

Vaccuperm VGS-147, -148

Vacuum regulator

Installation and operating instructions



Other languages

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**Warning**

Prior to installation, read these installation and operating instructions. Installation and operation must comply with local regulations and accepted codes of good practice.

1. Of general interest**1.1 Structure of the documentation**

The Grundfos vacuum regulator VGS-147 / VGS-148 is a state-of-the-art solution, which complies with recognised safety regulations.

Conformity with applicable standards, directives and laws has been verified.

Nevertheless, certain risks which cannot be prevented by the manufacturer are associated with the use of the system.

Purpose of this manual:

- Inform users of optimum use.
- Warn users of possible residual risks when using correctly and identify measures that should be taken to avoid damage.
- Caution users against obvious misuse or inappropriate use and inform them of the necessary care that must be taken when operating the system.

1.2 About this manual

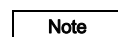
This manual contains the following standardised safety instructions about possible residual risks:

**Warning**

If these safety instructions are not observed, it may result in personal injury!

**Caution**

If these safety instructions are not observed, it may result in malfunction or damage to the equipment!

**Note**

Notes or instructions that make the job easier and ensure safe operation.

Information about possible residual risks is provided:

- On warning signs displayed in the installation location.
- At the start of each section in this manual.
- Directly before any operating procedures that could involve residual risks.

1.3 User/target groups

Users are persons who are responsible for operating and monitoring the vacuum regulator VGS-147 / VGS-148 at the installation location. The system may only be operated by trained and qualified personnel. Personnel must have appropriate technical knowledge and be familiar with the basic principles of measuring and control technology.

1.3.1 Responsibilities of the users

The users' responsibilities:

- Read this manual before operating the VGS-147 / VGS-148.
- Be trained by qualified personnel from Grundfos in the operation of the system.
- Observe the recognised regulations governing safety in the workplace and accident prevention.
- Wear appropriate protective clothing in accordance with national regulations for the prevention of accidents when operating the system and handling chemicals (German GUV-V D05).

1.4 Responsibilities of the operator

The owner of the building or operator of the VGS-147 / VGS-148 is responsible for the following:

- Consider this manual to be part of the product and ensure that it is kept clearly accessible in the immediate vicinity of the system for the entire service life of the system.
- Meet the installation requirements specified by the manufacturer (required water connections and fittings, environmental conditions, electrical connection, protective tube for dosing line if necessary, audible or optical warning device for alarm messages if necessary).
- Ensure that water lines and fixings are regularly checked, serviced and maintained.
- Obtain official approval for storing chemicals, if necessary.
- Train users in the operation of the system.
- Ensure that the regulations for the prevention of accidents are observed in the installation location (German GUV-V D05 regulation for the prevention of accidents, "Chlorination of Water" dated January 1997).
- Provide all users and service personnel with protective clothing in accordance with GUV-V D05 (face mask, gloves, protective apron).

1.5 Maintenance and service personnel

The system may only be maintained and serviced by authorised service personnel from Grundfos.

1.6 Correct usage

Grundfos VGS-147 / VGS-148 may be used for reducing the pressure (overpressure) of the gases chlorine (Cl_2) to subatmospheric pressure (vacuum) as described in this manual.

1.7 Inappropriate usage

Applications other than those listed in section [1.6 Correct usage](#) are considered not to be in accordance with the intended use and are not permitted. The manufacturer, Grundfos, accepts no liability for any damage resulting from incorrect use.

The system comprises state-of-the-art components and has undergone safety-related testing.



Warning

Unauthorised structural modifications to the system may result in serious damage to equipment and personal injury.

It is forbidden to open, modify, change the structure of, bridge, remove, bypass or disable components, especially safety equipment.

2. Handling chlorine

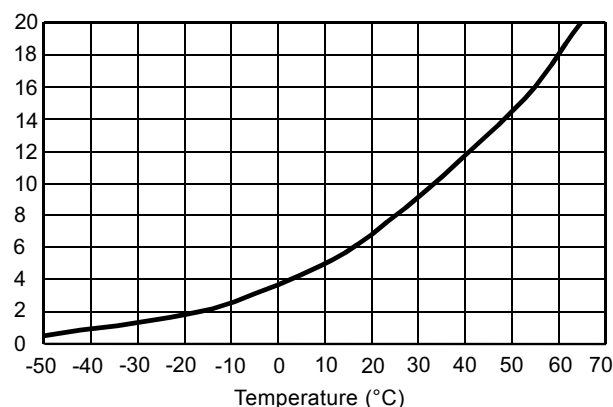
2.1 Physical and chemical data

Under normal conditions of pressure and temperature, chlorine is a yellowish green gas with a pungent odour. It exists as diatomic molecule Cl_2 .

It is not flammable, but can under certain circumstances promote the flammability of metals, hydrocarbons etc.

Atomic weight	35,457
Molecular weight Cl_2	70,941
Density (liquid)	1,57 g/cm ³ at -34,05 °C
Density (gaseous)	3,214 g/l at 0 °C, 1 bar
1 l liquid chlorine at 0 °C	corresponds to 457 l (0,457 m ³) gaseous chlorine
1 kg liquid chlorine at 0 °C	corresponds to 311 l (0,311 m ³) gaseous chlorine
Specific gravity	2,486 (specific gravity of air: 1)
Boiling point	- 34,05 °C (1 bar)
Melting point	- 100,98 °C
Evaporation heat	269 kJ/kg (at 0 °C)
Heat conductivity	0,527 kJ/m ² h (liquid chlorine)
Degree of purity acc. to DIN 19607	99,5 %
TLV (Threshold Limit Value)	1,5 mg/m ³ (0,5 Vol.-ppm)

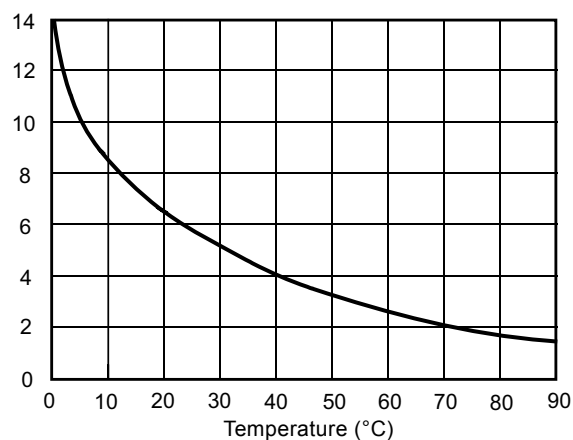
Vapour pressure curve of chlorine



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Fig. 1 Vapour pressure curve of chlorine

Solubility of chlorine gas in water



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Fig. 2 Solubility of chlorine gas in water

2.2 Safety advice for handling chlorine

2.2.1 Risks to health

Chlorine gas is toxic, more than 50 Vol.-ppm in the indoor air mean an acute danger to life.



Warning

R 23 Toxic by inhalation.

R 36/37/38 Irritating to eyes, respiratory system and skin.

Hazards of chlorine gas

- Irritating to eyes, respiratory system and skin.
- Causes whooping cough.
- Causes causticization of skin and respiratory system.
- Lethal by lung edema in case of long influence or high concentration.
- Slight paralyzing effect to the central nervous system.

Hazards of liquid chlorine

- Causes causticization of skin.
- Causes reddening and formation of bubbles.

2.2.2 Personal safety equipment

The operating authority of a chlorination plant has to provide for the operation personnel:

For each person

Respiratory equipment (full-sight gas mask)

- with an effective chlorine filter (B2P3), colour mark: grey with a white ring
- at least 1 spare filter per gas mask
- personally fitted (perfectly tight)
- labelled by name

Only plants with chlorine drums

- at least 2 protective suits with compressed air respirators

Storage of the safety equipment

- outside the chlorine rooms
- well visible
- easily available at any time
- protected from dust and moisture

Caution Further obligations of the operating authority

- Introducing the operation personnel to handle the safety equipment
- Carrying out exercises (at least half-yearly)
- Regular replacement of the gas mask filters
 - after the expiry of the date of durability
 - at least 6 months after opening (mark the opening date on the filter)
 - after contact with chlorine
 - Observe employing prohibition according to § 14 ArbStoffV (in Germany) resp. according to local laws!

2.2.3 Rules of conduct

- Change of chlorine containers only with gas mask.
- Entering contaminated rooms only with protective suit and compressed air respirator.
- In case of flight wear gas mask, if possible. Observe wind direction!
- Eating, drinking and storing food is prohibited in chlorine rooms.

2.2.4 First aid in case of accidents

First aid after having inhaled chlorine

- Keep calm.
- Remove injured persons from the dangerous area.
 - Helpers must pay attention to personal protection!
- Immediately remove contaminated clothes.
- Calm down injured persons and keep them warm with blankets.
- Supply fresh air; use oxygen respirator (alternately with inhaling steam), if possible.
 - No mouth-to-mouth resuscitation!
- Fast and gentle transport to hospital
 - lying
 - sitting in case of difficulty in breathing
 - state chlorine causticization as the cause.

First aid after causticization of the skin

- Keep calm.
- Remove contaminated clothes.
- Rinse skin with plenty of water
- Bandage the wound germ-freely
- Seek medical aid.
 - State chlorine causticization as the cause.

First aid after causticization of the eyes

- Keep calm.
- Rinse causticized eyes with plenty of water while the person is lying.
 - Protect healthy eye, if necessary.
 - Spread eyelids widely, let the eye move to all sides.
- Seek ophthalmologist.
 - State chlorine causticization as the cause.

First aid after internal causticization

- Keep calm.
- Drink water in short sips.
 - If possible, take medical charcoal.
- Seek medical aid.
 - state chlorine causticization as the cause.

2.2.5 Transport and storage of chlorine



Warning

Handling of chlorine containers only by experienced, practised personnel!

Basic rules for transport and storage of chlorine

- Treat containers carefully, do not throw!
- Protect containers from turning over or rolling away!
- Protect containers from direct sun rays and temperatures over 50 °C!
- Transport of containers only with valve protection nut and protection cap.



Warning

This rules are valid for both full and empty containers, as empty containers still contain rests of chlorine and therefore are under pressure.

Valid regulations

- Regulations for accident prevention "Chlorination of water" (GUV-V D5) with process instructions
- Regulations concerning places of work (ArbStättV))
- Technical rules for gases 280, 310 und 330



Warning

Strictly observe local law and regulations for handling, transport and storage of chlorine.

2.2.6 Pressure vessels and mountings

Chlorine is being offered in two container designs:

- Steel cylinders containing 50 kg or 65 kg, equipped with one valve for
 - the withdrawal of gaseous chlorine from the upright standing cylinder

Variant of chlorine cylinder

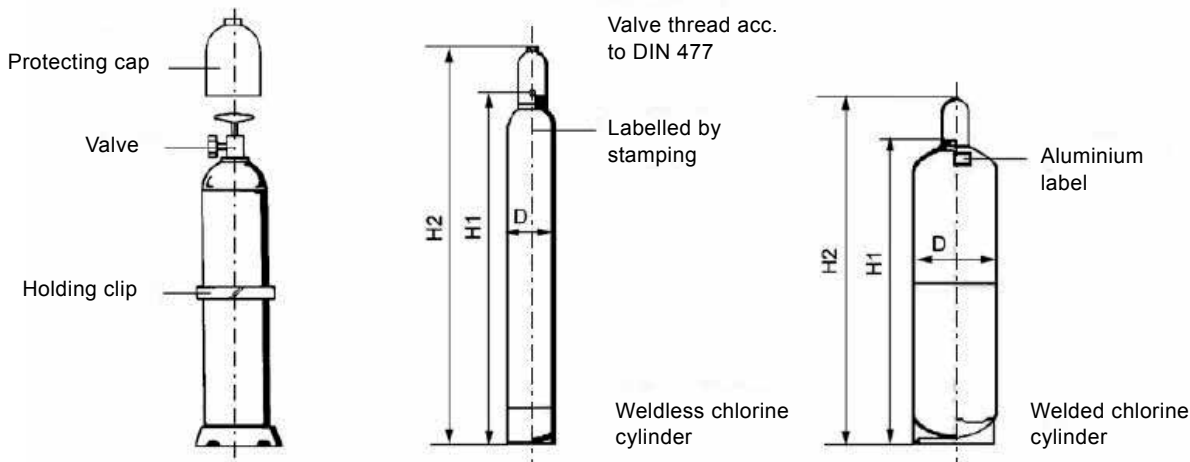


Fig. 3 Variant of chlorine cylinder

- Steel drums containing 500 kg or 1000 kg, equipped with
 - one valve for the withdrawal of gaseous chlorine
 - one valve for the withdrawal of liquid chlorine

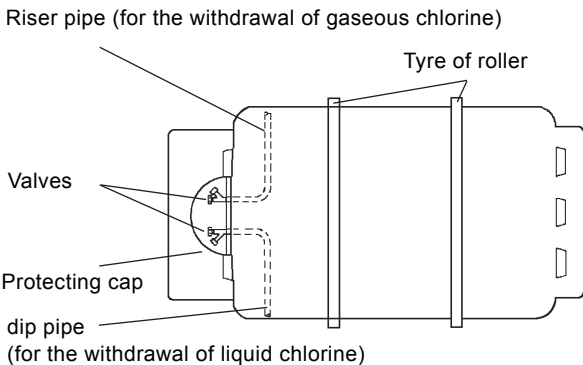


Fig. 4 Chlorine drum

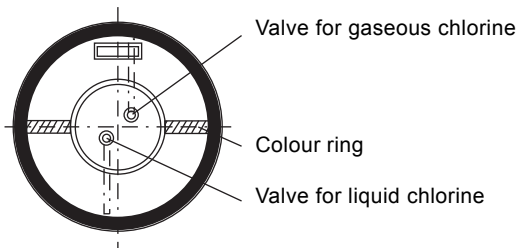


Fig. 5 Valve position of chlorine drum

Due to safety precautions, chlorine containers are only filled up to 95 % of their capacity.



Warning
Observe safety precautions for chlorine containers

- Kind of gas, weight, owner, producing date and date of the last testing have to be noted clearly on the container. Chlorine containers are marked by grey colour.
- No changes or repair by the user!
- Never open container valves by force. Stuck valve spindels can be loosened by wrapping a shred with warm water around the valve.
 - Never use an open flame!
 - Never use wrench lengthening!
 - Return containers with stuck valves to the manufacturer.
- Observe safety precautions and the manuals of the manufacturer!

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2.2.7 Chlorine extraction

Before the extraction

- The chlorine containers must be stored at least for 8 hours in the container room so that the content can adapt the ambient temperature.



Warning

Chlorine containers must never have a higher temperature than other parts of the plant. Danger of liquefaction and possible chlorine break-out!

- Turn chlorine drums on the support until the dip pipe and the riser pipe are placed vertically (observe the markings on the drum).
- Check tightness.

Connection

- Protect containers from turning over or rolling away!
- Dry the piping and the withdrawal system with dry nitrogen or dry air.
- No foreign matter must get into the plant.
- Mount new gaskets to the connection line.
- Connect the container.
- Slowly open the container valve.

Withdrawal of gaseous chlorine

At 15 °C about 1 % (DIN19607) of the content can be withdrawn per hour. In case of higher withdrawal danger of malfunction by the formation of ice on containers and piping!

Caution

Container size	Withdrawal quantity
50 Kg	500 g/h
65 Kg	650 g/h
500 Kg	5 Kg/h
1000 Kg	10 Kg/h

In case of higher chlorine requirement several chlorine containers of the same temperature have to be connected with header lines.

Withdrawal of liquid chlorine

- Within chlorination plants only possible from chlorine drums.
- Application of an evaporator is necessary.

Caution

Do not completely evacuate the chlorine drums. Danger of withdrawing deposits!

- Withdrawal of gaseous chlorine: Observe residual pressure of ca. 2 bar.
- Withdrawal of liquid chlorine: Observe residual pressure of ca. 4 bar.

After the extraction

- Close container valve.
- Disconnect container from the plant.
- Screw on valve protection nuts.
- Screw on protection cap.

Caution

Immediately close connection lines. No moisture must get into the lines!

2.3 Checking the tightness

Before commissioning check the tightness of the **whole plant**.



Warning

Do not check the tightness until the whole plant is ready for start-up. Danger of chlorine break-out!

2.3.1 Checking the chlorine solution lines and the diaphragm non-return of the injector

- Observe the manual of the injector!

2.3.2 Checking the tightness of the vacuum lines

Vacuum lines are all lines between vacuum regulator and injector.

- Close all container valves
- Close the rate valve
- Open the shut-off valve at the injection unit
- Open motive water valve
- Switch on the booster pump
- Open the rate valve
 - Floater shows gas flow or vacuummeter shows more than -9 m w. c.: **Leakage in vacuum line!**
- Close rate valve
- Switch off booster pump
- Close motive water valve
- Close the shut-off valve at the injection unit
- Check the vacuum lines and the connection. If necessary, carefully re-tighten them.
- Check tightness again!**
 - Floater shows no gas flow, vacuummeter shows -9 m w. c. or less: **Vacuum lines are tight.**

More possible reasons for insufficient operating vacuum

Note

- injector layed out too weakly or defective
- injector obstructed
- booster pump layed out too weakly or defective

2.3.3 Checking the tightness of pressure gas lines

Pressure gas lines are all lines from the gas containers to the vacuum regulator.

- If the plant is equipped with a nitrogen rinsing device: Check tightness roughly with nitrogen
- Detailed checking with ammonia

Checking the tightness with nitrogen

- Close all container valves
- Open container connection valves and all shut-off valves up to the gas dosing system
- Open the connection valve of the nitrogen cylinder
- Slowly open the valve of the nitrogen cylinder, until the lines have a pressure of about 10 bar (read at the manometer of the vacuum regulator).



Warning

Maximum nitrogen pressure 16 bar! Danger of damages and gas leakage when being exceeded!

- Apply soap water to all components under pressure
 - Formation of bubbles and/or pressure drop at manometer
Leakage in pressure lines!
 - Depressurize the plant!
 - Eliminate leakage!
 - Check tightness again!

No formation of bubbles, pressure at manometer does not drop significantly within one hour: **Pressure lines are tight.**

Checking the tightness with ammonia

See chapter [5.2.3 Checking the tightness with ammonia](#).

2.4 Constructional requirements of chlorination plants

All chlorine rooms



Fig. 6 Warning sign DIN 4844

– Warning sign according to DIN 4844 part 1 no. 4.2, to be installed at entrances

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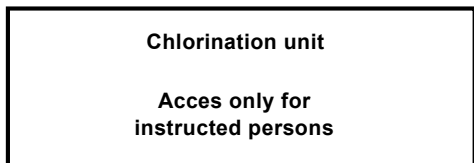


Fig. 7 Supplementary sign

– Supplementary sign according to DIN 4844 part 1 no. 4.5, to be installed at entrances

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Fig. 8 Mandatory sign

– Mandatory sign according to DIN 4844 part 1 no. 4.3, to be installed inside the rooms

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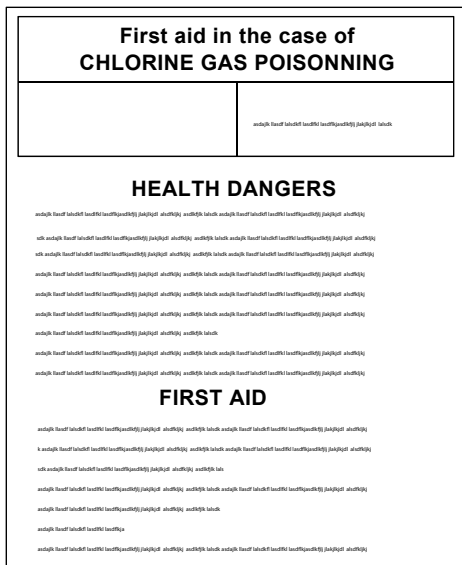


Fig. 9 Instruction sheet for first aid

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- Instruction sheet for first aid in case of chlorine gas intoxications, to be installed inside the rooms
- Maximum temperature: 40 °C
 - recommended temperature: 18-20 °C
 - recommended minimal temperature: 15 °C
- Overpressure lines of dosing equipment must not end in the open air
- Chlorine rooms must not be dedicated for the permanent stay of people.
- Only chlorine containers and the chlorination plant may be present in the rooms.

Rooms with pressure lines (e. g. storage rooms for chlorine containers)

- Flat, even floor
 - not below ground level
 - not higher than a possible loading ramp

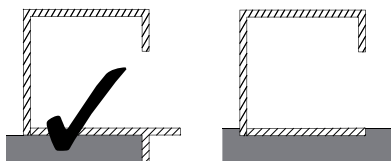


Fig. 10 Regulations for chlorine rooms (1)

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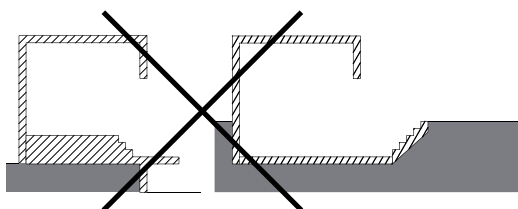
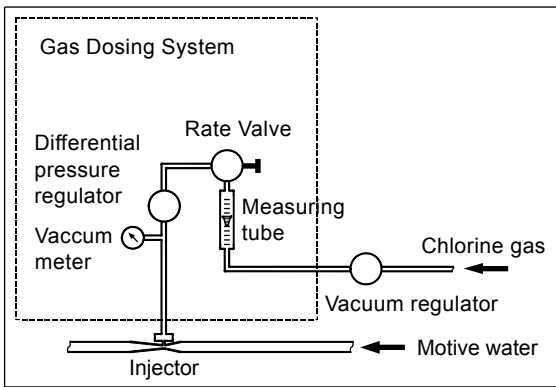


Fig. 11 Regulations for chlorine rooms (2)

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- Direct exit to the open air
- Lockable
 - doors must open outwards
 - it must be possible to open the doors without a key from inside the room
- No connection to other rooms
 - separated gastight and fire-resistant from other rooms
- A maximum of two vent holes of max. 20 cm² each
- Water sprinkling system
 - for precipitating escaping chlorine gas
 - operation must be possible by hand from outside the chlorine rooms
 - sufficiently dimensioned run-off with air trap
- Chlorine gas warning system
 - with optical and acoustical alarm
 - coupled to the water sprinkling system
 - coupling must reactivate automatically after having switched off (e. g. for container exchange)
- Chlorine gas must not be able to get into lower-lying rooms, shafts, pits, canals or aspirating holes of ventilation systems.

2.5 Principle function of the components



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Fig. 12 Components of a chlorinator

2.5.1 Vacuum regulator

- Reduces the gas pressure (overpressure) to subatmospheric pressure (vacuum)

2.5.2 Measuring tube

- Displays the gas flow

2.5.3 Rate valve

- For adjustment of the required gas flow
 - manually or automatically

2.5.4 Differential pressure regulator (Option: VGA-117)

- Regulates the difference of the pressures before and after the rate valve to a constant value
 - Adjusted dosing flow stays constant even when the injector vacuum varies.

2.5.5 Vacuummeter (Option: VGA-117)

- Displays the injector vacuum

2.5.6 Injector

- Creates the vacuum necessary for operating the part
- Mixes the chlorine gas with the water

2.6 List of valid laws and regulations

Laws and Regulations

BGBI. I 1975 S. 729	Verordnung über Arbeitsstätten (Arbeitsstättenverordnung - ArbStättV) Regulations concerning places of work (ArbStättV)
BGBI I 1980 S. 173, 184	Verordnung über Druckbehälter, Druckgasbehälter und Füllanlagen (Druckbehälterverordnung - DruckbehV) mit technischen Regeln Druckbehälter (TRB) mit technischen Regeln Druckgase (TRG) Regulations concerning pressure containers, gas cylinders and filling systems (pressure containers - DruckbehV) with technical rules for pressure containers (TRB) with technical rules for pressure gases (TRG)
BGBI I 1986 S. 1470	Gefahrstoffverordnung (GefStoffV) Regulations for hazardous materials (GefStoffV)
BGBI I 1975 S. 2494	Verordnung über gefährliche Arbeitsstoffe (Arbeitsstoffverordnung - ArbStoffV) Regulations for hazardous work materials (ArbStoffV)
GUV 0.1	Unfallverhütungsvorschrift "Allgemeine Vorschriften" Regulations for accident prevention "General Regulations"
GUV-V D5	Unfallverhütungsvorschrift "Chlorung von Wasser" Regulations for accident prevention "Chlorination of water"
GUV 49.1	Prüfliste zur Unfallverhütungsvorschrift "Chlorung von Wasser" Checklist for Regulations for accident prevention "Chlorination of water"
GUV 0.3	Unfallverhütungsvorschrift "Erste Hilfe" Regulations for accident prevention "First-Aid"
GUV 20.5	Merkblatt "Anleitung zur ersten Hilfe bei Unfällen" Leaflet "Instructions for First-Aid in case of accidents"
GUV 20.6	Merkblatt "Verbandzeug für die erste Hilfe bei Unfällen" Leaflet "Dressing material for First-Aid in case of accidents"
GUV 20.14	Atemschutzmerkblatt Leaflet for the protection of the air
GUV 29.6	Merkblatt "Über den Umgang mit ätzenden Stoffen" Leaflet "Handling of caustic materials"
GUV 60.3G26	Grundsatz für arbeitsmedizinische Vorsorgeuntersuchungen "Träger von Atemschutzgeräten für Arbeit und Rettung" G 26 Principle for preventive industrial medicine checkup "Wearers of respiratory equipment for work and rescue" G 26
GUV 2.6	Unfallverhütungsvorschrift "Druckbehälter" Regulations for accident prevention "Pressure containers"
GUV 2.10	Unfallverhütungsvorschrift "Elektrische Anlagen und Betriebsmittel" Regulations for accident prevention "Electrical installations and resources"
GUV 9.9	Unfallverhütungsvorschrift "Gase" Regulations for accident prevention "Gases"
ZH1/230	Merkblatt "Chlor" Leaflet "Chlorine"
CEFIC	Unfallmerkblatt für den Straßentransport "Chlor" Klasse 2, Ziffer 3 at UN 2201 Accident leaflet for the road transport "Chlorine" Class 2, Number 3 at UN 2201
BGBI I 1985, S. 1550	Verordnung über die Beförderung gefährlicher Güter auf der Straße - Gefahrgut Vstr/GGVS - Klasse 2, Ziffer 3 at Regulations for the transport of dangerous goods on the road - Gefahrgut Vstr/GGVS - Class 2, Number 3 at
GGVE	Gefahrgutverordnung Eisenbahn, Klasse 2, Ziffer 3 at) Regulations for dangerous goods on trains, Class 2, Number 3 at)
RID	Internationale Verordnung für die Beförderung gefährlicher Güter mit der Eisenbahn - Klasse 2, Ziffer 3 at International regulations for the transport of dangerous goods by train - Class 2, Number 3 at
BGBI I 1977, S. 1119	Verordnung über die Beförderung gefährlicher Güter auf dem Rhein (ADNR) Regulations for the transport of dangerous goods on the Rhine (ADNR)

DVGW-Rules

W203	Begriffe der Chlorung Concept of chlorination
W645-1	Überwachungs-, Mess-, Steuer- und Regeleinrichtungen in Wasserversorgungsanlagen Devices for monitoring, measuring, control and regulation in water supply plants
W291	Desinfektion von Wasserversorgungsanlagen Disinfection of water supply plants
W623	Dosieranlagen für Desinfektions- bzw. Oxidationsmittel - Dosieranlagen für Chlor Dosing units for disinfection or oxidation with chlorine
W640	Überwachungs-, Meß-, Steuer- und Regeleinrichtungen in Wasserwerken Systems for monitoring, measurement, control and regulation in waterworks DVGW-Merkblatt Arbeitshilfe zur Erstellung einer örtlichen Betriebsanweisung für Chlorungsanlagen unter Verwendung von Chlorgas DVGW leaflet Aid for the creation of a local manual für chlorination systems using chlorine gas

Standards

DIN 19606	Chlorgasdosieranlagen zur Wasseraufbereitung Chlorine gas dosing systems for water treatment
DIN 19607	Chlor zur Wasseraufbereitung Chlorine for water treatment
DIN EN 937	Chlor zur Aufbereitung von Wasser für den menschlichen Gebrauch Chlorine for the treatment of water for the human use
DIN 19643	Aufbereitung von Schwimm- und Badewasser Treatment of swimming pool and bathing water
DIN 3179, Teil 1,2	Einteilung der Atemgeräte, Übersicht Division of the respiratory equipment, overview
DIN 4102, Teil 2	Brandverhalten von Baustoffen und Bauteilen Behaviour in fire of building materials and parts
DIN 477, Teil 1	Gasflaschenventile; Bauformen, Baumaße, Anschlüsse, Gewinde Gas cylinder valves; forms, measurements, connections, threads

2.7 Recommended diameter

2.7.1 Between vacuum regulator and dosing regulator

Length of the vacuum line in (m)	Dosing quantity (g/h)							
	2000	4000	10000	20000	40000	70000	120000	200000
0	DN 8	DN 10	DN 15	DN 20	DN 25	DN 32	DN 40	DN 40
10	DN 8	DN 10	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50
20	DN 10	DN 15	DN 20	DN 25	DN 32	DN 40	DN 40	DN 50
30	DN 10	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65
40	DN 15	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65
50	DN 15	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65
75	DN 15	DN 15	DN 25	DN 32	DN 40	DN 50	DN 65	DN 65
100	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80

Grundfos company standard calculated with pressure drop
p=12.5 mbar

The indications in this table result from pressure loss observations. They do not take into consideration the possible influence of length and diameter of lines on the operational reliability of the system.

2.7.2 Between dosing regulator and injector

Length of the vacuum line in (m)	Dosing quantity (g/h)							
	2000	4000	10000	20000	40000	70000	120000	200000
0	DN 8	DN 8	DN 15	DN 15	DN 20	DN 25	DN 32	DN 40
10	DN 8	DN 8	DN 15	DN 15	DN 20	DN 25	DN 32	DN 40
20	DN 8	DN 10	DN 15	DN 20	DN 25	DN 25	DN 40	DN 40
30	DN 8	DN 10	DN 15	DN 20	DN 25	DN 32	DN 40	DN 40
40	DN 8	DN 10	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50
50	DN 10	DN 15	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50
75	DN 10	DN 15	DN 20	DN 25	DN 32	DN 40	DN 40	DN 50
100	DN 10	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65

Grundfos company standard calculated with pressure drop p = 50 mbar

The indications in this table result from pressure loss observations. They do not take into consideration the possible influence of length and diameter of lines on the operational reliability of the system.

3. Technical Data

3.1 General Data

Permissible medium	Cl ₂
--------------------	-----------------

3.1.1 Pressure connection

Vacuum line connection (outlet)	VGS-147: DN 20 VGS 148: DN 40
Vacuum line to be used	VGS-147: DN 20, PVC-pipe VGS-148: DN 40, PVC-pipe
Pressure line connection (flange) (inlet)	DN 25
Overpressure valve connection	8/11, PE tube
Overpressure line to be used	8/11, PE tube 8/11
Pressure line to be used	G1, seamless drawn steel pipes according to DIN 2441

3.1.2 Flow range

Type	Flow range	
VGS-147	1 - 40 kg/h	50 - 2100 #/day
	3.5 - 70 kg/h	200 - 3700 #/day
VGS-148	6 - 120 kg/h	400 - 6200 #/day
	10 - 200 kg/h	500 - 10500 #/day

3.1.3 Admission pressure

Minimal admission pressure	2 bar
Maximum admission pressure	11 bar

3.1.4 Accessories (not including)

Holding plate for wall fixing at change of container
Installation material in 3 lengths
Test medium for leak search

3.2 Dimensioned drawings

3.2.1 Vacuum regulator VGS-147

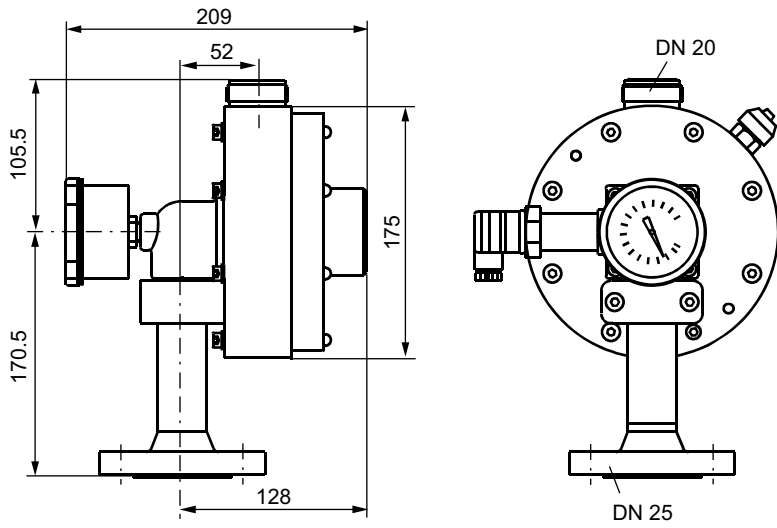


Fig. 13 Dimensional drawing of VGS-147

3.2.2 Vacuum regulator VGS-148

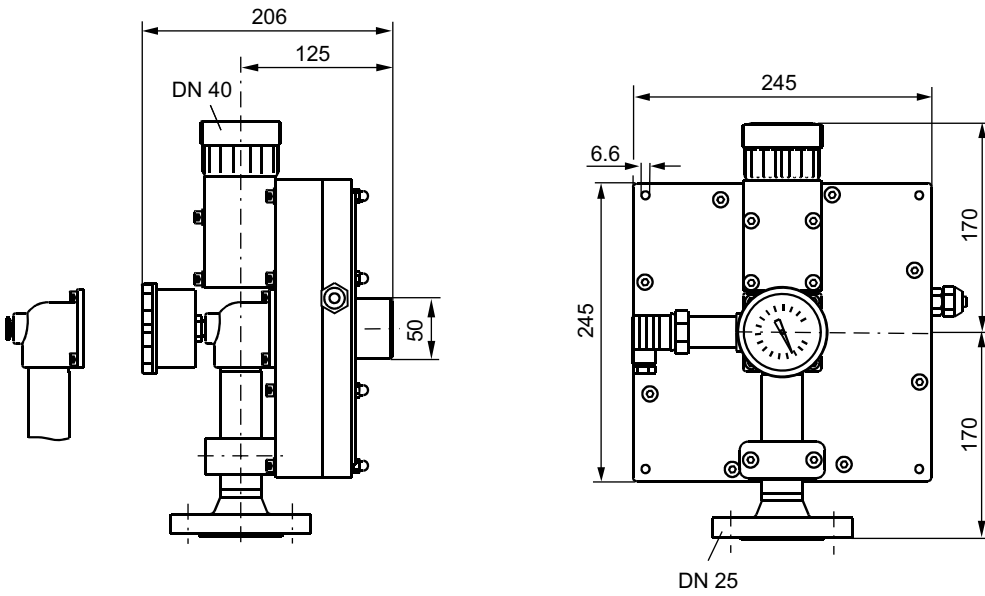


Fig. 14 Dimensional drawing of VGS-148

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4. Installation

4.1 Transport and storage

- Handle with care, do not throw!
- Dry and cool storage place.

4.2 Unpacking

- Observe when unpacking:
 - No humidity should get into gas-leading parts!
 - No foreign matter should get into gas-leading parts!
 - Remove plugs not until the connections shall be made!
- Mount as soon as possible after unpacking.

4.3 Mounting



Warning

Observe the information, see chapter 2. *Handling chlorine*

4.3.1 Requirements for mounting

- Installations at the pressure side from the containers resp. the evaporator are present and checked for tightness
- Piping has been rinsed with nitrogen
 - no more soiling present
- Filter and liquid gas trap and pressure reducing valve has been installed directly before the vacuum regulator
- Directly before the vacuum regulator the highest temperature in the course of the pressure gas lines is present.
 - If necessary, wrap a heater band around the pressure line connection of the vacuum regulator.



Warning

Ensure that all container valves are closed before mounting.

Only use the intended line types!

Do not install the vacuum regulator on walls, plates or something similar. Danger of distortion! The device will only be carried by the connection with the pressure line.

Caution

Ensure that all piping is free of distortion.

Do not mount the device in a distorted manner.

4.3.2 Pressure line connection

Note Ensure that the pressure lines are as short as possible.

Required tools and accessories

- 2 fork wrenches 19 mm

With connection set

- Put in flat gasket.
- Screw the pressure line into the connection piece
 - tighten with hemp or weld the thread

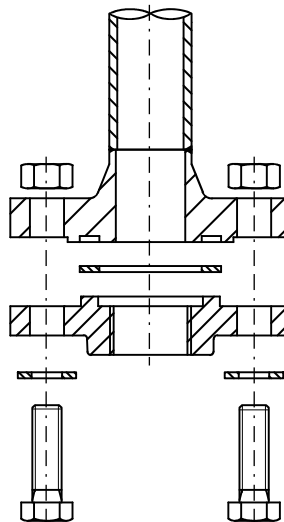


Fig. 15 Pressure line with connection set

4.3.3 Without connection set

- Put in flat gasket.
- Screw the pressure line connection (flange) to the flange of the pressure line resp. the flange of the component before.

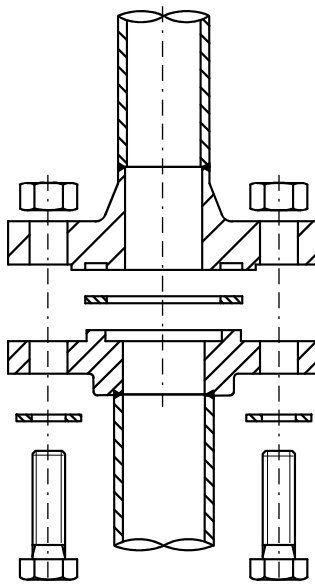


Fig. 16 Pressure line without connection set

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4.3.4 Vacuum line connection

- Push the union nut onto the pipe (in the right direction)
- Place the union end in the pipe
 - glue together with PVC glue
- If not yet present, place the o-ring on the connection
- Place the pipe on the connection
- Tighten the union nut by hand

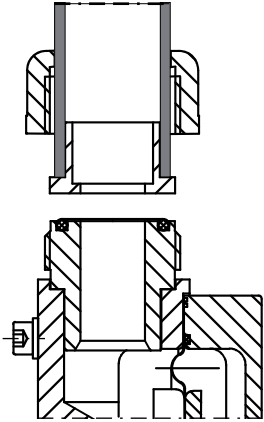


Fig. 17 Vacuum line connection

4.3.5 Overpressure line connection

- Push the union nut onto the tube (in the right direction)
- Put the tube onto the branch neck of the overpressure valve
- Tighten the union nut by hand

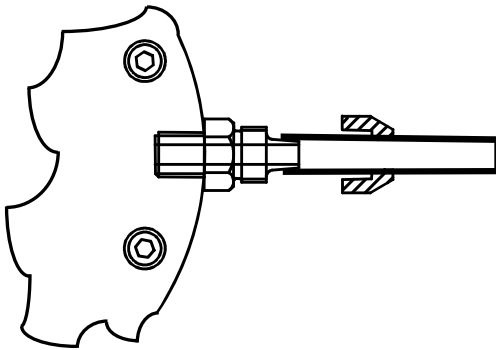


Fig. 18 Overpressure line connection

Warning

The overpressure line has to lead downwards, as chlorine is heavier than air.

Do connect the overpressure line to a suitable absorption vessel!

The overpressure line must end in the room and not lead in the open air!



5. Commissioning

5.1 Preparations for commissioning

5.1.1 Vacuum connections



Warning

Before connecting, ensure that the valves of all gas containers are closed.

Only use the intended line types!

Caution

Maximum length of the vacuum line, see chapter [2.7 Recommended diameter](#)

- At the vacuum regulator, connect the vacuum line and connect it to the dosing regulators.

Warning

Lead the overpressure line downwards, as chlorine is heavier than air.



Connect the overpressure line to a suitable adsorption device. If using a gas warning device: Mount the sensor in a distance of about 10 cm from the outlet hole of the adsorption device.

The overpressure line must end in the room, never lead to the open air!

- Connect the overpressure line to the overpressure connection.
- Connect the vacuum line to the injector.

5.1.2 Pressure line connection

Note

Ensure that the pressure lines are as short as possible.

- Slightly apply grease to the gasket, if necessary
- Connect the pressure line to the pressure line connection

5.1.3 Electrical connections

Connecting the contact manometer (option)

- Connect two cables with an external evaluation device

Note

The polarity is arbitrary.

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5.2 Checks before commissioning

Check tightness of the total plant before start-up.

- Observe manual of the gas dosing regulators!



Warning
Check the tightness not until the total plant is ready for start-up.

Danger of gas leakage!



Warning
Before checking the tightness:
Start running the optional built-in liquid trap or the separate liquid trap!

Danger of gas leakage!

5.2.1 Checking the tightness of pressure gas lines

Pressure gas lines are all lines from the gas containers to the vacuum regulator.

- If the plant is equipped with a nitrogen rinsing device: Check tightness roughly with nitrogen
- Detailed checking: with ammonia

5.2.2 Checking the tightness with nitrogen

- Close all container valves
- Open container connection valves and all shut-off valves up to the gas dosing system
- Open the connection valve of the nitrogen cylinder
- Slowly open the valve of the nitrogen cylinder, until the lines have a pressure of about 10 bar (read at the manometer of the vacuum regulator).



Warning
Maximum nitrogen pressure 16 bar!
Danger of damages and gas leakage when being exceeded!

- Apply leakage spray or soap water to all components under pressure
 - Formation of bubbles and/or pressure drop at manometer --> **Leakage in pressure lines!**
- **Depressurize the plant!**
- **Eliminate leakage!**
- **Check tightness again!**
 - No formation of bubbles, pressure at manometer does not drop significantly within one hour --> **Pressure lines are tight.**

5.2.3 Checking the tightness with ammonia

- Open all container valves and container connection valves and quickly close them again
- Slowly pass the open ammonia bottle along pressure-gas leading parts
 - Formation of white mist: **Leakage in pressure lines!**
- **Depressurize the plant!**
- **Eliminate leakage!**
- **Check tightness again!**

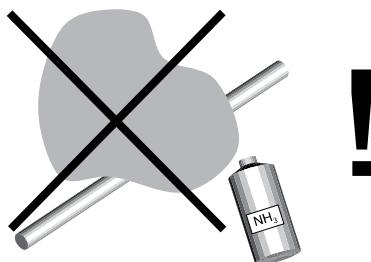


Fig. 19 Formation of white mist: Leakage in pressure lines!

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- No formation of white mist: Pressure lines are tight.



Fig. 20 Pressure lines are tight



Warning
Liquid ammonia must not come in contact with parts of the plant!

Danger of leakages by corrosion!

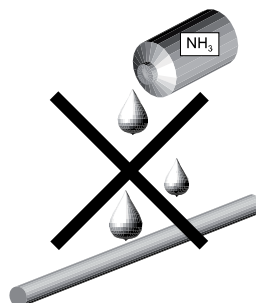


Fig. 21 Liquid ammonia makes leakages by corrosion

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6. Operation

6.1 Function

- Reducing the gas pressure (overpressure) to subatmospheric pressure (vacuum)
- In case of too high pressure in the device (e. g. if the inlet valve is soiled or damaged) the overpressure valve opens.
 - Gas will be lead to the absorption vessel.
- In case of the gas container getting empty or blocked gas supply (too high vacuum in the device) the vacuum regulator closes.
 - Gas containers will not be evacuated with the injector vacuum.

6.2 Display Elements

- Manometer
 - displays the gas pressure at the inlet (admission pressure)



Warning
Do not exceed the max. admission pressure!
Danger of gas break-out!

6.3 Operating

Note

The device is passive. All adjustment has to be made at other parts of gas dosing plant!

- Observe manuals of the other components.

6.4 Possible faults

Fault	To be recognized by	Cause	Correction
Gas leakage	Gas odour Formation of mist at the connections when checking the tightness	Connections not tight	Check connections and retighten them
	Gas escapes at the overpressure line while the plant is not running	Inlet valve not tight	Call the service
	Loss of pressure at the manometer while the plant is not running and the gas supply is closed	Inlet valve or connections not tight	Call the service
Overpressure valve not tight	Vacuum present in the overpressure line while the plant is running (to be felt by putting on a finger)	Spring corroded or soiled	Call the service
		O-ring (19) defective	Replace o-ring (19)
		Diaphragm defective	Call the service
Disturbed regulation	Vibrations and booming of the device	Diaphragm distorted or mounted incorrectly	Call the service
Desired dosing flow is not reached	Vacuum present in the overpressure line while the plant is running (to be felt by putting on a finger) Pressure gauge of the vacuum regulator	Admission pressure too low (< 2 bar)	Call the service
		Gas container empty	Replace gas containers by full ones
		Shut-off valves in the pressure lines closed or not perfectly open	Open the shut-off valves
		Temperature at the pressure line connection lower than the temperature of the other pressure gas lines	Wrap a heater band around the filter and/or the pressure line connection and warm them up. Close gas supply before the filter, adjust the gas dosing system to minimal dosing flow and start the plant
Re-liquefaction of the gas	Formation of ice on filter or pressure line connection during start-up, damages of PVC enclosure parts (only visible when the device is open)	Heating of the liquid trap not connected or defective	Call the service
		Vacuum regulator without liquid trap used with gas drum	Use a vacuum regulator with a liquid trap drum

7. Maintenance

Rates for cleaning and maintenance:

- at least every 12 months
- in case of malfunction



Warning
Do not open the device!
Cleaning, maintenance and repair only by authorized personnel!



Warning
Switch off the whole plant before doing cleaning and maintenance work!
Danger of gas break-out!



Warning
Check the tightness before restarting!
Danger of gas break-out!

8. Disposal

This product or parts of it must be disposed of in an environmentally sound way:

1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.

Subject to alterations.

GB: EU declaration of conformity

We, Grundfos, declare under our sole responsibility that the products VGA-111, VGA-113, VGA-117, VGA-146, VGB-103, VGS-141, VGS-143, VGS-145, VGS-147, VGS-148, to which the declaration below relates, are in conformity with the Council Directives listed below on the approximation of the laws of the EU member states.

DE: EU-Konformitätserklärung

Wir, Grundfos, erklären in alleiniger Verantwortung, dass die Produkte VGS-111, VGS-113, VGS-117, VGS-146, VGB-103, VGS-141, VGS-143, VGS-145, VGS-147, VGS-148, auf die sich diese Erklärung beziehen, mit den folgenden Richtlinien des Rates zur Angleichung der Rechtsvorschriften der EU-Mitgliedsstaaten übereinstimmen.

FR: Déclaration de conformité UE

Nous, Grundfos, déclarons sous notre seule responsabilité, que les produits VGA-111, VGA-113, VGA-117, VGA-146, VGB-103, VGS-141, VGS-143, VGS-145, VGS-147, VGS-148, auxquels se réfère cette déclaration, sont conformes aux Directives du Conseil concernant le rapprochement des législations des États membres UE relatives aux normes énoncées ci-dessous.

HU: EU megfeleléségi nyilatkozat

Mi, a Grundfos vállalat, teljes felelősséggel kijelentjük, hogy a(z) VGA-111, VGA-113, VGA-117, VGA-146, VGB-103, VGS-141, VGS-143, VGS-145, VGS-147, VGS-148 termék, amelyre az alábbi nyilatkozat vonatkozik, megfelelnek az Európai Unió tagállamainak jogi iránylevelit összehangoló tanács alábbi előírásainak.

PT: Declaração de conformidade UE

A Grundfos declara sob sua única responsabilidade que os produtos VGA-111, VGA-113, VGA-117, VGA-146, VGB-103, VGS-141, VGS-143, VGS-145, VGS-147, VGS-148, aos quais diz respeito a declaração abaixo, estão em conformidade com as Directivas do Conselho sobre a aproximação das legislações dos Estados Membros da UE.

RS: Deklaracija o usklađenosti EU

Mi, kompanija Grundfos, izjavljujemo pod punom vlastitom odgovornošću da je proizvod VGA-111, VGA-113, VGA-117, VGA-146, VGB-103, VGS-141, VGS-143, VGS-145, VGS-147, VGS-148, na koji se odnosi deklaracija ispod, u skladu sa dole prikazanim direktivama Saveta za usklađivanje zakona država članica EU.

SK: ES vyhlásenie o zhode

My, spoločnosť Grundfos, vyhlasujeme na svoju plnú zodpovednosť, že produkty VGA-111, VGA-113, VGA-117, VGA-146, VGB-103, VGS-141, VGS-143, VGS-145, VGS-147, VGS-148 na ktoré sa vyhlásenie uvedené nižšie vzťahuje, sú v súlade s ustanoveniami nižšie uvedených smerníc Rady pre zblíženie právnych predpisov členských štátov EÚ.

KZ: Сәйкестік жөніндегі ЕО декларациясы

Біз, Grundfos, ЕО мүше елдерінің заңдарына жақын төменде көрсетілген Кеңес директиваларына сәйкес төмендегі декларацияға қатысты VGA-111, VGA-113, VGA-117, VGA-146, VGB-103, VGS-141, VGS-143, VGS-145, VGS-147, VGS-148 өнімдері біздің жеке жауапкершілігімізде екенін мәлімдейміз.

CZ: Prohlášení o shodě EU

My firma Grundfos prohlašujeme na svou plnou odpovědnost, že výrobky VGA-111, VGA-113, VGA-117, VGA-146, VGB-103, VGS-141, VGS-143, VGS-145, VGS-147, VGS-148, na které se toto prohlášení vztahuje, jsou v souladu s níže uvedenými ustanoveními směrnice Rady pro sblížení právních předpisů členských států Evropského společenství.

ES: Declaración de conformidad de la UE

Grundfos declara, bajo su exclusiva responsabilidad, que los productos VGA-111, VGA-113, VGA-117, VGA-146, VGB-103, VGS-141, VGS-143, VGS-145, VGS-147, VGS-148 a los que hace referencia la siguiente declaración cumplen lo establecido por las siguientes Directivas del Consejo sobre la aproximación de las legislaciones de los Estados miembros de la UE.

GR: Δήλωση συμμόρφωσης ΕΕ

Εμείς, η Grundfos, δηλώνουμε με αποκλειστικά δική μας ευθύνη ότι τα προϊόντα VGA-111, VGA-113, VGA-117, VGA-146, VGB-103, VGS-141, VGS-143, VGS-145, VGS-147, VGS-148, στα οποία αναφέρεται η παρακάτω δήλωση, συμμορφώνονται με τις παρακάτω Οδηγίες του Συμβουλίου περί προσέγγισης των νομοθεσιών των κρατών μελών της ΕΕ.

PL: Deklaracja zgodności UE

My, Grundfos, oświadczamy z pełną odpowiedzialnością, że nasze produkty VGA-111, VGA-113, VGA-117, VGA-146, VGB-103, VGS-141, VGS-143, VGS-145, VGS-147, VGS-148, których deklaracja niniejsza dotyczy, są zgodne z następującymi dyrektywami Rady w sprawie zbliżenia przepisów prawnych państw członkowskich.

RO: Declarația de conformitate UE

Noi Grundfos declarăm pe propria răspundere că produsele VGA-111, VGA-113, VGA-117, VGA-146, VGB-103, VGS-141, VGS-143, VGS-145, VGS-147, VGS-148, la care se referă această declarație, sunt în conformitate cu Directivele de Consiliu specificate mai jos privind armonizarea legilor statelor membre UE.

RU: Декларация о соответствии нормам ЕС

Мы, компания Grundfos, со всей ответственностью заявляем, что изделия VGA-111, VGA-113, VGA-117, VGA-146, VGB-103, VGS-141, VGS-143, VGS-145, VGS-147, VGS-148, к которым относится нижеприведенная декларация, соответствуют нижеприведенным Директивам Совета Евросоюза о тождественности законов стран-членов ЕС.

TR: AB uygunluk bildirgesi

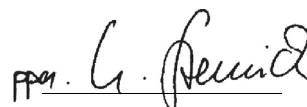
Grundfos olarak, aşağıdaki bildirim konusu olan VGA-111, VGA-113, VGA-117, VGA-146, VGB-103, VGS-141, VGS-143, VGS-145, VGS-147, VGS-148 ürünlerinin, AB Üye ülkelerinin direktiflerinin yakınlaştırılmasıyla ilgili durumun aşağıdaki Konsey Direktifleriyle uyumlu olduğunu ve bununla ilgili olarak tüm sorumluluğun bize ait olduğunu beyan ederiz.

- Machinery Directive (2006/42/EC). Standards used: DIN EN ISO 12100:2010.
- Low Voltage Directive (2014/35/EU). Standards used: EN 60204-1:2007 EN 61010-1:2011-07*
- EMC Directive (2014/30/EU)*. Standards used: EN 55014-1:2006+A1:2009+A2:2011 EN 55014-2:2016 EN 61000-6-1:2007 EN 61000-6-3:2011
- Other regulations applied: DIN 19606:2010-09

* Only valid for products with electrical components

This EU declaration of conformity is only valid when published as part of the Grundfos installation and operating instructions (publication numbers 95714202, 95714224, 98028175, 95714246, 95714278, 95713929, 95714262, 95714296).

Pfintzal, 1 May 2016



Ulrich Stemick
Technical Director
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Person authorised to compile technical file and empowered to sign the EU declaration of conformity.



Установки вакуумные для дозирования газов типа Vassiperm сертифицированы на соответствие требованиям Технических регламентов Таможенного союза: ТР ТС 004/2011 «О безопасности низковольтного оборудования»; ТР ТС 010/2011 «О безопасности машин и оборудования»; ТР ТС 020/2011 «Электромагнитная совместимость технических средств».

Сертификат соответствия:

ТС RU C-DK.АИ30.В.01214, срок действия до 17.12.2019 г.

Выдан: Органом по сертификации продукции «ИВАНОВО-СЕРТИФИКАТ» ООО «Ивановский Фонд Сертификации».

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Установки вакуумные для дозирования газов типа Vassiperm декларированы на соответствие требованиям Технического регламента Таможенного союза ТР ТС 032/2013 «О безопасности оборудования, работающего под избыточным давлением».

Декларация соответствия:

ТС N RU Д-DK.АИ30.В.05343, срок действия до 08.10.2020 г.

Истра, 1 марта 2016 г.

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