	Guards on terminals

Operator Type		
800T Type 4/13	Description	800H Type 4/4X/13
Code		Code
A	Flush head	AR
B	Extended head	BR
D	Mushroom head	DR
DX	Mushroom head less color cap	DRX
—	Bootless guarded head	GR
—	Booted head	R+

Color Cap	
Code	Description
Blank	Used only when ordering Operator Type DX/DRX
1	Green
2	Black
3	Orange*

Color Cap	
Code	Description
4	Grey*
5	White*
6	Red
7	Blue
9	Yellow

Special Mushroom Head	
Code	Description
J§	Jumbo mushroom head — plastic
L§	Jumbo mushroom head — metal

**Note:** Special mushroom head options only apply to mushroom head operator type code D/DR (Table c).

Contact Block(s)	
Code	Description
Blank	No contacts
Standard	
D1	1 N.O.
D2	1 N.C.
D3	1 N.O.E.M.
D4	1 N.C.L.B.
D5	1 N.O. (Mini)
D6	1 N.C. (Mini)
A1	1 N.C.L.B. - 1 N.O.
A2	2 N.O.†
A4	2 N.C.
A7	1 N.C.L.B. - 1 N.C.
A	1 N.O. - 1 N.C.
B	2 N.O. - 2 N.C.



### Certifications

UL Listed  
(File No. E14840, E10314  
Guide No. NKCR, NOIV)

CSA Certified  
(File No. LR1234, LR11924)

CSA C22.2, No. 14

29-005-002

### Specifications+

Electrical Ratings	
Contact ratings	Refer to the contact ratings tables on page 10-4.
Dielectric strength	2200V for one minute, 1300V for one minute (Logic Reed)
Electrical design life cycles	1 000 000 at max. rated load, 200 000 at max. rated load (Logic Reed)
Mechanical Ratings	
Vibration	10...2000 Hz, 1.52 mm displacement (peak-to-peak) max / 10 G max. (except Logic Reed)
Shock	1/2 cycle sine wave for 11 ms ≥ 25 G (contact fragility) and no damage at 100 G
Degree of protection	Type 1/4/12/13 (800T); Type 1/4/4X/12/13 (800H); EN/IEC 60529 IP66/65
Mechanical design life cycles	
Push buttons	(Momentary, non-illuminated) 10 000 000 min. (Momentary, illuminated) 250 000 min. (Push-pull/twist-to-release) 250 000 min.
Selector switches	(Non-illuminated) 1 000 000 min. (Illuminated, key-operated) 200 000 min.
Potentiometers	25 000 min.
All other devices	200 000 min.
Contact operation	Shallow, mini, and low-voltage contact blocks: Slow, double make and break Logic Reed and sealed switch contact blocks: Single break magnetic
Wire gauge/Terminal screw torque	#18...14 AWG (#18...10 Max Duty) / 6...8 lb•in
Typical operating forces	
Operators without contact blocks	Flush, extended button, standard mushroom, jumbo plastic mushroom: 2 lbs max. Jumbo and extended aluminum mushroom head: 3.95 lbs max. Maintained selector switch: 3.6 in•lb max.
Spring return selector switches	3.6 in•lb to stop, 0.2 in•lb to return
Illuminated push buttons and push-to-test pilot lights	5 lb max.
2-position push-pull	8.0 lb max. push or pull
3-position push-pull	8 lb max. push to in position or pull to center position (15 lb max. pull to out position)
Twist-to-release or push-pull	9 lbs max. push or pull 30 in•oz max. twist, 6 in•oz minimum return
Potentiometer	Rotational torque 3...12 in•oz; stopping torque 12 in•lb (minimum)
Contact blocks	Standard 1 lb Logic Reed 1 lb max. Sealed switch 3 lb max. at 0.205 in. plunger travel Stackable sealed switch 1 lb max. MaxDuty 1.4 lb max. PenTUFF 1.4 lb max. Self Monitoring 1.6 lb
Environment	
Temperature range	Operating -40...+131 °F (-40...+55 °C) Storage -40...+185 °F (-40...+85 °C)
<b>Note:</b> Operating temperatures below freezing are based on the absence of moisture and liquids. Consult your local Rockwell Automation sales office or Allen-Bradley distributor for use in lower temperature applications.	
Humidity	50...95% RH from 77...140 °F (25...60 °C) per Procedure IV of MIL-STD-810C, Method 507.1 cycling test



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Manuf.: . PNo: Allen-Bradley: 800H-AR2D1

**RM22TR33**

 Modular 3-phase control relay, 8 A, 2 CO,  
380...480 V AC

**Main**

Range of product	Zelio Control
Product or component type	Modular measurement and control relays
Relay type	Control relay
Phase	3 phase
Relay name	RM22TR
Relay monitored parameters	Overvoltage and undervoltage detection Phase sequence Phase failure detection
Time delay type	Adjustable 0.1...30 s, +/- 10 % of the full scale value on crossing the threshold Tt
Switching capacity in VA	2000 VA
Measurement range	380...480 V voltage AC

**Complementary**

Reset time	1500 ms at maximum voltage
Maximum switching voltage	250 V AC
Minimum switching current	10 mA 5 V DC
Maximum switching current	8 A AC
[Us] rated supply voltage	380...480 V AC
Supply voltage limits	304...576 V AC
Operating limits	- 20 % + 20 % Un
Power consumption in VA	15 VA 480 V AC 60 Hz
Voltage detection threshold	< 100 V AC
Supply voltage frequency	50...60 Hz +/- 10 %
Output contacts	2 C/O
Nominal output current	8 A
Setting accuracy of the switching threshold	+/- 10 % of the full scale
Setting accuracy of time delay	10 P
Time delay drift	<= 0.05 % per degree centigrade depending permissible ambient air temperature <= 1 % within the supply voltage range
Hysteresis	2 % fixed selectable
Run-up delay at power-up	650 ms
Maximum measuring cycle	150 ms measurement cycle as true rms value
Threshold adjustment voltage	2...20 % of Un selected
Voltage range	380...480 V phase to phase
Repeat accuracy	+/- 0.5 % input and measurement circuit +/- 3 % time delay
Measurement error	< 1 % over the whole range with voltage variation < 0.05 %/°C with temperature variation
Response time	<= 300 ms
Overvoltage category	III IEC 60664-1 III UL 508
Insulation resistance	> 100 MOhm 500 V DC IEC 60255-27
Mounting position	Any position
Connections - terminals	Screw terminals, 2 x 0.5...2 x 2.5 mm <sup>2</sup> AWG 20...AWG 14) solid without cable end Screw terminals, 2 x 0.2...2 x 1.5 mm <sup>2</sup> AWG 24...AWG 16) flexible with cable end Screw terminals, 1 x 0.5...1 x 3.3 mm <sup>2</sup> AWG 20...AWG 12) solid without cable end Screw terminals, 1 x 0.2...1 x 2.5 mm <sup>2</sup> AWG 24...AWG 14) flexible with cable end
Tightening torque	5.31...8.85 lbf.in (0.6...1 N.m) IEC 60947-1



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Telemecanique: RM22TR33

Housing material	Self-extinguishing plastic
Status LED	Relay ON LED Yellow) Power ON LED Green)
Mounting support	35 mm DIN rail EN/IEC 60715
Electrical durability	100000 cycles
Mechanical durability	10000000 cycles
Utilisation category	AC-15 IEC 60947-5-1 DC-13 IEC 60947-5-1 AC-1 IEC 60947-4-1 DC-1 IEC 60947-4-1
Safety reliability data	MTTFd = 388.1 years B10d = 350000
Contacts material	Cadmium free
Maximum Width	0.89 in (22.5 mm)
Net Weight	0.20 lb(US) (0.09 kg)

**Environment**

Immunity to microbreaks	10 ms
Electromagnetic compatibility	Immunity for residential, commercial and light-industrial environments EN/IEC 61000-6-1 Immunity for industrial environments EN/IEC 61000-6-2 Emission standard for residential, commercial and light-industrial environments EN/IEC 61000-6-3 Emission standard for industrial environments EN/IEC 61000-6-4 Electrostatic discharge 6 kV contact discharge)level 3 IEC 61000-4-2 Electrostatic discharge 8 kV air discharge)level 3 IEC 61000-4-2 Radiated radio-frequency electromagnetic field immunity test 10 V/mlevel 3 IEC 61000-4-3 Electrical fast transient/burst immunity test 4 kV direct)level 4 IEC 61000-4-4 Electrical fast transient/burst immunity test 2 kV capacitive coupling)level 4 IEC 61000-4-4 Surge immunity test 4 kV common mode)level 4 IEC 61000-4-5 Surge immunity test 2 kV differential mode)level 4 IEC 61000-4-5 Conducted and radiated emissionsclass B group 1 CISPR 11 Conducted and radiated emissionsclass B CISPR 22
Standards	EN/IEC 60255-1
Product certifications	CSA CCC EAC China RoHS RCM CE GL UL
Ambient air temperature for storage	-40...158 °F (-40...70 °C)
Ambient air temperature for operation	-4...122 °F (-20...50 °C) 60 Hz -4...140 °F (-20...60 °C) 50 Hz AC/DC
Relative humidity	93...97 % 77...131 °F (25...55 °C) IEC 60068-2-30
Vibration resistance	0.075 mm 10...58.1 Hz) not in operation IEC 60068-2-6 1 gn 10...58.1 Hz) not in operation IEC 60068-2-6 0.035 mm 58.1...150 Hz) in operation IEC 60068-2-6 0.5 gn 58.1...150 Hz) in operation IEC 60068-2-6
Shock resistance	15 gn 11 ms) not in operation IEC 60068-2-27 5 gn 11 ms) in operation IEC 60068-2-27
IP degree of protection	IP20 IEC 60529 terminals) IP40 IEC 60529 housing) IP50 IEC 60529 front panel)
Pollution degree	3 IEC 60664-1 3 UL 508
Dielectric test voltage	2.5 kV AC 50 Hz, 1 min IEC 60255-27

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Telemecanique: RM22TR33			

# LED LIGHT KIT



54-035-006

LED light kits provide interior enclosure lighting. These light kits are ideal for remote and darkened enclosure applications. The light can be mechanically fastened with included hardware to maintain enclosure UL listing (up to Type 4X), or can be magnetically attached to flat steel surfaces. The lights have auto-sensing circuitry (AC voltage 90 VAC to 260 VAC and DC voltage 20 VDC to 60 VDC). LED lights are light-weight and in a small form factor while providing 900 LM of 6500K light. Power consumption for all models is 5 watts.



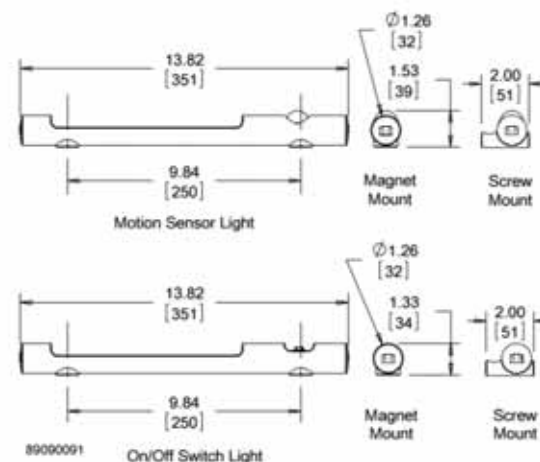
Catalog Number	AxBxC in./mm	Weight (oz)	Weight (gml)	Mounting Style	Power Source	Activation	Voltage
LEDA1M35	1.34 x 1.26 x 13.82 34 x 32 x 351	4.8	135	Magnetic	AC	On/off switch	90 VAC-260 VAC
LEDA2M35	1.54 x 1.26 x 13.82 39 x 32 x 351	5.0	140	Magnetic	AC	IR Motion Sensor	90 VAC-260 VAC
LEDA1S35	1.42 x 2.05 x 13.82 36 x 52 x 351	4.8	135	Screw	AC	On/off switch	90 VAC-260 VAC
LEDA2S35	1.63 x 2.05 x 13.82 41 x 52 x 351	5.0	140	Screw	AC	IR Motion Sensor	90 VAC-260 VAC
LEDD1M35	1.34 x 1.26 x 13.82 34 x 32 x 351	4.8	135	Magnetic	DC	On/off switch	20 VDC-60 VDC
LEDD2M35	1.54 x 1.26 x 13.82 39 x 32 x 351	5.0	140	Magnetic	DC	IR Motion Sensor	20 VDC-60 VDC
LEDD1S35	1.42 x 2.05 x 13.82 36 x 52 x 351	4.8	135	Screw	DC	On/off switch	20 VDC-60 VDC
LEDD2S35	1.63 x 2.05 x 13.82 41 x 52 x 351	5.0	140	Screw	DC	IR Motion Sensor	20 VDC-60 VDC

# LED LIGHT INPUT CONNECTOR/CABLE ASSEMBLY



The input connector/cable assembly is used to provide supply power to the LED light. Pre-assembled connector/cable assembly with

Catalog Number	A in./mm	Power Source	Use with
LEDA20C	78.74 2000	AC	AC LED Lights
LEDD20C	78.74 2000	DC	DC LED Lights



UL 508A Component Recognized; File No. E234324  
cUL Component Recognized per CSA C22.2 No 14; File No. E234324



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Device Tag: PL1,2  
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Manuf.: . PNo: Hoffman: LEDA1S35

**Table 35 - Technical Specifications - 1769-IQ16**

Attribute	1769-IQ16
Inputs	16 (8 points/group)
Voltage category	24V DC sink/source
Operating voltage range	10...30V DC @ 30 °C (86 °F) 10...26.4V DC @ 60 °C (140 °F)
Input delay, on	8 ms
Input delay, off	8 ms
Current draw @ 5.1V	115 mA
Heat dissipation, max	3.55 W
Off-state voltage, max	5V DC
Off-state current, max	1.5 mA
On-state voltage, min	10V DC
On-state current, min	2 mA
Inrush current, max	250 mA
Input impedance, nom	3 kΩ
Isolation voltage	Verified by one of the following dielectric tests: 1200V AC for 1 s or 1697V DC for 1 s, input point to bus and group to group 75V DC working voltage (IEC Class 2 reinforced insulation)
Weight, approx	270 g (0.60 lb)
Dimensions (HxWxD), approx	118 x 35 x 87 mm (4.65 x 1.38 x 3.43 in.) Height with mounting tabs 138 mm (5.43 in.)
Slot width	1

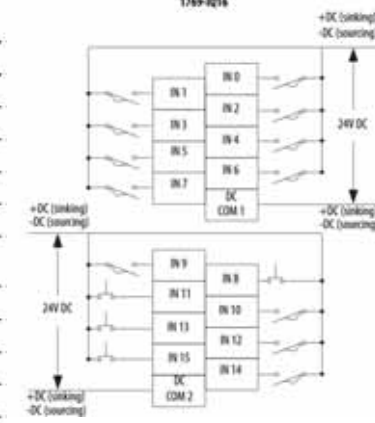


33-005-044

**1769-IQ16**

Compact 24V DC sink/source input module

1769-IQ16



**Table 35 - Technical Specifications - 1769-IQ16**

Attribute	1769-IQ16
Module location	DIN rail or panel mount
Power supply	1769-PA2, 1769-PB2, 1769-PA4, 1769-PB4
Power supply distance rating	8 modules
Terminal screw torque	0.68 N•m (6 lb•in)
Retaining screw torque	0.46 N•m (4.1 lb•in)
Wire size	(22...14 AWG) solid (22...16 AWG) stranded
Wire type	Cu-90 °C (194 °F)
IEC input compatibility	Type 1+
Replacement terminal block	1769-RTBN18 (1 per kit)
Replacement door label	1769-RL1 (2 per kit)
Replacement door	1769-RD (2 per kit)
Vendor ID code	1
Product type code	7
Product code	67
Enclosure type rating	None (open-style)

**Table 36 - Certifications - 1769-IQ16**

Certification <sup>(1)</sup>	1769-IQ16
c-UL	C-UL certified (under CSA C22.2 No. 142) UL 508 listed Class I, Division 2 Group A,B,C,D Hazardous Locations (UL 1604, C-UL under CSA C22.2 No. 213)
CE	CE compliant for all applicable directives
C-Tick	Australian Radiocommunications Act, compliant with: • AS/NZS CISPR 11; Industrial Enclosure

(1) When marked. See the Product Certification link at <http://www.rockwellautomation.com/global/certification/overview.page> for Declarations of Conformity, Certificates, and other certification details.

 630-499-7080 · www.elemechinc.com	Rev: 0	Device Tag:	
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Manuf.: . PNo: Allen-Bradley: 1769-IQ16	By: AJ	Job Number: HBR8191	Page # 1/1

# Compact 1769-OF4CI Isolated Analog Output Module

**Allen-Bradley**



## General Specifications

Specification	Value
Dimensions	118 mm (height) x 87 mm (depth) x 35 mm (width) height including mounting tabs is 138 mm  4.65 in. (height) x 3.43 in (depth) x 1.38 in (width) height including mounting tabs is 5.43 in.
Approximate Shipping Weight (with carton)	270g (0.6 lbs.)
Storage Temperature	-40°C to +85°C (-40°F to +185°F)
Operating Temperature	0°C to +60°C (32°F to +140°F)
Operating Humidity	5% to 95% non-condensing
Operating Altitude	2000 meters (6561 feet)
Vibration	Operating: 10 to 500 Hz, 5G, 0.030 in. peak-to-peak
Shock	Operating: 30G, 11 ms panel mounted (20G, 11 ms DIN rail mounted)  Non-Operating: 40G panel mounted (30G DIN rail mounted)
Agency Certification	<ul style="list-style-type: none"> <li>• C-UL certified (under CSA C22.2 No. 142)</li> <li>• UL 508 listed</li> <li>• CE compliant for all applicable directives</li> </ul>
Hazardous Environment Class	Class I, Division 2, Hazardous Location, Groups A, B, C, D (UL 1604, C-UL under CSA C22.2 No. 213)
Radiated and Conducted Emissions	EN50081-2 Class A
<i>Electrical /EMC:</i>	<i>The module has passed testing at the following levels:</i>
• ESD Immunity (IEC1000-4-2)	• 4 kV contact, 8 kV air, 4 kV indirect
• Radiated Immunity (IEC1000-4-3)	• 10 V/m, 80 to 1000 MHz, 80% amplitude modulation
• Fast Transient Burst (IEC1000-4-4)	• 2 kV, 5 kHz
• Surge Immunity (IEC1000-4-5)	• 1 kV galvanic gun
• Conducted Immunity (IEC1000-4-6)	• 10V dc, 0.15 to 80 MHz <sup>(1)</sup>



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33-005-108

# Output Specifications

Specification	1769-OF4CI
Analog Normal Operating Ranges <sup>(1)</sup>	0 to 20 mA, 4 to 20 mA
Full Scale Analog Ranges <sup>(1)</sup>	0 to 21 mA, 3.2 to 21 mA
Number of Outputs	4 isolated differential
Bus Current Draw (max.)	145 mA at 5V dc 140 mA at 24V dc
Heat Dissipation	2.68 Total Watts ( <i>All points - 21 mA into 250Ω - worst case calculated.</i> )
Digital Resolution Across Full Range	16 bits (unipolar)  +4 to +20 mA: 15.59 bits, 0.323 μA/bit 0 to +20 mA: 15.91 bits, 0.323 μA/bit
Conversion Rate (all channels) max.	110 ms
Step Response to 63% <sup>(2)</sup>	<2.9 ms
Resistive Load on Current Output	0 to 500 Ω (includes wire resistance)
Max. Inductive Load	0.1 mH
Field Calibration	None required
Overall Accuracy <sup>(3)</sup>	±0.35% full scale at 25°C



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# Compact™ 16-Point AC/DC Relay Output Module

Allen-Bradley

(Catalog Number 1769-OW16)



33-005-129

## Output Specifications

Specification	1769-OW16
Voltage Category	AC/DC normally open relay
Operating Voltage Range	5 to 265V ac 5 to 125V dc
Number of Outputs	16
Bus Current Draw (max.)	205 mA at 5V dc line 180 mA at 24V dc line
Heat Dissipation	4.75 Total Watts <i>(The Watts per point, plus the minimum Watts, with all points energized.)</i>
Signal Delay (max.) – resistive load	turn-on = 10 ms turn-off = 10 ms
Off-State Leakage (max.)	0 mA
On-State Current (min.)	10 mA at 5V dc
Continuous Current per Point (max.)	2.5A (Also see "Relay Contact Ratings" on page 16.)
Continuous Current per Common (max.)	10A
Continuous Current per Module (max.)	20A
Power Supply Distance Rating	8 (The module may not be more than 8 modules away from the power supply.)
Output Point to Bus Isolation	Verified by one of the following dielectric tests: 1836V ac for 1 sec. or 2596V dc for 2 sec. 265V ac working voltage (IEC Class 2 reinforced insulation)
Isolated Groups	Group 1: outputs 0 to 7 Group 2: outputs 8 to 15
Output Group to Output Group Isolation	Verified by one of the following dielectric tests: 1836V ac for 2 sec. or 2596V dc for 2 sec. 265V ac working voltage (basic insulation) 150V ac working voltage (IEC Class 2 reinforced insulation)
Vendor I.D. Code	1
Product Type Code	7
Product Code	85



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## General Specifications

Specification	Value
Dimensions	118 mm (height) x 87 mm (depth) x 52.5 mm (width) height including mounting tabs is 138 mm 4.65 in. (height) x 3.43 in (depth) x 2.07 in (width) height including mounting tabs is 5.43 in.
Approximate Shipping Weight (with carton)	450g (0.99 lbs.)
Storage Temperature	-40°C to +85°C (-40°F to +185°F)
Operating Temperature	0°C to +60°C (32°F to +140°F)
Operating Humidity	5% to 95% non-condensing
Operating Altitude	2000 meters (6561 feet) <sup>(1)</sup>
Vibration	Operating: 10 to 500 Hz, 5G, 0.030 inches maximum peak-to-peak Relay Operation: 2.0G
Shock	Operating: 30G panel mounted (20G DIN rail mounted) Relay Operation: 10G panel mounted (5G DIN rail mounted) Non-Operating: 40G panel mounted (30G DIN rail mounted)
Agency Certification	<ul style="list-style-type: none"> <li>• C-UL certified (under CSA C22.2 No. 142)</li> <li>• UL 508 listed</li> <li>• CE and C-Tick compliant for all applicable directives</li> </ul>
Hazardous Environment Class	Class I, Division 2, Hazardous Location, Groups A, B, C, D (UL 1604, C-UL under CSA C22.2 No. 213)
Radiated and Conducted Emissions	EN50081-2 Class A
<i>Electrical /EMC:</i>	<i>The module has passed testing at the following levels:</i>
ESD Immunity (IEC61000-4-2)	<ul style="list-style-type: none"> <li>• 4kV contact, 8 kV air, 4 kV indirect</li> </ul>
Radiated Immunity (IEC61000-4-3)	<ul style="list-style-type: none"> <li>• 10 V/m, 80 to 1000 MHz, 80% amplitude modulation, +900 MHz keyed carrier</li> </ul>
Fast Transient Burst (IEC61000-4-4)	<ul style="list-style-type: none"> <li>• 2 kV, 5 kHz</li> </ul>
Surge Immunity (IEC61000-4-5)	<ul style="list-style-type: none"> <li>• 2 kV common mode, 1 kV differential mode</li> </ul>
Conducted Immunity (IEC61000-4-6)	<ul style="list-style-type: none"> <li>• 10V, 0.15 to 80 MHz<sup>(2)</sup></li> </ul>

(1) For operation above 2000 meters, consult the factory.

(2) Conducted Immunity frequency range may be 150 kHz to 30 MHz if the Radiated Immunity frequency range is 30 MHz to 1000 MHz.



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Allen-Bradley: 1769-OW16

# Compact I/O Expansion Power Supplies

**Allen-Bradley**

Catalog Numbers 1769-PA2, 1769-PB2, 1769-PA4,  
1769-PB4



## 1769-PA2, 1769-PB2, 1769-PA4, 1769-PB4 - Technical Specifications

Attribute	1769-PA2	1769-PB2	1769-PA4	1769-PB4
Input voltage range	85...265V AC	19.2...31.2V DC	85...132V AC or 170...265V AC, switch selectable	19.2...32V DC
Input frequency range	47...63 Hz	N/A	47...63 Hz	N/A
Power supply distance rating <sup>(1)</sup>	8 (8 I/O modules can be connected on either side of the power supply for a maximum of 16 modules.)			
Operating altitude	2000 m (6562 ft)			
Isolation voltage	265V (continuous), Reinforced Insulation Type (IEC Class 1 grounding required)  Routine tested at 2596V DC for 1s, AC Power Input to System and AC Power Input to 24V DC User Power	75V (continuous), Reinforced Insulation Type (IEC Class 1 grounding required)  Routine tested at 1697V DC for 1s, DC Power Input to System	265V (continuous), Reinforced Insulation Type (IEC Class 1 grounding required)  Routine tested at 2596V DC for 1s, AC Power Input to System	75V (continuous), Reinforced Insulation Type (IEC Class 1 grounding required)  Routine tested at 1697V DC for 1s, DC Power Input to System
Power consumption	100 VA @ 120V AC 130 VA @ 240V AC	50 VA @ 24V DC	200 VA @ 120V AC 240 VA @ 240V AC	100 VA @ 24V DC
Power dissipation	8 W @ 60 °C	7.5 W @ 60 °C	18 W @ 60 °C	14.5 W @ 60 °C
Current capacity at 5V	2.0 A	2.0 A	4.0 A	4.0 A
Current capacity at 24V	0.8 A	0.8 A	2.0 A	2.0 A
Inrush current, max	25 A @ 132V AC	30 A @ 31.2V DC	25 A @ 132V AC	30 A @ 31.2V DC
Fuse type	Wickmann 19195-3.15A Littelfuse 02183.15MXP	Wickmann 19193-6.3A Littelfuse 021706.3MXP	Wickmann 19195-3.15A Littelfuse 02183.15MXP	Wickmann 19193-6.3A Littelfuse 021706.3MXP
Dimensions (HxWxD), approx.	118 x 70 x 87 mm (4.65 x 2.76 x 3.43 in.) height including mounting tabs is 138 mm (5.43 in.)			
Shipping weight, approx	525 g (1.16 lb)		630 g (1.39 lb)	
Wiring category <sup>(2)</sup>	1 on power ports	2 on power ports	1 on power ports	2 on power ports

Certification <sup>(1)</sup>	1769-PA2, 1769-PA4	1769-PB2, 1769-PB4
c-UL-us	UL Listed for Class 1, Division 2 Group A,B,C,D Hazardous Locations, certified for U.S. and Canada. See UL File E10314	



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Manuf.: . PNo: Allen-Bradley: 1769-PB2

33-005-140

# Compact I/O Isolated Analog Modules

1769-IF4I

## General Specifications for 1769-IF4I, -OF4CI, and -OF4VI Modules

**Table A.1 General Specifications**

Specification	Value
Dimensions (HxDxW)	118 mm x 87 mm x 35 mm (4.65 in. x 3.43 in. x 1.38 in.) Height including mounting tabs 138 mm (5.43 in.)
Approximate Shipping Weight (with carton)	300 g (0.65 lb)
Storage Temperature	-40...+85 °C (-40...+185 °F)
Operating Temperature	0...+60 °C (+32...+140 °F)
Operating Humidity	5...95% noncondensing
Operating Altitude	2000 m (6561 ft)
Vibration, Operating	10...500 Hz, 5 g, 0.030 in. peak-to-peak
Vibration, Relay Operation	2 g
Shock, Operating	30 g, 11 ms panel mounted (20 g, 11 ms DIN-rail mounted)
Shock, Relay Operation	7.5 g panel mounted (5 g DIN-rail mounted)
Shock, Nonoperating	40 g panel mounted (30 g DIN-rail mounted)
System Power Supply Distance Rating	8 (The module may not be more than 8 modules away from a system power supply.)
Recommended Cable	Belden 8761 (shielded)
Max Cable Length	1769-IF4I: See Effect of Transducer/Sensor and Cable Length Impedance on Voltage Input Accuracy on page 2-11. 1769-OF4CI and -OF4VI: See Effect of Device and Cable Output Impedance on Output Module Accuracy on page 2-13.
Agency Certification	<ul style="list-style-type: none"> <li>• C-UL certified (under CSA C22.2 No. 142)</li> <li>• UL 508 listed</li> <li>• CE compliant for all applicable directives</li> </ul>
Hazardous Environment Class	Class I, Division 2, Hazardous Location, Groups A, B, C, D (UL 1604, C-UL under CSA C22.2 No. 213)
Radiated and Conducted Emissions	EN50081-2 Class A
Specification	Value
Electrical /EMC:	The module has passed testing at the following levels:
<ul style="list-style-type: none"> <li>• ESD Immunity (IEC1000-4-2)</li> </ul>	<ul style="list-style-type: none"> <li>• 4 kV contact, 8 kV air, 4 kV indirect</li> </ul>
<ul style="list-style-type: none"> <li>• Radiated Immunity (IEC1000-4-3)</li> </ul>	<ul style="list-style-type: none"> <li>• 10V/m, 80...1000 MHz, 80% amplitude modulation</li> </ul>
<ul style="list-style-type: none"> <li>• Fast Transient Burst (IEC1000-4-4)</li> </ul>	<ul style="list-style-type: none"> <li>• 2 kV, 5 kHz</li> </ul>
<ul style="list-style-type: none"> <li>• Surge Immunity (IEC1000-4-5)</li> </ul>	<ul style="list-style-type: none"> <li>• 1 kV galvanic gun</li> </ul>
<ul style="list-style-type: none"> <li>• Conducted Immunity (IEC1000-4-6)</li> </ul>	<ul style="list-style-type: none"> <li>• 10V, 0.15...80 MHz<sup>(1)</sup></li> </ul>

<sup>(1)</sup> Conducted Immunity frequency range may be 150 kHz...30 MHz if the Radiated Immunity frequency range is 30...1000 MHz.



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# 1769-IF4I Input Specifications

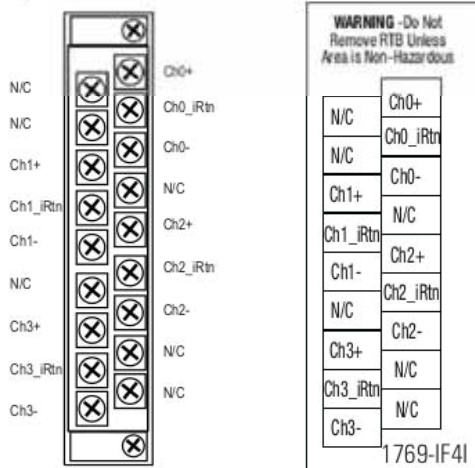
**Table A.2 1769-IF4I Specifications**

Specification	1769-IF4I
Analog Normal Operating Ranges <sup>(1)</sup>	Voltage: ± 10V dc, 0...10V dc, 0...5V dc, 1...5V dc Current: 0...20 mA, 4...20 mA
Full Scale Analog Ranges <sup>(1)</sup>	Voltage: ± 10.5V dc, 0...10.5V dc, 0...5.25V dc, 0.5...5.25V dc Current: 0...21 mA, 3.2...21 mA
Number of Inputs	4 isolated differential
Bus Current Draw, Max	145 mA at 5V dc 125 mA at 24V dc
Heat Dissipation	3.0 total W (The W per point, plus the min W, with all points energized.)
Converter Type	Delta Sigma
Response Speed per Channel	Input filter and configuration dependent. See Filter Frequency and Update Times on page 3-9.
Resolution, Max <sup>(2)</sup>	16 bits (unipolar) 15 bits plus sign (bipolar)
Rated Working Voltage <sup>(3)</sup>	30V ac/30V dc
Common Mode Rejection	Greater than 60 dB at 50 and 60 Hz with the 10 Hz filter selected, respectively.
Normal Mode Rejection Ratio	-50 dB at 50 and 60 Hz with the 10 Hz filter selected, respectively.
Input Impedance	Voltage Terminal: 1 MΩ (typical) Current Terminal: 249 Ω
Overall Accuracy <sup>(4)</sup>	Voltage Terminal: ±0.2% full scale at 25 °C Current Terminal: ±0.35% full scale at 25 °C

- (1) The over- or under-range flag will come on when the normal operating range (over/under) is exceeded. The module will continue to convert the analog input up to the maximum full scale range. The flag automatically resets when within the normal operating range.
- (2) Resolution is dependent upon your filter selection. The maximum resolution is achieved with the 10 Hz filter selected.
- (3) Rated working voltage is the maximum continuous voltage that can be applied at the input terminal, including the input signal and the value that floats above ground potential (for example, 10V dc input signal and 20V dc potential above ground).
- (4) Includes offset, gain, non-linearity and repeatability error terms.

## Analog Input Module Wiring

**Figure 2.9 1769-IF4I Terminal Layout**



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# CompactLogix 5370 L3 Controllers

Catalog Numbers 1769-L30ER, 1769-L30ERM, 1769-L30ER-NSE, 1769-L33ER, 1769-L33ERM, 1769-L36ERM

33-005-201

## CompactLogix 5370 L3 Controllers

In a CompactLogix 5370 L3 controller system, the 1769 I/O modules can be placed to the left and the right of the power supply. As many as eight modules can be placed on each side of the power supply. The CompactLogix 5370 L3 controller comes with:

- dual EtherNet/IP ports for ring topologies.
- USB port for firmware download and programming.

Characteristic	1769-L30ER	1769-L30ERM	1769-L30ER-NSE	1769-L33ER	1769-L33ERM	1769-L36ERM
Available user memory	1 MB	1 MB	1 MB No capacitor	2 MB	2 MB	3 MB
Memory card	1784-SD1 (1 GB), shipped with controller 1784-SD2 (2 GB)					
Communication ports	<ul style="list-style-type: none"> <li>• 2 EtherNet/IP</li> <li>• 1 USB</li> </ul>					
EtherNet/IP connections	<ul style="list-style-type: none"> <li>• 256 EtherNet/IP</li> <li>• 120 TCP</li> </ul>	<ul style="list-style-type: none"> <li>• 256 EtherNet/IP</li> <li>• 120 TCP</li> </ul>	<ul style="list-style-type: none"> <li>• 256 EtherNet/IP</li> <li>• 120 TCP</li> </ul>	<ul style="list-style-type: none"> <li>• 256 EtherNet/IP</li> <li>• 120 TCP</li> </ul>	<ul style="list-style-type: none"> <li>• 256 EtherNet/IP</li> <li>• 120 TCP</li> </ul>	<ul style="list-style-type: none"> <li>• 256 EtherNet/IP</li> <li>• 120 TCP</li> </ul>
EtherNet/IP nodes in one Logix Designer application, max	16			32		48
Integrated motion on an EtherNet/IP network	—	Supports up to 4 axes	—	—	Supports up to 8 axes	Supports up to 16 axes
Module expansion capacity	8 1769 modules 1 bank of modules			16 1769 modules 2 banks of modules		30 1769 modules 3 banks of modules
Battery	None					
Power supply distance rating	4 modules			4 modules		4 modules
Programming software support	<ul style="list-style-type: none"> <li>• RSLogix 5000 software, version 20 - For controllers that use firmware revision 20.xxx.</li> <li>• Logix Designer application, version 21 or later - For controllers that use firmware revision 21.xxx or later.</li> </ul>					

These controllers replace previous catalog numbers.

New Controller <sup>(1)</sup>	Replaces Previous Controller <sup>(2)</sup>	Differences
1769-L30ER	1769-L31	<ul style="list-style-type: none"> <li>• Additional memory</li> <li>• Integrated motion on EtherNet/IP support (1769-L30ERM, 1769-L33ERM, 1769-L36ERM)</li> <li>• USB port instead of RS-232 port</li> <li>• Dual-port EtherNet/IP support</li> <li>• SD card instead of CompactFlash card</li> </ul>
1769-L30ERM	1769-L32C <sup>(3)</sup>	
1769-L30ER-NSE	1769-L32E	
1769-L33ER	1769-L35CR <sup>(3)</sup>	
1769-L33ERM	1769-L35E	
1769-L36ERM	Any previous 1769-L3x controller	

(1) IMPORTANT: Typically, you can use any of the new controllers listed in each row as replacements for any of the previous controllers listed in the corresponding cell to the right. For example, you can replace a 1769-L32E with a 1769-L30ER, 1769-L30ERM, or 1769-L30ER-NSE controller.

In some rare cases, system configuration prevents controller replacement as shown above. For example, if your system uses a 1769-L32E controller with 12 expansion modules, you cannot replace that controller with a 1769-L30ER, 1769-L30ERM, or 1769-L30ER-NSE controller. Those controllers support no more than 8 expansion modules. You must replace the 1769-L32E controller with a 1769-L33ER, 1769-L33ERM, or 1769-L36ERM controller.

We recommend that before you upgrade your controllers, consider your application requirements to verify that the replacements listed above apply.

(2) These catalog numbers are still available for sale, see page 13 for details. Please contact your local Rockwell Automation sales office for ordering information.

(3) Requires converting from ControlNet connections to EtherNet/IP connections.



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**Table 3 - Technical Specifications - CompactLogix 5370 Controllers**

Attribute	1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B	1769-L24ER-QB1B, 1769-L24ER-QBFC1B, 1769-L27ERM-QBFC1B	1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM, 1769-L33ER, 1769-L33ERM, 1769-L36ERM
User memory	<ul style="list-style-type: none"> <li>1769-L16ER: 384 KB</li> <li>1769-L18ER, 1769-L18ERM: 512 KB</li> </ul>	<ul style="list-style-type: none"> <li>1769-L24ER-QB1B, 1769-L24ER-QBFC1B: 750 KB</li> <li>1769-L27ERM-QBFC1B: 1 MB</li> </ul>	<ul style="list-style-type: none"> <li>1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM: 1MB</li> <li>1769-L33ER, 1769-L33ERM: 2 MB</li> <li>1769-L36ERM: 3 MB</li> </ul>
Optional nonvolatile memory	1784-SD1 card with 1 Gb of available memory (shipped with controller) 1784-SD2 card with 2 Gb of available memory (available for separate ordering)		
Number of local expansion modules, max <sup>(1)</sup>	<ul style="list-style-type: none"> <li>1769-L16ER-BB1B: Six 1734 POINT I/O™ modules</li> <li>1769-L18ER-BB1B, 1769-L18ERM-BB1B: Eight 1734 POINT I/O modules</li> </ul>	Four 1769 Compact I/O modules	<ul style="list-style-type: none"> <li>1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM: Eight 1769 Compact I/O™ modules</li> <li>1769-L33ER, 1769-L33ERM: Sixteen 1769 Compact I/O modules</li> <li>1769-L36ERM: Thirty 1769 Compact I/O modules</li> </ul>
Number of I/O module banks, max	N/A	1	3
Current draw @ 5V DC, controller power	1 A	<ul style="list-style-type: none"> <li>1769-L24ER-QB1B: 1.54 A Value rated at the following ambient temperatures: 40 °C (104 °F), 55 °C (131 °F), 60 °C (140 °F).</li> <li>1769-L24ER-QBFC1B and 1769-L27ERM-QBFC1B: 1 A Value rated at the following ambient temperatures: 40 °C (104 °F), 55 °C (131 °F), 60 °C (140 °F).</li> </ul>	500 mA
Current draw @ 24V DC, controller power	N/A	<ul style="list-style-type: none"> <li>1769-L24ER-QB1B: 0.95A Value rated at the following ambient temperatures: 40 °C (104 °F), 55 °C (131 °F), 60 °C (140 °F).</li> <li>1769-L24ER-QBFC1B and 1769-L27ERM-QBFC1B: 0.8 A Value rated at the following ambient temperatures: 40 °C (104 °F), 55 °C (131 °F), 60 °C (140 °F).</li> </ul>	225 mA
Current draw @ 24V DC, field power, max	3 A - Combined total for all devices drawing current from field power connections Input: 5 mA Output: 500 mA	N/A	N/A
Power dissipation, max	11.5 W	<ul style="list-style-type: none"> <li>1769-L24ER-QB1B: 12 W</li> <li>1769-L24ER-QBFC1B, L27ERM-QBFC1B: 21 W</li> </ul>	4.5 W
Isolation voltage	50V (continuous), Basic Insulation Type Tested at 500V AC for 60 s, System to Field	30V (continuous), Basic Insulation Type, USB to system, Ethernet to system and Ethernet to Ethernet Type tested at 500V AC for 60 s	
Short circuit protection, field power	Internal fuse, Non-replaceable	N/A	N/A
Recommended external short circuit protection, field power	User-provided 4...5 A @ 3.15...5.5 A <sup>2</sup> t fuse	N/A	N/A
Weight, approx	0.66 kg (1.5 lb)	<ul style="list-style-type: none"> <li>1769-L24ER-QB1B = 0.63 kg (1.39 lb)</li> <li>1769-L24ER-QBFC1B and 1769-L27ERM-QBFC1B = 0.9 kg (1.9 lb)</li> </ul>	0.31 kg (0.68 lb)



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**Table 3 - Technical Specifications - CompactLogix 5370 Controllers**

Attribute	1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B	1769-L24ER-QB1B, 1769-L24ER-QBFC1B, 1769-L27ERM-QBFC1B	1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM, 1769-L33ER, 1769-L33ERM, 1769-L36ERM
Module width	100.00 mm (3.94 in.)	1769-L24ER-QB1B = 115.00 mm (4.53 in.) 1769-L24ER-QBFC1B and 1769-L27ERM-QBFC1B = 140 mm (5.51 in.)	55.00 mm (2.17 in.)
Module location	DIN rail mount	DIN rail or panel mount	
Panel-mounting screw torque	N/A	1.1 ... 1.8 N•m (10 ... 16 lb•in) - use M4 or #8 screws	
Embedded power supply	24V DC input, isolated	24V DC input, isolated	1769-PA2, 1769-PB2, 1769-PA4, 1769-PB4
Power supply distance rating	NA		<ul style="list-style-type: none"> <li>Controller and 1769-SDN: 4</li> <li>1769 Compact I/O modules: 4 ... 8, depending on module</li> </ul>
Wire category <sup>(2)</sup>	1 - signal ports 1 - power ports 2 - communication ports		2 - communication ports
Wire type, Ethernet	RJ-45 connector according to IEC 60603-7, 2 or 4 pair Category 5e minimum cable according to TIA 568-B.1 or Category 5 cable according to ISO/IEC 24702		
Wire type, power terminals and embedded I/O connections	Copper		N/A
Wire size, power terminals <sup>(3)</sup>	0.051 ... 3.31 mm <sup>2</sup> (30 ... 12 AWG) solid or stranded copper wire rated at 75 °C (167 °F), or greater, 1.2 mm (3/64 in.) insulation, max Each terminal accepts 1 or 2 wires	0.25 ... 2.50 mm <sup>2</sup> (22 ... 14 AWG) solid copper wire rated at 75 °C (167 °F), or greater, 1.2 mm (3/64 in.) insulation, max Each terminal accepts only 1 wire	N/A
Wire stripping length, power terminals <sup>(3)</sup>	10 mm (0.39 in)	8 mm (0.31 in)	N/A
Screw torque, power terminals <sup>(3)</sup>	0.5 ... 0.6 N•m (4.4 ... 5.3 lb•in)	1.0 ... 1.2 N•m (8.9 ... 10.6 lb•in)	N/A
Wire size, embedded I/O connections	0.205 ... 1.31 mm <sup>2</sup> (24 ... 16 AWG) solid or stranded copper wire rated at 75 °C (167 °F), or greater, 1.2 mm (3/64 in.) insulation, max or 90 °C (194 °F) Each terminal accepts only 1 wire		N/A
Wire stripping length, embedded I/O connections	10 mm (0.39 in)		N/A
North American temperature code	T4A	T3C	T5
IEC temperature code	T4		T5
Enclosure type rating	None (open-style)		

- You can use up to the maximum number of local expansion modules with the CompactLogix 5370 L1 controllers listed as long as the total current drawn by the embedded I/O and local expansion modules does not exceed both the available POINTBus backplane current of 1 A and the field power current of 3 A. For more information on POINTBus backplane current and field power current considerations when installing local expansion modules, see [page 2](#).
- Use this Conductor Category information for planning conductor routing. Refer to Industrial Automation Wiring and Grounding Guidelines, publication [1770-4.1](#) and the appropriate system-level installation manual.
- With respect to the CompactLogix 5370 L1 controllers, this specification applies to connecting wires to the power connector that is inserted in the controller. With respect to the CompactLogix 5370 L2 controllers, this specification applies to connecting wires to power terminals built into the controller.

**Table 19 - Certifications - CompactLogix 5370 Controllers**

Certification <sup>(1)</sup>	1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B	1769-L24ER-QB1B, 1769-L24ER-QBFC1B, 1769-L27ERM-QBFC1B	1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM, 1769-L33ER, 1769-L33ERM, 1769-L36ERM
c-UL-us	UL Listed Industrial Control Equipment, certified for US and Canada. See UL File E65584. UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, certified for U.S. and Canada. See UL File E194810.		
CE	European Union 2004/108/EC EMC Directive, compliant with: <ul style="list-style-type: none"> <li>EN 61326-1; Meas./Control/Lab., Industrial Requirements</li> <li>EN 61000-6-2; Industrial Immunity</li> <li>EN 61000-6-4; Industrial Emissions</li> <li>EN 61131-2; Programmable Controllers (Clause 8, Zone A &amp; B)</li> </ul>		
RCM	Australian Radiocommunications Act, compliant with: <ul style="list-style-type: none"> <li>AS/NZS CISPR 11; Industrial Emissions</li> </ul>		
Ex	European Union 94/9/EC ATEX Directive, compliant with: <ul style="list-style-type: none"> <li>EN 60079-15; Potentially Explosive Atmospheres, Protection "n"</li> <li>EN 60079-0; General Requirements</li> <li>II 3 G Ex nA IIC T4 Gc</li> </ul>	European Union 94/9/EC ATEX Directive, compliant with: <ul style="list-style-type: none"> <li>EN 60079-15; Potentially Explosive Atmospheres, Protection "n"</li> <li>EN 60079-0; General Requirements</li> <li>II 3 G Ex nA IIC T4 Gc</li> </ul>	European Union 94/9/EC ATEX Directive, compliant with: <ul style="list-style-type: none"> <li>EN 60079-15; Potentially Explosive Atmospheres, Protection "n"</li> <li>EN 60079-0; General Requirements</li> <li>II 3 G Ex nA IIC T5 Gc X</li> </ul>
EtherNet/IP	ODVA conformance tested to EtherNet/IP specifications.		
KC	Korean Registration of Broadcasting and Communications Equipment, compliant with: <ul style="list-style-type: none"> <li>Article 58-2 of Radio Waves Act, Clause 3</li> </ul>		

(1) When marked. See the Product Certification link at <http://www.ab.com> for Declarations of Conformity, Certificates, and other certification details.

 630-499-7080 · www.elemechinc.com	Rev: 0	Device Tag:	
	Date: 7/17/2020	PLC1	
Manuf.: PNO: Allen-Bradley: 1769-L33ER	By: AJ	Job Number: HBR8191	Page # 3/3

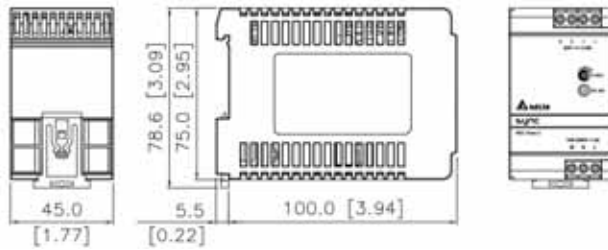


# Sync DIN Rail Power Supply

## 24V 100W Series



L x W x D: 75 x 45 x 100 mm [2.95 x 1.77 x 3.94 inch]  
DRS-24V100W1NZ



37-323-011

### Specifications

Model Number	DRS-24V100W1A□	DRS-24V100W1N□
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#### Input Ratings / Characteristics

Nominal Input Voltage	100-240Vac
Input Voltage Range	85-264Vac
Nominal Input Frequency	50-60Hz
Input Frequency Range	47-63Hz
DC Input Voltage Range*	120-375Vdc
Input Current	< 1.2A @ 115Vac, < 0.6A @ 230Vac
Efficiency at 100% Load	> 89% @ 115Vac & 230Vac
Max Power Dissipation	0% load < 0.4W @ 115Vac & 230Vac 100% load < 11W @ 115Vac & 230Vac
Max Inrush Current (Cold Start)	< 25A @ 115Vac, < 40A @ 230Vac
Power Factor at 100% Load	> 0.97 @ 115Vac, > 0.9 @ 230Vac
Leakage Current (Neutral to PE terminal)	< 0.5mA @ 264Vac

\*Fulfills test conditions for DC input. Safety approval for DC input can be obtained upon request.

#### Output Ratings / Characteristics\*\*

Nominal Output Voltage	24Vdc
Factory Set Point Tolerance	24Vdc ± 2%
Output Voltage Adjustment Range	24-28Vdc 22-24Vdc
Output Current	4.0A (96W max.) 3.8A (91.2W max.)
Output Power	96W 91.2W
Line Regulation	< 0.5% (@ 85-264Vac, 100% load)
Load Regulation	< 1.0% (@ 85-264Vac, 0-100% load)
PARD*** (20MHz)	< 50mVpp @ > 0°C to 70°C < 100mVpp @ 0°C to -20°C
Rise Time	< 100ms @ nominal input (100% load)
Start-up Time	< 2,500ms @ 115Vac (100% load) < 1,500ms @ 230Vac (100% load)
Hold-up Time	> 50ms @ 115Vac & 230Vac (100% load)
Dynamic Response (Overshoot & Undershoot O/P Voltage)	± 5% @ 85-264Vac input, 0-100% load (Slew Rate: 0.1A/μs, 50% duty cycle @ 5Hz to 1KHz)
Start-up with Capacitive Loads	3,000μF Max
Functional	DC OK Relay Contact (for DRS-24V100W1AR, DRS-24V100W1NR) 30V / 1A, resistive load The relay contact are normally "ON" (closed) when the output (Vout) is greater than 75% of its rated value and "OFF" (opened) when the output (Vout) is less than 75% typ.

\*\*For power de-rating from < -10°C to -20°C, and 55°C to 70°C, see power de-rating on page 3.

\*\*\*PARD is measured with an AC coupling mode, 5cm wires, and in parallel with 0.1μF ceramic capacitor & 47μF electrolytic capacitor.



Rev: 0

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By: AJ

Device Tag:

PS1

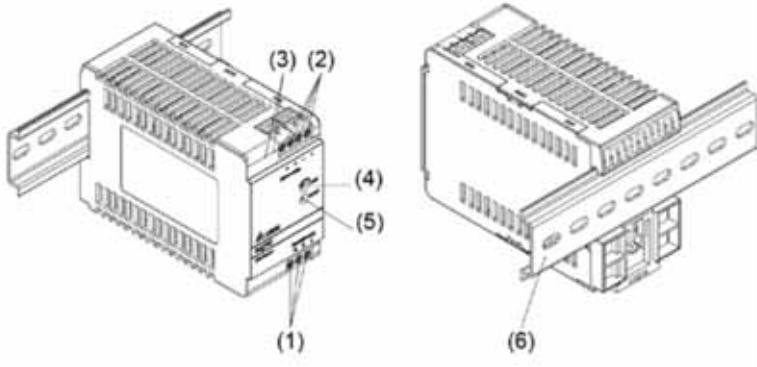
Job Number: HBR8191

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Manuf.: PNO:

Delta: DRS-24V100W1NZ

**DRS-24V100W1NR**



- 1) Input terminal block connector
- 2) Output terminal block connector
- 3) DC OK relay contact
- 4) DC voltage adjustment potentiometer
- 5) DC OK LED (Green)
- 6) Universal mounting system

**Environment**

Surrounding Air Temperature	Operating	-20°C to +70°C (Cold start at -40°C @ 40% load)
	Storage	-40°C to +85°C
Power De-rating		-10°C to -20°C de-rate power by 2% / °C > 55°C de-rate power by 3.33% / °C
Operating Humidity		5 to 95% RH (Non-Condensing)
Operating Altitude		0 to 2,000 Meters (6,560 ft.)
Shock Test	Non-Operating	IEC60068-2-27, Half Sine Wave: 50G for a duration of 11ms; 3 times per direction, 9 times in total
	Operating	IEC 60068-2-27, Half Sine Wave: 10G for a duration of 11ms; 1 time in X axis
Vibration	Non-Operating	IEC 60068-2-6, Random: 5-500Hz; 2.09G <sub>rms</sub> , 20 min per axis for all X, Y, Z directions
	Operating	IEC 60068-2-6, Sine Wave: 10-500Hz; 2G peak; displacement of 0.35mm; 1 octave per min; 60 min per axis for all X, Y, Z directions
Pollution Degree		2

**Protections**

Overvoltage	< 34.8V, SELV Output, Latch Mode
Overload / Overcurrent	105~140% of rated load current, Fold Forward Mode (current rises, voltage drops), Auto-recovery when the fault is removed
Over Temperature	< 75°C Surrounding Air Temperature @ 100% load, Latch Mode
Short Circuit	Hiccup Mode, Non-Latching (Auto-recovery when the fault is removed)
Internal Fuse	T3.15A
Degree of Protection	IP20
Protection Against Shock	Class I with PE* connection

\*PE: Primary Earth



Rev: 0  
Date: 7/17/2020  
By: AJ

Device Tag: PS1  
Job Number: HBR8191

# CliQ III DIN Rail Power Supply

## 24V 240W 1 Phase / DRP-24V240W1C□N



### Highlights & Features

- Universal AC input voltage range
- Built-in constant current circuit for charging application
- High efficiency of up to 94% at 230Vac
- Power Boost of 150% for 5 seconds
- Advanced Power Boost (APB) of 200% for 50ms
- SEMI F47 compliance at 120Vac
- Extreme low temperature cold start at -40°C
- Built-in DC OK Contact and LED indicator for DC OK
- Conformal coating on PCBA to protect against common dust and chemical pollutants



37-323-021



### Specifications

#### Input Ratings / Characteristics

Nominal Input Voltage		100-240Vac		Applicable for TN-, TT and IT mains networks
Input Voltage Range		100-264Vac		Continuously operating
		88-100Vac		With power de-rating. Refer to Fig. 6 on page 11.
Input Frequency	Nom.	50-60Hz		Range: 47-63Hz
DC Input Voltage Range (For DRP-24V240W1CBN)		100-375Vdc		Continuously operating, with safety approval according to IEC/EN/UL 60950-1.
		88-100Vdc		With power de-rating. Refer to Fig. 7 on page 11.
			115Vac	230Vac
Input Current	Typ.	2.27A	1.19A	At 24V, 10A. Refer to Fig. 1 on page 3.
	Max.	2.60A	1.30A	At 24V, 10A.
Efficiency	Typ.	92.70%	94.48%	At 24V, 10A. Refer to Fig. 2 on page 3.
	Min.	91.00%	93.00%	At 24V, 10A.
Average Efficiency	Typ.	91.52%	92.56%	At 24V, 2.5A (25%), 5.0A (50%),
	Min.	91.00%	92.00%	7.5A (75%), 10.0A (100%)
Max Power Dissipation	Typ.	3.54W	2.90W	At 24V, 0A. Refer to Fig. 3 on page 3.
	Max.	6.0W	6.0W	At 24V, 0A.
	Typ.	18.97W	14.05W	At 24V, 10A. Refer to Fig. 3 on page 3.
	Max.	21.0W	16.0W	At 24V, 10A.
Max Inrush Current (Cold Start)	Typ.	11.0A	24.4A	At 24V, 10A.
	Max.	33A	65A	
Max Inrush Energy (Cold Start)	Max.	1A <sup>2</sup> s		
Power Factor	Typ.	0.99	0.93	At 24V, 10A. Refer to Fig. 4 on page 3.
	Min.	0.99	0.93	At 24V, 10A.
Leakage Current (Enclosure to Neutral)		< 0.25mA / 0.80mA		110Vac, 50Hz, TN/TT system / IT system
		< 0.38mA / 1.00mA		132Vac, 50Hz, TN/TT system / IT system
		< 0.74mA / 2.00mA		264Vac, 50Hz, TN/TT system / IT system



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By: AJ

Device Tag:

PS2

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Manuf.: PNo: Delta: DRP24V240W1CAN

## Output Ratings / Characteristics\*

Nominal Output Voltage		24Vdc	
Factory Set Point Tolerance		24Vdc $\pm$ 1.0%	
Output Voltage Adjustment Range		24-28Vdc	
Output Current	Nom. Nom.	0-10.0A / 0-8.57A 15.0A / 12.86A (Slew rate 0.1A/ $\mu$ s)	Continuously operating at 24V / 28V Power Boost for 5 seconds at 24V / 28V, refer to the details in the Function section
Output Power	Nom. Nom.	240W / 240W 360W / 360W	Continuously operating at 24V / 28V Power Boost for 5 seconds at 24V / 28V, refer to the details in the Functions section
Power Boost Duration	Min.	5 seconds	Duration after which output voltage start to droop. Refer to the details in the Function section at Overload & Overcurrent Protections
Power Boost Recovery Time	Typ.	18 seconds	Required wait duration before next Power Boost can be delivered by the power supply. Refer to the details in the Function section
Advanced Power Boost (Slew rate 0.1A/ $\mu$ s)	Typ.	20A @ 50ms, resistive load	Output voltage will drop (Refer to the details in the Function section)
Line Regulation	Max.	0.5% (@ 88-264Vac input, 100% load)	
Load Regulation	Max.	1% (@ 88-264Vac input, 0-100% load)	
PARD**	Max.	100mVpp	20Hz to 20MHz, 50Ohm, warm up for 5mins

## Environment

Surrounding Air Temperature	Operating	-25°C to +70°C (Cold start -40°C)	
	Storage	-40°C to +85°C	
Power De-rating	Vertical Mounting	> 60°C de-rate power by 2.5% / °C	
	Horizontal Mounting	> 40°C de-rate power by 2.5% / °C	
	Input Voltage	<b>AC input</b> < 100Vac de-rate power by 0.83% / V <b>DC input</b> < 100Vdc de-rate power by 1.67% / V	
Operating Humidity		5 to 95% RH (Non-Condensing)	
Operating Altitude		0 to 5,000 Meters (16,400 ft.)	
Shock Test	Non-Operating	IEC 60068-2-27, Half Sine Wave: 30G for a duration of 18ms; 3 times per direction, 9 times in total	
Vibration	Non-Operating	IEC 60068-2-6, Sine Wave: 10-500Hz; 3G peak; displacement of 0.35mm; 60 min per axis for all X, Y, Z directions	
Bump Test	Operating	IEC 60068-2-29, Half Sine Wave: 10G for a duration of 11ms, 1,000 times per direction, 6,000 times in total	
Over Voltage Category		III (operating altitude 2,500 Meters) II (operating altitude 5,000 Meters)	According to IEC/EN 62477-1 / EN 60204-1 (clearance and creepage distances) and IEC 62103 (safety part)



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Device Tag:

PS2

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HBR8191Page #  
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Manuf.: PNo:

Delta: DRP24V240W1CAN

# Zelio® Plug-In Relays

## RPM power relays



Telemecanique

06-058-021

### General characteristics

<b>Conforming to standards</b>		IEC/EN 61810-1 (iss. 2), UL 508, CSA C22-2 n° 14	
<b>Product certifications</b>		cULus File E164862 CCN NLDX, NLDX7; cURus File E164862 CCN NLDX2, NLDX8; CSA; CE; RoHS compliant	
<b>Ambient air temperature</b> around the device	Storage	°C (F)	-40... +85 (-40... +185)
	Operation	°C (F)	-40... +55 (-40... +131)
<b>Vibration resistance</b> conforming to IEC/EN 60068-2-6	In operation	3 gn (10...150 Hz/± 1 mm / 5g/5 cycles)	
	Not operating	5 gn (10...150 Hz/± 1 mm / 5g/5 cycles)	
<b>Degree of protection</b>	Conforming to IEC/EN 60529	IP 40	
<b>Shock resistance</b> conforming to IEC/EN 60068-2-27	Opening	15 gn	
	Closing	15 gn	
<b>Protection category</b>		RT I	
<b>Mounting position</b>		Any	

### Insulation characteristics

<b>Rated insulation voltage (Ui)</b>	Conforming to IEC/EN 60947	V	250 (IEC), 300 (UL, CSA)
<b>Rated impulse withstand voltage (Uimp)</b>		kV	4 (1.2/50 μs)
<b>Dielectric strength</b> (rms voltage)	Between coil and contact	~ V	1550
	Between poles	~ V	1550
	Between contacts	~ V	1500

### Contact characteristics

Relay type		RPM1●●●	RPM2●●●	RPM3●●●	RPM4●●●
<b>Number and type of contacts</b>		1 C/O	2 C/O	3 C/O	4 C/O
<b>Contact materials</b>		AgNi			
<b>Conventional thermal current (Ith)</b>	For ambient temperature ≤ 55 °C	A	15		
<b>Rated operational current</b> in utilization categories AC-1 and DC-1	Conforming to IEC	NO	A	15	
		NC	A	7.5	
	Conforming to UL	A	15		
<b>Switching current</b>	Minimum	mA	10		
<b>Switching voltage</b>	Maximum	V	~/∞ 250 (IEC)		
	Minimum	V	17		
<b>Nominal load (resistive)</b>		A	15 / 250 ~ V		
		A	15 / 28 ∞ V		
<b>Switching capacity</b>	Maximum	~	VA	3750	
		∞	W	420	
	Minimum	mW	170		
<b>Maximum operating rate</b> In operating cycles/hour	No-load		18 000		
	Under load		1200		
<b>Utilization coefficient</b>			20 %		
<b>Mechanical durability</b>	In millions of operating cycles		10		
<b>Electrical durability</b> In millions of operating cycles	Resistive load		0.1		0.06
	Inductive load		See curves below		

**Electrical durability of contacts**  
Resistive load ~      Reduction coefficient for inductive load ~ (depending on power factor cos φ)      Maximum switching capacity on resistive load ∞



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By: AJ

Device Tag:

R1-11

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Manuf.: PNO:

Square D: RPM22F7

Power relays without LED (sold in lots of 10)

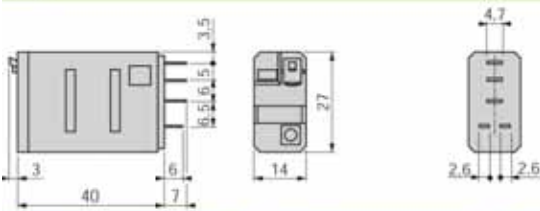
Control circuit voltage	Number and type of contacts - Thermal current (Ith)							
	1 C/O - 15 A		2 C/O - 15 A		3 C/O - 15 A		4 C/O - 15 A	
	Catalog number	Weight	Catalog number	Weight	Catalog number	Weight	Catalog number	Weight
V		kg		kg		kg		kg
≡ 12	RPM11JD	0.026	RPM21JD	0.036	RPM31JD	0.054	RPM41JD	0.071
≡ 24	RPM11BD	0.026	RPM21BD	0.036	RPM31BD	0.054	RPM41BD	0.071
≡ 48	RPM11ED	0.026	RPM21ED	0.036	RPM31ED	0.054	RPM41ED	0.071
≡ 110	RPM11FD	0.026	RPM21FD	0.036	RPM31FD	0.054	RPM41FD	0.071
~ 24	RPM11B7	0.026	RPM21B7	0.036	RPM31B7	0.054	RPM41B7	0.071
~ 48	RPM11E7	0.026	RPM21E7	0.036	RPM31E7	0.054	RPM41E7	0.071
~ 120	RPM11F7	0.026	RPM21F7	0.036	RPM31F7	0.054	RPM41F7	0.071
~ 230	RPM11P7	0.026	RPM21P7	0.036	RPM31P7	0.054	RPM41P7	0.071

Power relays with LED (sold in lots of 10)

≡ 12	RPM12JD	0.026	RPM22JD	0.036	RPM32JD	0.054	RPM42JD	0.071
≡ 24	RPM12BD	0.026	RPM22BD	0.036	RPM32BD	0.054	RPM42BD	0.071
≡ 48	RPM12ED	0.026	RPM22ED	0.036	RPM32ED	0.054	RPM42ED	0.071
≡ 110	RPM12FD	0.026	RPM22FD	0.036	RPM32FD	0.054	RPM42FD	0.071
~ 24	RPM12B7	0.026	RPM22B7	0.036	RPM32B7	0.054	RPM42B7	0.071
~ 48	RPM12E7	0.026	RPM22E7	0.036	RPM32E7	0.054	RPM42E7	0.071
~ 120	RPM12F7	0.026	RPM22F7	0.036	RPM32F7	0.054	RPM42F7	0.071
~ 230	RPM12P7	0.026	RPM22P7	0.036	RPM32P7	0.054	RPM42P7	0.071

Dimensions (mm):

Power relays  
RPM 1

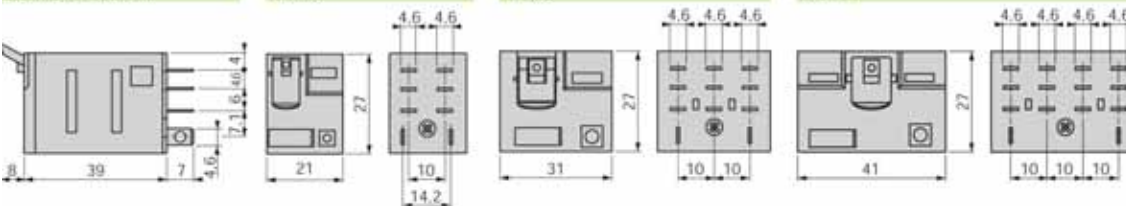


Common side view

RPM2

RPM3

RPM4



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R1-11

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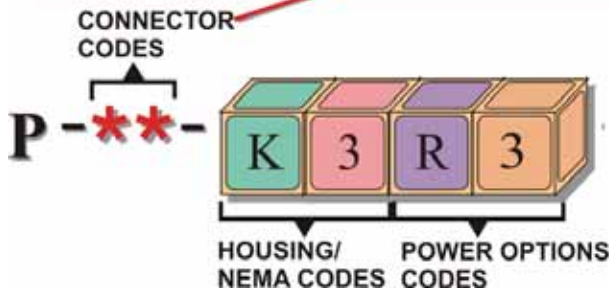
Manuf.: PNo:

Square D: RPM22F7

# GracePort® Ethernet Port Connector Code Data Sheet



**CONNECTOR CODE DESCRIPTION**



PANEL MOUNT HOUSING CODES	HOUSING SIZE	SURFACE MOUNT HOUSING CODES
B	6	A
F	16	E
H	24	G
K	32	N/A
M	48	L
M5 Type 304 Stainless	48	L5 Type 304 Stainless
M6 Type 316 Stainless	48	L6
N/A		M7 Hazardous Location

NEMA RATING CODES		NOTES
1	NEMA 1 (Panel mount no housing)	ADD "-G" TO THE END OF THE PART NUMBER FOR GASKETING ☺
2	NEMA 4X	Type 4X ☺ (1)
3	NEMA 12/4 & IP-65	☺, Type 4 ☺
5	NEMA 4X TYPE 304 STAINLESS STEEL	☺, Type 4X ☺
6	NEMA 4X TYPE 316 STAINLESS STEEL	☺, Type 4X ☺
7	NEMA 7&9 EXPLOSION PROOF	NO POWER OPTIONS ☺.

POWER OPTION CODES	DESCRIPTION	VAC	AMPS
R	US, Canada, Mexico (also used in Japan & Taiwan)	120	15
RD	Duplex Outlet	120	20
RF	GFCI Inside-Outlet	120	20
RG	Isolated Ground (Duplex)	120	15
RM	IEC 320 Male Power Entry Module	250	10
RP	IEC 320 Female Power Entry Module	250	10

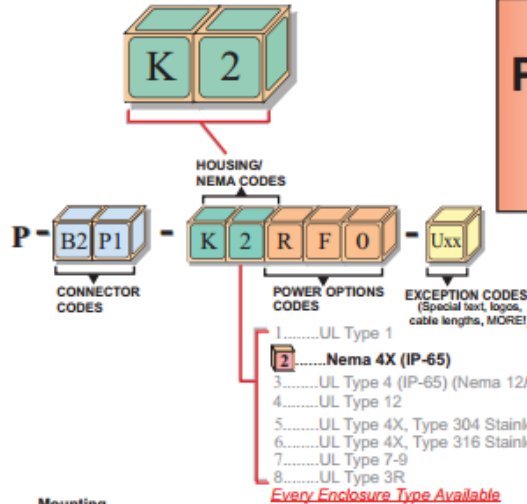
CIRCUIT BREAKER(1) CODES	
0	No Breaker
3	3 Amp 250V
5	5 Amp 250V
Call for other sizes	



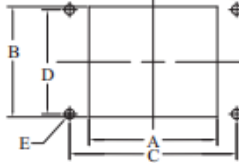
Rev: 0  
Date: 7/17/2020  
By: AJ

Device Tag:  
**RECP1**  
Job Number: HBR8191

# Panel Mount Housing Dimensions UL Type 4X - IP65 Ratings



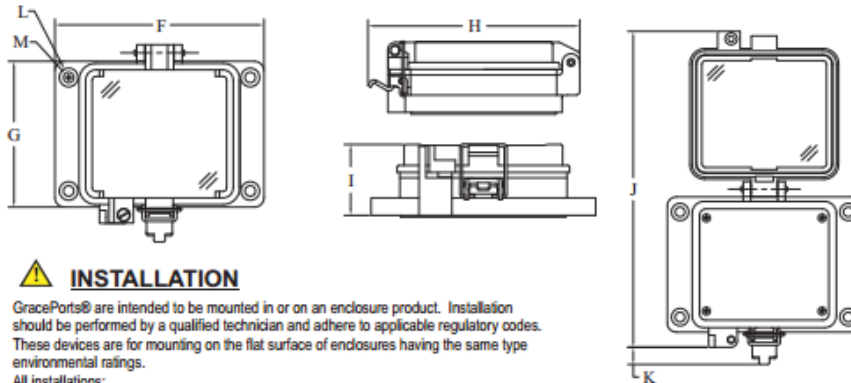
## ThruView™ Housings



Housing Code	Mounting Dimensions (inches [mm])					
	Weight (oz)	A	B	C	D	E Ø
B	3.8	2.06±.010 [52.4±.2]	1.42±.010 [36.0±.2]	2.76±.004 [70.0±.1]	1.26±.004 [32.0±.1]	.18±.010 [4.5±.2]
F	5.1	3.36±.010 [85.4±.2]	1.42±.010 [36.0±.2]	4.03±.004 [102.4±.1]	1.26±.004 [32.0±.1]	.18±.010 [4.5±.2]
H	5.9	4.42±.010 [112.4±.2]	1.42±.010 [36.1±.2]	5.12±.004 [130.0±.1]	1.26±.004 [32.0±.1]	.18±.010 [4.5±.2]
K	10.8	3.39±.010 [86.0±.2]	2.91±.010 [74.0±.2]	4.41±.004 [112.0±.1]	2.76±.004 [70.0±.1]	.26±.010 [6.5±.2]
M	13.2	4.80±.010 [122.0±.2]	3.15±.010 [80.0±.2]	5.83±.004 [148.0±.1]	2.76±.004 [70.0±.1]	.26±.010 [6.5±.2]

Housing Code	Overall Dimensions (inches [mm])							
	F	G	H	I	J	K	L Ø	M Ø
B	3.15 [80.0]	1.72 [43.6]	3.20 [81.2]	1.60 [40.7]	4.33 [110.1]	.96 [24.4]	N/A	.18±.004 [4.5±.1]
F	4.45 [113.0]	1.72 [43.6]	3.20 [81.2]	1.60 [40.7]	4.87 [123.7]	.57 [14.4]	N/A	.18±.004 [4.5±.1]
H	5.51 [140.0]	1.72 [43.6]	3.20 [81.2]	1.60 [40.7]	4.87 [123.7]	.57 [14.4]	N/A	.18±.004 [4.5±.1]
K	5.08 [129.0]	3.54 [90.0]	4.79 [121.6]	1.60 [40.7]	8.28 [210.2]	.45 [11.4]	.45 [11.5]	.26±.004 [6.5±.1]
M	6.50 [165.0]	3.78 [96.0]	5.02 [127.6]	1.60 [40.7]	8.52 [216.4]	.57 [14.4]	.45 [11.5]	.26±.004 [6.5±.1]

Drawings available at [www.graceport.com](http://www.graceport.com)



### ⚠️ INSTALLATION

GracePorts® are intended to be mounted in or on an enclosure product. Installation should be performed by a qualified technician and adhere to applicable regulatory codes. These devices are for mounting on the flat surface of enclosures having the same type environmental ratings.

**All installations:**

- 1) Cut panel opening and mount GracePort® assembly to enclosure with gasket.
- 2) Connect low voltage interface wiring according to documentation provided with unit.

**On units configured for optional AC power:**

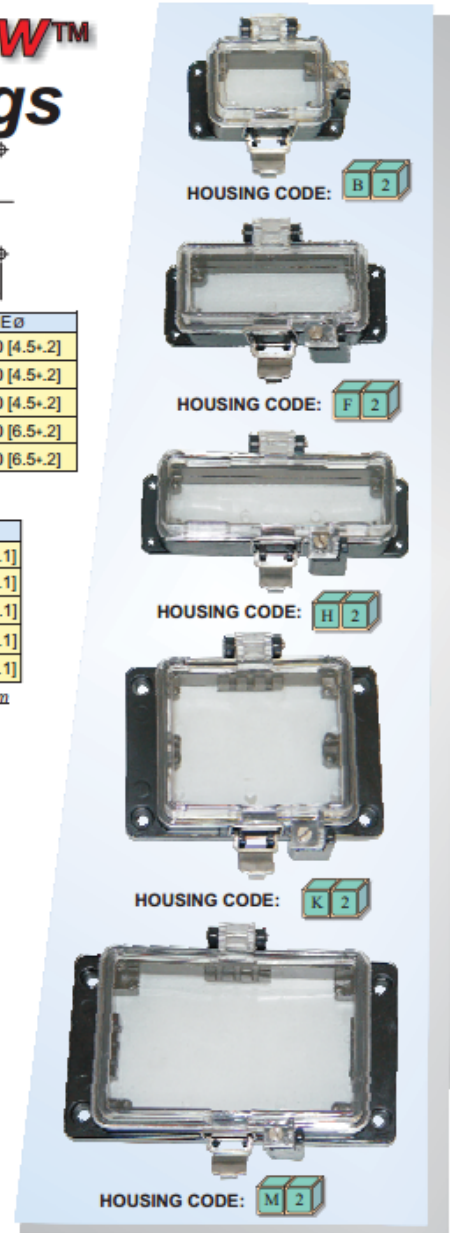
- 1) Connect outlet device as per code. Note: It is the responsibility of the installer to ensure adequate separation of high and low voltage circuits in the end-use product.
- 2) Ensure that the metal housing is reliably grounded using grounding means provided.

### SPECIFICATIONS: ELECTRICAL

Low voltage (data), limited to 30 VDC  
High voltage supply (for computer use only)  
120 VAC, 15A (UL), 5A (CSA)  
230-240 VAC, 16A (CE only)

### SPECIFICATIONS: MECHANICAL

Housing: Cast aluminum base  
Latch: Type 304 Stainless Steel (1CR18NI19)  
Cover: Polycarbonate, UV rated, V-O Flame rated  
Gasket: Thermoplastic elastomer  
Insert Material: Acrylic UL94HB



### APPROVALS RoHS

UL RECOGNIZED: E207344 Type 4, IP-65 (Outdoor Use)  
CSA: LR110845 (not for interrupting circuit)  
CE: EN61010/EN60950 (Foreign Power Outlets)



Manuf.: PNo:

Grace: P-R2-K3RF0

Rev: 0

Date: 7/17/2020

By: AJ

Device Tag:

RECP1

Job Number: HBR8191

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# Accessories

## 30.5 mm Push Buttons



# Allen-Bradley



Shallow Block



PenTUFF™ (Low Voltage)  
Contact Block



Logic Reed Block



Sealed Switch Block



Stackable Sealed  
Switch Block

Contact Type	Shallow Block*†		PenTUFF (Low Voltage) Block*†		Logic Reed Block‡		Sealed Switch Block‡		Stackable Sealed Switch Block‡	
	Cat. No.	Code	Cat. No.	Code	Cat. No.	Code	Cat. No.	Code	Cat. No.	Code
1 N.O.	800T-XD1	D	800T-XD1V	H	800T-XD1R	V	800T-XD1P	R	800T-XD1Y	5
1 N.C.	800T-XD2	E	800T-XD2V	U	800T-XD2R	W	800T-XD2P	S	800T-XD2Y	6
1 N.O.E.M.	800T-XD3	G	800T-XD3V	I	—	—	—	—	—	—
1 N.C.L.B.	800T-XD4	J	800T-XD4V	Q	—	—	—	—	—	—
1 N.O. - N.C.	800T-XA	A	800T-XAV	F	800T-XAR	T	800T-XAP	P	800T-XAY	7
2 N.O.	800T-XA2§	M	—	—	800T-XA2R§	Y	—	—	800T-XA2Y	8
2 N.C.	800T-XA4	N	—	—	800T-XA4R	Z	—	—	800T-XA4Y	9
1 N.C.L.B. - 1 N.O.	800T-XA1	B	—	—	—	—	—	—	—	—
1 N.C.L.B. - 1 N.C.	800T-XA7	C	—	—	—	—	—	—	—	—

**Note:** Modular suffix codes can be used when specifying selector switches with multiple contact blocks.

### PenTUFF™ (Low Voltage) Contact Ratings

Minimum DC: 5V, 1 mA  
 Maximum thermal continuous current  $I_{th}$  2.5 A AC/1.0 A DC. Bulletin 800T units with 800T-XAV contacts have ratings as follows:

Max. Opertnl. Volts $U_e$	Utilization Category		Rated Operational Currents		
	IEC	NEMA	Volts $U_e$	Make	Break
AC 300	AC-15	C300	120...300 0...120	1800VA 15 A	180VA 1.5 A
DC 150	DC-13	R150	24...150 0...24	28VA 1.0 A	

### Stackable Sealed Switch Contact Ratings

Minimum: 5V, 10 mA (digital); 24V, 1 mA (analog)  
 Maximum continuous current  $I_{th}$  2.5 A. Bulletin 800T units have control circuit ratings with sealed switch contact blocks as follows:

Max. Opertnl. Volts $U_e$	Utilization Category		Rated Operational Currents		
	IEC	NEMA	Volts $U_e$	Make	Break
AC 300	AC-15	C300	120...300 0...120	1800VA 15 A	180VA 1.5 A
DC 150	DC-13	Q150	24...150 0...24	69VA 2.5 A	

### MaxDuty Contact Rating

Maximum thermal continuous current  $I_{th}$  24 A.  
 Pilot Duty — 120V AC, 12 A; 24V DC, 10 A  
 Motor Ratings — 120V AC, 1.5 Hp; 240V AC, 3 Hp; 24V DC, 10 A FLA/60 A LRA

### Logic Reed Contact Ratings

Minimum — DC: 5V, 1 mA  
 Maximum — DC: 30V, 0.06 A, AC: 150V, 0.15 A  
 Should only be used with resistive loads.

### Product Certifications

Certifications	UR/UL, CSA, CCC, CE
Standards Compliance — CE Marked	NEMA ICS-5; UL 508, EN ISO 13850, EN 60947-1, EN 60947-5-1, EN 60947-5-5



Rev:	0	Device Tag:	SS1
Date:	7/17/2020		
By:	AJ	Job Number:	HBR8191
		Page #	1/1

Manuf.: . PNo: Allen-Bradley: 800T-XA

02-005-000

# 30.5 mm Push Buttons Selector Switches

800 T - HA 2 A

a b c d e



Protection Rating	
Code	Description
T	Metal, Type 4/13
H	Plastic, Type 4/4X/13

Finger-Safe Guards	
Code	Description
Blank	No guards
C	Guards on terminals

Knob Insert Colors		
800T Type 4/13	Description	800H Type 4/4X/13
Code		Code
H	White	HR
HX	Packet of colored inserts*	HRX
Metal Wing Lever Colors§		
Code	Color	Code
HA	Red	—
HG	Grey	—

Operator Type and Function	
Standard Knob	
Code	Operator Function
2	Maintained
4	Spring return from left†
5	Spring return from right
Knob Lever§	
Code	Operator Function
17	Maintained
18	Spring return from left†
19	Spring return from right
Metal Wing Lever§	
Code	Operator Function
11	Maintained
15	Spring return from left†
16	Spring return from right
Coin Slot§	
Code	Operator Function
6	Maintained
7	Spring return from left
8	Spring return from right

Contact Block(s)			
Code	Contact Configuration	Description	
		2-Position	
Blank	No contacts	—	—
Standard			
D1	1 N.O.	O	X
D2	1 N.C.	X	O
A	1 N.O. - 1 N.C.	O	X
		X	O
B	2 N.O. - 2 N.C.	O	X
		X	O
		O	X
		X	O

## Specifications\*

Electrical Ratings	
Contact ratings	Refer to the contact ratings tables on page 10-4.
Dielectric strength	2200V for one minute, 1300V for one minute (Logic Reed)
Electrical design life cycles	1 000 000 at max. rated load, 200 000 at max. rated load (Logic Reed)
Mechanical Ratings	
Vibration	10...2000 Hz, 1.52 mm displacement (peak-to-peak) max./10 G max. (except Logic Reed)
Shock	1/2 cycle sine wave for 11 ms ≥ 25 G (contact fragility) and no damage at 100 G
Degree of protection	Type 1/4/12/13 (800T); Type 1/4/4X/12/13 (800H); EN/IEC 60529 IP66/65
Mechanical design life cycles	
Push buttons	(Momentary, non-illuminated) 10 000 000 min. (Momentary, illuminated) 250 000 min. (Push-pull/twist-to-release) 250 000 min.
Selector switches	(Non-illuminated) 1 000 000 min. (Illuminated, key-operated) 200 000 min.
Potentiometers	25 000 min.
All other devices	200 000 min.
Contact operation	Shallow, mini, and low-voltage contact blocks: Slow, double make and break Logic Reed and sealed switch contact blocks: Single break magnetic
Wire gauge/Terminal screw torque	#18...14 AWG (#18...10 Max Duty) / 6...8 lb•in
Typical operating forces	
Operators without contact blocks	Flush, extended button, standard mushroom, jumbo plastic mushroom: 2 lbs max. Jumbo and extended aluminum mushroom head: 3.95 lbs max. Maintained selector switch: 3.6 in•lb max.
Spring return selector switches	3.6 in•lb to stop, 0.2 in•lb to return
Illuminated push buttons and push-to-test pilot lights	5 lb max.
2-position push-pull	8.0 lb max. push or pull
3-position push-pull	8 lb max. push to in position or pull to center position (15 lb max. pull to out position)
Twist-to-release or push-pull	9 lbs max. push or pull 30 in•oz max. twist, 6 in•oz minimum return
Potentiometer	Rotational torque 3...12 in•oz; stopping torque 12 in•lb (minimum)
Contact blocks	
Standard	1 lb
Logic Reed	1 lb max.
Sealed switch	3 lb max. at 0.205 in. plunger travel
Stackable sealed switch	1 lb max.
MaxDuty	1.4 lb max.
PenTUFF	1.4 lb max.
Self Monitoring	1.6 lb
Environment	
Temperature range	Operating -40...+131 °F (-40...+55 °C) Storage -40...+185 °F (-40...+85 °C)
Note:	Operating temperatures below freezing are based on the absence of moisture and liquids. Consult your local Rockwell Automation sales office or Allen-Bradley distributor for use in lower temperature applications.
Humidity	50...95% RH from 77...140 °F (25...60 °C) per Procedure IV of MIL-STD-810C, Method 507.1 cycling test

**Certifications**  
UL Listed  
(File No. E14840, E10314  
Guide No. NKCR, NOIV)  
CSA Certified  
(File No. LR1234, LR11924)  
CSA C22.2, No. 14



Rev: 0

Date: 7/17/2020

By: AJ

Device Tag:

SS1

Job Number: HBR8191

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Manuf.: . PNo: Allen-Bradley: 800H-HR2A

# 30.5 mm Push Buttons Selector Switches

# Allen-Bradley

800 T - J 2 C

a b c d e e f (cont'd)



39-005-009

Protection Rating	
Code	Description
T	Metal, Type 4/13
H	Plastic, Type 4/4X/13

Finger-Safe Guards	
Code	Description
Blank	No guards
C	Guards on terminals

Knob Insert Colors		
800T Type 4/13	Description	800H Type 4/4X/13
Code		Code
J	White	JR
JX	Packet of colored inserts*	JRX

Metal Wing Lever Colors*		
Code	Color	Code
JA	Red	—
JG	Grey	—

Knob/Lever Type Operators	
Standard Knob	
Code	Operator Function
2	Maintained
4	Spring return from left
5	Spring return from right
91	Spring return from both

Knob Lever*	
Code	Operator Function
17	Maintained
18	Spring return from left
19	Spring return from right
20	Spring return from both

Metal Wing Lever*	
Code	Operator Function
11	Maintained
15	Spring return from left
16	Spring return from right
141	Spring return from both

Coin Slot*	
Code	Operator Function
10	Spring return from both

Cam Option†	
Code	Description
KC1	KC1 cam
KC7	KC7 cam
KD7	KD7 cam
KE7	KE7 cam
KQ1	KQ1 cam
KQ7	KQ7 cam
KR1	KR1 cam
KR7	KR7 cam
KT1	KT1 cam
KT7	KT7 cam
KU7	KU7 cam

Contact Blocks	
Code	Description
Blank	No contacts on operator
Standard	
A	1 N.O. - 1 N.C. 1-800T-XA on white side 2 N.O. - 2 N.C. 2-800T-XAs — 1 on white side/1 on black side
B	1 on white side/1 on black side
PenTUFF (Low Voltage)	
AV	1 N.O. - 1 N.C. 1-800T-XAV on white side
BV	2 N.O. - 2 N.C. 2-800T-XAVs — 1 on white side/1 on black side

Contact Blocks*	
Code	Description
Blank	No contacts
Class 1, Div. 2/Zone 2	
Logic Reed	
AR	1 N.O. - 1 N.C. 1-800T-XAR on white side
BR	2 N.O. - 2 N.C. 2-800T-XARs — 1 on white side/1 on black side
Sealed Switch	
AP	1 N.O. - 1 N.C. 1-800T-XAP on white side
BP	2 N.O. - 2 N.C. 2-800T-XAPs — 1 on white side/1 on black side
Stackable Sealed Switch	
AY	1 N.O. - 1 N.C. 1-800T-XAY on white side
BY	2 N.O. - 2 N.C. 2-800T-XAYs — 1 on white side/1 on black side

\* One insert of each color (blue, green, orange, red, and yellow).  
 † Only available on Bul. 800T, Type 4/13 operators.  
 ‡ If an overlapping cam is required, consult your local distributor.  
 § Not available with wing levers.  
 † See Table 1 for cam selections and associated targets.

### Specifications\*

Electrical Ratings	
Contact ratings	Refer to the contact ratings tables on page 10-4.
Dielectric strength	2200V for one minute, 1300V for one minute (Logic Reed)
Electrical design life cycles	1 000 000 at max. rated load, 200 000 at max. rated load (Logic Reed)
Mechanical Ratings	
Vibration	10...2000 Hz, 1.52 mm displacement (peak-to-peak) max./10 G max. (except Logic Reed)
Shock	1/2 cycle sine wave for 11 ms ≥ 25 G (contact fragility) and no damage at 100 G
Degree of protection	Type 1/4/12/13 (800T); Type 1/4/4X/12/13 (800H); EN/IEC 60529 IP66/65
Mechanical design life cycles	
Push buttons	(Momentary, non-illuminated) 10 000 000 min. (Momentary, illuminated) 250 000 min. (Push-pull/twist-to-release) 250 000 min.
Selector switches	(Non-illuminated) 1 000 000 min. (Illuminated, key-operated) 200 000 min.
Potentiometers	25 000 min.
All other devices	200 000 min.
Contact operation	Shallow, mini, and low-voltage contact blocks: Slow, double make and break Logic Reed and sealed switch contact blocks: Single break magnetic
Wire gauge/Terminal screw torque	#18...14 AWG (#18...10 Max Duty) / 6...8 lb•in
Typical operating forces	
Operators without contact blocks	Flush, extended button, standard mushroom, jumbo plastic mushroom: 2 lbs max. Jumbo and extended aluminum mushroom head: 3.95 lbs max. Maintained selector switch: 3.6 in•lb max.
Spring return selector switches	3.6 in•lb to stop, 0.2 in•lb to return
Illuminated push buttons and push-to-test pilot lights	5 lb max.
2-position push-pull	8.0 lb max. push or pull
3-position push-pull	8 lb max. push to in position or pull to center position (15 lb max. pull to out position)
Twist-to-release or push-pull	9 lbs max. push or pull 30 in•oz max. twist, 6 in•oz minimum return
Potentiometer	Rotational torque 3...12 in•oz; stopping torque 12 in•lb (minimum)
Contact blocks	Standard 1 lb Logic Reed 1 lb max. Sealed switch 3 lb max. at 0.205 in. plunger travel Stackable sealed switch 1 lb max. MaxDuty 1.4 lb max. PenTUFF 1.4 lb max. Self Monitoring 1.6 lb
Environment	
Temperature range	Operating -40...+131 °F (-40...+55 °C) Storage -40...+185 °F (-40...+85 °C)
<b>Note:</b> Operating temperatures below freezing are based on the absence of moisture and liquids. Consult your local Rockwell Automation sales office or Allen-Bradley distributor for use in lower temperature applications.	
Humidity	50...95% RH from 77...140 °F (25...60 °C) per Procedure IV of MIL-STD-810C, Method 507.1 cycling test

### Certifications

UL Listed  
 (File No. E14840, E10314  
 Guide No. NKCR, NOIV)  
 CSA Certified  
 (File No. LR1234, LR11924)  
 CSA C22.2, No. 14



Rev: 0	Device Tag: SS2,4-6
Date: 7/17/2020	
By: AJ	Job Number: HBR8191
	Page # 1/1

Manuf.: . PNO:  
 Allen-Bradley: 800H-JR2A

800T/H 30.5 mm

3-Position Selector Switch Devices, Non-Illuminated

800 **T** - **J** 2 **C**  
a b c d e f



39-005-011

**a**

Protection Rating	
Code	Description
T	Metal, Type 4/13
H	Plastic, Type 4/4X/13

**b**

Finger-Safe Guards	
Code	Description
Blank	No guards
C	Guards on terminals

**c**

Knob Insert Colors		
800T Type 4/13	Description	800H Type 4/4X/13
Code		Code
J	White	JR
JX	Packet of colored inserts*	JRX
Metal Wing Lever Colors†		
Code	Color	Code
JA	Red	—
JG	Grey	—

**d**

Knob/Lever Type Operators	
Standard Knob	
Code	Operator Function
2	Maintained
4	Spring return from left
5	Spring return from right
91	Spring return from both
Knob Lever‡	
Code	Operator Function
17	Maintained
18	Spring return from left
19	Spring return from right
20	Spring return from both
Metal Wing Lever‡	
Code	Operator Function
11	Maintained
15	Spring return from left
16	Spring return from right
141	Spring return from both
Coin Slot‡	
Code	Operator Function
10	Spring return from both

**e**

Cam Option§Δ	
Code	Description
Blank	KB7 cam (std.)
KA1	KA1 cam
KA7	KA7 cam

Cam Option§Δ	
Code	Description
KC1	KC1 cam
KC7	KC7 cam
KD7	KD7 cam
KE7▲	KE7 cam
KQ1	KQ1 cam
KQ7	KQ7 cam
KR1▲	KR1 cam
KR7▲	KR7 cam
KT1▲	KT1 cam
KT7▲	KT7 cam
KU7▲	KU7 cam

**f**

Contact Blocks	
Code	Description
Blank	No contacts on operator
Standard	
A	1 N.O. - 1 N.C. 1-800T-XA on white side
B	2 N.O. - 2 N.C. 2-800T-XAs — 1 on white side/1 on black side
PenTUFF (Low Voltage)	
AV	1 N.O. - 1 N.C. 1-800T-XAV on white side
BV	2 N.O. - 2 N.C. 2-800T-XAVs — 1 on white side/1 on black side
Code	Description
Blank	No contacts
Class 1, Div. 2	
Logic Reed	
AR	1 N.O. - 1 N.C. 1-800T-XAR on white side
BR	2 N.O. - 2 N.C. 2-800T-XARs — 1 on white side/1 on black side
Sealed Switch	
AP	1 N.O. - 1 N.C. 1-800T-XAP on white side
BP	2 N.O. - 2 N.C. 2-800T-XAPs — 1 on white side/1 on black side
Stackable Sealed Switch	
AY	1 N.O. - 1 N.C. 1-800T-XAY on white side
BY	2 N.O. - 2 N.C. 2-800T-XAYs — 1 on white side/1 on black side



- CE Marked
- CSA Certified — File Nos. LR1234, LR11924
- CSA C22.2 — No. 14
- EN/IEC 60947-5-1
- EN/IEC 60947-5-5
- EN ISO 13850
- UL Listed — File Nos. E14840, E10314; Guide Nos. NKCR, NOIV, NISD

Table 1. Cam and Contact Block Functionality Table

Contact Block Suffix Code	Contact Block Side	Circuits	Cam Codes																								
			KB7 (Std.)	KA1	KA7	KC1	KC7	KD7	KE7	KQ1	KQ7	KR1	KR7	KT1	KT7	KU7											
A	White	X	X	O	O	X	O	O	O	X	O	O	X	O	O	X	O	O	X	O	O	X	O	O	X	O	O
	Black	O	X	O	X	O	O	X	O	X	O	O	X	O	X	O	X	O	X	O	X	O	X	O	X	O	X
B	White	O	X	O	X	O	O	X	O	O	X	O	O	X	O	O	X	O	O	X	O	O	X	O	O	X	O
	Black	X	O	O	X	O	O	X	O	O	X	O	O	X	O	O	X	O	O	X	O	O	X	O	O	X	O

Note: X = Closed/O = Open

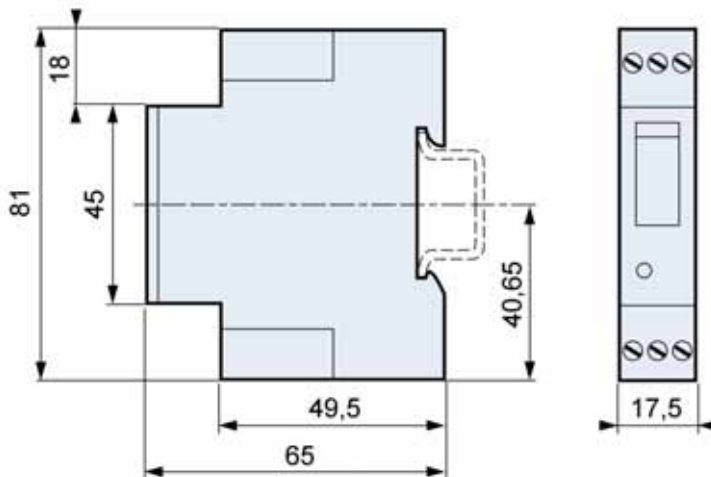
 630-499-7080 · www.elemechinc.com	Rev:	0	Device Tag:		
	Date:	7/17/2020	SS3		
	By:	AJ	Job Number:	HBR8191	Page #
Manuf.: . PNO:		Allen-Bradley: 800H-JR5A			

- Complete, compact units
- DIN rail and panel mounting
- Rating: 5 A ~ or 3 A ≐
- Output voltage 12-280 V ~ or 5-48 V ≐
- Input voltage 4-32 V ≐ regulated
- Input to output insulation voltage: 4 kV
- LED display of input status
- Replaceable protection fuse
- UL - cUL approval and CE marking



Output specifications	Triac	Transistor
Voltage range (Vrms max)	12-280 ~	5-48 ≐
Peak voltage (t=1 min.) (V peak)	600 ~	60 ≐
Maximum off-state leakage (at Vmax and T = 25 °C)	2 mArms	10 µA
Maximum current (Arms)	5	3
Minimum current (mArms)	50	10
Max. 1-cycle surge T=25°C (V peak)	100	5
On-state voltage drop at Imax and T=25°C (V peak)	1.6	1.6
ft (t = 10 ms) (A's)	600	-
Static (off-state) dv/dt (V/µs)	200	n/a
Rth junction/ambient air	20.3° C/W	22.6° C/W

**Dimensions**



Input specifications	Triac	Transistor
Input voltage (V)	4-32 ≐	4-32 ≐
Drop-out voltage	1V ≐	1V ≐
Maximum current (at Vmax)	22	16
Nominal input resistance	Regulated input	
Response time (close)	< 10 ms	50 µs
Response time (open)	< 10 ms	50 µs

Characteristics	Triac	Transistor
Operating temperature (° C)	-30 to +80	
Storage temperature (° C)	-40 to +100	
Input to output insulation voltage (Vrms)	4000	
Input/output capacitance (pF)	8	
Replaceable protection fuse	Yes	Yes
LED display of input status of input status	Yes	Yes
Capacity of input and output terminals	with ferrule : 2 x 1.5 mm <sup>2</sup> without ferrule : 2 x 2.5 mm <sup>2</sup> 1 x 4 mm <sup>2</sup>	

**Part numbers**

**Zero voltage switching (output ~)**

Rating	Output	Input	Part Number
3 A	5-48 V ≐	4-32 V ≐	84 130 104
5 A	12-280 V ~	4-32 V ≐	84 130 105

**Instantaneous switching**

Rating	Output	Input	Part Number
5 A	12-280 V ~	4-32 V ≐	84 130 108



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By: AJ		

Manuf.: . PNo: Crouzet: 84 130 104

# STP Series Pluggable

Surge-Trap®

SURGE PROTECTIVE DEVICE

DIN-RAIL PLUGGABLE SPD FOR  
ANSI/UL 1449 TYPE 1 AND 2 APPLICATIONS

**MERSEN**  
Expertise, our source of energy



40-030-002

## RATINGS:

- Volts ( $U_n$ ): 120-690VAC
- Nominal Discharge Current Rating ( $I_n$ ): 10-20kA
- Surge Capacity: 75kA
- Short-Circuit Current Rating (SCCR): 200kA

## APPROVALS:

- ANSI/UL 1449 4th Edition, Type 1 Component Assembly SPD, File E210793
- ANSI/IEEE C62.41.1, C62.41.2, C62.45
- RoHS Compliant



## GENERAL PRODUCT SPECIFICATIONS

Mounting:	35mm DIN-Rail	Operating & Storage Temperature:	- 40°C to + 85°C
Wire Range:	4-14AWG Solid / Stranded CU	Visual End of Life Indicator:	RED = End of Life
Terminal Torque:	35.4 lbs-in	Remote End of Life Indicator:	NO/NC Dry Contact
Degree of Protection:	IP 20	Frequency:	50-60 Hz
Flammability:	UL94 V0		

## 1-POLE, SINGLE-PHASE, 2-WIRE

Catalog Number	Nominal Voltage (VAC)	Maximum Continuous Operating Voltage (MCOV, VAC)				Voltage Protection Rating (VPR, VAC)				replacement plug	$I_n$ (kA)
		L-N	L-G	N-G	L-L	L-N	L-G	N-G	L-L		
STP120P07(M)	120	175	-	-	-	600	-	-	-	SP07U175	20
STP230P07(M)	240	275	-	-	-	600	-	-	-	SP07U275	20
STP277P07(M)	277	320	-	-	-	600	-	-	-	SP07U320	20
STP347P07(M)	347	420	-	-	-	800	-	-	-	SP07U420	10

## 2-POLE, SPLIT-PHASE, 3-WIRE

Catalog Number	Nominal Voltage (VAC)	Maximum Continuous Operating Voltage (MCOV, VAC)				Voltage Protection Rating (VPR, VAC)				replacement plug	$I_n$ (kA)
		L-N	L-G	N-G	L-L	L-N	L-G	N-G	L-L		
STP240S07(M)	120/240	175	-	-	350	600	-	-	1800	SP07U175	20
STP480S07(M)	240/480	275	-	-	550	600	-	-	1200	SP07U275	20

## 3-POLE, 3-PHASE DELTA, 4-WIRE

Catalog Number	Nominal Voltage (VAC)	Maximum Continuous Operating Voltage (MCOV, VAC)				Voltage Protection Rating (VPR, VAC)				replacement plug	$I_n$ (kA)
		L-N	L-G	N-G	L-L	L-N	L-G	N-G	L-L		
STP240D07(M)	240	-	275	-	550	-	900	-	1800	SP07U275	20
STP480D07(M)	480	-	550	-	1100	-	1500	-	3000	SP07U550	10

## 3-POLE, 3-PHASE WYE, 4-WIRE

Catalog Number	Nominal Voltage (VAC)	Maximum Continuous Operating Voltage (MCOV, VAC)				Voltage Protection Rating (VPR, VAC)				replacement plug	$I_n$ (kA)
		L-N	L-G	N-G	L-L	L-N	L-G	N-G	L-L		
STP208Y07(M)	120/208	175	-	-	350	600	-	-	1200	SP07U175	20
STP480Y07(M)	277/480	320	-	-	640	1500	-	-	2500	SP07U320	20
STP600Y07(M)	347/600	420	-	-	840	1500	-	-	2500	SP07U420	10
STP690Y07(M)	400/690	550	-	-	1100	1500	-	-	2500	SP07U550	10



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Manuf.: PNo:

Mersen: STP120P07

# STP Series Pluggable

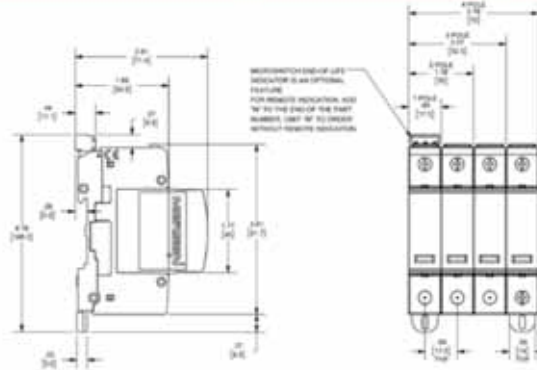
Surge-Trap®

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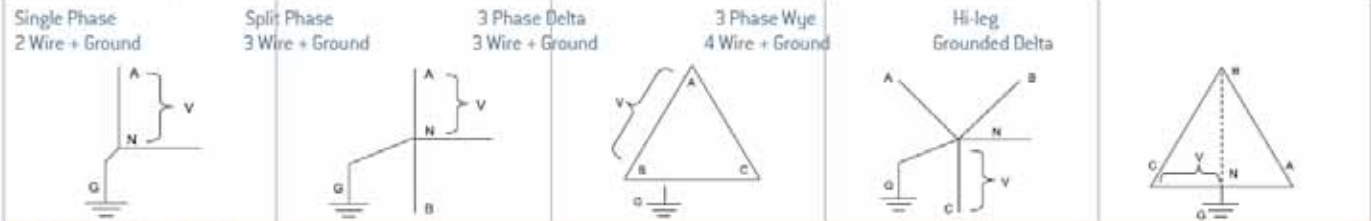
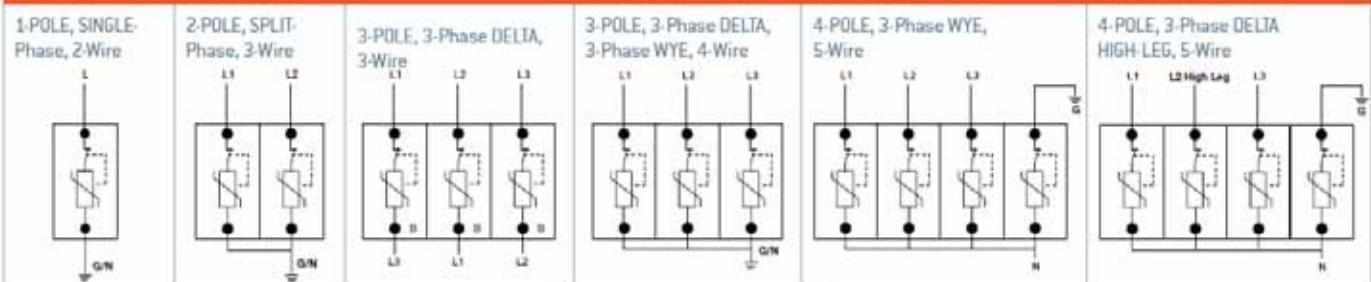
40-030-002

## DIMENSIONS - STP SERIES

poles	a	
	IN	MM
1 Pole	0.69	17.5
2 Pole	1.38	35
3 Pole	2.07	52.5
4 Pole	2.76	70



## WIRING DIAGRAMS



## REMOTE STATUS INDICATOR

ST Series	<table border="1"> <tr><td>NO</td><td>1</td></tr> <tr><td>Common</td><td>2</td></tr> <tr><td>NC</td><td>3</td></tr> </table>	NO	1	Common	2	NC	3		Signal Wire Range	#16 to #30 AWG
NO	1									
Common	2									
NC	3									
STP Series	<table border="1"> <tr><td>NO</td><td>14</td></tr> <tr><td>Common</td><td>11</td></tr> <tr><td>NC</td><td>12</td></tr> </table>	NO	14	Common	11	NC	12	Terminal Torque	2.2 lb-in	
NO	14									
Common	11									
NC	12									
			Cont. between Comm + NO	Product Offline, Not Protected						
			Cont. between Comm + NC	Product Online, Protected						
125 VAC - 3A max										

ST and STP Series: for remote indication, add "M" to the end of the catalog number. For example, ST4803PYGM.



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Manuf.: PNo:

Mersen: STP120P07

# EDS-G508E/G512E/G516E Series

Award-winning Product

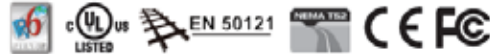


MOXA

8G/12G/16G-port full Gigabit managed Ethernet switches



- > Up to 12 10/100/1000BaseT(X) ports and 4 100/1000BaseSFP ports (EDS-G516E)
- > Turbo Ring and Turbo Chain (recovery time < 50 ms @ 250 switches), RSTP/STP, and MSTP for network redundancy
- > RADIUS, TACACS+, SNMPv3, IEEE 802.1X, HTTPS, and SSH to enhance network security
- > Easy network management by web browser, CLI, USB serial console, ABC-02-USB, MXconfig, and Windows utility
- > EtherNet/IP, PROFINET, and Modbus/TCP protocols supported for device management and monitoring



33-371-007

## Specifications

### Technology

#### Standards:

- IEEE 802.3 for 10BaseT
- IEEE 802.3u for 100BaseT(X) and 100BaseFX
- IEEE 802.3ab for 1000BaseT(X)
- IEEE 802.3z for 1000BaseX
- IEEE 802.3x for Flow Control
- IEEE 802.1D-2004 for Spanning Tree Protocol
- IEEE 802.1w for Rapid STP
- IEEE 802.1s for Multiple Spanning Tree Protocol
- IEEE 802.1Q for VLAN Tagging
- IEEE 802.1p for Class of Service
- IEEE 802.1X for Authentication
- IEEE 802.3ad for Port Trunk with LACP

**Protocols:** IGMPv1/v2/v3, GMRP, GVRP, SNMPv1/v2c/v3, DHCP Server/Client, DHCP Option 66/67/82, BootP, TFTP, SMTP, RARP, RMON, HTTP, HTTPS, Telnet, SSH, Syslog, EtherNet/IP, PROFINET, Modbus/TCP, SNMP Inform, LLDP, IEEE 1588 PTPv2, IPv6, NTP Server/Client

**LED Indicators:** PWR1, PWR2, FAULT, STATE, 10/100/1000M, MSTR/HEAD, CPLR/TAIL

**Alarm Contact:** 1 relay output with current carrying capacity of 1 A @ 24 VDC

**Digital Inputs:** 1 input with the same ground, but electrically isolated from the electronics.

- +13 to +30 V for state "1"
- -30 to +3 V for state "0"
- Max. input current: 8 mA

**Button:** Reset button

### Power Requirements

**Input Voltage:** 12/24/48/-48 VDC, redundant dual inputs

**Input Current:**

- EDS-G516E: 24 VDC / 0.46 A
- EDS-G512E: 24 VDC / 0.4 A
- EDS-G508E: 24 VDC / 0.33 A

**Overload Current Protection:** Present

**Connection:** 2 removable 2-contact terminal blocks

**Reverse Polarity Protection:** Present

### Physical Characteristics

**Housing:** Metal, IP30 protection

**Dimensions:** 79.2 x 135 x 137 mm (3.1 x 5.3 x 5.4 in)

**Weight:** 1440 g

**Installation:** DIN-rail mounting, wall mounting (with optional kit)

### Environmental Limits

**Operating Temperature:**

Standard Models: -10 to 60°C (14 to 140°F)

Wide Temp. Models: -40 to 75°C (-40 to 167°F)

**MIB:** MIB-II, Ethernet-Like MIB, P-BRIDGE MIB, Q-BRIDGE MIB, Bridge MIB, RSTP MIB, RMON MIB Group 1, 2, 3, 9

**Flow Control:** IEEE 802.3x flow control, back pressure flow control

### Switch Properties

**Priority Queues:** 4

**Max. Number of Available VLANs:** 256

**VLAN ID Range:** VID 1 to 4094

**IGMP Groups:** 2048

**MAC Table Size:** 8 K

**Packet Buffer Size:** 1 Mbit

**Jumbo Frame Size:** 9.6 KB

### Interface

**RJ45 Ports:** 10/100/1000BaseT(X) auto negotiation speed

**Fiber Ports:** 100/1000BaseSFP slot

**Console Port:** USB-serial console (Type B connector)

**Storage Port:** USB storage (Type A connector for ABC-02-USB)

**DIP Switches:** Turbo Ring, Master, Coupler, Reserve

**Storage Temperature:** -40 to 85°C (-40 to 185°F)

**Ambient Relative Humidity:** 5 to 95% (non-condensing)

### Standards and Certifications

**Safety:** UL 508

**Hazardous Location:** UL/cUL Class 1 Division 2 (pending), ATEX Zone 2 (pending)

**EMI:** FCC Part 15 Subpart B Class A, EN 61000-6-4 (Industrial)

**EMS:**

- EN 61000-6-2 (Industrial), EN 61000-4-2 (ESD) Level 4,
- EN 61000-4-3 (RS) Level 3, EN 61000-4-4 (EFT) Level 4,
- EN 61000-4-5 (Surge) Level 4, EN 61000-4-6 (CS) Level 3,
- EN 61000-4-8,
- IEEE 1613

**Traffic Control:** NEMA TS2

**Rail Traffic:** EN 50121-4

**Shock:** IEC 60068-2-27

**Freefall:** IEC 60068-2-32

**Vibration:** IEC 60068-2-6

**Note:** Please check Moxa's website for the most up-to-date certification status.

### MTBF (mean time between failures)

**Time:** EDS-G508E Series: 808,970 hrs

EDS-G512E-4GSFP Series: 816,823 hrs

EDS-G516E-4GSFP Series: 805,491 hrs

**Database:** Telcordia (Bellcore), GB

### Warranty

**Warranty Period:** 5 years

**Details:** See [www.moxa.com/warranty](http://www.moxa.com/warranty)



630-499-7080 · [www.elemechinc.com](http://www.elemechinc.com)

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Manuf.: PNo:

Moxa: EDS-G508E

By:

AJ





### Standards and Certifications

- UL listed
- CSA certified



### Enclosures

- Encapsulated design
- Suitable for indoor or outdoor applications
- Mountable in any position indoors and upright-only outdoors

#### 120 x 240 Volts to 120/240 Volts ①

kVA	Full Capacity Taps		Type	°C Temp. Rise	Frame	Wiring Diagram Number	Weight Lbs (kg)	Weathershield	Style Number
	FCAN	FCBN							
0.5	—	—	EP	115	FR57P	3E	16 (7)	Indoor-Outdoor	S10N11P51P
1	—	—	EP	115	FR67P	3E	31 (14)	Indoor-Outdoor	S10N11P01P
1.5	—	—	EP	115	FR67P	3E	42 (19)	Indoor-Outdoor	S10N11P16P
2	—	—	EP	115	FR68P	3E	42 (19)	Indoor-Outdoor	S10N11P02P
3	—	—	EP	115	FR176	3E	55 (25)	Indoor-Outdoor	S10N11S03N
5	—	—	EP	115	FR177	3E	113 (51)	Indoor-Outdoor	S10N11S05N
7.5	—	—	EP	115	FR178	3E	123 (56)	Indoor-Outdoor	S10N11S07N
10	—	—	EP	115	FR179	3E	193 (88)	Indoor-Outdoor	S10N11S10N
15	—	—	EP	115	FR180	3E	216 (98)	Indoor-Outdoor	S10N11S15N
25	—	—	EP	115	FR182	3E	375 (170)	Indoor-Outdoor	S10N11S25N

#### 240 x 480 Volts to 120/240 Volts Stainless Steel ②

kVA	Full Capacity Taps		Type	°C Temp. Rise	Frame	Wiring Diagram Number	Weight Lbs (kg)	Weathershield	Style Number
	FCAN	FCBN							
3	—	—	EP	115	FR176	3A	65 (30)	Indoor-Outdoor	S20N11S03SS
5	—	—	EP	115	FR177	3A	113 (51)	Indoor-Outdoor	S20N11S05SS
7.5	—	—	EP	115	FR178	3A	123 (56)	Indoor-Outdoor	S20N11S07SS
10	—	—	EP	115	FR179	3A	193 (88)	Indoor-Outdoor	S20N11S10SS
15	—	—	EP	115	FR180	3A	205 (93)	Indoor-Outdoor	S20N11S15SS
25	—	—	EP	115	FR182	3A	375 (170)	Indoor-Outdoor	S20N11S25SS

#### 208 Volts to 120/240 Volts ③

kVA	Full Capacity Taps		Type	°C Temp. Rise	Frame	Wiring Diagram Number	Weight Lbs (kg)	Weathershield	Style Number
	FCAN	FCBN							
0.5	—	—	EP	115	FR57P	26A	16 (7)	Indoor-Outdoor	S29N11P51P
1	—	—	EP	115	FR67P	26A	31 (14)	Indoor-Outdoor	S29N11P01P
1.5	—	—	EP	115	FR67P	26A	42 (19)	Indoor-Outdoor	S29N11P16P
2	—	—	EP	115	FR68P	26A	42 (19)	Indoor-Outdoor	S29N11P02P
3	—	—	EP	115	FR176	26A	65 (30)	Indoor-Outdoor	S29N11S03N
5	—	—	EP	115	FR177	26A	113 (51)	Indoor-Outdoor	S29N11S05N
7.5	—	—	EP	115	FR178	26A	123 (56)	Indoor-Outdoor	S29N11S07N
10	—	—	EP	115	FR179	26A	193 (88)	Indoor-Outdoor	S29N11S10N
15	—	—	EP	115	FR180	26A	216 (98)	Indoor-Outdoor	S29N11S15N
25	—	—	EP	115	FR182	26A	395 (179)	Indoor-Outdoor	S29N11S25N

### Notes

For 304 grade stainless steel enclosure, replace 10th character of catalog number with an "SS" suffix, e.g., P48G11S03SS, or add "SS" suffix before the addition of "CUB."  
 For 316 grade stainless steel enclosure, replace 10th character of catalog number with an "S6" suffix, e.g., P48G11S03S6, or add "S6" suffix before the addition of "CUB."  
 For other ratings or catalog numbers not shown, or for special enclosure types (including stainless steel), refer to Eaton. Frame drawings/dimensions information begins on **Page V2-T2-215**.



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Manuf.: PNo: Cutler-Hammer: S20N11P16P Assembly

**240 x 480 Volts to 120/240 Volts**

kVA	Full Capacity Taps		Type	°C Temp. Rise	Frame	Wiring Diagram Number	Weight Lbs (kg)	Weathershield	Style Number
	FCAN	FCBN							
0.050	—	—	EP	115	FR52	3A	7 (3)	Indoor-Outdoor	S20N11S81N
0.075	—	—	EP	115	FR54	3A	7 (3)	Indoor-Outdoor	S20N11S85N
0.100	—	—	EP	115	FR54	3A	7 (3)	Indoor-Outdoor	S20N11S82N
0.150	—	—	EP	115	FR55	3A	8 (4)	Indoor-Outdoor	S20N11S83N
0.25	—	—	EP	115	FR57P	3A	12 (5)	Indoor-Outdoor	S20N11P26P
0.5	—	—	EP	115	FR57P	3A	16 (7)	Indoor-Outdoor	S20N11P51P
0.75	—	—	EP	115	FR58AP	3A	26 (12)	Indoor-Outdoor	S20N11P76P
1	—	—	EP	115	FR67P	3A	31 (14)	Indoor-Outdoor	S20N11P01P
1.5	—	—	EP	115	FR67P	3A	42 (19)	Indoor-Outdoor	S20N11P16P
2	—	—	EP	115	FR68P	3A	42 (19)	Indoor-Outdoor	S20N11P02P
3	—	—	EP	115	FR176	3A	65 (30)	Indoor-Outdoor	S20N11S03N
3	②	②	EP	115	FR176	3A	65 (30)	Indoor-Outdoor	S20K11S03N
5	—	—	EP	115	FR177	3A	113 (51)	Indoor-Outdoor	S20N11S05N
5	②	②	EP	115	FR177	9A	105 (48)	Indoor-Outdoor	S20K11S05N
7.5	—	—	EP	115	FR178	3A	105 (48)	Indoor-Outdoor	S20N11S07N
7.5	②	②	EP	115	FR178	9A	123 (56)	Indoor-Outdoor	S20K11S07N
10	—	—	EP	115	FR179	3A	193 (88)	Indoor-Outdoor	S20N11S10N
10	②	②	EP	115	FR179	9A	193 (88)	Indoor-Outdoor	S20K11S10N
15	—	—	EP	115	FR180	3A	216 (98)	Indoor-Outdoor	S20N11S15N
15	③	③	EP	115	FR180	23A	216 (98)	Indoor-Outdoor	S20L11S15N
25	—	—	EP	115	FR182	3A	385 (175)	Indoor-Outdoor	S20N11S25N
25	③	③	EP	115	FR182	23A	375 (170)	Indoor-Outdoor	S20L11S25N
37.5	④	④	EP	115	FR300A	248A	735 (334)	Indoor-Outdoor	S20L11S37 ④

**600 Volts to 120/240 Volts**

kVA	Full Capacity Taps		Type	°C Temp. Rise	Frame	Wiring Diagram Number	Weight Lbs (kg)	Weathershield	Style Number
	FCAN	FCBN							
0.5	—	2 at -5%	EP	115	FR57P	2I	16 (7)	Indoor-Outdoor	S60G11P51P
0.75	—	2 at -5%	EP	115	FR58AP	2I	26 (12)	Indoor-Outdoor	S60G11P76P
1	—	2 at -5%	EP	115	FR67P	2I	31 (14)	Indoor-Outdoor	S60G11P01P
1.5	—	2 at -5%	EP	115	FR67P	2I	42 (19)	Indoor-Outdoor	S60G11P16P
2	—	2 at -5%	EP	115	FR68P	2I	42 (19)	Indoor-Outdoor	S60G11P02P
3	—	2 at -5%	EP	115	FR176	2I	65 (30)	Indoor-Outdoor	S60G11S03N
5	—	2 at -5%	EP	115	FR177	2I	105 (48)	Indoor-Outdoor	S60G11S05N
7.5	—	2 at -5%	EP	115	FR178	2I	123 (56)	Indoor-Outdoor	S60G11S07N
10	—	2 at -5%	EP	115	FR179	2I	193 (88)	Indoor-Outdoor	S60G11S10N
15	—	4 at -2.5%	EP	115	FR180	527A	216 (98)	Indoor-Outdoor	S60J11S15N
25	—	4 at -2.5%	EP	115	FR182	527A	385 (175)	Indoor-Outdoor	S60J11S25N
25	2 at 2.5%	4 at -2.5%	EP	115	FR132	83B	395 (180)	Indoor-Outdoor	S60M11S25N

**Notes**

- ① Contact Eaton for availability of 0.05–0.25 kVA designs.
- ② 1 at +10% FCBN at 240 volts; 2 at +5% FCBN at 480 volts.
- ③ 2 at +5% FCBN at 240 volts; 4 at +2.5% FCBN at 480 volts.
- ④ Floor-mount only.

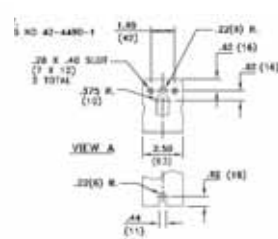
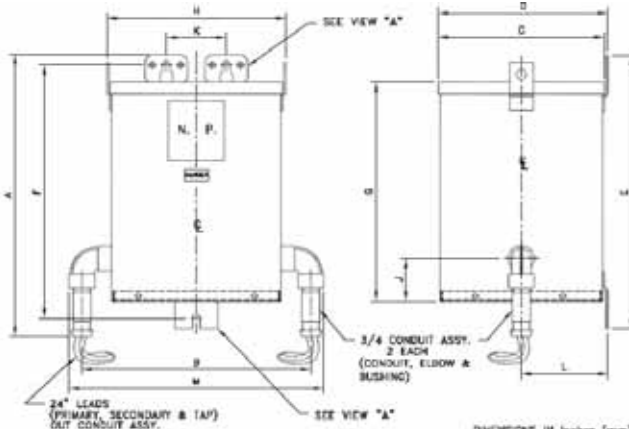
Contact your local Eaton sales office for CE Mark transformer requirements. For other ratings or styles not shown, or for special enclosure types (including stainless steel), refer to Eaton. Frame drawings/dimensions information begins on **Page V2-T2-213**.



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By: AJ

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Manuf.: PNO:  
Cutler-Hammer: S20N11P16P Assembly

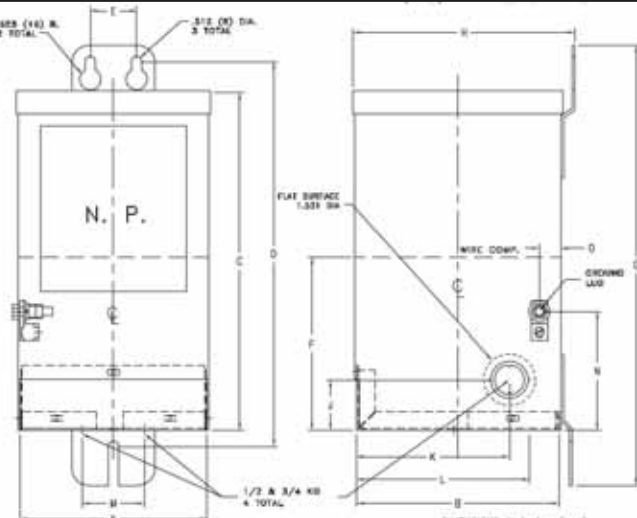


APPROX. NET WT. (LBS/KG)  
ALUMINUM COPPER

FRAME	A	B	C	D	E	F		
FR177H	113(51)	120(56)	16.53(420)	13.7(350)	9.47(246)	9.88(251)	16.15(410)	14.90(378)

DIMENSIONS IN inches (mm)

	G	H	J	K	L	M
	12.82(326)	10.06(256)	2.50(64)	3.50(89)	5.06(128)	13.54(343)



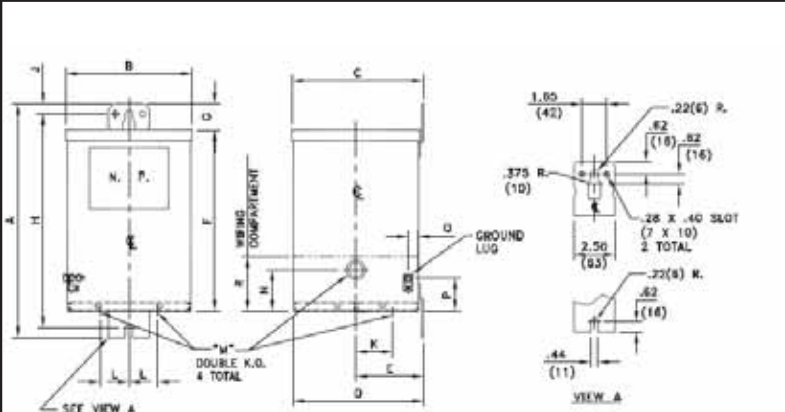
APPROX. NET WT. (LBS/KG)  
ALUMINUM COPPER

FRAME	A	B	C	D	E	F
FR177F	5.53(141)	6.88(152)	10.00(254)	11.40(291)	1.37(35)	5.12(130)

DIMENSIONS IN inches (mm)

	G	H	J	K	L	M
	13.02(331)	6.56(167)	1.50(38)	4.32(110)	3.11(79)	1.85(47)

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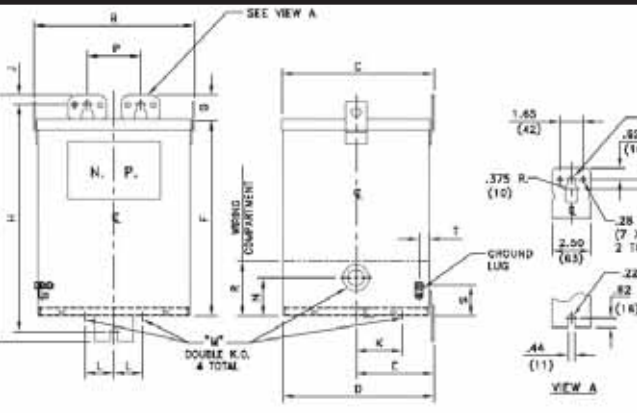


APPROX. NET WT. (LBS/KG)  
ALUMINUM COPPER

FRAME	A	B	C	D	E	F	G	H	J	
FR176	45(30)	89(31)	14.25(362)	7.68(195)	8.00(203)	7.94(202)	4.08(103)	11.06(281)	1.53(41)	13.00(330)

DIMENSIONS IN inches (mm)

	K	L	M	N	P	Q
	2.25(57)	1.75(44)	.5	.75(19.19)	2.50(64)	5.32(84)

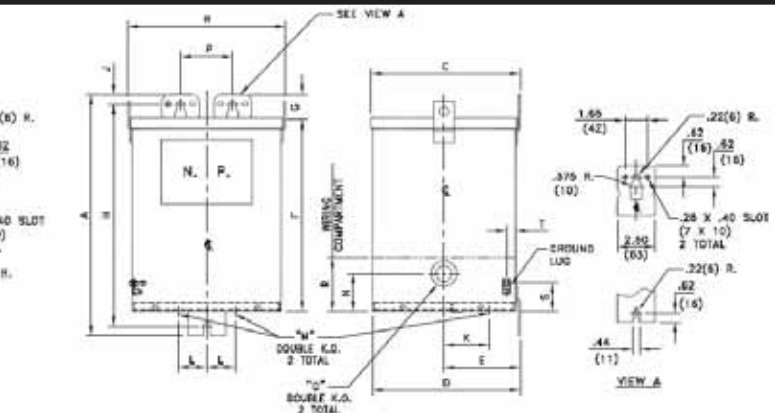


APPROX. NET WT. (LBS/KG)  
ALUMINUM COPPER

FRAME	A	B	C	D	E	F	G	H
FR178	123(55)	132(60)	16.00(406)	10.38(264)	9.99(254)	9.90(249)	5.06(129)	12.82(326)

DIMENSIONS IN inches (mm)

	J	K	L	M	N	P	R
	.83(16)	3.00(76)	1.80(46)	.75	1.25(19.32)	2.60(66)	3.45(88)



APPROX. NET WT. (LBS/KG)  
ALUMINUM COPPER

FRAME	A	B	C	D	E	F	G	H	J	
FR179	193(87)	222(91)	19.00(483)	13.38(340)	10.50(267)	10.48(266)	5.43(138)	15.82(402)	1.83(41)	17.75(451)

DIMENSIONS IN inches (mm)

	K	L	M	N	P	Q	R
	3.38(86)	1.88(48)	.75	1.25 (19.32)	2.50(64)	3.48(88)	1.00



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Manuf.: PNo: Cutler-Hammer: S20N11P16P Assembly

Item No. Z7.281.1227.0

Insulated jumper bar IVBWK 4 - 2

Cross connector, insulated for DIN rail terminal blocks type WK ..., 2-pole

Item No.	Z7.281.1227.0
EAN	4015573156081
order unit	10 Piece(s)

**Technical data**

**Accessories**

ArticlePrice	
Colour	Yellow
Type	Cross connector
Modular spacing	5.95 mm
Number of bridged clamps	2
Mounting method	Screwable
Insulated	Yes



Type	Part no.	Std. pack	Type	Part no.	Std. pack	Type	Part no.	Std. pack
for terminal blocks type			<b>WK 4/U</b>			<b>WK 4/3-6 SKO</b>		
<b>WK 2,5/U</b>	<b>5 mm spacing Screw: M 2.5</b>		<b>6 mm spacing Screw: M 3</b>			<b>6 mm spacing Screw: M 3</b>		
<b>WK 2,5 - 4 KOI/U</b>			<b>WK 4TKS D/U</b>			2pole 2072/2	Z7.220.0227.0	50
<b>WK 2,5 U/8113 S/H</b>			<b>WK 4 3 S 1 K/U</b>			3pole 2072/3	Z7.220.0327.0	50
<b>WKN 2,5 E/U</b>			<b>WK 4 3-6 S 1 K/U</b>			4pole 2072/4	Z7.220.0427.0	50
2pole VB WK 2,5-2	Z7.280.0227.0	10	<b>WK 4 5 S 2,8 1 K/U</b>			5pole 2072/5	Z7.220.0527.0	50
3pole VB WK 2,5-3	Z7.280.0327.0	10	<b>WK 4 3 S 1 K/IW/U</b>			6pole 2072/6	Z7.220.0627.0	50
4pole VB WK 2,5-4	Z7.280.0427.0	10	<b>WK 4 3-6 S 1 K/IW/U</b>			70pole 2072/M	Z7.210.1027.0	10
5pole VB WK 2,5-5	Z7.280.0527.0	10	<b>WK 4/U F1</b>					
6pole VB WK 2,5-6	Z7.280.0627.0	10	<b>WK 4/U F2</b>			<b>WK/5 S/U</b>	<b>6 mm spacing Screw: M 3</b>	
80pole VB WK 2,5 M-80	Z7.280.0027.0	10	2pole VB WK 4-2	Z7.281.0227.0	10	<b>WK/5-10 S/U</b>		
			3pole VB WK 4-3	Z7.281.0327.0	10	<b>WK/3-6 S/U</b>		
			4pole VB WK 4-4	Z7.281.0427.0	10	<b>WK/4 S/U</b>		
			5pole VB WK 4-5	Z7.281.0527.0	10	<b>WK/4-8 S/U</b>		
			6pole VB WK 4-6	Z7.281.0627.0	10	2pole 9703/6-2	Z7.211.0227.0	50
			70pole VB WK 4 M-70	Z7.281.0027.0	10	3pole 9703/6-3	Z7.211.0327.0	50
<b>WKM 2,5/15</b>	<b>5 mm spacing Screw: M 2.5</b>					4pole 9703/6-4	Z7.211.0427.0	50
<b>WKM 2,5 F1/15</b>			<b>WK 4/D 1/2 U</b>	<b>6 mm spacing Screw: M 3</b>		5pole 9703/6-5	Z7.211.0527.0	50
<b>WKM 2,5 F2/15</b>			<b>WK 4/D 2/2 U</b>			6pole 9703/6-6	Z7.211.0627.0	50
<b>WKM 2,5/2 S 2,8 1 K/15</b>			2pole VB WK 4 D...2	Z7.281.6227.0	10	70pole 9703/6 M-70	Z7.211.0027.0	10
<b>WKM 2,5 TP1 O/15</b>			3pole VB WK 4 D...3	Z7.281.6327.0	10			
<b>WKM 2,5 TP2 O/15</b>			4pole VB WK 4 D...4	Z7.281.6427.0	10			
2pole VB WKM 2,5/15-2	Z7.215.4227.0	50	5pole VB WK 4 D...5	Z7.281.6527.0	10			
3pole VB WKM 2,5/15-3	Z7.215.4327.0	50	6pole VB WK 4 D...6	Z7.281.6627.0	10			
4pole VB WKM 2,5/15-4	Z7.215.4427.0	50	70pole VB WK 4 D... M-70	Z7.281.6027.0	10			
5pole VB WKM 2,5/15-5	Z7.215.4527.0	50						
6pole VB WKM 2,5/15-6	Z7.215.4627.0	50	<b>WKM 4/15</b>	<b>6 mm spacing Screw: M 3</b>				
60pole VB WKM 2,5/15 M-60	Z7.215.4027.0	10	<b>WK 4/D EU</b>					
			<b>WK 4 E/U</b> for upper tier block					
<b>WK/3 S/IW/U</b>	<b>6 mm spacing Screw: M 3</b>		<b>WK 4 E/U GU ORANGE</b>					
<b>WK/3 - 6 S/IW/U</b>			<b>WK 4 E/U GO</b>					
<b>WK/4 S/IW/U</b>			<b>WK 4 E/U G2</b>					
<b>WK/4-8 S/IW/U</b>			<b>WK 4 E/U G1 ORANGE</b>					
2pole VB WK/...S/IW/U-2	Z7.281.3227.0	10	<b>WK 4 E/U G-URL</b>					
3pole VB WK/...S/IW/U-3	Z7.281.3327.0	10	<b>WK 4 E/U G-UURL</b>					
4pole VB WK/...S/IW/U-4	Z7.281.3427.0	10	<b>WK 4 E/U G-UURL</b>					
5pole VB WK/...S/IW/U-5	Z7.281.3527.0	10	<b>WK 4 E/U VB SCHWARZ</b>					
6pole VB WK/...S/IW/U-6	Z7.281.3627.0	10	2pole 9215 - 2	Z7.210.3227.0	50			
20pole VB WK/...S/IW/U-20	Z7.281.3027.0	10	3pole 9215 - 3	Z7.210.3327.0	50			
			4pole 9215 - 4	Z7.210.3427.0	50			
			5pole 9215 - 5	Z7.210.3527.0	50			
			6pole 9215 - 6	Z7.210.3627.0	50			
			70pole 9215 M-70	Z7.210.3027.0	10			



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Manuf.: . PNo: Wieland: Z7.281.1227

# MachineAlert™ Monitoring Relays

## Current Transformers

Use only with Cat No. 8095-C1.

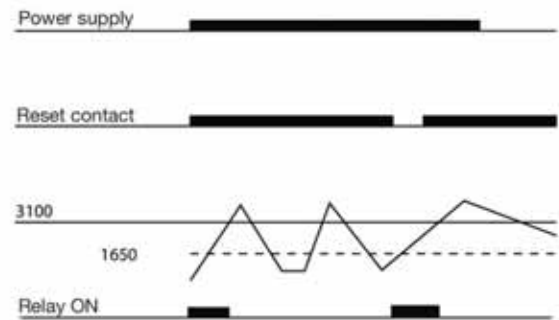
Trip Current Range Continuous AC Amperes (5 A Secondary Winding)	Maximum Current [A]		Cat. No.
	Continuous	Inrush	
4.2...50	75	350	8095-CT1
17...200	300	1400	8095-CT2
42...500	750	3500	8095-CT3
100...1200	1800	8400	8095-CT4



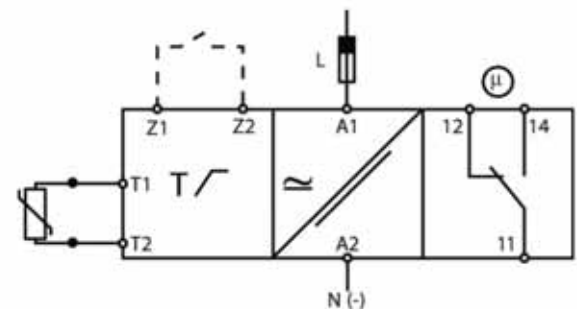
These devices are motor temperature monitoring relays, used to monitor the temperature of the coils of a motor with built-in PTCs. The alarm status of the relay can be reset by either an external contact or an internal button. The test button allows the simulation of the fault condition. The LEDs indicate the alarm status.

Cat. No.	817S-PTC-48	817S-PTC-115	817S-PTC-230
<b>Input Specifications</b>			
Input	Terminals T1, T2	Terminals T1, T2	Terminals T1, T2
Supply	24...48 V AC/DC	115V AC	230V AC
<b>Measuring Ranges</b>			
Max Cold PTC Resistance	1500 Ω	1500 Ω	1500 Ω
Alarm Setpoint	3100 Ω +/- 10%	3100 Ω +/- 10%	3100 Ω +/- 10%
Return Setpoint	1650 Ω +/- 10%	1650 Ω +/- 10%	1650 Ω +/- 10%
Short-circuit Detection	0...10 Ω	0...10 Ω	0...10 Ω
Measurement Voltage	<2.5 V	<2.5 V	<2.5 V
Contact Input	Terminals Z1, Z2	Terminals Z1, Z2	Terminals Z1, Z2
Disabled	>10 kΩ	>10 kΩ	>10 kΩ
Enabled	<500 Ω	<500 Ω	<500 Ω
Alarm Reset	>500 ms	>500 ms	>500 ms
<b>Output Specifications</b>			
Type of Contact	(1) Form C	(1) Form C	(1) Form C
Rated Insulation Voltage	250V AC	250V AC	250V AC
<b>Supply Specifications</b>			
Rated Operational Power			
AC	2.5VA	2.5VA	2.5VA
DC	1.5 W	1.5 W	1.5 W
<b>General Specifications</b>			
Alarm ON Delay	<150 ms	<150 ms	<150 ms
Reset Delay	<500 ms	<500 ms	<500 ms
<b>Environment</b>			
Degree of Protection	IP 20	IP 20	IP 20
Pollution Degree	3	3	3
Dimensions (W x H x D)	22.5 x 80 x 99.5 mm	22.5 x 80 x 99.5 mm	22.5 x 80 x 99.5 mm
Screw Terminals	Max. 0.5 N•m	Max. 0.5 N•m	Max. 0.5 N•m

Bulletin 817S Function Diagram



Bulletin 817S Wiring Diagram



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AJ

Device Tag:

THR1

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HBR8191

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Manuf.: PNo:

Allen-Bradley: 817S-PTC-115

06-005-067

# Pulse isolator



## 5202B

- 2 channels - 2 or 4 outputs
- Dual output
- 5-port 3.75 kVAC galvanic isolation
- Cable error detection
- Universal supply by AC or DC



18-247-001

### Environmental Conditions

Operating temperature.....	-20°C to +60°C
Calibration temperature.....	20...28°C
Relative humidity.....	< 95% RH (non-cond.)
Protection degree.....	IP20

### Mechanical specifications

Dimensions (HxWxD).....	109 x 23.5 x 130 mm
Weight approx.....	230 g
Wire size.....	1 x 2.5 mm <sup>2</sup> stranded wire
Screw terminal torque.....	0.5 Nm

### Common specifications

<b>Supply</b>	
Supply voltage, universal.....	21.6...253 VAC, 50...60 Hz or 19.2...300 VDC
Fuse.....	400 mA SB / 250 VAC
Max. required power.....	≤ 1.5 W (2 channels), 5202B1 and 5202B2
Max. required power.....	≤ 2.0 W (2 channels), 5202B4
Internal power dissipation.....	≤ 1.5 W (2 channels), 5202B1 and 5202B2
Internal power dissipation.....	≤ 2.0 W (2 channels), 5202B4

### Isolation voltage

Isolation voltage, test / working.....	3.75 kVAC / 250 VAC
PELV/SELV.....	IEC 61140

### Auxiliary supplies

NAMUR supply.....	8 VDC / 8 mA
EMC immunity influence.....	< ±0.5%
Extended EMC immunity: NAMUR NE21, A criterion, burst.....	< ±1%

### Input specifications

Sensor types.....	NAMUR according to EN 60947-5-6 / mechanical contact
Frequency range.....	0...5 kHz
Pulse length.....	> 0.1 ms
Input resistance.....	1 kΩ
Trig level, signal.....	< 1.2 mA, > 2.1 mA
Trig level, cable fault.....	< 0.1 mA, > 6.5 mA

### Output specifications

#### Relay output

Max. switching frequency.....	20 Hz
Max. voltage.....	250 VRMS
Max. current.....	2 AAC
Max. AC power.....	100 VA
Max. load at 24 VDC.....	1 A

#### NPN outputs

Max. switching frequency.....	5 kHz
Min. pulse length.....	> 0.1 ms
Max. load, current / voltage.....	80 mA / 30 VDC

#### Voltage drop at 25 mA / 80 mA.....

	< 0.75 VDC / < 2.5 VDC
--	------------------------

### Observed authority requirements

EMC.....	2014/30/EU
LVD.....	2014/35/EU
EAC.....	TR-CU 020/2011

### Approvals

ATEX.....	DEMKO 99ATEX127186, II (1) GD [EEx ia] IIC
UL.....	UL 913, UL 508
EAC Ex.....	RU C-DK.HA65.B.00355/19
SIL.....	Hardware assessed for use in SIL applications



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Manuf.: . PNo:

PR Electronics: 5202B2

By:

AJ

# SMALL COMPACT THERMOSTAT





## KTO 011 / KTS 011



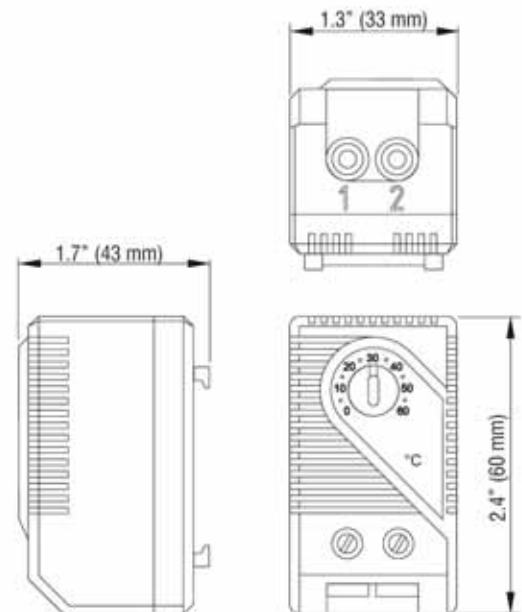
46-034-001



### Technical Data KT 011

Part No.	Contact type	Scale on housing
01140.9-00	normally closed 	30 - 140°F
01141.9-00	normally open 	30 - 140°F
01146.9-00	normally closed 	0 - 60°C
01147.9-00	normally open 	0 - 60°C

Sensor element:	Thermostatic bi-metal
Maximum tolerance:	±7.2°F (4K)
Switching difference (hysteresis):	12.6°F ± 5.4°F (7°C ± 3K)
Service life:	100,000 cycles
Switching capacity (max. load):	15A resistive/2A inductive @ 120 VAC 10A resistive/2A inductive @ 250 VAC DC 30W
EMI/EMC compliance:	EN 55014-1-2, EN 61000-3-2, EN 61000-3-3
Connections:	2-pole terminal for AWG 14 max. (2.5 mm <sup>2</sup> )
Mounting:	Clip for 35 mm DIN rail (EN 50022)
Dimensions (H x W x D):	2.4 x 1.3 x 1.7" (60 x 33 x 43 mm)
Housing:	Plastic, UL94V-0
Weight:	1.27 oz (36 g)
Protection type:	IP 20
Operating/storage temperature:	-49 to 158°F (-45 to 70°C)
Agency approvals:	UL, CSA



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TS1

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Manuf.: . PNo:

Stego: 01141.9-00

# UBC10.241, UBC10.241-N1

24V, 10A, DC-UPS



48-312-000



## DC-UPS WITH INTEGRATED BATTERY

- Compact and Easy to Install
- Longest Buffer Time in Class
- Easy Battery Access
- Stable Output Voltage in Buffer Mode
- Superior Battery Management for Longest Battery Life
- Temperature Compensated Battery Charging
- Comprehensive Diagnostics and Monitoring Functions
- Replace Battery Signal Included
- Electronically Overload and Short Circuit Protected
- 50% Power Reserves
- Selectable Buffer Time Limiter

### 1. GENERAL DESCRIPTION

This uninterruptible power supply (UPS) controller UBC10.241 with integrated battery is a compact addition to standard 24V power supplies to bridge power failures or voltage fluctuations. Expensive downtimes, long restart cycles and loss of data can be avoided.

The DC-UPS includes a professional battery management system which charges and monitors the battery to achieve the longest battery service life as well as many diagnostic functions that ensure a reliable operation of the entire system.

A unique feature of the UBC10.241 is that only one 12V battery is required to buffer the 24V output. This makes matching batteries unnecessary and allows a precise battery charging and testing.

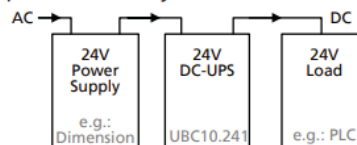
The UBC10.241 has one integrated 12V 5Ah high current VRLA battery, which is easy to change.

In addition to the UBC10.241, a separate UPS controller (UB10.241) which requires an external 12V battery is available when a longer buffer time is required.

### 2. SHORT-FORM DATA

Input voltage	nom. 24Vdc	
range	22.5-30Vdc	
Output current	min. 15A	Normal mode
	min. 10A	Buffer mode
Output voltage	typ. 0.23V lower as input voltage	Normal mode
	22.25V	Buffer mode, 10A
Integrated battery	12V 5Ah	VRLA lead acid
Temperature range	0 to 40°C	Operational
Dimensions	123x124x119mm	WxHxD
Buffer time	typ. 16'15"	At 5A load
	typ. 6'15"	At 10A load

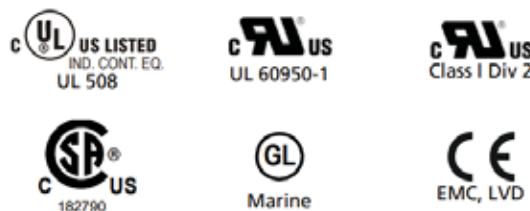
Typical setup of a DC-UPS system with the UBC10.241:



### 3. ORDER NUMBERS

DC-UPS	<b>UBC10.241</b>	Standard unit
	<b>UBC10.241-N1</b>	Battery not assembled
Accessories	<b>UZB12.051</b>	Battery 12V 5Ah

### 4. MARKINGS



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Manuf.: . PNo: PULS: UBC10.241



# PowerFlex® 525 AC Drive



50-005-075

PowerFlex® 525 AC Drives	
Power Ratings	100 - 120V: 0.4 to 1.1 kW / 0.5 to 1.5 Hp      380 - 480V: 0.4 to 22 kW / 0.5 to 30 Hp 200 - 240V: 0.4 to 2.2 kW / 0.5 to 20 Hp      525 - 600V: 0.4 to 22 kW / 0.5 to 30 Hp
Motor Control	Volts per Hertz      Closed Loop Velocity Vector Control Sensorless Vector Control      Permanent Magnet Motor Control
Application	Open Loop Speed Regulation Closed Loop Speed Regulation
Overload Capability	Normal Duty Application: 110% for 60 seconds, 150% for 3 sec Heavy Duty Application: 150% for 60 seconds, 180% for 3 sec (200% programmable)
Input Specification	1 Phase Voltage: 100 ... 120V/200 ... 240V Voltage: Adjustable 0V to rated motor voltage; -15% / +10% voltage tolerance 3 Phase Voltage: 200 ... 240V/380 ... 480V/525 ... 600V Frequency: 50 to 60 Hz Logic Control Ride Through: >0.5 seconds, 2 seconds typical 1/2 DC Bus operation (selectable) Maximum Short Circuit Rating: 100,000 amps symmetrical
Output Voltage Range	Adjustable 0V to rated motor voltage Intermittent Current: 150% for 60 seconds
Frequency Range	Max Output Frequency 500 Hz Input Frequency Variation 47 to 63 Hz
Ambient Operating Temperatures*	-20°C to 50°C (-4°F to 122°F) -20°C to 60°C (-4°F to 140°F) with current derating -20°C to 70°C (-4°F to 158°F) with current derating (with optional control module fan kit)
Altitude	1000 m (3280 ft) with derating guideline for up to max 4000 m (13,123 ft), with the exception of 600V at max 2000 m (6,561ft)
Enclosures	IP20 NEMA/Open IP30 NEMA/UL Type 1 (with conduit kit)
Mounting	DIN rail (frames A,B and C) Zero Stacking 50mm (1.96 in) air-flow gap at the top and bottom**
Configuration	Integral HIM, LCD, 5 digits, 16 segments, multi-language Connected Components Workbench Software Studio 5000™
Control I/O	7 Digital Inputs (24V DC, 6 programmable) 1 Analog Output (1 unipolar voltage or current) 2 Digital Outputs 2 Relays (1 form A relay & 1 form B relay; 24V DC, 120V AC, 240V AC) 2 Analog Inputs (1 bipolar voltage, 1 current)
Dynamic Braking	7th IGBT braking, DC braking
Carrier Frequency	2 to 16 kHz. 4 kHz default
EMC Filtering	Embedded 1 ph 240V and 3 ph 480V. Available as an external option for all voltages
Safety	Embedded ISO 13849-1 SIL2/PLd Cat 3 Safe Torque-Off
Communications	Embedded EtherNet/IP port      Integral RS485 with Modbus RTU/DSI Dual port EtherNet/IP option card      PROFIBUS® DP option card DeviceNet option card
Feedback Types	Line Driver Type Encoder Quadrature (dual channel) or Single Channel -Single ended or differential (A, B channel); Duty cycle of 50%, +10% Pulse-Train Input (1 to 100kHz) -Configurable Input Voltage: 5VDC (±10%); 10-12VDC (±10%), or 24V DC (±15%) Allowance Pulse Frequency -DC to 250Kz Frequency controlled PWM Allowable Pulse Frequency
Protection	Fault history log, Password-lock security
Standards	UL      TUV      C-Tick      Semi F47      ATEX      CE Marine (RINA) RoHS      ACS 156      CE      cUL      GOST-R      KCC
Control Features	Flying start      Fiber application specific features V/F ratioBus regulator      PTC input compatible Process PID      Position Control Common DC Bus      Regulation with encoder feedback or analog input StepLogic™ functions (relays and timers)      1/2 DC Bus Operation



Manuf.: PNo: <b>Allen-Bradley: 25B-D010N104</b>	Rev: 0	Device Tag: <b>VFD1</b>	
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	By: AJ		

**PowerFlex 525 AC Drives**

**50-005-075**

50/60Hz	Normal Duty (ND)		Heavy Duty (HD)		Output Current	Catalog No.	Frame Size
	HP	kW	HP	kW			
100-120V, 10 No Filter	0.5	0.4	0.5	0.4	2.5A	25B-V2P5N104	A
	1	0.75	1	0.75	4.8A	25B-V4P8N104	B
	1.5	1.1	1.5	1.1	6.0A	25B-V6P0N104	B
200-240V, 10 No Filter	0.5	0.4	0.5	0.4	2.5A	25B-A2P5N104	A
	1	0.75	1	0.75	4.8A	25B-A4P8N104	A
	2	1.5	2	1.5	8.0A	25B-A8P0N104	B
	3	2.2	3	2.2	11.0A	25B-A011N104	B
200-240V, 10 EMC Filter	0.5	0.4	0.5	0.4	2.5A	25B-A2P5N114	A
	1	0.75	1	0.75	4.8A	25B-A4P8N114	A
	2	1.5	2	1.5	8.0A	25B-A8P0N114	B
	3	2.2	3	2.2	11.0A	25B-A011N114	B
200-240V, 30 No Filter	0.5	0.4	0.5	0.4	2.5A	25B-B2P5N104	A
	1	0.75	1	0.75	5.0A	25B-B5P0N104	A
	2	1.5	2	1.5	8.0A	25B-B8P0N104	A
	3	2.2	3	2.2	11.0A	25B-B011N104	A
	5	4	5	4	17.5A	25B-B017N104	B
	7.5	5.5	7.5	5.5	24.0A	25B-B024N104	C
	10	7.5	10	7.5	32.2A	25B-B032N104	D
	15	11	15	11	48.3A	25B-B048N104	E
	20	15	15	11	62.1A	25B-B062N104	E
380-480V, 30 No Filter	0.5	0.4	0.5	0.4	1.4A	25B-D1P4N104	A
	1	0.75	1	0.75	2.3A	25B-D2P3N104	A
	2	1.5	2	1.5	4.0A	25B-D4P0N104	A
	3	2.2	3	2.2	6.0A	25B-D6P0N104	A
	5	4	5	4	10.5A	25B-D010N104	B
	7.5	5.5	7.5	5.5	13.0A	25B-D013N104	C
	10	7.5	10	7.5	17.0A	25B-D017N104	C
	15	11	15	11	24A	25B-D024N104	D
	20	15	15	11	30A	25B-D030N104	D
	25	18.5	20	15	37A	25B-D037N114*	E
30	22	25	18.5	43A	25B-D043N114*	E	
380-480V, 30 EMC Filter	0.5	0.4	0.5	0.4	1.4A	25B-D1P4N114	A
	1	0.75	1	0.75	2.3A	25B-D2P3N114	A
	2	1.5	2	1.5	4.0A	25B-D4P0N114	A
	3	2.2	3	2.2	6.0A	25B-D6P0N114	A
	5	4	5	4	10.5A	25B-D010N114	B
	7.5	5.5	7.5	5.5	13.0A	25B-D013N114	C
	10	7.5	10	7.5	17.0A	25B-D017N114	C
	15	11	15	11	24A	25B-D024N114	D
	20	15	15	11	30A	25B-D030N114	D
	25	18.5	20	15	37A	25B-D037N114	E
30	22	25	18.5	43A	25B-D043N114	E	
525-600V, 30 No Filter	0.5	0.4	0.5	0.4	0.9A	25B-E0P9N104	A
	1	0.75	1	0.75	1.7A	25B-E1P7N104	A
	2	1.5	2	1.5	3.0A	25B-E3P0N104	A
	3	2.2	3	2.2	4.2A	25B-E4P2N104	A
	5	4	5	4	6.6A	25B-E6P6N104	B
	7.5	5.5	7.5	5.5	9.9A	25B-E9P9N104	C
	10	7.5	10	7.5	12.0A	25B-E012N104	C
	15	11	15	11	19.0A	25B-E019N104	D
	20	15	15	11	22.0A	25B-E022N104	D
	25	18.5	20	15	27.0A	25B-E027N104	E
30	22	25	18.5	32.0A	25B-E032N104	E	

Dimensions mm (in)	Frame A: 152 (5.98) H x 72 (2.83) W x 172 (6.77) D
	Frame B: 180 (7.08) H x 87 (3.42) W x 172 (6.77) D
	Frame C: 220 (8.66) H x 109 (4.29) W x 184 (7.24) D
	Frame D: 260 (10.23) H x 130 (5.11) W x 212 (8.34) D
	Frame E: 300 (11.81) H x 185 (7.28) W x 279 (10.98) D

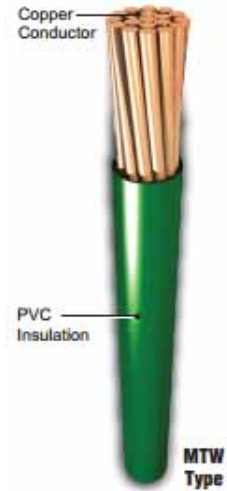


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Manuf.: PNO: Allen-Bradley: 25B-D010N104

# Wire – MTW Type

- CONDUCTORS:**
  - 22 AWG - 8AWG Stranded Tinned Copper per ASTM B-33
  - 22 AWG - 10 AWG Solid Tinned Copper per ASTM M-33
- INSULATION:**
  - Color-Coded Polyvinyl Chloride (PVC)
- TEMPERATURE RANGE/  
VOLTAGE RATING:**
  - UL 1011/1015/1028/BC-5W2: 105°C/600V
  - UL MTW: 90°C/600V
  - CSA AWM I A/B & TEW: 105°C/600V
- FLAME COMPLIANCES:**
  - UL VW-1
  - CSA FT-1
- INDUSTRY APPROVALS:**
  - UL Standard 758 - Styles 1011/1015/1028/1032/1230/1231/1335/1344
  - UL Standard 1063 - MTW
  - UL Standard 1426 - BC-5W2: 16 AWG - 8 AWG
  - CSA AWM I A/B & TEW
  - UL THHW
  - UL CT Tray Rated
  - SAE J378
- STANDARD COLORS:**
  - Black, Orange, Blue, Violet, White, Yellow, Brown, Green/Yellow, Red, Green, Gray
- OPTIONS:**
  - Stripes available upon request (minimums may apply)
  - Other copper constructions available upon request (minimums may apply)



51-000-062

Catalog Number	Description
F22027	22 AWG (7/.0096) TC AWM 1015
F20037	20 AWG (10/30) TC AWM 1015
F18054	18 AWG (16/30) TC AWM 1015
F16032	16 AWG (26/30) TC AWM 1015
F14037	14 AWG (41/30) TC AWM 1015
F12024	12 AWG (65/30) TC AWM 1015
F10012	10 AWG (105/30) TC AWM 1015
F08010	8 AWG (7X19/29) TC AWM 1028

**TEW/MTW Wire (Tinned Copper) Applications:**

► This tinned copper hook up wire may be used for wiring of machine tools, appliances, and control cabinets.



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By:	AJ	HBR8191	Page # 1/1

Manuf.: . PNo: EleMech: 51-000-062

# Polyurethane Tubing



94-255-009



## Specifications

Operating Fluid	Air, Water
Max. Operating Pressure	115 psi (0.8MPa) at 68°F (20°C)
Burst Pressure	Refer to burst pressure characteristic chart
Operating Temperature	Air: -4° to 140°F (-20° to 60°C) Water: 40° to 105°F (5° to 40°C)
Material	Polyurethane
Hardness	Shore A 95

## Dimensions

Inch	Series TIUB							
	Model	TIUB01	TIUB05	TIUB07	TIUB11	TIUB13		
Tube OD (Inches)		1/8	5/32	3/16	1/4	5/16	3/8	1/2
Tube ID (Inches)		0.08	0.1	0.13	0.17	0.2	0.25	0.33
Min. bending radius (Inches)		0.39	0.39	0.6	0.91	0.79	1.06	1.38

## How To Order

**TIUB 05 BU - 33**

Polyurethane → (under TIUB)  
 Inch Size → (under 05)  
 \*Color Indication → (under BU)  
 Length Per Roll → (under 33)

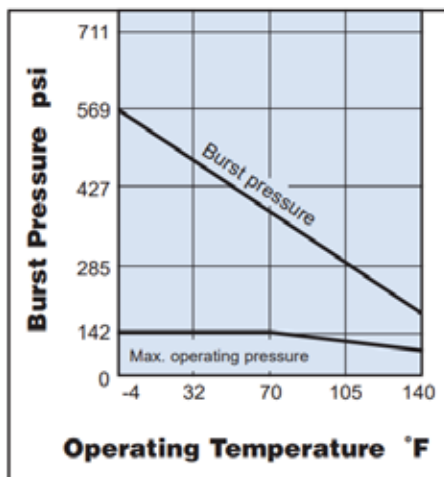
Symbol	Tube Size
01	1/8
See Note*	5/32
05	3/16
07	1/4
See Note*	5/16
11	3/8
13	1/2

Symbol	Color
B	Black
W	White
R	Red
BU	Blue
Y	Yellow
G	Green
C	Clear
YR	Orange

Symbol	Roll Size
20	66ft
33 <sup>1</sup>	100ft
153 <sup>1</sup>	500ft
305 <sup>1</sup>	1000ft

Longer lengths available upon request  
<sup>1</sup> Stocked item

## Burst Pressure Characteristics Chart



### ⚠ Caution

1. Can be used with general industrial water. For other fluids, please consult SMC.
2. Max. operating pressure and minimum bending radius are measured at 68°F.
3. When using tubing with SMC fittings, the chemical resistance of the fitting has to be investigated as well.



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Manuf.: . PNo: SMC USA: TIUB11BU-33

# Stainless Steel 316 One-touch Fittings *Series KQG2*



Applicable Tube: Inch Size, Connection Thread: UNF, NPT

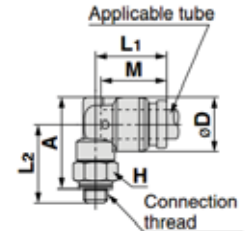
## Male Elbow: KQG2L

Applicable tube O.D. (inch)	Connection thread UNF, NPT	Model	H (Width across flat)	Note 1) $\phi D$	L1	L2	A*	M	Note 2) Effective area (mm <sup>2</sup> )	Weight (g)
$\phi 1/8"$	10-32UNF	KQG2L01-32	8	8.3	13.1	14.8	16	12	2.6	6.3
	1/8	KQG2L01-N01S	12		13.6	14.9	15.8		3	9
	1/4	KQG2L01-N02S	14		18.7	18.4	16.7			
$\phi 5/32"$	10-32UNF	KQG2L03-32	8	9.1	13.7	15.2	16.8	12.6	3.5	6.9
	1/8	KQG2L03-N01S	12		14.4	15.3	16.6		4.2	9.9
	1/4	KQG2L03-N02S	14		19.1	19.2	17.6			
$\phi 1/4"$	10-32UNF	KQG2L07-32	8	11.7	14.7	16.5	19.3	13.5	3.5	8.9
	1/8	KQG2L07-N01S	12		16.6	19.2	11.7			
	1/4	KQG2L07-N02S	14		15.9	20.4	21.8		19.4	
	3/8	KQG2L07-N03S	19		22.2	23.3	34.2			
$\phi 5/16"$	1/8	KQG2L09-N01S	12	13.7	18.6	18.3	21.9	16.1	21.6	15.1
	1/4	KQG2L09-N02S	14		19.1	21.5	23.9		21.1	
	3/8	KQG2L09-N03S	19		23.3	25.4	35.7			
$\phi 3/8"$	1/8	KQG2L11-N01S	12	16	20	19.4	24.2	16.6	21.6	19.7
	1/4	KQG2L11-N02S	14		22.6	26.2	23.2			
	3/8	KQG2L11-N03S	19		21	24.4	27.7		36.7	
	1/2	KQG2L11-N04S	22		28.2	29.8	60.2			
$\phi 1/2"$	1/4	KQG2L13-N02S	14	19.6	22.7	24.4	29.8	18.5	50.2	29.4
	3/8	KQG2L13-N03S	19		23.7	26.1	31.2		39.2	
	1/2	KQG2L13-N04S	22		29.9	33.3	61.3			

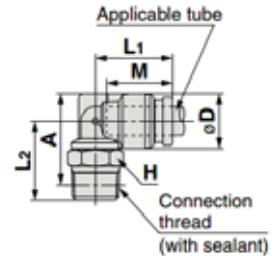
\* Reference dimensions after installation of NPT thread  
 Note 1)  $\phi D$  is maximum diameter.  
 Note 2) Value of FEP tube.



(10-32UNF)



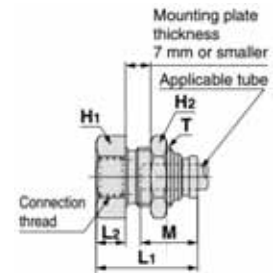
(NPT)



## Bulkhead Connector: KQG2E

Applicable tube O.D. (inch)	Connection thread NPT	Model	T (UNF)	Width across flat		L1	L2	Mounting hole	M	Note) Effective area (mm <sup>2</sup> )	Weight (g)
				H1	H2						
$\phi 1/8"$	1/4	KQG2E01-N02	7/16-20UNF	17	14	32.8	15.3	12.5	12	3.4	30.6
$\phi 5/32"$	1/4	KQG2E03-N02	7/16-20UNF	17	14	32.6	15.3	12.5	12.6	5.6	30.1
$\phi 1/4"$	1/4	KQG2E07-N02	1/2-20UNF	17	17	32.7	14.8	14	13.5	13.1	32.6
$\phi 5/16"$	3/8	KQG2E09-N03	5/8-18UNF	19	19	35	15.1	17	16.1	26.1	38.2
$\phi 3/8"$	3/8	KQG2E11-N03	3/4-16UNF	21	22	33.8	13.3	20.5	16.6	41.5	51.7
$\phi 1/2"$	3/8	KQG2E13-N03	7/8-14UNF	24	26	34.6	12.3	23.5	18.5	58.3	73.2
	1/2	KQG2E13-N04				41.4	19.1				74.7

Note) Value of FEP tube.



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BU2

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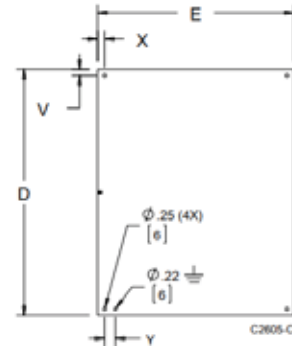
Manuf.: PNO:

SMC USA: KQG2E11-N03

94-255-042

# PANELS FOR JUNCTION BOXES

<b>SUB-PANEL CATALOG NUMBER</b>	<b>SUB-PANEL DIMENSIONS (IN.)</b>
<b>A-DPESS</b>	<b>D x E</b>



11-035-129

**NOTE:**

1. 6 indicates 316 Stainless Steel.
2. AL indicates Aluminum
3. G indicates Conductive Steel

Catalog Number	Material	Panel Size D x E (in.)	Panel Size D x E (mm)	V (in.)	V (mm)	X (in.)	X (mm)	Y (in.)	Y (mm)
A4P4G	Conductive	2.88 x 2.88	73 x 73	.31	8	.31	8	1.25	32
A6P4	Painted steel	4.88 x 2.88	124 x 73	.31	8	.31	8	1.25	32
A6P4G	Conductive steel	4.88 x 2.88	124 x 73	.31	8	.31	8	1.25	32
A6P4SS	Stainless Steel	4.88 x 2.88	124 x 73	.31	8	.31	8	1.25	32
A6P4AL	Aluminum	4.88 x 2.88	124 x 73	.31	8	.31	8	1.25	32
A6P6	Painted steel	4.88 x 4.88	124 x 124	.31	8	.31	8	1.25	32
A6P6G	Conductive steel	4.88 x 4.88	124 x 124	.31	8	.31	8	1.25	32
A6P6SS	Stainless Steel	4.88 x 4.88	124 x 124	.31	8	.31	8	1.25	32
A6P6AL	Aluminum	4.88 x 4.88	124 x 124	.31	8	.31	8	1.25	32
A7P7G	Conductive	5.88 x 5.88	149 x 149	.31	8	.31	8	1.25	32
A8P6	Painted steel	6.75 x 4.88	171 x 124	.25	6	.31	8	1.25	32
A8P6G	Conductive steel	6.75 x 4.88	171 x 124	.25	6	.31	8	1.25	32
A8P6SS	Stainless Steel	6.75 x 4.88	171 x 124	.25	6	.31	8	1.25	32
A8P6AL	Aluminum	6.75 x 4.88	171 x 124	.25	6	.31	8	1.25	32
A8P8	Painted steel	6.75 x 6.88	171 x 175	.25	6	.31	8	1.25	32
A8P8G	Conductive Steel	6.75 x 6.88	171 x 175	.25	6	.31	8	1.25	32
A8P8AL	Aluminum	6.75 x 6.88	171 x 175	.25	6	.31	8	1.25	32
A9P6G	Conductive	7.38 x 4.63	187 x 118	.31	8	.31	8	1.25	32
A10P8	Painted steel	8.75 x 6.88	222 x 175	.25	6	.31	8	1.25	32
A10P8G	Conductive steel	8.75 x 6.88	222 x 175	.25	6	.31	8	1.25	32
A10P8SS	Stainless Steel	8.75 x 6.88	222 x 175	.25	6	.31	8	1.25	32
A10P8AL	Aluminum	8.75 x 6.88	222 x 175	.25	6	.31	8	1.25	32
A10P10	Painted steel	8.75 x 8.88	222 x 226	.25	6	.31	8	1.25	32
A10P10G	Conductive steel	8.75 x 8.88	222 x 226	.25	6	.31	8	1.25	32
A10P10AL	Aluminum	8.75 x 8.88	222 x 226	.25	6	.31	8	1.25	32
A12P6	Painted steel	10.75 x 4.88	273 x 124	.25	6	.31	8	1.25	32
A12P6G	Conductive steel	10.75 x 4.88	273 x 124	.25	6	.31	8	1.25	32
A12P10	Painted steel	10.75 x 8.88	273 x 226	.25	6	.31	8	1.25	32
A12P10G	Conductive steel	10.75 x 8.88	273 x 226	.25	6	.31	8	1.25	32
A12P10SS	Stainless Steel	10.75 x 8.88	273 x 226	.25	6	.31	8	1.25	32
A12P10AL	Aluminum	10.75 x 8.88	273 x 226	.25	6	.31	8	1.25	32
A12P12	Painted steel	10.75 x 10.88	273 x 276	.25	6	.31	8	1.25	32
A12P12G	Conductive steel	10.75 x 10.88	273 x 276	.25	6	.31	8	1.25	32
A12P12SS	Stainless Steel	10.75 x 10.88	273 x 276	.25	6	.31	8	1.25	32
A14P8	Painted steel	12.75 x 6.88	324 x 175	.25	6	.31	8	1.25	32
A14P8G	Conductive steel	12.75 x 6.88	324 x 175	.25	6	.31	8	1.25	32
A14P12	Painted steel	12.75 x 10.88	324 x 276	.25	6	.31	8	1.25	32
A14P12G	Conductive steel	12.75 x 10.88	324 x 276	.25	6	.31	8	1.25	32
A14P12SS	Stainless Steel	12.75 x 10.88	324 x 276	.25	6	.31	8	1.25	32
A14P12AL	Aluminum	12.75 x 10.88	324 x 276	.25	6	.31	8	1.25	32
A16P10	Painted steel	14.75 x 8.88	375 x 226	.25	6	.31	8	1.25	32
A16P10G	Conductive steel	14.75 x 8.88	375 x 226	.25	6	.31	8	1.25	32
A16P14	Painted steel	14.75 x 12.88	375 x 327	.25	6	.31	8	1.25	32
A16P14G	Conductive steel	14.75 x 12.88	375 x 327	.25	6	.31	8	1.25	32
A16P14SS	Stainless Steel	14.75 x 12.88	375 x 327	.25	6	.31	8	1.25	32
A16P14AL	Aluminum	14.75 x 12.88	375 x 327	.25	6	.31	8	1.25	32
A18P16	Painted steel	16.75 x 14.88	425 x 378	.25	6	.31	8	1.25	32
A18P16G	Conductive steel	16.75 x 14.88	425 x 378	.25	6	.31	8	1.25	32
A18P16SS	Stainless Steel	16.75 x 14.88	425 x 378	.25	6	.31	8	1.25	32
A18P16AL	Aluminum	16.75 x 14.88	425 x 378	.25	6	.31	8	1.25	32
A20P16J	Painted	18.75 x 14.88	476 x 378	.47	12	.54	14	.81	21
A20P16JAL	Aluminum	18.75 x 14.88	476 x 378	.47	12	.54	14	.81	21



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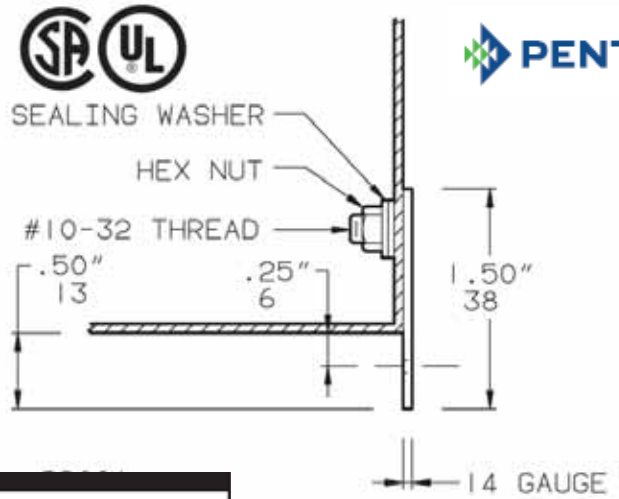
Hoffman: A-16P14

By:

AJ

## Mounting Bracket Kits

Mounting bracket kits DMFK1 and DMFK2 include two 14 gauge steel external mounting brackets and fasteners. Mounting bracket kit CMFK and CMFKSS each contain four 12 gauge steel or Type 304 stainless steel external mounting brackets and fasteners. Sealing washers are provided with each kit to maintain Type 4 or 12 rating after installation. Steel mounting brackets are zinc plated with clear chromate finish.



11-035-176

Catalog Number	Description
† DMFK1	Mounting bracket kit
† DMFK2	Mounting bracket kit
† CMFK	Steel mounting bracket kit
†† CMFKSS	Stainless steel mounting bracket kit
†† CMTGFT	Composite mounting bracket kit

† Maintains UL/CSA Type 4 and Type 12.

†† Maintains UL/CSA Type 4 Type 4X, and Type 12.



### Fiberglass Mounting Bracket Kit

Catalog Number	Bulletin Number
A50MFKR	A50Y



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EN1

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Manuf.: PNO:

Hoffman: A-50MFKR

ENCLOSURE CATALOG NUMBER	ENCLOSURE DIMENSIONS (IN.)	SUB-PANEL CATALOG NUMBER
<b>A-ABCJFGQRPWR</b>	<b>A x B x C</b>	<b>A APB</b>

**NOTE:** 1. PWR indicates with window cover.  
2. R indicates with solid cover.



**INDUSTRY STANDARDS**

Mounting brackets required to meet UL/CSA external mounting requirements.

UL 508A Listed; Type 3, 3R, 4, 4X, 12, 13; File No. E61997  
cUL Listed per CSA C22.2 No 94; Type 3, 3R, 4, 4X, 12, 13;  
File No. E61997  
Enclosure flammability evaluated per UL 508A  
Window flammability evaluated per UL 508A

NEMA/EEMAC Type 3, 3R, 4, 4X, 12, 13  
CSA File No. 42186: Type 3R, 4, 4X, 12  
IEC 60529, IP66  
Meets NEMA Type 3RX requirements

**APPLICATION**

Able to withstand harsh environments, these small enclosures feature a simple, traditional non-metallic design that is suitable for a broad range of applications.

**SPECIFICATIONS**

- Compression-molded fiberglass material has excellent temperature and chemical resistance qualities and exhibits outstanding physical properties
- Fiberglass material is easily punched, drilled, filed or sawed
- Seamless foam-in-place gasket assures water-tight and dust-tight seal
- Threaded internal bosses provided for mounting optional panels and terminal block kits

- Scratch-resistant polycarbonate windows are permanently bonded in place
- Screw-cover enclosures have easily removable covers attached to body with internal plated steel hinges. Cover securely fastens to the body with four captivated Type 316 stainless steel cover screws.
- Enclosures with quick-release latches have corrosion-resistant polyester hinges and polyester latches with a Type 316L stainless steel bail. Attached with Type 316 stainless steel screws. A Type 316L stainless steel padlock hasp is furnished with each enclosure.
- Sealing washers are furnished with enclosure

**FINISH**

Fiberglass material is light-gray inside and out. Optional steel panels are painted white. Optional stainless steel, aluminum and composite panels are unpainted.

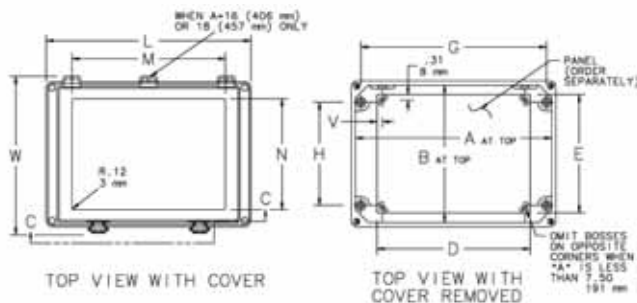
**ACCESSORIES**

See also *Accessories*.  
H2OMIT® Vent Drains, Type 4X  
HOL-SEALERS™ Non-Metallic Hole Seals  
Panels for Junction Boxes

**MODIFICATION AND CUSTOMIZATION**

Hoffman excels at modifying and customizing products to your specifications. Contact your local Hoffman sales office or distributor for complete information.

**BULLETIN: A50**



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Manuf.: . PNO:  
Hoffman: A-18149JFGQRPWR

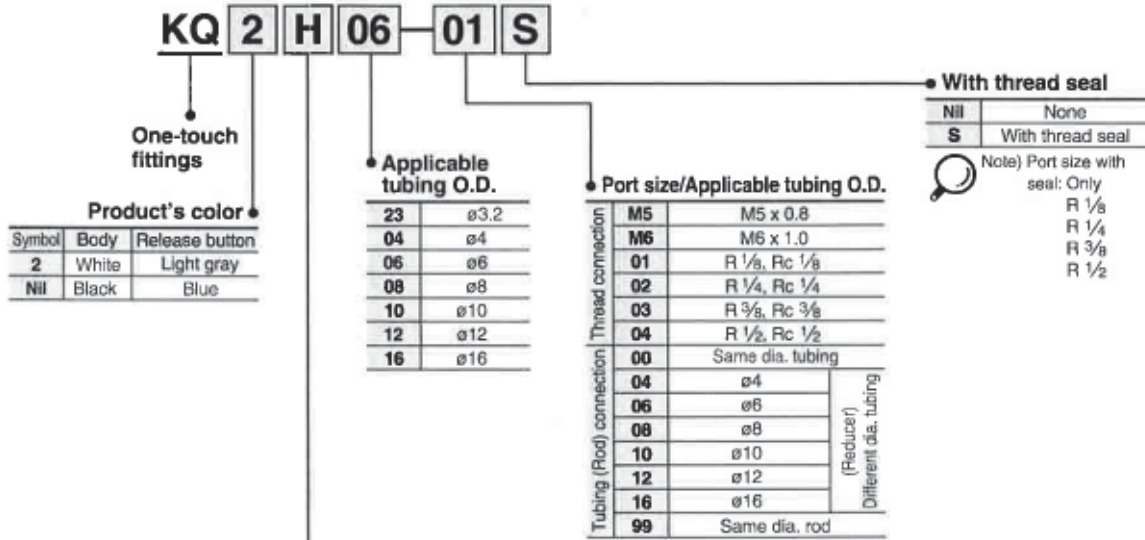


# One-touch Fittings Series KQ2

Applicable Tubing: Metric Size  
Connection Thread: M, R, Rc



94-255-020



**Model**

<b>H</b>	Male connector	<b>T</b>	Male branch tee
	Straight union		Union tee
	Different diameter straight		Different diameter tee * Note)
<b>S</b>	Hex. socket head male connector	<b>TW</b>	Cross*
<b>F</b>	Female connector	<b>TX</b>	Different diameter cross*
		<b>TY</b>	Different diameter cross*
		<b>Y</b>	Male run tee
		<b>D</b>	Male delta union
<b>L</b>	Male elbow	<b>U</b>	Branch
			Union "Y"
			Different dia. union "Y"
			Plug-in "Y"
<b>LU</b>	Male branch connector	<b>UD</b>	Delta branch
			Different dia. double union "Y"
			Double plug-in "Y"
			Different diameter plug-in "Y"
<b>K</b>	45° male elbow	<b>R</b>	Plug-in reducer
			<b>E</b>
<b>V</b>	Universal male elbow	<b>LE</b>	Bulkhead connector
			Bulkhead male elbow
<b>VS</b>	Hexagon socket head universal male elbow		
<b>VF</b>	Universal female elbow		
<b>LF</b>	Female elbow		
<b>VD</b>	Double universal male elbow		
<b>VT</b>	Triple universal male elbow		
<b>Z</b>	Branch universal male elbow		
<b>ZF</b>	Branch universal female elbow		
<b>ZD</b>	Double branch universal male elbow		
<b>ZT</b>	Triple branch universal male elbow		
		Extended plug-in elbow	
<b>W</b>	Extended male elbow		

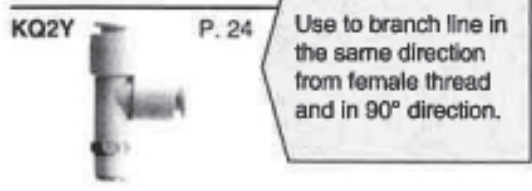
**Accessory**

Symbol	Name
	Nipple
<b>KQ2N</b>	Reducer nipple
	Adaptor
<b>KQ2C</b>	Tube cap
<b>KQ2C</b>	Color cap
<b>KQ2P</b>	Plug (White)
<b>KQP</b>	Plug (Blue)

Use the below part number to order the gasket for M5 and M6 threads.  
Gasket for M5 thread: M-5G2  
Gasket for M6 thread: M-6G

\* Available only for white color body.  
Note) KQT06-04, KQT08-06, KQT10-08, and KQT12-10 are available as made to order.

**Male run tee**



Applicable tubing O.D. (inch)	Connection thread NPT	Model	H (Width across flats)	Note) øD1	øD2	L1	L2	A *	M	Min. port size	Weight (g)
3/8	1/4	<b>KQ2Y11-35S</b>	17.46	17.9	17	25.5	29.5	49	21	7	29
	3/8	<b>KQ2Y11-36S</b>					31.5	51			38
	1/2	<b>KQ2Y11-37S</b>	22.23				35.5	53			64



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By: AJ		

Manuf.: PNo: SMC USA: KQ2Y11-36AS



# Series KQ2

Applicable Tubing: Metric Size



Threaded Type

**KQ2 H 07 - 34 A S**

Model

<b>H</b>	Male Connector
<b>S</b>	Hexagon Socket Head Male Connector
<b>F</b>	Female Union
<b>L</b>	Male Elbow
<b>K</b>	45 Degree Male Elbow
<b>V</b>	Universal Male
<b>VS</b>	Hexagon Socket Head Universal Male Elbow
<b>VF</b>	Universal Female Elbow
<b>LF</b>	Female Elbow
<b>VD</b>	Double Universal Male Elbow
<b>VT</b>	Triple Universal Male Elbow
<b>Z</b>	Branch Universal Male Elbow
<b>ZD</b>	Double Branch Universal Male Elbow
<b>ZT</b>	Triple Branch Universal Male Elbow
<b>W</b>	Extended Male Elbow
<b>T</b>	Male Branch Tee
<b>Y</b>	Male Run Tee
<b>U</b>	Branch "Y"
<b>X</b>	Different Diameter Plug In "Y"
<b>E</b>	Bulkhead Union Bulkhead Connector
<b>LE</b>	Bulkhead Union Elbow
<b>N</b>	Reducer Nipple

• Tube O.D.

<b>01</b>	1/8"
<b>03</b>	5/32"
<b>05</b>	3/16"
<b>07</b>	1/4"
<b>09</b>	5/16"
<b>11</b>	3/8"
<b>13</b>	1/2"

• Applicable Thread Type

<b>32</b>	10-32UNF
<b>33</b>	NPT 1/16
<b>34</b>	NPT 1/8
<b>35</b>	NPT 1/4
<b>36</b>	NPT 3/8
<b>37</b>	NPT 1/2
<b>*00</b>	Same Diameter Tubing

\*Only for "Bulkhead union" and "Bulkhead union elbow"

• Thread Sealing Method

<b>S</b>	With Thread Sealant
----------	---------------------

• Thread Material/Plating

<b>A</b>	Brass
<b>N</b>	Electroless Nickel Plated Brass
<input type="checkbox"/> <b>J</b>	Interchangeable with KJE



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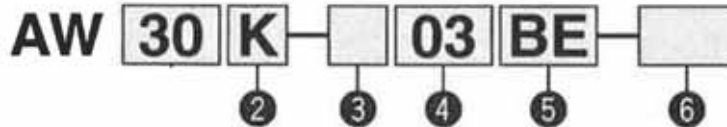
Manuf.: . PNo:

SMC USA: KQ2VD11-35AS

# Modular Type Filter Regulators



94-2555-004



②	With backflow mechanism	<b>Nil</b>	Without backflow mechanism	
		<b>K</b> (Note 1)	With backflow mechanism	
+				
③	Thread type	<b>Nil</b>	Rc	
		<b>N</b> (Note 2)	NPT	
		<b>F</b> (Note 3)	G	
+				
④	Port size	<b>02</b>	1/4	
		<b>03</b>	3/8	
+				
⑤ Option	a	Mounting	<b>Nil</b>	Without mounting option
			<b>B</b> (Note 5)	With bracket
			<b>H</b>	With set nut (for panel fitting)
	+			
	b	Float type auto drain	<b>Nil</b>	Without auto drain
			<b>C</b>	Float type auto drain (N.C.)
			<b>D</b>	Float type auto drain (N.O.)
	+			
	c	Pressure gauge	<b>Nil</b>	Without pressure gauge
			<b>E</b>	Square embedded type pressure gauge (with limit indicator)
			<b>G</b>	Round type pressure switch (without limit indicator)
				Round type pressure switch (with limit indicator)
Digital pressure switch		<b>E1</b> (Note 6)	Output: NPN output / Electrical entry: Wiring bottom entry	
		<b>E2</b> (Note 6)	Output: NPN output / Electrical entry: Wiring top entry	
	<b>E3</b> (Note 6)	Output: PNP output / Electrical entry: Wiring bottom entry		
	<b>E4</b> (Note 6)	Output: PNP output / Electrical entry: Wiring top entry		
+				
⑥ Semi-standard	d	Set pressure	<b>Nil</b>	0.05 to 0.85 MPa set
			<b>1</b> (Note 7)	0.02 to 0.2 MPa set
	+			
e	Bowl	<b>Nil</b>	Polycarbonate bowl	
		<b>2</b>	Metal bowl	
		<b>6</b>	Nylon bowl	
		<b>8</b>	Metal bowl with level gauge	
⑥ Semi-standard	f	Drain port (Note 8)	<b>Nil</b>	With drain cock
			<b>J</b> (Note 9)	Drain guide 1/8
				Drain guide 1/4
	<b>W</b> (Note 10)	Drain cock with barb fitting: For ø6 x ø4 nylon tube		
	+			
	g	Exhaust mechanism	<b>Nil</b>	Relieving type
			<b>N</b>	Non-relieving type
	+			
	h	Flow direction	<b>Nil</b>	Flow direction: Left to right
			<b>R</b>	Flow direction: Right to left
	+			
	i	Pressure unit	<b>Nil</b>	Name plate, caution plate for bowl, and pressure gauge in imperial units: MPa
<b>Z</b> (Note 11)			Name plate, caution plate for bowl, and pressure gauge in imperial units (PSI, F)	
<b>ZA</b> (Note 12)			Digital pressure switch: With unit switching function	



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Manuf.: PNO:

SMC USA: AW30-NO3BDE3-8Z

# Standard Specifications

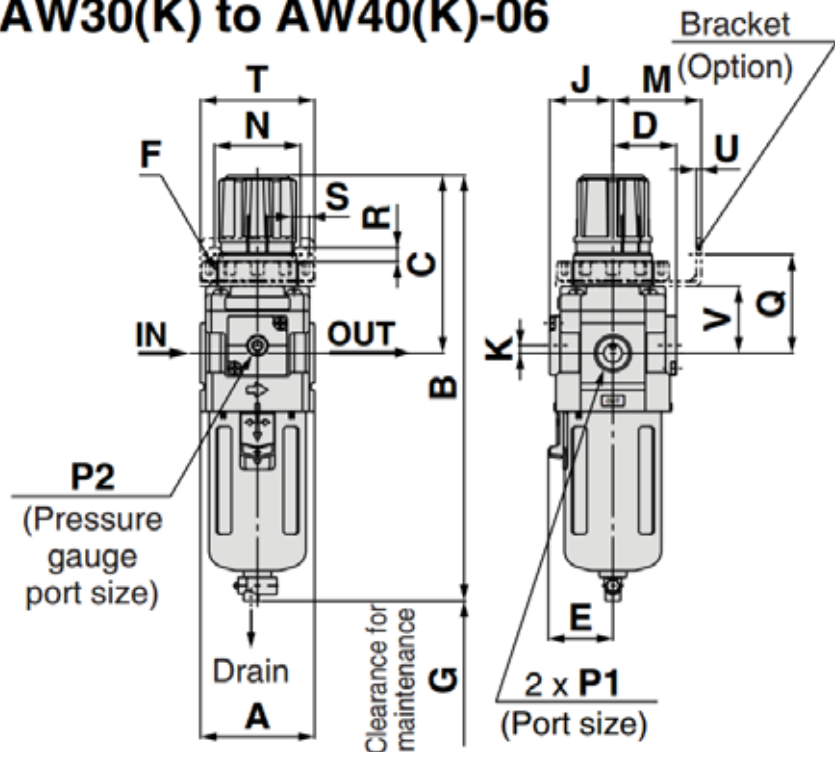


94-255-004

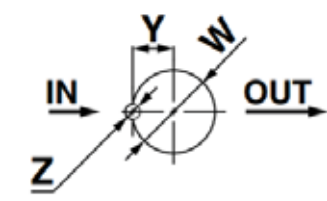
Model	AW30(K)
Port size	1/4, 3/8
Pressure gauge port size <sup>Note 1)</sup>	1/8
Fluid	Air
Ambient and fluid temperature <sup>Note 3)</sup>	-5 to 60°C
Proof pressure	1.5 MPa
Maximum operating pressure	1.0 MPa
Set pressure range	0.05 to 0.85 MPa
Relief pressure	Set pressure + 0.05 MPa
Nominal filtration rating	5 m
Drain capacity (cm <sup>3</sup> )	25
Bowl material	Polycarbonate
Bowl guard	Standard
Construction	Relieving type
Weight (kg)	0.40

Model	Standard specifications											Optional specifications					
	P1	P2	A	B <sup>Note)</sup>	C	D	E	F	G	J	K	H	J	H	J	H	J
AW30(K)	1/4, 3/8	1/8	53	201	86	29.5	30	M38 x 1.5	55	29.5	3.5	□28	30.5	□27.8	41	φ37.5	66

## AW30(K) to AW40(K)-06



### Panel fitting dimension



**Plate thickness**  
 AW30(K): Max. 3.5  
 AW40(K): Max. 5



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Manuf.: PNo:  
**SMC USA: AW30-NO3BDE3-8Z**

Silencer  
Compact Resin Type/Male Thread  
**Series AN05 to 40**



74-255-004



AN 20 - 02

Body size

Symbol
05
10
15
20
30
40

Thread type

Symbol	Thread type
Nil	M thread
	R
N	NPT

Thread connection port size

Symbol	Port size	Applicable model
M5	M5 x 0.8	AN05
01	1/8	AN10
02	1/4	AN15/20
03	3/8	AN30
04	1/2	AN40

## Specifications

Fluid	Compressed air
Max. operating pressure <sup>Note 1)</sup>	145psi (1.0 MPa)
Noise reduction	30 dB(A) <sup>Note 2)</sup>
Ambient and fluid temperature	41 to 140°F (5 to 60°C) <sup>Note 3)</sup>

Note 1) It indicates the inlet pressure for solenoid valve.

Note 2) The value may vary, depending on the pneumatic circuit or pressure that is exhausted from the solenoid valve.

Note 3) The product can be used in temperatures 14 to 140°F (-10 to 60°C) if there is no risk of water droplets forming and freezing.

## Performance

Model	Effective area mm <sup>2</sup>	Sonic conductance C [dm <sup>3</sup> /(s·bar)]	Recommended flow m <sup>3</sup> /min(ANR)	Weight g
AN05-M5	5	1	0.4 or less	0.5
AN10-01	10	2	0.8 or less	1
AN15-02	15	3	1.0 or less	2.5
AN20-02	35	7	3.0 or less	4
AN30-03	60	12	5.0 or less	5.5
AN40-04	90	18	8.0 or less	8.5

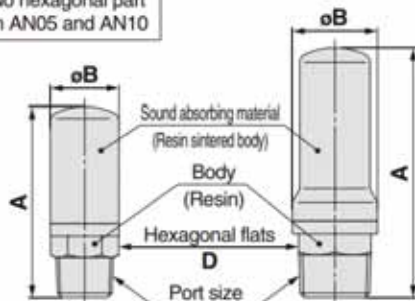
Note) Recommended flow rate is the flow at 72.5psi (0.5 MPa) in the inlet pressure.

## Construction/Parts/Dimensions

AN05/10/20

AN15/30/40

No hexagonal part in AN05 and AN10



### Dimensions (mm)

Model	Port size R, NPT	A	B	D
AN05-M5	M5 x 0.8	15	6.5	-
AN10-01	1/8	23	11	-
AN15-02	1/4	32	16	14
AN20-02	1/4	45	16.5	14
AN30-03	3/8	58.5	20	17
AN40-04	1/2	68	24	21



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RV1

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Manuf.: PNO: SMC USA: AN20-NO2

# Conforming to OSHA Standard Pressure Relief 3 Port Valve With Locking Holes



94-255-016

**VHS** **30** - **03** - **RZ** -

Pressure relief 3 port valve

Body size

Symbol	Standard port size
20	1/8
30	3/8
40	1/2
50	3/4

Thread type

Nil	Rc
N	NPT
F	G

Made to Order

Nil	Standard
X1	Body: Red
X502	Built-in silencer (EXH port)

Optional specifications

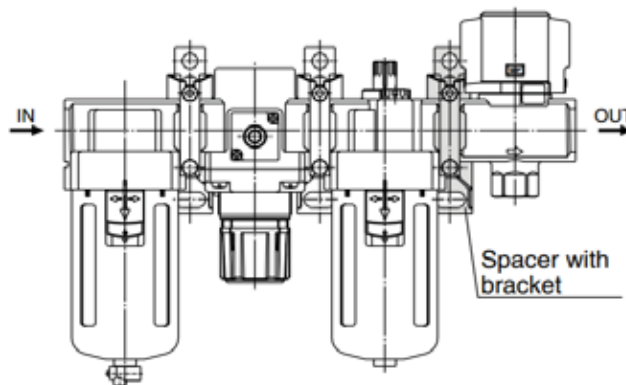
Symbol	Description
B	Knob color: Black
R	Flow direction: Right to left
Z <sup>Note)</sup>	PSI as unit displayed on label

Note) Only for the NPT thread.  
Under the New Measurement Law,  
products for overseas use only  
(SI unit type for use in Japan).

Port size

Symbol	Port size	Body size			
		20	30	40	50
01	1/8	●	—	—	—
02	1/4	●	●	●	—
03	3/8	—	●	●	—
04	1/2	—	—	●	—
06	3/4	—	—	●	●
10	1	—	—	—	●

Pressure relief 3 port valve	Spacer part no.	Spacer with bracket part no.	Applicable air preparation equipment
VHS20	Y200	Y200T	AC20
VHS30	Y300	Y300T	AC25, AC30



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Manuf.: PNo:

SMC USA: VHS30-N03-Z

# 5 Port Pilot Operated Solenoid Valve Metal Seal, Body Ported



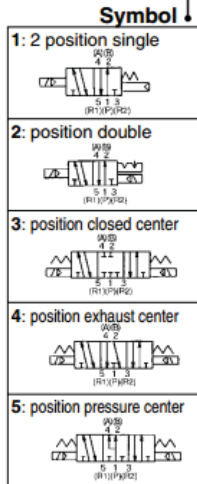
## Series VFS3000

### Model

Type of actuation	Model		Port size Rc	Flow characteristics						Max. operating cycle (cpm) <sup>(1)</sup>	Response time (ms) <sup>(2)</sup>	Mass (kg) <sup>(3)</sup>	
	Plug-in	Non plug-in		1 → 4/2(P → A/B)			4/2 → 5/3(A/B → R1/R2)						
				C [dm <sup>3</sup> /(s·bar)]	b	Cv	C [dm <sup>3</sup> /(s·bar)]	b	Cv				
2 position	Single	VFS3120	VFS3130	1/4	5.0	0.20	1.1	6.8	0.30	1.7	1200	20 or less	0.33
				3/8	6.1	0.14	1.4	7.3	0.23	1.8			
	Double	VFS3220	VFS3230	1/4	5.0	0.20	1.1	6.8	0.3	1.7	1500	15 or less	0.43
				3/8	6.1	0.14	1.4	7.3	0.23	1.8			
3 position	Closed center	VFS3320	VFS3330	1/4	5.0	0.20	1.1	6.3	0.27	1.6	600	40 or less	0.45
				3/8	5.7	0.20	1.4	6.8	0.21	1.7			
	Exhaust center	VFS3420	VFS3430	1/4	4.9	0.24	1.1	6.5	0.28	1.6	600	40 or less	0.45
				3/8	5.8	0.15	1.4	7.0	0.22	1.7			
	Pressure center	VFS3520	VFS3530	1/4	4.9	0.23	1.1	6.6	0.28	1.6	600	40 or less	0.45
				3/8	6.5	0.15	1.6	7.0	0.23	1.7			

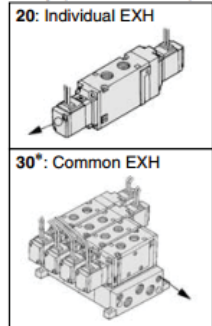
Note 1) Based on JIS B 8375 (once per 30 days) for the minimum operating frequency. Note 3) In the case of grommet type.  
Note 2) Based on JIS B 8375-1981. (The value at supply pressure 0.5 MPa.) Note 4) Factors of "Note 1)" and "Note 2)" are achieved in controlled clean air.

VFS3 1 20 - 1 G - 02 -



\* Reverse pressure: Can be used by external pilot specifications.

**Body (Pilot exhaust)**



\* Manifold only

**Pilot type**

Nil	Internal pilot
R*	External pilot

\* Option. It will be an individual external pilot.

(External pilot port: Body side. For 30 type, common external pilot (on manifold side).)

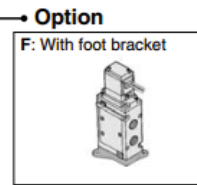
**Thread type**

Nil	Rc
N*	NPT
T*	NPTF
F*	G

\* Option

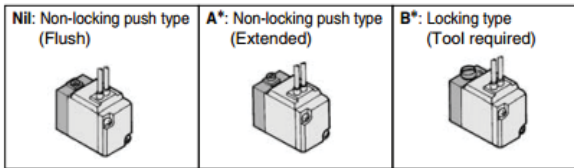
**Port size**

02	Rc 1/4
03	Rc 3/8



\* Mountable only for VFS3120.

**Manual override**



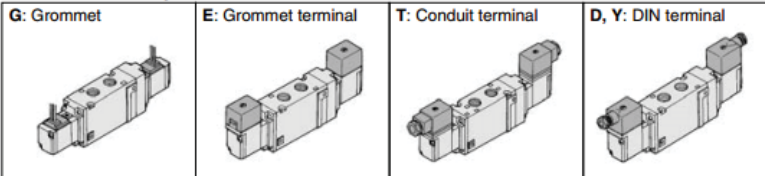
\* Option

**Light/Surge voltage suppressor**

Nil	None
Z	With light/surge voltage suppressor
S*	With surge voltage suppressor

\* Grommet type is available only w/ surge voltage suppressor, not w/ indicator light.

**Electrical entry**



**Coil rated voltage**

1	100 VAC (50/60 Hz)
2	200 VAC (50/60 Hz)
3 <sup>P</sup>	110 to 120 VAC (50/60 Hz)
4*	220 VAC (50/60 Hz)
5	24 VDC
6*	12 VDC
7*	240 VAC (50/60 Hz)
9*	Other

\* Option



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Manuf.: PNo:

SMC USA: VFS3120-3DZ-03T

74-255-006

# Push-to-Connect Tube Fitting for Air

# McMASTER-CARR

Adapter, for 3/8" Tube OD x 10 mm Tube OD

## 5779K259



94-215-004

For Use With	Air
Shape	Straight
Type	Adapter
Tube Connections	
Type	Push to Connect
Gender	Female
For Tube OD	
(A)	3/8"
(B)	10mm
Material	Nylon Plastic
Maximum Pressure	290 psi @ 72° F
Maximum Vacuum	28 in. of Hg @ 72° F
Temperature Range	0° to 170° F
For Tubing	Firm (Durometer A95) Polyurethane, Firm (Durometer D44) Polyethylene Plastic, and Hard (Durometer D62) Nylon Plastic
Release Ring	
Material	Plastic
Color	Black
Color	Black
Specifications Met	ISO 14743
RoHS	Compliant



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SPARE

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McMaster-Carr: 5779K259





2.5 mm<sup>2</sup>/5 mm Width



4 mm<sup>2</sup>/6 mm Width



10 mm<sup>2</sup>/10 mm Width

16 mm<sup>2</sup>/12 mm Width

35 mm<sup>2</sup>/16 mm Width

42-063-000

Type	Part no.	Std. pack	Type	Part no.	Std. pack	Type	Part no.	Std. pack
<b>Marking strips, unmarked</b>			<b>Marking strips, unmarked</b>			<b>10 mm<sup>2</sup>/10 mm Width</b>		
9705 A/5/10	04.242.5053.0	25	9705 A/6/10	04.242.6053.0	25	<b>10 mm<sup>2</sup>/10 mm Width</b>		
<b>Marking strips, marked</b>			<b>Marking strips, marked</b>			<b>marked for 5 blocks (every 2nd tag) *</b>		
9705 A/5/9 B 1 - 9	04.842.4953.0	25	9705 A/5/9 B 1 - 9	04.842.5953.0	25	9705 A/5/10/5 B	04.842.5553.0	25
9705 A/5/10 B*	04.842.5053.0	25	9705 A/5/10 B*	04.842.6053.0	25			
9705 A/5/10 B 1 - 10	04.845.0153.0	25	9705 A/5/10 B 1 - 10	04.846.0153.0	25			
11 - 20	04.845.0253.0	25	11 - 20	04.846.0253.0	25			
21 - 30	04.845.0353.0	25	21 - 30	04.846.0353.0	25			
31 - 40	04.845.0453.0	25	31 - 40	04.846.0453.0	25	<b>16 mm<sup>2</sup>/12 mm Width</b>		
41 - 50	04.845.0553.0	25	41 - 50	04.846.0553.0	25	<b>marked for 5 blocks (every 2nd tag) *</b>		
51 - 60	04.845.0653.0	25	51 - 60	04.846.0653.0	25	9705 A/6/10/5 B	04.842.6553.0	25
61 - 70	04.845.0753.0	25	61 - 70	04.846.0753.0	25			
71 - 80	04.845.0853.0	25	71 - 80	04.846.0853.0	25			
81 - 90	04.845.0953.0	25	81 - 90	04.846.0953.0	25			
91 - 100	04.845.1053.0	25	91 - 100	04.846.1053.0	25			
						<b>35 mm<sup>2</sup>/16 mm Width</b>		
⊕ (10 x)	04.855.0053.0	25	⊕ (10 x)	04.856.0053.0	25	<b>marked for 5 blocks (every 2nd tag) *</b>		
± (10 x)	04.855.0153.0	25	± (10 x)	04.856.0153.0	25	9705 A/11/10/5 B	04.842.8553.0	25
+	04.855.0253.0	25	+	04.856.0253.0	25			
-	04.855.0353.0	25	-	04.856.0353.0	25			
L1 (10 x)	04.855.0453.0	25	L1 (10 x)	04.856.0453.0	25			
L2 (10 x)	04.855.0553.0	25	L2 (10 x)	04.856.0553.0	25			
L3 (10 x)	04.855.0653.0	25	L3 (10 x)	04.856.0653.0	25			
PE (10 x)	04.855.0753.0	25	PE (10 x)	04.856.0753.0	25			
SL (10 x)	04.855.3153.0	25	SL (10 x)	04.856.3153.0	25			
N (10 x)	04.855.3253.0	25	N (10 x)	04.856.3253.0	25			
F1 (10 x)	04.855.0953.0	25	F1 (10 x)	04.856.0953.0	25			
F2 (10 x)	04.855.1053.0	25	F2 (10 x)	04.856.1053.0	25			
L1, L2, L3, N, PE (2 x)	04.855.0853.0	25	L1, L2, L3, N, PE (2 x)	04.856.0853.0	25			
with enlarged marking area			with enlarged marking area					
9705 AL/5/10	04.242.5153.0	25	9705 AL/6/10	04.242.6353.0	25			
*Custom marking upon request			*Custom marking upon request			* indicate required marking with part no.		



# Datasheet

Art.No. 07.311.0155.0

End plate AP 2,5 -4 V0

End plate for DIN rail terminal blocks type WK ..., color gray



Art.No.	07.311.0155.0
EAN	4015573392663
Order unit	10 pieces

## Approvals

## Technical data

### General

Colour	Grey
Type of end plate	Yes
Type of partition	No
Thickness	1.5 mm
Snap in	Yes
Inflammability class of insulation material acc. with UL94	V0

### Accessories

Type of end plate	Yes
Type of partition	No
Colour	Grey
Thickness	1.5 mm
Snap in	Yes
Inflammability class of insulation material acc. with UL94	V0



Rev: 0

Date: 7/17/2020

By: AJ

Device Tag:

TB1

Job Number: HBR8191

Page # 1/1

Manuf.: . PNo: Wieland: 07.311.0155.0

# Feed-through blocks with screw connection

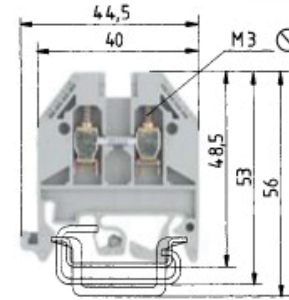
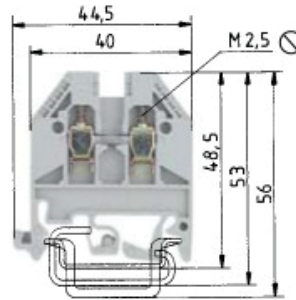
## selosIOS



42-063-003

UL wire connection versions

- <sup>4)</sup> or 2x no. 14 sol/str AWG  
or 2x no. 16 sol/str AWG  
or 2x no. 18 sol/str AWG  
or 3x no. 20 sol/str AWG or 3x no. 22 sol/str AWG
- <sup>5)</sup> or 2x no. 12 sol/str AWG  
or 2x no. 16 sol/str AWG  
or 3x no. 18 sol/str AWG or 3x no. 22 sol/str AWG
- <sup>6)</sup> or 2x no. 12 sol/str AWG  
or 2x no. 14 sol/str AWG  
or 3x no. 16 sol/str AWG



0344 Ex II 2GD IM2  
Ex e I/II  
EN 60947-7-1:2002  
UL ratings  
CSA ratings  
KEMA 02 ATEX 2114 U<sup>1)</sup> EN 60079-0/EN 60079-7  
Width  
Approvals

Field/factory wiring  
EN 60079-0/EN 60079-7  
Wire strip length

### WK 2,5/U

fine-stranded solid V A  
0.5-2.5 mm<sup>2</sup> 0.5-4 mm<sup>2</sup> 800V/8 kV/3 24  
No. 22-12 AWG 600V 20/30  
No. 24-12 AWG 600V 25  
0.5-2.5 mm<sup>2</sup> 0.5-4 mm<sup>2</sup> 690V 23  
5 mm 9 mm

### WK 4/U

fine-stranded solid V A  
0.5-4 mm<sup>2</sup> 0.5-6 mm<sup>2</sup> 800V/8 kV/3 32  
No. 22-10 AWG<sup>4)</sup> 600V 30/35  
No. 20-10 AWG 600V 40  
0.5-4 mm<sup>2</sup> 0.5-6 mm<sup>2</sup> 690V 14/27<sup>6)</sup>  
6 mm 9 mm

ATEX LR AEx Ex

ATEX LR AEx Ex

	Type	Part No.	Std. Pack	Type	Part No.	Std. Pack	
<b>Feed-through block</b>	gray	WK 2,5/U	57.503.0055.0	100	WK 4/U	57.504.0055.0	100
<b>Feed-through block Ex i</b>	blue	WK 2,5/U BLAU	57.503.0055.6	100	WK 4/U BLAU	57.504.0055.6	100
<b>Accessories</b>							
1. Mounting rail TS 35, DIN rail 7.5 mm high	L = 2 m	35 x 27 x 7,5 EN 60715	98.300.0000.0	1	35 x 27 x 7,5 EN 60715	98.300.0000.0	1
Mounting rail TS 35, DIN rail, 15 mm high	L = 2 m	35 x 24 x 15 EN 60715	98.360.0000.0	1	35 x 24 x 15 EN 60715	98.360.0000.0	1
Mounting rail TS 32, G rail <sup>2)</sup>	L = 2 m	9006 EN 60715 G-32	98.190.0000.0	1	9006 EN 60715 G-32	98.190.0000.0	1
2. End clamp with U-foot <sup>2)</sup>	10mm wide	WE 1/U	25.523.5753.0	100	WE 1/U	25.523.5753.0	100
End clamp TS 35, with screw	8mm wide	9708/2 S35	25.522.8553.0	100	9708/2 S35	25.522.8553.0	100
End clamp TS 35, without screw	8mm wide	WEF 1/35	25.523.9353.0	100	WEF 1/35	25.523.9353.0	100
3. End plate	gray	AP 2,5 - 4	07.311.0155.0	10	AP 2,5 - 4	07.311.0155.0	10
	blue	AP 2,5 - 4 BLAU	07.311.0155.6	10	AP 2,5 - 4 BLAU	07.311.0155.6	10
4. Partition	gray	TW 2,5 - 4	07.311.1155.0	10	TW 2,5 - 4	07.311.1155.0	10
	blue	TW 2,5 - 4 BLAU	07.311.1155.6	10	TW 2,5 - 4 BLAU	07.311.1155.6	10
5. Cross connector with screws	2 pole	IVB WK 2,5 - 2	Z7.280.2227.0	10	IVB WK 4 - 2	Z7.281.1227.0	10
insulated	3 pole	IVB WK 2,5 - 3	Z7.280.2327.0	10	IVB WK 4 - 3	Z7.281.1327.0	10
	up to 12 pole	IVB WK 2,5 - 12	Z7.280.3227.0	10	IVB WK 4 - 12	Z7.281.2227.0	10
6. Partition plate with marking facility		TS 2,5 GELB	07.311.2053.8	10	TS 4 GELB	07.311.2153.8	10
7. Single cover with marking facility		AD VB 2,5 GELB	04.326.2053.8	10	AD VB 4 GELB	04.326.2153.8	10
8. Cover with warning symbol over 4 blocks		AD VB 5/4 GELB	04.343.4756.8	10	AD VB 6/4 GELB	04.343.4856.8	10
For more accessories see pages 60-77							
For marking systems see pages 70-75							
<sup>4)</sup> For maintaining the proper isolation distances, the open side of a feed-through terminal block as well as both sides of a jumper are to be enclosed by partitions. <sup>5)</sup> Please note the mounting instructions on the cover page. <sup>2)</sup> Do not use in Ex environments. <sup>3)</sup> With/without jumper							

 <b>630-499-7080 · www.elemechinc.com</b>	Rev: 0	Device Tag: <b>TB1</b>	
	Date: 7/17/2020	Job Number: HBR8191	
Manuf.: . PNo: <b>Wieland: 57.504.0055.0</b>	By: AJ	Page # <b>1/1</b>	

Item No. 57.504.9055.0



Earth terminal WK 4 SL/ U /N0

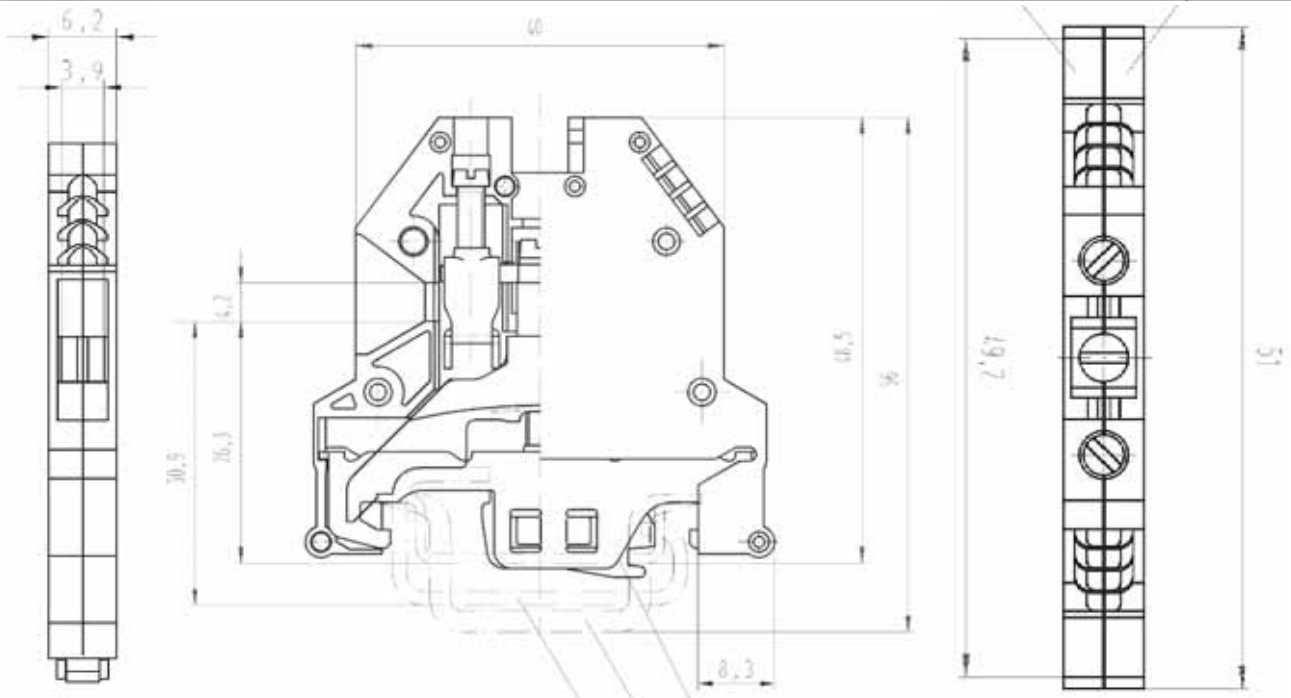
Ground DIN rail terminal block with screw connection for mounting on TS 35 and TS 32, nominal cross section 4 mm<sup>2</sup>, width 6 mm, color green/yellow



42-063-004



Rated impulse voltage	8 kV
Pollution degree	3
Closing plate required	No
Length	51 mm
Type of insulation material	Thermoplastic
Cross section UL	22-10 AWG
Cross section CSA	20-10 AWG
Maximum cross section fine stranded	4 mm <sup>2</sup>
Wire strip length	9 mm
Torque conductor mounting	0.5 Nm
Torque rail mounting	0,5



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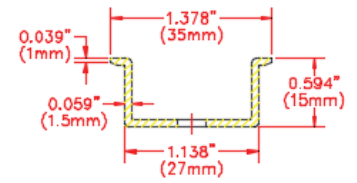
Manuf.: . PNo: Wieland: 57.504.9055.0

# DIN RAILS

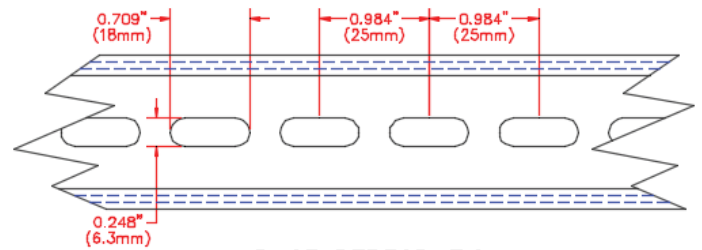
42-063-007

Catalog Number	Lengths per Pack
G1	12
G1F	12
G1F1	24
OMEGA 2F	20
OMEGA 2F1	40*
OMEGA 3	20
OMEGA 3F	20
OMEGA 3F1	40*
OMEGA 3FD	20
OMEGA 3A	10
OMEGA 3AF	10
OMEGA 3AF1	20*
OMEGA 3AFD	10
OMEGA 3B	10
OMEGA 3B1	10*
OMEGA 75	2

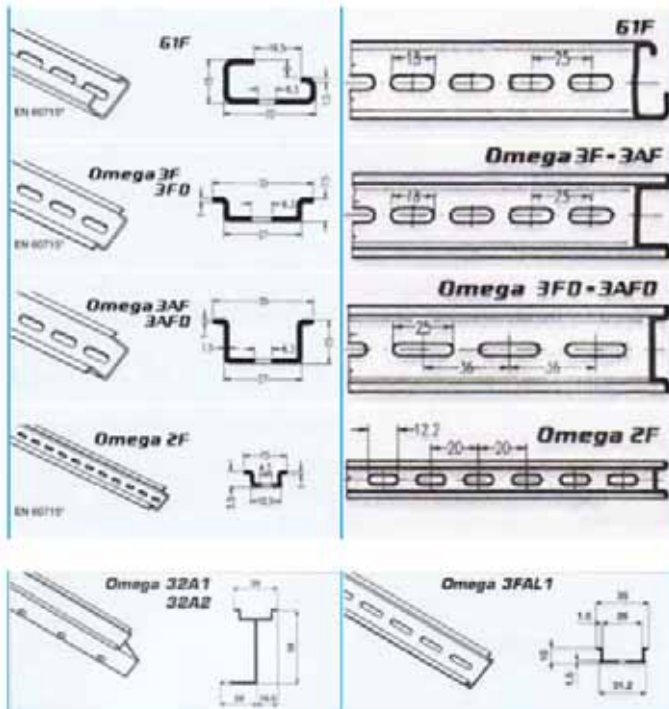
Treated with galvanic zinc plating and passivation (gal Zn 8c according to Din 50960)  
 Minimum thickness 6 microns  
 Standard length: 2 meters (6'6¾")



FRONT SECTION



BASE PERFORATION



Item No. Z5.522.8553.0  
 End bracket 9708 / 2 S 35  
 End clamp for mounting rail TS 35

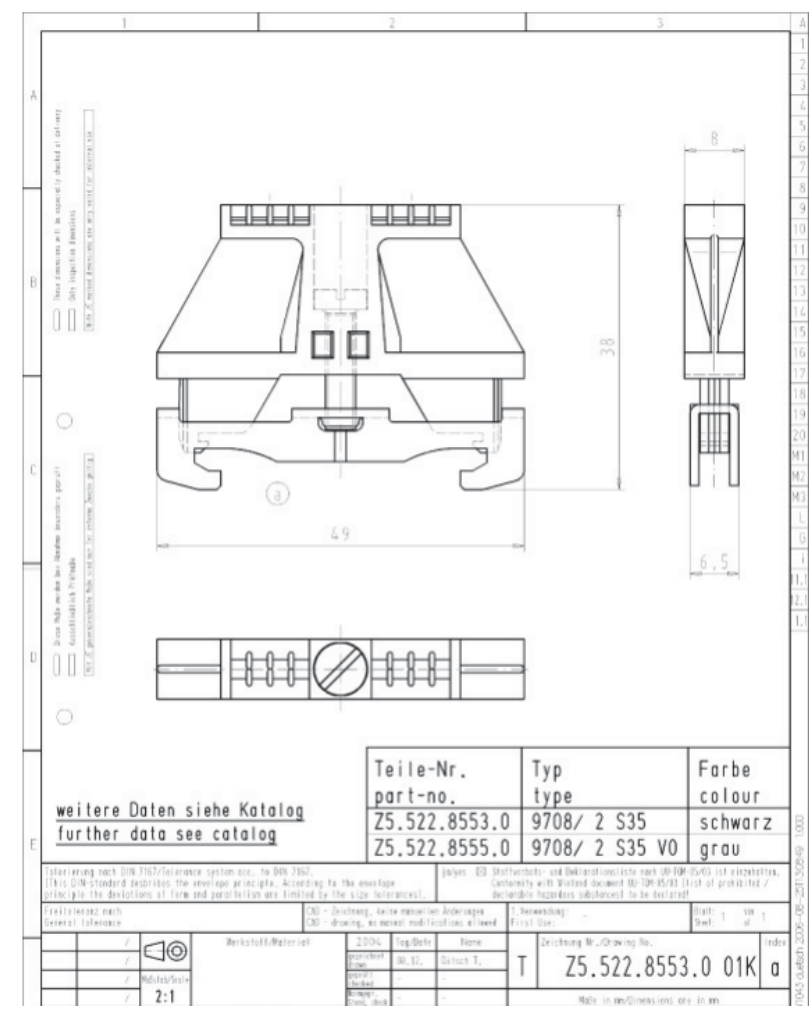


42-063-009

Item No.	Z5.522.8553.0
EAN	4015573141766
order unit	100 Piece(s)

Technical data

ArticlePrice	udp_no_price
Colour	Black
Inflammability class of insulation material acc. with UL94	V2
Width/grid dimension	8 mm
Latching	Screwable
Length	49 mm
Material	Metal
Mounting method	DIN rail (top hat rail) 35/7.5 mm



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	Date: 7/17/2020		
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- **Base and covers sold separately**
- Non-slip cover design incorporates integral high friction lining to inhibit cover movement
- Cover flush with base provides greater wire capacity and improves aesthetics
- Easy cover removal makes changes to wiring quick and easy
- Available in various colors



10-069-000

• Part Number	C1.5WH6
• RoHS Compliancy Status	Compliant
• Part Description	Covers duct to protect wires, improve aesthetics and provides greater wire capacity. Base and covers sold separately.
• Product Type	Type C Cover for Flush Cover Wiring Duct
• Material	Lead-Free PVC
• Color	White
• Length (ft.)	6
• Length (m)	1.82
• CE Compliant	Yes
• Pricing Description	Duct Cover, PVC, 1.5"W X 6', White



Rev:	0	Device Tag:	
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By:	AJ	Job Number:	HBR8191
		Page #	1/1

Manuf.: . PNo: Panduit: C1.5WH6

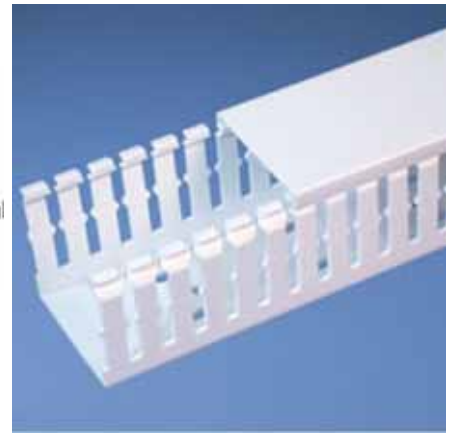
# F1.5X3WH6



**PANDUIT**

### Specifications

- Made of lead-free PVC
- UL Recognized continuous use temperature: 122°F (50°C)
- UL94 Flammability Rating of V-0
- Conforms with NFPA 79-2002 section 14.3.1 requirement for flame retardant material
- Available in Light Gray and White
- Provided with mounting holes



10-069-005

• Part Number	F1.5X3WH6
• RoHS Compliancy Status	Compliant
• Part Description	Narrow finger, slotted wiring duct.
• Material	Lead-Free PVC
• Color	White
• CSA Certified	Yes
• Length (ft.)	6
• CE Compliant	Yes
• CE Marking	Yes
• Duct Size W x H (In.)	1.75 x 3.12
• Duct Size W x H (mm)	44.5 x 79.2
• Mounting Method	Standard Mounting Holes
• Pricing Description	Slotted Duct,PVC,1.5"X3"X6',White



Rev: 0

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Page # 1/1

Manuf.: . PNo:

Panduit: F1.5X3WH6





ENCLOSURE CATALOG NUMBER	ENCLOSURE DIMENSIONS (IN.)	SUB-PANEL CATALOG NUMBER
<b>A-AHBCSS6LP</b>	<b>A x B x C</b>	<b>A APB</b>

NOTE: 6 indicates 316 Stainless Steel.



**APPLICATION**

For use in indoor and outdoor corrosive environments that require a water-tight seal, this enclosure's seamless foam-in-place gasket and screw-down clamps provide a secure seal against contaminants.

**SPECIFICATIONS**

- 14 gauge Type 304 or Type 316L stainless steel bodies and doors
- Seams continuously welded and ground smooth
- Seamless foam-in-place gasket
- Rolled lip around three sides of door
- Stainless steel door clamp assembly
- Hasp and staple for padlocking
- Door removed by pulling stainless steel continuous hinge pin
- Data pocket is high-impact thermoplastic
- Collar studs provided for mounting optional panels
- Exterior hardware on Type 316L stainless steel enclosures matches enclosure material
- Bonding provision on door; grounding stud on body

**FINISH**

Door, sides, top and bottom have smooth #4 brushed finish.

**ACCESSORIES**

- See also *Accessories*.
- Fast-Operating Clamp Assembly
- Panels for Type 3R, 4, 4X, 12 and 13 Enclosures
- Junction Box and Wall-Mount Enclosure Swing Out Panel Kit
- Steel and Stainless Steel Window Kits
- H2OMIT™ Vent Drains, Type 4X
- H2OMIT™ Thermoelectric Dehumidifier

**MODIFICATION AND CUSTOMIZATION**

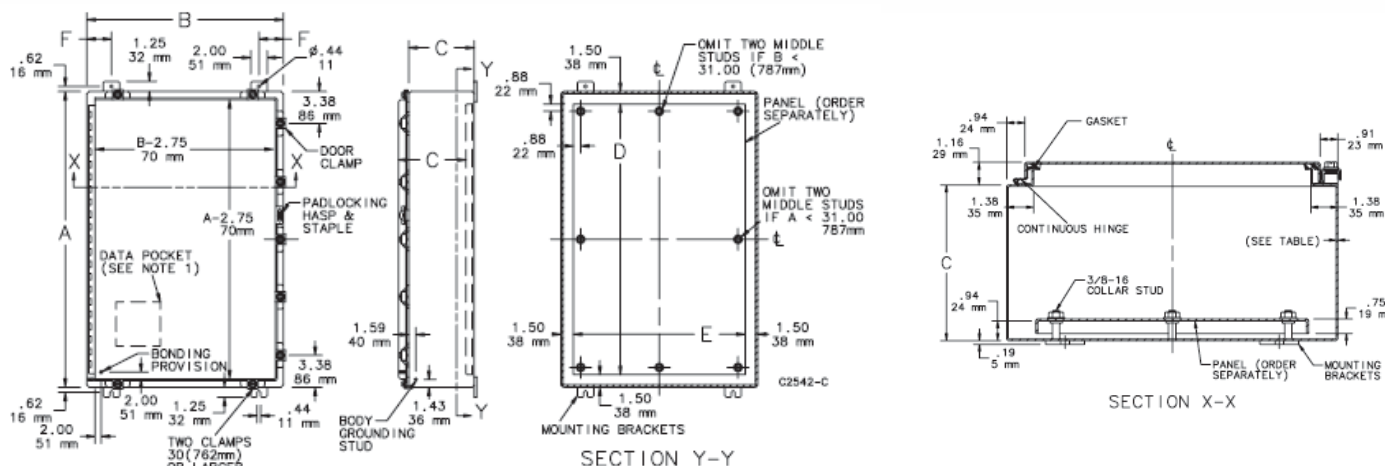
Hoffman excels at modifying and customizing products to your specifications. Contact your local Hoffman sales office or distributor for complete information.

BULLETIN: A45

**INDUSTRY STANDARDS**

UL 508A Listed; Type 3R, 4, 4X, 12; File No. E61997  
 cUL Listed per CSA C22.2 No 94; Type 3R, 4, 4X, 12; File No. E61997

NEMA/EEMAC Type 3, 3R, 4, 4X, 12, 13  
 CSA File No. 421B6: Type 4, 4X, 12  
 IEC 60529, IP66  
 Meets NEMA Type 3RX requirements



Rev: 0  
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 By: AJ

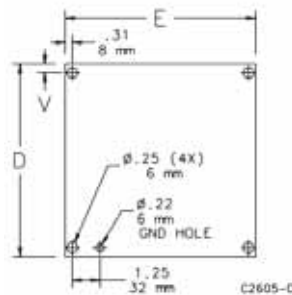
Device Tag: EN  
 Job Number: HBR8191  
 Page #: 1/1

Manuf.: PNo: Hoffman: A-24H2408SSLP

11-035-026

# SUB-PANELS FOR ENCLOSURES

SUB-PANEL CATALOG NUMBER	SUB-PANEL DIMENSIONS (IN.)
<b>A-DP<u>ESS</u></b>	<b><u>D</u> x <u>E</u></b>



**NOTE:**

- 6 indicates 316 Stainless Steel.
- AL indicates Aluminum
- G indicates Conductive Steel

Catalog Number	Material	Panel Size D x E (in.)	Panel Size D x E (mm)	Panel Gauge or Thickness	Edge Flanges	T (in.)	T (mm)	Number of Holes
A12P24	Painted steel	9.00 x 21.00	229 x 533	12 ga.	0	-	-	4
A12P24G	Conductive steel	9.00 x 21.00	229 x 533	12 ga.	0	-	-	4
A16P12	Painted steel	13.00 x 9.00	330 x 229	12 ga.	0	-	-	4
A16P12G	Conductive steel	13.00 x 9.00	330 x 229	12 ga.	0	-	-	4
A16P12SS6	Stainless Steel	13.00 x 9.00	330 x 229	12 ga.	0	-	-	4
A16P12AL	Aluminum	13.00 x 9.00	330 x 229	0.10 in./3 mm	0	-	-	4
A16P16	Painted steel	13.00 x 13.00	330 x 330	12 ga.	0	-	-	4
A16P16G	Conductive steel	13.00 x 13.00	330 x 330	12 ga.	0	-	-	4
A16P16SS6	Stainless Steel	13.00 x 13.00	330 x 330	12 ga.	0	-	-	4
A16P16AL	Aluminum	13.00 x 13.00	330 x 330	0.10 in./3 mm	0	-	-	4
A18P18	Painted steel	15.00 x 15.00	381 x 381	12 ga.	0	-	-	4
A18P18G	Conductive steel	15.00 x 15.00	381 x 381	12 ga.	0	-	-	4
A20P12	Painted steel	17.00 x 9.00	432 x 229	12 ga.	0	-	-	4
A20P12G	Conductive steel	17.00 x 9.00	432 x 229	12 ga.	0	-	-	4
A20P16	Painted steel	17.00 x 13.00	432 x 330	12 ga.	0	-	-	4
A20P16G	Conductive steel	17.00 x 13.00	432 x 330	12 ga.	0	-	-	4
A20P16SS6	Stainless Steel	17.00 x 13.00	432 x 330	12 ga.	0	-	-	4
A20P16AL	Aluminum	17.00 x 13.00	432 x 330	0.10 in./3 mm	0	-	-	4
A20P20	Painted steel	17.00 x 17.00	432 x 432	12 ga.	0	-	-	4
A20P20G	Conductive steel	17.00 x 17.00	432 x 432	12 ga.	0	-	-	4
A20P20SS6	Stainless steel	17.00 x 17.00	432 x 432	12 ga.	0	-	-	4
A20P20AL	Aluminum	17.00 x 17.00	432 x 432	0.10 in./3 mm	0	-	-	4
A24P16	Painted steel	21.00 x 13.00	533 x 330	12 ga.	0	-	-	4
A24P16G	Conductive steel	21.00 x 13.00	533 x 330	12 ga.	0	-	-	4
A24P16SS6	Stainless Steel	21.00 x 13.00	533 x 330	12 ga.	0	-	-	4
A24P20	Painted steel	21.00 x 17.00	533 x 432	12 ga.	2	0.75	19	4
A24P20G	Conductive steel	21.00 x 17.00	533 x 432	12 ga.	2	0.75	19	4
A24P20SS6	Stainless Steel	21.00 x 17.00	533 x 432	12 ga.	2	0.75	19	4
A24P20AL	Aluminum	21.00 x 17.00	533 x 432	0.10 in./3 mm	4	0.75	19	4
A24P24	Painted steel	21.00 x 21.00	533 x 533	12 ga.	2	0.75	19	4
A24P24G	Conductive steel	21.00 x 21.00	533 x 533	12 ga.	2	0.75	19	4
A24P24SS6	Stainless Steel	21.00 x 21.00	533 x 533	12 ga.	2	0.75	19	4
A24P24AL	Aluminum	21.00 x 21.00	533 x 533	0.10 in./3 mm	2	0.75	19	4
A30P16	Painted steel	27.00 x 13.00	686 x 330	12 ga.	2	0.75	19	4
A30P16G	Conductive steel	33.00 x 27.00	838 x 686	12 ga.	2	0.75	19	4
A30P20	Painted steel	27.00 x 17.00	686 x 432	12 ga.	2	0.75	19	4
A30P20G	Conductive steel	27.00 x 17.00	686 x 432	12 ga.	2	0.75	19	4
A30P20SS6	Stainless Steel	27.00 x 17.00	686 x 432	12 ga.	2	0.75	19	4
A30P24	Painted steel	27.00 x 21.00	686 x 533	12 ga.	2	0.75	19	4
A30P24G	Conductive steel	27.00 x 21.00	686 x 533	12 ga.	2	0.75	19	4
A30P24SS6	Stainless Steel	27.00 x 21.00	686 x 533	12 ga.	2	0.75	19	4
A30P24AL	Aluminum	27.00 x 21.00	686 x 533	0.10 in./3 mm	2	0.75	19	4
A30P30	Painted steel	27.00 x 27.00	686 x 686	12 ga.	4	0.75	19	4
A30P30G	Conductive steel	27.00 x 27.00	686 x 686	12 ga.	4	0.75	19	4
A30P30SS6	Stainless Steel	27.00 x 27.00	686 x 686	12 ga.	4	0.75	19	4
A36P16	Painted steel	33.00 x 13.00	838 x 330	12 ga.	2	0.75	19	4
A36P16G	Conductive steel	33.00 x 13.00	838 x 330	12 ga.	2	0.75	19	4
A36P24	Painted steel	33.00 x 21.00	838 x 533	12 ga.	2	0.75	19	6
A36P24G	Conductive steel	33.00 x 21.00	838 x 533	12 ga.	2	0.75	19	6
A36P24SS6	Stainless Steel	33.00 x 21.00	838 x 533	12 ga.	2	0.75	19	6
A36P24AL	Aluminum	33.00 x 21.00	838 x 533	0.10 in./3 mm	2	0.75	19	6
A36P30	Painted steel	33.00 x 27.00	838 x 686	12 ga.	4	0.75	19	6
A36P30G	Conductive steel	33.00 x 27.00	838 x 686	12 ga.	4	0.75	19	6
A36P30SS6	Stainless Steel	33.00 x 27.00	838 x 686	12 ga.	4	0.75	19	6
A36P30AL	Aluminum	33.00 x 27.00	838 x 686	0.10 in./3 mm	4	0.75	19	6
A36P36	Painted steel	33.00 x 33.00	838 x 838	12 ga.	4	0.75	19	8
A36P36G	Conductive steel	33.00 x 33.00	838 x 838	12 ga.	4	0.75	19	8
A36P36SS6	Stainless Steel	33.00 x 33.00	838 x 838	12 ga.	4	0.75	19	8
A40P24	Painted steel	37.00 x 21.00	940 x 533	12 ga.	4	0.75	19	6
A40P24G	Conductive steel	37.00 x 21.00	940 x 533	12 ga.	4	0.75	19	6
A40P30	Painted steel	37.00 x 29.00	940 x 737	12 ga.	4	0.75	19	4
A40P30G	Conductive steel	37.00 x 29.00	940 x 737	12 ga.	4	0.75	19	4
A42P24	Painted steel	39.00 x 21.00	991 x 533	12 ga.	2	0.75	19	6
A42P24G	Conductive steel	39.00 x 21.00	991 x 533	12 ga.	2	0.75	19	6
A42P30	Painted steel	39.00 x 27.00	991 x 686	12 ga.	4	0.75	19	6



Rev: 0  
Date: 7/17/2020  
By: AJ

Device Tag: EN  
Job Number: HBR8191  
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Manuf.: PNo:

Hoffman: A-24P24

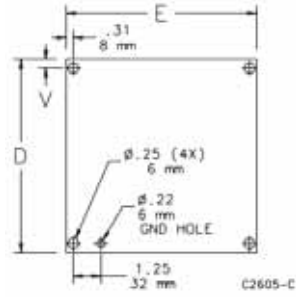
11-035-133

# SUB-PANELS FOR ENCLOSURES

<b>SUB-PANEL CATALOG NUMBER</b>	<b>SUB-PANEL DIMENSIONS (IN.)</b>
<b>A-DPESS</b>	<b>D x E</b>

**NOTE:**

- 6 indicates 316 Stainless Steel.
- AL indicates Aluminum
- G indicates Conductive Steel



Catalog Number	Material	Panel Size D x E (in.)	Panel Size D x E (mm)	Panel Gauge or Thickness	Edge Flanges	T (in.)	T (mm)	Number of Holes
A42P30G	Conductive steel	39.00 x 27.00	991 x 686	12 ga.	4	0.75	19	6
A42P30SS6	Stainless Steel	39.00 x 27.00	991 x 686	12 ga.	4	0.75	19	6
A42P36	Painted steel	39.00 x 33.00	991 x 838	12 ga.	4	0.75	19	8
A42P36G	Conductive steel	39.00 x 33.00	991 x 838	12 ga.	4	0.75	19	8
A42P36SS6	Stainless Steel	39.00 x 33.00	991 x 838	12 ga.	4	0.75	19	8
A42P42	Painted steel	39.00 x 39.00	991 x 991	12 ga.	4	0.75	19	8
A42P42G	Conductive steel	39.00 x 39.00	991 x 991	12 ga.	4	0.75	19	8
A48P24	Painted steel	45.00 x 21.00	1143 x 533	12 ga.	2	0.75	19	6
A48P24G	Conductive steel	45.00 x 21.00	1143 x 533	12 ga.	2	0.75	19	6
A48P30	Painted steel	45.00 x 27.00	1143 x 686	12 ga.	4	0.75	19	6
A48P30G	Conductive steel	45.00 x 27.00	1143 x 686	12 ga.	4	0.75	19	6
A48P36	Painted steel	45.00 x 33.00	1143 x 838	12 ga.	4	0.75	19	8
A48P36G	Conductive steel	45.00 x 33.00	1143 x 838	12 ga.	4	0.75	19	8
A48P36SS6	Stainless Steel	45.00 x 33.00	1143 x 838	12 ga.	4	0.75	19	8
A48P36AL	Aluminum	45.00 x 33.00	1143 x 838	0.10 in./3 mm	4	0.75	19	8
A48P42	Painted steel	45.00 x 39.00	1143 x 991	12 ga.	4	0.75	19	8
A48P42G	Conductive steel	45.00 x 39.00	1143 x 991	12 ga.	4	0.75	19	8
A48P48	Painted steel	44.00 x 44.00	1118 x 1118	11 ga.	4	0.84	21	10
A48P48G	Conductive steel	44.00 x 44.00	1118 x 1118	11 ga.	4	0.84	21	10
A54P42	Painted steel	50.00 x 38.00	1270 x 965	11 ga.	4	0.84	21	10
A54P42G	Conductive steel	50.00 x 38.00	1270 x 965	11 ga.	4	0.84	21	10
A60P24	Painted steel	57.00 x 21.00	1448 x 533	12 ga.	4	0.75	19	6
A60P24G	Conductive steel	57.00 x 21.00	1448 x 533	12 ga.	4	0.75	19	6
A60P30	Painted steel	57.00 x 27.00	1448 x 686	12 ga.	4	0.75	19	6
A60P30G	Conductive steel	57.00 x 27.00	1448 x 686	12 ga.	4	0.75	19	6
A60P36	Painted steel	57.00 x 33.00	1448 x 838	12 ga.	4	0.75	19	8
A60P36G	Conductive steel	57.00 x 33.00	1448 x 838	12 ga.	4	0.75	19	8
A60P36SS6	Stainless Steel	57.00 x 33.00	1448 x 838	12 ga.	4	0.75	19	8
A60P36AL	Aluminum	57.00 x 33.00	1448 x 838	0.10 in./3 mm	4	0.75	19	8
A60BFP42	Painted steel	56.00 x 38.00	1422 x 965	11 ga.	4	0.84	21	10
A60BFP42G	Conductive steel	56.00 x 38.00	1422 x 965	11 ga.	4	0.84	21	10
A60P48	Painted steel	56.00 x 44.00	1422 x 1118	11 ga.	4	0.84	21	10
A60P48G	Conductive steel	56.00 x 44.00	1422 x 1118	11 ga.	4	0.84	21	10
A60P60	Painted steel	56.00 x 56.00	1422 x 1422	11 ga.	4	0.84	21	10
A60P60G	Conductive steel	56.00 x 56.00	1422 x 1422	11 ga.	4	0.84	21	10
A72P36	Painted steel	69.00 x 33.00	1753 x 838	12 ga.	4	0.75	19	8
A72P36G	Conductive steel	69.00 x 33.00	1753 x 838	12 ga.	4	0.75	19	8
A72P60	Painted steel	68.00 x 56.00	1727 x 1422	11 ga.	4	0.84	21	10
A72P60G	Conductive steel	68.00 x 56.00	1727 x 1422	11 ga.	4	0.84	21	10
A72P72	Painted steel	68.00 x 68.00	1727 x 1727	11 ga.	4	0.84	21	10
A72P72G	Conductive steel	68.00 x 68.00	1727 x 1727	11 ga.	4	0.84	21	10



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Manuf.: PNo:

Hoffman: A-24P24

# PanelView Plus 7 Standard Terminals



26-005-091

**Table 4 - PanelView Plus 7 Standard 7-in., 9-in., and 10-in. Terminals**

Attribute	7-in. Touch 2711P-T7C21D8S, 2711P-T7C21D8S-B, 2711P-T7C22D8S, 2711P-T7C22D8S-B	9-in. Touch 2711P-T9W21D8S, 2711P-T9W21D8S-B, 2711P-T9W22D8S, 2711P-T9W22D8S-B	10-in. Touch 2711P-T10C21D8S, 2711P-T10C21D8S-B, 2711P-T10C22D8S, 2711P-T10C22D8S-B
Operator input	Touch	Touch	Touch
Display type	Color TFT LCD	Color TFT LCD	Color TFT LCD
Display size, diagonal	6.5 in.	9 in. widescreen	10.4 in.
Viewing area	132 x 99 mm	196 x 118 mm	211 x 158 mm
Display resolution	640 x 480 VGA, 18-bit color graphics	800 x 480 WVGA, 18-bit color graphics	800 x 600 SVGA, 18-bit color graphics
Aspect ratio	4:3	5:3	4:3
Brightness, typical	300 nits		
Backlight life	50,000 hr life, min at 40° C (104 °F) to half-brightness. Backlight is not replaceable.		
Touch screen	Analog resistive Actuation rating: 1 million presses Operating force: 100 grams		
Battery (real-time clock backup)	Accuracy: ±2 minutes per month. Battery life: 4 years min at 25 °C (77 °F) Replacement: CR2032 lithium coin cell (Allen-Bradley part number 2711P-RY2032)		
Memory	System User 512 MB RAM and 512 MB storage 80 MB nonvolatile storage for applications		
Secure Digital (SD) card slot	One SD card slot for storing application files Replacement: Allen-Bradley part number 1784-SD1 (1 GB) and 1784-SD2 (2 GB)		
USB ports	Host Device One USB 2.0 high-speed host port (type A) support removal flash drives for storage One high-speed 1.0 device port (type B) supports connection to host computer		
Ethernet port	Cat. Nos. with 21 Cat. Nos. with 22 One 10/100Base-T, Auto MDI/MDI-X Ethernet port with IEEE1588 support Two 10/100Base-T, Auto MDI/MDI-X Ethernet ports supporting star, linear, or DLR network topology		
Operating system	Windows CE includes FTP, VNC client server, ActiveX controls, PDF reader, third-party device support		
Software	FactoryTalk View Studio for Machine Edition, version 8.0 or later, FactoryTalk ViewPoint, version 2.6 or later		
<b>Electrical</b>			
Input voltage, DC	24V DC nom (18...30V DC), nonisolated DC power supply		
Power consumption, DC	50 W max (2.1A at 24V DC)		
Power supply	DIN-rail power supply, AC-to-DC, 85...265V AC, 47...63 Hz Recommended Replacement: Allen-Bradley part number 2711P-RSACDIN		
<b>Mechanical</b>			
Weight, approx	0.85 kg (1.86 lb)	1.29 kg (2.84 lb)	1.82 kg (4.0 lb)
Dimensions, HxWxD, approx	170 x 212 x 56.5 mm (6.69 x 8.35 x 2.22 in.)	190 x 280 x 56.5 mm (7.48 x 11.02 x 2.22 in.)	252 x 297 x 56.5 mm (9.92 x 11.69 x 2.22 in.)
Cutout dimensions, HxW, approx.	142 x 184 mm (5.59 x 7.24 in.)	162 x 252 mm (6.38 x 9.92 in.)	224 x 269 mm (8.82 x 10.59 in.)



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Manuf.: PNO:  
Allen Bradley: 2711P-T12W21D8S

**Table 5 - PanelView Plus 7 Standard 12-in. and 15-in. Terminals**

Attribute	12-in. Touch 2711P-T12W21D8S, 2711P-T12W21D8S-B, 2711P-T12W22D8S, 2711P-T12W22D8S-B	15-in. Touch 2711P-T15C21D8S, 2711P-T15C21D8S-B, 2711P-T15C22D8S, 2711P-T15C22D8S-B
Operator Input	Touch	Touch
Display type	Color TFT LCD	Color TFT LCD
Display size, diagonal	12.1 in. widescreen	15-in.
Viewing area	261 x 163 mm	304 x 228 mm
Display resolution	1280 x 800 WXGA, 18-bit color graphics	1024 x 768 XGA, 18-bit color graphics
Aspect ratio	5:3	4:3
Brightness, typical	300 nits	
Backlight life	50,000 h life, min. at 40° C to half-brightness. Backlight is not replaceable	
Touch screen	Analog resistive Actuation rating: 1 million presses Operating force: 100 grams	
Battery (real-time clock backup)	Accuracy: +/-2 minutes per month Battery life: 4 years min at 25 °C (77 °F) Replacement: CR2032 lithium coin cell	
Memory	System User 512 MB RAM and 512 MB storage 80 MB nonvolatile storage for applications	
Secure Digital (SD) card slot	One SD card slot for storing application files Replacement: Allen-Bradley part number 1784-SD1 (1 GB) and 1784-SD2 (2 GB)	
USB ports	Host Device One USB 2.0 high-speed host port (type A) support removal flash drives for storage One high-speed 1.0 device port (type B) supports connection to host computer	
Ethernet port	Cat. Nos. with 21 Cat. Nos. with 22 One 10/100Base-T, Auto MDI/MDI-X Ethernet port with IEEE1588 support Two 10/100Base-T, Auto MDI/MDI-X Ethernet ports supporting star, linear, or DLR network topology	
Operating system	Windows CE includes FTP, VNC client server, ActiveX controls, PDF reader, third-party device support	
Software	FactoryTalk View Studio for Machine Edition, version 8.0 or later, FactoryTalk ViewPoint, version 2.6 or later	
<b>Electrical</b>		
Input voltage, DC	24V DC nom (18...30V DC), nonisolated DC power supply	
Power consumption, DC	50 W max (2.1A at 24V DC)	
Power supply	DIN-rail power supply, AC-to-DC, 85...265V AC, 47...63 Hz Recommended Replacement: Allen-Bradley part number 2711P-RSACDIN	
<b>Mechanical</b>		
Weight, approx.	1.95 kg (4.29 lb)	3.07 kg (6.75 lb)
Dimensions, HxWxD, approx.	240 x 340 x 56.5 mm (9.65 x 13.39 x 2.22 in.)	318 x 381 x 56.5mm (12.52 x 15.00 x 2.22 in.)
Cutout dimensions, HxW, approx.	218 x 312 mm (8.58 x 12.28 in.)	290 x 353 mm (11.42 x 13.90 in.)



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Manuf.: PNo:  
**Allen Bradley: 2711P-T12W21D8S**

Bulletin 800T/H  
**30.5 mm Push Buttons**  
 Emergency Stop Operators



**2-Position Red Trigger Action Twist-to-Release, Non-Illuminated**

- Tamper resistant – front-of-panel mounting and non-removable operator head
- Compliant with global E-stop standards, including EN ISO 13850 and EN 60947-5-5



Cat. No. 800T-TFXJET6



Cat. No. 800T-TFXLET6



Cat. No. 800T-TFXK6



Cat. No. 800H-TFRXT6

Contact Type	Operator Position		Type 4/13			Type 4/4X/13
	Out	In	45 mm Plastic	63 mm Metal	Key Release	45 mm Plastic
No contacts	—	—	Cat. No.* <b>‡</b>	Cat. No.* <b>§</b>	Cat. No.* <b>‡</b>	Cat. No.* <b>‡</b>
1 N.C.	X	O	800T-TFXT6D2	800T-TFXLT6D2	800T-TFXK6D2	800H-TFRXT6D2
1 N.O. - 1 N.C.	O	X	800T-TFXT6A	800T-TFXLT6A	800T-TFXK6A	800H-TFRXT6A
1 S.M.C.B.➤	X	O	800TC-TFXT6D4S	800TC-TFXLT6D4S	800TC-TFXK6D4S	800HC-TFRXT6D4S

- \* For finger-safe contact block terminals, add a **C** to the cat. no. Example: Cat. No. 800TC-TFXT6 or 800HC-TFRXT6.
- ‡ To order a device with a jumbo (60 mm) plastic head add the letter **J** after **X**. Example: Cat. No. 800T-TFXJT6A or 800H-TFRXT6A.
- § To order a jumbo head device with "E-STOP" printed on the cap add the letters **JE** after **X**. Example: Cat. No. 800T-TFXJET6 or 800H-TFRXT6A.
- To order a device with "E-STOP" engraved on the cap add the letter **E** after **L**. Example: Cat. No. 800TC-TFXLET6D4S.
- ‡ Provided with two DO18 keys.
- Self-monitoring contact block.

**Standards Compliance**  
 UL 508  
 CCC  
**Certifications**  
 UL Listed  
 (File No. E14840, E10314  
 Guide No. NKCR, NOIV)  
 CSA Certified  
 (File No. LR1234, LR11924)  
 CSA C22.2, No. 14  
 EN/IEC: 60947-5-1

**800**   **T**   **-**   **T**   **FX**   **T**   **6**   **D2**  
a   b   c   d   e

Protection Rating	
Code	Description
T	Metal, Type 4/13
H	Plastic, Type 4/4X/13

Finger-Safe Guards	
Code	Description
Blank	No guards
C	Guards on terminals

Head Type‡		
800T Type 4/13	Description	800H Type 4/4X/13
Code		Code
FX	Standard (45 mm) mushroom head	FRX
FXJ	Jumbo (60 mm) mushroom head	FRXJ
FXJE	Jumbo (60 mm) mushroom head with "E-STOP"	FRXJE
FXK	45 mm mushroom head key release	—
FXL	63 mm anodized aluminum head	—
FXLE	63 mm anodized aluminum head with "E-STOP"	—

Release Function	
Code	Color
Blank	Key release‡
T	Twice release

**Note:** X = Closed/O = Open  
 ‡ Configurable only with **FXK** head type.

Code	Operator Position		Description
	Out	In	
	Blank	—	—
<b>Standard</b>			
D1	O	X	1 N.O.
D2	X	O	1 N.C.
D4	X	O	1 N.C.L.B.
A	O	X	1 N.O. - 1 N.C.
A1	O	X	1 N.O. - 1 N.C.L.B.
A5	X	O	2 N.C.L.B.
<b>PenTUFF (Low Voltage)</b>			
D1V	O	X	1 N.O.
D2V	X	O	1 N.C.
D4V	X	O	1 N.C.L.B.
AV	O	X	1 N.O. - 1 N.C.
<b>Class 1, Div. 2/Zone 2</b>			
<b>Logic Reed</b>			
D1R	O	X	1 N.O.
D2R	X	O	1 N.C.
AR	O	X	1 N.O. - 1 N.C.
<b>Sealed Switch</b>			
D1P	O	X	1 N.O.
D2P	X	O	1 N.C.
AP	O	X	1 N.O.
	X	O	1 N.C.
<b>Stackable Sealed Switch</b>			
D1Y	O	X	1 N.O.
D2Y	X	O	1 N.C.
AY	O	X	1 N.O. - 1 N.C.
	X	O	



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**PB2**

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Manuf.: PNO: Allen-Bradley: 800H-TFRXT6D2

29-005-117

# Section 7.0

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## **Polymer System**

**City of Cheyenne, WY – Dry Creek WRF Improvements**

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**No polymer system will be provided for this project by HUBER Technology**



# Section 8.0

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## **Test and Inspection Reports**

### **City of Cheyenne, WY – Dry Creek WRF Improvements**

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Testing information shall be supplied once the units have been manufactured and factory tested. Once manufacturing has been completed, Huber will add the required test verification under this section.

# Section 9.0

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# Certificate

Standard **ISO 9001:2015**

Certificate Registr. No. **01 100 1700023**

Certificate Holder: **Huber SE**  
Industriepark Erasbach A1  
92334 Berching  
Germany

Scope: Development, manufacture and sales of machine equipment and plant for water, wastewater, sludge for municipalities and industries

Proof has been furnished by means of an audit that the requirements of ISO 9001:2015 are met.

Validity: The certificate is valid from 2017-08-13 until 2020-08-12.  
First certification 2017

2017-07-20



TÜV Rheinland Cert GmbH  
Am Grauen Stein · 51105 Köln

# C E R T I F I C A T E

**ISO 14001:2015**

for

**HUBER SE**

at the site

**92334 Berching, Industriepark Erasbach A1**

The DAU-accredited environmental verifier hereby certifies that the named organization has implemented an Environmental Management System.

**Scope: Development, production and sales of machines and plants for water/waste water and sludge treatment**

With an audit it has been assessed that the requirements of ISO 14001:2015 are fulfilled.

**Nürnberg, 8 May 2018**

The follow-up certificate No. UGA 247-2018 is valid until 29 May 2021.

  
**Dipl.-Phys. Reinhard Mirz**  
Umweltgutachter  
DE-V-0260

  
**Dr. Reiner Beer**  
Umweltgutachterorganisation,  
DE-V-0279

# Section 10.0

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Warranty

HUBER Technology, Inc. a member of the HUBER Group warrants all screens, conveyance equipment, and parts manufactured by it to be free from defects in workmanship or materials for a period of one (1) year from the date of start-up, provided that in no event shall this warranty extend more than eighteen (18) months from date of delivery from the factory of Hans Huber SE, Germany. If, during said warranty period, any screens, conveyance equipment or parts manufactured by said companies prove to be defective in workmanship or material under normal use and service, and if such equipment or parts are found to be defective by an authorized representative or a factory member of the Huber Group, they will be replaced or repaired free of charge.

The Huber Group or its affiliates assumes no liability for the consequential damages of any kind and the purchaser by acceptance of delivery assumes all liability for the consequences of the use or misuse of the Huber Group products by the purchaser, his employees or others. The Huber Group or affiliates will not be held responsible for travel expenses, rented equipment, outside contractor's fees, or unauthorized repair service or parts.

The warranty shall not apply to any product or part of product which has been subjected to misuse, accident, negligence or used in a manner contrary to The Huber Group or affiliates printed instructions or damage due to a defective power supply, improper electrical protection or faulty installation or repair. Wear caused due to corrosive fluids is not covered in this warranty.

The HUBER Technology sole warranty and in lieu of all other warranties, expressed or implied, which are hereby excluded including in particular all warranties of merchantability or fitness for a particular purpose.

HUBER Technology neither assumes, nor authorizes any person or company to assume for it, any other obligation in connection with the sale of its equipment with the exception of a valid Huber Group guarantee or extended warranty, if applicable. Any other enlargement or modification of this warranty by a representative or other selling agent shall be his exclusive responsibility.

HUBER Technology, Inc.

Warranty Addendum

Per paragraph Section 44 46 26 - SCREW PRESS, PART 1 – GENERAL, 1.08 WARRANTY, Huber Technology agrees to amend the preceding standard warranty as follows:

**1.08 WARRANTY**

- A. *The manufacturer/supplier shall guarantee that the equipment, materials and performance shall be as specified herein and will be free of defects due to faulty design, materials or workmanship for a period not less than 2 years from the date of acceptance of the equipment following successful performance testing. Any conditions resulting in equipment failure or performance failure shall be considered a type of defect. Refer to the Purchase Agreement for details.*
  
- B. *Any type of equipment failure or defect due to materials of construction used by the manufacturer or the workmanship provided discovered during the warranty period or testing regardless of its magnitude shall be addressed and corrected to the satisfaction of the Owner by the manufacturer, at no cost to the Owner. The Owner shall not be responsible for any cost resulting from equipment failure during the warranty period. Manufacturer is not responsible for failures or defects caused by errors in operations or poor maintenance by the Owner.*

Huber Technology, Inc.

July, 2020