

FACTORY AUTOMATION

Mitsubishi Electric Magnetic Starters MS-T/N Series

MS-T/N SERIES



GLOBAL IMPACT OF MITSUBISHI ELECTRIC



Through Mitsubishi Electric's vision, "Changes for the Better" are possible for a brighter future.

Changes for the Better

We bring together the best minds to create the best technologies. At Mitsubishi Electric, we understand that technology is the driving force of change in our lives. By bringing greater comfort to daily life, maximizing the efficiency of businesses and keeping things running across society, we integrate technology and innovation to bring changes for the better.

Mitsubishi Electric is involved in many areas including the following

Energy and Electric Systems

A wide range of power and electrical products from generators to large-scale displays.

Electronic Devices

A wide portfolio of cutting-edge semiconductor devices for systems and products.

Home Appliance

Dependable consumer products like air conditioners and home entertainment systems.

Information and Communication Systems

Commercial and consumer-centric equipment, products and systems

Industrial Automation Systems

Maximizing productivity and efficiency with cutting-edge automation technology.

OVERVIEW

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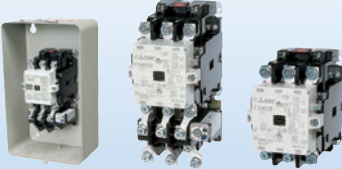



12. Motor Circuit Breaker MMP-T32

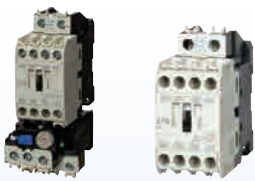

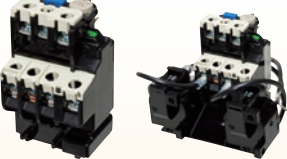



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Line-up A Wide Variation that Suits User Needs








| Application Based Name | | MS-T/N Series Magnetic Starters/Contactors | | | |
|---|-------------|--|---|---|--|
| | | Standard Type (AC Operated) | Reversible Type | DC Operated Type | Mechanically Latched Type |
| External Appearance of Representative Model | MS-T Series |  MS-T MSO-T S-T |  MS-2xT MSO-2xT S-2xT |  MSOD-T SD-T |  SL/SLD-T |
| | MS-N Series |  MS-N MSO-N S-N |  MS-2xN MSO-2xN S-2xN |  MSOD-N SD-N |  SL/SLD-N |
| Application/Function | | <ul style="list-style-type: none"> Usable in general applications such as motor starting, stopping, and burnout protection. | <ul style="list-style-type: none"> Ideal for forward rotation, reverse rotation, or plugging, as well as for the switching of normal and emergency power supplies. | <ul style="list-style-type: none"> Can be used if the control circuit is DC. (Can be used whether the main circuit is AC or DC.) | <ul style="list-style-type: none"> Because it is mechanically maintained, it does not open in the case of power stoppages or voltage drops. Applications <ul style="list-style-type: none"> Street Lighting Storage Circuits at Plants, etc. For Power Supply Switching Between Purchased Power and Home Generated Power |
| Page | | Page 70 | Page 71 | Page 87 | Page 98 |










| Application Based Name | | MS-T/N Series Magnetic Starters/Contactors | | Thermal Overload Relays | Contactor Relays |
|---|-------------|--|---|---|---|
| | | With Wiring Streamlining Terminal | Main Circuit 3-Pole Magnetic Contactors | | Standard Type (AC Operated) |
| External Appearance of Representative Model | MS-T Series |  MSO-T□BC S-T□BC |  S-T32 |  TH-T TH-T□SR |  SR-T |
| | MS-N Series | — |  S-N□8 |  TH-N TH-N□SR | — |
| Application/Function | | <ul style="list-style-type: none"> Designed to provide safety during maintenance and inspection, for example by allowing wiring operations to be performed more easily and by providing protection against electrical shocks without using a protective cover, etc. | <ul style="list-style-type: none"> Because there are only 3 main contacts and no auxiliary contact, the required surface area for mounting panels has been significantly reduced. By additionally installing an auxiliary contact unit, it is possible to attach a auxiliary contact. | <ul style="list-style-type: none"> Can be used for protecting motors from burnout caused by overload or restriction, and depending on the application, selection is possible among models that provide overload open phase protection (TH-T/N □ KP), delay trip types (TH-T/N □ SR), and speed types (TH-T/N □ FS, TH-T □ FSKP, TH-N □ KF), etc. | <ul style="list-style-type: none"> Can be used as an operating relay for magnetic contactors, etc., and can direct/transmit signals using multiple contacts. |
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| MS-T/N Series Magnetic Starters/Contactors | | | | |
|---|--|--|--|--|
| Delay Open Type | Magnetic Starters with Saturable Reactors and Thermal Overload Relays | Magnetic Starters with Quick-acting characteristics Thermal Overload Relays | Magnetic Starters with Push-Buttons | |
|  MSO/S-T□DL |  MSO-T□KPSR |  MSO-T□FSKP |  MS-T□PM | |
|  MSO/S-N□DL |  MSO-N□KPSR |  MSO-N□KF | - | |
| <ul style="list-style-type: none"> By allowing retention of status for a few seconds (1 to 4 seconds) during a momentary power failure or a drop in voltage, there is no need for the magnetic contactors to reactivate when power returns, enabling continuous operation of load. Applications <ul style="list-style-type: none"> Temporary Storage Circuits such as Automatic Control Devices | <ul style="list-style-type: none"> Prevents motor overload or restriction when starting time is long or starting current is large, as well as preventing unnecessary thermal overload relay operation. Can be used to protect intermittently operating motors. | <ul style="list-style-type: none"> Ideal for protecting motors with short time allowances for restriction, such as submersible motors or compressors. | <ul style="list-style-type: none"> Because the push-button is integrated with the magnetic starter, operation can be performed without the need for a separate push-button. | |
| Page 107 | Page 110 | Page 112 | Page 113 | |

| Contactor Relays | | | | Optional Units |
|--|--|---|--|--|
| DC Operated Type | Mechanically Latched Type | Delay Open Type | With Wiring Streamlining Terminal | Failure Detection Units (Contact Welding Detection) |
|  SRD-T |  SRL-T SRLD-T |  SR-T□DL |  SR/SRD-T□BC | - |
| - | - | - | - |  UN-FD |
| <ul style="list-style-type: none"> Can be used if the control circuit is DC. (Contact Areas can be used for both AC and DC) | <ul style="list-style-type: none"> Because it is mechanically maintained, it does not open in the case of power stoppages or voltage drops. | <ul style="list-style-type: none"> By allowing retention of status for a few seconds (1 to 4 seconds) during a momentary power failure or a drop in voltage, there is no need for the contactor relay to reactivate when power returns, enabling signals to be transmitted continuously. | <ul style="list-style-type: none"> Designed to provide safety during maintenance and inspection, for example by allowing wiring operations to be performed more easily and by providing protection against electrical shocks without using a protective cover, etc. | <ul style="list-style-type: none"> Detects failures (contact welding) that occur to the main circuit contact of a magnetic starter when in conduction mode, and can be used to prevent the running away of load devices by interrupting the power supply by combining a non-fuse breaker or magnetic contactor. |
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| Application Based Name | Optional Units (For Magnetic Starters/Contactors/Relays) | | | | | |
|---|---|--|---|---|--|---|
| | UT Series | | | UN Series | | |
| External Appearance of Representative Model |  Surge Absorber Units UT-SA |  Auxiliary Contact Units UT-AX |  Mechanical Interlock Units UT-ML |  Live Part Protection Cover Units UN-CV/UN-CZ |  Terminal Protection Cover Units UN-CW |  Surge Absorber Units UN-SA |
| |  DC/AC Interface Units for Control Coils UT-SY |  Independent Mounting Units UT-HZ |  Reset Release for Thermal Overload Relays UT-RR |  Auxiliary Contact Units UN-AX |  Auxiliary Contact Units With Contact for Low-level Signals UN-LL22 |  DC/AC Interface Units for Control Coils UN-SY |
| | | | |  Fluorescent Display Lamps UN-TL for Thermal Overload Relays |  Mechanical Interlock Units UN-ML |  Reset Release for Thermal Overload Relays UN-RR |
| Application/Function | <ul style="list-style-type: none"> · Can be easily mounted to and used in combination with magnetic contactors, contactor relays, and thermal overload relays. Please use separately as necessary. · Applications <ul style="list-style-type: none"> · UT/UN-CV/CZ: Protection from Live Parts · UT/UN-SA: Control of Coil Opening/Closing Surges · UN-LL: Switching of Low Voltages and Very Small Currents · UT/UN-SY: Switching of AC Operated Magnetic Contactor can be Performed Using PLC Output (DC24 V) · UN-TL: Displays the Trip Status of Thermal Overload Relays · UT/UN-ML: Prevents Simultaneous Switching On of Reversible Magnetic Contactors · UT/UN-RR: Can Perform Thermal Reset from Outside the Control Panel · UT-CW: Protection of Terminals · UT/UN-AX: Expansion of Auxiliary Contacts | | | | | |
| Page | Page 177 | | | | | |

| Application Based Name | Magnetic Contactors According to Application | Related Equipment | | |
|---|---|---|--|--|
| | Vacuum Magnetic Contactors | Solid State Contactors | Optional Units for Solid State Contactors | Electric Motor Protection Relays |
| External Appearance of Representative Model |  SH-V |  US-N  US-H |  Drive Units with Outputs UA-SH  Drive Units UA-DR1  Power Control Units UA-PC |  ET-N |
| Application/Function | <ul style="list-style-type: none"> · A large capacity magnetic contactor with a shut-off within a vacuum valve that does not arc and excellent safety. | <ul style="list-style-type: none"> · A maintenance-free product ideal for applications in which high-frequency switching, long product lifetime, and quiet operation are a priority. · Applications <ul style="list-style-type: none"> · Facilities Such as Hotels or Cleanrooms · For Heater Load Switching in Injection Molding Machinery etc. | <ul style="list-style-type: none"> · The range of application is expanded by using in combination with a US-N/K or US-H Series solid state contactor. · Applications <ul style="list-style-type: none"> · UA-DR1: For Control When Using AC Control Circuits · UA-PC: For Electrical Control | <ul style="list-style-type: none"> · An electric motor protection relay that can protect against overloads, restriction, and open phase during AC motor start-up or running, as well as detect reciprocal states. |
| Page | Page 245 | Page 292 | Page 309 | Page 326 |

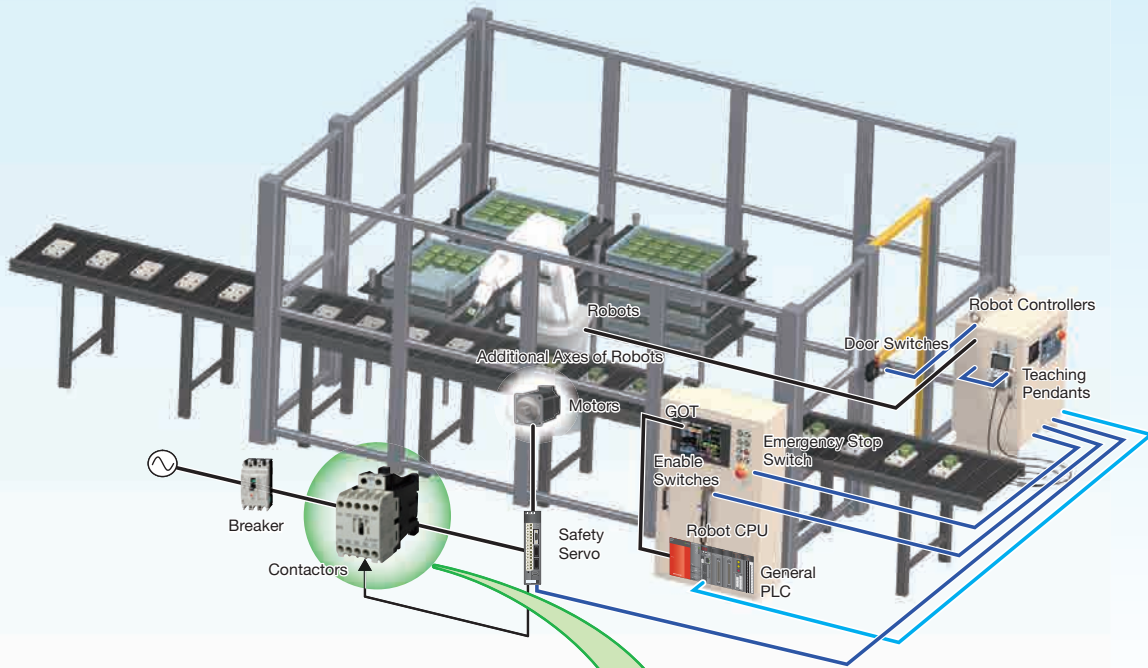
| Magnetic Starters/Contactors/Relays According to Application | | | |
|---|---|--|---|
| DC Interface Contactors | NC Main Contact Contactors | DC Contactors | Safety Contactors |
|  <p>MSOD-Q</p>  <p>SD-Q</p>  <p>SD-QR (Reversible)</p> |  <p>B(D)-T</p>  <p>B(D)-N</p> |  <p>DU(D)-N</p> |  <p>S(D)-T</p>  <p>SD-Q</p>  <p>S(D)-N</p> |
| <ul style="list-style-type: none"> Capable of being directly driven by the transistor output (DC24 V 0.1 A) of PLCs etc. | <ul style="list-style-type: none"> Main circuit break contact (normally closed contact) can be used for motor control and power switching for lighting circuits. Applications <ul style="list-style-type: none"> For Motor Starting Resistance Shortcircuits For Cushioned Starting of AC Motors | <ul style="list-style-type: none"> Can be used for applications controlling DC motors at 440 V or less and other general DC circuits. Applications <ul style="list-style-type: none"> Variable Speed Motor Control For Dynamic Brakes | <ul style="list-style-type: none"> Suitable for standard products in which the auxiliary break contact is a mirror contact. Can be applied to mechanical safety category 4 circuits. (Can detect malfunction of break contacts) |
| Page 228 | Page 235 | Page 239 | Page 268 |

| Related Equipment | | Motor Circuit Breakers |
|--|--|---|
| Voltage Detection Relays | Instantaneous Stop/Restart Relays | |
|  <p>SRE</p> |  <p>UA-DL2</p> |  <p>MMP-T32</p> |
| <ul style="list-style-type: none"> Can be used to detect drops in power supply voltage, such as a warning when switching to home generated power during a power outage or when battery voltage drops. | <ul style="list-style-type: none"> This is a relay that automatically restarts load equipment that has stopped momentarily due to a voltage drop or temporary outage, when power returns. Applications <ul style="list-style-type: none"> Motors or Heater Load Circuits at Various Types of Industrial Plants | <ul style="list-style-type: none"> A device that integrates a low voltage circuit breaker with thermal overload relay functionality. One unit protects motor branch circuits from overloads, open phase and short-circuits. |
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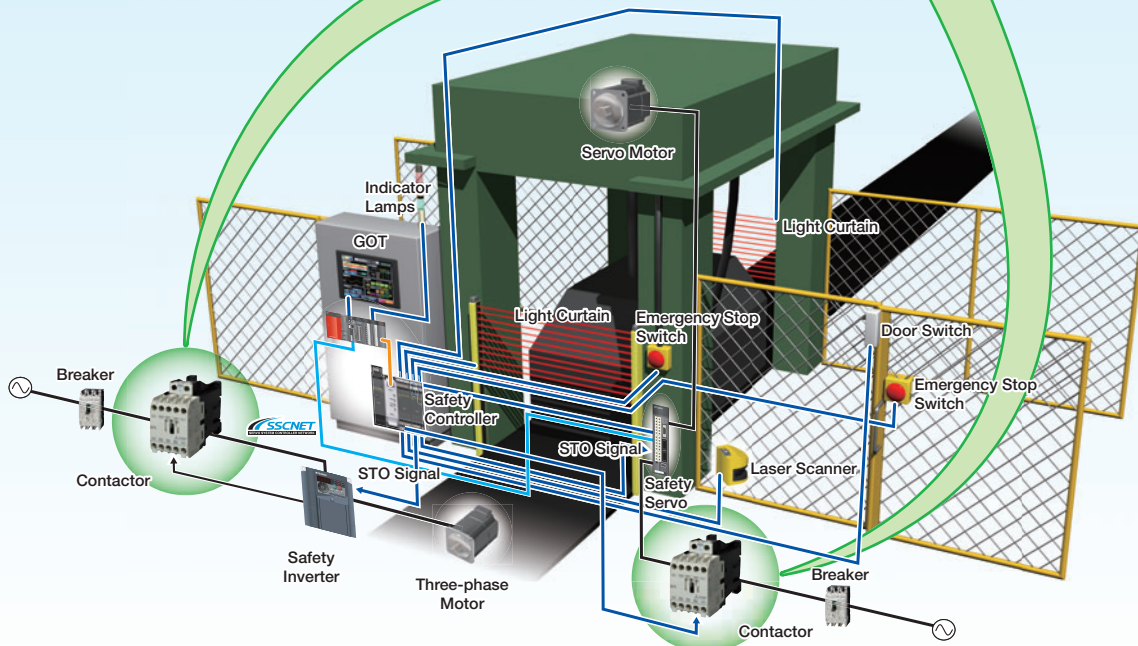
For Use in Various Industries

Our company's FA product line is employed in various industries manufacturing industry.

Assembly/Transport Solutions



Press Machining Solutions

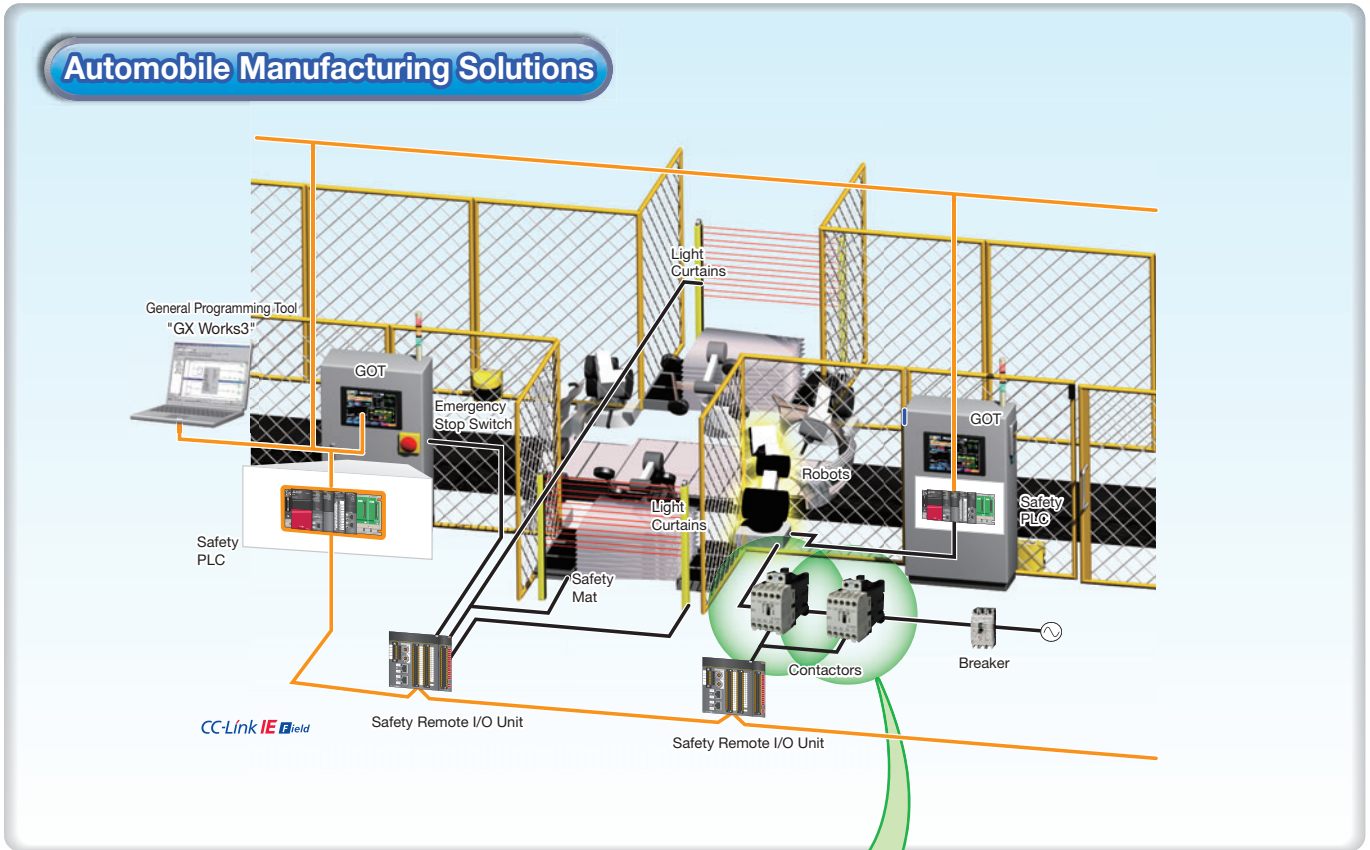


It is best to employ S-T series/S-N series/SD-Q series models with mirror contacts (safety separation function) in safety inverter/servo circuits for the shutting down of power in the event of an abnormality. With this application, compliance with safety categories 3 and 4 is achieved.

Mirror Contacts
(With Safety Separation Function)




familiar to customers, starting with the



Mirror Contacts (With Safety Separation Function)

Compliance has been achieved by duplexing the contactors in circuits, a requirement of safety categories 3 and 4.



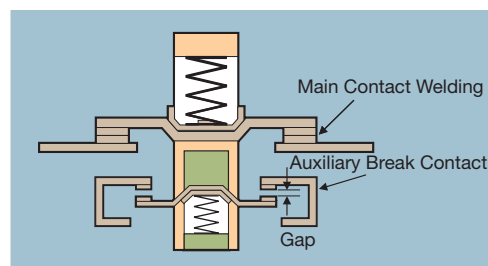
S-T Series

Mitsubishi Electric can provide an assortment of controllers and drivers that serve as accessory devices for magnetic starters and that are necessary for system structures, as well as other safety solutions related to these products.

■ Contactors with Mirror Contacts

<Auxiliary Break Contact OFF During Main Contact Welding>

- Compliant with TÜV regulations for mirror contacts. Complies with requirements for "control functionality during failures" stipulated in the section "Electrical Devices of Industrial Equipment" in EN regulation EN60204-1 and can be used as an interlocking circuit contact. (Refer to page 268 for certified models)
- Can be applied to mechanical safety category 4 circuits. (Can detect malfunction of break contacts)
- Features safety contactors and can be used to construct a completely safe system using a wide assortment of safe parts.



Notes for adopting the product

Before purchasing and using our products, please confirm the following product warranty.

1. Period and Scope of Warranty

● Warranty Period

- (1) The warranty period for our products shall be one year after purchase or delivery to the designated location. However the maximum warranty period shall be 18 months after production, in consideration that the maximum length of distribution period is to be 6 months after shipping.
- (2) This warranty period may not apply in the case where the use environment, use conditions, or the number of open/close operation times specifically impact the lives of products.

● Scope of Warranty

- (1) When any failure occurs during the above warranty period which is clearly our responsibility, we will replace or repair the failed portion of the product free of charge at the location of purchase or delivery.
Note that the "failure" mentioned here shall not include such items as scratches and discoloration which do not affect performance.
- (2) In the following cases, even during the warranty period, charged repair services shall be applied.
 - (1) Failures caused by inappropriate conditions, environment, handling, and uses other than those specified in catalogs, instruction manuals or specifications.
 - (2) Failures caused by inappropriate installation.
 - (3) Failures caused by the design of customer's equipment or software.
 - (4) Failures caused by the customer tampering with our products such as reworks without our authorization.
 - (5) Failures caused by the customer failing to correctly maintain or replace components such as spare parts, as specified by documents such as instruction manuals.
 - (6) Failures caused by uses of the product other than ordinarily intended.
 - (7) Failures caused by force majeure such as fire and abnormal voltage accidents, and natural disasters such as earthquake, wind and flood.
 - (8) Failures caused by reasons that were unforeseeable with the level of technology at the time of shipment.
- (3) The warranty that is mentioned here shall mean warranty of the unit of delivery, and any losses induced by the failures of delivered products shall be excluded from our warranty.

● Failure Diagnosis

In principle, primary failure diagnosis shall be conducted by the customer. However this job, if requested by the customer, can be performed by us or by our service company with charge. In this case, a service fee shall be charged to the customer in accordance with our price list.

2. Recommendation for Renewal Due to Life

Our magnetic starters and magnetic contactors with contacts and mechanical parts have certain wear life in line with the number of switching operations, while our coil wires and electronic parts have aging degradation life influenced by the use environment and use conditions.

Regarding the use of our magnetic starters and magnetic contactors, we recommend that customers renew the products every 10 years as a rule, provided that the products are used in line with the number of open/close operations specified by this catalog or the instruction manual or in a report entitled "Investigation of recommended renewal periods for low voltage devices" issued by the Japan Electrical Manufacturers' Association (JEMA).

We also recommend renewing devices other than the magnetic starters and magnetic contactors described in this catalog every 10 years as a rule.

3. Exemption from Warranty Related to Opportunity or Secondary Losses

Regardless of in or out of warranty period, loss of opportunity and lost earnings at the customer side caused by the failures of our products, any damages caused by special situations regardless of our potential foresight, secondary losses, accident compensation, damages to anything other than our products, compensation for jobs including replacement work, readjustment of field machinery equipment, startup test runs, etc. performed by the customer, and damages caused by any reasons for which we are not held responsible, shall be outside the scope of our compensation.

4. Applicable Range of Products

(1) The contents of products shown in this catalog are for your selection of models. When you actually use the product, read the "Instruction Manual" carefully beforehand and use correctly.

Please note that exterior views and/or specifications may change without notice, in no way affecting your product selection.

(2) When using a product listed in this catalog, you are constrained to conditions of use such that your applications will not lead to a serious accident even if the product develops a breakdown or failure, and that in the event of a breakdown or failure systematic backups and/or failsafe functions exist outside the device.

(3) The products described in this catalog are designed and manufactured as general products to be used for general industrial fields. For this reason, the products described in this catalog should not be used for applications requiring special quality assurance systems, such as atomic power plants and other power plants owned by power companies which seriously affect the public good, railway applications, and government and public office applications.

Note, however, that the products shall be applicable to such uses if the use is limited and the customer agrees not to require specially high quality.

Furthermore, when the customer is investigating application for the uses where serious impact is foreseen to the human body and assets and therefore high reliability for security and control system is required, such as aviation, medical services, railways, combustion and fuel equipment, manned transportation equipment, entertainment facilities and safety equipment, please contact our representatives and discuss any necessary agreement or specifications.

5. Supply Period of Spare Goods After Production Stop

(1) While we do not repair our company's magnetic starters or magnetic contactors, we can supply discontinued main contacts and coils as auxiliary parts for 7 years after their discontinuation (only for models that support auxiliary parts).

Please confirm with our company's sales office for details regarding supply availability.

(2) For the discontinuation of production, we will announce in such media as "sales and service" paper created by us.

Notes for security related issues

- Before performing the installation, wiring works, operation and maintenance/check for the products described in this catalog, make sure to read the "Instruction Manual" or "Notes for Use" attached to the product for correct usage.
- Do not modify or disassemble the products listed in this catalog. There is a risk of breakdown.
- In spite of our continued efforts to enhance the quality and reliability of our product, the product can fail. The products described in this catalog can bring about serious results, such as malfunctions of machinery, short circuit at power supply, and catching fire), by the malfunction caused by vibration, physical shock and improper wiring. Pay special attention to avoid any secondary accidents such as injuries and fire, as the result of failures or malfunctions.
- When you find any questions or you need more details after reading this catalog, please contact your dealer or our company.

<For using the products described in this catalog, please observe the following items.>

Danger

- Make sure to disconnect the power before you perform installation, removal, wiring works, or maintenance/checking. There is a risk of receiving an electric shock or occurrence of a malfunction.
- When the product is energized, avoid touching or coming near the product, especially the terminals having electricity. There is a risk of receiving an electric shock or burn injury.

Notes

- Use the product in the use environment described in this catalog and Instruction Manual. Do not install the product in any abnormal environment with high temperature, high humidity, dust, corrosive gas or excessive vibration/shock. There is a risk of catching fire, malfunctions, electric shock or failure.
- Avoid applying shocks by dropping or falling the product during transportation and unpacking. This will lead to breakage or failure of products.
- Do not use the product when it has received damage during transportation, installation or wiring. This can cause fire or malfunctions.
- Make sure that only technicians qualified for electric work or wiring should perform installation, wiring works and maintenance/checking of the product.
- Make sure that no foreign objects such as dust, iron powder and wire chips enter the product during installation and wiring works. There is a risk of contact failures and malfunctions leading to damage or fire at the load.
- When you use mounting screws of the wrong size or use a small number of screws than specified, or when the mounting to the rail of IEC 35mm width is defective, there is a risk that the product may fall.
- When you apply wiring works, be sure to use the wire size that suits the applied voltage, flow current and inrush current, and to fasten wires with the correct torque as specified in this catalog or the instruction manual. Defective wiring can cause fires, accidents and failures.
- To terminal screws and mounting screws, apply the torque as we specify for tightening, and regularly apply retorquing. When the tightening torque is too large, the work can damage terminal screws or mounting screws. When the terminal screws or mounting screws slacken or are broken, they can cause overheat or fire, or the body can fall off to create serious accidents.
- Confirm the rated values and specifications, and make sure to use a product that meets the requirements. When you use a product exceeding the rated/specified values, it may cause insulation breakdown leading to earth fault or short circuit accidents, or create the cause of fire by overheat or breakdown due to inability to shutdown.
- When a product described in this catalog is to be used in a facility where a failure can lead to injury to the human body or serious damage to earnings, make sure to install some safety mechanism.
- Apply regular checks to the product and use safety measures on the sequence to the critical circuits. The contacts of Contactors and Magnetic Starters can develop defective conduction, welding or burnout.
- Contactors and Magnetic Starters can create welding of contacts disabling the opening, due to such causes as switching operation for excessive current, abnormal wearing of contacts, chattering at operational instruction contacts, aging degradation and product life. Also the contacts may fail to open due to unexpected mechanical constraints other than contact adhesion. Since the disability of contact to open can cause the machine to go out of control, secure safety by assuming the mechanical constraints or contact welding leading to inability of open/close operations. There remains a risk of fire even when an overload protective device (Thermal Overload Relays) is provided.
- The example connection described in this catalog only shows a typical one to run a system. For the protection of each device and safety measures, the customer is requested to consider the connection for each system.
- Do not apply reworks to the product or disassemble the product. These may cause failures.
- When you dispose of the products, treat them as industrial waste products.



1

Features

| | |
|--|----|
| 1 Introducing the MS-T Series | 14 |
| 2 MS-T Series Optional Units..... | 19 |
| 3 MS-N Series (125 to 800 A Frame) Features..... | 20 |
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| 6 MS-T/N Series Specification List | 24 |
| 7 Introducing the MMP-T Series | 26 |

MS-T Series Introduction

Down-sizing

Small

10A frame model is over 16% smaller with a width of just 36mm!!

There is a saying that "every bit helps" and now with the industries smallest* general purpose Magnetic Contactor in its class, customers are able to more easily down-size their boards than ever before.

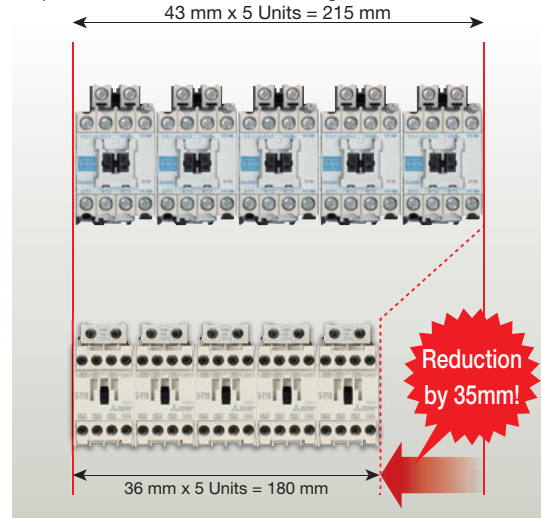
*For AC-operated 10A frame class general-purpose Magnetic Contactor (based on survey conducted by Mitsubishi dated September 2016)

Example: Status where 5 units are arranged
43 mm x 5 Units = 215 mm

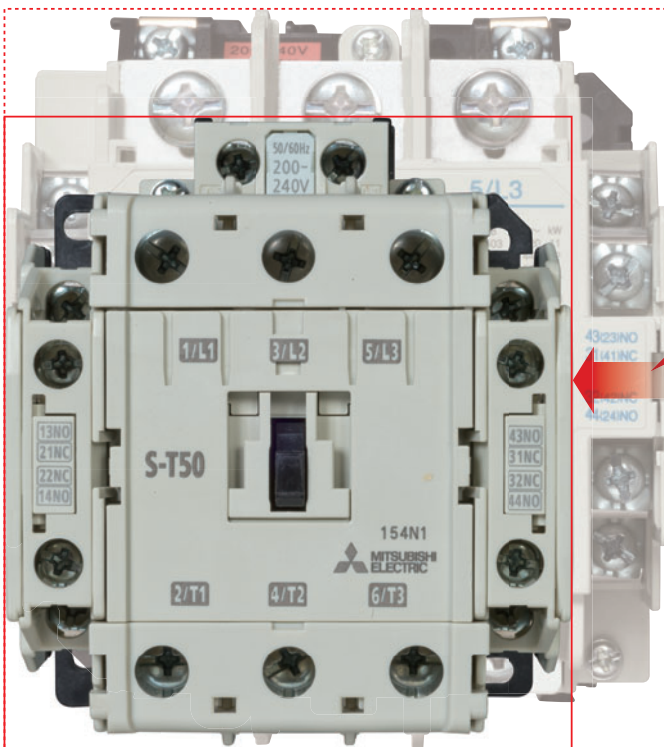


S-T10 (Actual Size)

Reduction by 7mm!



(For mounting details, refer to "Mounting" on page 62)

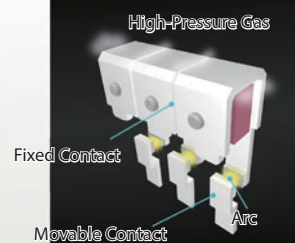


S-T50 (Actual Size)

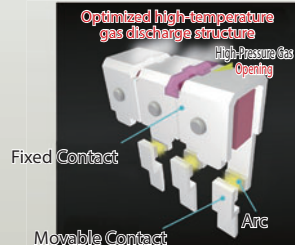
Reduction by 13mm!

The optimized high-temperature gas discharge structure and arc runner shape streamline the outline dimensions!!

Traditional MS-N Series

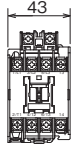
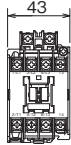
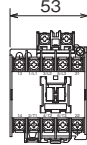
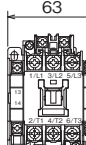
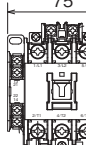
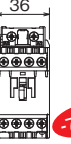
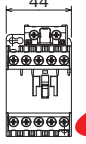
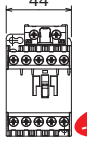
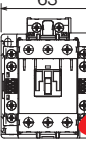
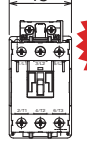


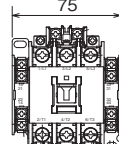
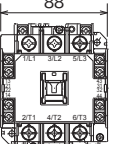
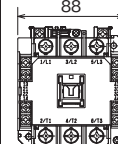
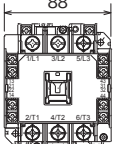
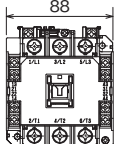
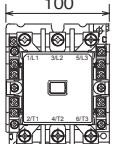
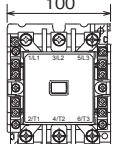
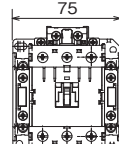
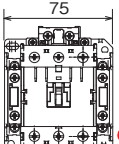
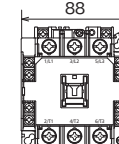
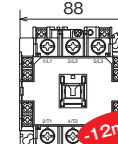
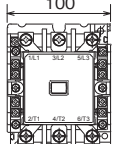
New MS-T Series



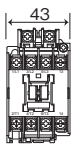
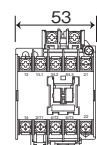
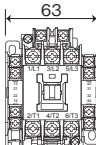
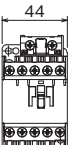
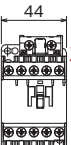
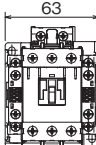
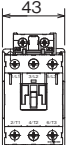
<AC Operated Type>

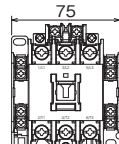
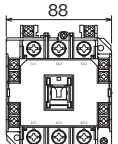
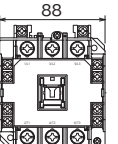
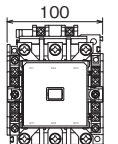
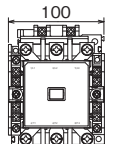
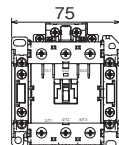
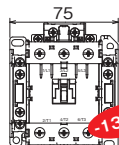
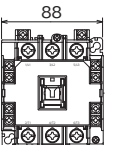
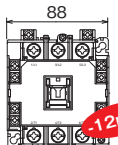
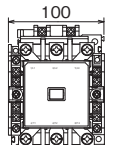
(Unit: mm)

| Frame Size | | 11A | 13A | | 20A | 25A | 32A |
|--------------------------|------------|--|---|---|---|--|--|
| Traditional MS-N Series | Front View |  S-N10 |  S-N11 (Auxiliary 1-pole) |  S-N12 (Auxiliary 2-pole) |  S-N20 |  S-N25 | None |
| New slimline MS-T Series | Front View |  S-T10 |  S-T12 (Auxiliary 2-pole) | |  S-T20 |  S-T25 |  S-T32 |

| Frame Size | | 35A | 50A | | 65A | | 80A | 100A |
|--------------------------|------------|--|--|---|---|--|--|---|
| Traditional MS-N Series | Front View |  S-N35 |  S-N50 |  S-N50AE |  S-N65 |  S-N65AE |  S-N80 |  S-N95 |
| New slimline MS-T Series | Front View |  S-T35 |  S-T50 | |  S-T65 | |  S-T80 |  S-T100 |

<DC Operated Type>

| Frame Size | | 13A | | 18A | 20A | 32A |
|--------------------------|------------|---|---|---|---|---|
| Traditional MS-N Series | Front View |  SD-N11 |  SD-N12 | None |  SD-N21 | None |
| New slimline MS-T Series | Front View |  SD-T12 | |  SD-T20 |  SD-T21 |  SD-T32 |

| Frame Size | | 35A | 50A | 65A | 80A | 100A |
|--------------------------|------------|---|---|---|---|--|
| Traditional MS-N Series | Front View |  SD-N35 |  SD-N50 |  SD-N65 |  SD-N80 |  SD-N95 |
| New slimline MS-T Series | Front View |  SD-T35 |  SD-T50 |  SD-T65 |  SD-T80 |  SD-T100 |

MS-T Series Introduction

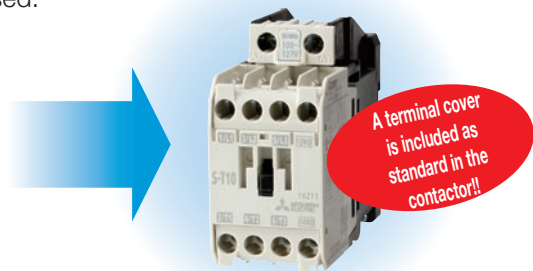
Standardization

Standardization

New integrated terminal covers

Target Frames: 10 A to 50 A Frame

The perennial issues of remembering to order the terminal covers, fitting them correctly or losing them in the process are challenges of the past. The integrated terminal cover system means they are always there, on the Magnetic Contactor or its Auxiliary contact, ready to be used.



Reduce your coil inventory by up to 50%

Target Frames: 10 A to 35 A Frame

The 13 types of operation coil ratings available with the SN Series have been halved to 7 types with that increasing the applicable voltage range. Users can reduce their inventory, and by integrating the types of coils manufactured, a shorter delivery can be realized.

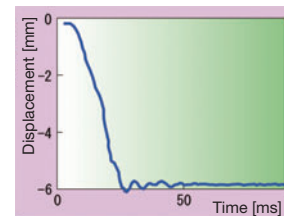
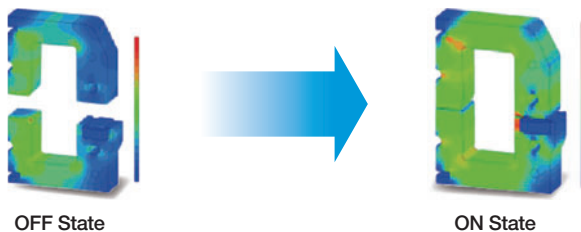
| Coil designation | Rated Voltage [V] | |
|------------------|-------------------|------------|
| | 50 Hz | 60 Hz |
| AC24V | 24 | 24 |
| AC48V | 48 to 50 | 48 to 50 |
| AC100V | 100 | 100 to 110 |
| AC120V | 110 to 120 | 115 to 120 |
| AC127V | 125 to 127 | 127 |
| AC200V | 200 | 200 to 220 |
| AC220V | 208 to 220 | 220 |
| AC230V | 220 to 240 | 230 to 240 |
| AC260V | 240 to 260 | 260 to 280 |
| AC380V | 346 to 380 | 380 |
| AC400V | 380 to 415 | 400 to 440 |
| AC440V | 415 to 440 | 460 to 480 |
| AC500V | 500 | 500 to 550 |



| Coil designation | Rated Voltage [V] |
|------------------|-------------------|
| | 50 Hz/60 Hz |
| AC24V | 24 |
| AC48V | 48 to 50 |
| AC100V | 100 to 127 |
| AC200V | 200 to 240 |
| AC300V | 260 to 300 |
| AC400V | 380 to 440 |
| AC500V | 460 to 550 |

* The conventional 7 types are available for the 50A and larger frames.

By integrating the electromagnetic field analysis and drive analysis, inconsistency in the electromagnetic attraction force is suppressed and rise of the coil temperature is reduced.



When AC150 V 60 Hz is applied on AC200V coil

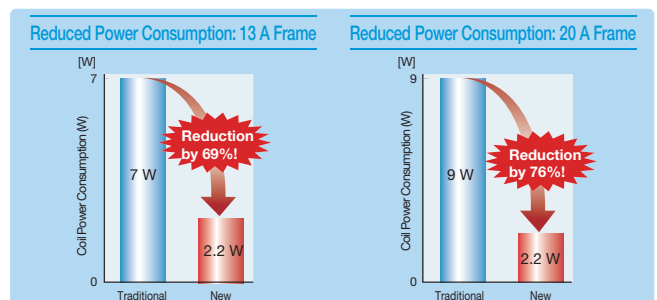
Capable of direct drive with transistor output of PLC, etc

Target Frames: 13 A to 32 A Frame * DC Operated Models

The adopted high-efficiency polarized electromagnet greatly reduces the coil power consumption, and enables all models to be directly driven with a DC24 V, 0.1 A rating transistor output. (DC24V coil)

| | Traditional Model | New Model | Lowering Rate |
|--------------------------------|-------------------|-----------|---------------|
| 13 A Frame (Coil: DC12/24V) | 7W | 2.2W | 69% |
| 20 A Frame (Coil: DC12/24V) | 9W | 2.2W | 76% |
| 32 A Frame (Coil: DC12/24V) | — | 2.2W | — |

* DC48V to 220V: 3.3 W.



Safety & Quality

Safety & Quality

Terminal Covers with Finger Protection Function

Target Frames: 10 A to 50 A Frame

In addition to the Magnetic Contactor, a terminal cover has been provided as a standard for the thermal, magnetic relay and auxiliary contact unit options. This realizes a finger protection function that complies with the DIN and VDE Standards, prevents electric shocks, and increases safety during maintenance and inspections.

[Finger Protection]

In the provisions regarding worker safety and accident protection during use of low-voltage switchgear and controlgear assemblies set forth with DIN EN 50274/VDE 0660 Teil 514, the range for providing protection against contact of live sections is divided into "Finger Safe (preventing finger contact)" and "Back of hand safe (protecting back of hand contact), and standards are provided. The MS-T Series terminal cover satisfies the requirements of these provisions.



Smart Wiring

Smart Wiring

Smart Design Means Smart Wiring

The integrated terminal covers have an additional benefit in that they act as a guide to improve wiring efficiency but also retain the terminal screw in place: no mislaying the screw, no dropping it or having trouble reinserting it in to the terminal block just fast efficient wiring. Fast wiring terminals (model name with suffix "BC") are also available to further improve wiring efficiency, workability and hence productivity.

Target Frames: 10 A to 50 A Frame



(1) The screw holder lifts up the screw.

(2) Insert the ring crimp lug.

(3) Tighten the screw.

MS-T Series Introduction

Easy branch circuit wiring with Motor Circuit Breaker and optional connection conductor unit.

Target Frames: 10 A to 32 A Frame

Easy wiring is available for the new MS-T Series by using the Motor Circuit Breaker and optional connection conductor unit, contributing your productivity improvement.



Global Standard

Complies with main International Standards

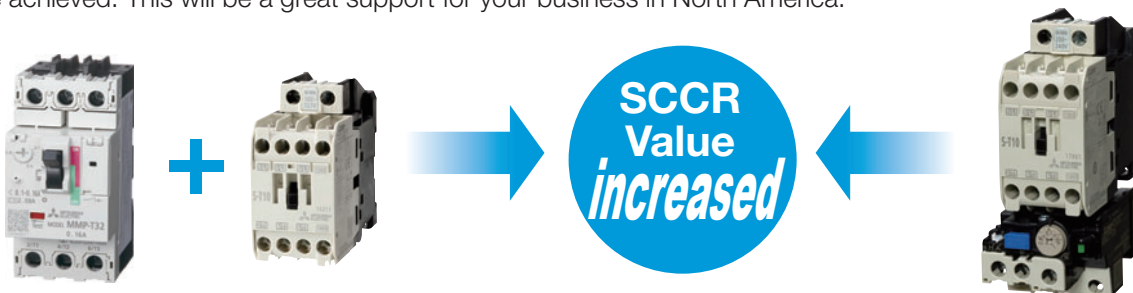
In addition to certification for use under various countries' standards such as IEC, JIS, UL, CE and CCC, etc., plans are also underway to obtain certification for the standards of other countries. We aim to contribute to helping customers expand their overseas business.

| Standards | Applicable standard | | | | Safety Certification Standard |
|--------------|---------------------|-------|--------------------|-----------------|-------------------------------|
| | International | Japan | European countries | | China |
| | IEC * | JIS | EN | Certifying Body | GB |
| EC Directive | | | TUV Rheinland | | |
| | | | | | U.S. & Canada |
| | | | | | UL [®] us |

Note: Also compliant with the requirements for mirror contacts comply with IEC60947-4-1 Annex F.

Higher SCCR values achieved by using with motor circuit breaker.

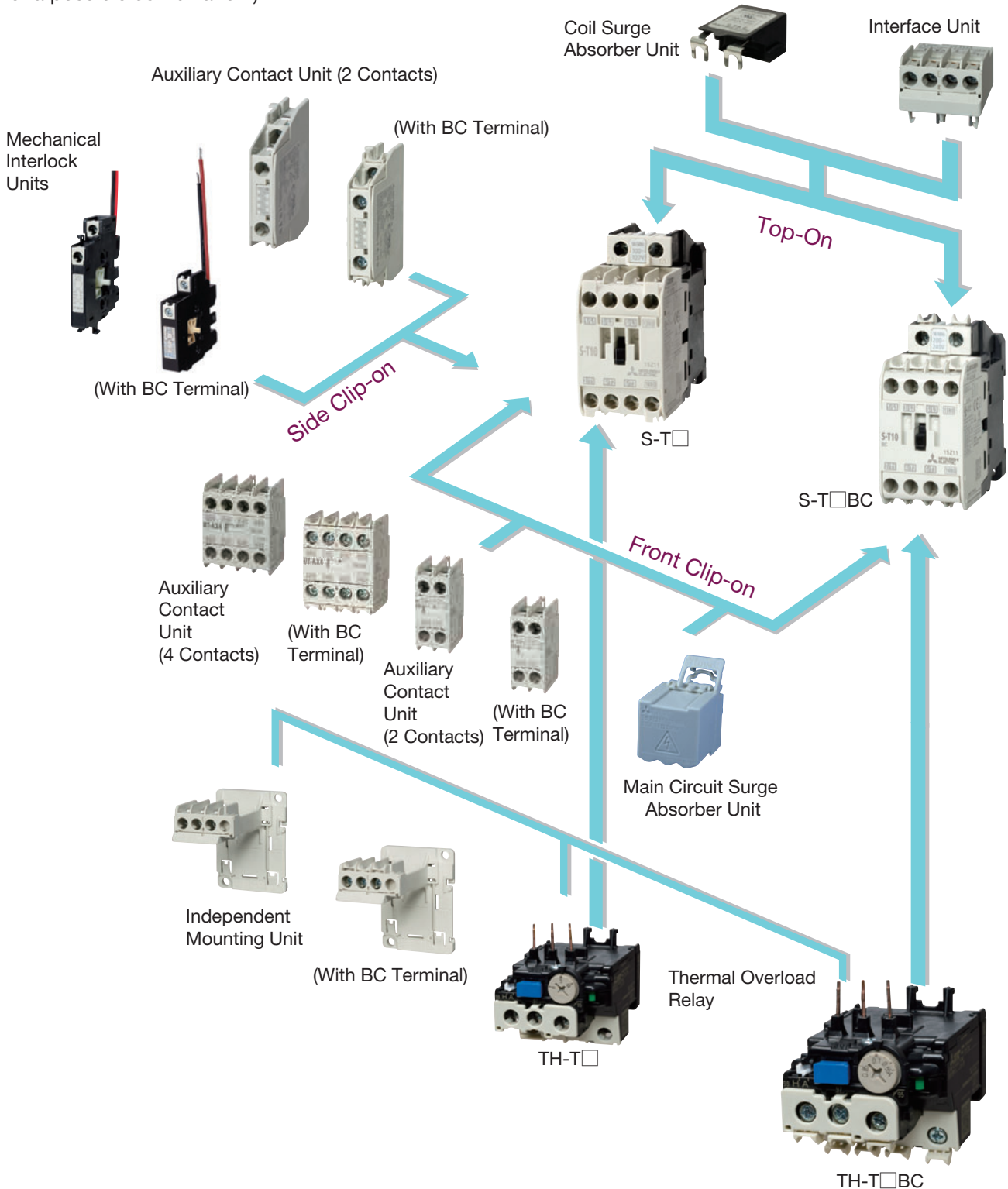
When the MMP-T Series and the S-T Series are used together, a higher SCCR (UL short-circuit current rating) value can be achieved. This will be a great support for your business in North America.



An Extensive Line of MS-T Series Optional Units

A Wide Selection of Optional Units

- We offer a wide range of optional units, including auxiliary contact units and surge absorber units, etc. Application ranges can be expanded by combining with optional units. (The photo shown is just one example of a possible combination.)

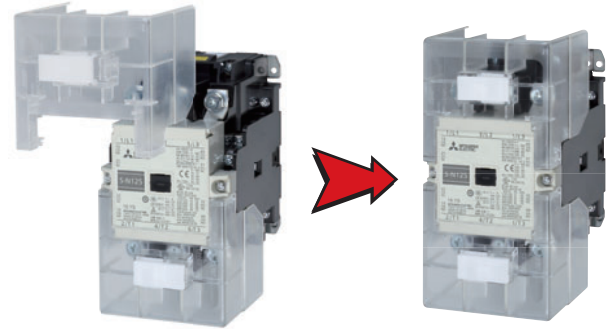


MS-N Series Magnetic Contactors

125 to 800 A Frame

Live Part Protection Covers for Finger Protection (125 to 400 A Frame, Optional)

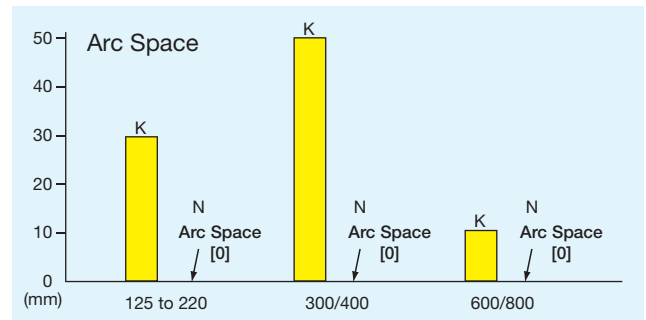
- Attention has been paid to safety in order to provide live part protection covers that offer finger protection and that are easy to handle.
- Various types are offered including those for magnetic contactors, magnetic starters, reversible magnetic contactors, and reversible magnetic starters, etc.
- Installation and removal can be easily performed with one touch.



Arc Space of Zero Realized (125 to 800 A frame)

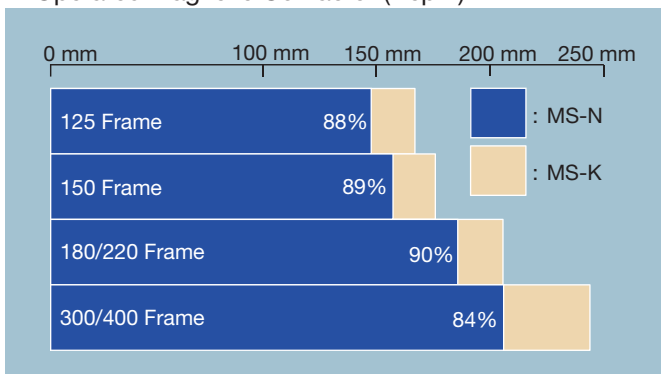
- Safety and a long product life have been guaranteed by combining the current capacities of each magnetic contactor to form an ideal arc-suppression structure that effectively interrupts current. Also, by employing HGC arc-suppression^(*), an arc space of "0" can be achieved, resulting in further improvements to safety and space-saving.
- Even in overcurrent interruption conditions (interruptions at 13 times the rated operating current) or short-circuit conditions, the arc space dimensions prevent arc touching for safety.

*HGC (Hot Gas Control) arc suppression method refers to a high-speed arc suppression method that provides control over arc discharge direction, as well as superior interrupting performance.

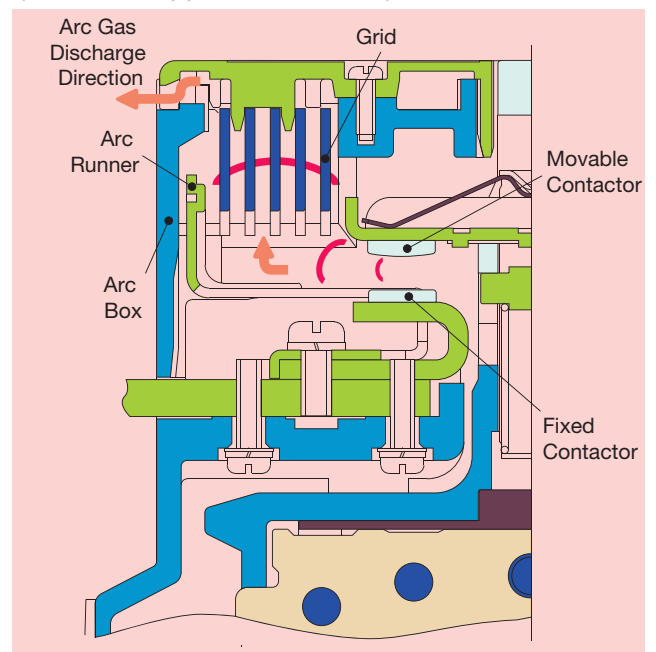


Realizing Space Saving

- Adoption of HGC Arc Suppression Method
- Because arc space has been reduced to zero by adopting HGC arc suppression, downsizing of control panels has been achieved.
- Required Panel Dimensions for AC Operated Magnetic Contactor (Depth)



Arc Suppression Structure (HGC Arc Suppression Method)



A Brightened Board Interior

- MS-N Series models feature a white front surface design that brightens the board interior.

Featuring an AC Operated DC Excitation Type Magnet

(MS-T Series T65 to T100 also used)

● Prevention of Buzzing

- Because DC excitation is used, there is no worry that magnetic buzzing sounds will be generated.

● Coils that Do Not Give Off Switching Surges

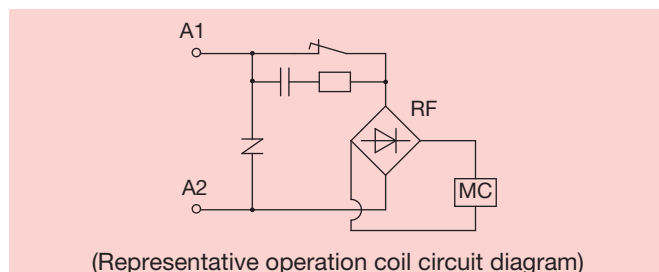
- Because a surge absorber function is built-in, coil switching surges are not generated.
- This simple circuit provides excellent reliability.

● Ultra-wide Dual Rated Coil

- The rated voltage range has been expanded, resulting in the number of coil types being reduced to a third.
- The mechanical switching durability within the rated voltage range is 5 million cycles.

● Coils Resistant to Voltage Drops

- Because the standard product is a low-voltage compensation type coil (operating will continue without interference even if voltage drops to 65% of rating during contact (first 1 to 2 cycles)), it has been made resistant to voltage drops.

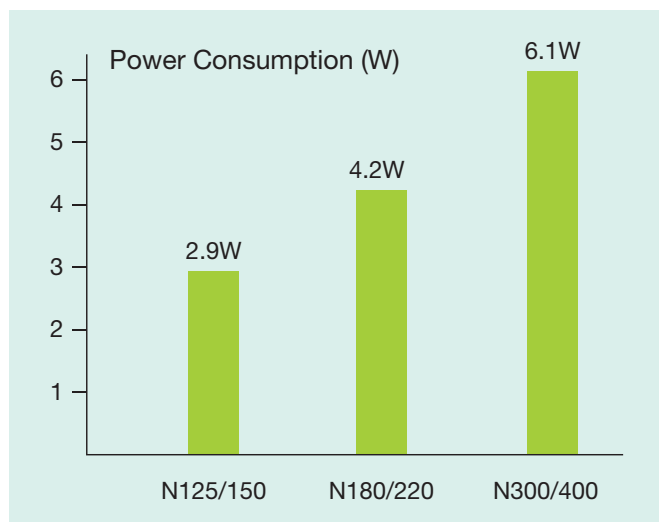


| Designation | Rating |
|-------------|---------------------|
| AC100V | 100 to 127V 50/60Hz |
| AC200V | 200 to 240V 50/60Hz |
| AC300V | 260 to 350V 50/60Hz |
| AC400V | 380 to 440V 50/60Hz |
| AC500V | 460 to 550V 50/60Hz |

We also manufacture those with AC24V and AC48V ratings. (N125, N150)

Low Power Consumption Coils

- Low power consumption has been realized by adopting an AC operated DC excitation magnet coil.



SD-Q Series DC Interface Contactors

Support for Direct Drive Using PLC Transistor Output

DC Interface Contactors (12 A Frame)



SD-Q11 Type



MSOD-Q11 Type

- **Direct Drive of Contactors Using Semiconductor Output (Transistor Output)**
Can drive a direct DC interface contactor using DC24 V transistor output without use of an intermediate relay.

- **Realizing Large Capacity and Long Product Life**
Because conventional free air thermal current (rated continuity current) has increased, these are only used for circuit current (for current switching of inverters, servos, etc.). Also, they can be applied to AC440 V circuits despite their compact size.

Wide Range of Types

| Model | Rated Voltage | Rated Power | Rated Current | Type |
|---------|---------------|-------------|---------------|---------------------|
| SD-Q11 | AC200V | 2.5kW | 1a(1b) | Non-Reversible Type |
| SD-QR11 | AC200V | 2.5kW | 1b×2 | Reversible Type |
| SD-Q12 | AC200V | 2.5kW | 1a1b(2a) | Non-Reversible Type |
| SD-QR12 | AC200V | 2.5kW | 1a1b×2 | Reversible Type |

| Model Name | Rated Capacity (kW) AC-3 | | Free Air Thermal Current (A) | Electrical Durability (x 10000) |
|------------|--------------------------|-------------|------------------------------|---------------------------------|
| | 200 to 240V | 380 to 440V | | |
| SD-Q11/Q12 | 2.5 | 4 | 20 | 100 |

Can be manufactured with a thermal overload relay (model name: MSOD-Q(R)□).

- **An Extensive Line of Installable Optional Units**
Features auxiliary contact units and a display window.
- **Surge Absorber Comes Standard Built-in**
Because the built-in surge absorber function controls surge voltage, it serves to prevent the negative effects of surge voltage at coil OFF, such as damage to peripheral devices.

- **Minimal Load for Auxiliary Contacts DC5 V 3 mA**
By doubling the auxiliary contacts, support for levels as low as DC5 V 3 mA has been made possible. (The failure ratio in normal environments free of dust or corrosive gas is 5×10^{-7} /cycle.)

- **Rail Mounting Standardized**
Can be mounted on an IEC and DIN regulation compliant 35 mm width rail.

Provides Support for a Large Number of International Standards

| Model | Model Name | Applicable Standard | | | | Safety Certified Standard | | EC Directives | Certifying Body | CCC Certification |
|---------------------|--|---------------------|---------------|---------|-----------------------|---------------------------|--------|---------------|-----------------|-------------------|
| | | JIS*1 JEM | IEC | DIN VDE | BS EN | UL | CSA | CE Mark | TÜV | GB |
| | | Japan | International | Germany | United Kingdom Europe | US | Canada | Europe | Germany | China |
| Magnetic Contactors | SD-Q11, Q12 SD-QR11, QR12 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Magnetic Starters | MSOD-Q11 (BC) KP, Q12 (BC) KP MSOD-QR11 (BC) KP, QR12 (BC) KP | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

Note 1 ○ : Standard product that conforms, is compliant, or for which certification has been obtained
Note 2 *1 : If JIS conformity declaration is required, please request.

Maintenance-Free and Noiseless

US-N□/US-K□ Model Solid State Contactors for Motor/Heater Loads (5 A Frame to 200 A Frame)



US-N5SSTE Type



US-N20TE Type

High-Frequency Switching and Maintenance-Free

No parts subject to electrical or mechanical wear, making them maintenance-free and ideal for use in high-frequency switching (motors, heaters, lighting, condenser switching, etc.).

Noiseless and Clean Running

Can be used comfortably without sound for applications in which switching sounds would be a nuisance (hotels, hospitals, offices, cleanrooms, etc.).

Applicable for a Wide Range of Main Circuit Voltages (US-N20 (TE) to N50(TE))

Can be used for a wide range (AC100 to 480 V) of main circuit voltages.

Provides Support for a Large Number of International Standards (US-N Series)

Our standard products comply with the domestic standards as well as various overseas standards and are certified to meet all the standards.

Live Part Protection Covers Provided as Standard Equipment for Improved Safety

(US-N Series)

In order to improve safety, live part protection covers with finger protection functionality and compliance with DIN and VDE regulations have been made standard equipment.

A Wide Range of Types and an Expanded Series

<Heater Load>

- 2-circuit, 3-circuit Integrated Type
- Cycle Control Type Voltage Adjusters

<Motor Load>

- 2-circuit, 3-circuit Integrated Type

<Current Frame>

- AC200 V 5 A to 200 A Frame
- AC400 V 20 A to 200 A Frame
- DC24 to 110 V 8 A Frame

US-H□ Solid State Contactors for Heater Load (20 A Frame to 50 A Frame)



US-H20 Type



US-H40DD Type



US-H20HZ Type

Ideal for Heater Loads

Ideal for high-frequency switching heater applications, such as injection molding machines or semiconductor manufacturing equipment, etc.

Applicable for a Wide Range of Main Circuit Voltages

Can be used for a wide range (AC24 to 480 V) of main circuit voltages.

Provides Support for a Large Number of International Standards

Our standard products comply with the domestic standards as well as various overseas standards and are certified to meet all the standards.

Display Window for Confirmation of Operation Standardized

With indicator lamps on the front surface, the operating voltage input status can be checked at a glance.

Realizes a Long Product Lifetime When Used for High-frequency Switching Applications

Realizes a long product lifetime when used for high-frequency switching applications by using a power semiconductor device.

Live Part Protection Cover can be Mounted for Improved Safety

After control panel mounting, a live part protection cover (option: UN-CV501US) can be easily mounted for improved safety.
































MS-T/N Series Specification List

| AC Operated | Category AC-3 (Note 1) (Three-Phase Cage Motor Standard Duty) [kW/A] (Note 2) | AC220 to 240V | 2.5/11 [2.2/11] | 3.5/13 [2.7/13] | 4.5/18 [3.7/18] | 5.5/25 [4/20] | 7.5/30(26) [5.5/26] | 7.5/32 [7.5/32] | 11/40 [7.5/35] | 15/55 (50) [11/50] | 18.5/65 [15/65] | |
|--|--|----------------------------|----------------------------|----------------------------|----------------------|-------------------|----------------------|----------------------|----------------|--------------------|-----------------|--|
| | AC380 to 440V | 4/9 [2.7/7] | 5.5/12 [4/9] | 7.5/18 [7.5/18] | 11/23 [7.5/20] | 15/30(26) [11/25] | 15/32 [15/32] | 18.5/40 [15/32] | 22/50 [22/48] | 30/65 [30/65] | | |
| | AC500V | 4/7 [2.7/6] | 5.5/9 [5.5/9] | 7.5/17 [7.5/17] | 11/17 [7.5/17] | 15/24 [11/20] | 15/24 [11/20] | 18.5/32 [15/26] | 25/38 [22/38] | 37/60 [30/45] | | |
| | AC690V | 4/5 | 5.5/7 | 7.5/9 | 7.5/9 | 11/12 | 11/12 | 15/17 | 22/26 | 30/38 | | |
| Conventional Free Air Thermal Current [A] | | 20 | | | 32 | | | 60 | 80 | 100 | | |
| | | 1a | 1a1b | | 2a2b | | | — | 2a2b | 2a2b | 2a2b | |
| MS-T/N Type Enclosed Magnetic Starters | | | — | | — | — | | | | | | |
| | MS-T10 | MS-T12 | | MS-T21 | | | MS-T35 | MS-T50 | MS-T65 | | | |
| MSO-T/N Type Open Magnetic Starters | | | | | | — | | | | | | |
| | MSO-T10 MSO-T10BC | MSO-T12 MSO-T12BC | MSO-T20 MSO-T20BC | MSO-T21 MSO-T21BC | MSO-T25 MSO-T25BC | | MSO-T35 MSO-T35BC | MSO-T50 MSO-T50BC | MSO-T65 | | | |
| S-T/N Type Magnetic Contactors | | | | | | | | | | | | |
| | S-T10 S-T10BC | S-T12 S-T12BC | S-T20 S-T20BC | S-T21 S-T21BC | S-T25 S-T25BC | S-T32 S-T32BC | S-T35 S-T35BC | S-T50 S-T50BC | S-T65 | | | |
| TH-T/N Type Thermal Overload Relays | | | | | | | | | | | | |
| | TH-T18(BC) TH-T18(BC)KP | TH-T25(BC) TH-T25(BC)KP | TH-T50(BC) TH-T50(BC)KP | TH-T65(BC) TH-T65(BC)KP | | | | | | | | |
| Current Range of Thermal Overload Relays [A] | 0.1 to 11 | 0.1 to 13 | 0.1 to 18 | 0.2 to 18 | 0.2 to 26 | — | 0.2 to 34 | 0.2 to 50 | 12 to 65 | | | |
| Electromagnetic Method | AC Operation/AC Excitation | | | | | | | | | | | |
| IEC 35 mm Rail Mounting | Applicable to AC690 V | | | | | | | | | | | |
| Surge Absorber | Externally Mounted Units (Model names with "SA" are externally mounted.) | | | | | | | | | | | |
| Auxiliary Twin Contacts | | | | | | | | | | | | |
| DC Operated | | | | | | | | | | | | |
| Mechanically Latched Type | | | | | | | | | | | | |
| Delayed Release | | | | | | | | | | | | |

- Note 1. The value in parentheses for the rated operating current is applicable in the case of magnetic contactors.
- Note 2. , , stand for "manufactured range", while stands for "outside manufactured range".
- Note 3. "BC" in the model name refers to "wiring streamlining terminal".
- Note 4. The value in parentheses for the motor capacity is applicable in the case of enclosed magnetic starters.

- Note 5. Mechanically latched types and delay open types have differing auxiliary contact arrangements. Refer to page 98 for details about mechanically latched types, or page 107 for delay open types.
- Note 6. Because there are products that cannot be mounted, please refer to combination details on page 178 when applying optional products.

Magnetic Starters, Magnetic Contactors, Thermal Overload Relays

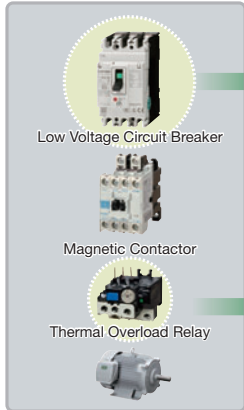
| | 22/85 [19/80] | 30/105 [22/100] | 37/125 [30/125] | 45/150 [37/150] | 55/180 [45/180] | 75/250 [55/220] | 90/300 [75/300] | 125/400 [110/400] | 190/630 [160/630] | 220/800 [200/800] |
|----------------------------|---|---|---|---|---|---|---|---|---|---|
| | 45/85 [37/80] | 55/105 [45/93] | 60/120 [60/120] | 75/150 [75/150] | 90/180 [90/180] | 132/250 [110/220] | 160/300 [150/300] | 220/400 [200/400] | 330/630 [300/630] | 440/800 [400/800] |
| | 45/75 [45/75] | 55/85 [45/75] | 60/90 [60/90] | 90/140 [90/140] | 110/180 [110/180] | 132/200 [132/200] | 160/250 [160/250] | 225/350 [200/350] | 330/500 [300/500] | 500/720 [400/720] |
| | 45/52 | 55/65 | 60/70 | 90/100 | 110/120 | 132/150 | 200/220 | 250/300 | 330/420 | 500/630 |
| | 120 | 150 | 150 | 200 | 260 | 260 | 350 | 450 | 660 | 800 |
| | 2a2b | 2a2b | 2a2b | 2a2b | 2a2b | 2a2b | 2a2b | 2a2b | 2a2b | 2a2b |
| |  |  |  |  |  |  |  |  | — | — |
| | MS-T80 | MS-T100 | MS-N125 | MS-N150 | MS-N180 | MS-N220 | MS-N300 | MS-N400 | | |
| |  |  |  |  |  |  |  |  | — | — |
| | MSO-T80 | MSO-T100 | MSO-N125 | MSO-N150 | MSO-N180 | MSO-N220 | MSO-N300 | MSO-N400 | | |
| |  |  |  |  |  |  |  |  |  |  |
| | S-T80 | S-T100 | S-N125 | S-N150 | S-N180 | S-N220 | S-N300 | S-N400 | S-N600 | S-N800 |
| |  | |  | |  | |  | |  | |
| | TH-T100 TH-T100KP | | TH-N120 TH-N120TA TH-N120TAKP | | TH-N220RH TH-N220RHKP | | TH-N400RH TH-N400RHKP | | TH-N600 TH-N600KP (Excluding +CT supply) | |
| | 12 to 80 | 12 to 100 | 34 to 125 | 34 to 150 | 65 to 180 | 65 to 220 | 85 to 300 | 85 to 400 | 200 to 800 | |
| AC Operation/DC Excitation | | | | | | | | | | |
| Built-in | | | | | | | | | | |

Introducing MMP-T

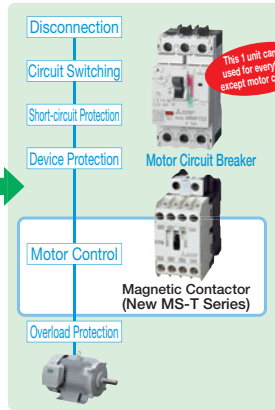
What is a motor circuit breaker?

This is a product that integrates a low voltage circuit breaker with thermal overload relay functionality and can be applied to motor circuits. One unit provides protection from overloads, open phase, and short-circuits.

When a motor circuit is composed of a low voltage circuit breaker and magnetic starter

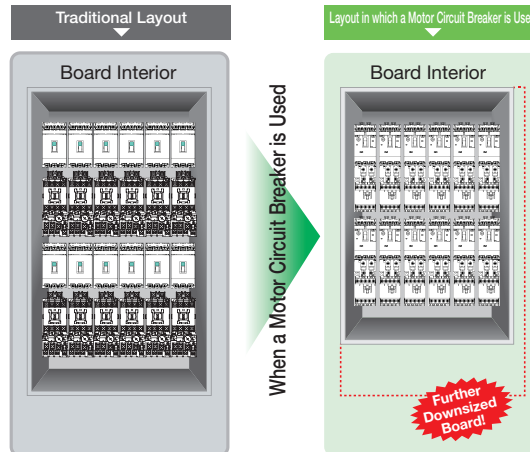


When a motor circuit is composed of a motor circuit breaker and magnetic contactor



Featuring a Space-saving Design that Results in Downsized Panels

Example of Space Saving Application

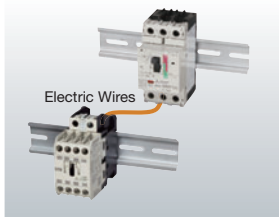


Wire Saving

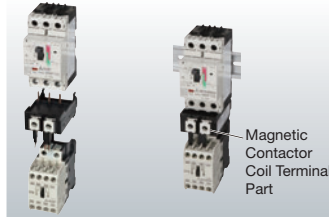
When wiring the motor circuit breaker and contactor, the number of wiring processes can be reduced by using a connecting conductor unit (optional). We also offer a DC interface contactor (SD-Q) and connecting conductor unit (model name: UT-MQ12), as well as a DC operated compact model (SD-T) and connecting conductor (model name: UT-MT20D).

Example of Application of Wire Saving

Example of Wiring in Electric Wires



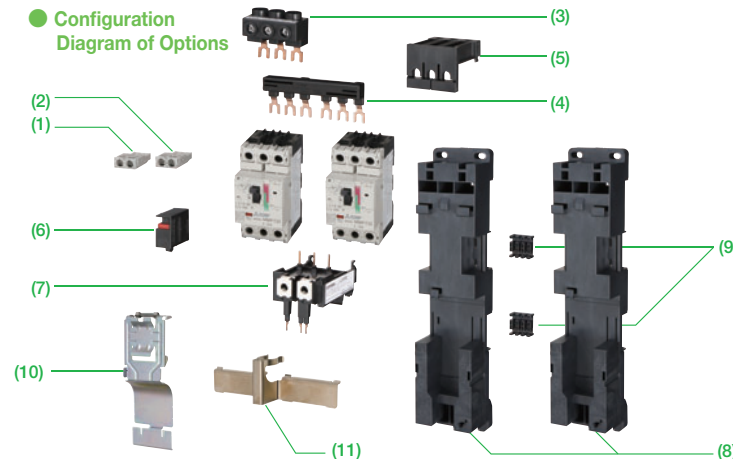
Wiring Example of Connecting Conductor Units



Usage Example With UT-MQ12

Ease-of-Use

A wide range of optional units is offered. This is in order to satisfy the various usage applications of our customers.



| Number | Product Name | Model Name | Specifications | Description |
|--------|------------------------------|--------------------------------|-----------------------------|---|
| (1) | Auxiliary Contact (Interior) | UT-MAX | 1a | The contacts of this unit operate in unison with the turning ON/OFF of the main unit. |
| | | UT-MAXLL(For Very Small Loads) | 1b | |
| (2) | Alarm Contact (Interior) | UT-MAL | 1a | The contacts of this unit operate (either short-circuits, overloads, open-phase) in unison with the trip operation of the main unit. |
| | | UT-MALL(For Very Small Loads) | 1b | |
| (3) | Power Supply Block | UT-EP3 | | This is a terminal block unit that can enable the wiring of bare wires (single core wire/stranded wire) on the power supply side if the unit is connected in parallel with a bus bar. |
| (4) | Bus Bar | UT-2B4 | 45 mm Clearance Row of 2 | A unit that can supply power (parallel connection) to 2 or 3 units individually without use of electric wire. |
| | | UT-3B4 | 45 mm Clearance Row of 3 | |
| | | UT-2B5 | 57 mm Clearance Row of 2 | |
| | | UT-3B5 | 57 mm Clearance Row of 3 | |
| (5) | Power Side Terminal Cover | UT-CV3 | | Power side terminal cover for UL60947-4-1A, Type E/F. |
| (6) | Short-circuit Display Unit | UT-TU | | A unit that operates and displays in red only when the unit trips due to a short circuit. Necessary for application to UL60947-4-1A, Type E/F. |
| (7) | Connecting Conductor Unit | UT-MT20 | | Unit for electrically and mechanically connecting MMP-T32 and a magnetic contactor. |
| | | UT-MT32 | | |
| | | UT-MQ12 | | |
| | | UT-MT20D | | |
| | | UT-MT32D | | |
| (8) | Mounting Base Unit | UT-BT20 | | Plate for mounting a combination starter by combining MMP-T32 and a magnetic contactor. Can be rail mounted or screw mounted. |
| | | UT-BT32 | | |
| | | UT-BT32D | | |
| (9) | Mounting Base Unit | UT-BT32DMP | | Plate for mounting a combination starter by combining MMP-T32 and a magnetic contactor. Can be rail mounted or screw mounted. |
| | | UT-RT10 | | |
| | | UT-RT20 | | |
| (10) | Joining Block Unit | UT-RT32 | | A block that connects the 2 mounting base units mechanically. |
| | | UT-RT32DMP | | |
| (11) | Joining Block Unit | UT-RT32DMP | | |

*For combination model names, please refer to the outline drawings on page 353.



2

Selection and Application

| | | |
|------|--|----|
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2.1 Model List

| Frame | | | T10 | T12 | T20 | T21 | T25 | T32 | T35 | T50 | | |
|--|--|-----------------------------|--|--------------------------------------|-----------------|----------------|---------------|---------------|-----------------|-----------------------|--------------------|-------------|
| Applicable standard | | | JIS C8201-4-1, IEC60947-4-1, EN60947-4-1, GB14048.4 | | | | | | | | | |
| Model Name | Magnetic Contactors (Without Thermal Overload Relay, Open Type) | Non-Reversing | S-T10 | S-T12 | S-T20 | S-T21 | S-T25 | S-T32 | S-T35 | S-T50 | | |
| | | Reversing | S-2 x T10 | S-2 x T12 | S-2 x T20 | S-2 x T21 | S-2 x T25 | S-2 x T32 | S-2 x T35 | S-2 x T50 | | |
| | Magnetic Starters (With standard 2-element, With Thermal Overload Relay) | Enclosed Type | Non-Reversing | MS-T10 | MS-T12 | — | MS-T21 | — | — | MS-T35 | MS-T50 | |
| | | | Reversing | — | — | — | MS-2 x T21 | — | — | MS-2 x T35 | MS-2 x T50 | |
| | | Open Type | Non-Reversing | MSO-T10 | MSO-T12 | MSO-T20 | MSO-T21 | MSO-T25 | — | MSO-T35 | MSO-T50 | |
| | | | Reversing | MSO-2 x T10 | MSO-2 x T12 | MSO-2 x T20 | MSO-2 x T21 | MSO-2 x T25 | — | MSO-2 x T35 | MSO-2 x T50 | |
| | Combined Thermal Overload Relays | | | TH-T18 | | | TH-T25 | | | TH-T25 / T50 | TH-T25 / T50 | |
| | Magnetic Starters With 3-element type Thermal Overload Relays | Enclosed Type | Non-Reversing | MS-T10KP | MS-T12KP | — | MS-T21KP | — | — | MS-T35KP | MS-T50KP | |
| | | | Reversing | — | — | — | MS-2 x T21KP | — | — | MS-2 x T35KP | MS-2 x T50KP | |
| | | Open Type | Non-Reversing | MSO-T10KP | MSO-T12KP | MSO-T20KP | MSO-T21KP | MSO-T25KP | — | MSO-T35KP | MSO-T50KP | |
| Reversing | | | MSO-2 x T10KP | MSO-2 x T12KP | MSO-2 x T20KP | MSO-2 x T21KP | MSO-2 x T25KP | — | MSO-2 x T35KP | MSO-2 x T50KP | | |
| Combined Thermal Overload Relays | | | TH-T18KP | | | TH-T25KP | | | TH-T25 / T50KP | TH-T25 / T50KP | | |
| Main contact rating | Rated Insulation Voltage [V] | | 690 | | | | | | | | | |
| | Rated Impulse Withstand Voltage [kV] | | 6 | | | | | | | | | |
| | Rated Frequency [Hz] | | 50/60 | | | | | | | | | |
| | Pollution Degree | | 3 | | | | | | | | | |
| | Rated operational current / power Category AC-3 (Note 1) (Three-phase squirrel-cage motor load standard responsibility) (Note 2) [kW/A] | AC220 to 240V | 2.5/11 [2.2/11] | 3.5/13 [2.7/13] | 4.5/18 [3.7/18] | 5.5/25 [4/20] | 7.5/30 [26] | 5.5/28 | 7.5/32 [7.5/32] | 11/40 [7.5/35] | 15/55 [50] [11/50] | |
| | | AC380 to 440V | 4/9 [2.7/7] | 5.5/12 [4/9] | 7.5/18 [7.5/18] | 11/23 [7.5/20] | 15/30 [26] | 11/25 | 15/32 [15/32] | 18.5/40 [15/32] | 22/50 [22/48] | |
| | | AC500V | 4/7 [2.7/6] | 5.5/9 [5.5/9] | 7.5/17 [7.5/17] | 11/17 [7.5/17] | 15/24 [11/20] | 15/24 [11/20] | 18.5/32 [15/26] | 25/38 [22/38] | | |
| | Rated operational current / power Category AC-4 (Three-phase squirrel-cage motor load inching responsibility) [kW/A] | AC220 to 240V | 1.5/8 | 2.2/11 | 3.7/18 | 4.5/20 | 5.5/26 | 5.5/26 | 5.5/26 | 7.5/35 | | |
| | | AC380 to 440V | 2.2/6 | 4/9 | 5.5/13 | 7.5/17 | 11/24 | 11/24 | 11/24 | 15/32 | | |
| | | AC500V | 2.7/6 | 5.5/9 | 5.5/10 | 7.5/12 | 7.5/13 | 11/17 | 15/24 | | | |
| Rated operational current / power Category AC-1 (Resistance, heater load) | | AC100 to 240V | 20 | | 32 | | | 60 | | 80 | | |
| AC380 to 440V | | 11 | 13 | | 32 | | | 60 | | 80 | | |
| Conventional Free Air Thermal Current I _{th} [A] | | 20 | | 32 | | | 60 | | 80 | | | |
| Auxiliary contact rating | Contact Arrangement | Standard Accessory (Note 7) | Non-Reversing | 1a | 1a1b | | 2a2b | | — | 2a2b | 2a2b | |
| | | Reversing (Note 8, Note 9) | 1a x 2 + 2b | 1a1b x 2 + 2b | | 2a2b x 2 | | 2a2b x 2 | | 2a2b x 2 | 2a2b x 2 | |
| | Max. number of additional options (Note 10) | Non-Reversing | 1 for UT-AX2/4, 2 for UT-AX11 | | | | | | | | | |
| | | Reversing | 2 for any UT-AX2/4/11 | | | | | — | | 2 for any UT-AX2/4/11 | | |
| | Rated Operating Current (Category AC-15: Alternating current coil load) [A] | | AC120V | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | |
| | DC24V | | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | | |
| Rated Operational Current (Category DC-13 : Direct current coil load) | | DC24V | 3 | | | | | | | | | |
| DC110V | | 0.6 | | | | | | | | | | |
| Conventional Free Air Thermal Current I _{th} [A] | | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | | | |
| Performance | Mechanical Durability | | [x 10000] | | | | | | | | | |
| | Electrical Durability (Note 5) [Ten thousand times] | | 1000 | | | | | | | | | |
| | Category AC-3 | | 200 (Note 5, 6) | | | | | | | | | |
| | Category AC-4 | | 3 (Note 5) | | | | | | | | | |
| Switching Frequency [Times/Hour] | Category AC-1 | | 50 | | | | | | | | | |
| | Category AC-3 | | 1800 | | | | | | | | | |
| | Category AC-4 | | 300 | | | | | | | | | |
| Category AC-1 | | 1200 | | | | | | | | | | |
| Characteristic | Coil consumption (Note7) [VA] | | Sealed | | 7 | | 4.5 | | 10 | | | |
| | Inrush | | 45 | | 75 | | 55 | | 110 | | | |
| Power Consumption (Note 7) [W] | | 2.2 | | 2.4 | | 2.4 | | 1.8 | | 3.8 | | |
| Outside Dimensions | Magnetic Contactors (without Thermal Overload Relays) (Width x Height x Depth) [mm] | | Non-Reversing | 36 x 75 x 78 | 44 x 75 x 78 | | 63 x 81 x 81 | | 43 x 81 x 81 | | 75 x 89 x 91 | |
| | Reversing | | 82 x 85 x 78 | 98 x 85 x 78 | | 136 x 81 x 81 | | 96 x 81 x 111 | | 160 x 114 x 97 | | |
| | Open Type Magnetic Starters (Width x Height x Depth) [mm] | | Non-Reversing | 46 x 115 x 79 | | | 63 x 128 x 82 | | — | | 75 x 157.5 x 91 | |
| | Reversing | | 90.5 x 125 x 79 | 98.5 x 125 x 79 | | 136 x 138 x 82 | | — | | 160 x 179 x 97 | | |
| | Enclosed Magnetic Starters (Width x Height x Depth) [mm] | | Non-Reversing | 76x165x97.5 | | — | | 104x176x110 | | — | | 135x231x126 |
| Reversing | | — | | — | | 220x192x115 | | — | | 300x247x130 | | |
| IEC 35mm rail mounting | | | Possible (excluding Enclosed Magnetic Starters) | | | | | | | | | |
| Installable Optional Unit Model Names (Note 10) | Additional Auxiliary Contact Units | | (Contact Arrangement 1a1b) UT-AX2/AX11 (Contact Arrangement 2a2b) UT-AX4 With Low-Level Signal Contact — | | | | | | | | | |
| | Coil Surge Absorber Units (Note 4) | | (Varistor) (Note 4) UT-SA21 (Varistor + Display LED) UT-SA22 (CR) UT-SA23 (Varistor + CR) UT-SA25 | | | | | | | | | |
| | DC-AC Interface | | Triac Output UT-SY21 Contact Output UT-SY22 | | | | | | | | | |
| | Live Part Protection Cover | For Magnetic Starters | | Non-Reversing — Reversing — | | | | | | | | |
| | | For Magnetic Contactors | | Non-Reversing — Reversing — | | | | | | | | |
| | Terminal Cover | | For Magnetic Starters (Non-Reversing) (Standard Equipment) For Magnetic Contactors (Non-Reversing) (Standard Equipment) | | | | | | | | | |
| | Mechanical Interlock Units | | | UT-ML20 (Note 11) | | | | UN-ML21 | | | | |

Note 1. The figure in the square brackets indicates the rated current shown on the rating plate of the product at which the category AC-3 opening/closing durability.
 Note 2. The value between parentheses for the rated operating current is for the magnetic starter (with thermal overload relay).
 Note 3. AC operated types T10 to T50, DC operated types T12 to T50 can be manufactured with coil surge absorber (□□-□SA type). The UT-SA21 type can be mounted.
 Note 4. T65 to N800 types have an integrated coil surge absorber rendering a coil surge absorber unit for prevention of coil switching surges unnecessary.
 Note 5. 1 million times for T20 class AC-3 380 V or more types for the rating in parentheses and 15,000 times for class AC-4 types. 15 thousand times for T35 to N800 class AC-4 380 V or more types.
 Note 6. Values are for the ratings in square brackets. The electrical durability for the current values not in parentheses varies inversely with the rough square of the current.
 Note 7. Mechanically latched types and delay open types have differing auxiliary contact arrangements. Refer to page 98 for details about mechanically latched types, or page 107 for delay open types.

| T65 | T80 | T100 | N125 | N150 | N180 | N220 | N300 | N400 | N600 | N800 |
|---|-------------------|-----------------------|-------------------------|-------------------------|-----------------------|-------------------|-------------------|-----------------------|-------------------|-------------------|
| JIS C8201-4-1, IEC60947-4-1, EN60947-4-1, GB14048.4 | | | | | | | | | | |
| S-T65 | S-T80 | S-T100 | S-N125 | S-N150 | S-N180 | S-N220 | S-N300 | S-N400 | S-N600 | S-N800 |
| S-2 x T65 | S-2 x T80 | S-2 x T100 | S-2 x N125 | S-2 x N150 | S-2 x N180 | S-2 x N220 | S-2 x N300 | S-2 x N400 | S-2 x N600 | S-2 x N800 |
| MS-T65 | MS-T80 | MS-T100 | MS-N125 | MS-N150 | MS-N180 | MS-N220 | MS-N300 | MS-N400 | — | — |
| MS-2 x T65 | MS-2 x T80 | MS-2 x T100 | MS-2 x N125 | MS-2 x N150 | MS-2 x N180 | MS-2 x N220 | MS-2 x N300 | MS-2 x N400 | — | — |
| MSO-T65 | MSO-T80 | MSO-T100 | MSO-N125 | MSO-N150 | MSO-N180 | MSO-N220 | MSO-N300 | MSO-N400 | — | — |
| MSO-2 x T65 | MSO-2 x T80 | MSO-2 x T100 | MSO-2 x N125 | MSO-2 x N150 | MSO-2 x N180 | MSO-2 x N220 | MSO-2 x N300 | MSO-2 x N400 | — | — |
| TH-T65 | TH-T65 / T100 | TH-T65 / T100 | TH-N120(TA) | TH-N120(TA) | TH-N220RH | TH-N220RH | TH-N400RH | TH-N400RH | TH-N600(+CT) | TH-N600(+CT) |
| MS-T65KP | MS-T80KP | MS-T100KP | MS-N125KP | MS-N150KP | MS-N180KP | MS-N220KP | MS-N300KP | MS-N400KP | — | — |
| MS-2 x T65KP | MS-2 x T80KP | MS-2 x T100KP | MS-2 x N125KP | MS-2 x N150KP | MS-2 x N180KP | MS-2 x N220KP | MS-2 x N300KP | MS-2 x N400KP | — | — |
| MSO-T65KP | MSO-T80KP | MSO-T100KP | MSO-N125KP | MSO-N150KP | MSO-N180KP | MSO-N220KP | MSO-N300KP | MSO-N400KP | — | — |
| MSO-2 x T65KP | MSO-2 x T80KP | MSO-2 x T100KP | MSO-2 x N125KP | MSO-2 x N150KP | MSO-2 x N180KP | MSO-2 x N220KP | MSO-2 x N300KP | MSO-2 x N400KP | — | — |
| TH-T65KP | TH-T65 / T100KP | TH-T65 / T100KP | TH-N120(TA)KP | TH-N120(TA)KP | TH-N220RHKP | TH-N220RHKP | TH-N400RHKP | TH-N400RHKP | TH-N600KP(+CT) | TH-N600KP(+CT) |
| 690 | | | | | 690 (1000) | | | | | |
| 6 | | | | | | | | | | |
| 50/60 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| 18.5/65 [15/65] | 22/85 [19/80] | 30/105 [22/100] | 37/125 [30/125] | 45/150 [37/150] | 55/180 [45/180] | 75/250 [55/220] | 90/300 [75/300] | 125/400 [110/400] | 190/630 [160/630] | 220/800 [200/800] |
| 30/65 [30/65] | 45/85 [37/80] | 55/105 [45/93] | 60/120 [60/120] | 75/150 [75/150] | 90/180 [90/180] | 132/250 [110/220] | 160/300 [150/300] | 220/400 [200/400] | 330/630 [300/630] | 440/800 [400/800] |
| 37/60 [30/45] | 45/75 [45/75] | 55/85 [45/75] | 60/90 [60/90] | 90/140 [90/140] | 110/180 [110/180] | 132/200 [132/200] | 160/250 [160/250] | 225/350 [200/350] | 330/500 [300/500] | 500/720 [400/720] |
| 30/38 | 45/52 | 55/65 | 60/70 | 90/100 | 110/120 | 132/150 | 200/220 | 250/300 | 330/420 | 500/630 |
| 11/50 | 15/65 | 19/80 | 22/93 | 30/125 | 37/150 | 45/180 | 55/220 | 75/300 | 110/400 | 160/630 |
| 22/47 | 30/62 | 37/75 | 45/90 | 55/110 | 75/150 | 90/180 | 110/220 | 150/300 | 200/400 | 300/630 |
| 22/38 | 30/45 | 37/55 | 45/65 | 55/80 | 75/140 | 90/140 | 110/200 | 150/250 | 200/350 | 300/500 |
| 100 | 120 | 150 | 150 | 200 | 260 | 260 | 350 | 450 | 660 | 800 |
| 100 | 120 | 150 | 150 | 200 | 260 | 260 | 350 | 450 | 660 | 800 |
| 100 | 120 | 150 | 150 | 200 | 260 | 260 | 350 | 450 | 660 | 800 |
| 2a2b | 2a2b | 2a2b | 2a2b | 2a2b | 2a2b | 2a2b | 2a2b | 2a2b | 2a2b | 2a2b |
| 2a2b x 2 | 2a2b x 2 | 2a2b x 2 | 2a2b x 2 | 3a3b x 2 | 3a3b x 2 | 3a3b x 2 | 3a3b x 2 | 3a3b x 2 | 4a4b x 2 | 4a4b x 2 |
| 1 for UT-AX2/4, 2 for UT-AX11 | | 4a4b | 4a4b | 4a4b | 4a4b | 4a4b | 4a4b | 4a4b | 4a4b | 4a4b |
| 2 for any UT-AX2/4/11 | | 3a3b x 2 | 3a3b x 2 | — | — | — | — | — | — | — |
| 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | 3 | | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 0.6 | | | | | | | | | | |
| 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| 500 | | | | | | | | | | |
| 200 | 100 (Note 6) | | | | | | 50 (Note 6) | | | |
| 3 (Note 5) | | | | | | | | | | |
| 50 | | | | | | | | | | |
| 1200 | | | | | | | | | | |
| 300 | | | | | | | | | | |
| 1200 | | | 600 | | | | | | | |
| 20 | | 23 | 24 | 24 | 40 | 40 | 50 | 50 | 90 | 90 |
| 115 | | 210 | 270 | 270 | 440 | 440 | 440 | 440 | 790 | 790 |
| 2.2 | 2.2 | 2.8 | 2.9 | 2.9 | 4.2 | 4.2 | 6.1 | 6.1 | 17 | 17 |
| 88 x 106 x 106 | 88 x 106 x 106 | 100 x 124 x 127 | 100 x 150 x 137 | 120 x 160 x 145 | 138 x 204 x 175 | 138 x 204 x 175 | 163 x 243 x 195 | 163 x 243 x 195 | 290 x 310 x 235 | 290 x 310 x 235 |
| 216 x 115 x 112 | 216 x 115 x 112 | 270 x 140 x 137 | 276 x 150 x 148 | 296 x 160 x 156 | 370 x 215 x 189 | 370 x 215 x 189 | 395 x 250 x 209 | 395 x 250 x 209 | 660 x 435 x 254 | 660 x 435 x 254 |
| 90 x 158 x 106 | 90 x 174.5 x 106 | 100 x 196 x 127 | 112 x 239 x 137 | 120 x 250 x 145 | 144 x 282 x 180.5 | 144 x 282 x 180.5 | 163 x 360 x 195 | 163 x 360 x 195 | — | — |
| 216 x 169 x 112 | 216 x 185.5 x 112 | 270 x 213 x 137 | 276 x 251 x 148 | 296 x 276 x 156 | 370 x 304 x 194.5 | 370 x 304 x 194.5 | 395 x 392 x 209 | 395 x 392 x 209 | — | — |
| 160 x 282 x 145 | | 190 x 317 x 163 | 230 x 396 x 190 | | 270 x 496 x 209 | | — | — | — | — |
| 320 x 282 x 140 | | 410 x 347 x 154 | 440 x 436 x 170 | | 520 x 536 x 209 | | 600 x 616 x 230 | | — | — |
| Possible (excluding Enclosed Magnetic Starters) | | | | | | | | | | |
| UN-AX2/AX11 | | UN-AX80 | | | UN-AX150 | | | | | |
| UN-AX4 | | — | | | — | | | | | |
| UN-LL22 | | — | | | — | | | | | |
| — | | — | | | — | | | | | |
| — | | — | | | — | | | | | |
| — | | — | | | — | | | | | |
| — | | — | | | — | | | | | |
| UN-SY31 | | — | | | — | | | | | |
| UN-SY32 | | — | | | — | | | | | |
| UN-CZ500 + UN-CZ501 | | UN-CZ800+ UN-CZ801 | UN-CZ1250+ UN-CZ1251 | UN-CZ1500+ UN-CZ1501 | UN-CZ2200 + UN-CZ2201 | | | UN-CZ3000 + UN-CZ3001 | | |
| UN-CZ504 | | UN-CZ804 | UN-CZ1254 | UN-CZ1504 | UN-CZ2204 | | | UN-CZ3004 | | |
| UN-CZ500 x 2 | | UN-CZ800 x 2 | UN-CZ1250 x 2 | UN-CZ1500 x 2 | UN-CZ2200 x 2 | | | UN-CZ3000 x 2 | | |
| UN-CZ502 | | UN-CZ802 | UN-CZ1252 | UN-CZ1502 | UN-CZ2202 | | | UN-CZ3002 | | |
| UT-CW800 + UT-CW655 | | — | | | — | | | | | |
| UT-CW800 | | — | | | — | | | | | |
| UN-ML21 | | UN-ML80 | | UN-ML150 | UN-ML220 | | | | | |

Note 8. The +2b on the auxiliary contact arrangement of reversible T10 to T20 types indicates the break contact of the integrated UT-ML20 interlock unit.

There is no need to specify when ordering.

Note 9. Auxiliary contact arrangements for reversible types are displayed by twos, in a contact arrangement combined with two magnetic contactors. For standard contact arrangements there is no need to specify when ordering; however, please specify a matching contact arrangement for 2 units if for a special configuration. <Example> For 1b x 2 + 2b: 2B

Note 10. Because there are products that cannot be mounted, please refer to combination details on page 178 when applying optional products.

Note 11. Not applicable to AC operated types produced before March, 2019.

2.2 Manufacturing Range List

● Non-Reversible Type

| Frame | | T10 | T12 | T20 | T21 | T25 | T32 | T35 | T50 | T65 | T80 | T100 | N125 | N150 | N180 | N220 | N300 | N400 | N600 | N800 | | | |
|---------------------------|------------------------------|---|----------------|----------------|------|----------|-----|----------|-----|------|-----|-----------|-----------|------|------|------|------|------|------|------|---|---|---|
| Category AC-3 | 220V | 2.5 | 3.5 | 4.5 | 5.5 | 7.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 | 90 | 125 | 190 | 220 | | | |
| Rated Capacity [kW] | 440V | 4 | 5.5 | 7.5 | 11 | 15 | 15 | 18.5 | 22 | 30 | 45 | 55 | 60 | 75 | 90 | 132 | 160 | 220 | 330 | 440 | | | |
| Model Name (Note 6) | Auxiliary Contact | Standard | 1a | 1a1b | 1a1b | ← 2a2b → | | ← 2a2b → | | | | | | | | | | | | | | | |
| | Special | 1b | 2a (Note 8) | 2a (Note 8) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | |
| Magnetic Starters | Enclosed | Standard Specifications | MS-□ | ○ | ○ | - | ○ | - | - | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | - | |
| | | With Push-Button | MS-□PM | ○ | ○ | - | ○ | - | - | ○ | ○ | ○ | ○ | ○ | - | - | - | - | - | - | - | - | - |
| | | 3-Element (2E) Thermal | MS-□KP | ○ | ○ | - | ○ | - | - | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | - |
| | | Open Time Quick Motion Type | MS-□QM | - | - | - | - | - | - | - | - | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | - |
| | Open Type | Standard Specifications | MSO-□ | ○ | ○ | ○ | ○ | ○ | - | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | - |
| | | | MSOD-□ | - | ○ | ○ | ○ | - | - | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | ○ | ○ | ○ | ○ | - | - |
| | | 3-Element (2E) Thermal | MSO-□KP | ○ | ○ | ○ | ○ | ○ | - | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | - |
| | | | MSOD-□KP | - | ○ | ○ | ○ | - | - | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | ○ | ○ | ○ | ○ | - | - |
| | | With Saturable Reactor | MSO-□SR | ○ | ○ | ○ | ○ | ○ | - | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | - |
| | | | MSOD-□SR | - | ○ | ○ | ○ | - | - | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | ○ | ○ | ○ | ○ | - | - |
| | | With 3-Element (2E) Thermal Saturable Reactor | MSO-□KPSR | - | - | - | ○ | ○ | - | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | - |
| | | | MSOD-□KPSR | - | - | - | ○ | - | - | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | ○ | ○ | ○ | ○ | - | - |
| | | 2-Element Quick-acting Characteristics Thermal | MSO-□FS | - | - | - | ○ | ○ | - | ○ | ○ | ○ | ○ | ○ | - | - | - | - | - | - | - | - | - |
| | | | MSOD-□FS | - | - | - | ○ | - | - | ○ | ○ | ○ | ○ | ○ | - | - | - | - | - | - | - | - | - |
| | | 3-Element (2E) Quick-acting Characteristics Thermal | MSO-□FSKP | ○ | ○ | ○ | ○ | ○ | - | ○ | ○ | ○ | ○ | ○ | - | - | - | - | - | - | - | - | - |
| | | | MSOD-□FSKP | - | ○ | ○ | ○ | - | - | ○ | ○ | ○ | ○ | ○ | - | - | - | - | - | - | - | - | - |
| | | Open Time Quick Motion Type | MSO-□QM | - | - | - | - | - | - | - | - | - | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | - |
| | | | MSOD-□QM | - | - | - | - | - | - | - | - | - | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | - |
| | | Surge Absorber Mounted Type | MSO-□SA | ○ | ○ | ○ | ○ | ○ | - | ○ | ○ | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | MSOD-□SA | - | ○ | ○ | ○ | - | - | ○ | ○ | - | - | - | - | - | - | - | - | - | - | - | - |
| | Wiring Streamlining Terminal | MSO-□BC | ○ | ○ | ○ | ○ | ○ | - | ○ | ○ | - | - | - | - | - | - | - | - | - | - | - | - | |
| | | MSOD-□BC | - | ○ | ○ | ○ | - | - | ○ | ○ | - | - | - | - | - | - | - | - | - | - | - | - | |
| | Anticorrosion Treatment | MSO-□YS | ○ | ○ | ○ | ○ | ○ | - | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | - | |
| | | MSOD-□YS | - | ○ | ○ | ○ | - | - | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | ○ | ○ | ○ | ○ | - | - | |
| | Delay Open Type | MSO-□DL | - | ○ | - | ○ | - | - | ○ | ○ | ○ | ○ | ○ | - | ○ | - | ○ | ○ | ○ | ○ | - | - | |
| | Mechanically Latched Type | MSOL-□ | - | - | - | ○ | - | - | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | ○ | ○ | ○ | ○ | - | - | |
| | | MSOLD-□ | - | - | - | ○ | - | - | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | ○ | ○ | ○ | ○ | - | - | |
| | With Terminal Cover | MSO-□CW | - | - | - | - | - | - | - | - | - | ○ | ○(Note 7) | - | - | - | - | - | - | - | - | - | |
| MSOD-□CW | | - | - | - | - | - | - | - | - | - | ○ | ○(Note 7) | - | - | - | - | - | - | - | - | - | | |
| Magnetic Contactors | Standard Specifications | S-□ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | |
| | | SD-□ | - | ○ | ○ | ○ | - | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | ○ | ○ | ○ | ○ | ○ | |
| | Surge Absorber Mounted Type | S-□SA(Note3) | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | - | - | - | - | - | - | - | - | - | - | - | |
| | | SD-□SA | - | ○ | ○ | ○ | - | ○ | ○ | ○ | - | - | - | - | - | - | - | - | - | - | - | - | |
| | Anticorrosion Treatment | S-□YS | - | - | - | - | - | - | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | - | |
| | Open Time Quick Motion Type | S-□QM | - | - | - | - | - | - | - | - | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | - | | |
| | Wiring Streamlining Terminal | S-□BC | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | - | - | - | - | - | - | - | - | - | - | - | |
| | | SD-□BC | - | ○ | ○ | ○ | - | ○ | ○ | ○ | - | - | - | - | - | - | - | - | - | - | - | - | |
| | With Terminal Cover | S-□CW | - | - | - | - | - | - | - | - | - | ○ | ○ | - | - | - | - | - | - | - | - | - | |
| | | SD-□CW | - | - | - | - | - | - | - | - | - | ○ | ○ | - | - | - | - | - | - | - | - | - | |
| Delay Open Type | S-□DL | - | ○ | - | ○ | - | - | ○ | ○ | ○ | ○ | ○ | - | ○ | - | ○ | ○ | ○ | ○ | - | - | | |
| Mechanically Latched Type | SL-□ | - | - | - | ○ | - | - | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | ○ | ○ | ○ | ○ | ○ | ○ | | |
| | SLD-□ | - | - | - | ○ | - | - | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | ○ | ○ | ○ | ○ | ○ | ○ | | |

● Reversible Type

| Frame | | 2 x T10 | 2 x T12 | 2 x T20 | 2 x T21 | 2 x T25 | 2 x T32 | 2 x T35 | 2 x T50 | 2 x T65 | 2 x T80 | 2 x T100 | 2 x N125 | 2 x N150 | 2 x N180 | 2 x N220 | 2 x N300 | 2 x N400 | 2 x N600 | 2 x N800 | | |
|---------------------------|---|---------------|-----------------|----------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|---|---|
| Category AC-3 | 220V | 2.5 | 3.5 | 4.5 | 5.5 | 7.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 | 90 | 125 | 190 | 220 | | |
| | 440V | 4 | 5.5 | 7.5 | 11 | 15 | 15 | 18.5 | 22 | 30 | 45 | 55 | 60 | 75 | 90 | 132 | 160 | 220 | 330 | 440 | | |
| Rated Capacity [kW] | Standard | (1a x 2) + 2b | (1a1b x 2) + 2b | 2a2b x 2 | | | | | | | | | | 3a3b x 2 | | | | | 4a4b x 2 | | | |
| | Special | (1b x 2) + 2b | (2a x 2) + 2b | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| Model | Standard Specifications | MS-□ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | |
| Magnetic Starters | 3-Element (2E) Thermal | MS-□KP | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | |
| | Standard Specifications | MSO-□ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | |
| | 3-Element (2E) Thermal | MSOD-□ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | | MSO-□KP | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | With Saturable Reactor | MSO-□SR | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | | MSOD-□SR | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | With 3-Element (2E) Thermal Saturable Reactor | MSO-□KPSR | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | | MSOD-□KPSR | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | 2-Element Quick-acting Characteristics Thermal | MSO-□FS | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | | MSOD-□FS | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | 3-Element (2E) Quick-acting Characteristics Thermal | MSO-□FSKP | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | | MSOD-□FSKP | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | Surge Absorber Mounted Type | MSO-□SA | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | | MSOD-□SA | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | Wiring Streamlining Terminal | MSO-□BC | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | | MSOD-□BC | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | With Terminal Cover | MSO-□CW | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | | MSOD-□CW | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | Anticorrosion Treatment | MSO-□YS | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | | MSOD-□YS | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Mechanically Latched Type | MSOL-□ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | |
| | MSOLD-□ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | |
| Magnetic Contactors | Standard Specifications | S-□ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | |
| | | SD-□ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | |
| | Surge Absorber Mounted Type | S-□SA(Note 3) | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | | SD-□SA | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | Anticorrosion Treatment | S-□YS | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | Wiring Streamlining Terminal | S-□BC | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | | SD-□BC | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | With Terminal Cover | S-□CW | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | | SD-□CW | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | Mechanically Latched Type | SL-□ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | | SLD-□ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | Class 2 Heat Resistance | S-□FN | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | With Reversing Connecting Conductor (Both Power and Load Sides) | S-□SD | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | | SD-□SD | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | With Power Side 3-Pole In-Phase Crossover Conductor | S-□SG | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | | SD-□SG | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | With Load Side 3-Pole In-Phase Crossover Conductor | S-□SX | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | | SD-□SX | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | With Load Side 3-Pole Reverse-Phase Switching Crossover Conductor | S-□SF | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | | SD-□SF | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

Note 1. ◎ : Permanently in stock, depending on operation coil voltage and heater designation. ○ : Made to order.
 - : Outside production range

Note 2. The value between parentheses for the class AC-3 rated capacity applies to an enclosed magnetic starter.

Note 3. T65 to N800 types have an AC control coil integrated surge absorber, rendering a coil surge absorber unit for prevention of coil switching surges unnecessary.

Note 4. The +2b on the auxiliary contact arrangement of reversible T10 to T20 types indicates the break contact of the integrated UT-ML20 interlock unit. There is no need to specify when ordering.

Note 5. Auxiliary contact arrangements for reversible types are displayed by twos, in a contact arrangement combining two magnetic contactors. For standard contact arrangements there is no need to specify when ordering; however, please specify a matching contact arrangement for 2 units if for a special configuration.

<Example> For 1b x 2 + 2b: 2B

Note 6. Mechanically latched types and delay open types have differing auxiliary contact arrangements. Refer to page 98 for details about mechanically latched types, or page 107 for delay open types.

Note 7. MSO(D)-(2x)T80CW(KP) heater designation 67A is not manufactured.

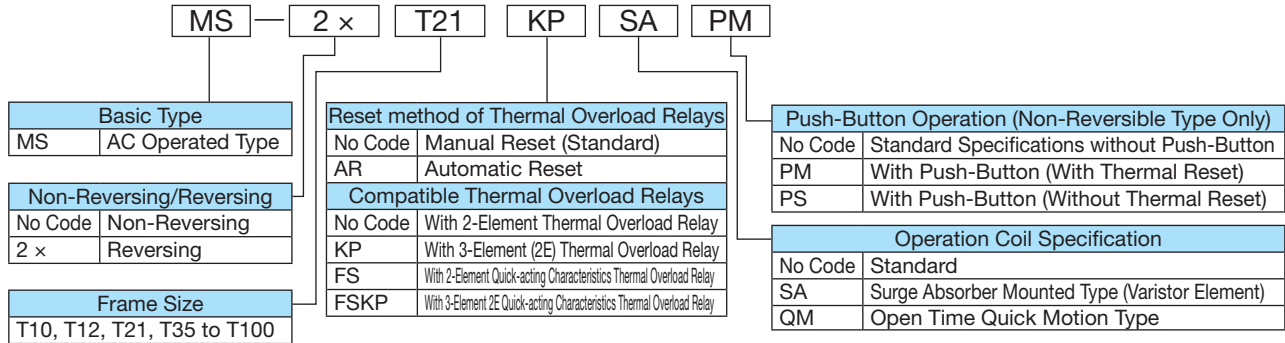
Note 8. S-T12/T20 auxiliary contact 2b can be manufactured.

2.3 Type Designation Structure

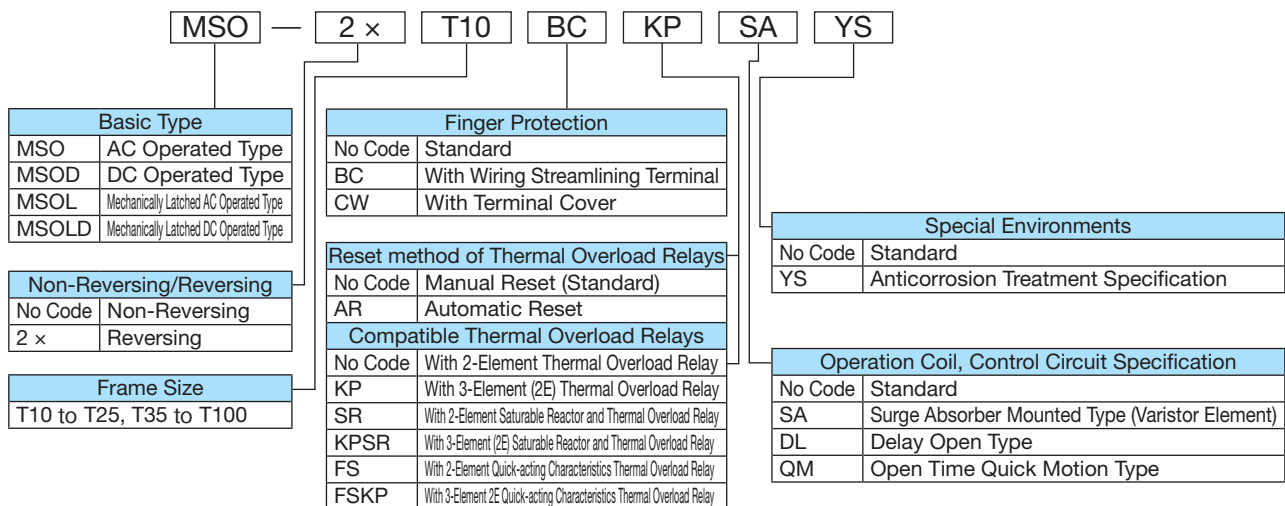
2.3.1 MS-T Magnetic Starters

Note 1. Refer to the Product Model List (page 28) or the individual listed page for details about product manufacturing specifications and target models. Furthermore, some types may be unable to be manufactured depending on the combination of symbols.

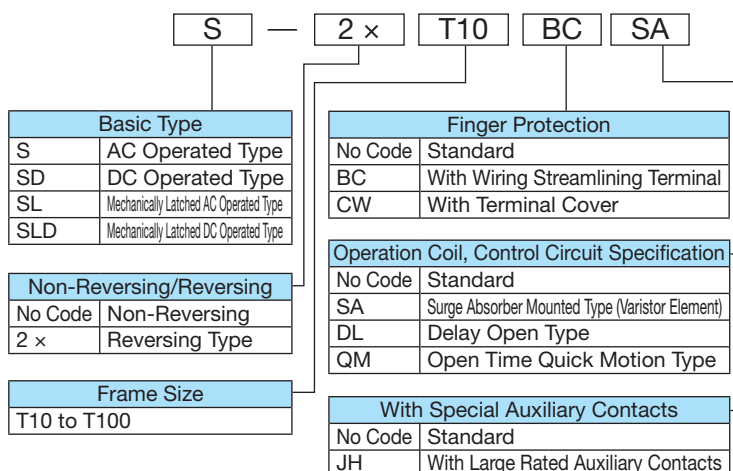
● Enclosed Magnetic Starters



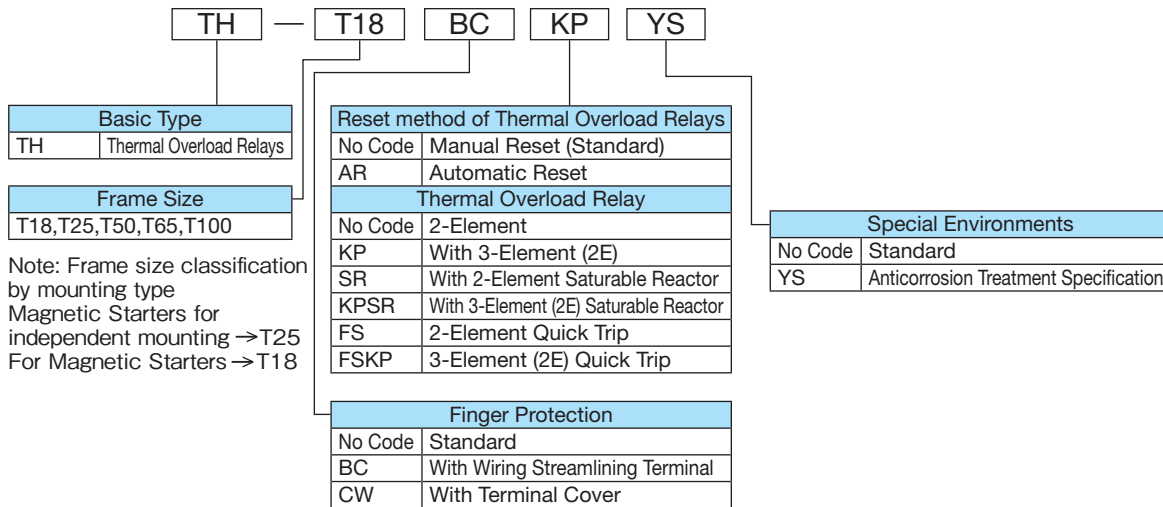
● Open Type Magnetic Starters



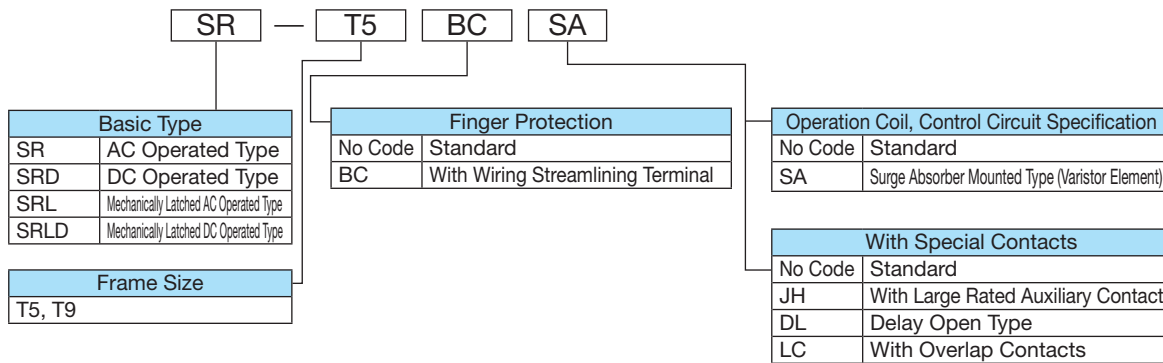
2.3.2 S-T Magnetic Contactors



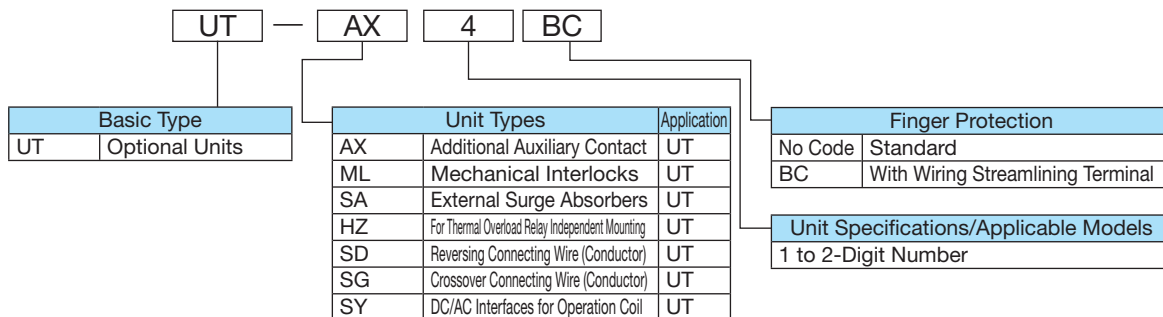
2.3.3 TH-T Thermal Overload Relays



2.3.4 SR-T Contactor Relays



2.3.5 UT Optional Units

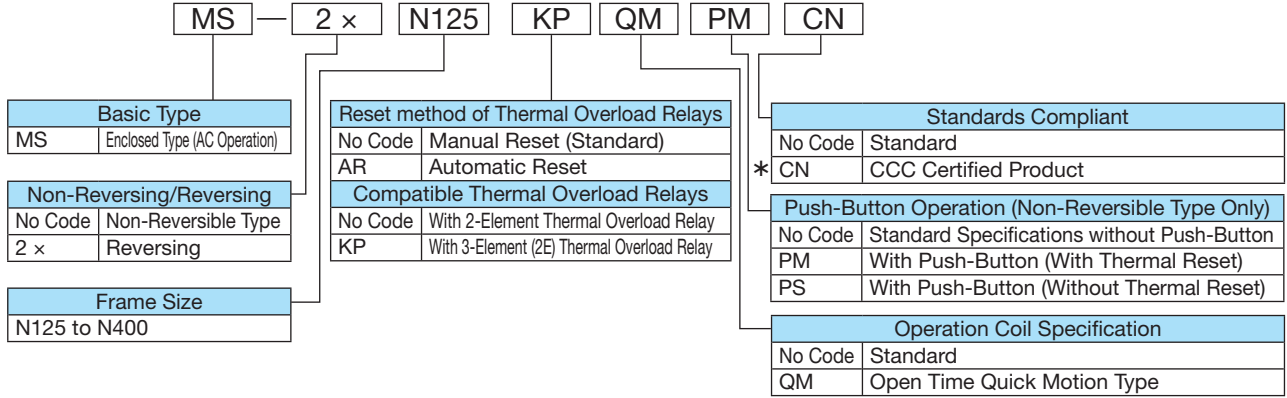


2.3.6 MS-N Magnetic Starters

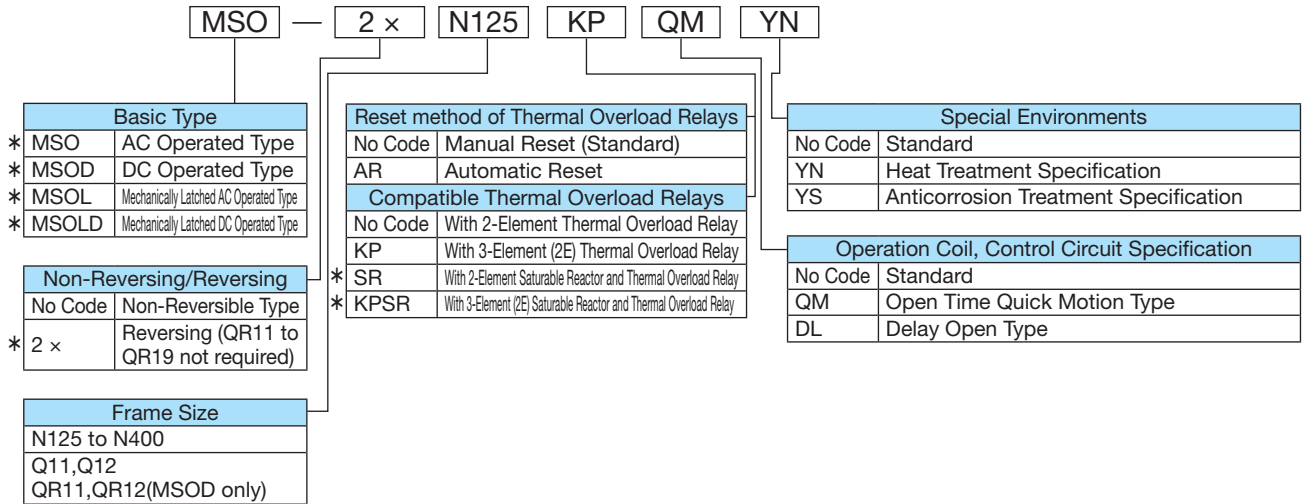
● Enclosed Magnetic Starters

Note 1 . Refer to the Product Model List (page 28) or the individual listed page for details about product manufacturing specifications and target models. Furthermore, some types may be unable to be manufactured depending on the combination of symbols.

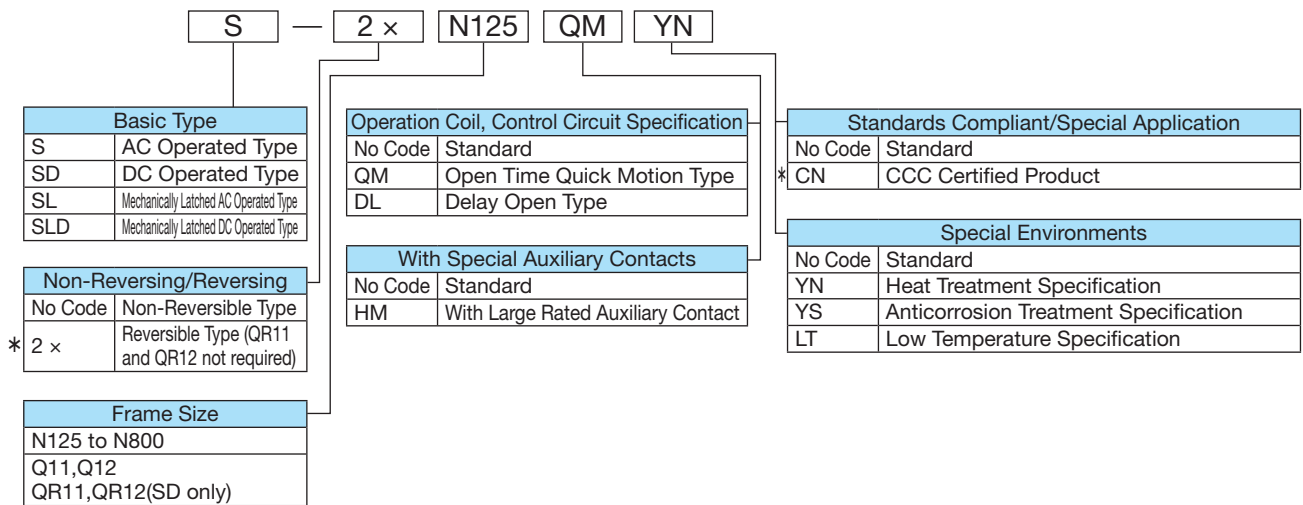
Note 2 . Symbols are indicated on the packaging box, but those marked with an * are not displayed on the product.



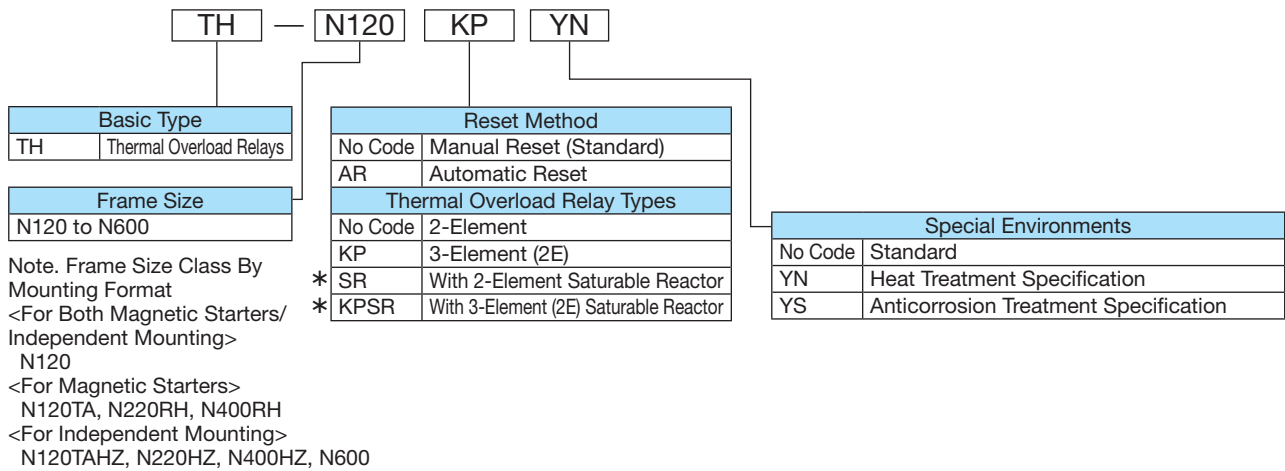
● Open Type Magnetic Starters



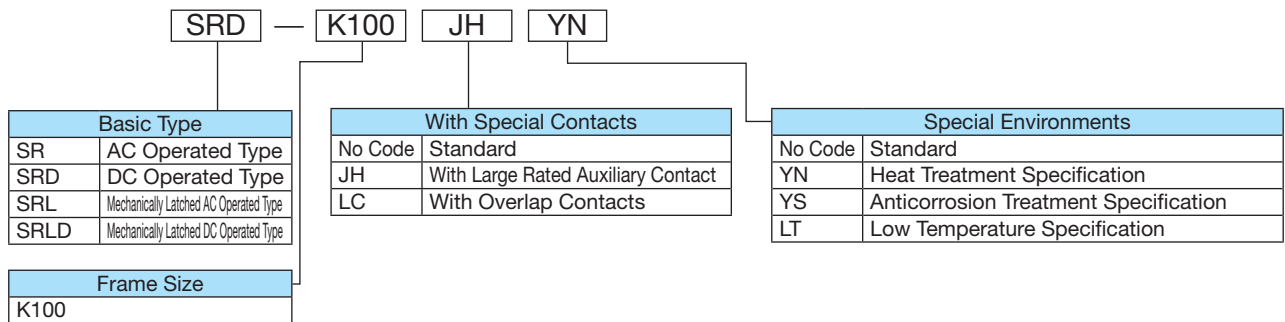
2.3.7 S-N Magnetic Contactors



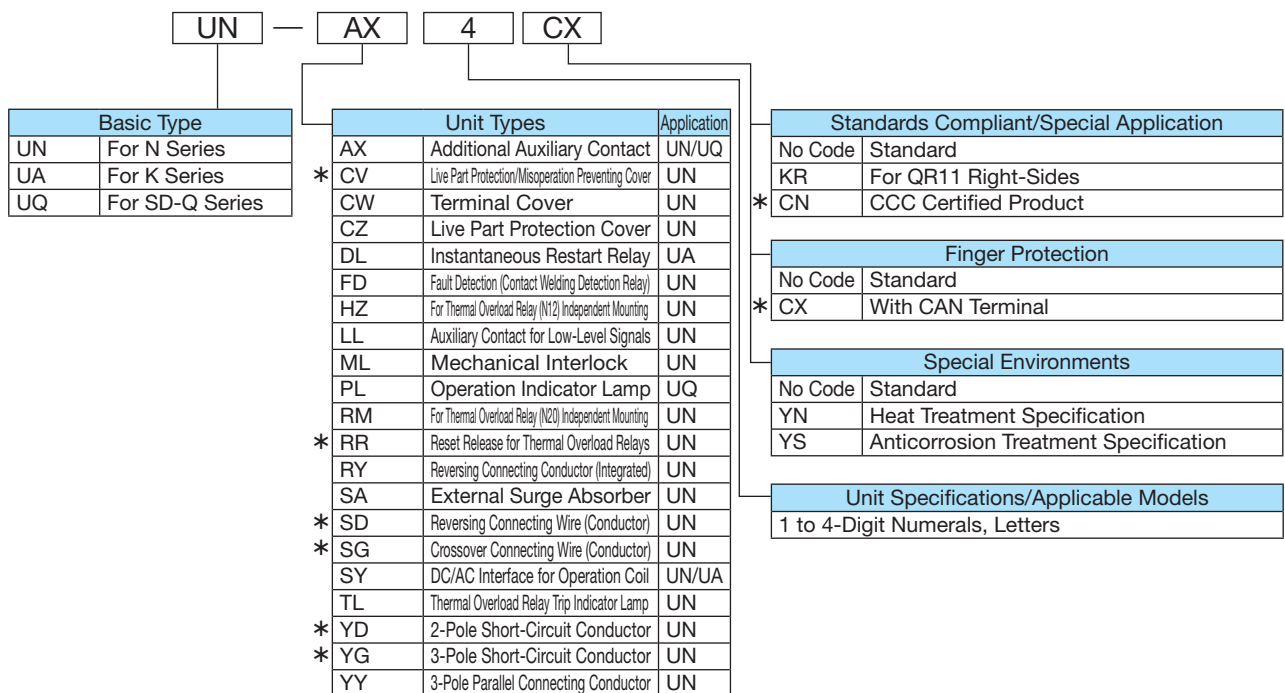
2.3.8 TH-N Thermal Overload Relays






2.3.9 SR-K Contactor Relays



2.3.10 UN / UA / UQ Optional Units



2.4 Explanations of Terms

| Item | Application | Terminology Meaning | Typical Model Name/Display (□ is replaced with a number) |
|----------------------------------|--|---|--|
| 1. Device | (1) Magnetic Starters (Magnetic Switches) | A set containing a magnetic contactor and thermal overload relay. | Enclosed: MS Open Type: MSO(D), MSOL(D) |
| | (2) Magnetic Contactors (Contactors) | The contactor opens and closes the main contact via a solenoid and comes as both an AC or DC contactor depending on the type of main circuitry to switch (AC or DC). | Main Circuit Dual AC/DC: S(D), SL(D) Main Circuit DC Only: DU(D) |
| | (3) AC Operated Magnetic Contactors | A magnetic contactor with a solenoid activated by AC current. | S |
| | (4) DC Operated Magnetic Contactors | A magnetic contactor with a solenoid activated by DC current. | SD |
| | (5) Mechanically Latched Magnetic Contactors | A magnetic contactor that can close the contact (ON) either electrically (closing coil) or mechanically and has a mechanical latch mechanism that retains the closed state without operational force until a time that it is electrically (opening coil) or mechanically open-circuited (OFF). | SL(D) |
| | (6) Delay Open Magnetic Contactors | A magnetic contactor that uses the discharge from a capacitor to keep the contact closed for a few seconds even if a voltage drop or momentary power failure occurs in the control circuit. | S-□ DL |
| | (7) Reversible Magnetic Contactors | A magnetic contactor that allows a motor to be reversed via switching the contact connections. | S-(D)-2x□, SL(D)-2x□ |
| | (8) Thermal Overload Relays | If the motor is drawing too much current (overloaded) due to a motor overload, constraint or open-phase, then the integrated bi-metal curves due to the heat generated and its output opens the magnetic contactor, preventing heat damage to the motor. | TH |
| 2. Rating | (1) Rated Insulation Voltage | The guaranteed withstanding voltage and the voltage that determines the isolation distance. | □ V (Both AC/DC) |
| | (2) Rated Operating Voltage | The voltage that determines applications relating to making capacity, breaking capacity, switching frequency and switching durability. | AC □ to □ V, DC □ V |
| | (3) Rated Capacity | The maximum applicable load capacity at the rated operating voltage. | Motor □ φ □ kW, Resistance □ φ □ kW |
| | (4) Rated Operating Current | The maximum current for full performance at the rated operating voltage. | AC-3 □ A, AC-4 □ A, DC1 □ A |
| | (5) Conventional Free Air Thermal Current (Ith) | The current that can flow for 8 hours without causing a temperature rise exceeding the defined value when the magnetic contactor is not being switched. An expression defined in JISC8201-1 specifying the rated continuity current. | Ith= □ A |
| | (6) Operation Coil | Magnetizes the solenoid for attractive force, or demagnetizes it for magnetic contactor switching operation. | — |
| | · Coil Designation | Shows the typical value of the rated operating current to be specified by symbol when ordering. | AC □ V, DC □ V |
| · Operation Coil Rating | The rated operating voltage (nominal voltage) range and frequency (for AC) of the operation coil | □ V □ Hz, DC □ V | |
| 3. Performance | (1) Making Capacity | The current value that can flow when making (ON) under conditions defined by the standards (tested 50 times for JIS and 100 times for JEM) | □ A |
| | (2) Breaking Capacity | The current value that can flow when breaking (OFF) under conditions defined by the standards (tested 50 times for JIS and 25 times for JEM) | □ A |
| | (3) Switching Frequency | The number of times switching can be performed in a 1-hour period under conditions defined by the standards. | □ Times/Hr |
| | (4) Switching Durability (Lifetime) | The maximum possible number of times that the magnetic contactor can be switched and used without degraded operation under conditions defined by the standards. | □ 10,000 Times |
| | · Mechanical Durability | The durability due to mechanical wear if switched under conditions defined by the standards, without any current applied to the main circuit. | □ 10,000 Times |
| | · Electrical Durability | The durability due to electrical wear if switched under conditions defined by the standards, with current applied to the main circuit. | □ 10,000 Times |
| 4. Properties | (1) Operating Voltage | The minimum voltage required to close the contact (ON) through excitation of the magnetic contactor operation coil. (input voltage and tripping voltage for mechanically latched types) | □ to □ V (Standard Value: 85% or Less of Rated Operating Voltage) |
| | (2) Open Voltage | The maximum voltage that can be reached by gradually dropping off the voltage applied to the magnetic contactor operation coil before the contact opens (OFF). | □ to □ V (Standard Value: 20% or More of Rated Operating Voltage for AC Operation 10% or More for DC Operation) |
| | (3) Operating Time | The time taken for the contact to transition (ON or OFF) once the operation coil has been excited or demagnetized. | □ ms |
| | (4) Operation Coil | [As per 2.(6)] | — |
| | · Inrush Input | The momentary capacity (input VA) immediately after the operation coil is excited, regular input or below for DC operated types. | AC: □ VA, DC: □ W (= □ VA) |
| | · Regular Input | The coil capacity (consumed electricity) when the operation coil is excited and in the closed-contact state | AC: □ VA, DC: □ W (= □ VA) |
| 5. Operations/ Actions/Others | (1) Inching (Inching Operation) | Inching, also known as jogging, is a frequent switching of starting current for minor motor rotations. | — |
| | (2) Plugging (Reverse Phase Braking) | Sudden reversal of the contact connections result in stoppage of the motor. | — |
| | (3) Self-Retention | Uses the auxiliary make contact of an ON magnetic contactor to continuously apply current to the magnetic contactor operation coil causing it to retain its ON state after the ON command, only releasing via an OFF command or power failure. | (Refer to page 64) |
| | (4) Interlock | An interlocking system whereby if 2 magnetic contactors are not permitted to be simultaneously turned on, as with reversible types, when one contactor turns ON it prevents the other contactor from reaching the ON state. There is a mechanical interlock via a mechanical mechanism and an electrical interlock via the auxiliary break contact. | (Refer to page 64) |
| | (5) Make Contact | Normally open, closing when a current is applied to the operation coil. Also known as an NO (Normally Open) contact. |  |
| | (6) Break Contact | Normally closed, opening when a current is applied to the operation coil. Also known as an NC (Normally Closed) contact. |  |
| | (7) Main Circuit | Switches the main contact (terminal numbers 1/L1-2/T1, 3/L2-4/T2, 5/L3-6/T3) for circuits with large currents (several A to 1,000 A or more) such as with motors or illumination circuitry. |  |
| | (8) Operation (Control) Circuit | Switches via auxiliary make contact or auxiliary break contact for circuits with small currents (several 10s of mA to several A) such as with magnetic contactor operation coils or display circuitry. | — |
| | (9) Direct Start | The most general type of operation where the full voltage is applied for starting/stopping the motor. Also known as full-voltage operation. | — |
| | (10) Star/Delta Start | To soften the electrical/mechanical shock to the motor when starting, the motor windings are connected in star configuration for 1/3 of the full-voltage current. Once accelerated the windings are switched to delta configuration for the least expensive, reduced-voltage running. | — |
| | (11) Category AC-3 | Motor regular start/stop switching duty. (Closed with 6 times the rated current and breaking with 1 times the rated current in durability testing) | (Refer to pages 44, 45) |
| | (12) Category AC-4 | Motor starting current switching duty (Closed with 6 times the rated current and breaking with 6 times the rated current in durability testing) for more severe switching than category AC-3. This also applies to inching and plugging. | (Refer to pages 44, 45) |
| | (13) Category AC-1 | Switching duty for electric heating or resistive loads with almost no inrush current when starting. (Closed/breaking with 1 time the rated current in durability testing) | (Refer to pages 44, 49) |
| | (14) 2E and 3E | 2E: A thermal overload relay or electronic type that protects the motor from overload/constraint + open-phase conditions. 3E: An electronic motor protection relay that protects the motor from overload/constraint + open-phase + reverse-phase (opposing phase) conditions. | TH- □ KP, ET-N □ ET-N □ |

2.5 Main Contact Rating

● Rated Capacity (JISC8201-4-1, IEC60947-4-1)

The maximum applicable load capacity of magnetic starters/magnetic contactors under standard conditions is as per the table below.

| Application Frame | Rated Capacity [kW] | | | | | | | | | | Rated Insulation Voltage [V] |
|----------------------|---|-------------|----------|------|---|-------------|---|-------------|-------------|-------------|------------------------------|
| | Standard Sequence | | | | Inching Duty | | Three-Phase Resistive Load (Category AC-1) | | | | |
| | Three-Phase Squirrel-cage Motor (Category AC-3) | | | | Single-Phase Motor Application Capacity (Category AC-3) | | Three-Phase Squirrel-cage Motor (Category AC-4) | | | | |
| | 220 to 240V | 380 to 440V | 500V | 690V | 100 to 110V | 220 to 240V | 220 to 240V | 380 to 500V | 220 to 240V | 400 to 440V | |
| T10 | 2.5[2.2] | 4[2.7] | 4[2.7] | 4 | 0.4 | 0.8 | 1.5 | 2.7(2.2) | 6.5 | 8 | 690 |
| T12 | 3.5[2.7] | 5.5[4] | 5.5[5.5] | 5.5 | 0.55 | 1 | 2.2 | 5.5(4) | 6.5 | 10 | |
| T20 | 4.5[3.7] | 7.5[7.5] | 7.5[7.5] | 7.5 | 0.75 | 1.5 | 3.7 | 5.5 | 6.5 | 10 | |
| T21 | 5.5[4] | 11[7.5] | 11[7.5] | 7.5 | 0.9 | 1.8 | 3.7 | 5.5 | 11 | 22 | |
| T25 | 7.5[5.5] | 15[11] | 15[11] | 11 | 1.2 | — | 4.5 | 7.5 | 11 | 22 | |
| T32 | 7.5[7.5] | 15[15] | 15[11] | 11 | 1.7 | — | 5.5 | 7.5(11) | 11 | 22 | |
| T35 | 11[7.5] | 18.5[15] | 18.5[15] | 15 | 1.7 | — | 5.5 | 11 | 20 | 40 | |
| T50 | 15[11] | 22[22] | 25[22] | 22 | — | — | 7.5 | 15 | 27 | 55 | |
| T65 | 18.5[15] | 30[30] | 37[30] | 30 | — | — | 11 | 22 | 34 | 68 | |
| T80 | 22[19] | 45[37] | 45[45] | 45 | — | — | 15 | 30 | 41 | 83 | |
| T100 | 30[22] | 55[45] | 55[45] | 55 | — | — | 19 | 37 | 50 | 100 | |
| N125 | 37[30] | 60[60] | 60[60] | 60 | — | — | 22 | 45 | 50 | 100 | |
| N150 | 45[37] | 75[75] | 90[90] | 90 | — | — | 30 | 55 | 65 | 130 | |
| N180 | 55[45] | 90[90] | 110[110] | 110 | — | — | 37 | 75 | 90 | 180 | |
| N220 | 75[55] | 132[110] | 132[132] | 132 | — | — | 45 | 90 | 90 | 180 | |
| N300 | 90[75] | 160[150] | 160[160] | 200 | — | — | 55 | 110 | 120 | 240 | |
| N400 | 125[110] | 220[200] | 225[200] | 250 | — | — | 75 | 150 | 155 | 310 | |
| N600 | 190[160] | 330[300] | 330[300] | 330 | — | — | 110 | 200 | 220 | 440 | |
| N800 | 220[200] | 440[400] | 500[400] | 500 | — | — | 160 | 300 | 270 | 540 | |

Note 1. The rated values for single-phase class AC-4 motors are the same as for class AC-3.

Note 2. The numbers in parentheses for the inching duty indicate the rated values for 380 to 440 V.

Note 3. The 200 to 240 V ratings for enclosed magnetic starters below have changed ratings in accordance with the Electrical Appliance and Material Safety Law.

MS-T21: 3.7 kW

Note 4. Refer to page 28 for information regarding electrical durability.

● Rated Operating Current and Conventional Free Air Thermal Current (JISC8201-4-1, IEC60947-4-1)

The maximum applicable current that satisfies the making or breaking capacity, switching frequency and switching durability required by the standards is as per the table below.

| Application Frame | Motor Load | | | | | | | Resistive Load | | Conventional Free Air Thermal Current (Note 2) [A] |
|----------------------|---|-------------|----------|------|---|-------------|------|---|-------------|--|
| | Category AC-3 Rated Operating Current [A] | | | | Category AC-4 Rated Operating Current [A] | | | Category AC-1 Rated Operating Current [A] | | |
| | 220 to 240V | 380 to 440V | 500V | 690V | 220 to 240V | 380 to 440V | 500V | 220 to 240V | 400 to 440V | |
| T10 | 11[11] | 9[7] | 7[6] | 5 | 8 | 6 | 6 | 20 | 11 | 20 |
| T12 | 13[13] | 12[9] | 9[9] | 7 | 11 | 9 | 9 | 20 | 13 | 20 |
| T20 | 18[18] | 18[18] | 17[17] | 9 | 18 | 13 | 10 | 20 | 13 | 20 |
| T21 | 25[20] | 23[20] | 17[17] | 9 | 18 | 13 | 10 | 32 | 32 | 32 |
| T25 | 30(26)[26] | 30(26)[25] | 24[20] | 12 | 20 | 17 | 12 | 32 | 32 | 32 |
| T32 | 32[32] | 32[32] | 24[20] | 12 | 26 | 24 | 13 | 32 | 32 | 32 |
| T35 | 40[35] | 40[32] | 32[26] | 17 | 26 | 24 | 17 | 60 | 60 | 60 |
| T50 | 55(50)[50] | 50[48] | 38[38] | 26 | 35 | 32 | 24 | 80 | 80 | 80 |
| T65 | 65[65] | 65[65] | 60[45] | 38 | 50 | 47 | 38 | 100 | 100 | 100 |
| T80 | 85[80] | 85[80] | 75[75] | 52 | 65 | 62 | 45 | 120 | 120 | 120 |
| T100 | 105[100] | 105[93] | 85[75] | 65 | 80 | 75 | 55 | 150 | 150 | 150 |
| N125 | 125[125] | 120[120] | 90[90] | 70 | 93 | 90 | 65 | 150 | 150 | 150 |
| N150 | 150[150] | 150[150] | 140[140] | 100 | 125 | 110 | 80 | 200 | 200 | 200 |
| N180 | 180[180] | 180[180] | 180[180] | 120 | 150 | 150 | 140 | 260 | 260 | 260 |
| N220 | 250[220] | 250[220] | 200[200] | 150 | 180 | 180 | 140 | 260 | 260 | 260 |
| N300 | 300[300] | 300[300] | 250[250] | 220 | 220 | 220 | 200 | 350 | 350 | 350 |
| N400 | 400[400] | 400[400] | 350[350] | 300 | 300 | 300 | 250 | 450 | 450 | 450 |
| N600 | 630[630] | 630[630] | 500[500] | 420 | 400 | 400 | 350 | 660 | 660 | 660(800) |
| N800 | 800[800] | 800[800] | 720[720] | 630 | 630 | 630 | 500 | 800 | 800 | 800(1000) |

Note 1. The rated operating current indicates the maximum applicable current that satisfies the making capacity or breaking capacity, switching frequency and switching durability at the rated operating voltage.

Note 2. The values in the parentheses for N600 and N800 are applicable for ambient temperature of 40°C or less.

Note 3. The value between parentheses for the rated operating current for T21 and T35 is that applicable for the magnetic contactor.

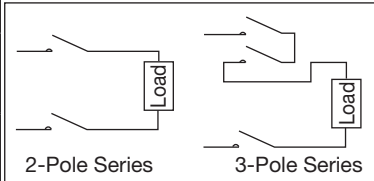
Note 4. The main contact minimum operating voltage and current differ depending on the allowable fault rate. Please refer to page 40 for details.

Note 5. Refer to page 28 for information regarding electrical durability.

● DC Rating (JEM1038, JISC8201-5-1)

| Frame | Rated Voltage DC (V) | Category DC2, DC4 Rated Operating Current (DC Motor Load) [A] | | Category DC1 Rated Operating Current (Resistive Load) [A] | | Category DC-13 Rated Operating Current (DC Coil Load) [A] | | |
|------------|----------------------|---|---------------|---|---------------|---|---------------|---------------|
| | | 2-Pole Series | 3-Pole Series | 2-Pole Series | 3-Pole Series | Single Pole | 2-Pole Series | 3-Pole Series |
| T10 | 24 | 8 | 8 | 10 | 10 | 5 | 8 | 8 |
| | 48 | 4 | 6 | 10 | 10 | 3 | 4 | 6 |
| | 110 | 2.5 | 4 | 6 | 8 | 0.6 | 2 | 3 |
| | 220 | 0.8 | 2 | 3 | 8 | 0.2 | 0.3 | 0.8 |
| T12 | 24 | 12 | 12 | 12 | 12 | 7 | 12 | 12 |
| | 48 | 6 | 10 | 12 | 12 | 5 | 6 | 10 |
| | 110 | 4 | 8 | 10 | 12 | 1.2 | 3 | 5 |
| | 220 | 1.2 | 4 | 7 | 12 | 0.2 | 0.5 | 2 |
| T20 | 24 | 18 | 18 | 18 | 18 | 10 | 14 | 15 |
| | 48 | 15 | 18 | 18 | 18 | 5 | 7 | 12 |
| | 110 | 8 | 15 | 13 | 18 | 1.2 | 3 | 5 |
| | 220 | 2 | 8 | 8 | 18 | 0.2 | 0.5 | 2 |
| T21 | 24 | 20 | 20 | 20 | 20 | 12 | 20 | 20 |
| | 48 | 15 | 20 | 20 | 20 | 8 | 12 | 15 |
| | 110 | 8 | 15 | 15 | 20 | 1.5 | 3 | 10 |
| | 220 | 2 | 8 | 10 | 20 | 0.25 | 1.2 | 4 |
| T25, T32 | 24 | 25 | 25 | 25 | 25 | 15 | 25 | 25 |
| | 48 | 20 | 25 | 25 | 25 | 10 | 15 | 25 |
| | 110 | 10 | 20 | 25 | 25 | 1.5 | 4 | 12 |
| | 220 | 3 | 10 | 12 | 22 | 0.25 | 1.2 | 4 |
| T35 | 24 | 35 | 35 | 35 | 35 | 15 | 35 | 35 |
| | 48 | 20 | 30 | 35 | 35 | 10 | 15 | 25 |
| | 110 | 10 | 20 | 25 | 35 | 1.5 | 4 | 12 |
| | 220 | 3 | 10 | 12 | 30 | 0.25 | 1.2 | 4 |
| T50 | 24 | 45 | 50 | 50 | 50 | — | — | — |
| | 48 | 25 | 35 | 40 | 50 | — | — | — |
| | 110 | 15 | 30 | 35 | 50 | — | — | — |
| | 220 | 3.5 | 12 | 15 | 40 | — | — | — |
| T65 | 24 | 45 | 50 | 50 | 65 | — | — | — |
| | 48 | 25 | 35 | 40 | 65 | — | — | — |
| | 110 | 15 | 30 | 35 | 65 | — | — | — |
| | 220 | 3.5 | 12 | 15 | 50 | — | — | — |
| T80 | 24 | 65 | 80 | 80 | 80 | — | — | — |
| | 48 | 40 | 60 | 65 | 80 | — | — | — |
| | 110 | 20 | 50 | 50 | 80 | — | — | — |
| | 220 | 5 | 20 | 20 | 60 | — | — | — |
| T100 | 24 | 93 | 93 | 93 | 93 | — | — | — |
| | 48 | 60 | 90 | 93 | 93 | — | — | — |
| | 110 | 40 | 80 | 80 | 93 | — | — | — |
| | 220 | 30 | 50 | 50 | 70 | — | — | — |
| N125 | 24 | 120 | 120 | 120 | 120 | | | |
| | 48 | 60 | 90 | 100 | 120 | | | |
| | 110 | 40 | 80 | 80 | 100 | | | |
| | 220 | 30 | 50 | 50 | 80 | | | |
| N150 | 24 | 150 | 150 | 150 | 150 | | | |
| | 48 | 100 | 130 | 120 | 150 | | | |
| | 110 | 80 | 120 | 100 | 150 | | | |
| | 220 | 60 | 80 | 100 | 150 | | | |
| N180(N220) | 24 | 180(220) | 180(220) | 180(220) | 180(220) | | | |
| | 48 | 150 | 180(220) | 180 | 180(220) | | | |
| | 110 | 120 | 150 | 150 | 180(220) | | | |
| | 220 | 80 | 100 | 150 | 180(220) | | | |
| N300 | 24 | 300 | 300 | 300 | 300 | | | |
| | 48 | 200 | 280 | 240 | 300 | | | |
| | 110 | 150 | 200 | 200 | 300 | | | |
| | 220 | 90 | 150 | 200 | 300 | | | |
| N400 | 24 | 400 | 400 | 400 | 400 | | | |
| | 48 | 200 | 280 | 240 | 400 | | | |
| | 110 | 150 | 200 | 200 | 400 | | | |
| | 220 | 90 | 150 | 200 | 300 | | | |
| N600(N800) | 24 | 630(800) | 630(800) | 630(800) | 630(800) | | | |
| | 48 | 630 | 630 | 630(800) | 630(800) | | | |
| | 110 | 630 | 630 | 630 | 630(800) | | | |
| | 220 | 630 | 630 | 630 | 630(800) | | | |

Note 1. Electrical durability of 500,000 operations.
 Note 2. Connect for use in 2-pole series or 3-pole series as per the diagram below.
 Note 3. The rated operating current increases when connected in series but the reliability of the contacts decreases.



Standards for DC Rating

| Standards | Category | Making Capacity Test | | | Breaking Capacity Test | | | Electrical Durability Test | | | | | | Typical Application Example |
|---------------|----------|----------------------|---------|---------|------------------------|---------|---------|----------------------------|---------|---------|----------|---------|---------|--|
| | | Current | Voltage | *1 | Current | Voltage | *1 | Making | | | Breaking | | | |
| | | | | | | | | Current | Voltage | *1 | Current | Voltage | *1 | |
| JEM-1038 | DC1 | 1.1Ie | 1.1Ee | 1(ms) | 1.1Ie | 1.1Ee | 1(ms) | Ie | Ee | 1(ms) | Ie | Ee | 1(ms) | Resistive Load |
| | DC2 | 4Ie | 1.1Ee | 2.5(ms) | 4Ie | 1.1Ee | 2.5(ms) | 2.5Ie | Ee | 2(ms) | Ie | 0.1Ee | 7.5(ms) | DC Shunt Motor Starting/Stopping |
| | DC4 | 4Ie | 1.1Ee | 15(ms) | 4Ie | 1.1Ee | 15(ms) | 2.5Ie | Ee | 7.5(ms) | Ie | 0.3Ee | 10(ms) | DC Series-Wound Motor Starting/Stopping |
| JIS C8201-5-1 | DC-13 | 1.1Ie | 1.1Ee | 6P(ms) | 1.1Ie | 1.1Ee | 6P(ms) | Ie | Ee | 6P(ms) | Ie | Ee | 6P(ms) | DC Inductive Load (DC Coil Load Control) |

Note 1. Ie: Rated Operating Current, Ee: Rated Operating Voltage

Note 2. *1 For JEM-1038: Time constant,

For JIS C8201-5-1: Time taken to reach 95% of rated operating current. Maximum 300 (ms)

P = No. watts consumed at steady state (calculated by Ee x Ie).

Note 3. Making capacity tests are performed 100 times, while breaking capacity tests are performed 25 times. (JIS C8201-5-1 calls for making and breaking capacity tests to be performed 10 times.)

2.6 Auxiliary Contact Arrangements and Ratings

No. of Installed Auxiliary Contacts and Contact Arrangement

All Auxiliary Contacts Are Twin Contacts

| Frame Model | Non-Reversible Magnetic Contactors | | | | | | | Reversible Magnetic Contactor (Note 4) | | | | | | |
|-------------|------------------------------------|----------------------|--------------------|----------------------|----------------------|-----------|--------------|---|---|------------------|----------------------------------|-------------------|----------------------|----------------------|
| | T10 | T12 | T32 | T20 | T21 to T80 | T100 N125 | N150 to N800 | 2 x T10 | 2 x T12 2 x T20 | 2 x T32 (Note 6) | 2 x T21 to 2 x T80 | 2 x T100 2 x N125 | 2 x N150 to 2 x N400 | 2 x N600 to 2 x N800 |
| Standard | 1a | 1a1b | — | 1a1b | 2a2b | 2a2b | 2a2b | 1a1b/2+2b (Note 3) | 1a1b/2+2b (Note 3) | 2a2b x 2 | 2a2b x 2 | 2a2b x 2 | 3a3b x 2 | 4a4b x 2 |
| Special | 1b | 2a (Note 8) | — | 2a (Note 8) | — | — | — | 1b/2+2b (Note 3) | 2a/2+2b (Note 3) | — | — | — | — | — |
| Maximum | 5a 4a1b 3a2b | 5a1b 4a2b 3a3b | 4a 3a1b 2a2b | 5a1b 4a2b 3a3b | 6a2b 5a3b 4a4b | 4a4b | 4a4b | 5a x 2 + 2b 4a1b x 2 + 2b 3a2b x 2 + 2b (Note 3) | 5a1b x 2 + 2b 4a2b x 2 + 2b 3a3b x 2 + 2b (Note 3) | — | 6a2b x 2 5a3b x 2 4a4b x 2 | 3a3b x 2 | — | — |

Note 1. The 2 auxiliary break contacts of reversible magnetic starters (MS-2x, MSO-2x) are wired as an electrical interlock.

Note 2. No specification needs to be made for standard contact arrangements. Specify only for special arrangements.

Note 3. The +2b on the auxiliary contact arrangement of reversible T10, T12 and T20 types indicates the break contact of the integrated UT-ML20 interlock unit. There is no need to specify when ordering.

Note 4. Auxiliary contact arrangements for reversible types are displayed by twos, in a contact arrangement combining two magnetic contactors. Please specify a matching contact arrangement for 2 units when ordering. <Example> For 1a1b x 2 + 2b: 2A2B

Note 5. The maximum number of units indicates that when using additional auxiliary contact units available as option parts for the magnetic contactor. The body and auxiliary contact unit can be additionally installed by the customer as a separate arrangement. Refer to page 183 for details about auxiliary contact units.

Mounting of auxiliary contact units to enclosed types or delay open types, and mounting of front clip-on auxiliary contact units to mechanically latched types are not possible.

Note 6. Reversible 2 x T32 type has auxiliary contact unit 2a2b (UT-AX4) x 2 included as standard.

Note 7. Mechanically latched types and delay open types have differing auxiliary contact arrangements as per the table above. Refer to page 98 for details about mechanically latched types, or page 107 for delay open types.

Note 8. S-T12/T20 auxiliary contact 2b can be manufactured.

Rated Operating Current and Conventional Free Air Thermal Current of Auxiliary Contacts (Rated Continuity Current)

| Frame | Rated Operating Current (A) | | | | | | | | | | | | | | | | Conventional Free Air Thermal Current Ith [A] |
|-------------------------------------|-------------------------------|--------|--------|--------|-------------------------------|-------|--------|--------|------------------------------------|--------|--------|--------|------------------------------------|-------|--------|--------|---|
| | Category AC-15 (AC Coil Load) | | | | Category DC-13 (DC Coil Load) | | | | Category AC-12 (AC Resistive Load) | | | | Category DC-12 (DC Resistive Load) | | | | |
| | AC120V | AC240V | AC440V | AC500V | DC24V | DC48V | DC110V | DC220V | AC120V | AC240V | AC440V | AC500V | DC24V | DC48V | DC110V | DC220V | |
| T10 to T100 N125 to N800 | 6 | 3 | 1.5 | 1.2 | 3 | 1.5 | 0.6 | 0.3 | 10 | 8 | 5 | 5 | 10 | 8 | 5 | 1 | 10 |
| T10JH to T100JH N125HM to N800HM | 10(6) | 10(5) | 5(3) | 4(3) | 7[10] | 5 | 1.2 | 0.2 | 20 | 16 | 10 | 10 | 10 | 8 | 5 | 1 | 20 |

Note 1. The minimal applicable load is T10 to T100, N125 to N800: 20V3mA, T10JH to T100JH, N125HM to N800HM: 48V200mA.

Note 2. Electrical durability of 500,000 operations.

Note 3. The rated operating current between parentheses indicate the same-pole make and break contact values for different operating voltages.

Note 4. JISC8201-5-1 classifications are class AC-15 applicable to AC inductive loads (AC coil load (exceeding 72 VA) control) and class DC-13 applicable to DC inductive loads (DC coil load control).

Note 5. JISC8201-5-1 classifications are class AC-12 applicable to AC resistive loads and class DC-12 applicable to DC resistive loads.

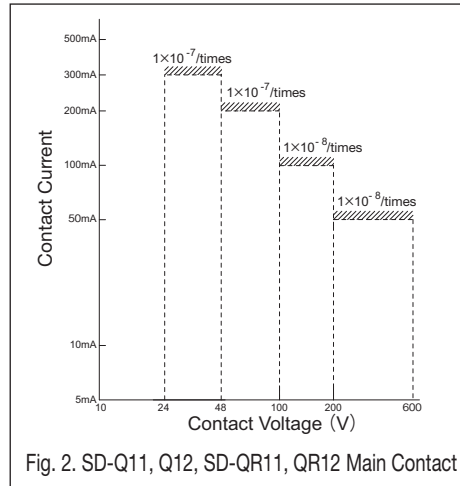
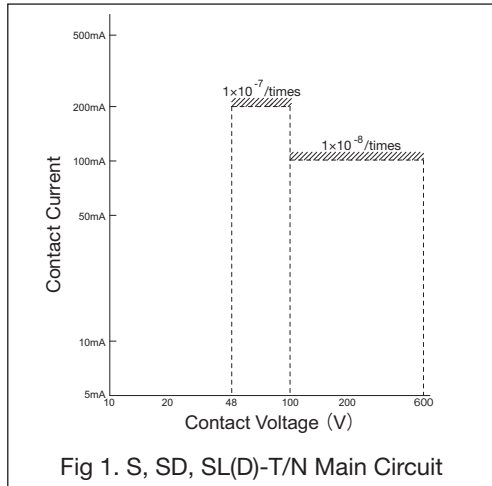
Note 6. T10JH to T100JH and N125HM to N800HM use auxiliary contacts that do not have a twin contact shape. Electrical durability is 200,000 operations at DC24 V [10 A].

2.7 Contact Reliability of Main Contacts and Auxiliary Contacts

The minimum working voltage and current of the S, SD, SL(D)-T/N type and SD-Q type Magnetic Contactors and the contact of the SR, SRD, SRL(D)-T/K type Contactor Relays vary depending on the allowable failure rate. Apply the following diagrams.

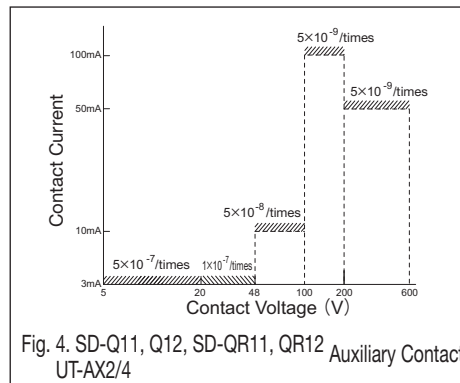
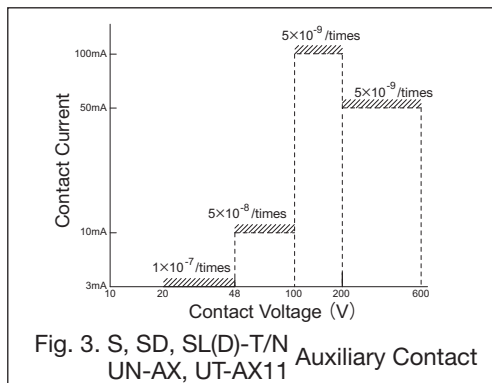
- The contact reliability reduces when a contact is connected in series or when the current is applied and broken at the time of opening and closing the contact. Prescribe remedies such as connecting the contact in parallel (providing redundancy).
- If a reliability higher than the contact reliability given in Diagram 1 to Diagram 7 is required, the contacts must be connected in parallel (redundant).

● Magnetic Contactors

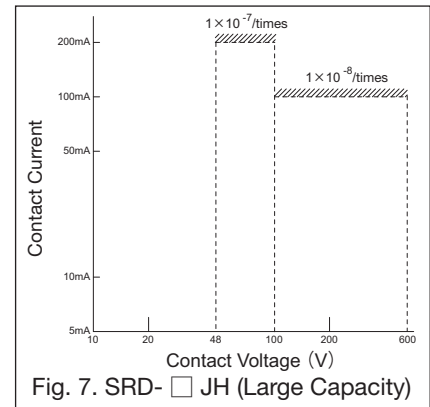
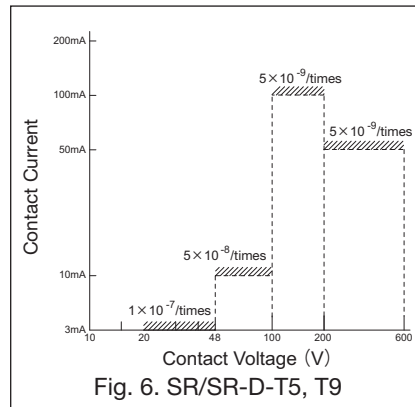
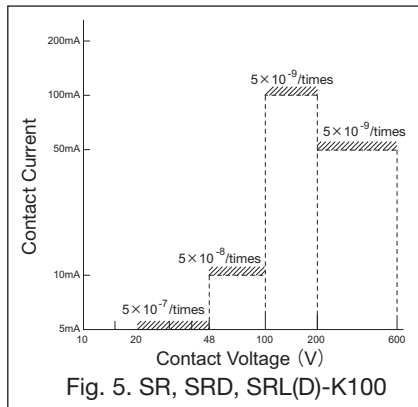


Note 1: The contact reliability indicates the failure rate λ 60 (the number of failures/the number of opening and closing operations, per contact) at 60% reliability standard. This reliability is applied when the product is in use under a clean atmosphere in the standard specification environment (Refer to page 62).

Note 2: The contact resistance of the contacts may change due to economical corrosion and that may affect the contacts in the case of a light load. It is recommended that regular inspections to be conducted, with load opening and closing performed several times in the inspection, and that consideration be provided on the system side.



● Contactor Relays



2.8 Coil Types and Rating

2.8.1 AC Operated Type

● For S-T10 to T50, B-T21, SR-T5/T9 Types

| Coil Designation | Rated Voltage [V] | | Coil Indication |
|------------------|-------------------|--|-----------------------------|
| | 50 Hz/60 Hz | | |
| AC24V | 24 | | Rated Voltage/ Frequency |
| AC48V | 48 to 50 | | |
| AC100V | 100 to 127 | | |
| AC200V | 200 to 240 | | |
| AC300V | 260 to 300 | | |
| AC400V | 380 to 440 | | |
| AC500V | 460 to 550 | | |

Note 1. Coil designation AC100V and AC200V are standard products.

Note 2. Some applicable models, such as the delay open type (S-T□DL), have different coil ratings. Please check the individual pages.

Note 3. When ordering you may indicate a single rating (e.g. 200 V 60 Hz); however, the rated voltage of the product will be as displayed above.

● For S-N38/N48, SR-K100 Types

| Coil Designation | Rated Voltage [V] | | Coil Indication |
|------------------|-------------------|------------|-----------------------------|
| | 50Hz | 60Hz | |
| AC12V | 12 | 12 | Rated Voltage/ Frequency |
| AC24V | 24 | 24 | |
| AC48V | 48 to 50 | 48 to 50 | |
| AC100V | 100 | 100 to 110 | |
| AC120V | 110 to 120 | 115 to 120 | |
| AC127V | 125 to 127 | 127 | |
| AC200V | 200 | 200 to 220 | |
| AC220V | 208 to 220 | 220 | |
| AC230V | 220 to 240 | 230 to 240 | |
| AC260V | 240 to 260 | 260 to 280 | |
| AC380V | 346 to 380 | 380 | |
| AC400V | 380 to 415 | 400 to 440 | |
| AC440V | 415 to 440 | 460 to 480 | |
| AC500V | 500 | 500 to 550 | |

Note 1. Coil designation AC100V and AC200V are standard products.

Note 2. When ordering you may indicate a single rating (e.g. 200 V 60 Hz); however, the rated values of the product will be as displayed to the left.

Coil designations for the below voltages and frequencies are as follows.

220 V 60 Hz → Coil designation AC200V

380 V 50 Hz → Coil designation AC400V

240 V 50 Hz → Coil designation AC230V

220 V 50 Hz → Coil designation AC230V

415 V 50 Hz → Coil designation AC400V

● For S-N38SA/N48SA Types

| Coil Designation | Rated Voltage [V] | | Coil Indication | Varistor Voltage [V] |
|------------------|-------------------|------------|-----------------------------|----------------------|
| | 50Hz | 60Hz | | |
| AC12V | 12 | 12 | Rated Voltage/ Frequency | 120 |
| AC24V | 24 | 24 | | 120 |
| AC48V | 48 to 50 | 48 to 50 | | 120 |
| AC100V | 100 | 100 to 110 | | 470 |
| AC120V | 110 to 120 | 115 to 120 | | 470 |
| AC127V | 125 to 127 | 127 | | 470 |
| AC200V | 200 | 200 to 220 | | 470 |
| AC220V | 208 to 220 | 220 | | 470 |
| AC230V | 220 to 240 | 230 to 240 | | 470 |
| AC230V | 220 to 240 | 230 to 240 | | 470 |

Note 1. Append "SA" to the end of the model name when ordering for a type with an integrated surge absorber (varistor).

E.g. S-N38SA AC100V

Note 2. When ordering you may indicate a single rating (e.g. 200 V 60 Hz); however, the rated values of the product will be as displayed to the left.

Coil designations for the below voltages and frequencies are as follows.

220 V 60 Hz → Coil designation AC200V

240 V 50 Hz → Coil designation AC230V

220 V 50 Hz → Coil designation AC230V

Note 3. Models other than those on the left are not manufactured.

● For S-T65 to T100 Types For S-N125 to N800, B-N65/N100, DU-N30 to N260 Types

| Coil Designation | Rated Voltage [V] | | Coil Indication |
|------------------|-------------------|--|-----------------------------|
| | 50Hz/60Hz | | |
| AC24V(Note1) | 24 | | Rated Voltage/ Frequency |
| AC48V(Note1) | 48 to 50 | | |
| AC100V | 100 to 127 | | |
| AC200V | 200 to 240 | | |
| AC300V | 260 to 350 | | |
| AC400V | 380 to 440 | | |
| AC500V | 460 to 550 | | |

Note 1. AC24V and AC48V coils for the model names below are not manufactured.

AC24V Coil: S-N180/N220, N300/N400, N600/N800
DU-N180, N260

AC48V Coil: S-N600/N800

Note 2. Some applicable models, such as the delay open type (S-T□DL, S-N□DL), have different coil ratings. Please check the individual pages.

● For S-T10SA to T50SA, B-T21SA, SR-T5SA/T9SA Types

| Coil Designation | Rated Voltage [V] | | Coil Indication | Varistor Voltage [V] |
|------------------|-------------------|--|-----------------------------|----------------------|
| | 50 Hz/60 Hz | | | |
| AC24V | 24 | | Rated Voltage/ Frequency | 120 |
| AC48V | 48 to 50 | | | 120 |
| AC100V | 100 to 127 | | | 470 |
| AC200V | 200 to 240 | | | 470 |
| AC300V | 260 to 300 | | | 910 |
| AC400V | 380 to 440 | | | 910 |

Note 1. Add "SA" to the end of the type name to order the operation coil surge absorber mounted type (varistor).

Example: S-T10SA AC100V

Note 2. When ordering you may indicate a single rating (e.g. 200 V 60 Hz); however, the rated voltage of the product will be as displayed above.

● For S-T65QM to T100QM Types For S-N125QM to N400QM Types

| Coil Designation | Rated Voltage [V] | | Coil Indication |
|------------------|-------------------|--|-----------------------------|
| | 50Hz/60Hz | | |
| AC100V | 100 to 127 | | Rated Voltage/ Frequency |
| AC200V | 200 to 240 | | |

Note 1. Models other than AC100V, AC200V are not manufactured.

Refer below for information regarding model names for coils not listed above.

SH-V□ :Page 246

The coil designation is a symbol to be specified when ordering. Please contact us regarding production capabilities for special nominal coil voltages. Special coils are produced without receiving certification from the various standards. (No Certification Symbols)

2.9 Properties

● AC Operated Type

| Model Name | Input [VA] | | Power Consumption [W] | Operating Voltage [V] | | Coil Current [mA] | Operating Time [ms] | | Operating Transformer Capacity [VA] |
|------------------|------------|---------|-----------------------|-----------------------|-----------|-------------------|---------------------------|-----------------------------|-------------------------------------|
| | Inrush | Regular | | Operation | Open | | Coil ON → Main Contact ON | Coil OFF → Main Contact OFF | |
| S-T10, T12 | 45 | 7 | 2.2 | 120 to 150 | 75 to 115 | 30 | 12 to 18 | 5 to 20 | 15 to 30 |
| S-T20 | 45 | 7 | 2.2 | 120 to 150 | 75 to 115 | 30 | 12 to 18 | 5 to 20 | 15 to 30 |
| S-T21, T25 | 75 | 7 | 2.4 | 125 to 155 | 80 to 115 | 30 | 13 to 20 | 5 to 15 | 15 to 30 |
| S-T32 | 55 | 4.5 | 1.8 | 125 to 155 | 80 to 115 | 20 | 15 to 22 | 5 to 15 | 15 to 30 |
| S-T35, T50 | 110 | 10 | 3.8 | 120 to 150 | 80 to 115 | 45 | 10 to 20 | 5 to 14 | 30 to 50 |
| S-T65, T80 | 115 | 20 | 2.2 | 110 to 135 | 60 to 100 | 67 | 20 to 30 | 35 to 65 | 30 to 50 |
| S-T100 | 210 | 23 | 2.8 | 110 to 135 | 60 to 100 | 85 | 20 to 35 | 50 to 100 | 50 to 75 |
| S-N125 | 270 | 24 | 2.9 | 110 to 135 | 70 to 105 | 100 | 20 to 30 | 60 to 110 | 75 to 100 |
| S-N150 | 270 | 24 | 2.9 | 110 to 135 | 70 to 105 | 100 | 22 to 32 | 60 to 110 | 75 to 100 |
| S-N180, N220 | 440 | 40 | 4.2 | 110 to 135 | 70 to 105 | 165 | 25 to 35 | 70 to 130 | 100 to 150 |
| S-N300, N400 | 440 | 50 | 6.1 | 110 to 135 | 70 to 105 | 200 | 30 to 40 | 90 to 150 | 100 to 150 |
| S-N600, N800 | 790 | 90 | 17.0 | 108 to 130 | 60 to 90 | 340 | 51 to 80 | 57 to 93 | 150 to 250 |
| T65QM, T80QM | 115 | 20 | 2.2 | 110 to 135 | 60 to 100 | 67 | 20 to 30 | 12 to 30 | 30 to 50 |
| T100QM | 210 | 23 | 2.8 | 110 to 135 | 60 to 100 | 85 | 20 to 35 | 13 to 30 | 50 to 75 |
| S-N125QM | 270 | 24 | 2.9 | 110 to 135 | 70 to 105 | 100 | 20 to 30 | 15 to 30 | 75 to 100 |
| S-N150QM | 270 | 24 | 2.9 | 110 to 135 | 70 to 105 | 100 | 22 to 32 | 15 to 30 | 75 to 100 |
| S-N180QM, N220QM | 440 | 40 | 4.2 | 110 to 135 | 70 to 105 | 165 | 25 to 35 | 20 to 40 | 100 to 150 |
| S-N300QM, N400QM | 440 | 50 | 6.1 | 110 to 135 | 70 to 105 | 200 | 30 to 40 | 20 to 40 | 100 to 150 |

Note 1. The above indicates rough property indices for AC200V coils.

Note 2. The drive voltage is that at a 20°C cold state at 60 Hz. Voltages for coils other than AC200V can be calculated proportionately.

E.g.: For a AC100V coil, drive voltage $\approx (100 \div 200) \times$ drive voltage in table above

Note 3. The input and power consumption are average values. These are almost the same for coils other than AC200V.

Note 4. The coil current is the average normal value with a 220 V, 60 Hz applied voltage. Divide the regular input by the coil voltage for coils other than AC200V. E.g.: For a AC100V coil, coil current \approx input from table above $\div 100$

Note 5. The drive time is that with 200V, 60 Hz applied to a standard auxiliary contact arrangement. These are almost the same for coils other than AC200V.

Note 6. S-T□QM and S-N□QM are open time quick motion types.

Refer below for information regarding model names for coils other than S-T/N□.

SR-T□: Page 154

B-T/N□: Page 236

DU-N□: Page 240

SH-V□: Page 246

● DC Operated Type

| Model Name | Coil Properties | | | Operating Voltage [V] | | Operating Time [ms] | |
|---------------|------------------|-----------------------|-------------------------|-----------------------|----------|---------------------------|-----------------------------|
| | Coil Current [A] | Power Consumption [W] | Coil Time Constant [ms] | Operation | Open | Coil ON → Main Contact ON | Coil OFF → Main Contact OFF |
| SD-T12 | 0.033 | 3.3(2.2) | 40(45) | 60 to 75 | 10 to 30 | 60(85) | 10 |
| SD-T20 | 0.033 | 3.3(2.2) | 40(45) | 60 to 75 | 10 to 30 | 60(85) | 10 |
| SD-T21 | 0.033 | 3.3(2.2) | 50(40) | 60 to 75 | 10 to 30 | 65(90) | 20 |
| SD-T32 | 0.033 | 3.3(2.2) | 50(40) | 60 to 75 | 10 to 30 | 70(95) | 20 |
| SD-T35, T50 | 0.09 | 9 | 40 | 50 to 65 | 15 to 35 | 50 | 8 |
| SD-T65, T80 | 0.18 | 18 | 65 | 52 to 63 | 20 to 35 | 50 | 13 |
| SD-T100 | 0.24 | 24 | 80 | 50 to 65 | 15 to 30 | 75 | 18 |
| SD-N125 | 0.31 | 31 | 100 | 50 to 63 | 16 to 28 | 125 | 22 |
| SD-N150 | 0.31 | 31 | 100 | 50 to 63 | 17 to 30 | 135 | 37 |
| SD-N220 | 0.41 | 41 | 125 | 52 to 61 | 12 to 25 | 145 | 40 |
| SD-N300, N400 | 0.55 | 55 | 220 | 53 to 62 | 12 to 25 | 175 | 55 |
| SD-N600, N800 | 0.72(6.0) | 72(600) | 50 | 54 to 62 | 23 to 42 | 105 | 80 |

Note 1. The left table indicates rough property indices for DC100V coils.

The values in the parentheses for SD-T12 to T32 indicate rough property indices for DC12V or DC24V coils.

Note 2. The drive voltage is that at a 20°C cold state. Voltages for coils other than DC100V can be calculated proportionately.

E.g.: For a DC24V coil, drive voltage $\approx (24 \div 100) \times$ drive voltage in table above

Note 3. The power consumption and coil time constant are average values. These are almost the same for coils other than DC100V.

Note 4. The coil current is the average normal value with DC100V applied. Divide the power consumption by the coil voltage for coils other than DC100V. E.g.: For a DC24V coil, coil current \approx power consumption from table above $\div 24$

Note 5. The drive time is that with DC100V applied to a standard auxiliary contact arrangement. These are almost the same for coils other than DC100V.

Note 6. The value in the parentheses for SD-N600, N800 types indicate the coil inrush current and momentary power consumption. There is no inrush current for other frames.

Note 7. The drive time (coil OFF → main contact OFF) slows down when combined with a surge absorber element, so care should be taken with sequence timing. Furthermore, use only after confirming there is no fault with the real-life application.

Refer below for information regarding model names for coils other than SD-T/N□.

SRD-T□: Page 156

SD-Q□: Page 230

BD-T/N□: Page 236

DUD-N□: Page 240

SHD-V□: Page 246

● Mechanically Latched Type

| Frame | Inrush Input [VA] | | | | Operating Voltage [V] | | | | Operating Time [ms] | | | |
|------------------|-------------------|----------|----------------|-----------------|-----------------------|----------|-------------|----------|---------------------|----------|-------------|----------|
| | AC Operated | | DC Operated | | AC Operated | | DC Operated | | AC Operated | | DC Operated | |
| | Closing | Tripping | Closing | Tripping | Closing | Tripping | Closing | Tripping | Closing | Tripping | Closing | Tripping |
| SL(D)-T21 | 80*2 | 110*2 | 40*2 | 150*2 | 150 | 95 | 127 | 112 | 15 | 10 | 20 | 9 |
| SL(D)-T35/T50 | 120*2 | 150*2 | 100*2 | 150*2 | 140 | 110 | 115 | 85 | 20 | 14 | 18 | 11 |
| SL(D)-T65/T80 | 120*1 | 250*2 | 120*1 | 200*2 | 130 | 85 | 120 | 75 | 23 | 11 | 18 | 13 |
| SL(D)-T100 | 250*1 | 250*1 | 250*1 (400) | 300*1 (500) | 130 | 95 | 115 | 90 | 30 | 15 | 29 | 18 |
| SL(D)-N125 | 300*1 | 350*1 | 350*1 (500) | 350*1 (500) | 120 | 85 | 110 | 80 | 30 | 14 | 26 | 17 |
| SL(D)-N150 | 300*1 | 350*1 | 350*1 (500) | 350*1 (500) | 140 | 89 | 130 | 85 | 35 | 14 | 31 | 17 |
| SL(D)-N220 | 350*1 | 450*1 | 450*1 (600) | 500*1 (700) | 125 | 99 | 110 | 90 | 35 | 18 | 31 | 17 |
| SL(D)-N300, N400 | 400*1 | 800*1 | 450*1 (600) | 800*1 (1100) | 143 | 112 | 125 | 95 | 50 | 17 | 50 | 17 |
| SL(D)-N600, 800 | 1000*1 | 500*1 | 850*1 | 500*1 | 140 | 120 | 140 | 120 | 65 | 50 | 63 | 50 |

Note 1. The above indicates rough property indices for AC200V coils under AC operation (SL-T/N□) and for DC200V coils under DC operation (SLD-T/N□).

The Class 2 heat-resistant magnetic contactors SL(D)-T50FN and SL(D)-T50, which have different properties.

Note 2. The drive voltage is the average value at a 20°C cold state for both AC (at 60 Hz) and DC operation. Voltages for coils other than AC200V or DC200V can be calculated proportionately. (E.g.: For a AC100V coil, drive voltage = (100 ÷ 200) x drive voltage in table above)

Note 3. The inrush input indicates the average value. However, the value in parentheses is the average value with DC120V applied to the DC125V coil. These values are almost the same for coils other than DC200V or AC200V, excluding DC125V. The values for AC24V and AC48V coils differ as per the table above.

Note 4. The drive time is the time taken from when the closing coil or tripping coil energizes until the main contact transitions (ON or OFF) when 220V, 60 Hz is applied for AC operation or DC200V is applied for DC operation. These are almost the same for coils other than AC200V or DC200V.

Note 5. *1 types have integrated surge absorber function. (Excluding AC/DC 24 or 48V types. SLD-T65/T80 type integrated closing coils are rated for DC100, 125, 200V only) *2 Coil surge absorber units can be additionally mounted.

Refer below for information regarding model names for coils other than SL(D)-T/N□.

SRL(D)-T□ : Page 158

SHL(D)-V□ : Page 246

2.10 Performance

● Classification and Making / Breaking Capacity Test Criteria

JISC8201-4-1 Low Voltage Switching and Control Devices and the International Electrotechnical Commission (IEC) implement the following standards to govern the breaking and making capacities of AC contactors.

| Category | Making / Capacity Test | | Breaking Capacity Test | | Typical Application Example |
|----------|------------------------|----------|------------------------|----------|--|
| | JIS, IEC | JIS, IEC | JIS, IEC | JIS, IEC | |
| AC-1 | 1.5le | 0.8 | 1.5le | 0.8 | Non-Inductive Or Low-Inductance Loads, Resistive Heaters |
| AC-2 | 4le | 0.65 | 4le | 0.65 | Wound Motor Starting, Running, Stopping |
| AC-3 | 10le | (Note 3) | 8le | (Note 3) | Cage Induction Motor Starting, Running, Stopping |
| AC-4 | 12le | (Note 3) | 10le | (Note 3) | Cage Induction Motor Starting, Inching, Plugging |
| AC-5a | 3le | 0.45 | 3le | 0.45 | Switching Discharge Lamp Control Equipment |
| AC-5b | 1.5le | (Note 4) | 1.5le | (Note 4) | Switching Incandescent Lamps |
| AC-6a | (Note 5) | | (Note 5) | | Switching Transformers |
| AC-6b | (Note 6) | | (Note 6) | | Switching Capacitor Banks |
| AC-8a | 6le | (Note 3) | 6le | (Note 3) | Control of Closed-Type Refrigerant Compressor Motors with Manual Return Overload Tripping Devices |
| AC-8b | 6le | (Note 3) | 6le | (Note 3) | Control of Closed-Type Refrigerant Compressor Motors with Automatic Return Overload Tripping Devices |

Note 1. le: Rated operating current. Note 2. Tested at a voltage 1.05 times greater than rated voltage.

Note 3. le ≤ 100 A: 0.45, le > 100 A: 0.35. Note 4. Carried out with an incandescent load.

Note 5. Class AC-6a le is 0.45 times that of class AC-3 le when switching a transformer with a peak inrush current less than 30 times greater than the rated current.

Note 6. Class AC-6b le can be found from the following formula when switching a single capacitor bank in a circuit with an estimated short-circuit current of ik at the location of the capacitor bank.

$$\text{Class AC-6b le} = ik \frac{x^2}{(x-1)^2} \quad \text{Here, } x = 13.3 \frac{\text{Class AC-3 le}}{ik}$$

ik > 205 × Class AC-3 le

Note 7. Class AC-3 ratings and performance can be substituted for AC-5a, AC-5b, AC-6a, AC-6b.

● Category AC-3 Rated Performance

● Performance of Magnetic Contactors

| Frame | Rated Operating Voltage [V] | Rated Operating Current [A] | Making and Breaking Capacities [A] | | AC Operated Types (S-□) | | | DC Operated Types (SD-□) | | | Mechanically Latched Types (SL(D)-□) | | |
|-------|-----------------------------|-----------------------------|------------------------------------|------|--|--------------------------------|----------------------------|--|--------------------------------|----------------------------|--|--------------------------------|----------------------------|
| | | | | | Switching Frequency [Times/Hour] category AC-3 | Switching Durability [x 10000] | | Switching Frequency [Times/Hour] category AC-3 | Switching Durability [x 10000] | | Switching Frequency [Times/Hour] category AC-3 | Switching Durability [x 10000] | |
| | | | | | | Mechanical | Electrical (category AC-3) | | Mechanical | Electrical (category AC-3) | | Mechanical | Electrical (category AC-3) |
| T10 | 220 | 11 | 110 | 88 | 1800 | 1000 | 200 | — | — | — | — | — | |
| | 440 | 7 | 90 | 72 | | | | | | | | | |
| T12 | 220 | 13 | 130 | 104 | 1800 | 1000 | 200 | 1800 | 1000 | 200 | — | — | |
| | 440 | 9 | 120 | 96 | | | | | | | | | |
| T20 | 220 | 18 | 180 | 144 | 1800 | 1000 | 200 | 1800 | 1000 | 200 | — | — | |
| | 440 | 18 | 180 | 144 | | | | | | | | | |
| T21 | 220 | 20 | 250 | 200 | 1800 | 1000 | 200 | 1800 | 1000 | 200 | 1200 | 50 | |
| | 440 | 20 | 230 | 184 | | | | | | | | | |
| T25 | 220 | 26 | 300 | 240 | 1800 | 1000 | 200 | — | — | — | — | — | |
| | 440 | 25 | 300 | 240 | | | | | | | | | |
| T32 | 220 | 32 | 320 | 256 | 1800 | 1000 | 200 | 1800 | 1000 | 200 | — | — | |
| | 440 | 32 | 320 | 256 | | | | | | | | | |
| T35 | 220 | 35 | 400 | 320 | 1800 | 1000 | 200 | 1800 | 1000 | 200 | 1200 | 50 | |
| | 440 | 32 | 400 | 320 | | | | | | | | | |
| T50 | 220 | 50 | 550 | 440 | 1200 | 1000 | 200 | 1200 | 1000 | 200 | 1200 | 25 | |
| | 440 | 48 | 500 | 400 | | | | | | | | | |
| T65 | 220 | 65 | 650 | 520 | 1200 | 500 | 200 | 1200 | 500 | 200 | 1200 | 25 | |
| | 440 | 65 | 650 | 520 | | | | | | | | | |
| T80 | 220 | 80 | 850 | 680 | 1200 | 500 | 100 | 1200 | 500 | 100 | 1200 | 25 | |
| | 440 | 80 | 850 | 680 | | | | | | | | | |
| T100 | 220 | 100 | 1050 | 840 | 1200 | 500 | 100 | 1200 | 500 | 100 | 1200 | 25 | |
| | 440 | 93 | 1050 | 840 | | | | | | | | | |
| N125 | 220 | 125 | 1250 | 1000 | 1200 | 500 | 100 | 1200 | 500 | 100 | 1200 | 25 | |
| | 440 | 120 | 1200 | 960 | | | | | | | | | |
| N150 | 220 | 150 | 1500 | 1200 | 1200 | 500 | 100 | 1200 | 500 | 100 | 1200 | 25 | |
| | 440 | 150 | 1500 | 1200 | | | | | | | | | |
| N180 | 220 | 180 | 1800 | 1440 | 1200 | 500 | 100 | — | — | — | — | — | |
| | 440 | 180 | 1800 | 1440 | | | | | | | | | |
| N220 | 220 | 220 | 2500 | 2000 | 1200 | 500 | 100 | 1200 | 500 | 100 | 1200 | 25 | |
| | 440 | 220 | 2500 | 2000 | | | | | | | | | |
| N300 | 220 | 300 | 3000 | 2400 | 1200 | 500 | 100 | 1200 | 500 | 100 | 1200 | 25 | |
| | 440 | 300 | 3000 | 2400 | | | | | | | | | |
| N400 | 220 | 400 | 4000 | 3200 | 1200 | 500 | 50 | 1200 | 500 | 50 | 1200 | 25 | |
| | 440 | 400 | 4000 | 3200 | | | | | | | | | |
| N600 | 220 | 630 | 6300 | 5040 | 1200 | 500 | 50 | 1200 | 500 | 50 | 1200 | 10 | |
| | 440 | 630 | 6300 | 5040 | | | | | | | | | |
| N800 | 220 | 800 | 8000 | 6400 | 1200 | 500 | 50 | 1200 | 500 | 50 | 1200 | 10 | |
| | 440 | 800 | 8000 | 6400 | | | | | | | | | |

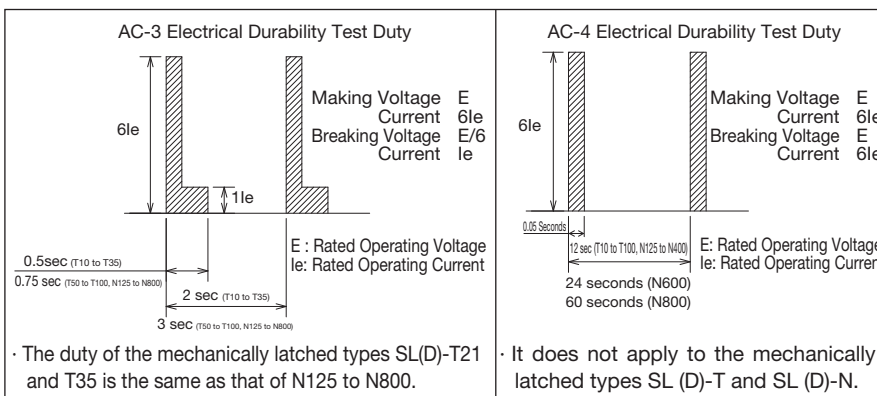
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Note 1. The number of tests according to JISC8201-4-1 is shown in the table below.

| | JIS |
|---------------------|----------|
| Making Capacities | 50 times |
| Breaking Capacities | 50 times |

Note 2. It has 13 times the making breaking capacity (1 time) of the rated operating current.

Note 3. The electrical durability test is conducted based on JISC8201-4-1, with duty as in the figure at right.



Refer below for information regarding model performance not listed above.

SR,SRD,SRL(D)-T□: Pages 154, 156, 158
 B(D)-T/N□: Page 235
 SH,SHD,SHL(D)-V□: Page 245

SD-Q□: Page 229
 DU(D)-N□: Page 240

2.11 Application to Motor Loads

● Direct Start

In the case of the standard (not including inching, etc.) direct start, a frame is selected in which the rated capacity of the magnetic starter and magnetic contactor will be equal to or greater than the rated capacity of the motor.

● Application to Standard Three-Phase (3 φ) Cage Motor

It indicates the heater designation of the thermal overload relay for the standard three-phase cage motor and frame of the applicable magnetic starter.

| Motor Capacity [kW] | 200 to 240 V | | | | | Motor Capacity [kW] | 400 to 440 V | | | | | | | |
|---------------------|---|----------------|------------------------|-----|--------------|---------------------|---|-----|------------------------|----------|-----|-----|-----|----------------|
| | Heater Designation [A] (Adjustment Range of Settling Current) | | Magnetic Starter Frame | | | | Heater Designation [A] (Adjustment Range of Settling Current) | | Magnetic Starter Frame | | | | | |
| (0.015) | 0.12 | (0.1 to 0.16) | T10 | T12 | T20, T21 | (0.015) | — | T10 | T12 | T20, T21 | T25 | T35 | T50 | |
| (0.025) | 0.17 | (0.14 to 0.22) | | | | (0.025) | — | | | | | | | |
| (0.03) | 0.24 | (0.2 to 0.32) | | | | (0.03) | — | | | | | | | |
| (0.035) | 0.35 | (0.28 to 0.42) | | | | (0.035) | — | | | | | | | |
| 0.05 | 0.35 | (0.28 to 0.42) | | | | 0.05 | 0.24 | | | | | | | (0.2 to 0.32) |
| (0.07) | 0.5 | (0.4 to 0.6) | | | | (0.07) | 0.35 | | | | | | | (0.28 to 0.42) |
| 0.1 | 0.7 | (0.55 to 0.85) | | | | 0.1 | 0.35 | | | | | | | (0.28 to 0.42) |
| (0.15) | 0.9 | (0.7 to 1.1) | | | | (0.15) | 0.5 | | | | | | | (0.4 to 0.6) |
| 0.2 | 1.3 | (1 to 1.6) | | | | 0.2 | 0.7 | | | | | | | (0.55 to 0.85) |
| (0.3) | 1.7 | (1.4 to 2) | | | | (0.3) | 0.9 | | | | | | | (0.7 to 1.1) |
| 0.4 | 2.1 | (1.7 to 2.5) | 0.4 | 1.3 | (1 to 1.6) | | | | | | | | | |
| (0.55) | 2.5 | (2 to 3) | (0.55) | 1.3 | (1 to 1.6) | | | | | | | | | |
| 0.75 | 3.6 | (2.8 to 4.4) | 0.75 | 1.7 | (1.4 to 2) | | | | | | | | | |
| (1.0) | 5 | (4 to 6) | (1.0) | 2.5 | (2 to 3) | | | | | | | | | |
| 1.5 | 6.6 | (5.2 to 8) | 1.5 | 3.6 | (2.8 to 4.4) | | | | | | | | | |
| (1.9)2.2 | 9 | (7 to 11) | (1.9)2.2 | 5 | (4 to 6) | | | | | | | | | |
| (2.5) | 11 | (9 to 13) | (2.5) | 5 | (4 to 6) | | | | | | | | | |
| (3.0) | 11 | (9 to 13) | (3.0) | 6.6 | (5.2 to 8) | | | | | | | | | |
| 3.7 | 15 | (12 to 18) | 3.7 | 6.6 | (5.2 to 8) | | | | | | | | | |
| 5.5 | 22 | (18 to 26) | 5.5 | 11 | (9 to 13) | | | | | | | | | |
| 7.5 | 29 | (24 to 34) | 7.5 | 15 | (12 to 18) | | | | | | | | | |
| (9.0) | 35 | (30 to 40) | (9.0) | 15 | (12 to 18) | | | | | | | | | |
| 11 | 42 | (34 to 50) | 11 | 22 | (18 to 26) | | | | | | | | | |
| 15 | 54 | (43 to 65) | 15 | 29 | (24 to 34) | | | | | | | | | |
| 18.5 | 67 | (54 to 80) | 18.5 | 35 | (30 to 40) | | | | | | | | | |
| 22 | 82 | (65 to 100) | 22 | 42 | (34 to 50) | | | | | | | | | |
| 30 | 105 | (85 to 125) | 30 | 54 | (43 to 65) | | | | | | | | | |
| 37 | 125 | (100 to 150) | 37 | 67 | (54 to 80) | | | | | | | | | |
| 45 | 150 | (120 to 180) | 45 | 82 | (65 to 100) | | | | | | | | | |
| (50) | 180 | (140 to 220) | (50) | 105 | (85 to 125) | | | | | | | | | |
| 55 | 180 | (140 to 220) | 55 | 105 | (85 to 125) | | | | | | | | | |
| (60) | 180 | (140 to 220) | (60) | 105 | (85 to 125) | | | | | | | | | |
| 75 | 250 | (200 to 300) | 75 | 125 | (100 to 150) | | | | | | | | | |
| 90 | 330 | (260 to 400) | 90 | 150 | (120 to 180) | | | | | | | | | |
| 110 | 330 | (260 to 400) | 110 | 180 | (140 to 220) | | | | | | | | | |
| 132 | 500 | (400 to 600) | 132 | 250 | (200 to 300) | | | | | | | | | |
| 150 | 500 | (400 to 600) | 150 | 250 | (200 to 300) | | | | | | | | | |
| 160 | 500 | (400 to 600) | 160 | 250 | (200 to 300) | | | | | | | | | |
| 200 | 660 | (520 to 800) | 200 | 330 | (260 to 400) | | | | | | | | | |
| 300 | | | 300 | 500 | (400 to 600) | | | | | | | | | |
| 400 | | | 400 | 660 | (520 to 800) | | | | | | | | | |

- Note 1. The heater designation is a symbol to be specified when ordering.
- Note 2. Refer to page 129 for details about selecting voltage and motor capacities for heater designations not listed in the above table.
- Note 3. Please use N600/N800 in combination with TH-N600 and separately sold current transformer (Mitsubishi CW-□).

Note 4. () of the motor capacity indicates a special capacity.

● Application to Standard Single-Phase (1 φ) Motor

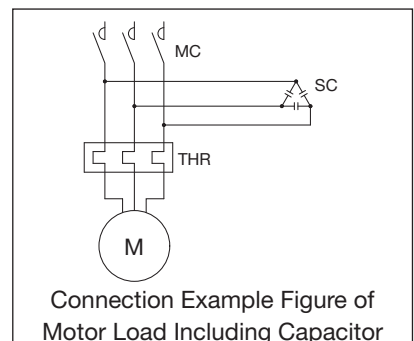
It indicates the heater designation of the thermal overload relay for the single-phase motor and frame of the applicable magnetic starter.

| Motor Capacity [kW] | 100 to 110V | | | | | 200 to 240V | | | | | | |
|---------------------|---|--------------|------------------------|-----|----------|---|--------------|------------------------|-----|----------|-----|-----|
| | Heater Designation [A] (Adjustment Range of Settling Current) | | Magnetic Starter Frame | | | Heater Designation [A] (Adjustment Range of Settling Current) | | Magnetic Starter Frame | | | | |
| 0.035 | 1.7 | (1.4 to 2) | T10 | T12 | T20, T21 | 0.9 | (0.7 to 1.1) | T10 | T12 | T20, T21 | T25 | T35 |
| 0.065 | 2.5 | (2 to 3) | | | | 1.3 | (1 to 1.6) | | | | | |
| 0.1 | 3.6 | (2.8 to 4.4) | | | | 1.7 | (1.4 to 2) | | | | | |
| 0.15 | 5 | (4 to 6) | | | | 2.5 | (2 to 3) | | | | | |
| 0.2 | 5 | (4 to 6) | | | | 2.5 | (2 to 3) | | | | | |
| 0.25 | 6.6 | (5.2 to 8) | | | | 3.6 | (2.8 to 4.4) | | | | | |
| 0.3 | 6.6 | (5.2 to 8) | | | | 3.6 | (2.8 to 4.4) | | | | | |
| 0.4 | 9 | (7 to 11) | | | | 5 | (4 to 6) | | | | | |
| 0.55 | 11 | (9 to 13) | | | | 5 | (4 to 6) | | | | | |
| 0.75 | 15 | (12 to 18) | | | | 6.6 | (5.2 to 8) | | | | | |

- Note 1. The heater designation is a symbol to be specified when ordering.
- Note 2. Refer to page 129 for details about selecting voltage and motor capacities for heater designations not listed in the above table.
- Note 3. For the enclosed type (MS-T12), the applicable capacity of the 100 to 110 V motor is 0.4 kW.

● Application to Motor Load Including Capacitor

When connecting a phase advanced capacitor in parallel to the motor, a series reactor for the inrush current suppression during input should ideally be inserted in the capacitor. For small capacity motors, there are many cases where the reactor has been omitted as shown in the figure at right, and therefore the electrical durability of the magnetic contactor may be shortened. In this case, special attention is necessary for the application of the magnetic contactor. Please consult us when selecting.



2.12 Application to Star/Delta Starting

Methods for star/delta starting include the use of 3 magnetic contactors (the 3-contactor type from figure 1), 2 magnetic contactors (the 2-contactor type from figure 2) or resistance insertion when switching from star to delta (the closed-transition type from figure 3).

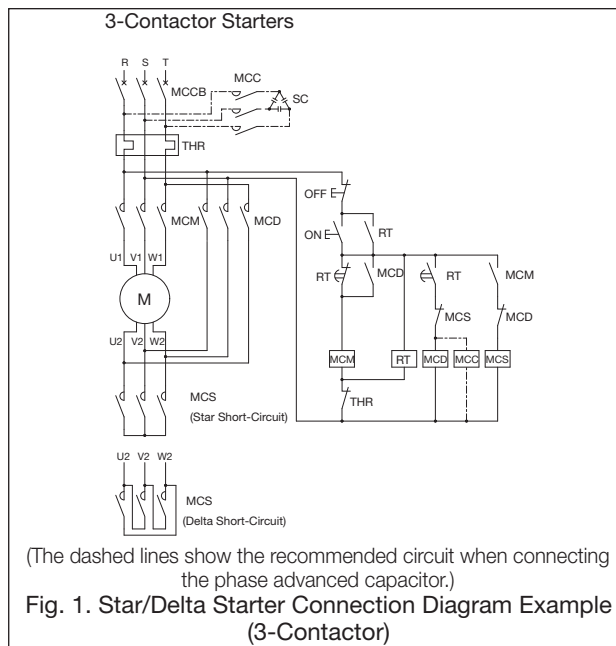
Electrical interlocks are required to be installed between star (MCS or MCS1) and delta (MCD) magnetic contactors. 3-contactor types are the most generally used and do not apply voltage to the motor windings when stopped, suppressing damage to the insulation due to leakage currents. 2-contactor types are more economical but continue to apply voltage to the motor windings when stopped, so are not suitable for applications with a lot of downtime such as with fire extinguishing facilities.

Closed-transition types do not cut motor power when switching from star to delta configurations, suppressing inrush current and voltage drops.

The table below compares the various current values for direct start and star/delta starting.

Page 48 shows a selection of various magnetic contactors and thermal overload relays for the connections in figure 1 and figure 2.

Additionally, when applied to the high-frequency motors, the transient inrush current tends to increase during star starting current and delta switching, which may call for a review of the contactor selected.



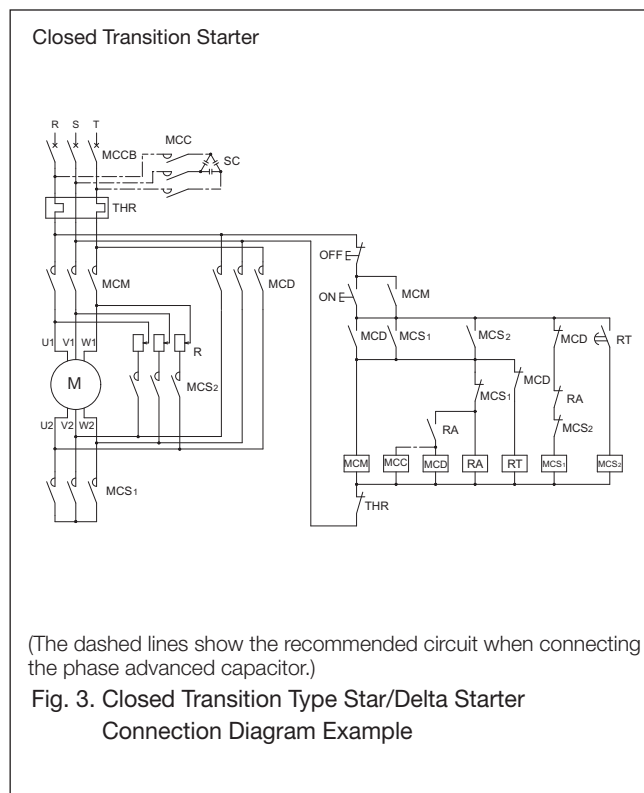
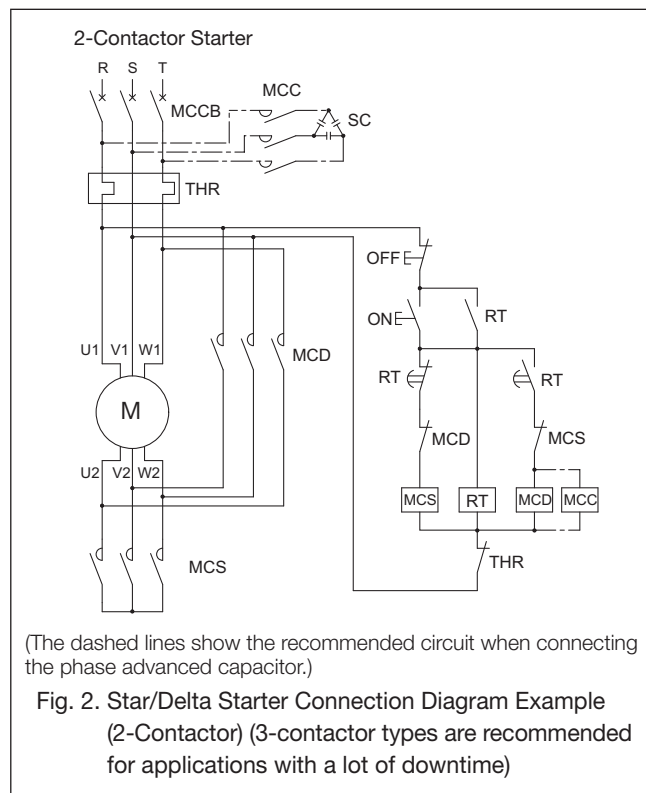
⚠ The motor and equipment may be damaged if it is unable to switch from reduced voltage starting to full voltage running and continues in the reduced voltage starting state.

Comparison of Direct and Star/Delta Starting

| Starting Method | Starting (Star Magnetic Contactors) | | | | Running (Delta Magnetic Contactors) | | |
|-----------------|-------------------------------------|--------|-----------------|-----------------|-------------------------------------|-----------------|-----------------|
| | Starting Current | Torque | Contact Current | Contact Voltage | Full-Load Current | Contact Current | Contact Voltage |
| Direct | 6Im | 1.5T | 6Im | $Em/\sqrt{3}$ | Im | Im | $Em/\sqrt{3}$ |
| Star/Delta | 2Im | 0.5T | 2Im | $Em/\sqrt{3}$ | Im | $Im/\sqrt{3}$ | Em |

Note 1. Im: Full-load current in delta configuration, Em: Line-to-line voltage, T: Rated torque

Note 2: Estimated torque value.



● Star/Delta Starter Model Selection

| Applicable Standard Three-Phase Squirrel-cage Motors | | | Magnetic Contactors for Main and Delta (MCM, MCD) | Star Magnetic Contactors (MCS) <small>Note 5</small> | Thermal Overload Relays (THR) <small>Note 8</small> | |
|--|---------------------|-------------------|---|--|--|--------------------|
| Rated Voltage [V] | Rated Capacity [kW] | Rated Current [A] | | Short Circuit Type: Star short circuit (Figs. 1, 2) [Delta short circuit (applicable to Fig. 1)] | Model Name | Heater Designation |
| AC200 to 220 V | 5.5 | 26 | S-T20 | S-T10 [S-T10] | TH-T25 | 22A |
| | 7.5 | 34 | S-T21 | S-T12 [S-T10] | TH-T65 | 29A |
| | 11 | 48 | S-T35 | S-T20 [S-T10] | TH-T65 | 42A |
| | 15 | 65 | S-T50 | S-T25 [S-T12] | TH-T65 | 54A |
| | 18.5 | 79 | S-T50 | S-T35 [S-T20] | TH-N120 | 67A |
| | 22 | 93 | S-T65 | S-T35 [S-T20] | TH-N120 | 82A |
| | 30 | 124 | S-T80 | S-T50 [S-T25] | TH-N120TAHZ | 105A |
| | 37 | 152 | S-T100 | S-T65 [S-T35] | TH-N120TAHZ | 125A |
| | 45 | 180 | S-N125 | S-T65 [S-T35] | TH-N220HZ | 150A |
| | 55 | 220 | S-N150 | S-T80 [S-T50] | TH-N220HZ | 180A |
| | 75 | 300 | S-N180 | S-T100 [S-T65] | TH-N400HZ | 250A |
| | 90 | 360 | S-N220 | S-N125 [S-T80] | TH-N400HZ | 330A |
| | 110 | 440 | S-N300 | S-N150 [S-T100] | TH-N400HZ | 330A |
| | 132 | 528 | S-N300 | S-N180 [S-N125] | TH-N600+CT | 500A |
| | 160 | 640 | S-N400 | S-N220 [S-N125] | TH-N600+CT | 660A |
| 200 | 800 | S-N600 | S-N300 [S-N180] | TH-N600+CT | 660A | |
| AC400 to 440 V | 5.5 | 13 | S-T12 | S-T10 [S-T10] | TH-T25 | 11A |
| | 7.5 | 17 | S-T20 | S-T10 [S-T10] | TH-T25 | 15A |
| | 11 | 24 | S-T20 | S-T12 [S-T10] | TH-T25 | 22A |
| | 15 | 32.5 | S-T21 | S-T20 [S-T10] | TH-T65 | 29A |
| | 18.5 | 39.5 | S-T25 | S-T20 [S-T12] | TH-T65 | 35A |
| | 22 | 46.5 | S-T35 | S-T20 [S-T12] | TH-T65 | 42A |
| | 30 | 62 | S-T50 | S-T25 [S-T20] | TH-T65 | 54A |
| | 37 | 76 | S-T50 | S-T35 [S-T20] | TH-N120 | 67A |
| | 45 | 90 | S-T65 | S-T35 [S-T20] | TH-N120 | 82A |
| | 55 | 110 | S-T65 | S-T50 [S-T25] | TH-N120TAHZ | 105A |
| | 75 | 150 | S-T100 | S-T65 [S-T35] | TH-N120TAHZ | 125A |
| | 90 | 180 | S-N125 | S-T65 [S-T50] | TH-N220HZ | 150A |
| | 110 | 220 | S-N150 | S-T80 [S-T50] | TH-N220HZ | 180A |
| | 132 | 264 | S-N180 | S-T100 [S-T65] | TH-N400HZ | 250A |
| | 160 | 320 | S-N220 | S-N125 [S-T65] | TH-N400HZ | 330A |
| | 200 | 400 | S-N300 | S-N150 [S-T80] | TH-N400HZ | 330A |
| | 250 | 500 | S-N300 | S-N180 [S-N125] | TH-N600+CT | 500A |
| 300 | 600 | S-N400 | S-N220 [S-N125] | TH-N600+CT | 500A | |

Note 1. Star magnetic contactors are fully capable of withstanding a continuity current 2 times the rated current for a running time of 15 seconds, and shut off when the current falls to 0.8 times the motor rated current.

Note 2. The making current of delta contacts is $6/\sqrt{3}$ times the rated motor current.

Note 3. A saturable reactor (delay trip type, TH-T/N□SR) or thermal overload relay short-circuited during start-up may be required depending on thermal overload relay starting current/time.

Note 4. A timer (RT) for setting the star magnetic contactor running time can be applied as an on-delay timer with momentary contacts by using the control circuit connections shown in Figs. 1 to 3.

Note 5. 2-contactor systems cannot be applied to star magnetic contactors with short-circuited delta connections.

Note 6. Electrical durability of 300,000 operations for 3-contactor types and 100,000 operations for 2-contactor types.

Note 7. Since 1b contact is required for internal wiring, select S-T10 with auxiliary contact 1b or S-T12.

Note 8. The thermal relay is intended for a line current detection. For a phase current detection, select a heater that can be set to $1/\sqrt{3}$ for the motor rated current.

2.13 Application to Resistive Loads

Switching resistive loads such as electric heaters or heating equipment have minimal inrush current and large power factor, allowing a larger current value to be applied compared to the magnetic contactor than with motor loads. MS-T/N series magnetic contactors are manufactured based on the standards (JISC8201-4-1, JEM1038) and possess the following properties. If the actual usage conditions differ from these conditions, users are asked to perform evaluations themselves (using the actual equipment). JISC8201-4-1 and JEM1038 standards define the following duties for when applying resistive loads to magnetic contactors.

Standards for Resistive Loads

| Applications | Standard | Category | Making and Breaking Capacities | | Electrical Durability | |
|------------------------------|----------|----------|--|--|--|--|
| | | | Making | Breaking | Making | Breaking |
| Switching AC Resistive Loads | JIS | AC-1 | 1.5 I _e , 1.05 E _e , cos φ 0.8 | 1.5 I _e , 1.05 E _e , cos φ 0.8 | I _e , E _e , cos φ 0.95 | I _e , E _e , cos φ 0.95 |
| | JEM | AC1 | 1.5 I _e , 1.1 E _e , cos φ 0.95 | 1.5 I _e , 1.1 E _e , cos φ 0.95 | I _e , E _e , cos φ 0.95 | I _e , E _e , cos φ 0.95 |
| Switching DC Resistive Loads | JIS | DC-1 | 1.5 I _e , 1.05 E _e , L/R 1(ms) | 1.5 I _e , 1.05 E _e , L/R 1(ms) | I _e , E _e , L/R 1(ms) | I _e , E _e , L/R 1(ms) |
| | JEM | DC1 | 1.1 I _e , 1.1 E _e , L/R 1(ms) | 1.1 I _e , 1.1 E _e , L/R 1(ms) | I _e , E _e , L/R 1(ms) | I _e , E _e , L/R 1(ms) |

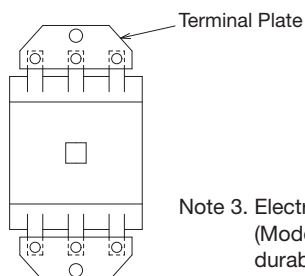
Note 1. I_e: rated operating current, E_e: rated voltage, cos φ: power factor, L/R: time constant.

Applying Resistive Loads to Magnetic Contactors

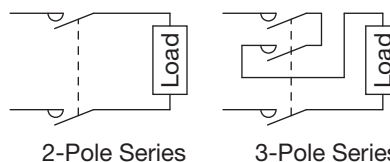
The table below shows the ratings for when applying resistive loads to MS-T/N series magnetic contactors.

| Application Frame | Category AC-1 Rated Operating Current [A] | | Category AC-1 Rated Capacity [kW] | | | | Category AC-1 Rated Operating Current (3-Pole Parallel) [A] | Category DC-1 Rated Operating Current 3-Pole Series (2-Pole Series) [A] | | | |
|----------------------|---|--------------|-----------------------------------|--------------|--------------|--------------|---|---|----------|----------|----------|
| | 100 to 240 V | 400 to 440 V | 200 to 240 V | 400 to 440 V | 100 to 110 V | 200 to 240 V | | 24 V | 48 V | 110 V | 220 V |
| T10 | 20 | 11 | 6.5 | 8 | 2 | 4 | 40 | 10(10) | 10(10) | 8(6) | 8(3) |
| T12 | 20 | 13 | 6.5 | 10 | 2 | 4 | 40 | 12(12) | 12(12) | 12(10) | 12(7) |
| T20 | 20 | 13 | 6.5 | 10 | 2 | 4 | 40 | 18(18) | 18(18) | 18(13) | 18(8) |
| T21 | 32 | 32 | 11 | 22 | 3.2 | 6.4 | 64 | 20(20) | 20(20) | 20(15) | 20(10) |
| T25, T32 | 32 | 32 | 11 | 22 | 3.2 | 6.4 | 64 | 25(25) | 25(25) | 25(25) | 22(12) |
| T35 | 60 | 60 | 20 | 40 | 6 | 12 | 120 | 35(35) | 35(35) | 35(25) | 30(12) |
| T50 | 80 | 80 | 27 | 55 | 8 | 16 | 160 | 50(50) | 50(40) | 50(35) | 40(15) |
| T65 | 100 | 100 | 34 | 68 | 10 | 20 | 200 | 65(50) | 65(40) | 65(35) | 50(15) |
| T80 | 120 | 120 | 41 | 83 | 12 | 24 | 240 | 80(80) | 80(65) | 80(50) | 60(20) |
| T100 | 150 | 150 | 50 | 100 | 15 | 30 | 300 | 93(93) | 93(93) | 93(80) | 70(50) |
| N125 | 150 | 150 | 50 | 100 | 15 | 30 | 330 | 120(120) | 120(100) | 100(80) | 80(50) |
| N150 | 200 | 200 | 65 | 130 | 20 | 40 | 400 | 150(150) | 150(120) | 150(100) | 150(100) |
| N180 | 260 | 260 | 90 | 180 | 26 | 52 | 520 | 180(180) | 180(180) | 180(150) | 180(150) |
| N220 | 260 | 260 | 90 | 180 | 26 | 52 | 520 | 220(220) | 220(180) | 220(150) | 220(150) |
| N300 | 350 | 350 | 120 | 240 | 35 | 70 | 700 | 300(300) | 300(240) | 300(200) | 300(200) |
| N400 | 450 | 450 | 155 | 310 | 45 | 90 | 800 | 400(400) | 400(240) | 400(200) | 300(200) |
| N600 | 660 | 660 | 220 | 440 | 63 | 126 | 1200 | 630(630) | 630(630) | 630(630) | 630(630) |
| N800 | 800 | 800 | 270 | 540 | 80 | 160 | 1600 | 800(800) | 800(800) | 800(630) | 800(630) |

Note 1. Use a terminal plate as per the figure below to give a uniform temperature rise on each pole for 3-pole parallel configurations.



Note 2. Connect contacts to both sides of the load for use in DC 2-pole series or 3-pole series applications as per the diagram below.



Note 3. Electrical durability of 500,000 operations. (Models with mechanical durability of 500,000 operations or less use the mechanical durability value)

Note 4. De-rate by 10% if the current for T100 exceeds 80%.

Note 5. Switching frequencies are: T10 to T80: 1200 times/hour, T100, N125 to N800: 600 times/hour.

2.14 Application to Lighting Loads

When switching fluorescent lights, mercury lights and incandescent lights, the starting current (immediately after the magnetic contactor closes) can be several times greater (10 times for fluorescent lights, 2 times for mercury lights and 10 times for incandescent lights) than the regular current (after settled on). This starting current can be close-circuited and must be capable of withstanding the time until illumination and have a predetermined switching durability. Lighting loads are governed by JIS and IEC standards and defined as class

AC-5a (switching of discharge lamp control equipment) and AC-5b (switching incandescent lamps) (see page 44). However, the ratings and performance of class AC-3 can be substituted and the total regular current of the lighting load should be selected such that it is less than the rated operating current of the class AC-3 magnetic contactor. The below notes the number of applicable lamps for single-phase double-pole types per MS-T series magnetic contactor, based on the input current according to internal standards (article 3-6-3, 3-6-4).

2.15 Phase Advanced Capacitor Switching

● Switching Capacitor Banks

The following items should be investigated when using switching capacitors for power factor correction with magnetic contactors.

- (1) Capacity to withstand the inrush current determined by the impedance of the circuit when switching.
- (2) Conventional free air thermal current 1.3 x 1.1 times greater than the capacitor's rated current. (From JISC4901 - Phase Advanced Capacitor Switching Explained)
- (3) Zero re-ignition or recurring arcs (arcing after being shut-off) when breaking.

The table below shows the applicable capacity (independent bank switching) of MS-T/N series magnetic contactor with capacitive loads.

| Application Frame | Three-Phase, With 6% or More Series Reactor (Note 1) | | | | Three-Phase, Without Series Reactor (Notes 2, 3) | | | | Single-Phase, Without Series Reactor (Notes 2, 3) | | | |
|----------------------|--|-------------|-----------------|-------------|--|-------------|-----------------|-------------|---|-------------|-----------------|-------------|
| | 200 to 240 V | | 400 to 440 V | | 200 to 240 V | | 400 to 440 V | | 200 to 240 V | | 400 to 440 V | |
| | Capacity [kvar] | Current [A] | Capacity [kvar] | Current [A] | Capacity [kvar] | Current [A] | Capacity [kvar] | Current [A] | Capacity [kvar] | Current [A] | Capacity [kvar] | Current [A] |
| T10 | 3.8 | 11 | 4.8 | 7 | 2 | 6 | 3 | 4.3 | 1.2 | 6 | 1.7 | 4.3 |
| T12 | 4.5 | 13 | 6.2 | 9 | 3 | 9 | 4 | 6 | 1.8 | 9 | 2.4 | 6 |
| T20 | 4.8 | 14 | 9.6 | 14 | 4 | 12 | 8.3 | 12 | 2.4 | 12 | 4.8 | 12 |
| T21 | 6.9 | 20 | 13 | 20 | 5 | 15 | 10 | 15 | 3 | 15 | 6 | 15 |
| T25, T32 | 7.6 | 22 | 15 | 22 | 7.6 | 22 | 15 | 22 | 4.4 | 22 | 8.8 | 22 |
| T35 | 12 | 35 | 22 | 32 | 11 | 32 | 20 | 30 | 6.4 | 32 | 12 | 30 |
| T50 | 17 | 50 | 31 | 46 | 15 | 45 | 27 | 40 | 9 | 45 | 16 | 40 |
| T65 | 22 | 65 | 42 | 62 | 17 | 50 | 34 | 50 | 10 | 50 | 20 | 50 |
| T80 | 27 | 80 | 51 | 75 | 22 | 65 | 40 | 60 | 13 | 65 | 24 | 60 |
| T100 | 32 | 93 | 64 | 93 | 30 | 90 | 60 | 90 | 18 | 90 | 36 | 90 |
| N125 | 36 | 105 | 72 | 105 | 34 | 100 | 69 | 100 | 20 | 100 | 40 | 100 |
| N150 | 48 | 140 | 96 | 140 | 45 | 130 | 90 | 130 | 26 | 130 | 52 | 130 |
| N180 | 62 | 180 | 124 | 180 | 62 | 180 | 124 | 180 | 36 | 180 | 72 | 180 |
| N220 | 62 | 180 | 124 | 180 | 62 | 180 | 124 | 180 | 36 | 180 | 72 | 180 |
| N300 | 84 | 245 | 169 | 245 | 80 | 230 | 160 | 230 | 46 | 230 | 92 | 230 |
| N400 | 109 | 315 | 218 | 315 | 100 | 300 | 200 | 300 | 60 | 300 | 120 | 300 |
| N600 | 159 | 461 | 319 | 461 | 150 | 430 | 300 | 430 | 86 | 430 | 172 | 430 |
| N800 | 193 | 559 | 387 | 559 | 170 | 500 | 350 | 500 | 100 | 500 | 200 | 500 |

Note 1. Applicable in situations where the series reactor is not saturable, the electrical durability is the same as class AC-3 (see page 45) and there are parallel banks.

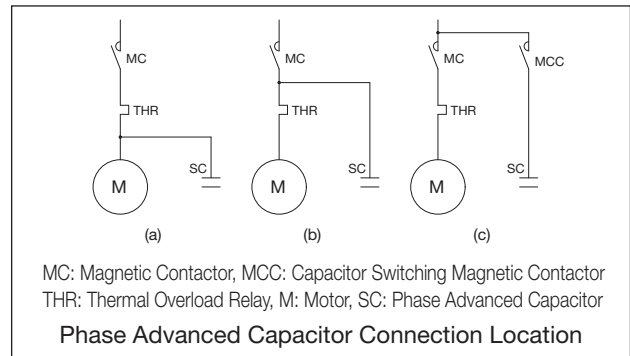
Note 2. The peak wave amplitude of the inrush current when close-circuited is within 20 times the capacitor's rated current (actual value) and the electrical durability is approximately 200,000 operations.

Note 3. The applicable capacity is reduced for parallel banks without series reactors as the averaged current (determined by parallel bank capacity and circuit impedance) will flow.

● Motor Load and Simultaneous Switching

The capacitor connections are as per the figure to the right; however, for Fig. (a) on the right, the thermal overload relay set value may require lowering by the full-load current of the motor according to the power factor correction percentage. Furthermore, for Fig. (c) on the right, the motor starting/stopping magnetic contactor coil and switching capacitor magnetic contactor coil should be connected in parallel and must be switched simultaneously to prevent becoming a leading power factor when stopped.

When 1 motor and capacitor magnetic contactor is being switched, as per Figs. (a) and (b) on the right, the switching lifetime will be reduced more than if switching a motor alone.



2.16 Application to PLCs

MS-T, MS-N and SD-Q series magnetic contactors have a operation coil with a small VA and no width-increasing rail attached; SD-Q types, in particular, can be directly driven by the output of DC24 V 0.1 A transistors.

Refer to the PLC manual for correct usage, magnetic contactor switching frequency and managing back-emfs from the operation coil (inductive load).

TH-T and TH-N series thermal overload relays adopt 1a1b independent contacts as output contacts. Differing voltages can also be used.

The below table shows whether direct driving from PLCs is applicable.

● S(D)-T/N, SD-Q Series Magnetic Contactor PLC Direct Drive

| Applicable Models | | MELSEC iQ-R Series | | | | | MELSEC-L Series | | | | | MELSEC-Q Series | | | | | | | | | | | | | | | | | | | | | | |
|---|----------------------------|--------------------|----------------------|----------------------|-----------------------|----------------|-------------------|--|---|----------------------|-----------------------|--------------------------|--------------------|---------------------|--|------------|-------------------|----------|-----------------|------------|--------------------------------|---|--|---------|------------|--------------------------------|---|--|---------|---------|--------------------------------|---|--|--|
| Classification | Model Name | Output Units | | | I/O Combination Units | Output Units | | | I/O Combination Units | Output Units | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Contact Output | Transistor Output | Transistor Output | | Contact Output | Transistor Output | Triac Output | | Transistor Output | Contact Output | Triac Output | Transistor Output | | | | | | | | | | | | | | | | | | | | | |
| SR-T, SRD-T : Contactor Relays S-T/N, SD-T/N : Magnetic Contactors SD-Q : DC Interface Contactors | Operation Coil Designation | RY10R2 | RY41NT2P RY42NT2P | RY41PT1P RY42PT1P | RY40NT5P RY40PT5P | RH42C4NY2P | LY10R2 | LY41NT1P LY42NT1P LY41PT1P LY42PT1P | L28CPU L28CPU-BT L28SCPU L28SCPU-P L28CPU-P L28CPU-L-P L28CPU L28CPU-P L28CPU-PBT | LY40NT5P LY40PT5P | LY20S6 No Varistor | LH42C4NT1P LH42C4PT1P | QY10(-TS) QY18A | QY22 No Varistor | QY40P(-TS) QY41P QY42P QY81P QY82P | QY41H | QY50 QY80(-TS) | QY68A | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | AC100 V | AC200 V | Using UN-SY □ / UT-SY □ DC24 V | | | AC100 V | AC200 V | Using UN-SY □ / UT-SY □ DC24 V | | | AC100 V | AC200 V | Using UN-SY □ / UT-SY □ DC24 V | | | |
| | | | | | | | | | | | | | | | | | | | SR-T5, T9 | ○ 1 mil. | ○ 1.5 mil. | ○ | | | ○ 1 mil. | ○ 1.5 mil. | ○ | | | ○ | ○ | ○ | | |
| | | | | | | | | | | | | | | | | | | | S-T10, T12, T20 | ○ 1 mil. | ○ 1.5 mil. | ○ | | | ○ 1 mil. | ○ 1.5 mil. | ○ | | | ○ | ○ | ○ | | |
| | | | | | | | | | | | | | | | | | | | S-T21, T25 | ○ 1 mil. | ○ 1.5 mil. | ○ | | | ○ 1 mil. | ○ 1.5 mil. | ○ | | | ○ | ○ | ○ | | |
| | | | | | | | | | | | | | | | | | | | S-T32 | ○ 1.5 mil. | ○ 2 mil. | ○ | | | ○ 1.5 mil. | ○ 2 mil. | ○ | | | ○ | ○ | ○ | | |
| | | | | | | | | | | | | | | | | | | | S-T35/T50 | ○ 0.5 mil. | ○ 1 mil. | ○ | | | ○ 0.5 mil. | ○ 1 mil. | ○ | | | ○ | ○ | ○ | | |
| | | | | | | | | | | | | | | | | | | | S-T65/T80 | ○ 0.5 mil. | ○ 1 mil. | ○ | | | ○ 0.5 mil. | ○ 1 mil. | ○ | | | ○ | x | ○ | | |
| | | | | | | | | | | | | | | | | | | | S-T100 | ○ 0.5 mil. | ○ 0.5 mil. | ○ | | | ○ 0.5 mil. | ○ 0.5 mil. | ○ | | | ○ | x | ○ | | |
| | | | | | | | | | | | | | | | | | | | S-N125, N150 | ○ 0.5 mil. | ○ 0.5 mil. | ○ | | | ○ 0.5 mil. | ○ 0.5 mil. | ○ | | | ○ | x | ○ | | |
| S-N180/N220 | ○ 0.3 mil. | ○ 0.4 mil. | ○ | | | ○ 0.3 mil. | ○ 0.4 mil. | ○ | | | ○ | x | ○ | | | | | | | | | | | | | | | | | | | | | |
| S-N300/N400 | ○ 0.2 mil. | ○ 0.3 mil. | ○ | | | ○ 0.2 mil. | ○ 0.3 mil. | ○ | | | ○ | x | ○ | | | | | | | | | | | | | | | | | | | | | |
| S-N600/N800 | x | ○ 0.2 mil. | x | | | x | ○ 0.2 mil. | x | | | x | x | x | | | | | | | | | | | | | | | | | | | | | |
| SD-Q □, QR □ | DC24V | ○ 1 mil. | | ○ | | | ○ 1 mil. | | ○ | | | ○ | | ○ 1 mil. | | ○ | | ○ | | | | | | | | | | | | | | | | |
| | | DC24 V | DC110 V | | | | DC24 V | DC110 V | | | | DC24 V | DC110 V | | | | | | | | | | | | | | | | | | | | | |
| | | ○ 0.3 mil. | ○ 0.3 mil. | ○ DC24 V | ○ DC24 V | ○ DC24 V | ○ DC24 V | ○ 0.3 mil. | ○ 0.3 mil. | ○ DC24 V | ○ DC24 V | ○ DC24 V | ○ DC24 V | | ○ 0.3 mil. | ○ 0.3 mil. | ○ DC24 V | ○ DC24 V | ○ DC24 V | ○ DC24 V | | | | | | | | | | | | | | |
| | | ○ 0.3 mil. | ○ 0.3 mil. | ○ DC24 V | ○ DC24 V | ○ DC24 V | ○ DC24 V | ○ 0.3 mil. | ○ 0.3 mil. | ○ DC24 V | ○ DC24 V | ○ DC24 V | ○ DC24 V | | ○ 0.3 mil. | ○ 0.3 mil. | ○ DC24 V | ○ DC24 V | ○ DC24 V | ○ DC24 V | | | | | | | | | | | | | | |
| | | ○ 0.3 mil. | ○ 0.3 mil. | ○ DC24 V | ○ DC24 V | ○ DC24 V | ○ DC24 V | ○ 0.3 mil. | ○ 0.3 mil. | ○ DC24 V | ○ DC24 V | ○ DC24 V | ○ DC24 V | | ○ 0.3 mil. | ○ 0.3 mil. | ○ DC24 V | ○ DC24 V | ○ DC24 V | ○ DC24 V | | | | | | | | | | | | | | |
| | | x | x | x | x | ○ DC24 V | x | x | x | x | x | x | ○ DC24 V | | x | x | x | ○ DC24 V | ○ DC24 V | | | | | | | | | | | | | | | |
| | | x | x | x | x | x | x | x | x | x | x | x | x | | x | x | x | ○ DC24 V | ○ DC24 V | | | | | | | | | | | | | | | |
| | | x | x | x | x | x | x | x | x | x | x | x | x | | x | x | x | ○ DC24 V | ○ DC24 V | | | | | | | | | | | | | | | |
| | | x | x | x | x | x | x | x | x | x | x | x | x | | x | x | x | ○ DC24 V | ○ DC24 V | | | | | | | | | | | | | | | |
| | | x | x | x | x | x | x | x | x | x | x | x | x | | x | x | x | x | x | x | | | | | | | | | | | | | | |
| Mechanically Latched Type AC Operated | AC100 V AC200 V | Closing | Tripping | | | | Closing | Tripping | | | | Closing | Tripping | Closing | Tripping | | | | | | | | | | | | | | | | | | | |
| | | ○ 0.5 mil. | ○ 0.5 mil. | | | | ○ 0.5 mil. | ○ 0.5 mil. | | | | ○ | ○ | ○ 0.5 mil. | ○ 0.5 mil. | ○ | ○ | | | | | | | | | | | | | | | | | |
| | | ○ 0.5 mil. | ○ 0.5 mil. | | | | ○ 0.5 mil. | ○ 0.5 mil. | | | | ○ | ○ | ○ 0.5 mil. | ○ 0.5 mil. | ○ | ○ | | | | | | | | | | | | | | | | | |
| | | ○ 0.5 mil. | ○ 0.5 mil. | | | | ○ 0.5 mil. | ○ 0.5 mil. | | | | ○ | ○ | ○ 0.5 mil. | ○ 0.5 mil. | ○ | ○ | | | | | | | | | | | | | | | | | |
| | | ○ 0.25 mil. | ○ 0.25 mil. | | | | ○ 0.25 mil. | ○ 0.25 mil. | | | | ○ | ○ | ○ 0.25 mil. | ○ 0.25 mil. | ○ | ○ | | | | | | | | | | | | | | | | | |
| | | ○ 0.25 mil. | ○ 0.25 mil. | | | | ○ 0.25 mil. | ○ 0.25 mil. | | | | ○ | ○ | ○ 0.25 mil. | ○ 0.25 mil. | ○ | ○ | | | | | | | | | | | | | | | | | |
| | | ○ 0.25 mil. | ○ 0.25 mil. | | | | ○ 0.25 mil. | ○ 0.25 mil. | | | | ○ | ○ | ○ 0.25 mil. | ○ 0.25 mil. | ○ | ○ | | | | | | | | | | | | | | | | | |
| | | ○ 0.25 mil. | ○ 0.25 mil. | | | | ○ 0.25 mil. | ○ 0.25 mil. | | | | ○ | ○ | ○ 0.25 mil. | ○ 0.25 mil. | ○ | ○ | | | | | | | | | | | | | | | | | |
| | | ○ 0.25 mil. | x | | | | ○ 0.25 mil. | x | | | | ○ | x | ○ 0.25 mil. | x | ○ | x | | | | | | | | | | | | | | | | | |
| | | x | x | | | | x | x | | | | x | ○ | x | x | x | ○ | | | | | | | | | | | | | | | | | |

Note 1. ○: applicable (1 operation coil per output pole), x: not applicable.

Note 2. The contact output value shows the electrical durability of the output relay. The transistor output value shows the applicable control circuit voltage.

Note 3. UN-SY□ and UT-SY□ are interface units (optional parts).

Note 4. Mechanically latched DC operated types (SRLD, SLD) are not applicable with any model.

● S(D)-T/N, SD-Q Series Magnetic Contactor PLC Direct Drive

| Applicable Models | | CC-Link | | | | | | | | CC-Link Safety | | CC-Link LT | | | | | | | |
|--|--|----------------------------------|---|---------------|---|---|-------------------------------|---------------|---|--|---|---|-------------------------------|---|--|-----------------------------|-------------------------------|---------|---|
| Classification | Model Name SR-T, SRD-T : Contactor Relays S-T/N, SD-T/N : Magnetic Contactors SD-Q : DC Interface Contactors | Operation Coil Designation | I/O Combination Units | | | | | | | | Output Units | I/O Combination Units | Output Units | | I/O Combination Units | | | | |
| | | | Contact Output | | | | Transistor Output | | | | Transistor Output | Transistor Output | Transistor Output | Transistor Output | | | | | |
| | | | AJ65SBTB32-16KDR AJ65SBTB32-16DR AJ65DBTB1-32DR | AJ65BTB2-16DR | AJ65SBTB32-8DT AJ65SBTB1-16DT AJ65SBTB32-16DT AJ65SBTB1-32DT AJ65SBTB1-32DTE1 | AJ65SBTB1-32D2T AJ65BTS32-16DT AJ65SBTC4-16DT AJ65SBTC4-16DT2 AJ65FBTA42-16DT | AJ65BTB □-16DT | AJ65BTCE3□-DT | AJ65SBTCF1-32DT AJ65BTCE3-19DTE AJ65BTCE3-32DTE | AJ65SBTCF1-32DT1 AJ65BTCE3-19DTE AJ65BTCE3-32DTE | AJ65FBTA42-16DTE | OSQJ65BTS2-4T | OSQJ65BTS2-12DT | CL1Y4-T1B2 CL2Y8-TP1B2 CL1Y4-T1S2 CL2Y8-TP1S2 CL2Y8-TPE1S2 CL2Y16-TPE1MV | CL1Y4-T1C2 CL2Y8-TP1C2V CL1Y4-T1S2 CL2Y16-TP1MV CL2Y16-TP1M1V CL1Y2-T1D2S | CL1X2-DT1D5S CL1X4-DT1B2 | CL1X8-DT1B2 CL2X16-DTP1CSV | | |
| AC Operated | | | AC100V | AC200V | AC100V | AC200V | Using UN-SY □ /UT-SY □ DC24 V | | | | Using UN-SY □ / UT-SY □ DC24 V (Note 5) | Using UN-SY □ / UT-SY □ DC24 V (Note 5) | Using UN-SY □ /UT-SY □ DC24 V | | | | | | |
| | SR-T5,T9 | | ○ 2 mil. | ○ 2 mil. | ○ 2 mil. | ○ 2 mil. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | |
| | S-T10,T12,T20 | | ○ 2 mil. | ○ 2 mil. | ○ 2 mil. | ○ 2 mil. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | |
| | S-T21,T25 | | ○ 2 mil. | ○ 2 mil. | ○ 2 mil. | ○ 2 mil. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | |
| | S-T32 | | ○ 2 mil. | ○ 2 mil. | ○ 2 mil. | ○ 2 mil. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | |
| | S-T35/T50 | AC100V AC200V | ○ 2 mil. | ○ 2 mil. | ○ 2 mil. | ○ 2 mil. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | |
| | S-T65/T80 | | ○ 1.5 mil. | ○ 2 mil. | ○ 1.5 mil. | ○ 2 mil. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | |
| | S-T100 | | ○ 1 mil. | ○ 1.5 mil. | ○ 1 mil. | ○ 1.5 mil. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | |
| | S-N125,N150 | | ○ 1 mil. | ○ 1.5 mil. | ○ 1 mil. | ○ 1.5 mil. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | S-N180/N220 | | ○ 0.5 mil. | ○ 1 mil. | ○ 0.5 mil. | ○ 1 mil. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| S-N300/N400 | ○ 0.5 mil. | | ○ 0.5 mil. | ○ 0.5 mil. | ○ 0.5 mil. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | |
| S-N600/N800 | x | | ○ 0.4 mil. | x | ○ 0.4 mil. | x | x | x | x | x | x | x | x | x | x | x | x | x | |
| DC Operated | SD-Q □ ,QR □ | | DC24V | ○ 2 mil. | ○ 2 mil. | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | |
| | | | | DC24V | DC110V | DC24V | DC110V | | | | | | | | | | | | |
| | SRD-T5,T9 | | DC24V DC110V | ○ 0.4 mil. | ○ 0.8 mil. | ○ 0.4 mil. | ○ 0.8 mil. | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | |
| | SD-T12/T20 | ○ 0.4 mil. | | ○ 0.8 mil. | ○ 0.4 mil. | ○ 0.8 mil. | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | | |
| | SD-T21/T32 | ○ 0.4 mil. | | ○ 0.8 mil. | ○ 0.4 mil. | ○ 0.8 mil. | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | ○ DC24V | | |
| | SD-T35/T50 | ○ 0.1 mil. | | ○ 0.3 mil. | ○ 0.1 mil. | ○ 0.3 mil. | ○ DC24V | ○ DC24V | x | x | ○ DC24V | ○ DC24V | ○ DC24V | x | x | x | x | | |
| | SD-T65/T80 | x | | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | |
| | SD-T100 | x | | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | |
| | SD-N125,N150 | x | | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | |
| | SD-N220 | x | | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | |
| SD-N300/N400 | x | x | | x | x | x | x | x | x | x | x | x | x | x | x | x | x | | |
| SD-N600/N800 | x | x | | x | x | x | x | x | x | x | x | x | x | x | x | x | x | | |
| Mechanically Latched Type AC Operated | | | Closing | Tripping | Closing | Tripping | / | | | | | | | | | | | | |
| | SRL-T5 | AC100V AC200V | ○ 0.5 mil. | ○ 0.5 mil. | ○ 0.5 mil. | ○ 0.5 mil. | | | | | | | | | | | | | |
| | SL-T21 | | ○ 0.5 mil. | ○ 0.5 mil. | ○ 0.5 mil. | ○ 0.5 mil. | | | | | | | | | | | | | |
| | SL-T35/T50 | | ○ 0.5 mil. | ○ 0.5 mil. | ○ 0.5 mil. | ○ 0.5 mil. | | | | | | | | | | | | | |
| | SL-T65/T80 | | ○ 0.25 mil. | ○ 0.25 mil. | ○ 0.25 mil. | ○ 0.25 mil. | | | | | | | | | | | | | |
| | SL-T100 | | ○ 0.25 mil. | ○ 0.25 mil. | ○ 0.25 mil. | ○ 0.25 mil. | | | | | | | | | | | | | |
| | SL-N125,N150 | | ○ 0.25 mil. | ○ 0.25 mil. | ○ 0.25 mil. | ○ 0.25 mil. | | | | | | | | | | | | | |
| | SL-N220 | | ○ 0.25 mil. | ○ 0.25 mil. | ○ 0.25 mil. | ○ 0.25 mil. | | | | | | | | | | | | | |
| | SL-N300/N400 | | ○ 0.25 mil. | x | ○ 0.25 mil. | x | | | | | | | | | | | | | |
| | SL-N600/N800 | | x | x | x | x | | | | | | | | | | | | | |

Note 1. ○: applicable (1 operation coil per output pole), x: not applicable

Note 2. The contact output value shows the electrical durability of the output relay. The transistor output value shows the applicable control circuit voltage.

Note 3. UN-SY □ and UT-SY □ are interface units (optional parts).

Note 4. Mechanically latched DC operated types (SRLD, SLD) are not applicable with any model.

Note 5. Doesn't comply with safety category 3 or above (dual circuitry) so use a separate safety relay.

2.17 Application to Inverter Circuits

Select from the below items when using a magnetic contactor for input to a Mitsubishi inverter circuit.

Note 1. The motor capacity indicates the selection when using a 4-pole AC200 V/400 V 50 Hz standard Mitsubishi motor.

Note 2. Magnetic contactors are selected at Class AC-1. The electrical durability of magnetic contactors is 500,000 operations. When used for emergency stops while the motor is running, it is 25 operations.

If emergency stop operation or commercial operation is to be used, then a magnetic contactor with a Class AC-3 rated operation current should be selected to suit the motor rated current.

Note 3. 55K or less is the wire size for a maximum continuous allowable temperature of 75°C (HIV wire [600 V double-layer vinyl insulated wire]). This assumes that the ambient temperature is 50°C or less and the wiring distance 20 m or less.

75K or more is the wire size for a maximum continuous allowable temperature of 90°C (LMFC [Flame-Retardant, Flexible, Cross-Linked Polyethylene Insulated Electric Wire], etc.). This assumes interior control panel wiring and ambient temperature of 50°C or less.

(1) FR-A800 Series

| Voltage | Motor Output (Note 1) (kW) | Model Name of Applicable Inverter (ND Rating) | Input Magnetic Contactor (Note 2) | | Recommended Wire Size (mm ²) (Note 3) | | |
|-------------|----------------------------|---|---|--------|--|-------|---------|
| | | | Power Factor Correction (AC or DC) Reactor Connection | | R/L1, S/L2, T/L3 Power Factor Correction (AC or DC) Reactor Connection | | U, V, W |
| | | | No | Yes | No | Yes | |
| 200 V Class | 0.4 | FR-A820-0.4K(00046) | S-T10 | S-T10 | 2 | 2 | 2 |
| | 0.75 | FR-A820-0.75K(00077) | S-T10 | S-T10 | 2 | 2 | 2 |
| | 1.5 | FR-A820-1.5K(00105) | S-T10 | S-T10 | 2 | 2 | 2 |
| | 2.2 | FR-A820-2.2K(00167) | S-T10 | S-T10 | 2 | 2 | 2 |
| | 3.7 | FR-A820-3.7K(00250) | S-T21 | S-T10 | 3.5 | 3.5 | 3.5 |
| | 5.5 | FR-A820-5.5K(00340) | S-T35 | S-T21 | 5.5 | 5.5 | 5.5 |
| | 7.5 | FR-A820-7.5K(00490) | S-T35 | S-T35 | 14 | 14 | 8 |
| | 11 | FR-A820-11K(00630) | S-T35 | S-T35 | 14 | 14 | 14 |
| | 15 | FR-A820-15K(00770) | S-T50 | S-T50 | 22 | 22 | 22 |
| | 18.5 | FR-A820-18.5K(00930) | S-T65 | S-T50 | 38 | 22 | 22 |
| | 22 | FR-A820-22K(01250) | S-T100 | S-T65 | 38 | 38 | 38 |
| | 30 | FR-A820-30K(01540) | S-T100 | S-T100 | 60 | 60 | 60 |
| | 37 | FR-A820-37K(01870) | S-N150 | S-N125 | 80 | 60 | 60 |
| | 45 | FR-A820-45K(02330) | S-N180 | S-N150 | 100 | 100 | 100 |
| | 55 | FR-A820-55K(03160) | S-N220 | S-N180 | 100 | 100 | 100 |
| | 75 | FR-A820-75K(03800) | — | S-N300 | — | 125 | 125 |
| | 90 | FR-A820-90K(04750) | — | S-N300 | — | 150 | 150 |
| | 400 V Class | 0.4 | FR-A840-0.4K(00023) | S-T10 | S-T10 | 2 | 2 |
| 0.75 | | FR-A840-0.75K(00038) | S-T10 | S-T10 | 2 | 2 | 2 |
| 1.5 | | FR-A840-1.5K(00052) | S-T10 | S-T10 | 2 | 2 | 2 |
| 2.2 | | FR-A840-2.2K(00083) | S-T10 | S-T10 | 2 | 2 | 2 |
| 3.7 | | FR-A840-3.7K(00126) | S-T10 | S-T10 | 2 | 2 | 2 |
| 5.5 | | FR-A840-5.5K(00170) | S-T21 | S-T12 | 2 | 2 | 2 |
| 7.5 | | FR-A840-7.5K(00250) | S-T21 | S-T21 | 3.5 | 3.5 | 3.5 |
| 11 | | FR-A840-11K(00310) | S-T21 | S-T21 | 5.5 | 5.5 | 5.5 |
| 15 | | FR-A840-15K(00380) | S-T35 | S-T21 | 8 | 5.5 | 5.5 |
| 18.5 | | FR-A840-18.5K(00470) | S-T35 | S-T35 | 14 | 8 | 8 |
| 22 | | FR-A840-22K(00620) | S-T35 | S-T35 | 14 | 14 | 14 |
| 30 | | FR-A840-30K(00770) | S-T50 | S-T50 | 22 | 22 | 22 |
| 37 | | FR-A840-37K(00930) | S-T65 | S-T50 | 22 | 22 | 22 |
| 45 | | FR-A840-45K(01160) | S-T100 | S-T65 | 38 | 38 | 38 |
| 55 | | FR-A840-55K(01800) | S-T100 | S-T100 | 60 | 60 | 60 |
| 75 | | FR-A840-75K(02160) | — | S-T100 | — | 60 | 60 |
| 90 | | FR-A840-90K(02600) | — | S-N150 | — | 60 | 60 |
| 110 | | FR-A840-110K(03250) | — | S-N180 | — | 80 | 80 |
| 132 | | FR-A840-132K(03610) | — | S-N220 | — | 100 | 100 |
| 150 | | FR-A840-160K(04320) | — | S-N300 | — | 125 | 125 |
| 160 | | FR-A840-160K(04320) | — | S-N300 | — | 125 | 125 |
| 185 | FR-A840-185K(04810) | — | S-N300 | — | 150 | 150 | |
| 220 | FR-A840-220K(05470) | — | S-N400 | — | 2×100 | 2×100 | |
| 250 | FR-A840-250K(06100) | — | S-N600 | — | 2×100 | 2×100 | |
| 280 | FR-A840-280K(06830) | — | S-N600 | — | 2×125 | 2×125 | |

(2) FR-F800 Series

| Voltage | Motor Output (Note 1) (kW) | Model Name of Applicable Inverter (LD Rating) | Input Magnetic Contactor (Note 2) | | Recommended Wire Size (mm ²) (Note 3) | | U, V, W |
|-------------|----------------------------|---|---|--------|--|-------|---------|
| | | | Power Factor Correction (AC or DC) Reactor Connection | | R/L1, S/L2, T/L3 Power Factor Correction (AC or DC) Reactor Connection | | |
| | | | No | Yes | No | Yes | |
| 200 V Class | 0.75 | FR-F820-0.75K(00046) | S-T10 | S-T10 | 2 | 2 | 2 |
| | 1.5 | FR-F820-1.5K(00077) | S-T10 | S-T10 | 2 | 2 | 2 |
| | 2.2 | FR-F820-2.2K(00105) | S-T10 | S-T10 | 2 | 2 | 2 |
| | 3.7 | FR-F820-3.7K(00167) | S-T21 | S-T10 | 3.5 | 3.5 | 3.5 |
| | 5.5 | FR-F820-5.5K(00250) | S-T25 | S-T21 | 5.5 | 5.5 | 5.5 |
| | 7.5 | FR-F820-7.5K(00340) | S-T35 | S-T25 | 8 | 5.5 | 5.5 |
| | 11 | FR-F820-11K(00490) | S-T35 | S-T35 | 14 | 14 | 14 |
| | 15 | FR-F820-15K(00630) | S-T50 | S-T50 | 22 | 22 | 22 |
| | 18.5 | FR-F820-18.5K(00770) | S-T65 | S-T50 | 38 | 22 | 22 |
| | 22 | FR-F820-22K(00930) | S-T100 | S-T65 | 38 | 38 | 38 |
| | 30 | FR-F820-30K(01250) | S-T100 | S-T100 | 60 | 60 | 60 |
| | 37 | FR-F820-37K(01540) | S-N150 | S-N125 | 80 | 60 | 60 |
| | 45 | FR-F820-45K(01870) | S-N180 | S-N150 | 100 | 100 | 100 |
| | 55 | FR-F820-55K(02330) | S-N220 | S-N180 | 100 | 100 | 100 |
| 75 | FR-F820-75K(03160) | — | S-N300 | — | 125 | 125 | |
| 90 | FR-F820-90K(03800) | — | S-N300 | — | 150 | 150 | |
| 110 | FR-F820-110K(04750) | — | S-N400 | — | 150 | 150 | |
| 400 V Class | 0.75 | FR-F840-0.75K(00023) | S-T10 | S-T10 | 2 | 2 | 2 |
| | 1.5 | FR-F840-1.5K(00038) | S-T10 | S-T10 | 2 | 2 | 2 |
| | 2.2 | FR-F840-2.2K(00052) | S-T10 | S-T10 | 2 | 2 | 2 |
| | 3.7 | FR-F840-3.7K(00083) | S-T10 | S-T10 | 2 | 2 | 2 |
| | 5.5 | FR-F840-5.5K(00126) | S-T21 | S-T12 | 2 | 2 | 2 |
| | 7.5 | FR-F840-7.5K(00170) | S-T21 | S-T21 | 3.5 | 3.5 | 3.5 |
| | 11 | FR-F840-11K(00250) | S-T21 | S-T21 | 5.5 | 5.5 | 5.5 |
| | 15 | FR-F840-15K(00310) | S-T35 | S-T21 | 8 | 5.5 | 5.5 |
| | 18.5 | FR-F840-18.5K(00380) | S-T35 | S-T35 | 14 | 8 | 8 |
| | 22 | FR-F840-22K(00470) | S-T35 | S-T35 | 14 | 14 | 14 |
| | 30 | FR-F840-30K(00620) | S-T50 | S-T50 | 22 | 22 | 22 |
| | 37 | FR-F840-37K(00770) | S-T65 | S-T50 | 22 | 22 | 22 |
| | 45 | FR-F840-45K(00930) | S-T100 | S-T65 | 38 | 38 | 38 |
| | 55 | FR-F840-55K(01160) | S-T100 | S-T100 | 60 | 60 | 60 |
| | 75 | FR-F840-75K(01800) | — | S-T100 | — | 60 | 60 |
| | 90 | FR-F840-90K(02160) | — | S-N150 | — | 60 | 60 |
| | 110 | FR-F840-110K(02600) | — | S-N180 | — | 80 | 80 |
| | 132 | FR-F840-132K(03250) | — | S-N220 | — | 100 | 100 |
| | 150 | FR-F840-160K(03610) | — | S-N300 | — | 125 | 125 |
| | 160 | FR-F840-160K(03610) | — | S-N300 | — | 125 | 125 |
| 185 | FR-F840-185K(04320) | — | S-N300 | — | 150 | 150 | |
| 220 | FR-F840-220K(04810) | — | S-N400 | — | 2×100 | 2×100 | |
| 250 | FR-F840-250K(05470) | — | S-N600 | — | 2×100 | 2×100 | |
| 280 | FR-F840-280K(06100) | — | S-N600 | — | 2×125 | 2×125 | |
| 315 | FR-F840-315K(06830) | — | S-N600 | — | 2×150 | 2×150 | |

(3) FR-CC2 Series

| Voltage | Motor Output (Note 1) (kW) | Model Name of Applicable Inverter | Input Magnetic Contactor (Note 2) | | Recommended Wire Size (mm ²) (Note 3) | | U, V, W |
|---------|----------------------------|-----------------------------------|---|--------|--|-------|---------|
| | | | Power Factor Correction (AC or DC) Reactor Connection | | R/L1, S/L2, T/L3 Power Factor Correction (AC or DC) Reactor Connection | | |
| | | | No | Yes | No | Yes | |
| 400 V | 315 | FR-CC2-H315K | — | S-N600 | — | 2×150 | — |
| | 355 | FR-CC2-H355K | — | S-N600 | — | 2×200 | — |
| | 400 | FR-CC2-H400K | — | S-N800 | — | 2×200 | — |

(4) FR-E700 Series

| Voltage | Motor Output (Note 1) (kW) | Model Name of Applicable Inverter | Input Magnetic Contactor (Note 2) | | Recommended Wire Size (mm ²) (Note 3) | | U, V, W |
|-------------|----------------------------|-----------------------------------|---|-------|--|-----|---------|
| | | | Power Factor Correction (AC or DC) Reactor Connection | | R/L1, S/L2, T/L3 Power Factor Correction (AC or DC) Reactor Connection | | |
| | | | No | Yes | No | Yes | |
| 200 V Class | 0.1 | FR-E720-0.1K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 0.2 | FR-E720-0.2K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 0.4 | FR-E720-0.4K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 0.75 | FR-E720-0.75K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 1.5 | FR-E720-1.5K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 2.2 | FR-E720-2.2K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 3.7 | FR-E720-3.7K | S-T21 | S-T10 | 3.5 | 3.5 | 3.5 |
| | 5.5 | FR-E720-5.5K | S-T35 | S-T21 | 5.5 | 5.5 | 5.5 |
| | 7.5 | FR-E720-7.5K | S-T35 | S-T35 | 14 | 8 | 8 |
| | 11 | FR-E720-11K | S-T35 | S-T35 | 14 | 14 | 14 |
| 400 V Class | 15 | FR-E720-15K | S-T50 | S-T50 | 22 | 22 | 22 |
| | 0.4 | FR-E740-0.4K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 0.75 | FR-E740-0.75K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 1.5 | FR-E740-1.5K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 2.2 | FR-E740-2.2K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 3.7 | FR-E740-3.7K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 5.5 | FR-E740-5.5K | S-T21 | S-T12 | 3.5 | 2 | 2 |
| | 7.5 | FR-E740-7.5K | S-T21 | S-T21 | 3.5 | 3.5 | 3.5 |
| | 11 | FR-E740-11K | S-T21 | S-T21 | 5.5 | 5.5 | 5.5 |
| | 15 | FR-E740-15K | S-T35 | S-T21 | 8 | 5.5 | 5.5 |

(5) FR-D700 Series

| Voltage | Motor Output (Note 1) (kW) | Model Name of Applicable Inverter | Input Magnetic Contactor (Note 2) | | Recommended Wire Size (mm ²) (Note 3) | | |
|-------------|----------------------------|-----------------------------------|---|-------|---|-----|---------|
| | | | Power Factor Correction (AC or DC) Reactor Connection | | R/L1, S/L2, T/L3 | | U, V, W |
| | | | No | Yes | No | Yes | |
| 200 V Class | 0.1 | FR-D720-0.1K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 0.2 | FR-D720-0.2K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 0.4 | FR-D720-0.4K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 0.75 | FR-D720-0.75K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 1.5 | FR-D720-1.5K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 2.2 | FR-D720-2.2K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 3.7 | FR-D720-3.7K | S-T21 | S-T10 | 3.5 | 3.5 | 3.5 |
| | 5.5 | FR-D720-5.5K | S-T35 | S-T21 | 5.5 | 5.5 | 5.5 |
| | 7.5 | FR-D720-7.5K | S-T35 | S-T35 | 14 | 8 | 8 |
| 400 V Class | 0.4 | FR-D740-0.4K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 0.75 | FR-D740-0.75K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 1.5 | FR-D740-1.5K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 2.2 | FR-D740-2.2K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 3.7 | FR-D740-3.7K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 5.5 | FR-D740-5.5K | S-T21 | S-T12 | 3.5 | 2 | 2 |
| | 7.5 | FR-D740-7.5K | S-T21 | S-T21 | 3.5 | 3.5 | 3.5 |
| | 11 | FR-D740-11K | S-T21 | S-T21 | 5.5 | 5.5 | 5.5 |
| | 15 | FR-D740-15K | S-T35 | S-T21 | 8 | 5.5 | 5.5 |

(6) FR-F700PJ Series

| Voltage | Motor Output (Note 1) (kW) | Model Name of Applicable Inverter | Input Magnetic Contactor (Note 2) | | Recommended Wire Size (mm ²) (Note 3) | | |
|-------------|----------------------------|-----------------------------------|-----------------------------------|-------|---|-----|---------|
| | | | Reactor or Filter Pack Connection | | R/L1, S/L2, T/L3 | | U, V, W |
| | | | No | Yes | No | Yes | |
| 200 V Class | 0.4 | FR-F720PJ-0.4K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 0.75 | FR-F720PJ-0.75K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 1.5 | FR-F720PJ-1.5K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 2.2 | FR-F720PJ-2.2K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 3.7 | FR-F720PJ-3.7K | S-T21 | S-T10 | 3.5 | 3.5 | 3.5 |
| | 5.5 | FR-F720PJ-5.5K | S-T35 | S-T21 | 5.5 | 5.5 | 5.5 |
| | 7.5 | FR-F720PJ-7.5K | S-T35 | S-T35 | 14 | 8 | 8 |
| | 11 | FR-F720PJ-11K | S-T35 | S-T35 | 14 | 14 | 14 |
| | 15 | FR-F720PJ-15K | S-T50 | S-T50 | 22 | 22 | 22 |
| 400 V Class | 0.4 | FR-F740PJ-0.4K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 0.75 | FR-F740PJ-0.75K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 1.5 | FR-F740PJ-1.5K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 2.2 | FR-F740PJ-2.2K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 3.7 | FR-F740PJ-3.7K | S-T10 | S-T10 | 2 | 2 | 2 |
| | 5.5 | FR-F740PJ-5.5K | S-T21 | S-T12 | 3.5 | 2 | 2 |
| | 7.5 | FR-F740PJ-7.5K | S-T21 | S-T21 | 3.5 | 3.5 | 3.5 |
| | 11 | FR-F740PJ-11K | S-T21 | S-T21 | 5.5 | 5.5 | 5.5 |
| | 15 | FR-F740PJ-15K | S-T35 | S-T21 | 8 | 5.5 | 5.5 |

2.18 Application to Servo Circuits

2.18.1 Selection Examples for MR-J4-GF/MR-J4-B/MR-J4-A

Selection examples when using 600 V double-layered vinyl insulated wire (HIV wires) are listed below.

The wire size for U, V, W, and \ominus varies depending on the servo motor. For details about wires used for wiring to servo motors, refer to "Selection Example in HIV Wires for Servo Motors" in the catalog of "Mitsubishi Electric General Purpose AC Servo MELSERVO-J4" (L(NA)03056).

| Servo Amplifier Model Name | Magnetic Contactor ^(Note 3, 6) | Wire Size [mm ²] ^(Note 5) | | | | | | |
|---|---|--|----------------------------------|----------------------------------|---|--------------------------------|----------------------------------|-----------|
| | | L1, L2, L3, \ominus | L11, L21 | P+, C | U, V, W, \ominus | | | |
| MR-J4-10GF(1)/B(1)/A(1) | S-T10 | 2 (AWG 14) | 2 (AWG 14) ^(Note 1) | 2 (AWG 14) ^(Note 1) | AWG 18 to 14 ^(Note 4) | | | |
| MR-J4-20GF/B/A | S-T10 | | | | | | | |
| MR-J4-20GF1/B1/A1 | S-T10 | | | | | | | |
| MR-J4-40GF/B/A | S-T10 | | | | | | | |
| MR-J4-40GF1/B1/A1 | S-T10 | | | | | | | |
| MR-J4-60GF/B/A | S-T10 | | | | | | | |
| MR-J4-70GF/B/A | S-T10 | | | | | | | |
| MR-J4-100GF/B/A (Three-Phase Power Input) | S-T10 | | | | | | | |
| MR-J4-100GF/B/A (Single-Phase Power Input) | S-T10 | | | | | | | |
| MR-J4-200GF/B/A (Three-Phase Power Input) | S-T21 | | | | | | | |
| MR-J4-200GF/B/A (Single-Phase Power Input) | S-T21 | 3.5 (AWG 12) | 1.25 to 2 (AWG 16 to 14) | 3.5 (AWG 12) ^(Note 1) | AWG 16 to 10 ^(Note 4) | | | |
| MR-J4-350GF/B/A | S-T21 | | | | | | | |
| MR-J4-500GF/B/A ^(Note 2) | S-T35 | 5.5 (AWG 10) | 1.25 to 2 (AWG 16 to 14) | 3.5 (AWG 12) ^(Note 1) | 2 to 5.5 (AWG 14 to 10) | | | |
| MR-J4-700GF/B/A ^(Note 2) | S-T50 | 8 (AWG 8) | | | 2 to 8 (AWG 14 to 8) | | | |
| MR-J4-11KGF/B/A ^(Note 2) | S-T50 | 14 (AWG 6) | 1.25 to 2 (AWG 16 to 14) | 3.5 (AWG 12) ^(Note 1) | 5.5 (AWG 10), 8 (AWG 8), 14 (AWG 6) | | | |
| MR-J4-15KGF/B/A ^(Note 2) | S-T65 | 22 (AWG 4) | | | 5.5 (AWG 10) ^(Note 1) | 8 (AWG 8), 22 (AWG 4) | | |
| MR-J4-22KGF/B/A ^(Note 2) | S-T100 | 38 (AWG 2) | 1.25 to 2 (AWG 16 to 14) | 3.5 (AWG 12) ^(Note 1) | 38 (AWG 2) | | | |
| MR-J4-60GF4/B4/A4 | S-T10 | 2 (AWG 14) | | | 2 (AWG 14) ^(Note 1) | 2 (AWG 14) ^(Note 1) | AWG 16 to 14 ^(Note 4) | |
| MR-J4-100GF4/B4/A4 | S-T10 | 2 (AWG 14) | | | | | | |
| MR-J4-200GF4/B4/A4 | S-T10 | 2 (AWG 14) | | | | | | |
| MR-J4-350GF4/B4/A4 | S-T21 | 2 (AWG 14) | | | | | | |
| MR-J4-500GF4/B4/A4 ^(Note 2) | S-T21 | 2 (AWG 14) | | | | | | |
| MR-J4-700GF4/B4/A4 ^(Note 2) | S-T21 | 3.5 (AWG 12) | | | | | | |
| MR-J4-11KGF4/B4/A4 ^(Note 2) | S-T35 | 5.5 (AWG 10) | | | | | | |
| MR-J4-15KGF4/B4/A4 ^(Note 2) | S-T35 | 8 (AWG 8) | | | | | | |
| MR-J4-22KGF4/B4/A4 ^(Note 2) | S-T50 | 14 (AWG 6) | 3.5 (AWG 12) ^(Note 1) | 3.5 (AWG 12) ^(Note 1) | | | | 8 (AWG 8) |
| MR-J4-22KGF4/B4/A4 ^(Note 2) | S-T50 | 14 (AWG 6) | | | | | | |

Note 1. Keep the wire length for the regenerative option within 5 m.

Note 2. When connecting to a terminal block, be sure to use the screws attached to the terminal block.

Note 3. Use a magnetic contactor with an operation delay time of 80 ms or less (the time from current application to the operation coil until the contact closes).

Note 4. The wire size indicates the applicable size for the servo amplifier connector.

Note 5. When complying with IEC/EN/UL/CSA standards, refer to "MELSERVO-J4 Instructions and Cautions for Safe Use of AC Servos" as enclosed with the servo amplifier.

Note 6. Install one no-fuse breaker and one magnetic contactor for each servo amplifier.

2.18.2 Selection Examples for MR-J4-DU

Selection examples when using 600 V double-layered vinyl insulated wire (HIV wires) are listed below. The wire size for U, V, W, and ⊕ varies depending on the servo motor. For details about wires used for wiring to servo motors, refer to "Selection Example in HIV Wires for Servo Motors" in the catalog of "Mitsubishi Electric General Purpose AC Servo MELSERVO-J4" (L(NA)03056).

| Converter Unit Model Name | Drive Unit Model Name | Magnetic Contactor (Note 1, 7) | Wire Size [mm ²] (Note 8) | | | | | | | |
|---------------------------|----------------------------------|-----------------------------------|---------------------------------------|-----------------------------|-------|--------|--------------|--------------|--|--------------|
| | | | L1, L2, L3, ⊕ | L11, L21 | P2, C | P1, P2 | | | | |
| MR-CV11K | | S-T35 | 8 (AWG 8) | 1.25 to 2 (AWG 16 to 14) | | | | | | |
| MR-CV18K | | S-T65 | 22 (AWG 4) | | | | | | | |
| MR-CV30K | | S-N125 | 38 (AWG 2) | | | | | | | |
| MR-CV37K | | S-N125 | 60 (AWG 2/0) | | | | | | | |
| MR-CV45K | | S-N150 | 60 (AWG 2/0) | | | | | | | |
| MR-CV55K | | S-N220 | 80 (AWG 3/0) | | | | | | | |
| MR-CV11K4 | | S-T21 | 5.5 (AWG 10) | | | | | | | |
| MR-CV18K4 | | S-T35 | 8 (AWG 8) | | | | | | | |
| MR-CV30K4 | | S-T65 | 14 (AWG 6) | | | | | | | |
| MR-CV37K4 | | S-T80 | 22 (AWG 4) | | | | | | | |
| MR-CV45K4 | | S-T100 | 22 (AWG 4) | | | | | | | |
| MR-CV55K4 | | S-N125 | 38 (AWG 2) | | | | | | | |
| MR-CV75K4 | | S-N150 | 60 (AWG 2/0) | | | | | | | |
| MR-CR55K (Note 6) | | Combined with MR-J4-DU30K_(-RJ) | S-N150 | | | | 38 (AWG 2) | 5.5 (AWG 10) | | 60 (AWG 2/0) |
| | | Combined with MR-J4-DU37K_(-RJ) | S-N180 | | | | 60 (AWG 2/0) | | | 60 (AWG 2/0) |
| MR-CR55K4 (Note 6) | Combined with MR-J4-DU30K_4(-RJ) | S-T65 | 22 (AWG 4) | 22 (AWG 4) | | | | | | |
| | Combined with MR-J4-DU37K_4(-RJ) | S-T80 | 22 (AWG 4) | 38 (AWG 2) | | | | | | |
| | Combined with MR-J4-DU45K_4(-RJ) | S-T100 | 38 (AWG 2) | 38 (AWG 2) | | | | | | |
| | Combined with MR-J4-DU55K_4(-RJ) | S-N150 | 38 (AWG 2) | 38 (AWG 2) | | | | | | |

| Drive Unit Model Name | Wire Size [mm ²] (Note 8) | |
|-----------------------|---------------------------------------|-----------------------------|
| | U, V, W ⊕ | L11, L21 |
| MR-J4-DU900B(-RJ) | 14 (AWG 6) | 1.25 to 2 (AWG 16 to 14) |
| MR-J4-DU11KB(-RJ) | 14 (AWG 6) | |
| MR-J4-DU15KB(-RJ) | 22 (AWG 4) | |
| MR-J4-DU22KB(-RJ) | 38 (AWG 2) | |
| MR-J4-DU30KB(-RJ) | 60 (AWG 2/0) | |
| MR-J4-DU30KA(-RJ) | | |
| MR-J4-DU37KB(-RJ) | 60 (AWG 2/0) | |
| MR-J4-DU37KA(-RJ) | | |
| MR-J4-DU900B4(-RJ) | 8 (AWG 8) | |
| MR-J4-DU11KB4(-RJ) | 8 (AWG 8) | |
| MR-J4-DU15KB4(-RJ) | 8 (AWG 8) | |
| MR-J4-DU22KB4(-RJ) | 14 (AWG 6) | |
| MR-J4-DU30KB4(-RJ) | 22 (AWG 4) | |
| MR-J4-DU30KA4(-RJ) | | |
| MR-J4-DU37KB4(-RJ) | 22 (AWG 4) | |
| MR-J4-DU37KA4(-RJ) | | |
| MR-J4-DU45KB4(-RJ) | 38 (AWG 2) | |
| MR-J4-DU45KA4(-RJ) | | |
| MR-J4-DU55KB4(-RJ) | 38 (AWG 2) | |
| MR-J4-DU55KA4(-RJ) | | |

2.18.3 Selection Examples for MR-J4W2-B and MR-J4W3-B

Selection examples when using 600 V double-layered vinyl insulated wire (HIV wires) are listed below. The wire size for U, V, W, and ⊕ varies depending on the servo motor. For details about wires used for wiring to servo motors, refer to "Selection Example in HIV Wires for Servo Motors" in the catalog of "Mitsubishi Electric General Purpose AC Servo MELSERVO-J4" (L(NA)03056).

| Servo Amplifier Model Name | Magnetic Contactors | Wire Size [mm ²] (Note 3) | | | |
|----------------------------|------------------------------|---------------------------------------|------------|----------------|-----------------------|
| | | L1, L2, L3, ⊕ | L11, L21 | P+, C (Note 5) | U, V, W, ⊕ |
| MR-J4W2-22B | Refer to the following table | | 2 (AWG 14) | | AWG 18 to 14 (Note 2) |
| MR-J4W2-44B | | | | | |
| MR-J4W2-77B | | | | | |
| MR-J4W2-1010B | | | | | |
| MR-J4W3-222B | | | | | |
| MR-J4W3-444B | | | | | |

● Selection Examples for MR-J4W2-B (Note 4)

| Total Rotary Servo Motor Output | Total Linear Servo Motor Continuous Thrust | Total Direct Drive Motor Output | Magnetic Contactor (Note 1, 7) |
|---------------------------------|--|---------------------------------|--------------------------------|
| 300 W or less | — | — | S-T10 |
| Over 300 W, 600 W or less | 150 N or less | 100 W or less | S-T10 |
| Over 600 W, 1 kW or less | Over 150 N, 300 N or less | Over 100 W, 252 W or less | S-T10 |
| Over 1 kW, 2 kW or less | Over 300 N, 720 N or less | Over 252 W, 838 W or less | S-T21 |

● Selection Examples for MR-J4W3-B (Note 4)

| Total Rotary Servo Motor Output | Total Linear Servo Motor Continuous Thrust | Total Direct Drive Motor Output | Magnetic Contactor (Note 1, 7) |
|---------------------------------|--|---------------------------------|--------------------------------|
| 450 W or less | 150 N or less | — | S-T10 |
| Over 450 W, 800 W or less | Over 150 N, 300 N or less | 252 W or less | S-T10 |
| Over 800 W, 1.5 kW or less | Over 300 N, 450 N or less | Over 252 W, 378 W or less | S-T21 |

- Note 1. Use a magnetic contactor with an operation delay time of 80 ms or less (the time from current application to the operation coil until the contact closes).
- Note 2. The wire size indicates the applicable size for the servo amplifier connector.
- Note 3. When complying with IEC/EN/UL/CSA standards, refer to "MELSERVO-J4 Instructions and Cautions for Safe Use of AC Servos" as enclosed with the servo amplifier.
- Note 4. For details on selection of no-fuse breakers and magnetic contactors used in combination with rotary servo motors, linear servo motors and direct drive motors, refer to "MR-J4W2-_BMR-J4W3-_BMR-J4W2-0303B6 Servo Amplifier Instruction Manual".
- Note 5. Keep the wire length for the regenerative option within 5 m.
- Note 6. When connecting to a terminal block, be sure to use the screws attached to the terminal block.
- Note 7. Install one no-fuse breaker and one magnetic contactor for each servo amplifier or drive unit.
- Note 8. When complying with IEC/EN/UL/CSA standards, refer to "MR-CV_/MR-CR_/MR-J4-DU_ Instructions and Cautions for Safe Use of AC Servos" as enclosed with the power regeneration converter unit, resistance regeneration converter unit, and drive unit.

2.19 Application to Primary Switching of Transformers

When connecting a transformer to the circuit, a significantly larger inrush current flows than usual. This is due to the extremely large magnetizing current that flows, generating a maximum of 2 times the regular magnetic flux in order to saturate the iron core and induce the required voltages.

| Frame | Single-Phase Transformer [kVA(A)] | | | | | | Three-Phase Transformer [kVA(A)] | | | | | |
|------------|-----------------------------------|--------|-------|--------|-------|-------|----------------------------------|-------|-------|-------|-------|-------|
| | 220 V | | 440 V | | 550 V | | 220 V | | 440 V | | 550 V | |
| T10 | 1.2 | (5.5) | 1.5 | (3.5) | 1.5 | (3) | 2 | (5.5) | 2.5 | (3.5) | 2.5 | (3) |
| T12 | 1.5 | (6.5) | 2 | (4.5) | 2 | (3.5) | 2.5 | (6.5) | 3.5 | (4.5) | 4 | (4.5) |
| T20 | 2 | (9) | 3 | (6.5) | 2.8 | (5) | 3.5 | (9) | 5 | (6.5) | 6 | (6.5) |
| T21 | 2.2 | (10) | 3.3 | (7.5) | 3 | (5.5) | 4 | (10) | 7.5 | (10) | 8 | (8.5) |
| T25 | 3 | (13.5) | 3.5 | (8) | 3.7 | (6.5) | 5.5 | (15) | 11 | (15) | 11 | (12) |
| T32 | 3.5 | (16) | 4.5 | (10) | 3.7 | (6.5) | 5.5 | (15) | 13 | (17) | 11 | (12) |
| T35 | 3.7 | (17) | 4.5 | (10) | 4 | (7.5) | 6 | (17) | 13 | (17) | 13 | (14) |
| T50 | 5.5 | (25) | 7.5 | (17.5) | 7.5 | (14) | 9.5 | (25) | 19 | (25) | 19 | (20) |
| T65 | 7 | (32) | 13 | (30) | 11 | (20) | 12 | (32) | 24 | (32) | 21 | (22) |
| T80 | 7.5 | (35) | 14 | (32) | 14.5 | (27) | 15 | (40) | 30 | (40) | 30 | (32) |
| T100 | 10 | (46) | 18.5 | (42) | 19 | (35) | 19 | (50) | 38 | (50) | 38 | (40) |
| N125 | 11 | (50) | 20 | (45) | 20 | (37) | 23.5 | (62) | 40 | (62) | 50 | (52) |
| N150 | 13.5 | (62) | 24 | (55) | 27 | (50) | 28.5 | (75) | 57 | (75) | 65 | (70) |
| N180, N220 | 22 | (100) | 45 | (100) | 50 | (90) | 42 | (110) | 84 | (110) | 95 | (100) |
| N300 | 30 | (135) | 55 | (120) | 65 | (115) | 57 | (150) | 110 | (150) | 140 | (150) |
| N400 | 35 | (165) | 65 | (150) | 80 | (150) | 76 | (200) | 150 | (200) | 190 | (200) |
| N600 | 65 | (300) | 132 | (300) | 160 | (300) | 110 | (300) | 220 | (300) | 280 | (300) |
| N800 | 88 | (400) | 180 | (400) | 215 | (400) | 150 | (400) | 300 | (400) | 380 | (400) |

- Note 1. Applicable for transformer peak inrush currents less than 20 times greater than the rated current value.
- Note 2. If the transformer inrush current exceeds 20 times, select a class AC-3 magnetic contactor such that the current value is less than 10 times the rated operating current. Conversely, if the transformer inrush current is significantly less than 20 times then it can be used at a slightly higher capacity than listed in the table above.
- Note 3. The transformer primary switching has an influence on the magnetizing inrush current of the transformer itself, meaning that repetitive switching 1 time per day etc. is not ideal for the transformer. The entire wiring system, including the transformer, should be checked to ensure there are no problem points with this kind of switching before using in an application.
- Note 4. Electrical durability of 500,000 operations.



3

Handling (Precautions)

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3.1 Usage Environment

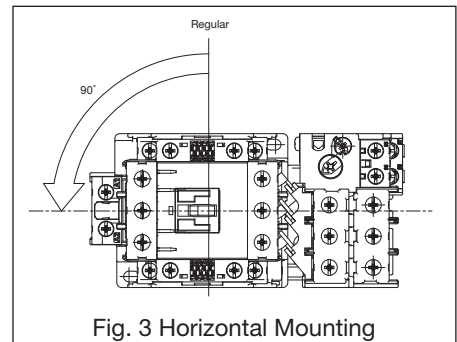
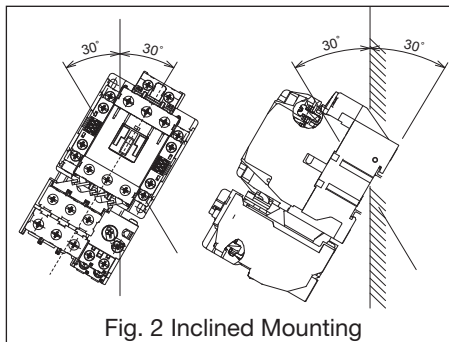
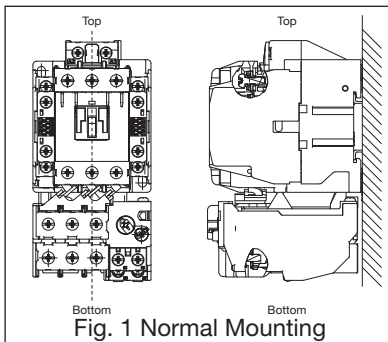
- (1) Ambient Temperature : -10°C to 40°C
 (Applied to the outside of the control board environment) Average daily atmospheric temperature: 35°C (Max.), Average yearly atmospheric temperature: 25°C (Max.)
- (2) Maximum temperature : 55°C However, the ambient temperature of boxed MS type is 40°C (Average yearly temperature of the inside of the control board is 40°C or less)
Please note that the operating characteristics of the Magnetic Contactors and Thermal Overload Relays may vary with the ambient temperature.
- (3) Relative Humidity : 45% to 85% RH (However, dew condensation and freezing should be avoided.)
- (4) Height above sea level: 2000 m or less
- (5) Vibration : 10 to 55 Hz 19.6 m/s^2 or less
- (6) Impact : 49 m/s^2 or less
- (7) Atmosphere : Inclusion of dust, smoke, corrosive gas, moisture, salt content and the like in the atmosphere should be avoided as much as possible.
Please note that continuing to use the device in a closed condition for a long period may cause contact failure.
Never use the device under an atmosphere that contains flammable gas.
- (8) Storage Temperature/ : -30°C to 65°C /45% to 85% RH (However, dew condensation and freezing should be avoided.)
 Relative Humidity The storage temperature is ambient temperature during transportation or storage and should be within the usage temperature when starting to use the device.

3.2 Mounting

The following content applies to MS-T/N Series (including DU-N and B-T/N types). Please consult us regarding other models and special mounting procedures.

● Direct Mounting

- (1) The device should be mounted in a dry location low in dust and vibration.
- (2) The normal mounting direction is the direction shown in Fig. 1 on a vertical surface, but mounting the device at an inclination angle of up to 30 degrees in either direction is allowed. (Fig. 2)
- (3) **Mounting the device on a floor or ceiling is not allowed. (Mounting the device on a floor or ceiling may affect the continuity performance, operation performance, and durability of the contact.)**
- (4) If mounting the device in a horizontal orientation cannot be avoided, be sure to rotate the device by 90 degrees in a counterclockwise direction from the normal mounting direction as shown in Fig. 3 when mounting it. **If the device is mounted in a horizontal orientation, its characteristic is nearly unchanged but mechanical durability may be deteriorated. Horizontal mounting of reversible types, mechanically latched types, or S-N600 and N800 models is not allowed.**



● Mounting of Enclosed Types

Because the lid tightening screws for enclosed type models MS-T10 to T50 are tightened from below, an amount of space equivalent to that shown in Fig. 4 must be secured underneath.

● Tightening torque of mounting screw (Common to all models)

- (1) The device should be mounted by force of tightening torques shown in the right table. (For data on the mounting screws of each model, please refer to the outline drawings.)
- (2) If the product is to be installed onto a plastic surface, please use mounting screws with metal washers.
- (3) Please use mounting screws with a length of M4x14 to M4x22 for MSO/S-T10 to T20 types (including reversible), SR-T5/T9 types, and SRL(D)-T5 types.

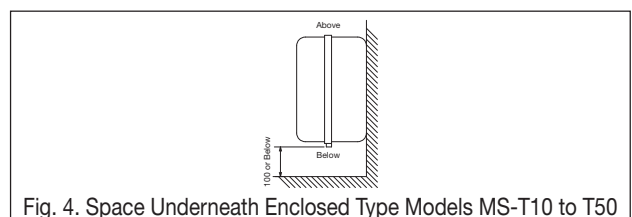
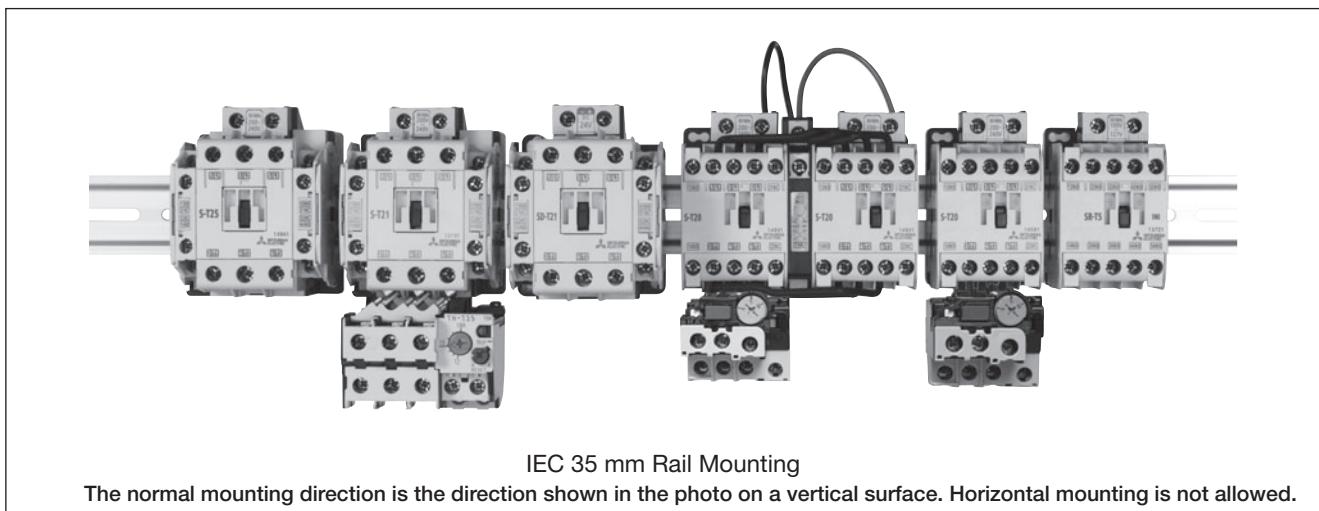


Fig. 4. Space Underneath Enclosed Type Models MS-T10 to T50

| Screw Size | Tightening torque of mounting screw N·m Parentheses Show Standard Value |
|------------|--|
| M4 | 1.2 to 1.9 (1.5) |
| M5 | 2 to 3.3 (2.5) |
| M6 | 3.5 to 5.8 (4.4) |
| M8 | 6.3 to 10.3 (7.8) |
| M10 | 12 to 19 (15) |

● Mounting of IEC 35mm wide rail



(1) Names of Models Representative of Rail Mounted Applications

The T10 to T80 types and SR-T/K types can be mounted on the IEC 35mm wide rail as a standard. In the case of reversible types, rail mounting is possible when a mounting board is used. (MSO-2xT35 to T80, MSOD-2xT35, T50, S-2xT35 to T80, SD-2xT35, T50)

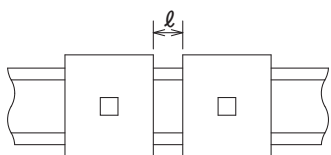
| Magnetic Starters | Magnetic Contactors | Magnetic Starters | Magnetic Contactors | Contactor Relays |
|--------------------------------|---------------------|-------------------|---------------------|------------------|
| MSO-T10 | S-T10 | MSOD-T12 | SD-T12 | SR-T5, T9 |
| MSO-T12 | S-T12 | MSOD-T20 | SD-T20 | SR-K100 |
| MSO-T20 | S-T20 | MSOD-T21 | SD-T21 | SRD-T5 |
| MSO-T21 | S-T21 | MSOD-T35 | SD-T32 | SRD-T9 |
| MSO-T25 | S-T25 | MSOD-T50 | SD-T35 | SRD-K100 |
| MSO-T35 | S-T32 | | SD-T50 | SRL(D)-T5 |
| MSO-T50 | S-T35 | | SL(D)-T21 | SRL(D)-K100 |
| MSO-T65 | S-T50 | | SL(D)-T35 | |
| MSO-T80 | S-T65 | | SL(D)-T50 | |
| | S-T80 | | SL(D)-T65 | |
| | | | SL(D)-T80 | |
| Thermal Overload Relays | | | | |
| TH-T18+UT-HZ18 | | | | |
| TH-T25+UN-RM20 | | | | |

(2) Minimum Clearance ℓ (mm) of Product when Rail Mounted

Because of the effect on temperature rise of individual product parts and product life, make sure to ensure that the dimensions equal to that or above those shown in the table below are ensured between parts when performing rail mounting.

| Frame | T10 T12 T20 T21 | T25 T32 T35 T50 | TH-T18 + UT-HZ18 TH-T25 + UN-RM20 | SR(D)-T/K SRL(D)-T/K | T65 T80 |
|--------------------------|--------------------------|--------------------------|--------------------------------------|-------------------------|------------|
| Minimum Clearance ℓ | 5 | | | 5 | 10 |
| Close Mounting* | OK | | | OK | OK |

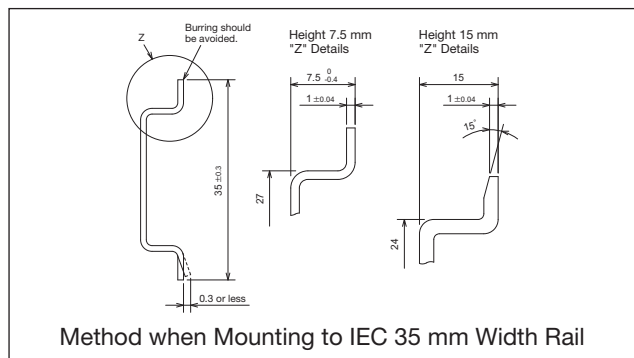
Note: *Although close mounting is allowed, when continuing to apply current to the device or when mounting products high in switching frequency or utilization on the same rail, the device life may be shortened in terms of temperature rise and shock, while attaching/detaching the auxiliary terminal cover will prove difficult if S-T21 to T50 and UT-AX11 are closely mounted. Also, because the characteristics of thermal overload relays are also somewhat influenced by the space between device and heater, please keep the space between the devices over the minimum value shown in the above table as much as possible when mounting them.



(3) Applicable Rail

DIN, EN, IEC, and JIS C2812 standards-compliant 35mm wide rails come in two types: 7.5mm and 15mm in rail height. Their shapes and dimensions are as shown in the figure below.

| Rail | Rail Specifications |
|------|--|
| 1 | TH35-7.5 Rail Width 35 mm, Rail height 7.5 mm |
| 2 | TH35-15 Rail Width 35 mm, Rail height 15 mm |

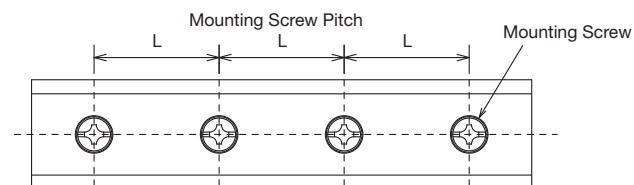


(4) Maximum Pitch of Rail Mounting Screw L (mm)

When mounting a rail on a surface of the board, be sure to keep the rail mounting screw pitch below the dimension shown in the following table in order to secure sufficient mechanical strength.

| Frame | T10 T12 T20 T21 | T25 T32 | TH-T18 + UN-HZ18 SR(D)-T/K SRL(D)-T/K | T35 T50 | T65 T80 |
|----------|--------------------------|------------|---|------------|--------------|
| Rail | | | | | |
| TH35-7.5 | 250 | | | 200 | (150) Note 2 |
| TH35-15 | 500 | | | 500 | 500 |

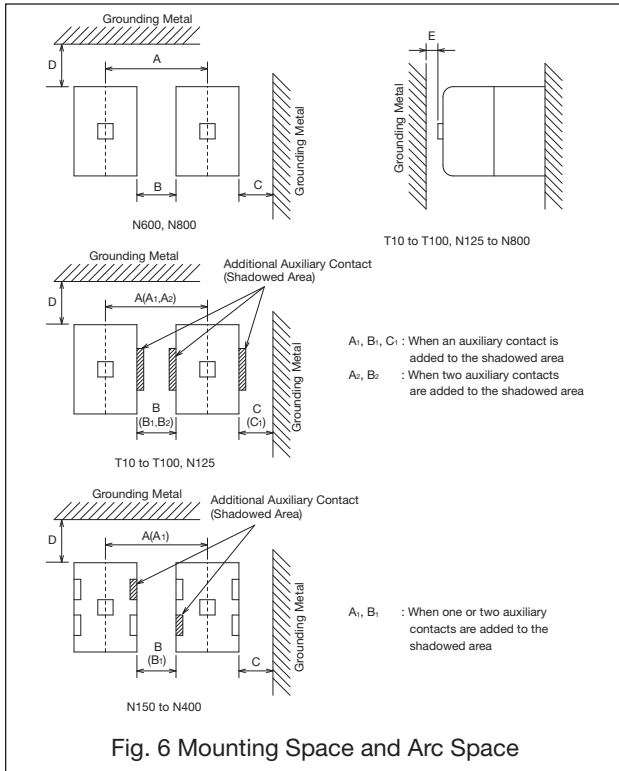
Note 1. It is also recommended that a minimum pitch be selected when installing multiple devices on the same rail.
Note 2. Use of devices with extreme switching frequencies is not recommended for the dimension values in parentheses.



● Mounting Space and Arc Space

When mounting the Magnetic Contactors side by side, be sure to keep the devices isolated by a distance longer than the dimension shown in the following table. Also, the Magnetic Contactors and adjacent grounding metal should be isolated by a distance longer than the dimension shown in the following table. The content indicated () is applied when additionally mounting auxiliary contacts.

Although an arc space is not required in front of the Magnetic Contactors, providing a space longer than the E dimension shown in the following table is recommended in consideration of variation in the Magnetic Contactor's depth dimension, and vibration caused when turning on or releasing the contactor.



● Minimal Mounting Space when Attaching UN-CZ

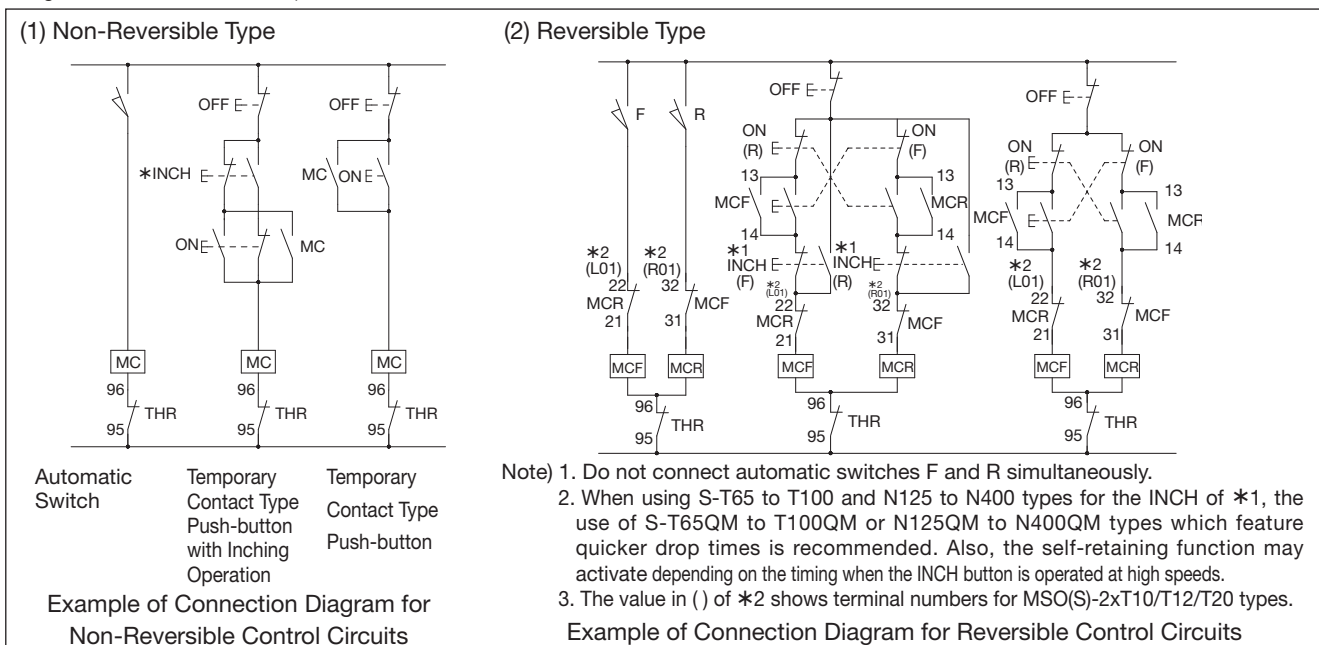
| Frame | B | C |
|------------------|-----|-----|
| T65 to 100, N125 | *34 | *32 |
| N150 to N400 | 64 | 47 |

*When UN-CZ1251 is used for MSO-N125, use B:43 and C:40.

3.3 Connection

● Control Circuit Method and Connecting of Operating Switch

The following figure shows an example diagram for connecting control circuits when automatically or manually operating motors, etc., using an automatic switch and push-button switch.



● Minimal Mounting Space and Arc Space

| Frame | Minimal Mounting Space | | | | Front Arc Space (Note 1) | Front Mounting Space E (Note 4) |
|-------|---|---|------------------------------------|------------------|--------------------------|---------------------------------|
| | A (A ₁ , A ₂) Dimension [mm] | B (B ₁ , B ₂) Dimension [mm] | C (C ₁) Dimension [mm] | D Dimension [mm] | | |
| T10 | 41(A ₁ = 53, A ₂ = 65) | | | | | |
| T12 | 49 | | | | | |
| T20 | (A ₁ = 61, A ₂ = 73) | 5 (Note 3) | 10 | | 15 | 5 (Note 5) |
| T21 | 68 | (B ₁ = 17, B ₂ = 29) | (C ₁ = 22) | | | |
| T25 | (A ₁ = 80, A ₂ = 92) | | | | | |
| T32 | 48(A ₁ = 60, A ₂ = 72) | | | | | |
| T35 | 80 | 5 (Note 3) | 10 | | | |
| T50 | (A ₁ = 93.5, A ₂ = 107) | (B ₁ = 18.5, B ₂ = 32) | (C ₁ = 23.5) | | 25 | 5 |
| T65 | 98 | 10 (Note 3) | 10 | | | |
| T80 | (A ₁ = 111.5, A ₂ = 125) | (B ₁ = 23.5, B ₂ = 37) | (C ₁ = 23.5) | | | |
| T100 | 110 | 10 | 16 | | 15 | 10 |
| T5 | 49 | 5 (Note 3) | 10 | | | |
| T9 | 49 | 5 (Note 3) | 10 | | 0 | 5 (Note 5) |
| N125 | 112 | 12 | 16 | 25 | 0 | 10 |
| N150 | 132 (A ₁ = 140) | 12 (B ₁ = 20) | 16 | 30 | | |
| N180 | 150 (A ₁ = 160) | 12 (B ₁ = 22) | 16 | 50 | | |
| N220 | | | | | | |
| N300 | 175 (A ₁ = 185) | | | 90 | | |
| N400 | | | | | | |
| N600 | 305 | 15 | 20 | | | |
| N800 | | | | | | |

- Note 1. The value of arc space is a value of IEC and JIS Standards-based shut-off capacity test.
- Note 2. When using a UN-CZ model live part protection cover, because space for mounting and removing the live part protection cover is required, make sure to ensure that dimensions B and C are equal to or above those shown in the table left.
- Note 3. Although the B dimension of T10 to T80, T5/T9 allows close mounting, when continuing to apply current to the device or when mounting products high in switching frequency or utilization on the same rail, the device life may be shortened in terms of temperature rise and shock. Additionally, because close mounting of S-T21 to T50 and UT-AX11 will make it difficult to attach or detach auxiliary terminal covers, make every effort to mount the devices at intervals of at least the minimum value shown in the above table.
- Note 4. Always ensure a distance of 5 mm or more between mechanically latched type SL(D)-T21 to T80, SRL(D)-T5 models.
- Note 5. A space of 3 mm must be insured when mounting UT-AX2 and UT-AX4 models.

● **Applicable electric wire size and tightening torque and terminal dimension of terminal screw**

⚠ There may cause overheating or fire. Be sure to properly keep the tightening torque and periodically re-tighten the screw. However, please note that tightening the screw under the status where oil is adhered to the terminal portion may damage the terminal screw even within the existing tightening torque.

Electric wires should be properly connected according to the electric wiring diagram. Tightening the terminal screw should be properly conducted within the tightening torque shown in the table below. Insufficient tightening of the terminal screw may cause overheating or cause the electric wire to drop off. Excessive tightening torque may damage the terminal screw. Adhesion of rock paint, thermo-labels, etc. to electric wire connection or contact may cause heat generation due to defective continuity: this is very dangerous.

The main circuit terminals of T10 to T50 and TH-T18 to T50 types may be wired connected by single wire, stranded wire, and crimp lug. The main circuit terminals and operating circuit terminals of T10 to T32 and TH-T18/T25 types are self-lifting terminals that are easy to connect.

| Model | Terminal dimension and size/type of screw | | | Applicable electric | | Applicable Crimp Lug Size | Connection conductor thickness(T) | Tightening torque of terminal screw [N·m] Reference values are given in brackets. | | | | | | | |
|---|--|-------------------|-------------------------------|--------------------------------------|---------------------------|---------------------------|--|---|-----------------------------------|--|---------------------|----------------------|------------|------------|------------|
| | Main circuit | | Operating circuit | wire size [ømm, mm ²] | | | | Main circuit | Operating circuit | Main circuit | Operating circuit | | | | |
| Standard type Contactor Relays Magnetic Contactors Thermal Overload Relays (Note 1) | Dimension of terminal portion X x Y x Z [mm] (Note 2) | Screw size | Screw type | Cross slot screw with pressure plate | Main circuit | Operating circuit | Main circuit | Operating circuit | Main circuit (Note 2) | Main circuit | Operating circuit | | | | |
| SR-T5, T9 | — | — | — | M3.5x7.6 | — | — | — | — | — | — | — | | | | |
| S-T10, T12, T20 | 7.5 x 3.7 x 4.5 | M3.5x7.6 | Self-Lifting Cross-slot Screw | M3.5x7.6 | ø1.6 0.75 to 2.5 | ø1.6 0.75 to 2.5 | 1.25-3.5 to 2-3.5 5.5-S3* (Notes 9, 10) | 1.25-3.5 to 2-3.5 | 1.6 | 0.9 to 1.5 | 0.9 to 1.5 | | | | |
| S-T21, T25, T32 | 10.5 x 5.2 x 5.5 | M4x10.5 | | M3.5x7.6 | ø1.6 to 2.6 1.25 to 6 | | | | 1.25-4 to 5.5-4 | 3 | | 1.2 to 1.9 | | | |
| S-T35, T50 | 13.3 x 5.5 x 6.9 | M5x14.8 | | M3.5x7.6 | ø1.6 to 3.6 1.25 to 16 | | | | 1.25-5 to 14-5 22-S5 (Note 10) | 6 | | 2.0 to 3.3 | | | |
| S-T65, T80 (Note 11) | 15 x 7 x 8.5 | M6x12 | Plus-minus Screw | M4x10 | 2 to 22 (Note 3) | 1.25 to 2 | 1.25-6 to 22-6 38-S6 (Note 10) 60-S6 (Note 10) | 1.25-4 to 2-4 5.5-S4 | 3.7 | 3.5 to 5.7 | 1.2 to 1.9 | | | | |
| S-T100 | 15 x 7.5 x 11.5 | | | | 2 to 38 (Note 3) | | | | 1.25-6 to 60-6 | | | 4 | | | |
| SR-K100 | — | — | — | M3.5x7.5 | — | — | — | 1.25-3.5 to 2-3.5 | — | — | 0.94 to 1.51 (1.17) | | | | |
| S-N125 | 15 x 8.5 x 14 | M8x20 | Hex Bolt (With Cross) | M4x10 | — | ø1.6 1.25 to 2 | 5.5-8 to 60-8 | 1.25-4 to 2-4 5.5-S4 | 10.5 | 6.28 to 10.29 (7.84) | 1.18 to 1.86 (1.47) | | | | |
| S-N150 | 20 x 10 x 15 | M8x20 | | | — | | | | 8-8 to 100-8 | 10.5 | | 6.28 to 10.29 (7.84) | | | |
| S-N180, N220 | 25 x 12.5 x 18 | M10x25 | | | — | | | | 14-10 to 150-10 | 13.5 | | 11.8 to 19.1 (14.7) | | | |
| S-N300, N400 | 30 x 15 x 22.5 | M12x30 | | | — | | | | 22-12 to 200-12 | 15.5 | | 19.6 to 31.3 (24.5) | | | |
| S-N600, N800 | 40 x 15 x 28 | M16x45 | | | — | | | | 80-16 to 325-16 | 25 | | 62.8 to 98 (78.4) | | | |
| SD-Q11, Q12 | 7.5 x 5.5 x 4 | M3.5x7.6 | Self-Lifting Cross-slot Screw | M3.5x7.6 | ø1.6 1.25 to 2 | ø1.6 1.25 to 2 | 1.25-3.5 to 2-3.5 | 1.25-3.5 to 2-3.5 | 1.6 | 0.94 to 1.17 (1.0) | 0.94 to 1.17 (1.0) | | | | |
| TH-T18 (Load Side) | 7.5 x 4 x 4 | M3.5x7.6 | | M3.5x7.6 | ø1.6 0.75 to 2.5 | | | | ø1.6 0.75 to 2.5 | 1.25-3.5 to 2-3.5 5.5-S3* (Notes 9, 10) | 1.25-3.5 to 2-3.5 | 2 | 0.9 to 1.5 | 0.9 to 1.5 | |
| TH-T25 (Power Side/Load Side) | 10.2 x 6.8 x 5 / 10.2 x 5.7 x 5 | M4x10.5 / M4x10.5 | | M3.5x7.6 | ø1.6 to 2.6 1.25 to 6 | | | | | | | 1.25-4 to 5.5-4 | 2.5 | | 1.2 to 1.9 |
| TH-T50 (Load Side) | 13.3 x 5.8 x 6.9 | M5x14.8 | | M3.5x7.6 | ø2 to 3.6 4 to 14 | | | | | | | 5.5-5 to 14-5 | 8 | | 2.0 to 3.3 |
| TH-T65 | 17 x 7.5 x 8.5 | M6x12 | Plus-minus Screw | M4x10 | 2 to 22 (Note 3) | ø1.6 1.25 to 2 | 5.5-6 to 22-6 | 1.25-4 to 2-4 5.5-S4 | 4 | 3.5 to 5.7 | 1.2 to 1.9 | | | | |
| TH-T100 (Load Side) | 15 x 7.5 x 10 | M6x12 | | | 8 to 38 (Note 3) | | | | 14-6 to 22-6 38-S6 (Note 10) | 3.7 | | 3.5 to 5.7 | | | |
| TH-N120 | 15 x 10 x 12 | M8x20 | Hex Bolt (With Cross) | M4x10 | — | ø1.6 1.25 to 2 | 8-8 to 38-8 | 1.25-4 to 2-4 5.5-S4 | 11.5 | 6.28 to 10.29 (7.84) | 1.18 to 1.86 (1.47) | | | | |
| TH-N120TA (Load Side) | 20 x 10 x 15 | M8x20 | | | — | | | | 38-8 to 100-8 | 11.5 | | 6.28 to 10.29 (7.84) | | | |
| TH-N220RH (Load Side) | 25 x 12.5 x 20 | M10x25 | | | — | | | | 22-10 to 150-10 | 14.5 | | 11.8 to 19.1 (14.7) | | | |
| TH-N220HZ | | | | | — | | | | 22-12 to 200-12 | 17.5 | | 19.6 to 31.3 (24.5) | | | |
| TH-N400RH (Load Side) | | | | | 30 x 15 x 22.5 | | | | M12x30 | — | | — | 2.5 | — | |
| TH-N400HZ | — | — | — | — | — | — | — | — | — | — | | | | | |
| TH-N600 | — | — | — | — | — | — | — | — | — | — | — | | | | |

Please read the notes on the following page.

(Continued on Next Page)

Note 1. SD, SL, and SLD-T/N types are the same.

Note 2. The dimension of the main circuit terminal is a dimension for board conductor wiring. (See the right diagram) The board conductor thickness (T dimension) must be below the allowable connection conductor thickness indicated on page 65, because of the length of the terminal screw. In case of wiring with two boards used, the total value of two boards must be below the value (T dimension) shown in the table.

Note 3. If wiring to terminals is performed with the insulation coating peeled, please use the designated wire press. In this case, the value between parentheses is the size of electrical wire that can be connected.

- MS-T65 to T100 types include a pressure plate for the main circuit.
- MSO, S-T65 to T100 types do not include a pressure plate for the main circuit.
- MS, MSO, S-N125 to 800 types are dedicated for crimp lug wiring.

Note 4. Control circuits are auxiliary contact terminals or coil terminals of magnetic contactors and control circuit terminals of thermal overload relays.

Note 5. In each terminal, two wires or two crimp lugs may be connected. (One crimp lug and one wire can also be connected)

Note 6. The cross slot screws with pressure plate of T Series and those of N Series are the same in size but different in pressure plate dimension, so please avoid the mixed use of such screws. This may break the insulation barrier or make the wire likely to fall out.

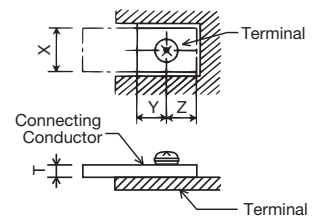
Note 7. When using the IEC60529 finger-safe specification for MSO/S-T10(BC), T50(BC), T65CW, T80CW, and SR-T5/T9(BC), be sure to insulate the crimping part of the crimp lug. However, please insulate 5.5-S3 by a method other than insulated crimp terminal.

Note 8. Tightening the terminal screw excessively without wiring may break the screw and consequently disable the tightening, so please avoid such excessive tightening.

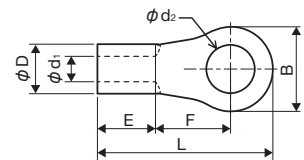
Note 9. When wiring two crimp lugs for T10 to T20BC and TH-T18BC, use crimp lugs with an F dimension of 6 mm or more.

Note 10. J.S.T. Mfg. Co., Ltd. model numbers are shown as typical applicable crimp lugs.

Note 11. Ring crimp lugs cannot be used for connection when wiring to T65CW, T80CW auxiliary contact terminals.

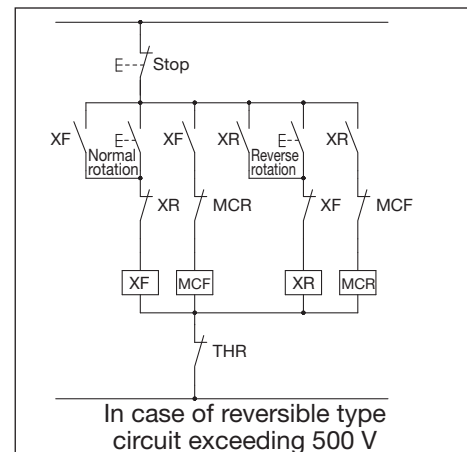


Crimp Lug Dimensions



Application to Circuits Exceeding 380 V

- (1) When applying MS/MSO/S-T10, T12, T20, SR-T□/K□, and TH-T18 types to a circuit exceeding 380 V to set crimp lug wiring, be sure to insulate the crimping part. However, please insulate 5.5-S3 by a method other than insulated crimp terminal.
- (2) When applying such parts to a Reversing type circuit exceeding 500V, please use an SR-T type Contactor Relays (XF, XR) as shown in the right figure to set the switching time allowance.
- (3) For application to a circuit exceeding 380 V for crimp lug 22-S5 with MS/MSO/S-T35, T50 or crimp lug 60-S6 with MS/MSO/S-T65, T80, use the insulation cap attachment.



Break Contact Terminals

When removing break contact terminals for the auxiliary contacts and contactor relays of magnetic contactors during wiring or when reinstalling after inspection, make sure to do so after ensuring that the Connectable Carrier (Crossbar) is pushed in. (If reinstallation is performed without the cross bar pushed in, the movable terminal contact of the break contact may come off inside, malfunction, or suffer contact failure).

Wiring Direction

Although the upper terminal side is usually set to the power supply side when wiring, the lower terminal side may be set to the power supply side when it is unavoidable due to some reason of the board wiring. **However, the mounting direction must be in accordance with the description in Item 3.2 on Page 62.**

Precautions for DC Contactor Use

As shown in Fig. A to the right, if the area of the DC circuit where the minus side of the coil opens and closes at the control contact is high in humidity and is at a location where condensation forms easily, the coil may become disconnected due to electrical corrosion*.

As shown in Fig. B, it is recommended that the control contact open and close on the plus side of the coil.

*Electrical Corrosion: A phenomenon where the surface of metals chemically undergoes corrosive wear due to the surrounding environment or electrochemical reactions

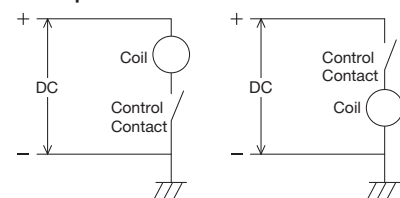


Fig. A

Fig. B

3.4 Operating Circuits

- ⚠ Applying a low voltage that does not operate the Magnetic Contactors to the operating circuit may cause overcurrent to the coil, which may cause the coil to be burned in a short time.
- ⚠ If the operating circuit wiring is too long, when the coil's instantaneous current flows, the wiring impedance may cause a reduction in the coil voltage, so that the operating circuit may fail to be activated. Also, the stray capacitance of the wired line may cause the coil's excitation not to be released even when releasing the excitation.
- ⚠ Use in a circuit (inverter) with high harmonics and high frequency levels can burn the operation coil or surge absorber with CR in the S-T65 to T100, N125 to N800 type Magnetic Contactors.

● Power Supply Voltage Fluctuation Range for Operating Circuit

(1) Operating Voltage

When the rated voltage and frequency are applied to the coil at an ambient temperature of 40°C (Inside temperature of the board: 55°C), the device operates without any problem at 85 to 110% of the rated voltage of the coil after the temperature increases and becomes saturated.

(2) Voltage/Frequency and Coil Rating of Operating Circuit

The rated voltage/frequency of the operating circuit and that of the control coil must be matched.

Applying a voltage exceeding 100% of the rated voltage to the control circuit when using the coil may acceleratedly deteriorate of the coil insulation and consequently reduced mechanical durability, so set the coil's average voltage to 95 to 100% of the rated voltage when using the coil.

● Selection of Operating Transformer Capacity

Please refer to the following page for operating transformer capacities for magnetic contactors.

S-T/N Type Magnetic Contactors: Page 43

SL(D)-T/N Type Magnetic Contactors: Page 99

● Driving Magnetic Contactor with Triac Control

The electromagnet in the S-T65 to T100, N125 to N800 type Magnetic Contactor incorporates the capacitor-drop type AC operated DC excited method using the capacitor drop. Thus, a Triac with voltage resistance that is 2-2-fold the circuit voltage must be selected.

If the Triac voltage resistance is low, use of a varistor in parallel with the Triac is recommended.

● Using with Square Wave Power Supply

The electromagnet in the S-T65 to T100, N125 to N800 type Magnetic Contactor incorporates the AC operated DC exciting method using the capacitor drop. It cannot be used with a square wave as the coil's exciting current will increase greatly.

● Connecting Multiple Units in Row

If using with multiple S-T65 to T100 and N125 to N800 type magnetic contactor control circuits connected in a row, the open time may be roughly doubled due to influence from the built-in capacitor.

In the case of failure, please arrange the circuit as shown to the right.

3.5 Application to Special Environments

- ⚠ Please note that the operation characteristics of Magnetic Contactor and Thermal Overload Relay may vary with the ambient temperature.

● High Temperatures

When using Magnetic Starters or Magnetic Contactors at high ambient temperature, the temperature may mainly affect the insulation life (continuous electric conduction life) of the operation coil and the aging variation of the molding component.

MS-T/N types, open MSO and S-T/N types without a box are standard products available even at the inside temperature of 55°C.

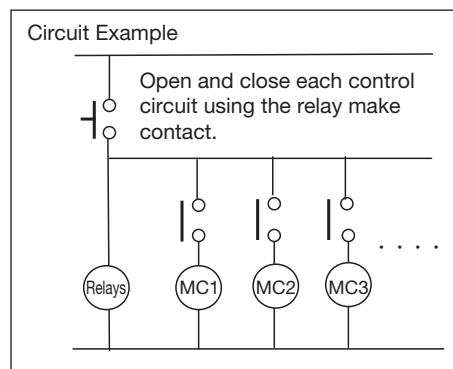
● Low Temperatures

Although the Magnetic Contactors may be transported to a cold region or used in such a cold region or under cold conditions such as those found in a refrigerator with the contactor incorporated in a switchboard the S-T type Magnetic Contactors is applicable as a standard product. The S-N type magnetic contactor series feature the low-temperature specification S-N □ LT type. Except for those shown below, we do not manufacture low-temperature specification magnetic starters, magnetic contactors, or thermal overload relays.

Low-temperature-based products: S-N □ LT, S-2×N □ LT Types

Applicable temperature range of low-temperature product: Operating temperature -50 to 55°C

Storage Temperature -60 to 65°C



● Corrosive Gas

Corrosive gases that exist in an environment with Magnetic Starters or Magnetic Contactors used are gases such as sulfurous acid (SO₂), hydrogen sulfide (H₂S), chlorine (Cl₂), and ammonia (NH₃), and conductive portions can be protected by plating a metal resistant to such gases on the portion. However, because there is no adequate corrosion prevention method for the contact, such gases may increase the contact resistance, resulting in increased temperature.

Additionally, if the environment contains some corrosive gas but is under dry conditions, this may delay the progression of corrosion, so using the switchboard with the inside kept as dry as possible is also one of the corrosion prevention methods. In the Magnetic Starters and Thermal Overload Relays, corrosion-prevented products (MS-T/N□YS, MSO-T/N□YS, S-N□YS, TH-T/N□YS types) of the specification with increased corrosion resistance to such corrosive gases are also manufactured. Additionally, S-T10 to T32 and SD-T12 to T32 type Magnetic Contactors is of corrosion resistance-increased specification as a standard product.

● Dust

Magnetic Starters and Magnetic Contactors used in an iron foundry, construction site, or powder conveying machine tend to be subject to a relatively large amount of dust. When using the control board in such locations, the board must be dust-prevention-structured. **Also, using the board under hermetically-sealed condition for a long period may cause contact failure.**

● Export of the Products to Tropical Regions

The environment of exported products which pass through tropical regions tends to be of high temperature and high humidity, and humidity is the environmental factor that affects the Magnetic Starters and Magnetic Contactors most severely. Humidity is the biggest rust-generating factor and the exported products must be in a structure resistant to humidity. Although the standard products have sufficient mold resistance, for exports that pass through the tropics, it is recommended to add a moisture absorbent (silica gel) in an amount of 3 kg or more per 1 m³, so as to lower the humidity and conform to JIS Z1402 export-use packing stipulations.

3.6 Precautions for Use

⚠ **Be sure to periodically check the Magnetic Starters and apply danger prevention measures on the sequence of important circuits.**

(The Magnetic Starters contacts may suffer from defective continuity, welding, and burning.)

⚠ **When performing installation, wiring, and maintenance & inspection, be sure to disconnect the Magnetic Starters from the power supply. It may cause electric shock. In addition, the malfunction attributable to vibration, impact, and false wiring may exert serious results (machine malfunction, short-circuiting of power supply, etc.) on the Magnetic Contactors.**

● Performance

The performance described in this catalog is based on the result of a test conducted under the conditions specified in the Standard (JEM1038 "Magnetic Contactors", JISC8201-4-1 "Low Voltage Switching Devices and Control Devices", etc.). If actual use condition is different from this test condition, the user must evaluate the condition (by using an actual device).

● Use Conditions

Although the device can operate without any problem when under the conditions described in this chapter, be careful regarding the following.

(1) Ambient Temperature

Even under normal usage, deterioration of the insulation will progress.

In particular, as the ambient temperature rises, the insulation life is shortened. In general, it is said that every time the ambient temperature rises by 6 to 10°C, the insulation life decreases by half (Arrhenius' law). In a case where the ambient temperature is high and voltage exceeding the rated voltage is continuously applied to coil, the coil temperature rises and life may be shortened dramatically.

(2) Vibration/Shock

Although vibration of 19.6 m/s² and shock of 49 m/s² do not cause contact malfunction, there may be trouble due to fatigue damage etc. when the vibration and shock are below these values but are applied continuously.

In particular, please note that the resonance of an installed board may exert a large vibration on the product.

3.7 Maintenance, Inspection and Part Replacement

Please refer to the operation manual or maintenance manual for information on the correct maintenance and inspection, as well as part replacement (coils, contacts).

Because the following parts cannot be replaced, never perform disassembly.

(1) MS-T Series Magnetic Contactors and Contactor Relays

(S(D)-T10 to T32, SR(D)-T5/T9)

(2) Mechanically Latched Contactors, Contactor Relays

(SL(D)-□, SRL(D)-□)

(3) Delay Open Type Magnetic Contactors and Relays

(S-T/N□DL, SR-T□DL)

(4) DC Interface Contactors (SD-Q□/QR□)

(5) Because heat-resistant magnetic contactors and contactor relays (Classes 1 and 2), as well as MS-T/N□ type enclosed magnetic starters are products for the Electrical Appliance and Material Safety Law in Japan, please do not modify them.

4

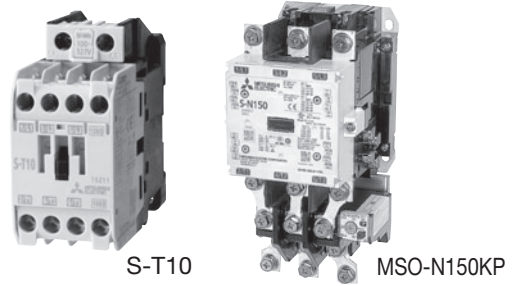
MS-T/N Series Magnetic Starters/Magnetic Contactors

| | | |
|------|---|-----|
| 4.1 | Standard (AC Operated) Magnetic Starters/Magnetic Contactors MS/MSO/S-□ | 70 |
| 4.2 | Reversible Magnetic Starters/Magnetic Contactors MS/MSO/S-2x□ | 71 |
| 4.3 | DC Operated Magnetic Starters/Magnetic Contactors MSOD/SD-□ | 87 |
| 4.4 | Mechanically Latched Magnetic Starters/Magnetic Contactors MSOL(D)/SL(D)-□ | 98 |
| 4.5 | Delay Open Magnetic Starters/Magnetic Contactors MSO/S-□DL | 107 |
| 4.6 | Magnetic Starters with Saturable Reactors and Thermal Overload Relays MSO-□(KP)SR | 110 |
| 4.7 | Magnetic Starters with Quick-acting Characteristics Thermal Overload Relays MSO-□FS(KP)..... | 112 |
| 4.8 | Magnetic Starters with Push-Buttons MS-□PM | 113 |
| 4.9 | Magnetic Starters/Magnetic Contactors with Wiring Streamlining Terminals MSO/S-T□BC | 115 |
| 4.10 | Main Circuit 3-Pole Magnetic Contactors S(D)-T32, S-N□8..... | 117 |
| 4.11 | How to Order | 120 |

4.1 MS/MSO/S- □ Standard (AC Operated) Magnetic Starters/Magnetic Contactors

A high quality product that supports the various needs of our customers on a global scale.

- Usable in general applications such as motor starting, stopping, and burnout protection.
- Adopts twin contacts for the auxiliary contacts across all series for high reliability.
- Our standard products comply with the domestic standards as well as various overseas standards and are certified as meeting all standards. (Refer to page 252 for details.)

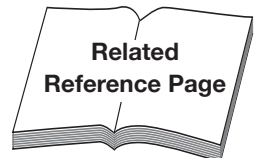


● Ratings/Specifications (Standard Applicability)

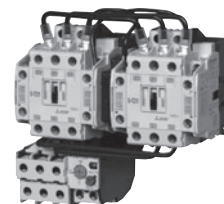
| Magnetic Contactors | Magnetic Starters (Note 12) | Rated Capacity [kW] | | | | Rated Operating Current [A] | | | | Resistive Load (Category AC-1) | | Conventional Free-Air Thermal Current [A] | Auxiliary Contact | | Compatible Thermal Overload Relays | |
|---------------------|-----------------------------|---|----------------|----------|---------|---|---------------------|----------|---------|--------------------------------|----------------|---|--------------------|--------------------------------------|------------------------------------|------------------------------|
| | | Three-Phase Squirrel-cage Motor (Category AC-3) | | | | Three-Phase Squirrel-cage Motor (Category AC-3) | | | | Resistive Load (Category AC-1) | | | Standard (Special) | Additional Unit Model Names x Pieces | Model Name | Heater Designation Range [A] |
| | | AC220 to 240 V | AC380 to 440 V | AC500 V | AC690 V | AC220 to 240 V | AC380 to 440 V | AC500 V | AC690 V | AC100 to 240 V | AC380 to 440 V | Ith | | | | |
| S-T10(BC) | MSO-T10(BC)KP | 2.5[2.2] | 4[2.7] | 4[2.7] | 4 | 11[11] | 9[7] | 7[6] | 5 | 20 | 11 | 20 | 1a(1b) | UT-AX2, 4(BC) x 1 or UT-AX11(BC) x 2 | TH-T18(BC)KP | 0.12 to 9 |
| S-T12(BC) | MSO-T12(BC)KP | 3.5[2.7] | 5.5[4] | 5.5[5.5] | 5.5 | 13[13] | 12[9] | 9[9] | 7 | 20 | 13 | 20 | 1a1b (2a, 2b) | | TH-T18(BC)KP | 0.12 to 11 |
| S-T20(BC) | MSO-T20(BC)KP | 4.5[3.7] | 7.5[7.5] | 7.5[7.5] | 7.5 | 18[18] | 18[18] | 17[17] | 9 | 20 | 13 | 20 | 2a2b | | TH-T25(BC)KP | 0.12 to 15 |
| S-T21(BC) | MSO-T21(BC)KP | 5.5[4] (Note 3) | 11[7.5] | 11[7.5] | 7.5 | 25[20] | 23[20] | 17[17] | 9 | 32 | 32 | 32 | 2a2b | | TH-T25(BC)KP | 0.24 to 22 |
| S-T25(BC) | MSO-T25(BC)KP | 7.5 [5.5] | 15[11] | 15[11] | 11 | 30[26][26] (Note 1) | 30[26][25] (Note 1) | 24[20] | 12 | 32 | 32 | 32 | 2a2b | | TH-T25(BC)KP | 0.24 to 22 |
| S-T32(BC) | — | 7.5 [7.5] | 15[15] | 15[11] | 11 | 32[32] | 32[32] | 24[20] | 12 | 32 | 32 | 32 | — | | — | — |
| S-T35(BC) | MSO-T35(BC)KP | 11[7.5] | 18.5[15] | 18.5[15] | 15 | 40[35] | 40[32] | 32[26] | 17 | 60 | 60 | 60 | 2a2b | | TH-T25(BC)KP | 0.24 to 22 |
| S-T50(BC) | MSO-T50(BC)KP | 15[11] | 22[22] | 25[22] | 22 | 55[50][50] (Note 1) | 50[48] | 38[38] | 26 | 80 | 80 | 80 | | | TH-T50(BC)KP | 29 |
| S-T65(CW) | MSO-T65(CW)KP | 18.5[15] | 30[30] | 37[30] | 30 | 65[65] | 65[65] | 60[45] | 38 | 100 | 100 | 100 | | | TH-T25(BC)KP | 0.24 to 22 |
| S-T80(CW) (Note 10) | MSO-T80(CW)KP (Note 11) | 22[19] | 45[37] | 45[45] | 45 | 85[80] | 85[80] | 75[75] | 52 | 120 | 120 | 120 | | | UN-AX2, 4 x 1 or UN-AX11 x 2 | TH-T65KP |
| S-T100 | MSO-T100KP | 30[22] | 55[45] | 55[45] | 55 | 105[100] | 105[93] | 85[75] | 65 | 150 | 150 | 150 | 2a2b | TH-T100KP (Note 4) | 67 | |
| S-N125 | MSO-N125KP | 37[30] | 60[60] | 60[60] | 60 | 125[125] | 120[120] | 90[90] | 70 | 150 | 150 | 150 | | UN-AX80 x 2 | TH-T65KP | 15 to 54 |
| S-N150 | MSO-N150KP | 45[37] | 75[75] | 90[90] | 90 | 150[150] | 150[150] | 140[140] | 100 | 200 | 200 | 200 | | TH-T100KP | 67, 82 | |
| S-N180 | MSO-N180KP | 55[45] | 90[90] | 110[110] | 110 | 180[180] | 180[180] | 180[180] | 120 | 260 | 260 | 260 | | TH-N120KP | 42 to 105 | |
| S-N220 | MSO-N220KP | 75[55] | 132[110] | 132[132] | 132 | 250[220] | 250[220] | 200[200] | 150 | 260 | 260 | 260 | | (TA) | 42 to 125 | |
| S-N300 | MSO-N300KP | 90[75] | 160[150] | 160[160] | 200 | 300[300] | 300[300] | 250[250] | 220 | 350 | 350 | 350 | | UN-AX150 x 2 | TH-N220KPRH | 82 to 150 |
| S-N400 | MSO-N400KP | 125[110] | 220[200] | 225[200] | 250 | 400[400] | 400[400] | 350[350] | 300 | 450 | 450 | 450 | | TH-N400KPRH | 82 to 180 | |
| S-N600 | — | 190[160] | 330[300] | 330[300] | 330 | 630[630] | 630[630] | 500[500] | 420 | 660 | 660 | 660 | | TH-N600KPRH | 105 to 250 | |
| S-N800 | — | 220[200] | 440[400] | 500[400] | 500 | 800[800] | 800[800] | 720[720] | 630 | 800 | 800 | 800 | | UN-AX600 x 1 | TH-N600KP (Note 5) | 105 to 330 |
| | | | | | | | | | | | | | | | | 250 to 500 |
| | | | | | | | | | | | | | | | 250 to 660 | |

- Note 1. The value in parentheses for the rated operating current is applicable in the case of magnetic contactors.
- Note 2. Enclosed type magnetic starters are of MS-□ type. T20, T25, T32 and N600, N800 types are outside production range. It should be noted that auxiliary contact units cannot be additionally installed to enclosed types. MS-T□ DP is for single-phase motors. Refer to page 253 article 10.3 for details about production range or applicable capacities.
- Note 3. MS-T21 type with 200 to 220 V ratings are 3.7 kW, in accordance with the Electrical Appliance and Material Safety Law.
- Note 4. Enclosed type heater designation 67A uses a thermal overload relay dedicated for enclosed types.
- Note 5. Please use TH-N600 in combination with a separately sold current transformer (Mitsubishi CW-□).
- Note 6. Refer to page 49 for information regarding application to resistive loads and capacitive loads.
- Note 7. The main contact minimum operating voltage and current differ depending on the allowable fault rate. Refer to page 40 for details.
- Note 8. "BC" in the model name refers to "wiring streamlining terminal".
- Note 9. T65 to T100 and N125 to N800 are AC operated, DC energizing types, which may become unusable or undergo property alteration depending on the control circuit conditions. Carefully read page 67 before use.
- Note 10. Contact us or the dealer if you intend to use it at rating 120 A or higher in Class AC-1.
- Note 11. MSO-T80CW heater designation 67A is not manufactured.
- Note 12. MSO-T□ and MSO-N□ types can also be manufactured.

| Item | Reference Page | Remarks |
|---|----------------|---------|
| · Auxiliary Contact Rating | Page 39 | — |
| · Operation Coil | Page 41 | — |
| · Properties | Page 43 | — |
| · Performance | Page 44 | — |
| · Outline Drawings/Contact Arrangements | Page 73 | — |
| · How to Order | Page 120 | — |
| · Combining with Optional Units | Page 180 | — |



4.2 MS/MSO/S-2x□ Reversible Magnetic Starters/ Magnetic Contactors



MSO-2xT21KP

Ideal for forward/reverse operation of AC motors

- Ideal for forward rotation, reverse rotation, or plugging, as well as for the switching of normal and emergency power supplies.
- A highly reliable mechanical interlock is equipped as standard.

● Ratings/Specifications (Standard Applicability)

| Magnetic Contactors | Magnetic Starters (Note 12) | Rated Capacity [kW] | | | | Rated Operating Current [A] | | | | | | Conventional Free-Air Thermal Current I _{th} [A] | Auxiliary Contact | | Compatible Thermal Overload Relays | |
|---------------------|-----------------------------|---|----------------|----------|---------|---|---------------------|----------|---------|--------------------------------|----------------|---|-----------------------------|--------------------------------------|------------------------------------|------------------------------|
| | | Three-Phase Squirrel-cage Motor (Category AC-3) | | | | Three-Phase Squirrel-cage Motor (Category AC-3) | | | | Resistive Load (Category AC-1) | | | Standard (Special) | Additional Unit Model Names x Pieces | Model Name | Heater Designation Range [A] |
| | | AC220 to 240 V | AC380 to 440 V | AC500 V | AC690 V | AC220 to 240 V | AC380 to 440 V | AC500 V | AC690 V | AC100 to 240 V | AC380 to 440 V | | | | | |
| S-2xT10(BC) | MSO-2xT10(BC)KP | 2.5[2.2] | 4[2.7] | 4[2.7] | 4 | 11[11] | 9[7] | 7[6] | 5 | 20 | 11 | 20 | 1a x 2 + 2b (1b x 2 + 2b) | | | 0.12 to 9 |
| S-2xT12(BC) | MSO-2xT12(BC)KP | 3.5[2.7] | 5.5[4] | 5.5[5.5] | 5.5 | 13[13] | 12[9] | 9[9] | 7 | 20 | 13 | 20 | 1a1b x 2 + 2b (2a x 2 + 2b) | | TH-T18(BC)KP | 0.12 to 11 |
| S-2xT20(BC) | MSO-2xT20(BC)KP | 4.5[3.7] | 7.5[7.5] | 7.5[7.5] | 7.5 | 18[18] | 18[18] | 17[17] | 9 | 20 | 13 | 20 | 1a1b x 2 + 2b (2a x 2 + 2b) | UT-AX2, 4(BC) x 2 or UT-AX11(BC) x 2 | | 0.12 to 15 |
| S-2xT21(BC) | MSO-2xT21(BC)KP | 5.5[4] (Note 3) | 11[7.5] | 11[7.5] | 7.5 | 25[20] | 23[20] | 17[17] | 9 | 32 | 32 | 32 | | | TH-T25(BC)KP | 0.24 to 22 |
| S-2xT25(BC) | MSO-2xT25(BC)KP | 7.5[5.5] | 15[11] | 15[11] | 11 | 30[26][26] (Note 1) | 30[26][25] (Note 1) | 24[20] | 12 | 32 | 32 | 32 | | | | 0.24 to 22 |
| S-2xT32(BC) | — | 7.5[7.5] | 15[15] | 15[11] | 11 | 32[32] | 32[32] | 24[20] | 12 | 32 | 32 | 32 | | | | — |
| S-2xT35(BC) | MSO-2xT35(BC)KP | 11[7.5] | 18.5[15] | 18.5[15] | 15 | 40[35] | 40[32] | 32[26] | 17 | 60 | 60 | 60 | | | | — |
| S-2xT50(BC) | MSO-2xT50(BC)KP | 15[11] | 22[22] | 25[22] | 22 | 55[50][50] (Note 1) | 50[48] | 38[38] | 26 | 80 | 80 | 80 | 2a2b x 2 | UT-AX2, 4(BC) x 2 or UT-AX11(BC) x 2 | TH-T25(BC)KP TH-T50(BC)KP | 0.24 to 22 29 |
| S-2xT65(CW) | MSO-2xT65(CW)KP | 18.5[15] | 30[30] | 37[30] | 30 | 65[65] | 65[65] | 60[45] | 38 | 100 | 100 | 100 | | | TH-T65KP | 15 to 54 |
| S-2xT80(CW) | MSO-2xT80(CW)KP (Note 11) | 22[19] | 45[37] | 45[45] | 45 | 85[80] | 85[80] | 75[75] | 52 | 120 | 120 | 120 | | UN-AX2, 4 x 2 or UN-AX11 x 2 | TH-T100KP | 67 |
| S-2xT100 | MSO-2xT100KP | 30[22] | 55[45] | 55[45] | 55 | 105[100] | 105[93] | 85[75] | 65 | 150 | 150 | 150 | | UN-AX80 x 2 | TH-T65KP TH-T100KP | 15 to 54 67, 82 |
| S-2xN125 | MSO-2xN125KP | 37[30] | 60[60] | 60[60] | 60 | 125[125] | 120[120] | 90[90] | 70 | 150 | 150 | 150 | | | TH-N120KP | 42 to 105 |
| S-2xN150 | MSO-2xN150KP | 45[37] | 75[75] | 90[90] | 90 | 150[150] | 150[150] | 140[140] | 100 | 200 | 200 | 200 | | | (TA) | 42 to 125 |
| S-2xN180 | MSO-2xN180KP | 55[45] | 90[90] | 110[110] | 110 | 180[180] | 180[180] | 180[180] | 120 | 260 | 260 | 260 | | | TH-N220KPRH | 82 to 150 |
| S-2xN220 | MSO-2xN220KP | 75[55] | 132[110] | 132[132] | 132 | 250[220] | 250[220] | 200[200] | 150 | 260 | 260 | 260 | 3a3b x 2 | — | | 82 to 180 |
| S-2xN300 | MSO-2xN300KP | 90[75] | 160[150] | 160[160] | 200 | 300[300] | 300[300] | 250[250] | 220 | 350 | 350 | 350 | | | TH-N400KPRH | 105 to 250 |
| S-2xN400 | MSO-2xN400KP | 125[110] | 220[200] | 225[200] | 250 | 400[400] | 400[400] | 350[350] | 300 | 450 | 450 | 450 | | | | 105 to 330 |
| S-2xN600 | — | 190[160] | 330[300] | 330[300] | 330 | 630[630] | 630[630] | 500[500] | 420 | 660 | 660 | 660 | 4a4b x 2 | — | TH-N600KP | 250 to 500 |
| S-2xN800 | — | 220[200] | 440[400] | 500[400] | 500 | 800[800] | 800[800] | 720[720] | 630 | 800 | 800 | 800 | | | (Note 5) | 250 to 660 |

- Note 1. The value in parentheses for the rated operating current is applicable in the case of magnetic contactors.
- Note 2. Enclosed type magnetic starters are of MS-2x□ type. T10, T12, T20, T25, T32 and N600, N800 types are outside production range. It should be noted that auxiliary contact units cannot be additionally installed to enclosed types.
- Note 3. MS-2 x T21 types with 200 to 220 V ratings are 3.7 kW, in accordance with the Electrical Appliance and Material Safety Law.
- Note 4. Enclosed type heater designation 67A uses a thermal overload relay dedicated for enclosed types.
- Note 5. Please use TH-N600 in combination with a separately sold current transformer (Mitsubishi CW-□).
- Note 6. Refer to page 49 for information regarding application to resistive loads and capacitive loads.
- Note 7. The main contact minimum operating voltage and current differ depending on the allowable fault rate. Refer to page 40 for details.
- Note 8. The +2b on the auxiliary contact arrangement of reversible T10, T12 and T20 types indicates the break contact of the integrated UT-ML20 interlock unit. There is no need to specify when ordering.
- Note 9. Auxiliary contact arrangements are displayed by twos, in a contact arrangement combined with two magnetic contactors. For standard contact arrangements there is no need to specify when ordering; however, please specify a matching contact arrangement for 2 units if for a special configuration. <Example> 1b x 2 + 2b: 2B, 2ax2 + 2b: 4A
- Note 10. "BC" in the model name refers to "wiring streamlining terminal".
- Note 11. MSO-2xT80CW heater designation 67A is not manufactured.
- Note 12. MSO-2xT□ and MSO-2xN□ types can also be manufactured.

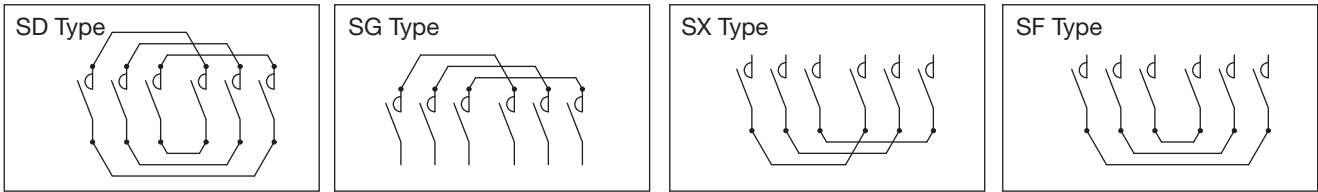
● Connecting Conductor Included

Standard reversible magnetic contactors do not have a connecting conductor installed on the main circuit; however, products with connecting conductors (3-pole) on the main circuit can be manufactured. The 4 types below are available. (However, excluding S-2xT□SD/SG/SF and S-2xN□SG types, no thermal overload relays can be added.)

- (1) Mountable on Both Power/Load Side ... For Reversing Operation : S-2xT□SD, S-2xN□SD
- (2) Mountable Only on Power Side (3-Pole In-Phase) ... For 2 Load Circuits : S-2xT□SG, S-2xN□SG
- (3) Mountable Only on Load Side (3-Pole In-Phase) ... For 2 Power Systems : S-2xT□SX, S-2xN□SX
- (4) Mountable Only on Load Side (Reverse Phase Switchable) : S-2xT□SF, S-2xN□SF

Note 1. If a connecting conductor is required, refer to page 202 to order a main circuit conductor kit.

● Connecting Conductor Wiring Diagram



● Structure/Operation

● Structure

- (1) MSO-2 × T□, S-2 × T□ and MSO-2 × N□ types have the same mounting pitch as S-2 × N□ types.
- (2) Reversible MSO/S-2xT10 to T25 types can be mounted to IEC 35 mm rails as-is, while T35 to T80 types can be mounted by removing the mounting plate.

● Operation

(1) Open State (Fig. 1, 2(a), 3(a))

When both the left and right contactors are in the OFF state, the lever tip is retained in the open state via the return spring.

(2) Closed State (Fig. 2(b) and Fig. 3(b))

When the contactor of one side is energized (closed), the cross bar causes the lever pin (or lever system) to be pushed downward, rotating the interlock lever so that the lever tips cross each other.

When this happens, even if an energizing operation is attempted on the other contactor, as the lever tips are crossed over the operation will be prevented.

(3) Opening

When the energizing current to a contact on one side is halted, the cross bar returns to its original state via the contactor tripping spring. This action of the cross bar raises the interlock lever with the help of the return spring, returning the interlock lever to its correct position.

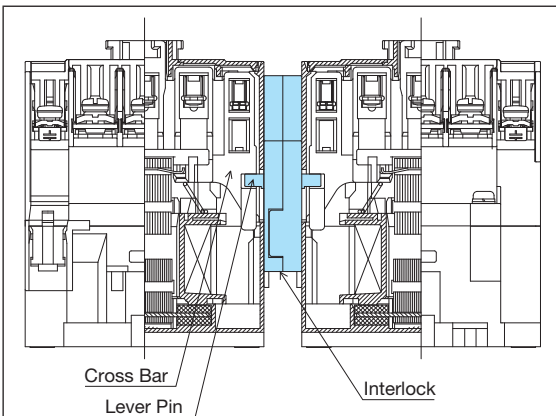


Fig. 1. Structural and Operational Diagram (T10 to T80)

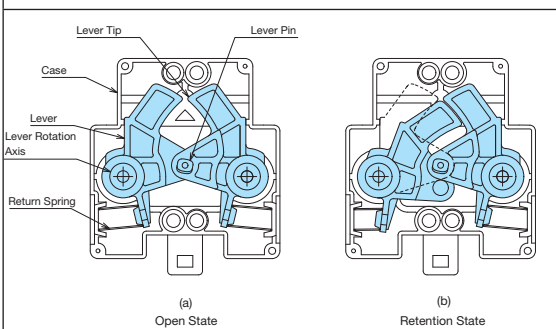
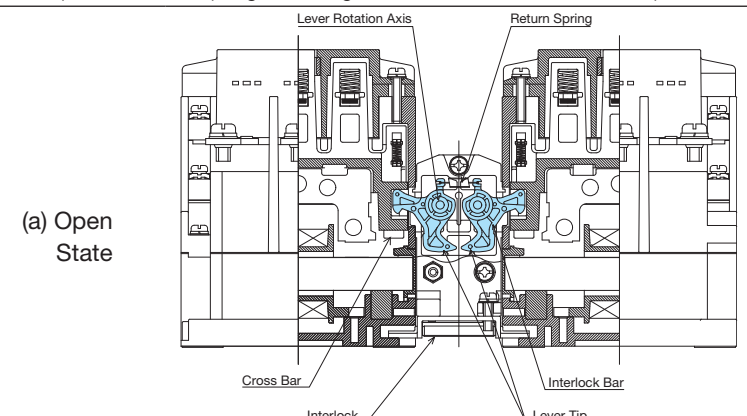


Fig. 2. Interlock Internal Structure (T10 to T80)



(a) Open State

(b) Retention State

Fig. 3. Structural and Operational Diagram (T100, N125 to N400)

● Handling

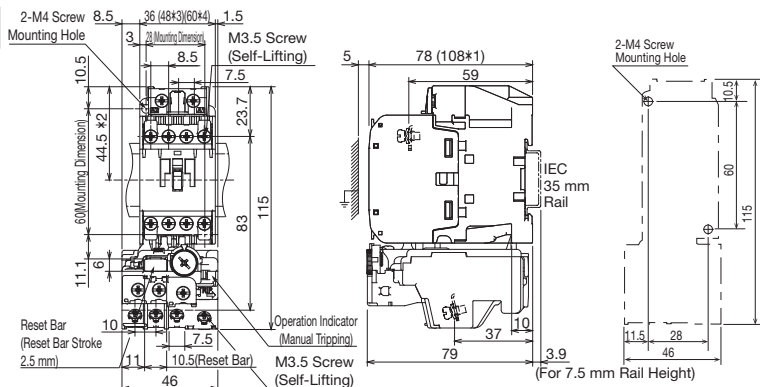
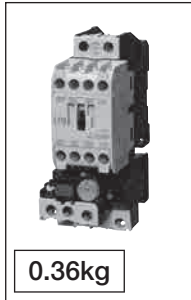
- (1) Be sure to release the electrical interlock via the break contact of the left and right magnetic contactors.
- (2) The electrical interlock uses the break contact on the inner side (the mechanical interlock side).
- (3) Horizontal mounting of the product is not available.

| | Item | Reference Page | Remarks |
|--|---|----------------|---------|
| | · Auxiliary Contact Rating | Page 39 | — |
| | · Operation Coil | Page 41 | — |
| | · Properties | Page 43 | — |
| | · Performance | Page 44 | — |
| | · Outline Drawings/Contact Arrangements | Page 73 | — |
| | · How to Order | Page 120 | — |
| | · Combining with Optional Units | Page 180 | — |

● Outline Drawings/Contact Arrangements (AC Operated Magnetic Starters/Magnetic Contactors)

■ T10

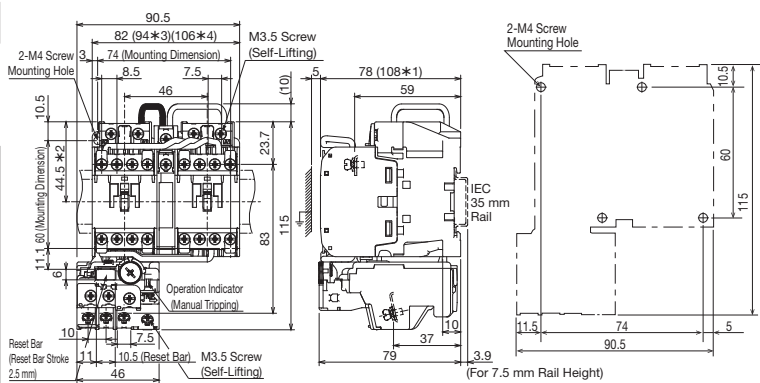
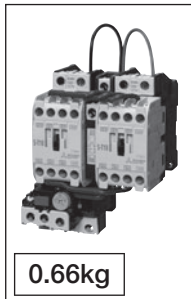
Non-Reversing
MSO-T10(BC)KP



*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
*2 Dimension: Width Dimension from Center of IEC 35 mm Rail
*3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)

| Auxiliary Contact | Contact Arrangement | | | | |
|---|---------------------|------------|------------|-----------|-------------|
| 1a | | | | | |
| 1b | | | | | |
| <table border="1"> <thead> <tr> <th>Model Name</th> <th>Model Name</th> </tr> </thead> <tbody> <tr> <td>MSO-T10KP</td> <td>MSO-T10BCKP</td> </tr> </tbody> </table> | | Model Name | Model Name | MSO-T10KP | MSO-T10BCKP |
| Model Name | Model Name | | | | |
| MSO-T10KP | MSO-T10BCKP | | | | |

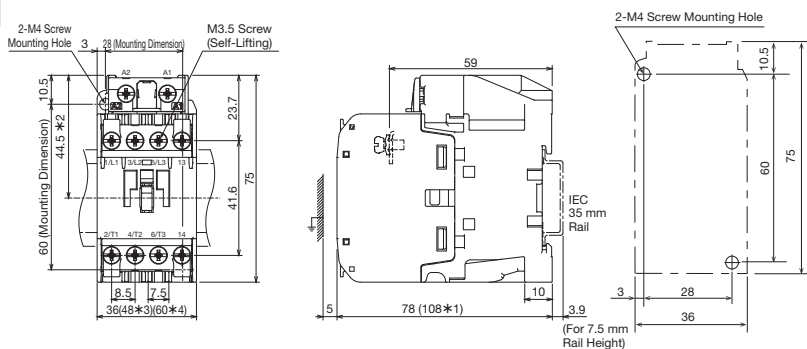
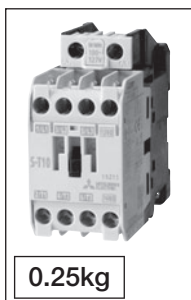
Reversing
MSO-2 x T10(BC)KP



*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
*2 Dimension: Width Dimension from Center of IEC 35 mm Rail
*3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)

| Connection Diagram | | | | | |
|---|---------------|------------|------------|-------------|---------------|
| No wiring for BC. (Comes with product) | | | | | |
| | | | | | |
| <table border="1"> <thead> <tr> <th>Model Name</th> <th>Model Name</th> </tr> </thead> <tbody> <tr> <td>MSO-2xT10KP</td> <td>MSO-2xT10BCKP</td> </tr> </tbody> </table> | | Model Name | Model Name | MSO-2xT10KP | MSO-2xT10BCKP |
| Model Name | Model Name | | | | |
| MSO-2xT10KP | MSO-2xT10BCKP | | | | |

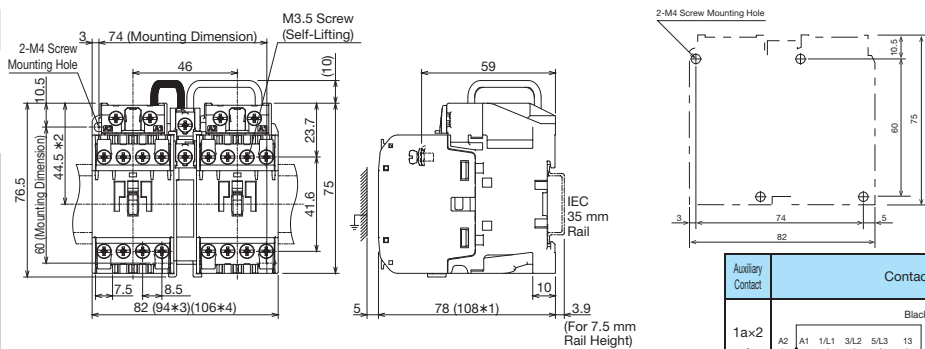
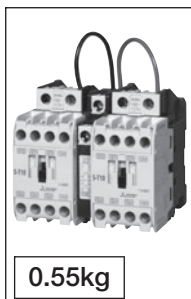
Non-Reversing
S-T10(BC)



*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
*2 Dimension: Width Dimension from Center of IEC 35 mm Rail
*3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)

| Auxiliary Contact | Contact Arrangement | | | | |
|---|---------------------|------------|------------|-------|---------|
| 1a | | | | | |
| 1b | | | | | |
| <table border="1"> <thead> <tr> <th>Model Name</th> <th>Model Name</th> </tr> </thead> <tbody> <tr> <td>S-T10</td> <td>S-T10BC</td> </tr> </tbody> </table> | | Model Name | Model Name | S-T10 | S-T10BC |
| Model Name | Model Name | | | | |
| S-T10 | S-T10BC | | | | |

Reversing
S-2 x T10(BC)



*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
*2 Dimension: Width Dimension from Center of IEC 35 mm Rail
*3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)

| Auxiliary Contact | Contact Arrangement | | | | |
|---|---------------------|------------|------------|---------|-----------|
| 1a x 2 + 2b | | | | | |
| <table border="1"> <thead> <tr> <th>Model Name</th> <th>Model Name</th> </tr> </thead> <tbody> <tr> <td>S-2xT10</td> <td>S-2xT10BC</td> </tr> </tbody> </table> | | Model Name | Model Name | S-2xT10 | S-2xT10BC |
| Model Name | Model Name | | | | |
| S-2xT10 | S-2xT10BC | | | | |

4 MS-T/N Series Magnetic Starters/Magnetic Contactors

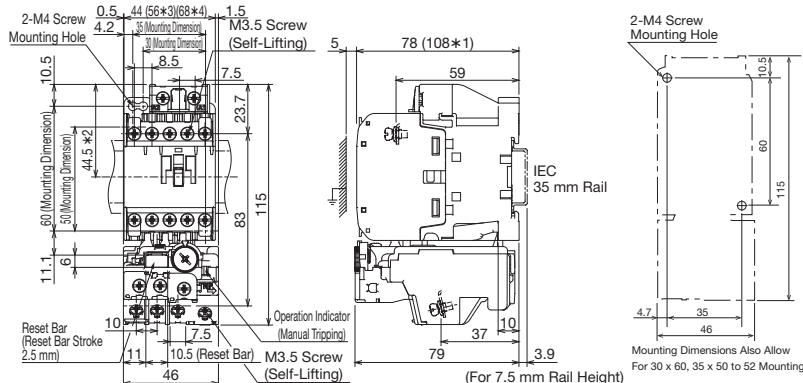
T12/T20

Non-Reversing

MSO-T12(BC)KP
MSO-T20(BC)KP



0.38kg



*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
*2 Dimension: Width Dimension from Center of IEC 35 mm Rail
*3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)

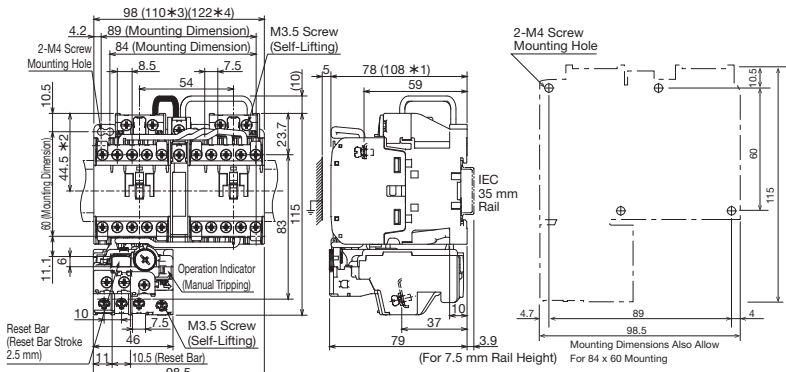
| Auxiliary Contact | Contact Arrangement | | | | | | |
|--|---------------------|------------|------------|-----------|-------------|-----------|-------------|
| 1a1b | | | | | | | |
| 2a | | | | | | | |
| <table border="1"> <thead> <tr> <th>Model Name</th> <th>Model Name</th> </tr> </thead> <tbody> <tr> <td>MSO-T12KP</td> <td>MSO-T12BCKP</td> </tr> <tr> <td>MSO-T20KP</td> <td>MSO-T20BCKP</td> </tr> </tbody> </table> | | Model Name | Model Name | MSO-T12KP | MSO-T12BCKP | MSO-T20KP | MSO-T20BCKP |
| Model Name | Model Name | | | | | | |
| MSO-T12KP | MSO-T12BCKP | | | | | | |
| MSO-T20KP | MSO-T20BCKP | | | | | | |

Reversing

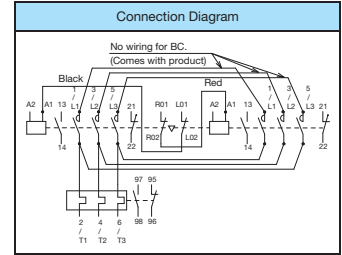
MSO-2xT12(BC)KP
MSO-2xT20(BC)KP



0.7kg



*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
*2 Dimension: Width Dimension from Center of IEC 35 mm Rail
*3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC))



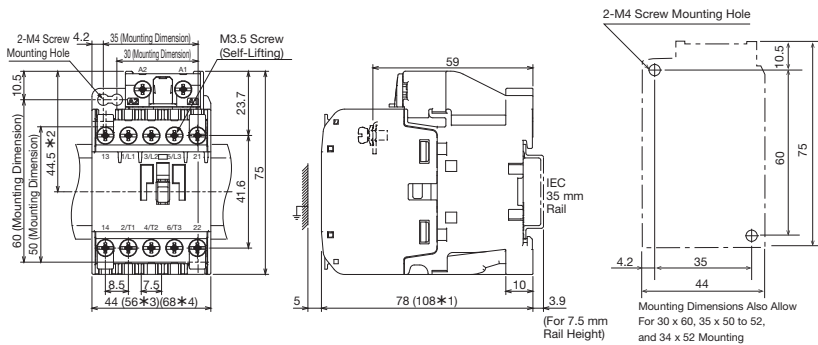
| Model Name | Model Name |
|-------------|---------------|
| MSO-2xT12KP | MSO-2xT12BCKP |
| MSO-2xT20KP | MSO-2xT20BCKP |

Non-Reversing

S-T12(BC)
S-T20(BC)



0.27kg



*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
*2 Dimension: Width Dimension from Center of IEC 35 mm Rail
*3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)

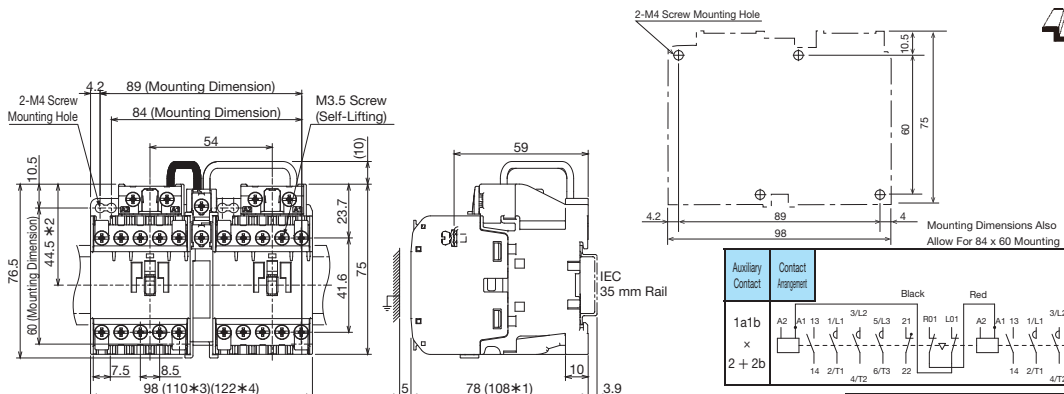
| Auxiliary Contact | Contact Arrangement | | | | | | |
|--|---------------------|------------|------------|-------|---------|-------|---------|
| 1a1b | | | | | | | |
| 2a | | | | | | | |
| <table border="1"> <thead> <tr> <th>Model Name</th> <th>Model Name</th> </tr> </thead> <tbody> <tr> <td>S-T12</td> <td>S-T12BC</td> </tr> <tr> <td>S-T20</td> <td>S-T20BC</td> </tr> </tbody> </table> | | Model Name | Model Name | S-T12 | S-T12BC | S-T20 | S-T20BC |
| Model Name | Model Name | | | | | | |
| S-T12 | S-T12BC | | | | | | |
| S-T20 | S-T20BC | | | | | | |

Reversing

S-2xT12(BC)
S-2xT20(BC)



0.59kg

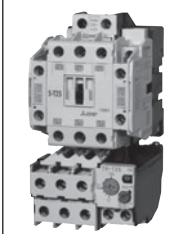


*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
*2 Dimension: Width Dimension from Center of IEC 35 mm Rail
*3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)

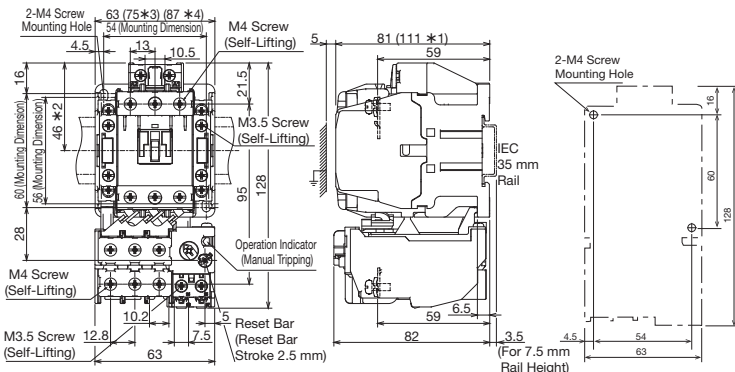
| Auxiliary Contact | Contact Arrangement | | | | | | |
|--|---------------------|------------|------------|---------|-----------|---------|-----------|
| 1a1b x 2 + 2b | | | | | | | |
| <table border="1"> <thead> <tr> <th>Model Name</th> <th>Model Name</th> </tr> </thead> <tbody> <tr> <td>S-2xT12</td> <td>S-2xT12BC</td> </tr> <tr> <td>S-2xT20</td> <td>S-2xT20BC</td> </tr> </tbody> </table> | | Model Name | Model Name | S-2xT12 | S-2xT12BC | S-2xT20 | S-2xT20BC |
| Model Name | Model Name | | | | | | |
| S-2xT12 | S-2xT12BC | | | | | | |
| S-2xT20 | S-2xT20BC | | | | | | |

T21/T25

Non-Reversing
MSO-T21(BC)KP
MSO-T25(BC)KP



0.58 kg



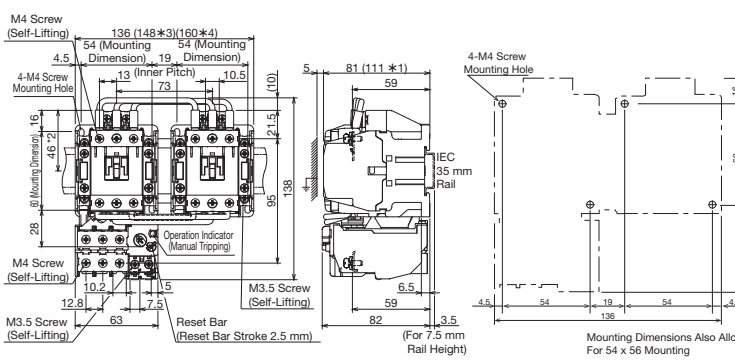
*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
*2 Dimension: Width Dimension from Center of IEC 35 mm Rail
*3, 4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)

| Auxiliary Contact | Contact Arrangement |
|-------------------|---------------------|
| 2a2b | |
| Model Name | Model Name |
| MSO-T21KP | MSO-T21BCKP |
| MSO-T25KP | MSO-T25BCKP |

Reversing
MSO-2xT21(BC)KP
MSO-2xT25(BC)KP



1.03 kg



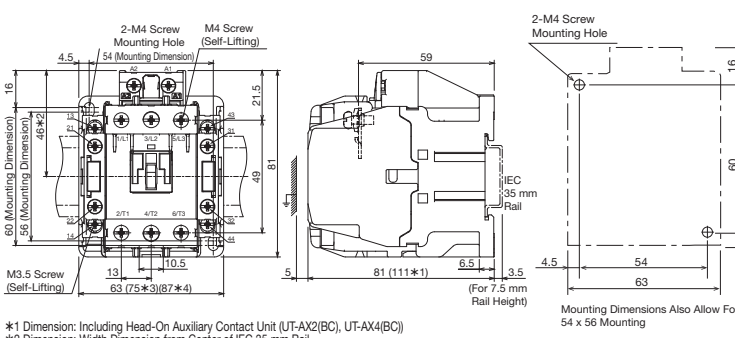
*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
*2 Dimension: Width Dimension from Center of IEC 35 mm Rail
*3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)

| Connection Diagram | |
|--|---------------|
| No wiring for BC. (Comes with product) | |
| | |
| Model Name | Model Name |
| MSO-2xT21KP | MSO-2xT21BCKP |
| MSO-2xT25KP | MSO-2xT25BCKP |

Non-Reversing
S-T21(BC)
S-T25(BC)



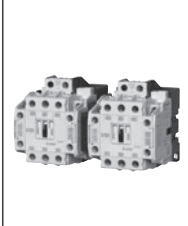
0.41 kg



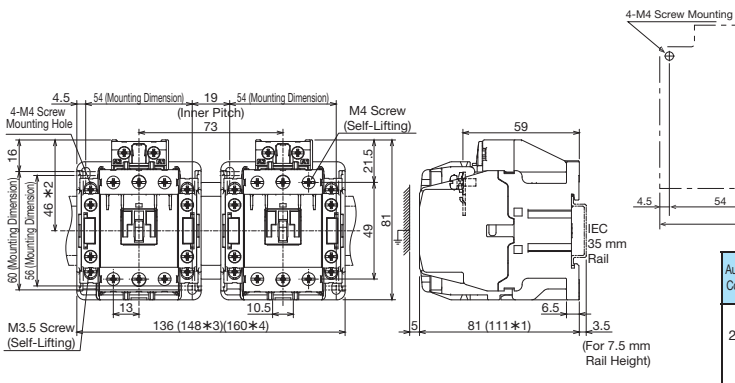
*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
*2 Dimension: Width Dimension from Center of IEC 35 mm Rail
*3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)

| Auxiliary Contact | Contact Arrangement |
|-------------------|---------------------|
| 2a2b | |
| Model Name | Model Name |
| S-T21 | S-T21BC |
| S-T25 | S-T25BC |

Reversing
S-2 x T21(BC)
S-2 x T25(BC)



0.86 kg



*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
*2 Dimension: Width Dimension from Center of IEC 35 mm Rail
*3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)

| Auxiliary Contact | Contact Arrangement |
|-------------------|---------------------|
| 2a2b | |
| Model Name | Model Name |
| S-2xT21 | S-2xT21BC |
| S-2xT25 | S-2xT25BC |

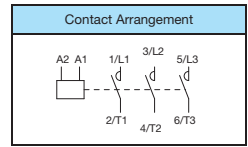
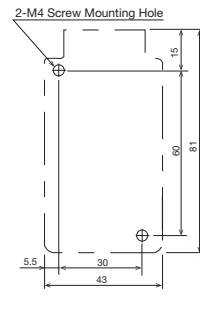
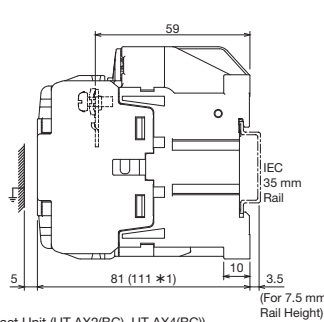
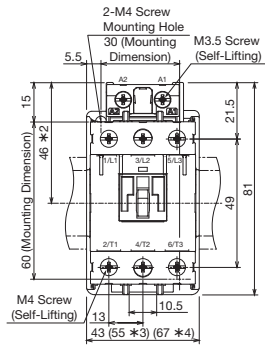
T32

Non-Reversing

S-T32(BC)



0.36 kg



*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
*2 Dimension: Width Dimension from Center of IEC 35 mm Rail

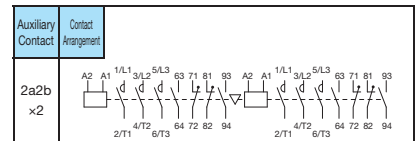
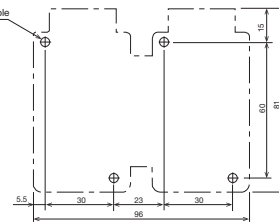
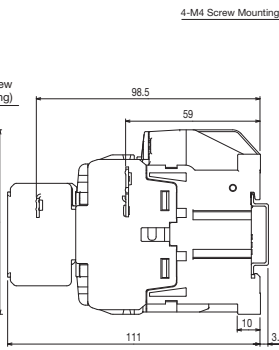
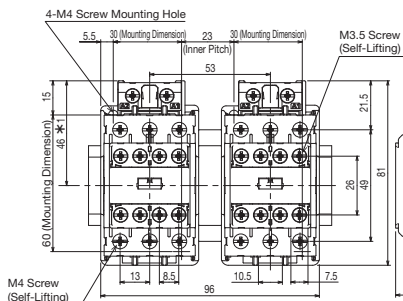
| | |
|------------|---------|
| Model Name | S-T32 |
| | S-T32BC |

Reversing

S-2 × T32(BC)



0.76 kg



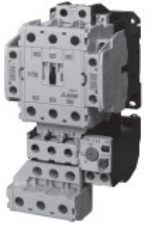
*1 Dimension: Width Dimension from Center of IEC 35 mm Rail

| | |
|------------|-----------|
| Model Name | S-2xT32 |
| | S-2xT32BC |

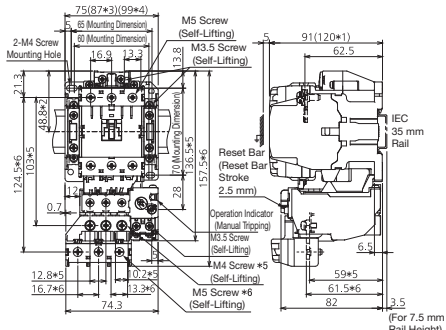
T35/T50

Non-Reversing

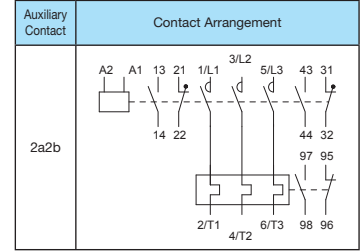
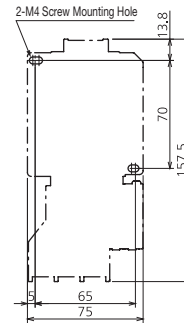
MSO-T35(BC)KP
MSO-T50(BC)KP



0.79 kg



- *1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
- *2 Dimension: Width Dimension from Center of IEC 35 mm Rail
- *3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC))
- *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)
- *5 Dimension: Heater Designations 22A or Less, *6 Dimension: Heater Designations 29A or More

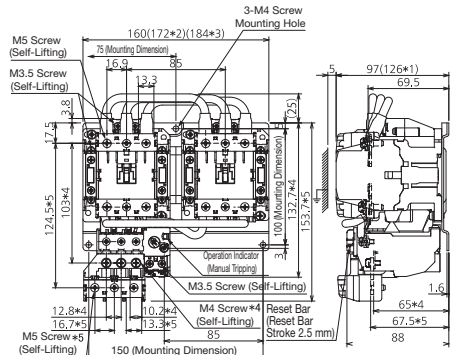


| Model Name | Model Name |
|------------|-------------|
| MSO-T35KP | MSO-T35BCKP |
| MSO-T50KP | MSO-T50BCKP |

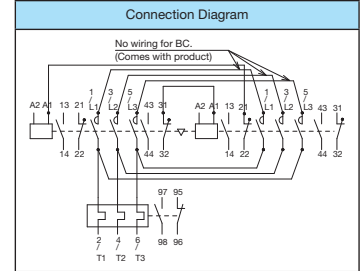
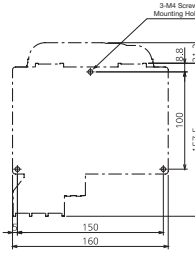
Reversing

MSO-2 x T35(BC)KP
MSO-2 x T50(BC)KP

1.54 kg



- *1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
- *2, *3 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC))
- *2 Has 1 Piece, *3 Has 2 Pieces (Both Sides)
- *4 Dimension: Heater Designations 22A or Less, *5 Dimension: Heater Designations 29A or More

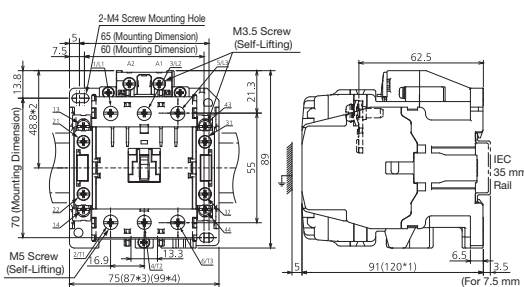


| Model Name | Model Name |
|-------------|---------------|
| MSO-2xT35KP | MSO-2xT35BCKP |
| MSO-2xT50KP | MSO-2xT50BCKP |

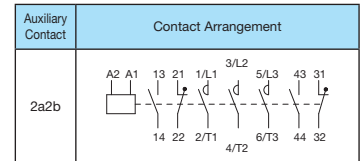
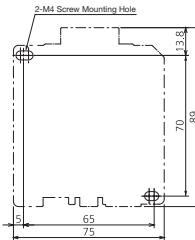
Non-Reversing

S-T35(BC)
S-T50(BC)

0.55 kg



- *1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
- *2 Dimension: Width Dimension from Center of IEC 35 mm Rail
- *3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC))
- *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)

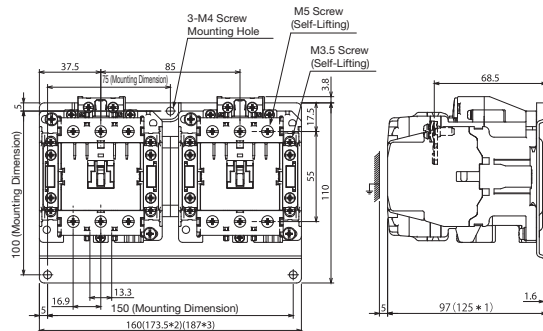


| Model Name | Model Name |
|------------|------------|
| S-T35 | S-T35BC |
| S-T50 | S-T50BC |

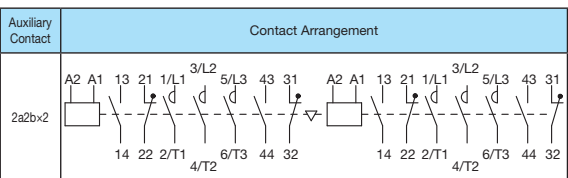
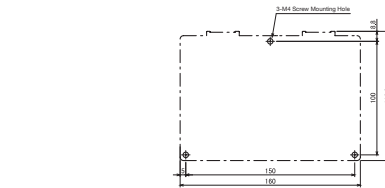
Reversing

S-2 x T35(BC)
S-2 x T50(BC)

1.3 kg



- *1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
- *2, *3 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC))
- *2 Has 1 Piece, *3 Has 2 Pieces (Both Sides)

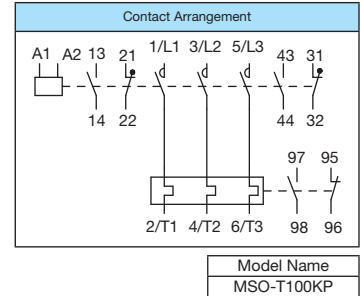
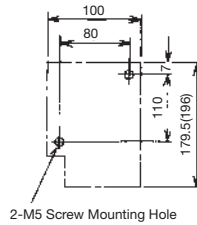
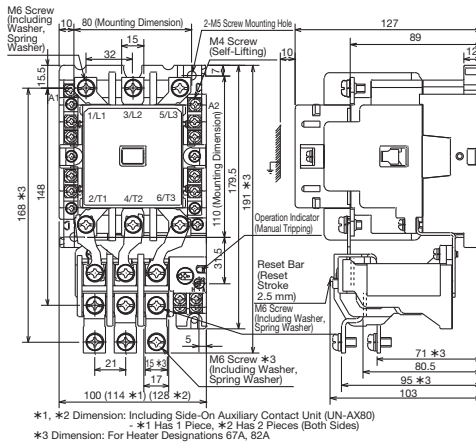
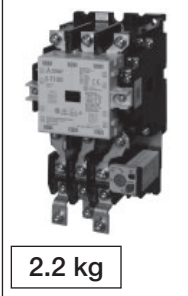


| Model Name | Model Name |
|------------|------------|
| S-2xT35 | S-2xT35BC |
| S-2xT50 | S-2xT50BC |

T100

Non-Reversing

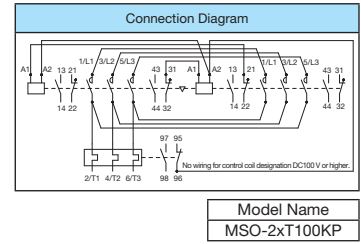
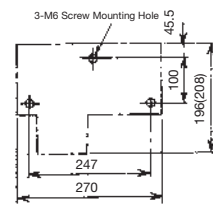
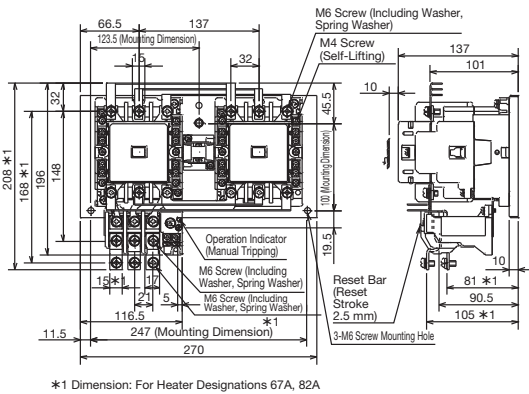
MSO-T100KP



Reversing

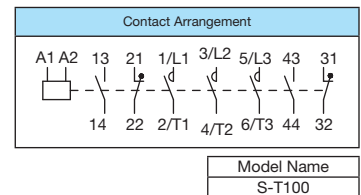
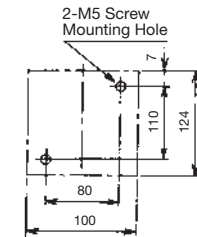
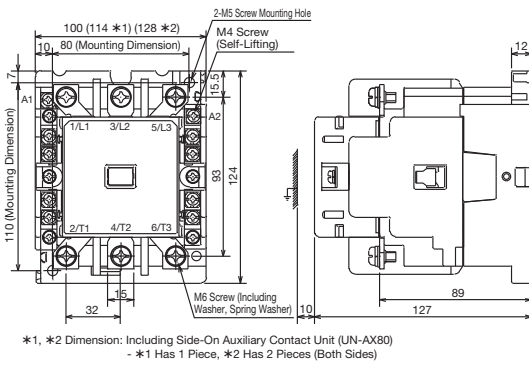
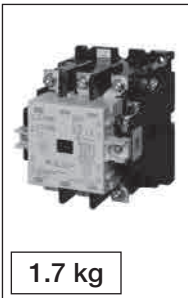
MSO-2 x T100KP

4.6 kg



Non-Reversing

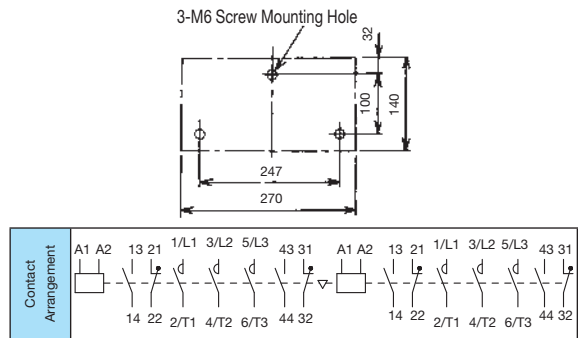
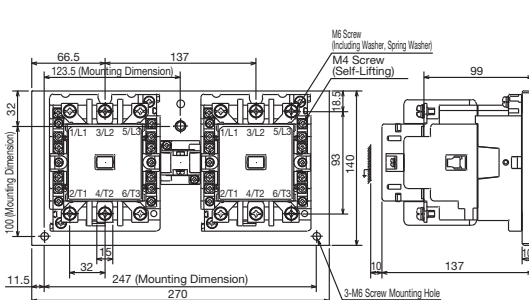
S-T100



Reversing

S-2 x T100

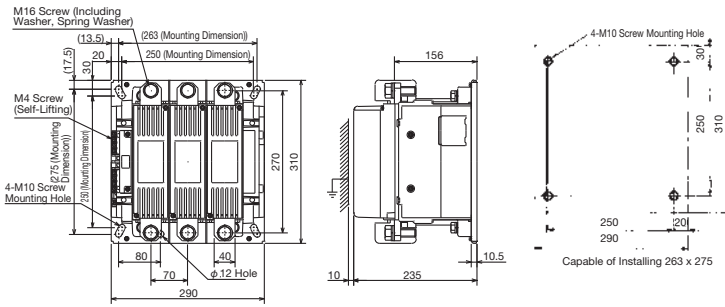
4.3 kg



N600/N800

Non-Reversing

S-N600
S-N800

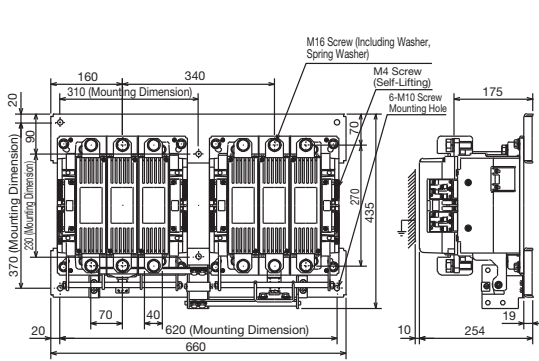


| Contact Arrangement | | Model Name | | |
|---------------------|------------------------------------|------------|------|------|
| A1 | 13 21 43 31 (13) (31) (23) (41) | 1/L1 | 3/L2 | 5/L3 |
| A2 | 14 22 44 32 (14) (32) (24) (42) | 2/T1 | 4/T2 | 6/T3 |
| | | S-N600 | | |
| | | S-N800 | | |

Reversing

S-2 × N600
S-2 × N800

54 kg



6-M10 Screw Mounting Hole
310
20
370
435
20
620
660
230
307

| Contact Arrangement | | Model Name | |
|---------------------|--|------------|--|
| A1 | 13 21 43 31 1/L1 3/L2 5/L3 53 61 83 71 13 21 43 31 1/L1 3/L2 5/L3 53 61 83 71 A1 | S-2xN600 | |
| A2 | 14 22 44 32 2/T1 4/T2 6/T3 54 62 84 72 14 22 44 32 2/T1 4/T2 6/T3 54 62 84 72 A2 | S-2xN800 | |

● Non-Reversing Magnetic Starter (Enclosed)

Enclosure (Case): Steel
Paint Color: Munsell 5Y7/1
Protective Structure: IP20

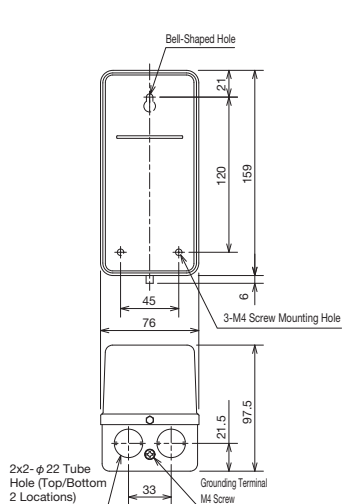


Fig 4. MS-T10KP (0.74 kg)
MS-T12KP (0.76 kg)

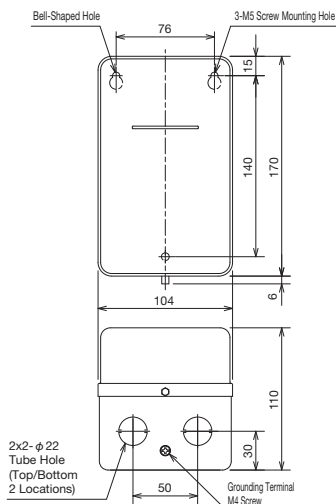


Fig 5. MS-T21KP (1.12 kg)

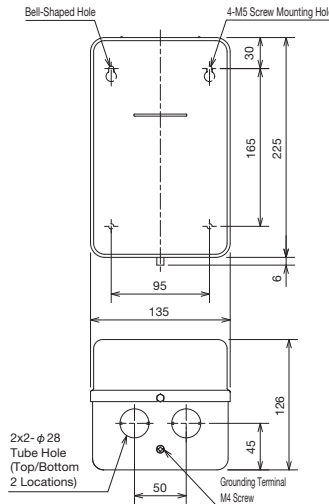


Fig 6. MS-T35KP/T50KP (1.9 kg)

Note 1. Leave 100 mm space at the bottom of the enclosure when mounting MS-T10KP to T50KP types.
Note 2. 3 rubber bushings are included for MS-T10KP to T50KP types.
Note 3. MS-T □ and MS-N □ types can also be manufactured.

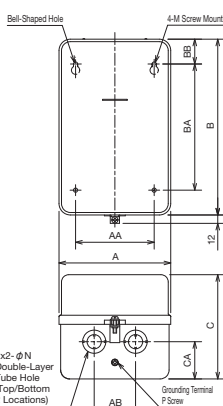


Fig 7. MS-T65KP to T100KP
MS-N125KP to N220KP

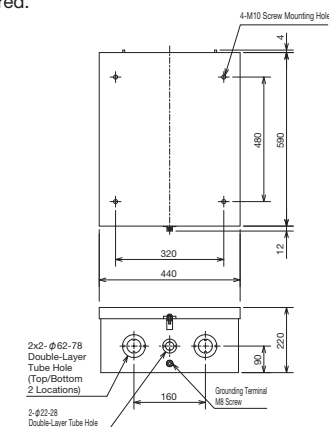
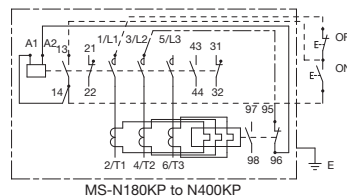
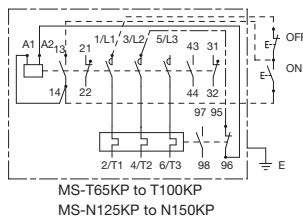
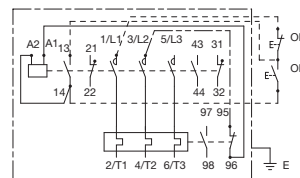
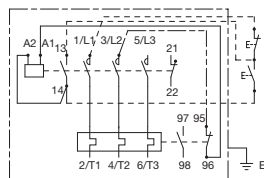
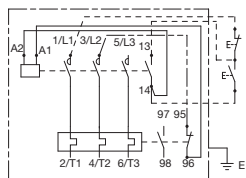


Fig 8. MS-N300KP/N400KP (27.5 kg/28 kg)

| Model | Dimensions | | | | | | | | | | | Weight [kg] |
|-------------------------|------------|-----|-----|-----|-----|----|-----|----|----|----------|----|----------------|
| | A | AA | AB | B | BA | BB | C | CA | M | N | P | |
| MS-T65KP/T80KP | 160 | 120 | 80 | 270 | 220 | 25 | 145 | 45 | M5 | 22 to 35 | M4 | 2.9 |
| MS-T100KP | 190 | 150 | 100 | 305 | 260 | 25 | 163 | 67 | M6 | 22 to 35 | M4 | 4.0 |
| MS-N125KP | 230 | 170 | 90 | 384 | 330 | 29 | 190 | 80 | M8 | 44 to 50 | M6 | 8.0 |
| MS-N150KP/N180KP/N220KP | 270 | 200 | 120 | 484 | 400 | 44 | 209 | 85 | M8 | 44 to 50 | M6 | 12.8/16.2/18.2 |



Note 1) The figure above shows the same power supply for both the main circuit and control circuit.
The solid lines show completed wiring while the broken lines and double-dashed lines are still in need of wiring. (For the double-dashed lines, use the power supply attached to the unit)
Note 2) If the power supplies for the main circuit and control circuit differ, power wiring between the 1/L1-OFF button broken lines and the 3/L2-TH95 double-dashed lines is unnecessary, but the OFF button and TH95 terminal should be wired from the separate control circuit power supply.

| Model Name | Model Name | Model Name | Model Name |
|------------|------------|------------|------------|
| MS-T10KP | MS-T65KP | MS-N125KP | MS-N400KP |
| MS-T12KP | MS-T80KP | MS-N150KP | |
| MS-T21KP | MS-T100KP | MS-N180KP | |
| MS-T35KP | | MS-N220KP | |
| MS-T50KP | | MS-N300KP | |

● Reversing Magnetic Starters (Enclosed Type)

Enclosure (Case): Steel
Paint Color: Munsell 5Y7/1
Protective Structure: IP20

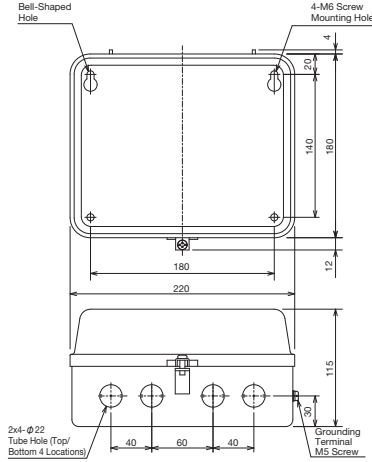


Fig. 9. MS-2xT21KP (2.0 kg)

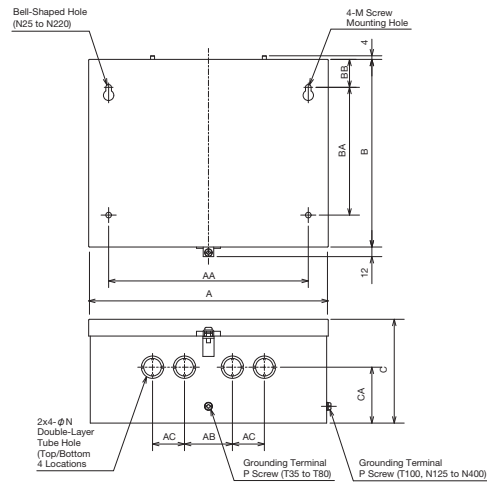
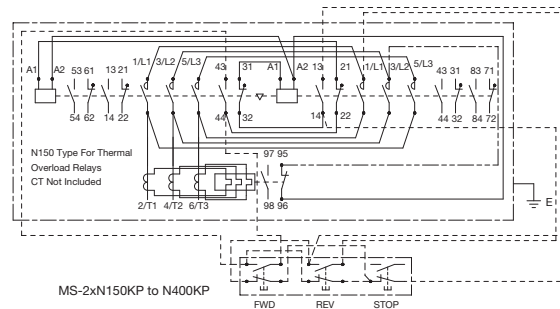
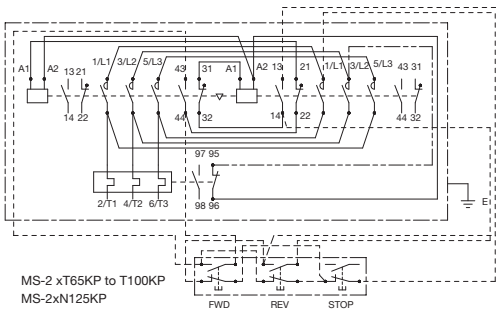
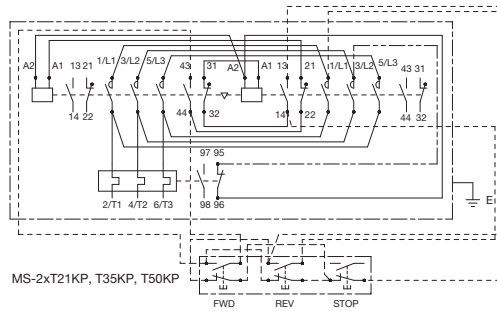


Fig. 10. MS-2xT35KP to T100KP, MS-2xN125KP to N400KP

Note 1. 3 rubber bushings are included for MS-2xT21 to T50.
Note 2. MS-2xT □ and MS-2xN □ types can also be manufactured.

| Model | Dimensions | | | | | | | | | | | Weight [kg] | | |
|---------------------------|------------|-----|-----|-----|-----|-----|----|-----|-----|-----|----------|-------------|----|----------------|
| | A | AA | AB | AC | B | BA | BB | C | CA | M | N | | O | P |
| MS-2xT35KP, T50KP | 300 | 250 | 60 | 40 | 235 | 160 | 35 | 130 | 70 | M6 | 22 to 28 | 4 | M5 | 4.7 |
| MS-2xT65KP/T80KP | 320 | 270 | 100 | 60 | 270 | 240 | 15 | 140 | 70 | M6 | 22 to 36 | 4 | M6 | 6.6 |
| MS-2xT100KP | 410 | 350 | 140 | 60 | 330 | 270 | 35 | 154 | 87 | M6 | 22 to 36 | 4 | M6 | 10 |
| MS-2xN125KP | 440 | 370 | 120 | 80 | 424 | 350 | 39 | 170 | 94 | M8 | 44 to 50 | 4 | M6 | 15.5 |
| MS-2xN150KP/N180KP/N220KP | 520 | 440 | 160 | 80 | 524 | 440 | 44 | 209 | 90 | M8 | 44 to 50 | 4 | M6 | 20.5/28.5/28.5 |
| MS-2xN300KP/N400KP | 600 | 500 | 130 | 120 | 604 | 500 | 54 | 230 | 100 | M10 | 62 to 78 | 4 | M8 | 46/47 |



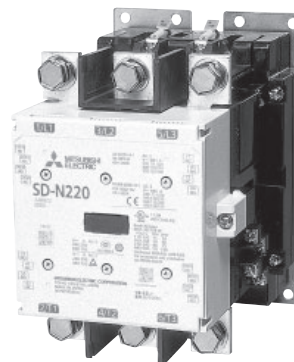
Note 1) The figure above shows the same power supply for both the main circuit and control circuit.
The solid lines show completed wiring while the broken lines and double-dashed lines are still in need of wiring. (For the double-dashed lines, use the power supply attached to the unit)
Note 2) If the power supplies for the main circuit and control circuit differ, power wiring between the 1/L1-STOP button broken lines and the 3/L2-TH95 double-dashed lines is unnecessary, but the STOP button and TH95 terminal should be wired from the separate control circuit power supply.

| Model Name | Model Name | Model Name | Model Name |
|------------|-------------|-------------|-------------|
| MS-2xT21KP | MS-2xT80KP | MS-2xN125KP | MS-2xN300KP |
| MS-2xT35KP | MS-2xT100KP | MS-2xN150KP | MS-2xN400KP |
| MS-2xT50KP | | MS-2xN180KP | |
| MS-2xT65KP | | MS-2xN220KP | |

4.3 MSOD/SD-□ DC Operated Magnetic Starters/Magnetic Contactors

The operation coil is dedicated for DC

- The operation coil can be used with a separate power supply for DC operation.
(Main circuit can use both AC and DC)
- Electromagnet buzzing does not occur.
- The coil doesn't use saving resistance so there is no inrush current.
(Excluding N600, N800)
- SD-T12 to T32 and SD-N600, N800 type operation coil terminals have polarity.
Connect terminal number A1 (+) to the positive and A2 (-) to the negative sides.



SD-N220

● Ratings/Specifications (Standard Applicability)

| Magnetic Contactors | Magnetic Starters (Note 10) | Rated Capacity [kW] | | | | Rated Operating Current [A] | | | | | | Conventional Free-Air Thermal Current I _{th} [A] | Auxiliary Contact | | Compatible Thermal Overload Relays | |
|------------------------|-----------------------------|---|----------------|----------|---------|---|----------------|----------|---------|--------------------------------|----------------|--|--------------------|--|------------------------------------|---------------------------------|
| | | Three-Phase Squirrel-cage Motor (Category AC-3) | | | | Three-Phase Squirrel-cage Motor (Category AC-3) | | | | Resistive Load (Category AC-1) | | | Standard (Special) | Additional Unit Model Names x Pieces | Model Name | Heater Designation Range [A] |
| | | AC220 to 240 V | AC380 to 440 V | AC500 V | AC690 V | AC220 to 240 V | AC380 to 440 V | AC500 V | AC690 V | AC100 to 240 V | AC380 to 440 V | | | | | |
| SD-T12(BC) | MSOD-T12(BC)KP | 3.5[2.7] | 5.5[4] | 5.5[5.5] | 5.5 | 13[13] | 12[9] | 9[9] | 7 | 20 | 13 | 20 | 1a1b(2a) | UT-AX2, 4(BC) x 1 or UT-AX11(BC) x 2 | TH-T18(BC)KP | 0.12 to 11 |
| SD-T20(BC) | MSOD-T20(BC)KP | 4.5[3.7] | 7.5[7.5] | 7.5[7.5] | 7.5 | 18[18] | 18[18] | 17[17] | 9 | 20 | 13 | 20 | | | 2a2b | TH-T25(BC)KP |
| SD-T21(BC) | MSOD-T21(BC)KP | 5.5[4] | 11[7.5] | 11[7.5] | 7.5 | 25[20] | 23[20] | 17[17] | 9 | 32 | 32 | 32 | — | — | TH-T25(BC)KP | 0.24 to 22 |
| SD-T32(BC) | — | 7.5[7.5] | 15[15] | 15[11] | 11 | 32[32] | 32[32] | 24[20] | 12 | 32 | 32 | 32 | | | 2a2b | UN-AX2, 4 x 1 or UN-AX11 x 2 |
| SD-T35(BC) | MSOD-T35(BC)KP | 11[7.5] | 18.5[15] | 18.5[15] | 15 | 40[35] | 40[32] | 32[26] | 17 | 60 | 60 | 60 | 2a2b | UN-AX2, 4 x 1 or UN-AX11 x 2 | TH-T50(BC)KP | 29 |
| SD-T50(BC) | MSOD-T50(BC)KP | 15[11] | 22[22] | 25[22] | 22 | 55[50] ^(Note 1) | 50[48] | 38[38] | 26 | 80 | 80 | 80 | | | 2a2b | UN-AX2, 4 x 1 or UN-AX11 x 2 |
| SD-T65(CW) | MSOD-T65(CW)KP | 18.5[15] | 30[30] | 37[30] | 30 | 65[65] | 65[65] | 60[45] | 38 | 100 | 100 | 100 | 2a2b | UN-AX2, 4 x 1 or UN-AX11 x 2 | TH-T65KP | 15 to 54 |
| SD-T80(CW) (Note 8) | MSOD-T80(CW)KP (Note 9) | 22[19] | 45[37] | 45[45] | 45 | 85[80] | 85[80] | 75[75] | 52 | 120 | 120 | 120 | | | 2a2b | UN-AX80 x 2 |
| SD-T100 | MSOD-T100KP | 30[22] | 55[45] | 55[45] | 55 | 105[100] | 105[93] | 85[75] | 65 | 150 | 150 | 150 | 2a2b | UN-AX80 x 2 | TH-T65KP | 15 to 54 |
| SD-N125 | MSOD-N125KP | 37[30] | 60[60] | 60[60] | 60 | 125[125] | 120[120] | 90[90] | 70 | 150 | 150 | 150 | | | 2a2b | UN-AX80 x 2 |
| SD-N150 | MSOD-N150KP | 45[37] | 75[75] | 90[90] | 90 | 150[150] | 150[150] | 140[140] | 100 | 200 | 200 | 200 | 2a2b | UN-AX150 x 2 | TH-N120KP (TA) | 42 to 105 |
| SD-N180 | MSOD-N180KP | 55[45] | 90[90] | 110[110] | 110 | 180[180] | 180[180] | 180[180] | 120 | 260 | 260 | 260 | | | 2a2b | UN-AX150 x 2 |
| SD-N220 | MSOD-N220KP | 75[55] | 132[110] | 132[132] | 132 | 250[220] | 250[220] | 200[200] | 150 | 260 | 260 | 260 | 2a2b | UN-AX150 x 2 | TH-N220KPRH | 82 to 180 |
| SD-N300 | MSOD-N300KP | 90[75] | 160[150] | 160[160] | 200 | 300[300] | 300[300] | 250[250] | 220 | 350 | 350 | 350 | | | 2a2b | UN-AX150 x 2 |
| SD-N400 | MSOD-N400KP | 125[110] | 220[200] | 225[200] | 250 | 400[400] | 400[400] | 350[350] | 300 | 450 | 450 | 450 | 2a2b | UN-AX600 x 1 | TH-N400KPRH | 105 to 330 |
| SD-N600 | — | 190[160] | 330[300] | 330[300] | 330 | 630[630] | 630[630] | 500[500] | 420 | 660 | 660 | 660 | | | 2a2b | UN-AX600 x 1 |
| SD-N800 | — | 220[200] | 440[400] | 500[400] | 500 | 800[800] | 800[800] | 720[720] | 630 | 800 | 800 | 800 | 2a2b | UN-AX600 x 1 | TH-N600KP (Note 4) | 250 to 600 |

Note 1. The value in parentheses for the rated operating current is applicable in the case of magnetic contactors.

Note 2. Enclosed types are not manufactured.

Note 3. Also manufactured as reversible types (MSOD-2x□ types excluding SD-2x□, T32 and N600/N800).

Note 4. Use TH-N600 in combination with a separately sold current transformer (Mitsubishi CW-□).

Note 5. The magnetic starters listed below are also manufactured.

- Models with 2E Thermal Overload Relay: MSOD-T12KP to T100KP, MSOD-N125KP to N400KP
- Models with Quick Trip Thermal Overload Relay: MSOD-T12FSKP to T100FSKP, MSOD-T21FS to T100FS
- Models with Delayed Trip Thermal Overload Relay: MSOD-T12SR to T100SR, MSOD-T21KPSR to T100KPSR, MSOD-N125SR to N400SR, MSOD-N125KPSR to N400KPSR

Note 6. Refer to page 49 for information regarding application to resistive loads and capacitive loads.

Note 7. The main contact minimum operating voltage and current differ depending on the allowable fault rate. Refer to page 40 for details.

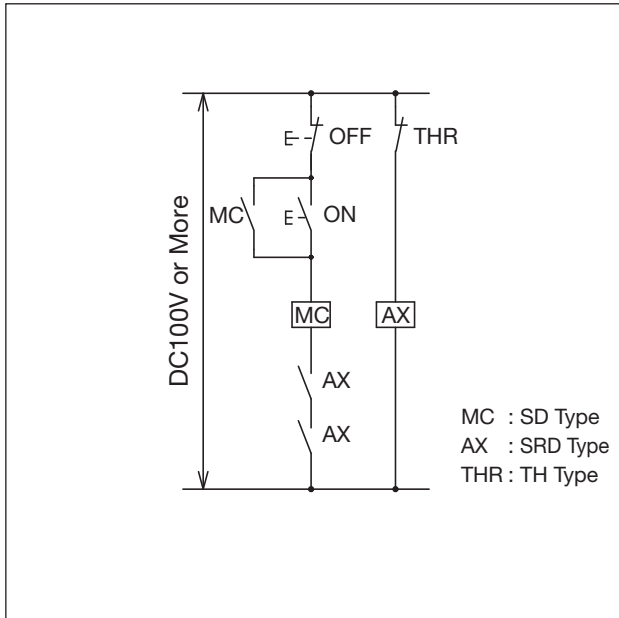
Note 8. Contact us or the dealer if you intend to use it at rating 120 A or higher in Class AC-1.

Note 9. MSOD-T80CW heater designation 67A is not manufactured.

Note 10. MSOD-T□ and MSOD-N□ types can also be manufactured.

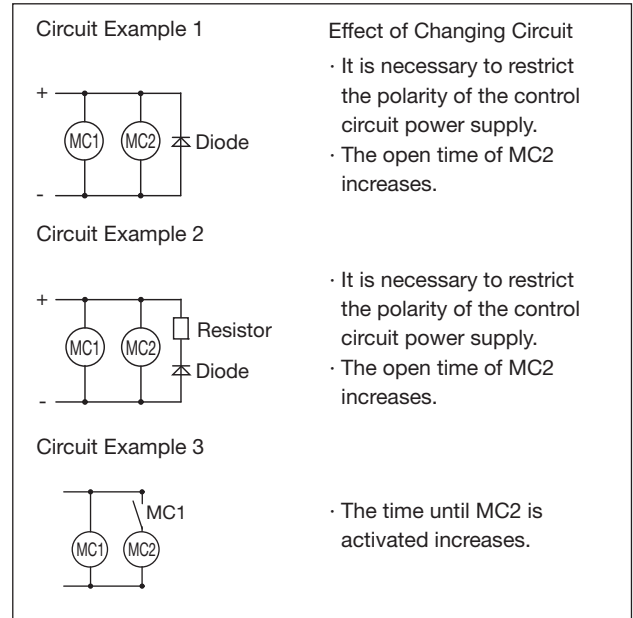
● Handling

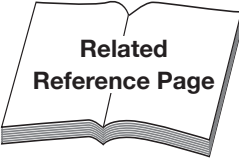
(1) T65 to T100 type and N125 to N800 type coils of DC100V or more cannot be switched by the auxiliary contacts of thermal overload relays (TH- □ types). Switch using the contactor relay (SR or SRD type) contacts as per the figure below.



(2) Connecting differing DC operated magnetic contactor control circuits in parallel and simultaneously switching OFF can cause flip-flopping. As such, use one of the circuits listed below.

(MC1: Small Frame, MC2: Large Frame)

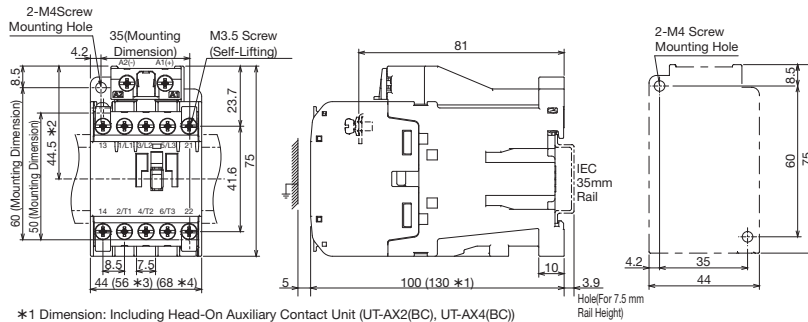
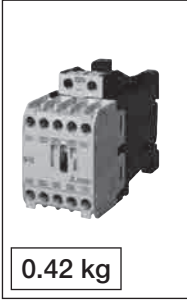


|  | Item | Reference Page | Remarks |
|---|----------------------------|----------------|---------|
| | · Auxiliary Contact Rating | Page 39 | — |
| · Operation Coil | Page 42 | — | |
| · Properties | Page 43 | — | |
| · Performance | Page 44 | — | |
| · Outline Drawings/Contact Arrangements | Page 89 | — | |
| · How to Order | Page 120 | — | |
| · Combining with Optional Units | Page 180 | — | |

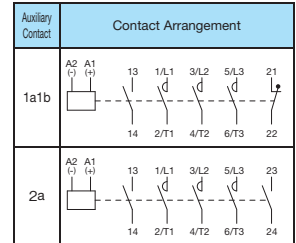
● Outline Drawings/Contact Arrangements (DC Operated Magnetic Starters/Magnetic Contactors)
 ■ T12/T20

Non-Reversing

SD-T12(BC)
SD-T20(BC)



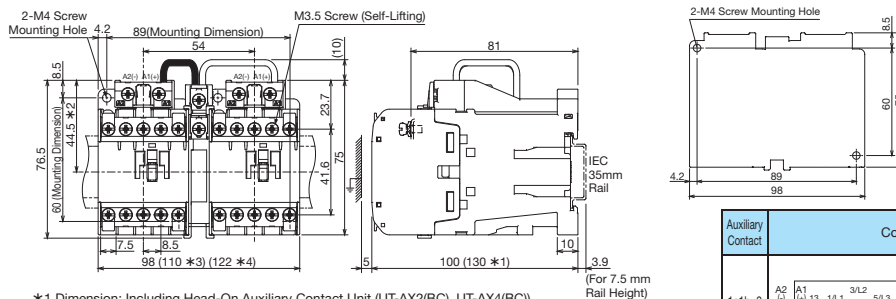
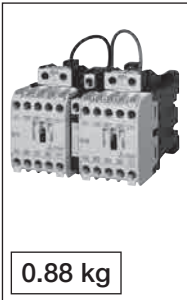
*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
 *2 Dimension: Width Dimension from Center of IEC 35 mm Rail
 *3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC))
 - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)



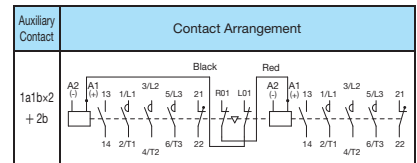
| Model Name | Model Name |
|------------|------------|
| SD-T12 | SD-T12BC |
| SD-T20 | SD-T20BC |

Reversing

SD-2 x T12(BC)
SD-2 x T20(BC)



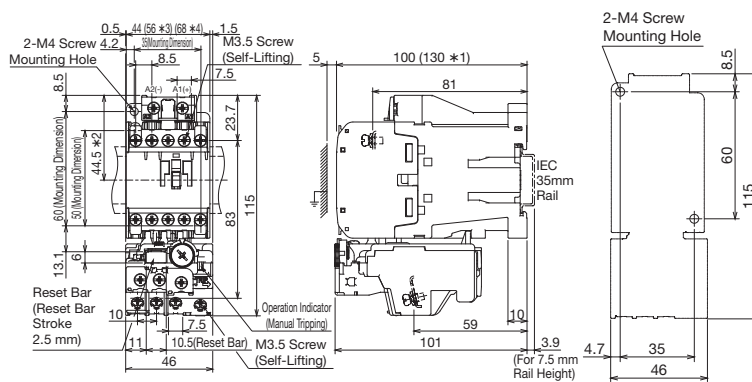
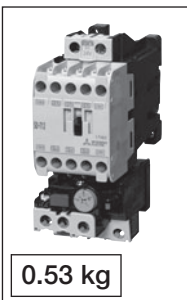
*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
 *2 Dimension: Width Dimension from Center of IEC 35 mm Rail
 *3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC))
 - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)



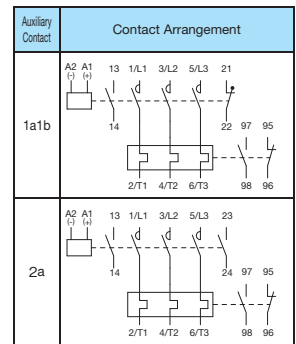
| Model Name | Model Name |
|------------|------------|
| SD-2xT12 | SD-2xT12BC |
| SD-2xT20 | SD-2xT20BC |

Non-Reversing

MSOD-T12(BC)KP
MSOD-T20(BC)KP



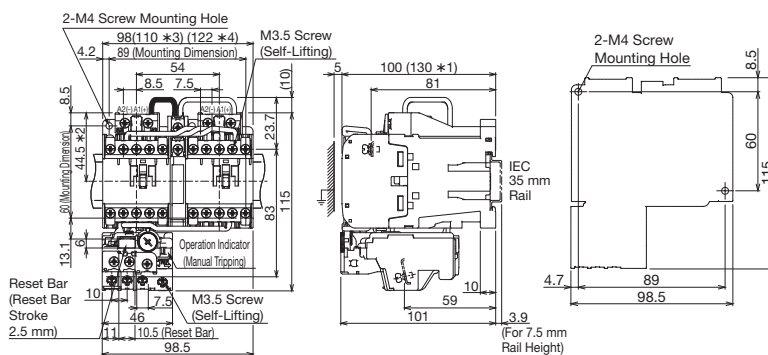
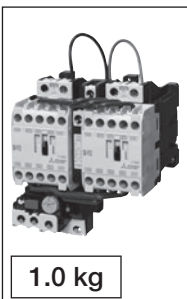
*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
 *2 Dimension: Width Dimension from Center of IEC 35 mm Rail
 *3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC))
 - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)



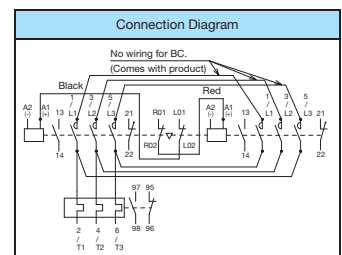
| Model Name | Model Name |
|------------|--------------|
| MSOD-T12KP | MSOD-T12BCKP |
| MSOD-T20KP | MSOD-T20BCKP |

Reversing

MSOD-2 x T12(BC)KP
MSOD-2 x T20(BC)KP



*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
 *2 Dimension: Width Dimension from Center of IEC 35 mm Rail
 *3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC))
 - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)



| Model Name | Model Name |
|--------------|----------------|
| MSOD-2xT12KP | MSOD-2xT12BCKP |
| MSOD-2xT20KP | MSOD-2xT20BCKP |

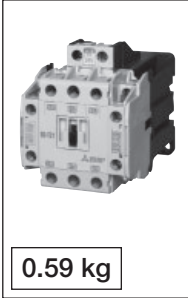
4 MS-T/N Series Magnetic Starters/Magnetic Contactors

T21

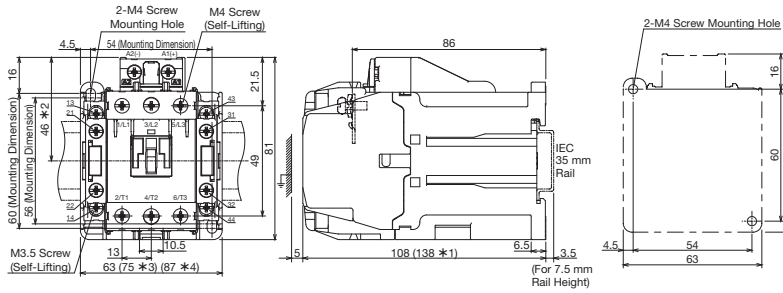
Non-Reversing



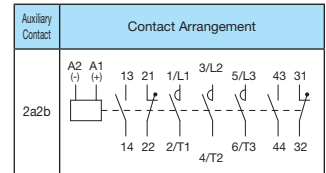
SD-T21(BC)



0.59 kg



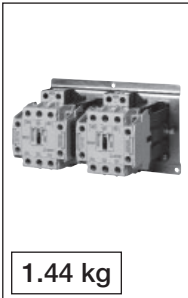
- *1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
- *2 Dimension: Width Dimension from Center of IEC 35 mm Rail
- *3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)



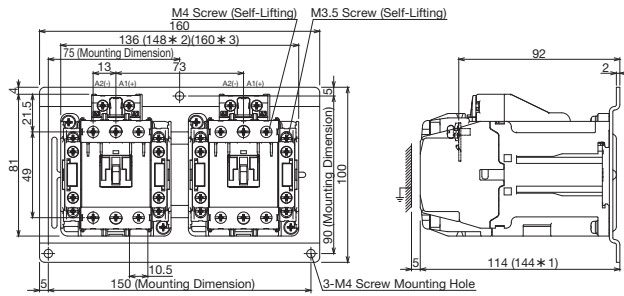
| Model Name |
|------------|
| SD-T21 |
| SD-T21BC |

Reversing

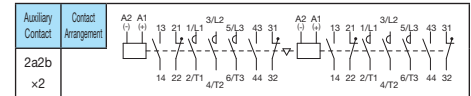
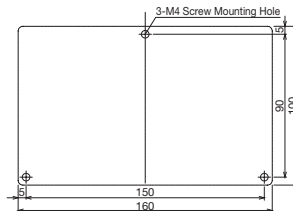
SD-2 x T21(BC)



1.44 kg



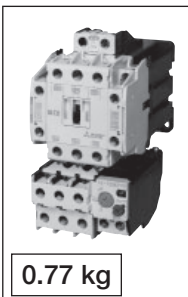
- *1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
- *2, *3 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *2 Has 1 Piece, *3 Has 2 Pieces (Both Sides)



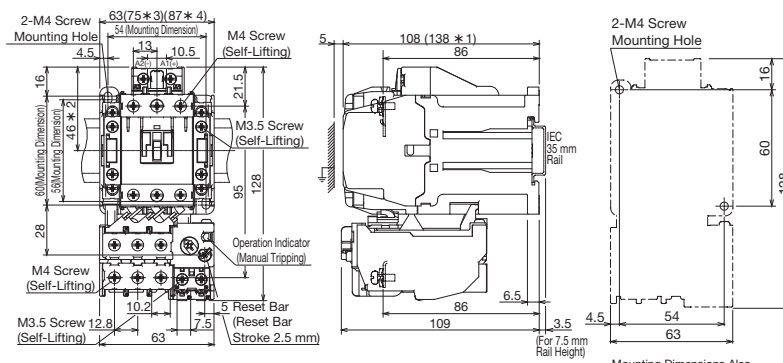
| Model Name |
|------------|
| SD-2xT21 |
| SD-2xT21BC |

Non-Reversing

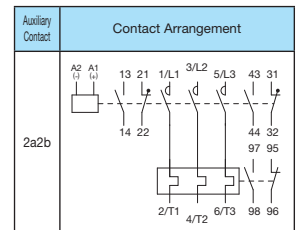
MSOD-T21(BC)KP



0.77 kg



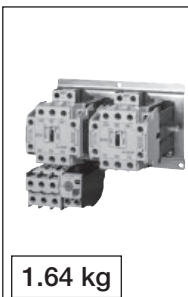
- *1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
- *2 Dimension: Width Dimension from Center of IEC 35 mm Rail
- *3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)



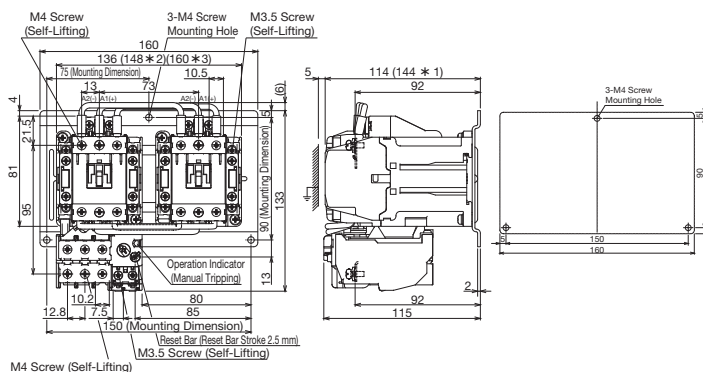
| Model Name |
|--------------|
| MSOD-T21KP |
| MSOD-T21BCKP |

Reversing

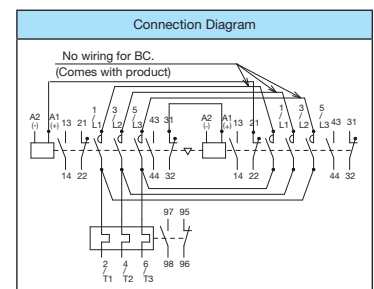
MSOD-2 x T21(BC)KP



1.64 kg



- *1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
- *2, *3 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *2 Has 1 Piece, *3 Has 2 Pieces (Both Sides)

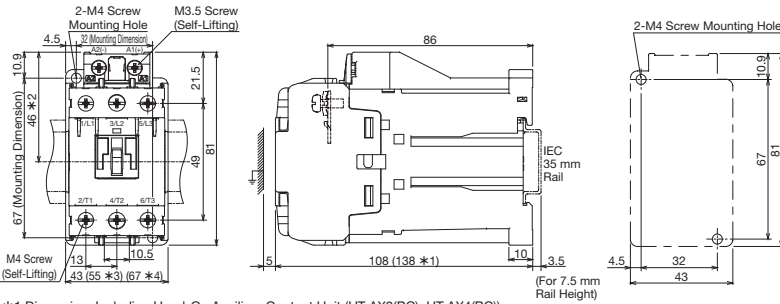
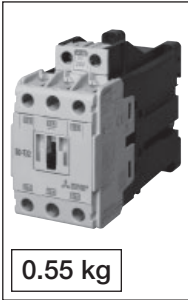


| Model Name |
|----------------|
| MSOD-2xT21KP |
| MSOD-2xT21BCKP |

T32

Non-Reversing

SD-T32(BC)

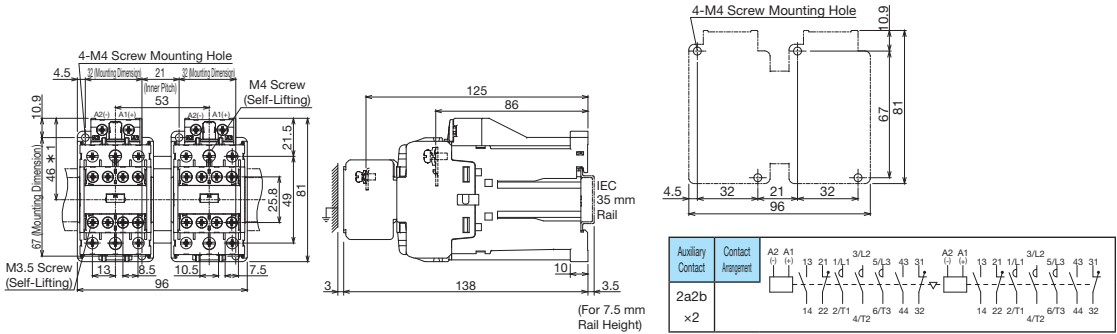


- *1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
- *2 Dimension: Width Dimension from Center of IEC 35 mm Rail
- *3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)

| Contact Arrangement | |
|---------------------|----------------------------------|
| A2 A1 (-) (+) | 1/L1 3/L2 5/L3 2/T1 4/T2 6/T3 |
| Model Name | |
| SD-T32 | |
| SD-T32BC | |

Reversing

SD-2 x T32(BC)



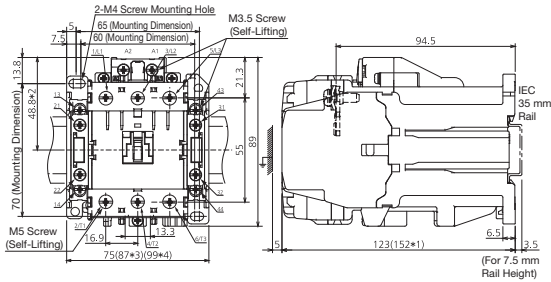
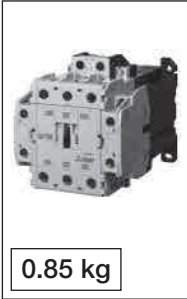
- *1 Dimension: Width Dimension from Center of IEC 35 mm Rail

| Auxiliary Contact | Contact Arrangement |
|-------------------|--|
| 2a2b x2 | A2 A1 (-) (+) 13 21 14/L1 3/L2 5/L3 43 31 14 22 2/T1 4/T2 6/T3 44 32 |
| Model Name | |
| SD-2xT32 | |
| SD-2xT32BC | |

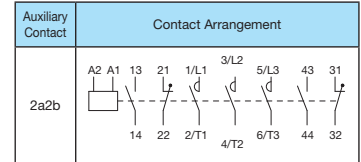
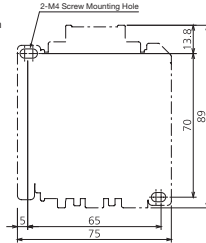
T35/T50

Non-Reversing

SD-T35(BC)
SD-T50(BC)



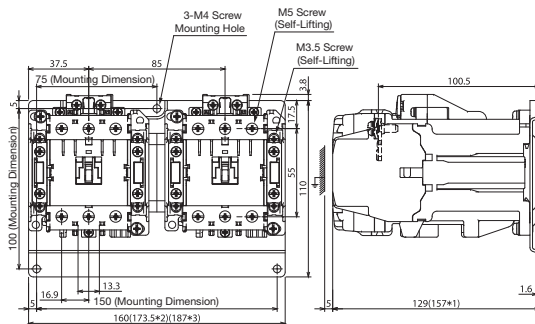
- *1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
- *2 Dimension: Width Dimension from Center of IEC 35 mm Rail
- *3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC))
- *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)



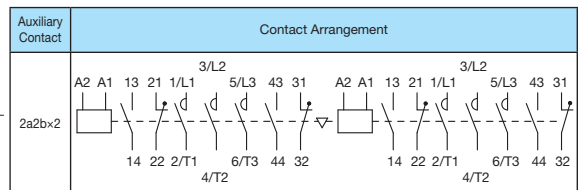
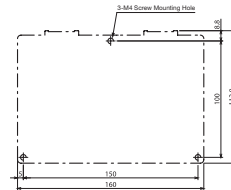
| Model Name | Model Name |
|------------|------------|
| SD-T35 | SD-T35BC |
| SD-T50 | SD-T50BC |

Reversing

SD-2 x T35(BC)
SD-2 x T50(BC)



- *1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
- *2, *3 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC))
- *2 Has 1 Piece, *3 Has 2 Pieces (Both Sides)

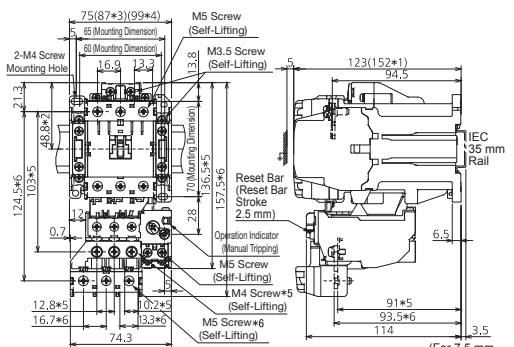


| Model Name | Model Name |
|------------|------------|
| SD-2xT35 | SD-2xT35BC |
| SD-2xT50 | SD-2xT50BC |

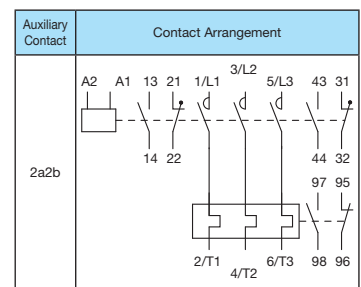
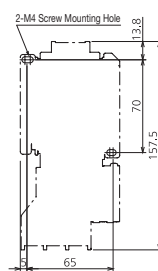
Non-Reversing

MSOD-T35(BC)KP
MSOD-T50(BC)KP

1.09 kg



- *1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
- *2 Dimension: Width Dimension from Center of IEC 35 mm Rail
- *3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC))
- *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)
- *5 Dimension: Heater Designations 22A or Less, *6 Dimension: Heater Designations 29A or More

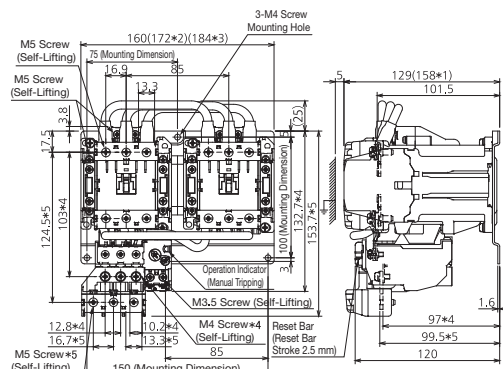


| Model Name | Model Name |
|------------|--------------|
| MSOD-T35KP | MSOD-T35BCKP |
| MSOD-T50KP | MSOD-T50BCKP |

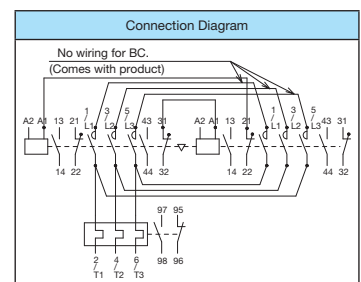
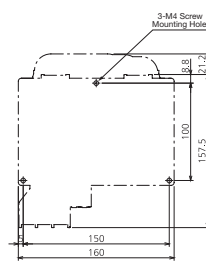
Reversing

MSOD-2 x T35(BC)KP
MSOD-2 x T50(BC)KP

2.2 kg



- *1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
- *2, *3 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC))
- *2 Has 1 Piece, *3 Has 2 Pieces (Both Sides)
- *4 Dimension: Heater Designations 22A or Less, *5 Dimension: Dimension at the Heater Designation of 29A

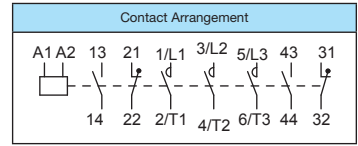
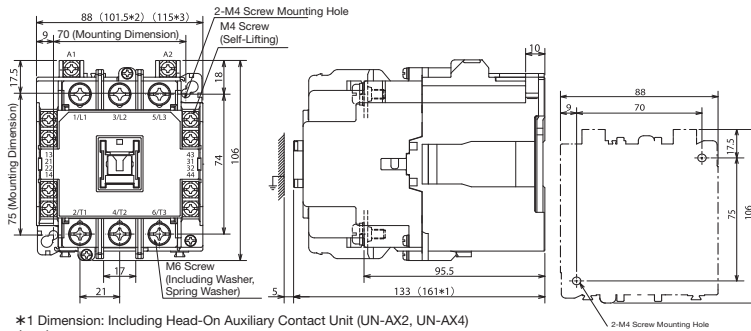


| Model Name | Model Name |
|--------------|----------------|
| MSOD-2xT35KP | MSOD-2xT35BCKP |
| MSOD-2xT50KP | MSOD-2xT50BCKP |

T65/T80

Non-Reversing

SD-T65(CW)
SD-T80(CW)



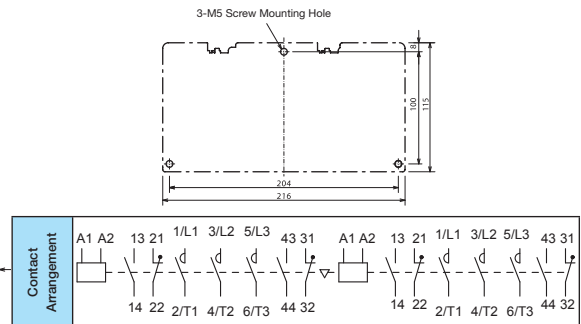
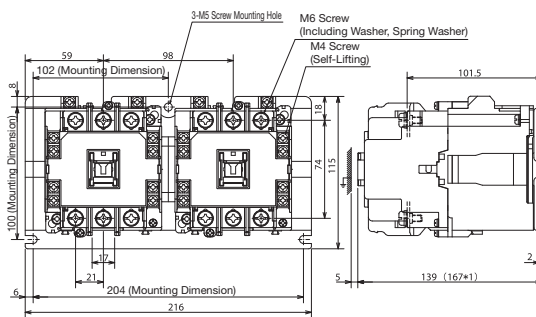
| |
|------------|
| Model Name |
| SD-T65 |
| SD-T80 |

*1 Dimension: Including Head-On Auxiliary Contact Unit (UN-AX2, UN-AX4)
*2, *3 Dimension: Including Side-On Auxiliary Contact Unit (UN-AX11)
- *2 Has 1 Piece, *3 Has 2 Pieces (Both Sides)

Reversing

SD-2 x T65(CW)
SD-2 x T80(CW)

4.6 kg

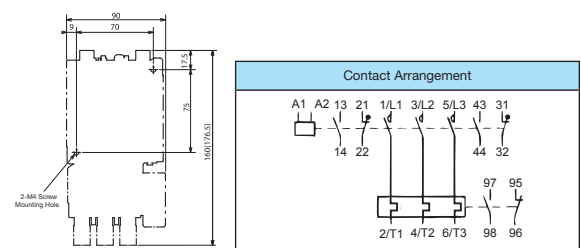
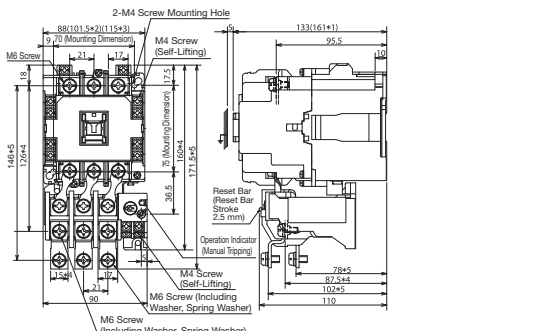
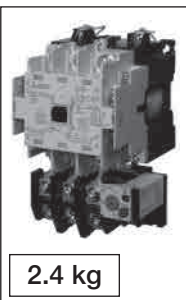


| |
|------------|
| Model Name |
| SD-2xT65 |
| SD-2xT80 |

*1 Dimension: Including Head-On Auxiliary Contact Unit (UN-AX2, UN-AX4)

Non-Reversing

MSOD-T65(CW)KP
MSOD-T80(CW)KP



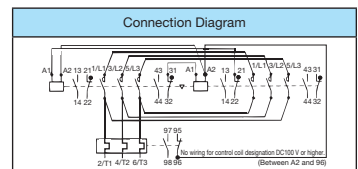
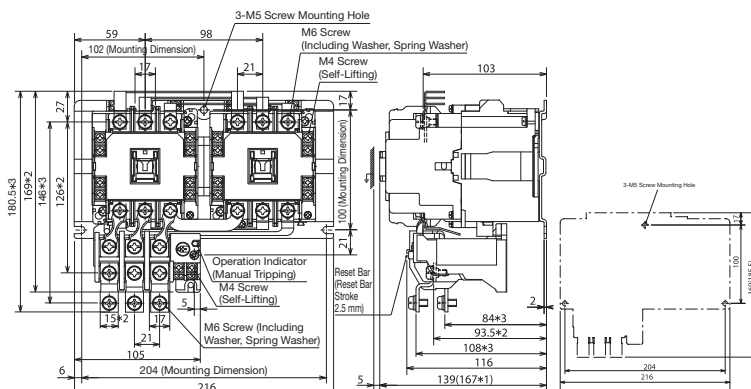
| |
|------------|
| Model Name |
| MSOD-T65KP |
| MSOD-T80KP |

*1 dimension includes the head-on auxiliary contact unit (UN-AX2, UN-AX4).
*2, *3 dimensions indicate when using a side-on auxiliary contact unit (UN-AX11) - *2 indicates 1 piece, *3 indicates 2 pieces (both sides).
*4 indicates the dimension at heater designation of 54A or less.
*5 indicates the dimension at heater designation of 67A. (MSOD-T80CW 67A is not manufactured)

Reversing

MSOD-2 x T65(CW)KP
MSOD-2 x T80(CW)KP

4.9 kg



| |
|--------------|
| Model Name |
| MSOD-2xT65KP |
| MSOD-2xT80KP |

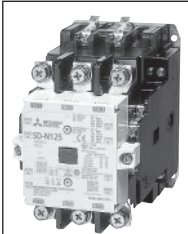
*1 dimension includes the head-on auxiliary contact unit (UN-AX2, UN-AX4).
*2 indicates the dimension at heater designation of 54A or less.
*3 indicates the dimension at heater designation of 67A. (MSOD-2xT80CW 67A is not manufactured)

Note 1. The terminal numbers in parentheses for the S, SD, SL(D) auxiliary contacts in the center contact arrangement example are indicated along with the product, and represent the numbers of the old version (A Series).

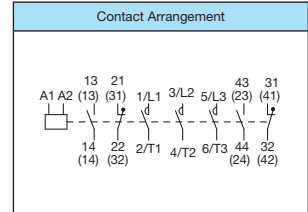
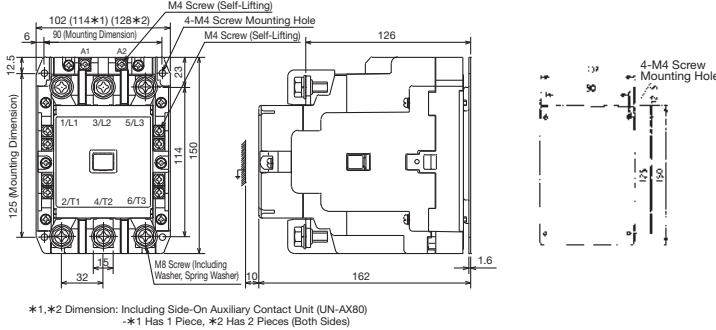
N125

Non-Reversing

SD-N125



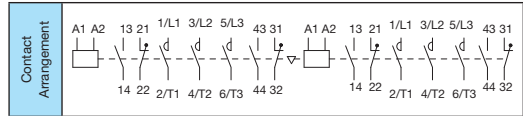
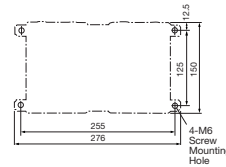
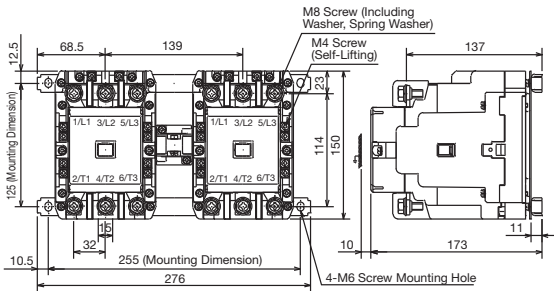
4.3 kg



| | |
|------------|---------|
| Model Name | SD-N125 |
|------------|---------|

Reversing

SD-2xN125

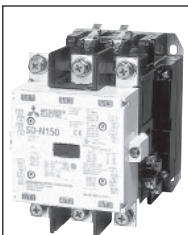


| | |
|------------|-----------|
| Model Name | SD-2xN125 |
|------------|-----------|

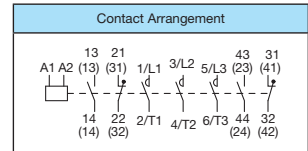
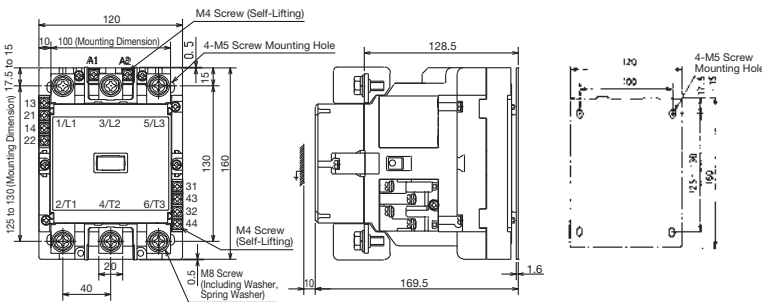
N150

Non-Reversing

SD-N150



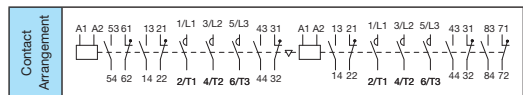
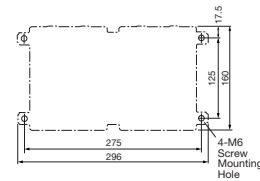
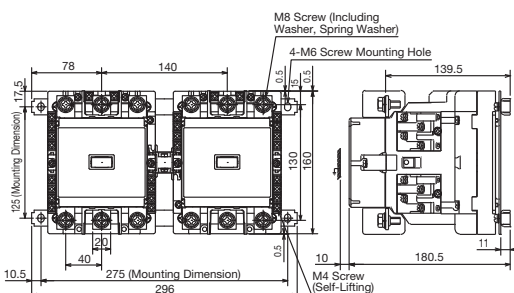
4.8 kg



| | | | |
|------------|---------|--------------|--------|
| Model Name | SD-N150 | Model Number | SN2971 |
|------------|---------|--------------|--------|

Reversing

SD-2xN150



| | |
|------------|-----------|
| Model Name | SD-2xN150 |
|------------|-----------|

10 kg

4

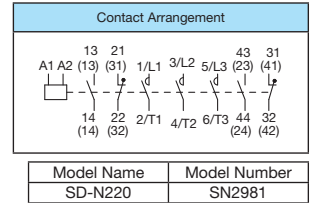
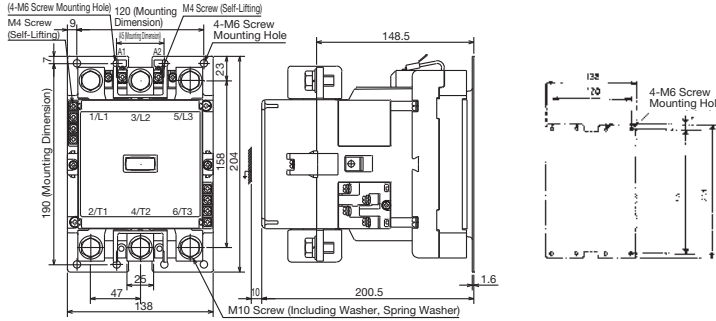
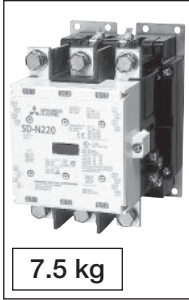
MS-T/N Series Magnetic Starters/Magnetic Contactors

Note 1. The terminal numbers in parentheses for the S, SD, SL(D) auxiliary contacts in the center contact arrangement example are indicated along with the product, and represent the numbers of the old version (A Series).

N220

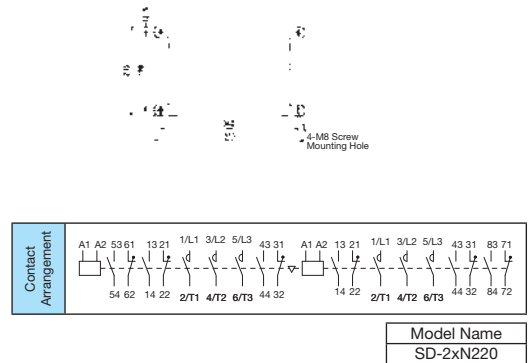
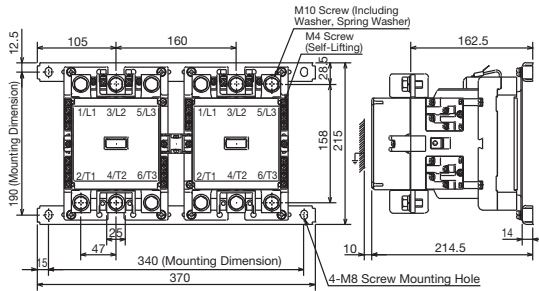
Non-Reversing

SD-N220



Reversing

SD-2xN220



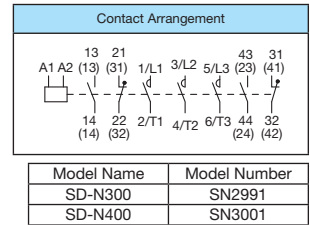
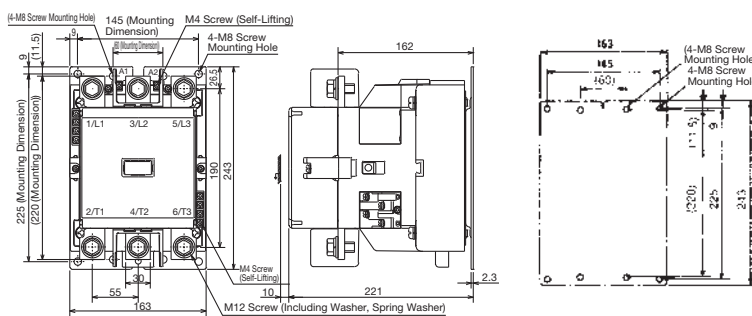
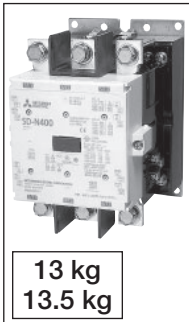
17 kg

N300/N400

Non-Reversing

SD-N300

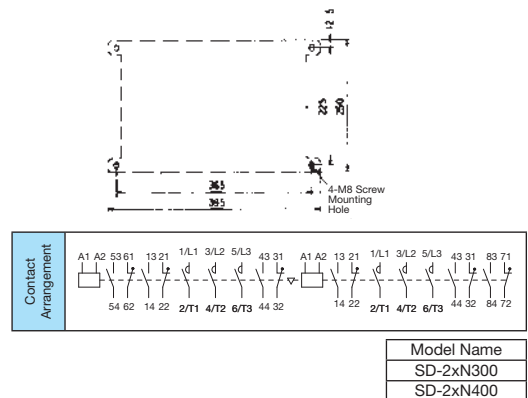
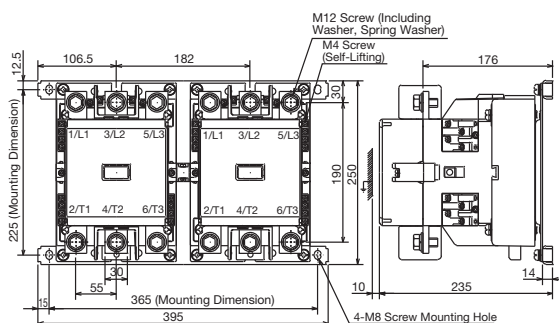
SD-N400



Reversing

SD-2xN300

SD-2xN400



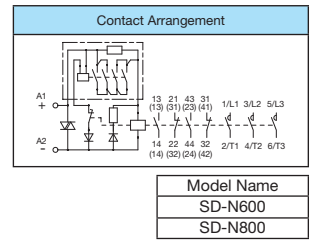
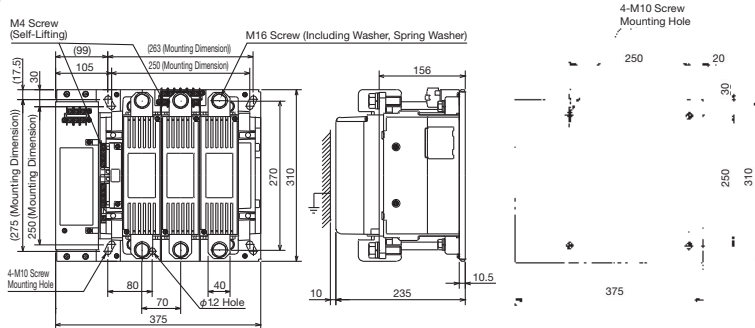
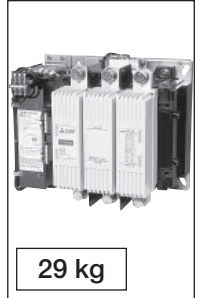
28 kg
29 kg

Note 1. The terminal numbers in parentheses for the S, SD, SL(D) auxiliary contacts in the center contact arrangement example are indicated along with the product, and represent the numbers of the old version (A Series).

N600/N800

Non-Reversing

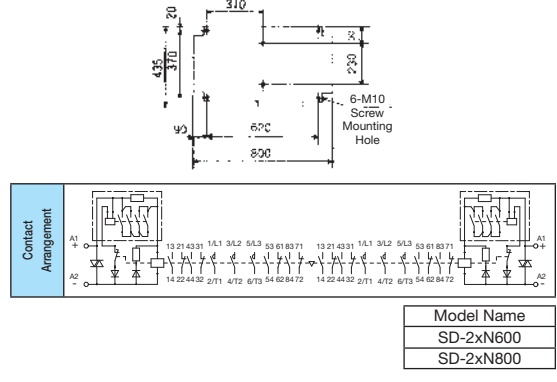
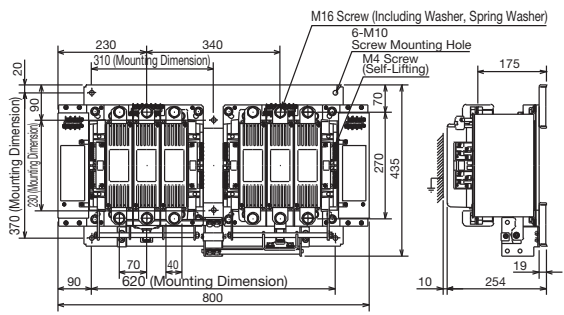
SD-N600
SD-N800



Reversing

SD-2 x N600
SD-2 x N800

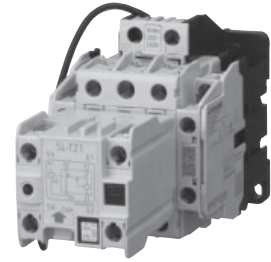
64 kg



4.4 MSOL(D)/SL(D)-□ Mechanically Latched Magnetic Starters/Magnetic Contactors

Contact doesn't open when power failures or voltage drops occur

- Installing a reliable mechanical latch mechanism to magnetic contactors and using the equipped closing and opening coils allows mechanical retention in the closed state. (Can also be operated manually)
- The magnetic contactor will not release due to power failures, momentary power failures or voltage drops.
- Power saving and no noise type as the coil is only momentarily energized and doesn't consume power in the regular state.
- Suitable for distribution panels, street lights, important facilities within buildings or the memory circuits of plants and more.
- Suitable for AC/DC power supply switching and power purchasing/self-generated power supply switching, with 2 units combined.
(Applicable with MSOL(D)/SL(D)-2x □ types that have a mechanical interlock equipped as standard)



SL-T21

● Ratings/Specifications (Standard Applicability)

| Magnetic Contactors | Magnetic Starters (Note 8) | Rated Capacity [kW] | | | | Rated Operating Current [A] | | | | | | Conventional Free Air Thermal Current I _{th} [A] | Auxiliary Contact (for Reversing) | | | Compatible Thermal Overload Relays | |
|---------------------|----------------------------|---|--------------|-----------|-------|---|--------------|-----------|-------|--------------------------------|--------------|---|-----------------------------------|-------------------------------------|--------------------------------------|------------------------------------|------------------------------|
| | | Three-Phase Squirrel-cage Motor (Category AC-3) | | | | Three-Phase Squirrel-cage Motor (Category AC-3) | | | | Resistive Load (Category AC-1) | | | Valid | For Self-Demagnetization (Built-in) | Additional Unit Model Names x Pieces | Model Name | Heater Designation Range [A] |
| | | 220 to 240 V | 380 to 440 V | 500 V | 690 V | 220 to 240 V | 380 to 440 V | 500 V | 690 V | 200 to 240 V | 380 to 440 V | | | | | | |
| SL-T21(BC) | MSOL-T21(BC)KP | 5.5 [4] | 11 [7.5] | 11 [7.5] | 7.5 | 25 [20] | 23 [20] | 17 [17] | 9 | 32 | 32 | 32 | 2a2b (2a2b x 2) | 1a1b (1a1b x 2) | UT-AX11(BC)x2 | TH-T25(BC)KP | 0.24 to 22 |
| SL-T35(BC) | MSOL-T35(BC)KP | 11 [7.5] | 18.5 [15] | 18.5 [15] | 15 | 40 [35] | 40 [32] | 32 [26] | 17 | 60 | 60 | 60 | | | | TH-T50(BC)KP | 0.24 to 22 |
| SL-T50(BC) | MSOL-T50(BC)KP | 15 [11] | 22 [22] | 25 [22] | 22 | 55 [50/50] | 50 [48] | 38 [38] | 26 | 80 | 80 | 80 | 1a2b (1a2b x 2) | 1a1b (1a1b x 2) | UN-AX11x2 | TH-T25(BC)KP | 0.24 to 22 |
| SL-T65 | MSOL-T65KP | 18.5 [15] | 30 [30] | 37 [30] | 30 | 65 [65] | 65 [65] | 60 [45] | 38 | 100 | 100 | 100 | | | | TH-T50(BC)KP | 29 to 42 |
| SL-T80 | MSOL-T80KP | 22 [19] | 45 [37] | 45 [45] | 45 | 85 [80] | 85 [80] | 75 [75] | 52 | 120 | 120 | 120 | 1a2b (1a2b x 2) | 1a1b (1a1b x 2) | UN-AX11x2 | TH-T65KP | 15 to 54 |
| SL-T100 | MSOL-T100KP | 30 [22] | 55 [45] | 55 [45] | 55 | 105 [100] | 105 [93] | 85 [75] | 65 | 150 | 150 | 150 | | | | TH-T100KP | 67 |
| SL-N125 | MSOL-N125KP | 37 [30] | 60 [60] | 60 [60] | 60 | 125 [125] | 120 [120] | 90 [90] | 70 | 150 | 150 | 150 | 1a2b (1a2b x 2) | 1a1b (1a1b x 2) | UN-AX80x2 (UN-AX80x2) | TH-T65KP | 15 to 54 |
| SL-N150 | MSOL-N150KP | 45 [37] | 75 [75] | 90 [90] | 90 | 150 [150] | 150 [150] | 140 [140] | 100 | 200 | 200 | 200 | | | | TH-T100KP | 67, 82 |
| SL-N220 | MSOL-N220KP | 75 [55] | 132 [110] | 132 [132] | 132 | 250 [220] | 250 [220] | 200 [200] | 150 | 260 | 260 | 260 | 1a2b (2a3b x 2) | 1a1b (1a1b x 2) | UN-AX150x2 (-) | TH-N120KP(TA) | 42 to 105 |
| SL-N300 | MSOL-N300KP | 90 [75] | 160 [150] | 160 [160] | 200 | 300 [300] | 300 [300] | 250 [250] | 220 | 350 | 350 | 350 | | | | TH-N220KPRH | 82 to 180 |
| SL-N400 | MSOL-N400KP | 125 [110] | 220 [200] | 225 [200] | 250 | 400 [400] | 400 [400] | 350 [350] | 300 | 450 | 450 | 450 | 1a2b (3a4b x 2) | 1a1b (1a1b x 2) | UN-AX600x1 (-) | TH-N400KPRH | 105 to 250 |
| SL-N600 | — | 190 [160] | 330 [300] | 330 [300] | 330 | 630 [630] | 630 [630] | 500 [500] | 420 | 660 | 660 | 660 | | | | TH-N600KP (Note 3) | 250 to 500 |
| SL-N800 | — | 220 [200] | 440 [400] | 500 [400] | 500 | 800 [800] | 800 [800] | 720 [720] | 630 | 800 | 800 | 800 | | | | | 250 to 660 |

Note 1. The value in parentheses for the rated operating current is applicable in the case of magnetic contactors.

Note 2. Use model names SLD-T□, SLD-N□ or MSOLD-T□, MSOLD-N□ for DC closing coils.

Note 3. Use TH-N600 in combination with a separately sold current transformer (Mitsubishi CW-□).

Note 4. Reversing (SL(D)-2 x T□, SL(D)-2 x N□ or MSOL(D)-2 x T□, MSOL(D)-2 x N□ types) can also be manufactured.

Note 5. Refer to page 49 for information regarding application to resistive loads and capacitive loads.

Note 6. The main contact minimum operating voltage and current differ depending on the allowable fault rate. Please refer to page 40 for details.

Note 7. No specification needs to be made for contact arrangements that are valid and self-demagnetizing.

Note 8. MSOL(D)-T□ and MSOL(D)-N□ types can also be manufactured.

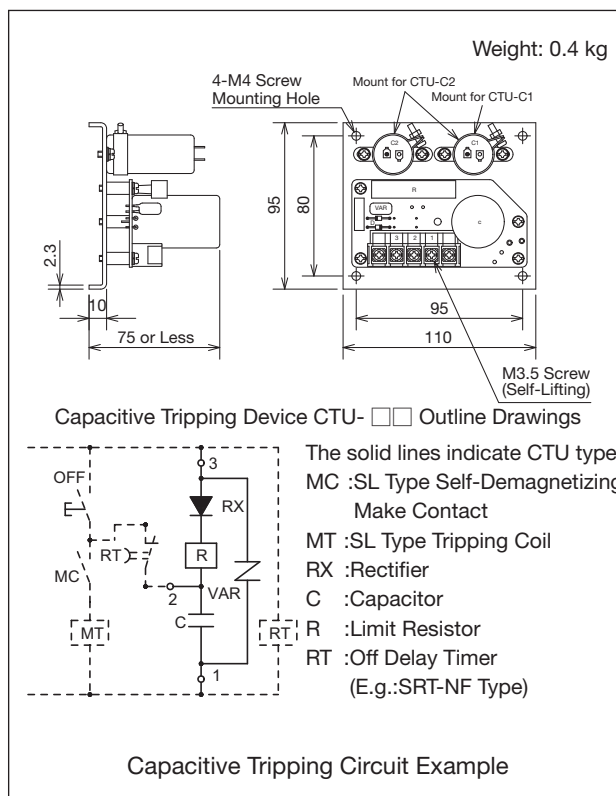
● Operating Transformer Capacity, Capacitive Tripping

| Frame | Operating Transformer Capacity (For AC Operation) (VA) | Minimum Capacitance For Capacitive Tripping (For AC200 V) (μ F) Note 1 | Capacitive Tripping Device Model Name Note 2 | |
|-------|--|---|---|--------|
| | | | AC100V | AC200V |
| T21 | 75 to 100 | 40 | CTU-A1 | CTU-A2 |
| T35 | 75 to 100 | 40 | | |
| T50 | 75 to 100 | 40 | | |
| T65 | 75 to 100 | 150 | | |
| T80 | 75 to 100 | 150 | CTU-B1 | CTU-B2 |
| T100 | 100 to 150 | 150 | | |
| N125 | 100 to 150 | 150 | | |
| N150 | 100 to 150 | 150 | | |
| N220 | 150 to 200 | 150 | | |
| N300 | 200 to 300 | 150 | | |
| N400 | 200 to 300 | 150 | | |
| N600 | 300 to 400 | 600 | | |
| N800 | 300 to 400 | 600 | | |

Note 1. The minimum capacitance for capacitive tripping is the value required to trip the circuit within 5 seconds of a power failure.

Note 2. CTU type capacitive tripping device specifications.

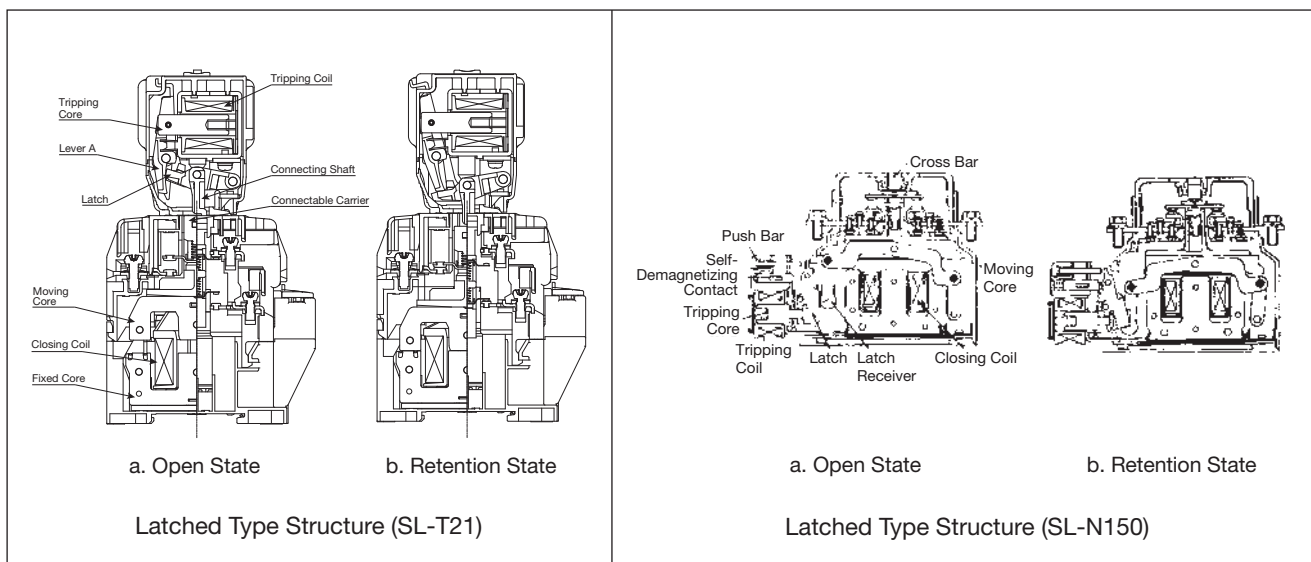
- Charging for at least 10 seconds at the rated voltage allows for tripping up to 30 seconds after a power failure.
- Tripping Coil Rated Voltage/Frequency
For AC100 V: 100 to 110 V, 50/60 Hz
For AC200 V: 200 to 220 V, 50/60 Hz
- Uses an electrolytic capacitor, so the capacity should be checked periodically.



● Structure/Operation

● Structure

The latch is installed above the unit for T21 to T80 types and beneath the power supply side the unit for T100 and N125 to N800 types. The figure below shows a typical application.



● **Operation**

Closing

- (1) Energizing the closing coil attracts the movable core, engaging lever A or the latch receiver to the latch while simultaneously close-circuiting the main contact.
- (2) When the latch engages the self-demagnetizing contact is open-circuited, stopping current to the closing coil and completing the close.

Tripping

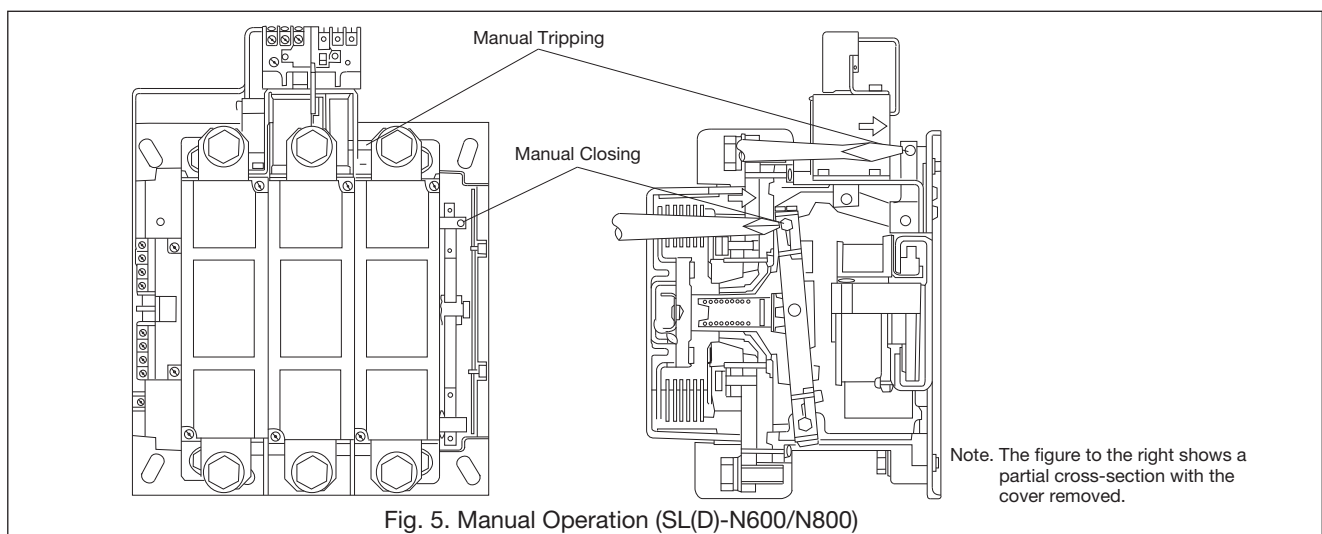
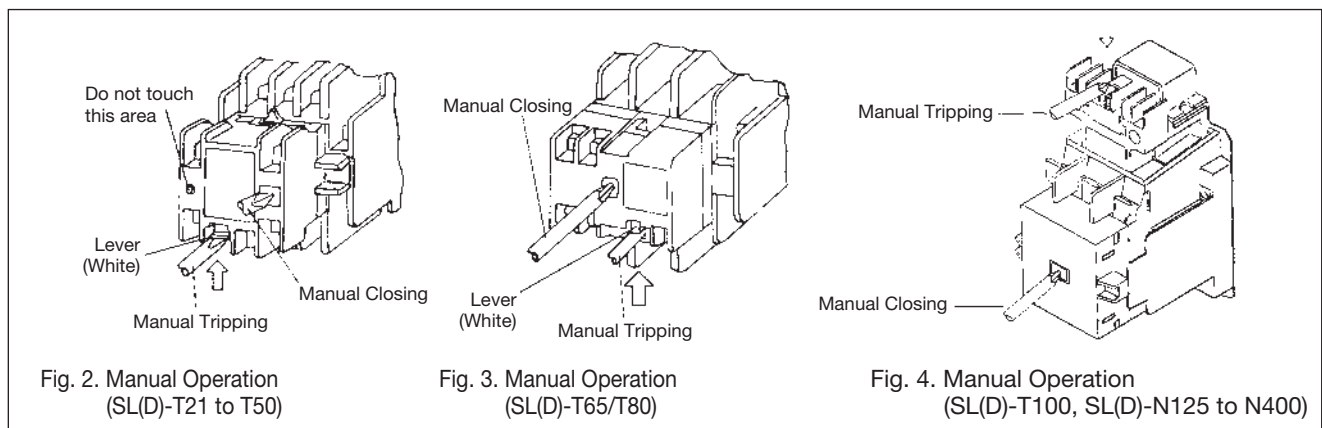
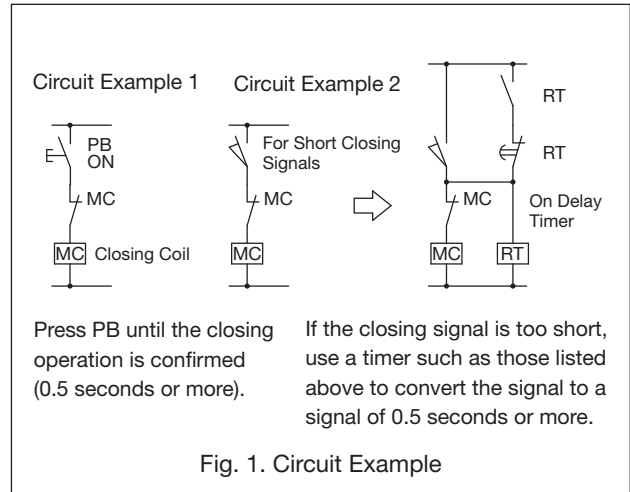
- (1) Energizing the tripping coil attracts the movable core, freeing lever A or the latch receiver from the latch.
- (2) When the latch is released the movable core returns to its original position and the main contact is opened.

● **Manual Operation**

The contactors can be manually operated for the purpose of sequence checking. Manually close or trip the contactor using a screwdriver as per figures 2 to 5. However, do not operate manually if a current is flowing through the main circuit, as there is a risk of electric shock due to arcing.

● **Control Command Duration (Minimum Energize Time)**

The command duration of external switches that direct the closing coil or tripping coil must be 0.3 seconds or more for T21 to T100 and N125 to N220 types and 0.5 seconds or more for N300 to N800 types.



● Handling

● Model Name

An SL in the model name indicates an AC closing coil while SLD indicates a DC closing coil. Magnetic starter (with thermal overload relay) model names are either MSOL type or MSOLD type.

● Operation Coils

S and SD types have different coil operating voltage ranges for both closing and tripping coils. The closing and tripping coils are both short-rated for 15 second operation, so be sure to connect a self-demagnetizing contact in series with the coil. The allowable range of the applied voltage is 85 to 110% of the rated voltage.

● Operating Switch Contact Capacity

Caution is required as the coil input to SL and SLD types is greater than that for S and SD types. Coil breaking in regular operation is done by the self-demagnetizing contact, so operation is possible using a closing relay or operating switch with making capacity equivalent to the coil input. However, in some cases the command duration is too short (approx. 0.5 seconds required), or breaking may be triggered by external shocks, so a contact with breaking capacity should be used.

● Closing and Tripping Commands

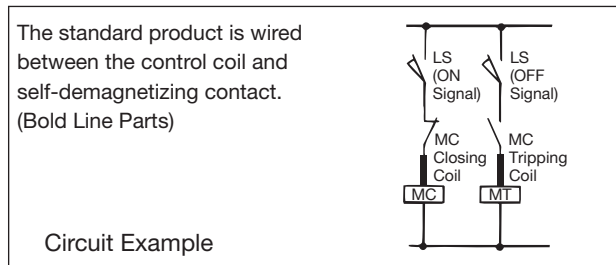
Configure your system such that the closing switch and tripping switch command signals never overlap (simultaneous contact).

● Power Supply Capacity

Caution is required as the momentary input to the operation coil is greater than that for S and SD types.

● Control Circuit Wiring

Do not remove the wiring for the operation coil and self-demagnetizing contact (bold lines in figure below) but wire according to the caution nameplate attached to the unit.

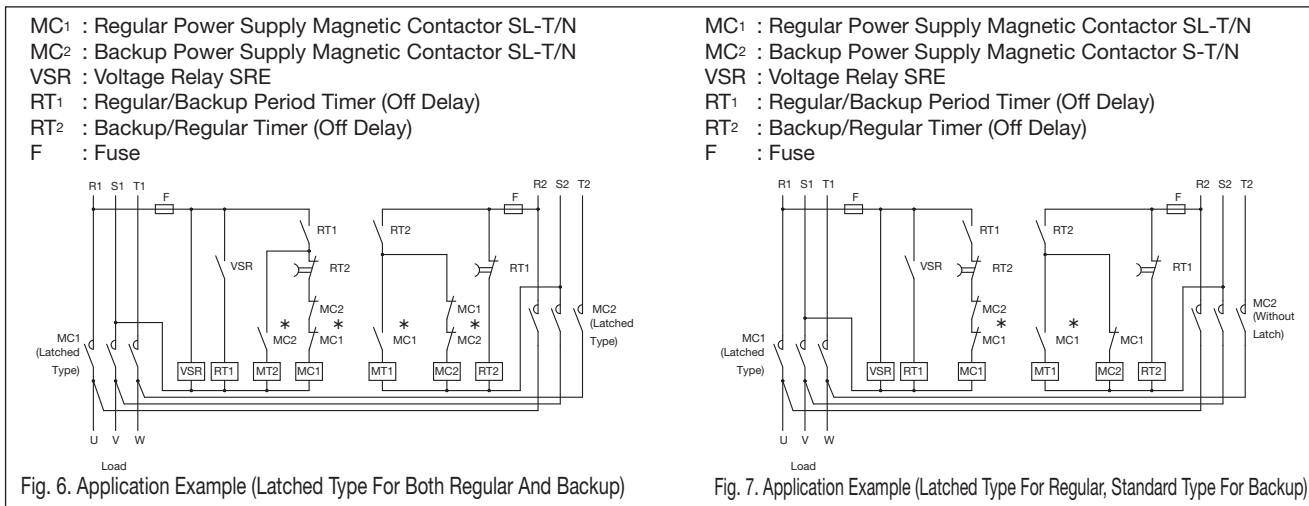


● Disassembly

Mechanically latched magnetic contactors are calibrated assembled products, so the coil cannot be replaced or disassembled. (Do not disassemble.)

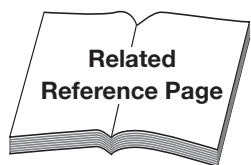
● Application Example

Fig. 6. shows an example using a latched type for both regular and backup use with switched power supplies. Fig. 7. shows an example using a latched type for regular operation and a standard type (without latch) for backup use. When switching with a timer use periods of 0.2 seconds or more.



Note. * contacts are self-demagnetizing contacts wired to the closing coil (MC1, MC2) or tripping coil (MT1, MT2).

| Item | Reference Page | Remarks |
|---|----------------|---------|
| · Auxiliary Contact Rating | Page 39 | — |
| · Operation Coil | Page 42 | — |
| · Properties | Page 44 | — |
| · Performance | Page 44 | — |
| · Outline Drawings/Contact Arrangements | Page 102 | — |
| · How to Order | Page 120 | — |
| · Combining with Optional Units | Page 180 | — |



4

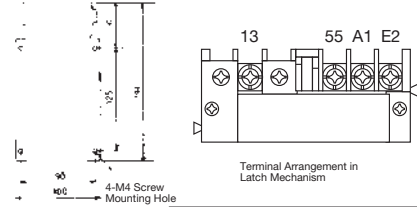
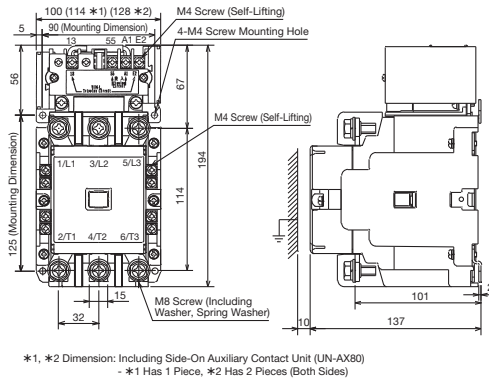
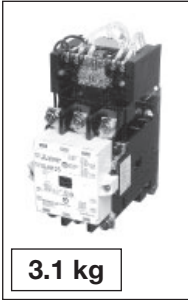
MS-T/N Series Magnetic Starters/Magnetic Contactors

Note 1. The terminal numbers in parentheses for the S, SD, SL(D) auxiliary contacts in the center contact arrangement example are indicated along with the product, and represent the numbers of the old version (A Series).

N125

Non-Reversing

SL(D)-N125

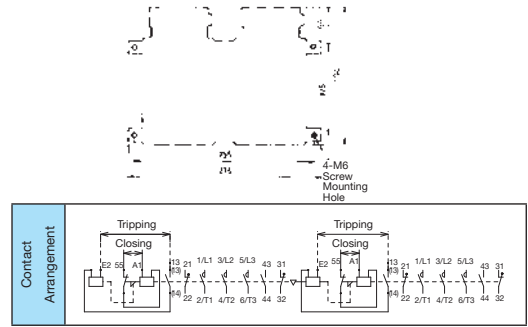
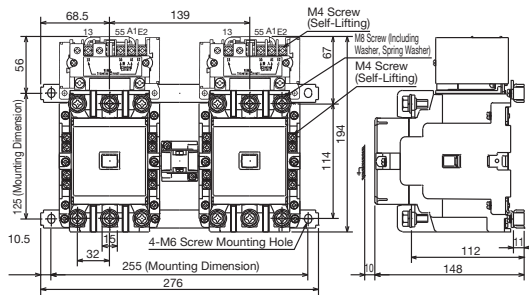


| Model Name | Model Number | Model Name | Model Number |
|------------|--------------------------------|------------|--------------|
| SL-N125 | SLN05 <input type="checkbox"/> | SLD-N125 | SLN3541 |

Reversing

SL(D)-2xN125

7.0 kg

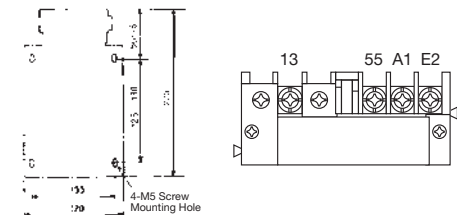
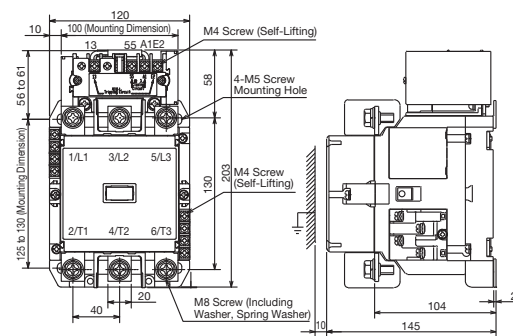
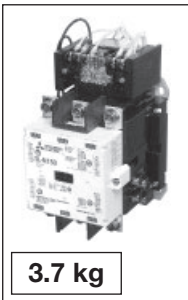


| Model Name | Model Name |
|------------|------------|
| SL-2xN125 | SLD-2xN125 |

N150

Non-Reversing

SL(D)-N150

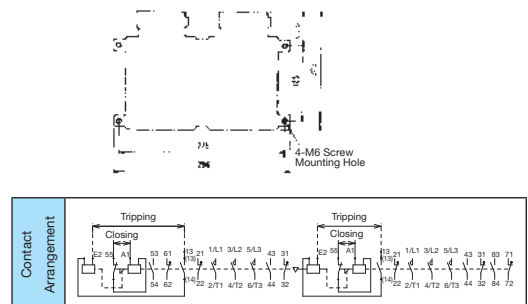
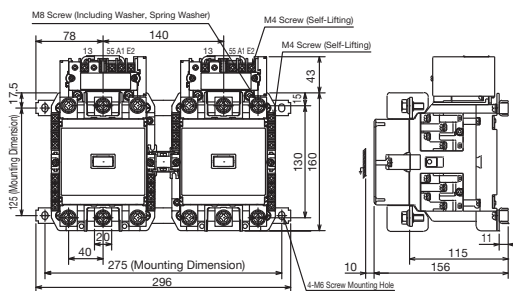


| Model Name | Model Number |
|------------|--------------------------------|
| SL-N150 | SLN06 <input type="checkbox"/> |
| SLD-N150 | SLN355 |

Reversing

SL(D)-2xN150

8.0 kg



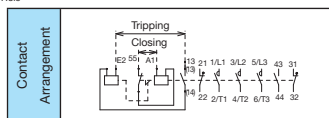
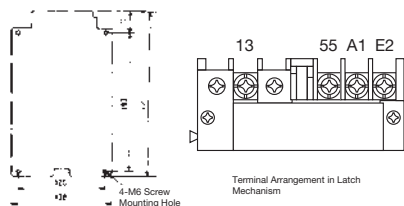
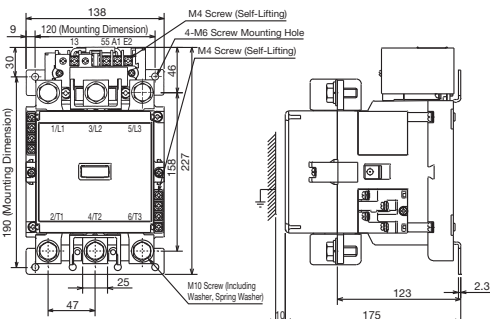
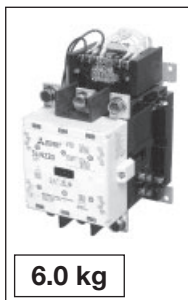
| Model Name | Model Number |
|------------|-------------------------------|
| SL-2xN150 | SLN1 <input type="checkbox"/> |
| SLD-2xN150 | SLN355 |

Note 1. The terminal numbers in parentheses for the S, SD, SL(D) auxiliary contacts in the center contact arrangement example are indicated along with the product, and represent the numbers of the old version (A Series).

N220

Non-Reversing

SL(D)-N220

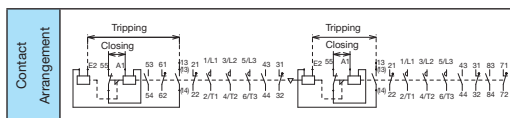
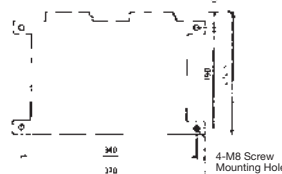
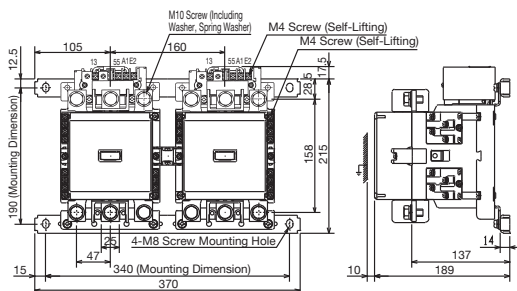


| Model Name | Model Number |
|------------|--------------|
| SL-N220 | SLN06 □□ |
| SLD-N220 | SLN3561 |

4

Reversing

SL(D)-2xN220



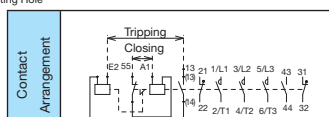
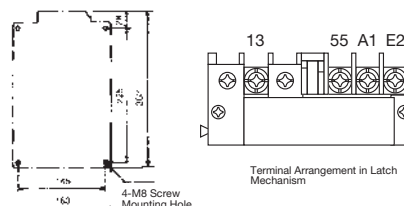
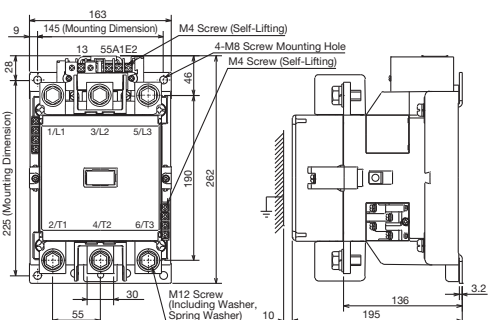
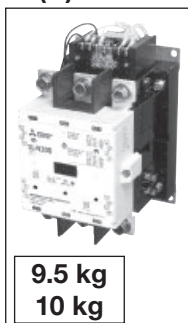
| Model Name | Model Number |
|------------|--------------|
| SL-2xN220 | SLN19 □□ |
| SLD-2xN220 | |

14 kg

N300/N400

Non-Reversing

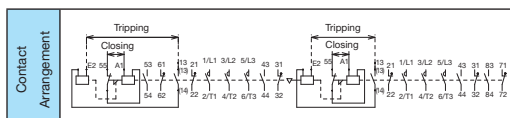
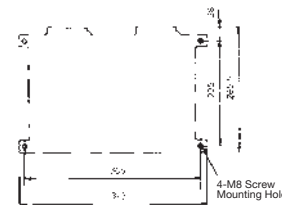
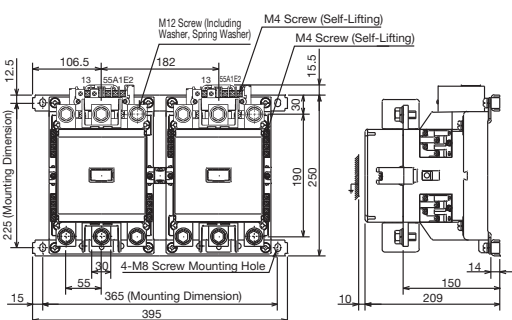
**SL(D)-N300
SL(D)-N400**



| Model Name | Model Number | Model Name | Model Number |
|------------|--------------|------------|--------------|
| SL-N300 | SLN06 □□ | SLD-N300 | SLN3571 |
| SL-N400 | SLN06 □□ | SLD-N400 | SLN3581 |

Reversing

**SL(D)-2 x N300
SL(D)-2 x N400**



| Model Name | Model Number | Model Name | Model Number |
|------------|--------------|------------|--------------|
| SL-2xN300 | SLN19 □□ | SLD-2xN300 | |
| SL-2xN400 | SLN19 □□ | SLD-2xN400 | |

**21 kg
22 kg**

4

MS-T/N Series Magnetic Starters/Magnetic Contactors

Note 1. The terminal numbers in parentheses for the S, SD, SL(D) auxiliary contacts in the center contact arrangement example are indicated along with the product, and represent the numbers of the old version (A Series).

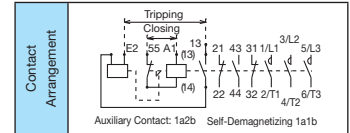
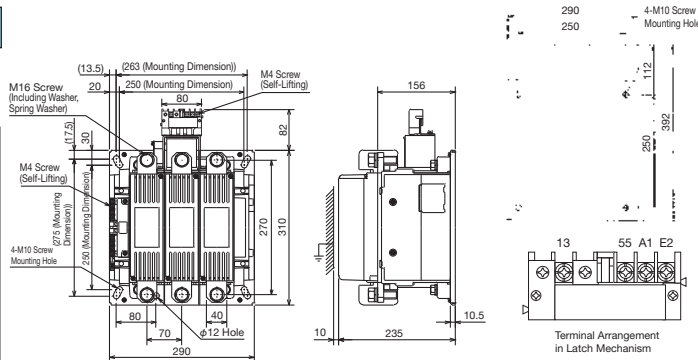
N600/N800

Non-Reversing

SL(D)-N600
SL(D)-N800



27 kg

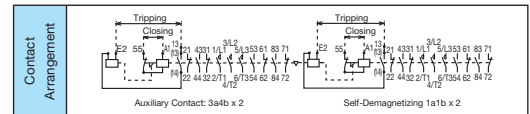
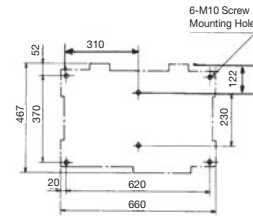
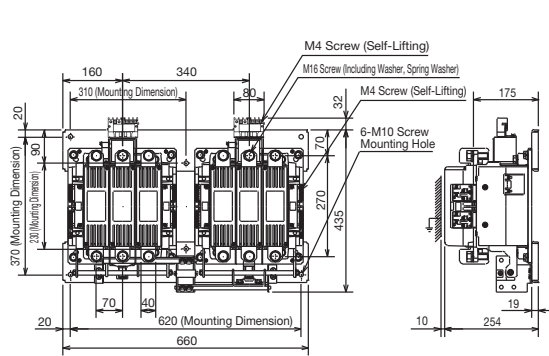


| Model Name | Model Number | Model Name | Model Number |
|------------|--------------|------------|--------------|
| SL-N600 | SNL0681 | SLD-N600 | |
| SL-N800 | | SLD-N800 | |

Reversing

SL(D)-2 x N600
SL(D)-2 x N800

60 kg

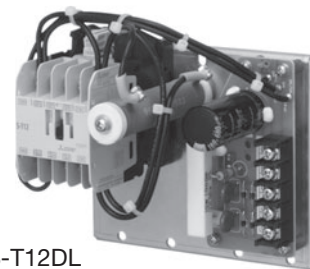


| Model Name | Model Name |
|------------|------------|
| SL-2xN600 | SLD-2xN600 |
| SL-2xN800 | SLD-2xN800 |

4.5 MSO/S-□DL Delay Open Magnetic Starters/Magnetic Contactors

Retains the closed state for 2^{+2}_{-1} seconds during a momentary power failure

- In cases of momentary power failures or momentary voltage drops due to lightning strikes on wiring etc., the discharge from a capacitor allows the closed state to be retained for 2^{+2}_{-1} seconds.
- No re-closing operations for magnetic contactors are required when power is restored, which makes continuous load operation possible.
- Suitable for temporary storage circuitry in illumination equipment or automatic control devices.



S-T12DL

● Ratings/Specifications (Standard Applicability)

| Magnetic Contactors | Magnetic Starters (Note 8) | Rated Capacity [kW] | | | | Rated Operating Current [A] | | | | Conventional Free Air Thermal Current Ith [A] | Auxiliary Contact | | Compatible Thermal Overload Relays | | | |
|---------------------|----------------------------|---|--------------|-----------|-------|---|--------------|-----------|-------|---|--------------------------------|--------------|------------------------------------|--------------------------------------|-------------------|------------------------------|
| | | Three-Phase Squirrel-cage Motor (Category AC-3) | | | | Three-Phase Squirrel-cage Motor (Category AC-3) | | | | | Resistive Load (Category AC-1) | | Valid | Additional Unit Model Names x Pieces | Model Name | Heater Designation Range [A] |
| | | 220 to 240 V | 380 to 440 V | 500 V | 690 V | 220 to 240 V | 380 to 440 V | 500 V | 690 V | | 200 to 240 V | 380 to 440 V | | | | |
| S-T12DL | MSO-T12DLKP | 3.5 [2.7] | 5.5 [4] | 5.5 [5.5] | 5.5 | 13 [13] | 12 [9] | 9 [9] | 7 | 20 | 13 | 20 | — | — Note 3 | TH-T18KP | 0.12 to 11 |
| S-T21DL | MSO-T21DLKP | 5.5 [4] | 11 [7.5] | 11 [7.5] | 7.5 | 25 [20] | 23 [20] | 17 [17] | 9 | 32 | 32 | 32 | 1a1b | | TH-T25KP | 0.24 to 22 |
| S-T35DL | MSO-T35DLKP | 11 [7.5] | 18.5 [15] | 18.5 [15] | 15 | 40 [35] | 40 [32] | 32 [26] | 17 | 60 | 60 | 60 | 1a1b | | TH-T25KP | 0.24 to 22 |
| S-T50DL | MSO-T50DLKP | 15 [11] | 22 [22] | 25 [22] | 22 | 55 [50] [50] (Note 1) | 50 [48] | 38 [38] | 26 | 80 | 80 | 80 | | | TH-T50KP | 29 |
| S-T65DL | MSO-T65DLKP | 18.5 [15] | 30 [30] | 37 [30] | 30 | 65 [65] | 65 [65] | 60 [45] | 38 | 100 | 100 | 100 | | | TH-T25KP | 0.24 to 22 |
| S-T80DL | MSO-T80DLKP | 22 [19] | 45 [37] | 45 [45] | 45 | 85 [80] | 85 [80] | 75 [75] | 52 | 120 | 120 | 120 | | | TH-T50KP | 29 to 42 |
| S-T100DL | MSO-T100DLKP | 30 [22] | 55 [45] | 55 [45] | 55 | 105 [100] | 105 [93] | 85 [75] | 65 | 150 | 150 | 150 | 1a1b | | TH-T65KP | 15 to 54 |
| S-N150DL | MSO-N150DLKP | 45 [37] | 75 [75] | 90 [90] | 90 | 150 [150] | 150 [150] | 140 [140] | 100 | 200 | 200 | 200 | | | TH-T65KP | 15 to 54 |
| S-N220DL | MSO-N220DLKP | 75 [55] | 132 [110] | 132 [132] | 132 | 250 [220] | 250 [220] | 200 [200] | 150 | 260 | 260 | 260 | | | TH-T65KP (Note 7) | 67 |
| S-N300DL | MSO-N300DLKP | 90 [75] | 160 [150] | 160 [160] | 200 | 300 [300] | 300 [300] | 250 [250] | 220 | 350 | 350 | 350 | | | TH-T65KP | 15 to 54 |
| S-N400DL | MSO-N400DLKP | 125 [110] | 220 [200] | 225 [200] | 250 | 400 [400] | 400 [400] | 350 [350] | 300 | 450 | 450 | 450 | 1a1b | UN-AX150x1 (Note 3) | TH-N120KP(TA) | 42 to 125 |
| | | | | | | | | | | | | | | | TH-N220KPRH | 82 to 180 |
| | | | | | | | | | | | | | | | TH-N400KPRH | 105 to 250 |
| | | | | | | | | | | | | | | | | 105 to 330 |

Note 1. The value in parentheses for the rated operating current is applicable in the case of magnetic contactors.

Note 2. The combining magnetic contactor is dedicated for use with T50 or less AC operated type (S type), or T65 to 100 and N125 or greater DC operated type (SD type), and cannot be replaced alone.

Note 3. Auxiliary contact units UN-AX150 can be installed on the left side for N150DL to N400DL types; however, T12DL to T100DL types cannot be used to mount additional auxiliary contact units.

Note 4. Magnetic starters can be manufactured to have 3-element (2E) thermal overload relays (MSO- □ DLKP) included.

Note 5. Instantaneous stop/restart relays (UA-DL2) are also available as related products. Refer to page 332.

Note 6. Cannot be used with live part protection covers. Furthermore, types with wiring streamlining terminals (BC) cannot be manufactured.

Note 7. Thermal overload relay dedicated for MSO-T80DL 67 A. S-T80DL and the standard TH-T100 67A cannot be combined for use as a magnetic starter.

Note 8. MSO-T□DL and MSO-N□DL types can also be manufactured.

● Properties/Performance/Operation Coil

| Frame | Input [VA] | | Operating Voltage [V] | | Operating Time [ms] | | Operation Coils | | Making and Breaking Current Capacities | Switching Frequency | Switching Durability [x 10000] | | Delay Time | | | |
|--------|------------|--------|---|---|--------------------------------------|--|-----------------|-------------------------|---|---------------------|--------------------------------|----------------------------|-------------------------------|-------------------------|--|-----|
| | Inrush | Normal | Operation | Open | Operating Power ON → Main Contact ON | Operating Power OFF → Main Contact OFF | Designation | Rated Voltage | | | Mechanical | Electrical (Category AC-3) | | | | |
| T12DL | 70 | 13 | 85% or Less of Operation Coil Rated Voltage | 10% or More of Operation Coil Rated Voltage | 7 to 100 | 10 to 100 | AC100V | 100 to 110V 50/60 Hz | 10 Times Class AC-3 Rated Operating Current | 1200 Times/Hour | 100 | 100 | 2^{+2}_{-1} Seconds (Fixed) | | | |
| T21DL | 100 | 15 | | | | | | | | | | | | | | |
| T35DL | 113 | 24 | | | | | | | | | | | | | | |
| T50DL | 113 | 24 | | | 30 to 100 | | | | | | AC200V | | | 200 to 220V 50/60 Hz | 8 Times Class AC-3 Rated Operating Current | 500 |
| T65DL | 55 | 26 | | | | | | | | | | | | | | |
| T80DL | 55 | 26 | | | | | | | | | | | | | | |
| T100DL | 66 | 27 | | | | | | | | | | | | | | |
| N150DL | 76 | 55 | | | | | | | | | | | | | | |
| N220DL | 100 | 66 | | | | | | | | | | | | | | |
| N300DL | 140 | 85 | | | | | | | | | | | | | | |
| N400DL | 140 | 85 | | | | | | | | | | | | | | |

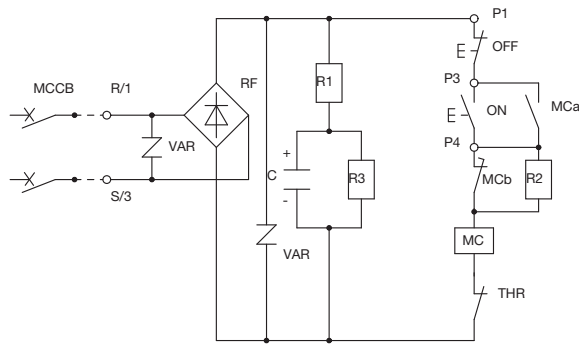
Note 1. The above indicates rough property indices for AC200V coils.

Note 2. The input is the average when applying 220 V at 60 Hz. Values for AC100V coils are approximately the same.

Note 3. The operating time is the value when applying 200 V at 60 Hz. Values for AC100V coils are approximately the same.

Note 4. Operation coils are only AC100V or AC200V.

Connecting

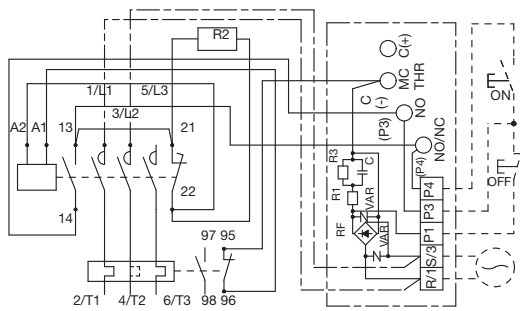


Deployment Connection Diagram

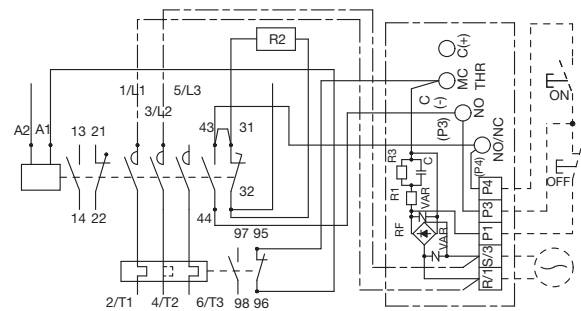
Note 1. The figure to the left is for MSO-□DL.

Note 2. The MCCB, ON and OFF buttons in the figure to the left are not provided.

Note 3. If connecting an external magnetic coil or indicator lamp, connect between the R/1 and S/3 terminals.



MSO-T12DL(KP) Actual Wiring Diagram



MSO-T21DL(KP) Actual Wiring Diagram

The connections shown with single-dashed lines between the L1-R/1 and L2-S/3 terminals are not wired if the control circuit voltage is AC100 V or if the main circuit and control circuit voltages differ.

Operation Description (Deployment Connection Diagram)

Power Supply Closing

Closing the power supply with **MCCB** causes **C** to charge via **RF** and **R1**.

Closing Magnetic Contactors

Pressing the **ON** button causes **MC** to energize via **MCb**, closing the contactor.

When **MC** has completed closing, **MCb** opens and, in the order of **MCa** → **R2** → **MC**, the current flows to retain the contactor.

Opening Magnetic Contactors

Pressing the **OFF** button cuts off current to **MC**, instantly opening the magnetic contactor.

When Power Supply Voltage Drops and Momentary Power Failures Occur

Charge accumulated in **C** discharges via **R1** → **R2** → **MC** circuits, opening **MC** after a predetermined time (after the delay time).

Handling (Deployment Connection Diagram)

- If ON and OFF for **MCCB** are repeated at short intervals (or when momentary power failures occur several times in quick succession) the following may occur
 - (1) The inrush current to **RF** and **R1** repeatedly flows, causing overloading.
 - (2) Sufficient charge is not provided to **C**, causing damage to components or insufficient retention time.
- Even when the power is OFF (**MCCB** is OFF), charge may still reside within **C**, so necessary precautions should be taken to avoid electric shocks.
- ON and OFF operations should be conducted using the push-button switch located as in the figure above. The magnetic contactor may flip-flop when the power is switched ON or OFF. Also, when switching the power to perform sequence checks etc., the operator should allow at least 5 seconds for the capacitor to charge.
- Uses an electrolytic capacitor so the delay time should be checked periodically.

● Outline Drawings

MSO/S-T12, T21, T35, T50DL
MSO/S-T65 to T100DL
MSO/S-N125 to N400DL

◆ Caution Do not install wiring or other equipment in the vicinity of the resistor (refer to the figure above) as it reaches high temperatures (approx. 100°C temperature rise).

Variable Dimensions Table

| Variable Dimensions | A | AB | AC | AD | AE | B | BA | BC | BD | BE | BF | BG | BH | C | CA | CB | CD | CE | CF | CG | CH | D | E | F | G |
|---------------------|-----|-----|----|-----|------|-------|-----|----|------|-------|------|------|------|-------|-------|----|------|-------|-----|-------|----|------|------|----|------|
| Frame | | | | | | | | | | | | | | | | | | | | | | | | | |
| T12DL | 132 | 40 | 49 | 69 | 29.8 | 110 | 100 | 5 | 11.2 | 83 | 41.6 | — | 12.5 | 113 | 65 | 6 | — | 43 | — | 85 | 5 | M3.5 | M3.5 | — | 3-M4 |
| T21DL | 137 | 60 | 43 | 73 | 34 | 125 | 100 | 19 | 10.5 | 94.5 | 49 | — | 11 | 113 | 65 | 6 | — | 65 | — | 88 | 5 | M4 | M3.5 | — | 3-M4 |
| T35/T50DL | 134 | 50 | 42 | 67 | 38.5 | 162 | 150 | 6 | 23 | 103 | 55 | 21.5 | — | 114 | 70.5 | 8 | 69.5 | 67 | — | 89 | 5 | M5 | M3.5 | M5 | 3-M4 |
| T65/T80DL | 150 | 50 | 56 | 81 | 50 | 168 | 150 | 9 | 27 | 126 | 74 | — | — | 141 | 103.5 | 8 | — | 95.5 | — | 118 | 5 | M6 | M4 | M6 | 3-M5 |
| T100DL | 170 | 100 | 35 | 85 | 53 | 220 | 200 | 10 | 35.5 | 148 | 93 | 20 | — | 165 | 127 | 8 | 109 | 118.5 | 133 | 141 | 10 | M6 | M4 | M6 | 3-M6 |
| N150DL | 210 | 140 | 26 | 105 | 80 | 270 | 250 | 10 | 33 | 200 | 130 | 25 | — | 177.5 | 136.5 | 8 | — | 99.5 | 102 | 134.5 | 10 | M8 | M4 | M8 | 3-M8 |
| N220DL | 230 | 140 | 20 | 90 | 90 | 290 | 250 | 12 | 31 | 246.5 | 158 | — | — | 208.5 | 156.5 | 8 | — | 103.5 | — | 214 | 10 | M10 | M4 | — | 3-M8 |
| N300/N400DL | 300 | 200 | 10 | — | 110 | 363.5 | 200 | 25 | 30 | 318.5 | 190 | — | — | 229 | 170 | 8 | — | 122.5 | — | 227 | 10 | M12 | M4 | — | 4-M8 |

Weight Table

| | S- | MSO- |
|-------------|---------|---------|
| T12DL | 0.73 | 0.84 |
| T21DL | 0.98 | 1.2 |
| T35/T50DL | 1.20 | 1.44 |
| T65/T80DL | 2.8 | 3.1 |
| T100DL | 3.9 | 4.4 |
| N150DL | 6.3 | 7.6 |
| N220DL | 9.1 | 11.6 |
| N300/N400DL | 15/15.5 | 17.5/18 |

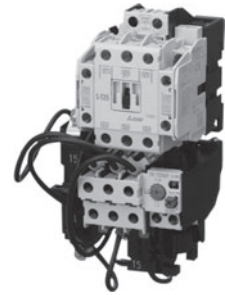
- Note 1. *1: "CH" is the arc space.
- Note 2. Below indicates the case when using TH-T50/T100 and TH-N□TA thermal overload relays.
 *2: "BG" has extended terminal pitch, "F Screw" has a terminal screw on the load side
 *3: "CD" has load side 4/T2 terminal height
 *4: "CF" has load side 2/T1, 6/T3 terminal height
- Note 3. The F screw for MSO-T35/T50DL is M4 with heater designations of 22A or below.
- Note 4. The maximum outline drawings (A x B x C) of S-□DL and MSO-□DL are the same. However, S-N300/N400DL has a "B" dimension of 250.
- Note 5. The power connector protrudes from the product on the power supply side by approximately 15 mm.
- Note 6. MSO-T12 to T100DL (with delay trip thermal overload relay) are not manufactured.

| | Item | Reference Page | Remarks |
|--|---------------------------------|----------------|--|
| | · Auxiliary Contact Rating | Page 39 | — |
| | · How to Order | Page 123 | Be sure to specify main circuit specifications and operation coil designation as both MSO-□DL and S-□DL may or may not require wiring from the main circuit. |
| | · Combining with Optional Units | Page 180 | — |

4.6 MSO-□(KP)SR Magnetic Starters with Saturable Reactors and Thermal Overload Relays

Capable of protecting motors with a long starting time from burnout

- Thermal overload relays with saturable reactors and magnetic contactors can be used in combination.
- Prevents motor overload or restriction when starting time is long or starting current is especially large, as well as preventing unnecessary thermal overload relay operation.
- Can be used to protect motors that are run intermittently.



MSO-T25KPSR

● Ratings/Specifications (Standard Applicability)

| Magnetic Starters | | Rated Capacity [kW] | | | | Rated Operating Current [A] | | | | Auxiliary Contact | | Compatible Thermal Overload Relays | | |
|---|--|---|----------------|----------|---------|---|----------------|----------|---------|--|------------------|------------------------------------|--------------------------------------|------------|
| | | Three-Phase Squirrel-cage Motor (Category AC-3) | | | | Three-Phase Squirrel-cage Motor (Category AC-3) | | | | | | Standard (Special) | Additional Unit Model Names x Pieces | Model Name |
| Thermal Overload Relay with 3 Elements (2E) | Thermal Overload Relay with 2 Elements | AC220 to 240 V | AC380 to 440 V | AC500 V | AC690 V | AC220 to 240 V | AC380 to 440 V | AC500 V | AC690 V | With 3-Element (2E) | With 2-Element | | | |
| — | MSO-T10SR | 2.5[2.2] | 4[2.7] | 4[2.7] | 4 | 11[11] | 9[7] | 7[6] | 5 | 1a(1b) | — | TH-T18SR | 0.12 to 9 | |
| — | MSO-T12SR | 3.5[2.7] | 5.5[4] | 5.5[5.5] | 5.5 | 13[13] | 12[9] | 9[9] | 7 | 1a1b(2a) | | | | 0.12 to 11 |
| — | MSO-T20SR | 4.5[3.7] | 7.5[7.5] | 7.5[7.5] | 7.5 | 18[18] | 18[18] | 17[17] | 9 | | | | | 0.12 to 15 |
| MSO-T21KPSR | MSO-T21SR | 5.5[4] | 11[7.5] | 11[7.5] | 7.5 | 25[20] | 23[20] | 17[17] | 9 | UT-AX2, 4(BC) x 1 or UT-AX11(BC) x 2 | TH-T25KPSR | TH-T25SR | 0.24 to 22 0.24 to 22 | |
| MSO-T25KPSR | MSO-T25SR | 7.5[5.5] | 15[11] | 15[11] | 11 | 30[26][26] | 30[26][25] | 24[20] | 12 | | TH-T25PSR | TH-T25SR | 0.24 to 22 | |
| MSO-T35KPSR | MSO-T35SR | 11[7.5] | 18.5[15] | 18.5[15] | 15 | 40[35] | 40[32] | 32[26] | 17 | | TH-T50PSR | TH-T50SR | 29 | |
| MSO-T50KPSR | MSO-T50SR | 15[11] | 22[22] | 25[22] | 22 | 55[50][50] | 48[48] | 38[38] | 26 | | TH-T25PSR | TH-T25SR | 0.24 to 22 | |
| MSO-T65KPSR | MSO-T65SR | 18.5[15] | 30[30] | 37[30] | 30 | 65[65] | 65[65] | 60[45] | 38 | UN-AX2, 4 x 1 or UN-AX11 x 2 | TH-T65PSR | TH-T65SR | 15 to 54 | |
| MSO-T80KPSR | MSO-T80SR | 22[19] | 45[37] | 45[45] | 45 | 85[80] | 85[80] | 75[75] | 52 | | TH-T100PSR | TH-T100SR | 67 | |
| MSO-T100KPSR | MSO-T100SR | 30[22] | 55[45] | 55[45] | 55 | 105[100] | 105[93] | 85[75] | 65 | UN-AX80 x 2 | TH-T65PSR | TH-T65SR | 15 to 54 | |
| MSO-N125KPSR | MSO-N125SR | 37[30] | 60[60] | 60[60] | 60 | 125[125] | 120[120] | 90[90] | 70 | | TH-T100PSR | TH-T100SR | 67, 82 | |
| MSO-N150KPSR | MSO-N150SR | 45[37] | 75[75] | 90[90] | 90 | 150[150] | 150[150] | 140[140] | 100 | UN-AX150 x 2 | TH-N120 (TA)KPSR | TH-N120 (TA)SR | 42 to 105 42 to 125 | |
| MSO-N180KPSR | MSO-N180SR | 55[45] | 90[90] | 110[110] | 110 | 180[180] | 180[180] | 180[180] | 120 | | TH-N220 RHKPSR | TH-N220 RHSR | 82 to 150 82 to 180 | |
| MSO-N220KPSR | MSO-N220SR | 75[55] | 132[110] | 132[132] | 132 | 250[220] | 250[220] | 200[200] | 150 | TH-N400 RHKPSR | TH-N400 RHSR | 105 to 250 105 to 330 | | |
| MSO-N300KPSR | MSO-N300SR | 90[75] | 160[150] | 160[160] | 200 | 300[300] | 300[300] | 250[250] | 220 | | | | | |
| MSO-N400KPSR | MSO-N400SR | 125[110] | 220[200] | 225[200] | 250 | 400[400] | 400[400] | 350[350] | 300 | | | | | |

Note 1. Enclosed magnetic starters are not manufactured.

Note 2. Reversible types can also be manufactured for MSO-2x □ SR, T21, N125 or greater, as well as for MSO-2x □ KPSR types. MSO-2XT10 to T20SR use a thermal overload relay TH-T18HZSR.

Note 3. Only 1 UT-AX11 type unit can be installed on the right side of MSO-T21 to T50KPSR types.

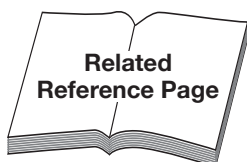
Note 4. Cannot be used with live part protection covers (UT-CW, UN-CZ).

Note 5. MSO-T10SR to T50(KP)SR can also be manufactured to have wiring streamlining terminals (BC).

Note 6. MSO-T10 to T20BCSR have no screw holder attached to the main circuit terminal (3-pole) on the magnetic contactor load side.

Note 7. MSO-T35, T50BC(KP)SR with heater designation of 29 A or more and MSO-2xT21 to T50BC(KP)SR have no screw holder in the main circuit terminal (3-pole) on the thermal relay power supply side.

| Item | Reference Page | Remarks |
|---------------------------------|----------------|---|
| · Auxiliary Contact Rating | Page 39 | — |
| · Operation Coil | Page 41 | Same as MSO/S-□ types. |
| · Properties | Page 43 | Same as MSO/S-□ types. Refer to pages 126, 135 for information about thermal overload relays. |
| · Performance | Page 44 | Same as MSO/S-□ types. However, the switching frequency of MSO-T10SR to T50(KP)SR types is 1200 times/hour, with a mechanical durability of 2.5 million operations. Refer to pages 126, 135 for information about thermal overload relays |
| · How to Order | Page 123 | — |
| · Combining with Optional Units | Page 180 | — |



● Application

● Protecting Motors with Long Starting Time

Prevents starting malfunctions when running with a load with large inertia. Use with motors that have a starting current of 5 to 8 times the full-load current and a starting time of 10 to 25 seconds.

● Protecting Motors with Large Starting Current

Use with motors that have a starting current greater than 8 times but no more than 20 times the full-load current. Capable of starting the motor without causing the heater of the thermal overload relay to melt. However, the magnetic starter should be selected such that the motor starting current is no more than 6 times the rated operating current of the class AC-3 magnetic starter.

● Protecting Motors Running Intermittently

Capable of protecting motors without sacrificing overload protection functionality when periodically running motors intermittently or when wanting to make use of the maximum motor output over short periods.

Note 1. In either case, consideration is required to find a balance between the motor and protection to suit the desired motor properties.

● Outline Drawings

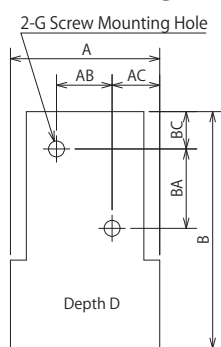


Fig. a. MSO-T10 to T50(KP)SR Types

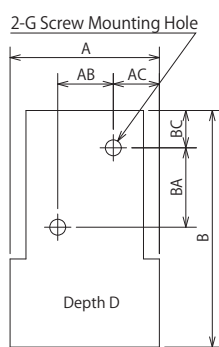


Fig. b. MSO-T65 to T100(KP)SR Types

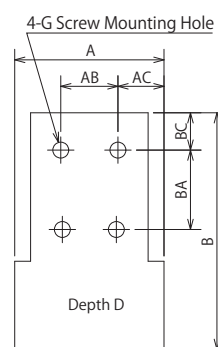


Fig. c. MSO-N125 to N400(KP)SR Type

| Frame | No. Thermal Elements | A | AB | AC | B | BA | BC | D | G | Weight [kg] | Reference Diagram (Above Figure) |
|---------------|----------------------|------|-----|------|-------|-----|------|-------|----|-------------|----------------------------------|
| T10SR | 2 | 94 | 28 | 30.5 | 150 | 60 | 10.5 | 79 | M4 | 0.54 | Fig. a |
| T12/T20SR | | 94 | 35 | 30.3 | 150 | 60 | 10.5 | 79 | M4 | 0.56 | |
| T21/T25SR | | 97.5 | 54 | 4.5 | 162.5 | 60 | 16 | 82 | M4 | 0.78 | |
| T35/T50SR | | 97.5 | 65 | 5 | 170.5 | 70 | 13.8 | 91 | M4 | 0.99 | |
| T65/T80SR | | 140 | 70 | 26 | 189.5 | 75 | 15.5 | 106 | M4 | 1.25 | |
| T100SR | 2 | 140 | 80 | 25 | 211 | 110 | 7 | 127 | M5 | 2.5 | Fig. b |
| N125SR | | 160 | 90 | 30 | 239 | 125 | 12.5 | 137 | M4 | 3.9 | |
| N150SR | | 160 | 100 | 32 | 250 | 130 | 15 | 145 | M5 | 5 | |
| N180/N220SR | 2 | 144 | 120 | 12 | 282 | 190 | 7 | 180.5 | M6 | 8.2 | Fig. c |
| N300/N400SR | | 163 | 145 | 9 | 360 | 225 | 9 | 195 | M8 | 11.7/12.2 | |
| T21/T25KPSR | | 97.5 | 54 | 4.5 | 162.5 | 60 | 16 | 82 | M4 | 0.86 | |
| T35/T50KPSR | 3 | 97.5 | 65 | 5 | 170.5 | 70 | 13.8 | 91 | M4 | 1.07 | Fig. a |
| T65/T80KPSR | | 140 | 70 | 26 | 189.5 | 75 | 15.5 | 120.5 | M4 | 1.35 | |
| T100KPSR | | 140 | 80 | 25 | 211 | 110 | 7 | 145 | M5 | 2.6 | Fig. b |
| N125KPSR | | 160 | 90 | 30 | 269 | 125 | 12.5 | 137 | M4 | 4.1 | |
| N150KPSR | | 160 | 100 | 34 | 273 | 130 | 15 | 145 | M5 | 5.2 | |
| N180/N220KPSR | 3 | 168 | 120 | 36 | 282 | 190 | 7 | 180.5 | M6 | 8.5 | Fig. c |
| N300/N400KPSR | | 178 | 145 | 24 | 360 | 225 | 9 | 195 | M8 | 11.8/12.3 | |

4.7 MSO-□FS(KP) Magnetic Starters with Quick-acting Characteristics Thermal Overload Relays

Capable of protecting motors with small heat capacity

- Quick-acting characteristics thermal overload relays and magnetic contactors can be used in combination with each other.
- Suitable for protecting motors such as submersible motors or compressors that have short allowable time during constraint.



MSO-T25FSKP

● Ratings/Specifications (Standard Applicability)

| Magnetic Starters | | Rated Capacity [kW] | | | | Rated Operating Current [A] | | | | Auxiliary Contact | | Combinable Thermal Overload Relays | | |
|---|--|---|----------------|----------|---------|---|----------------|---------|---------|--------------------|-------------------------------------|------------------------------------|----------------|---|
| | | Three-Phase Squirrel-cage Motor (Category AC-3) | | | | Three-Phase Squirrel-cage Motor (Category AC-3) | | | | | | Model Name | | Heater Designation Applicable Range [A] |
| Thermal Overload Relays With 3-Element (2E) | Thermal Overload Relays With 2-Element | AC220 to 240 V | AC380 to 440 V | AC500 V | AC690 V | AC220 to 240 V | AC380 to 440 V | AC500 V | AC690 V | Standard (Special) | Additional Unit Model Name x Pieces | With 3-Element (2E) | With 2-Element | |
| | | MSO-T10FSKP | — | 2.5[2.2] | 4[2.7] | 4[2.7] | 4 | 11[11] | 9[7] | | | 7[6] | 5 | 1a(1b) |
| MSO-T12FSKP | — | 3.5[2.7] | 5.5[4] | 5.5[5.5] | 5.5 | 13[13] | 12[9] | 9[9] | 7 | 1a1b(2a) | TH-T18FSKP | — | 2.1 to 11 | |
| MSO-T20FSKP | — | 4.5[3.7] | 7.5[7.5] | 7.5[7.5] | 7.5 | 18[18] | 18[18] | 17[17] | 9 | | TH-T18FSKP | — | 2.1 to 15 | |
| MSO-T21FSKP | MSO-T21FS | 5.5[4] | 11[7.5] | 11[7.5] | 7.5 | 25[20] | 23[20] | 17[17] | 9 | | TH-T25FSKP | TH-T25FS | 2.1 to 15 | |
| MSO-T25FSKP | MSO-T25FS | 7.5[5.5] | 15[11] | 15[11] | 11 | 30[26][26] | 30[26][25] | 24[20] | 12 | | TH-T25FSKP | TH-T25FS | 2.1 to 22 | |
| MSO-T35FSKP | MSO-T35FS | 11[7.5] | 18.5[15] | 18.5[15] | 15 | 40[35] | 40[32] | 32[26] | 17 | | TH-T25FSKP | TH-T25FS | 2.1 to 22 | |
| MSO-T50FSKP | MSO-T50FS | 15[11] | 22[22] | 25[22] | 22 | 55[50][50] | 50[48] | 38[38] | 26 | 2a2b | TH-T50FSKP | TH-T50FS | 29 | |
| MSO-T65FSKP | MSO-T65FS | 18.5[15] | 30[30] | 37[30] | 30 | 65[65] | 65[65] | 60[45] | 38 | | TH-T25FSKP | TH-T25FS | 22 | |
| MSO-T80FSKP | MSO-T80FS | 22[19] | 45[37] | 45[45] | 45 | 85[80] | 85[80] | 75[75] | 52 | | TH-T50FSKP | TH-T50FS | 29 to 42 | |
| MSO-T100FSKP | MSO-T100FS | 30[22] | 55[45] | 55[45] | 55 | 105[100] | 105[93] | 85[75] | 65 | | UN-AX2, 4 x 1 or UN-AX11 x 2 | TH-T65FSKP | TH-T65FS | 42, 54 |
| | | | | | | | | | | | | (Note 5) | (Note 5) | 67 |
| | | | | | | | | | | | UN-AX80 x 2 | TH-T65FSKP | TH-T65FS | 42, 54 |
| | | | | | | | | | | | | TH-T100FSKP | TH-T100FS | 67, 82 |

Note 1. Thermal overload relays are manufactured for the 1.7 A to 93 A (heater designation 2.1A to 82A) range.

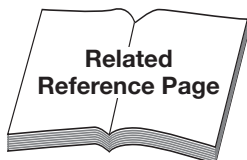
Note 2. Reversible types can also be manufactured for MSO-T21 to T100FS and for MSO-T10 to T100FSKP types.

Note 3. T10 to T50 can also be manufactured to have wiring streamlining terminals (BC).

Note 4. Enclosed MS-T□FS/FSKP types can also be manufactured.

Note 5. Enclosed type heater designation 67A uses a thermal overload relay dedicated for enclosed types.

| Item | Reference Page | Remarks |
|---|----------------|--|
| · Auxiliary Contact Rating | Page 39 | — |
| · Operation Coil | Page 41 | Same as MSO/S-□ types. |
| · Properties | Page 43 | Same as MSO/S-□ types. Refer to pages 126, 137 for information about thermal overload relays. |
| · Performance | Page 44 | Same as MSO/S-□ types. Refer to pages 126, 137 for information about thermal overload relays. |
| · Outline Drawings/Contact Arrangements | Page 73 | Same as MSO-□ type. |
| · How to Order | Page 121 | — |
| · Combining with Optional Units | Page 180 | — |



4.8 MS-□PM Magnetic Starters with Push-Buttons

ON and OFF control is possible with the power supply and load connections alone

- The ON and OFF push-button switch is mounted to the surface of the enclosure.
- MS-T10PM and MS-T12PM have a reset button, while MS-T21PM and greater have an OFF button that also resets the thermal overload relay.



MS-T10PM

● Ratings/Specifications (Standard Applicability)

| Magnetic Starters | Rated Capacity [kW] | | | | Rated Operating Current [A] | | | | Auxiliary Contact (Note 5) | Combinable Thermal Overload Relays | | |
|---|---|----------------|----------|---------|---|----------------|---------|---------|----------------------------|------------------------------------|------------|------------------------------|
| | Three-Phase Squirrel-cage Motor (Category AC-3) | | | | Three-Phase Squirrel-cage Motor (Category AC-3) | | | | | Standard (Special) | Model Name | Heater Designation Range [A] |
| With ON, OFF and Reset Buttons (Note 8) | AC220 to 240 V | AC380 to 440 V | AC500 V | AC690 V | AC220 to 240 V | AC380 to 440 V | AC500 V | AC690 V | | | | |
| MS-T10KPPM | 2.5[2.2] | 4[2.7] | 4[2.7] | 4 | 11[11] | 9[7] | 7[6] | 5 | 1a(1b) | 2a2b | TH-T18KP | 0.12 to 9 |
| MS-T12KPPM | 3.5[2.7] | 5.5[4] | 5.5[5.5] | 5.5 | 13[13] | 12[9] | 9[9] | 7 | 1a1b(2a) | | | 0.12 to 11 |
| MS-T21KPPM | 5.5[4](Note 4) | 11[7.5] | 11[7.5] | 7.5 | 25[20] | 23[20] | 17[17] | 9 | | | TH-T25KP | 0.24 to 15 |
| MS-T35KPPM | 11[7.5] | 18.5[15] | 18.5[15] | 15 | 40[35] | 40[15] | 32[26] | 17 | | | TH-T25KP | 0.24 to 22 |
| | | | | | | | | | | | TH-T50KP | 29 |
| MS-T50KPPM | 15[11] | 22[22] | 25[22] | 22 | 55(50)[50] | 50[48] | 38[38] | 26 | | | TH-T25KP | 0.24 to 22 |
| | | | | | | | | | | | TH-T50KP | 29 to 42 |
| MS-T65KPPM | 18.5[15] | 30[30] | 37[30] | 30 | 65[65] | 65[65] | 60[45] | 38 | | | TH-T65KP | 15 to 54 |
| MS-T80KPPM | 22[19] | 45[37] | 45[45] | 45 | 85[80] | 85[80] | 75[75] | 52 | | | (Note 7) | 67 |
| MS-T100KPPM | 30[22] | 55[45] | 55[45] | 55 | 105[100] | 105[93] | 85[75] | 65 | | | TH-T65KP | 15 to 54 |
| | | | | | | | | | | TH-T100KP | 67, 82 | |

Note 1. Auxiliary contact units cannot be installed.

Note 2. Can be manufactured to have 3-element (2E) thermal overload relays (MS-□KPPM) included.

Note 3. Can be manufactured to have thermal overload relays that cannot be reset at the surface of the enclosure (MS-□PS).

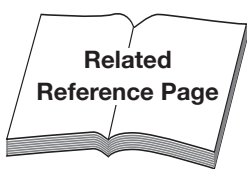
Note 4. MS-T21PM types with 200 to 220 V ratings are 3.7 kW, in accordance with the Electrical Appliance and Material Safety Law.

Note 5. Among the auxiliary contacts of MS-T21PM or greater, 1a is internally wired as a self-retaining contact.

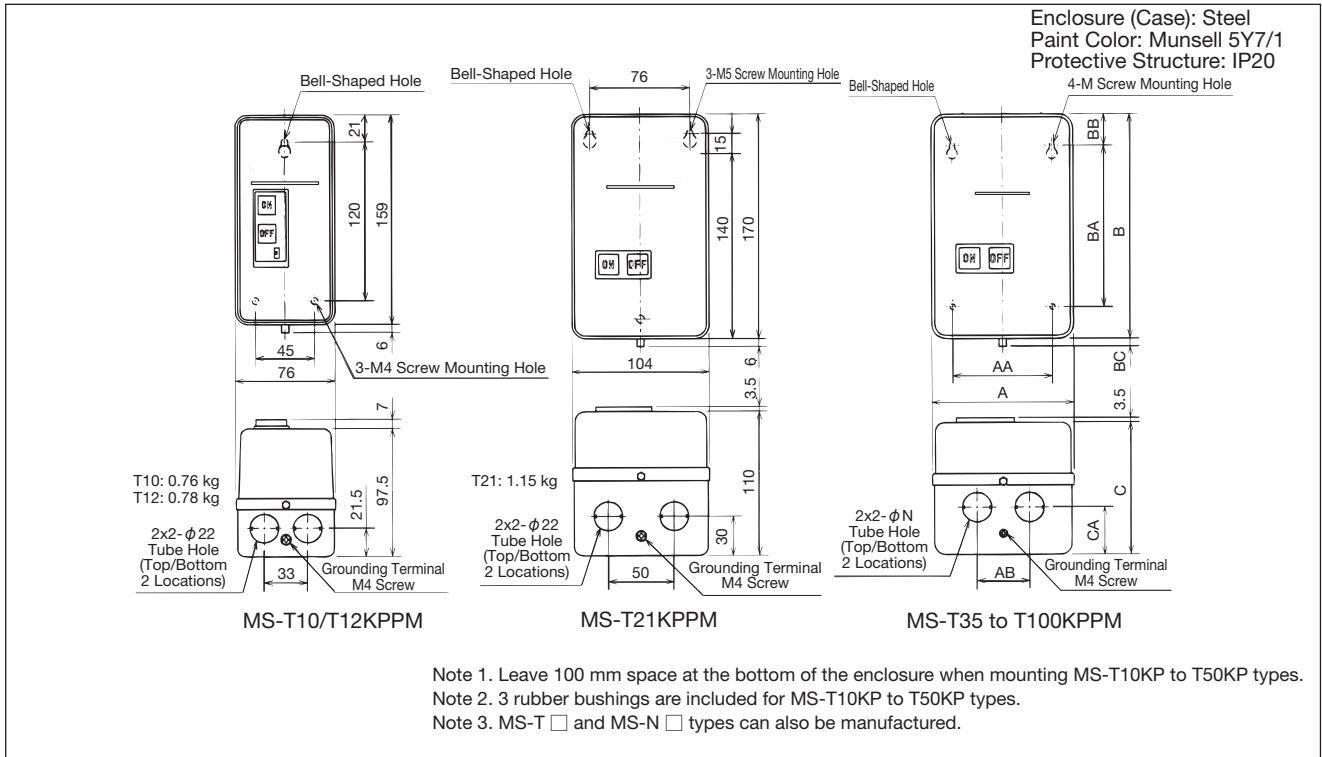
Note 6. MS-T□DPPM(PS) is for single-phase motors. Refer to page 253 article 10.2 for details about production scope and applicable capacities.

Note 7. Heater designation 67A uses a thermal overload relay dedicated for enclosed types.

Note 8. MS-T□PM and MS-N□PM types can also be manufactured.

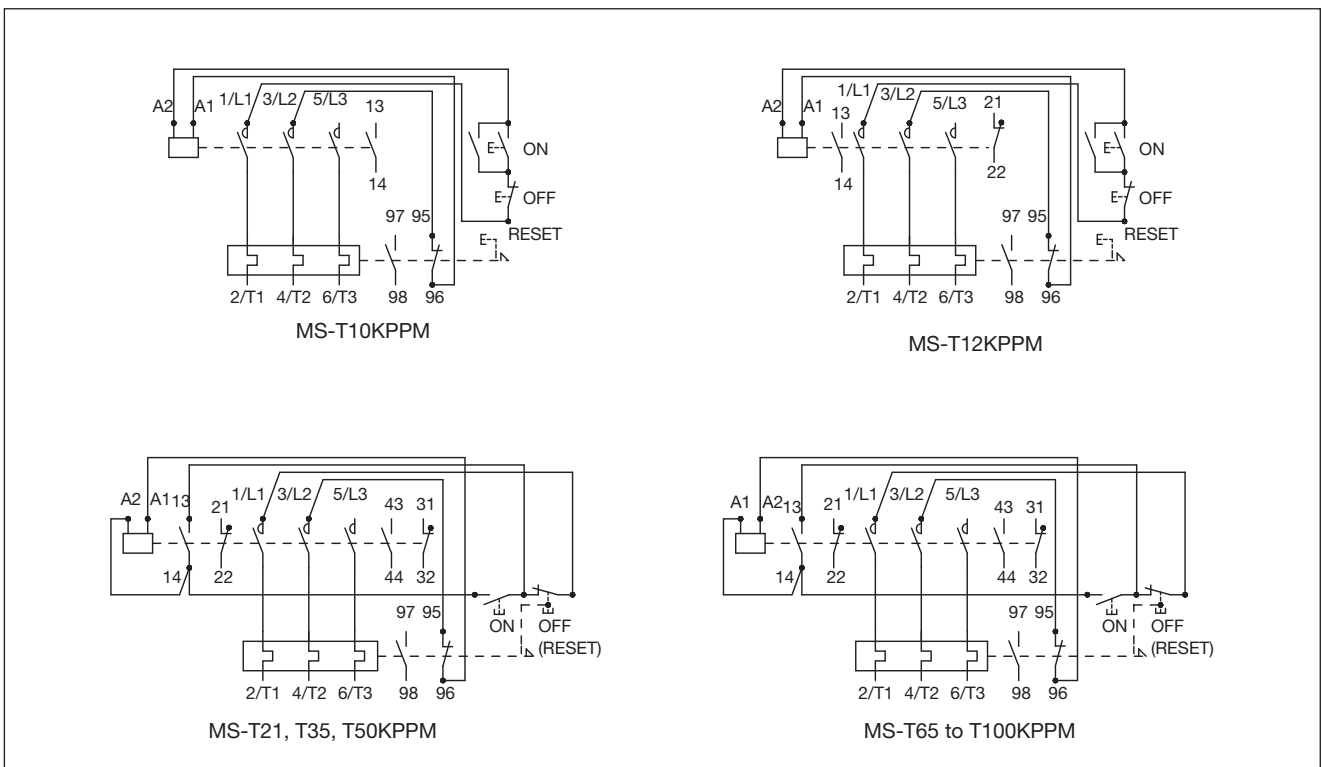
|  | Item | Reference Page | Remarks |
|---|----------------------------|----------------|--|
| | · Auxiliary Contact Rating | Page 39 | — |
| | · Operation Coil | Page 41 | Same as MS/MSO/S- □ types. |
| | · Properties | Page 43 | Same as MS/MSO/S- □ types. Refer to pages 126, 135 for information about thermal overload relays. |
| | · Performance | Page 44 | Same As Above |
| | · How to Order | Page 121 | — |

Outline Drawings



| Frame | Variable Dimensions | | | | | | | | | | | Weight [kg] |
|----------|---------------------|-----|-----|-----|-----|----|----|-----|----|----|----|-------------|
| | A | AA | AB | B | BA | BB | BC | C | CA | M | N | |
| T35, T50 | 135 | 95 | 50 | 225 | 165 | 30 | 6 | 126 | 45 | M5 | 28 | 1.9 |
| T65, T80 | 160 | 120 | 80 | 270 | 220 | 25 | 12 | 145 | 45 | M5 | 35 | 2.9 |
| T100 | 190 | 150 | 100 | 300 | 260 | 20 | 12 | 163 | 67 | M6 | 35 | 4.0 |

Connection Diagram



Note 1. The connections in the figure above differ if the main circuit voltage and control circuit voltage differ.

4.9 MSO/S-T□BC Magnetic Starters/Magnetic Contactors with Wiring Streamlining Terminals

Equipped with wiring streamlining terminal function and finger safe specifications compliant with DIN EN 50274/VDE 0660 Teil 514.

- Improved Smart Wiring

Wiring is possible without having to remove the terminal cover, which leads to further improvements in wiring efficiency, workability, and hence productivity.

- Abundant Model Range

Both non-reversible and reversible type magnetic starters/magnetic contactors are available for frames up to 10 A to 50 A.



MSO-T10BCKP

- Manufacturing Range List

| Model Frame | Non-Reversing | | | | Reversing | | | | Terminal Cover Types |
|----------------|---------------------|-------------------|---------------------|-------------------|---------------------|-------------------|---------------------|-------------------|------------------------------------|
| | Magnetic Contactors | | Magnetic Starters | | Magnetic Contactors | | Magnetic Starters | | |
| | Model Name | Auxiliary Contact | Model Name (Note 4) | Auxiliary Contact | Model Name | Auxiliary Contact | Model Name (Note 4) | Auxiliary Contact | |
| T10 | S-T10BC | 1a | MSO-T10BCKP | 1a | S-2xT10BC | 1a x 2 + 2b | MSO-2xT10BCKP | 1a x 2 + 2b | Wiring Streamlining Terminal |
| | | 1b | | 1b | | 1b x 2 + 2b | | 1b x 2 + 2b | |
| T12 | S-T12BC | 1a1b | MSO-T12BCKP | 1a1b | S-2xT12BC | 1a1b x 2 + 2b | MSO-2xT12BCKP | 1a1b x 2 + 2b | |
| | | 2a, 2b | | 2a, 2b | | 2a x 2 + 2b | | 2a x 2 + 2b | |
| T20 | S-T20BC | 1a1b | MSO-T20BCKP | 1a1b | S-2xT20BC | 1a1b x 2 + 2b | MSO-2xT20BCKP | 1a1b x 2 + 2b | |
| | | 2a | | 2a | | 2a x 2 + 2b | | 2a x 2 + 2b | |
| T21 | S-T21BC | 2a2b | MSO-T21BCKP | 2a2b | S-2xT21BC | 2a2b x 2 | MSO-2xT21BCKP | 2a2b x 2 | |
| T25 | S-T25BC | 2a2b | MSO-T25BCKP | 2a2b | S-2xT25BC | 2a2b x 2 | MSO-2xT25BCKP | 2a2b x 2 | |
| T32 | S-T32BC | — | — | — | S-2xT32BC | 2a2b x 2 | — | — | |
| T35 | S-T35BC | 2a2b | MSO-T35BCKP | 2a2b | S-2xT35BC | 2a2b x 2 | MSO-2xT35BCKP | 2a2b x 2 | |
| T50 | S-T50BC | 2a2b | MSO-T50BCKP | 2a2b | S-2xT50BC | 2a2b x 2 | MSO-2xT50BCKP | 2a2b x 2 | |

Note 1. Terminal numbers are compliant with EN standards (EN50005 and EN50012).

Note 2. The 2 auxiliary break contacts of reversible magnetic starters are wired as an electrical interlock.

Note 3. S/SD-2 x T32BC type has auxiliary contact unit 2a2b (UT-AX4BC) x 2 included as standard.

Note 4. Magnetic starters model names indicate when 3-element (2E) thermal overload relays are included. Remove KP from the model name for 2-element types.

Note 5. DC operated types (SD, MSOD) can also be manufactured. However, T10 and T25 types are not manufactured.

Note 6. Mechanically latched types (SL, SLD) can only be manufactured for T21, T35 and T50.

Note 7. The +2b on the auxiliary contact arrangement of reversible T10, T12 and T20 types indicates the break contact of the integrated UT-ML11BC interlock unit. There is no need to specify when ordering.

● Applicable Thermal Overload Relays

| Magnetic Starter Frame | Thermal Overload Relay Model Name |
|------------------------|-----------------------------------|
| T10, T12, T20 | TH-T18BC(KP) |
| T21, T25 | TH-T25BC(KP) *1 |
| T35, T50 | TH-T25BC(KP) *2 |
| | TH-T50BC(KP) *2 |

*1: Separately arrange an UN-TH21 connecting conductor kit.

*2: Separately arrange a UT-TH50 connecting conductor kit.

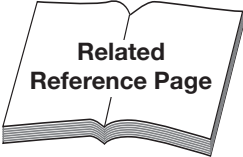
● Precautions When Using Crimp Lugs

To comply with DIN EN 50274/VDE 0660 Teil 514 finger safe specifications, be sure to completely cover the entire crimp portion of the crimp lug with an insulating sleeve.

● Connection Diagram/Contact Arrangement Diagram

● Terminal numbers are compliant with EN50005 and JIS C8201-4-1 standards.

● MSO type connection is the same as the standard type.

| | Item | Reference Page | Remarks |
|--|---|----------------|--|
|  | · Auxiliary Contact Rating | Page 39 | — |
| | · Operation Coil | Page 41 | Same as MSO/S-□ types. |
| | · Properties | Page 43 | Same as MSO/S-□ types. Refer to pages 126, 135 for information about thermal overload relays. |
| | · Performance | Page 44 | Same As Above |
| | · Outline Drawings/Contact Arrangements | Page 73 | Same as MSO/S-□ types. |
| | · How to Order | Page 121 | — |
| | · Combining with Optional Units | Page 180 | Auxiliary contact units, interface units, front clip-on timer units and surge absorber units can be mounted. |

4.10 S(D)-T32, S-N□8 Main Circuit 3-Pole Magnetic Contactors

Dramatically reduces panel installation area required

- A space-saving type without auxiliary contacts equipped and just 3-pole main contacts.
- If auxiliary contacts are required, auxiliary contact units can be installed.
(Reversing types have 2a2b x 2 installed)



● Ratings/Specifications (Standard Applicability)

| Magnetic Contactors | | Rated Capacity [kW] | | | | Rated Operating Current [A] | | | | Conventional Free Air Thermal Current [A] | Additional Auxiliary Contact Unit Model Name x Pieces (Note 2) | Terminal Screw Size / Standard Tightening Torque (N·m) | | Recommended Crimp Lug Size Compatible with Terminal | | | |
|-------------------------|---------------------------------|---|--------------|-------|-------|---|--------------|-------|-------|---|--|--|-------------------------------|---|----------------------------|----------------|-------------------|
| | | Three-Phase Squirrel-cage Motor (Category AC-3) | | | | Three-Phase Squirrel-cage Motor (Category AC-3) | | | | | | Resistive Load (Category AC-1) | | Main Circuit | Control Circuit | Main Circuit | Control Circuit |
| Non-Reversing | Reversing | 220 to 240 V | 380 to 440 V | 500 V | 690 V | 220 to 240 V | 380 to 440 V | 500 V | 690 V | 200 to 220 V | 380 to 440 V | lth [A] | | | | | |
| S-T32(BC) SD-T32(BC) | S-2 x T32(BC) SD-2 x T32(BC) | 7.5 | 15 | 15 | 11 | 32 | 32 | 24 | 12 | 32 | 32 | | | | | | |
| S-N38(CX) | S-2 x N38(CX) | 7.5 | 15 | 15 | | 35 | 32 | 24 | | 60 | 60 | 60 | UN-AX2, 4 x 1 (Front Clip-on) | M5 2.06 - 3.33 (2.55) | M3.5 0.94 - 1.51 (1.17) | 1.25-5 to 14-5 | 1.25-3.5 to 2-3.5 |
| S-N48(CX) | S-2 x N48(CX) | 11 | 15 | 15 | | 50 | 35 | 24 | | 80 | 80 | 80 | | | | | |

Note 1. The M4 main circuit terminal screw size for T32 types makes it unsuitable for applications exceeding 20 A in accordance with the Electrical Appliance and Material Safety Law.

Note 2. Reversing types already have 2 UT/UN-AX4 units installed so no more can be mounted. Furthermore, all side clip-on units (UT/UN-AX11) are not applicable.

Note 3. Types including thermal overload relays (MSO) are not manufactured.

Note 4. A "BC" in the model name indicates a wiring streamlining terminal, "CX" indicates a CAN terminal.

Note 5. Please note that SD-T32 type operation coil terminals have polarity. A1 (+), A2 (-)

● Properties/Performance

| Model Name | Input [VA] | | Power Consumption [W] | Coil Current [mA] | Operating Voltage [V] | | Operating Time [ms] | | Making Current Capacity [A] (Peak 0.5 ms) | Switching Frequency | Switching Durability [x 10000] | |
|------------|------------|---------|-----------------------|-------------------|-----------------------|-----------|---------------------------|-----------------------------|---|---------------------|--------------------------------|----------------------------|
| | Momentary | Regular | | | Operation | Open | Coil ON → Main Contact ON | Coil OFF → Main Contact OFF | | | Mechanical | Electrical (Category AC-3) |
| SD-T32 | — | — | 3.3 (2.2) | 0.033 | 60 to 75 | 10 to 30 | 70 (95) | 20 | 400 | 1800 Times/Hour | 1000 | 200 |
| S-T32 | 55 | 4.5 | 1.8 | 20 | 125 to 155 | 80 to 115 | 15 to 22 | 5 to 15 | 400 | | | |
| S-N38 | 110 | 13 | 4.3 | 80 | 120 to 145 | 90 to 115 | 10 to 20 | 5 to 14 | 500 | | 500 | 100 |
| S-N48 | 110 | 13 | 4.3 | 80 | 120 to 145 | 90 to 115 | 10 to 20 | 5 to 14 | 670 | | | |

Note 1. The above table indicates rough property indices for DC100V coils for DC operated types and AC200V coils for AC operated types. The values in the parentheses for SD-T32 indicate rough property indices for DC12V or DC24V coils.

Note 2. The drive voltage is that at a 20°C cold state. (AC operated type values are for 60 Hz)

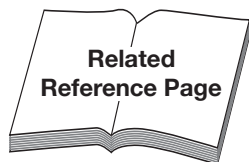
Note 3. The coil current is the average regular value with DC100V (DC operated type) or AC220 V at 60 Hz (AC operated type) applied.

Note 4. The operating time is the value with DC100V (DC operated type) or AC220 V at 60 Hz (AC operated type) applied.

Note 5. The coil input and power consumption are the average values.

Note 6. The electrical durability at the making current capacity lasts 100,000 operations.

| Item | Reference Page | Remarks |
|---------------------------------|----------------|---------|
| • Operation Coil | Page 41 | — |
| • How to Order | Pages 121,123 | — |
| • Combining with Optional Units | Page 180 | — |




4

MS-T/N Series Magnetic Starters/Magnetic Contactors

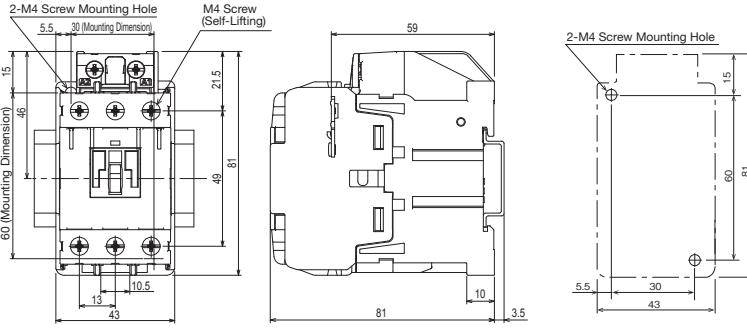
Outline Drawings/Contact Arrangements

S-T32(BC)





0.36kg




| Contact Arrangement | |
|---------------------|----------------|
| A2 A1 | 1/L1 3/L2 5/L3 |
| 2/T1 | 4/T2 6/T3 |

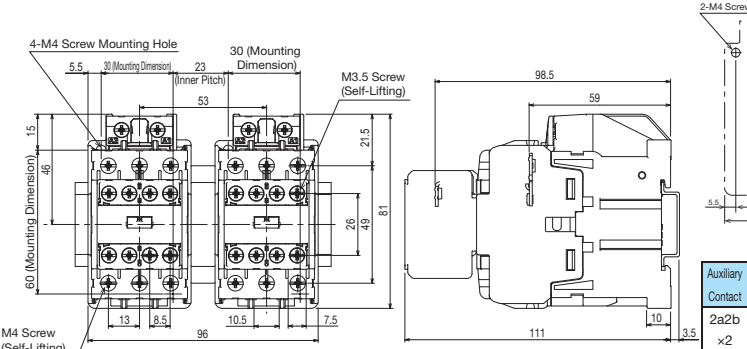
| Model Name | |
|------------|--|
| S-T32 | |
| S-T32BC | |

S-2xT32(BC)





0.76kg




| Auxiliary Contact Arrangement | |
|-------------------------------|----------------------|
| A2 A1 1/L1 3/L2 5/L3 | A2 A1 1/L1 3/L2 5/L3 |
| 2a2b | 2/T1 4/T2 6/T3 |
| x2 | x2 |

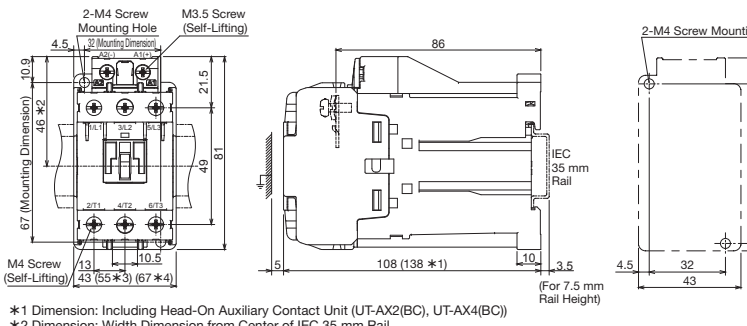
| Model Name | Model Name |
|------------|------------|
| S-2xT32 | S-2xT32BC |

SD-T32(BC)





0.55kg




| Contact Arrangement | |
|---------------------|----------------|
| A2 A1 | 1/L1 3/L2 5/L3 |
| 2/T1 | 4/T2 6/T3 |

| Model Name | |
|------------|--|
| SD-T32 | |
| SD-T32BC | |

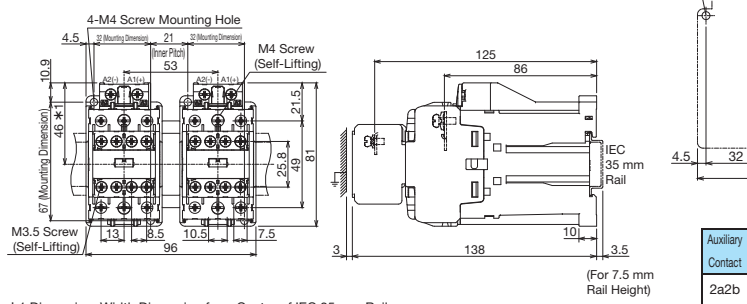
*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
 *2 Dimension: Width Dimension from Center of IEC 35 mm Rail
 *3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)

SD-2xT32(BC)





1.22kg

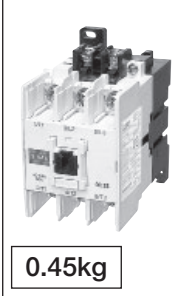


| Auxiliary Contact Arrangement | |
|-------------------------------|----------------------|
| A2 A1 1/L1 3/L2 5/L3 | A2 A1 1/L1 3/L2 5/L3 |
| 2a2b | 2/T1 4/T2 6/T3 |
| x2 | x2 |

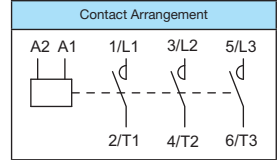
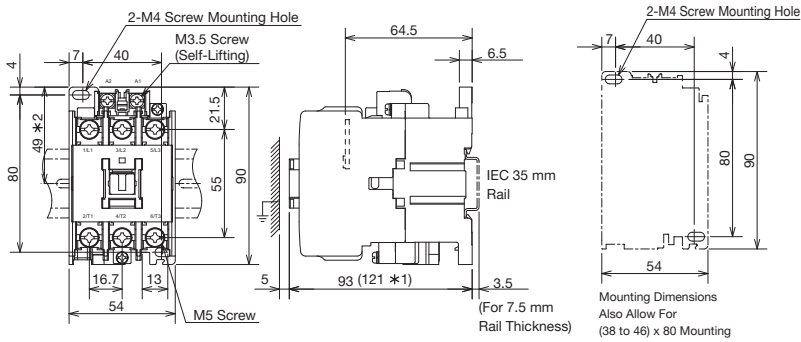
| Model Name | Model Name |
|------------|------------|
| SD-2xT32 | |
| SD-2xT32BC | |

*1 Dimension: Width Dimension from Center of IEC 35 mm Rail

S-N38(CX)
S-N48(CX)



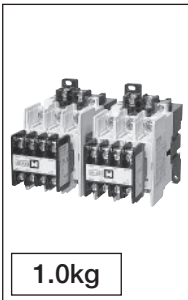
0.45kg



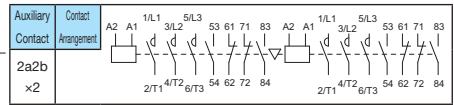
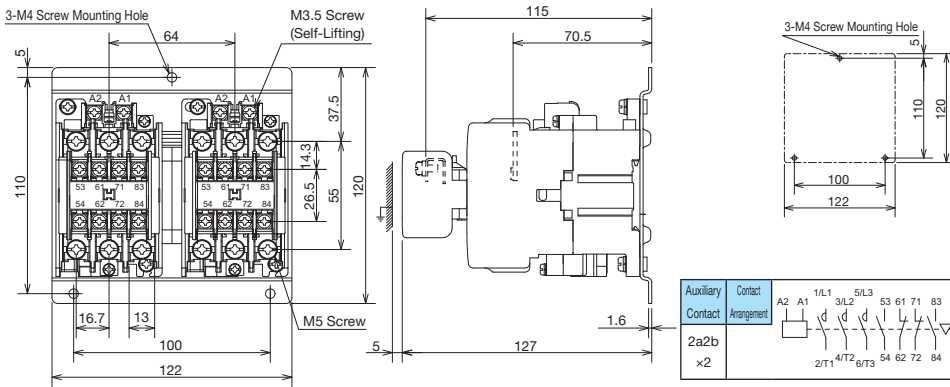
*1 Dimension: Including Head-On Auxiliary Contact Unit (UN-AX2(CX), UN-AX4(CX))
*2 Dimension: Width Dimension from Center of IEC 35 mm Rail.
Not Applicable With Side-On Auxiliary Contact Unit (UN-AX11(CX))

| Model Name | Model Number | Model Name | Model Number |
|------------|--------------|------------|--------------|
| S-N38 | SN03 □□ | S-N38CX | SN53 □□ |
| S-N48 | SN03 □□ | S-N48CX | SN53 □□ |

S-2xN38(CX)
S-2xN48(CX)



1.0kg



Side-On Auxiliary Contact Units (UN-AX11(CX)) Not Applicable

| Model Name | Model Name |
|------------|------------|
| S-2xN38 | S-2xN38CX |
| S-2xN48 | S-2xN48CX |

4.11 How to Order

Precautions

Follow the steps below when ordering. Enter a space in ▲.
 If there are multiple 2 letter symbols (SA, BC, KP etc.) appended to the model name frame size (T10 etc.) then specify them in alphabetical order. (E.g.: MSO-T10BCKPSA)
 (If not in alphabetical order, the model name displayed will change automatically.)

MS-T Series

1. Standard (AC Operated) Magnetic Starters

MS-(2x)T (Enclosed Type)

| Model Name | Motor Capacity | Main Circuit Voltage | Operation Coil Designation or Control Circuit Voltage/Frequency | (Note) Auxiliary Contact |
|---------------------------|-----------------------------|---|---|---|
| MS-T21KP MS-T10KP | ▲ 3.7kW | ▲ 200V ▲ 200V | ▲ AC200V ▲ AC200V | ▲ 1B |
| Refer to pages 70 and 71. | Select from page 46 or 129. | Do not apply AC voltage to the main circuit. (To distinguish it from the control circuit voltage) | Select the coil designation from page 41 or specify the control circuit voltage and frequency used. | Specify if using a special contact arrangement. Refer to page 39. |

MSO-(2x)T (Open Type)

| Model Name | Motor Capacity or Heater Designation (Knob Setpoint) | Main Circuit Voltage | Operation Coil Designation or Control Circuit Voltage/Frequency | (Note) Auxiliary Contact |
|---------------------------|--|---|---|---|
| MSO-T10KP | ▲ 9A | ▲ 200V | ▲ AC200V | ▲ 1B |
| Refer to pages 70 and 71. | Select from page 46 or 129. | Do not apply AC voltage to the main circuit. (To distinguish it from the control circuit voltage) | Select the coil designation from page 41 or specify the control circuit voltage and frequency used. | Specify if using a special contact arrangement. Refer to page 39. |

2. Standard (AC Operated) Magnetic Contactors

S-T Type, S-2xT Type

| Model Name | Operation Coil Designation or Control Circuit Voltage and Frequency | (Note) Auxiliary Contact |
|---------------------------|---|---|
| S-T20 S-T20 | ▲ AC200V ▲ AC100V50Hz | ▲ 2A |
| Refer to pages 70 and 71. | Select the coil designation from page 41 or specify the control circuit voltage and frequency used. | Specify if using a special contact arrangement. Refer to page 39. |

3. DC Operated Magnetic Starters/Contactors

MSOD-T Type

| Model Name | Motor Capacity or Heater Designation (Knob Setpoint) | Main Circuit Voltage | Operation Coil Designation | (Note) Auxiliary Contact |
|-------------------|--|--|---|---|
| MSOD-T21KP | ▲ 3.7kW | ▲ 200V | ▲ DC100V | ▲ |
| Refer to page 87. | Select from page 46 or 129. | Do not apply AC voltage to the main circuit. | Select the coil designation from page 42. | Specify if using a special contact arrangement. Refer to page 39. |

SD-T Type

| Model Name | Operation Coil Designation | (Note) Auxiliary Contact |
|--|---|---|
| SD-T21 | ▲ DC110V | ▲ |
| Refer to page 87. SD-2 x T21 is a reversing type. | Select the coil designation from page 42. | Specify if using a special contact arrangement. Refer to page 39. |

4. Mechanically Latched Magnetic Starters/Contactors

MSOL-T Type

| Model Name | Motor Capacity or Heater Designation (Knob Setpoint) | Main Circuit Voltage | Closing Coil | Tripping Coil |
|--|--|---|---|---------------|
| MSOL-T21KP | ▲ 3.7kW | ▲ 200V | ▲ MC-AC200V | ▲ MT-AC200V |
| Specify "MSOLD" if using a DC operated closing coil. Refer to page 98. | Select from page 46 or 129. | Do not apply AC voltage to the main circuit. (To distinguish it from the control circuit voltage) | Select the coil designation from page 42. | |

SL-T Type, SLD-T Type

| Model Name | Closing Coil Designation | Tripping Coil Designation |
|---|---|---------------------------|
| SL-T21 | ▲ MC-AC100V | ▲ MT-AC100V |
| Refer to page 98. · The model name is SLD if using a DC operated closing coil. | Select the coil designation from page 42. | |

SL-2xT Type, SLD-2xT Type

Specify using the SL-T type listed above if the left and right closing coils or tripping coils have the same ratings. However, specify using the following if the left and right coils have different ratings.

| Model Name | Closing Coil Designation (Left Side) | Tripping Coil Designation (Left Side) | Closing Coil Designation (Right Side) | Tripping Coil Designation (Right Side) |
|---|---|---------------------------------------|---------------------------------------|--|
| SL-2xT21 | ▲ MC1-AC100V | ▲ MT1-AC100V | ▲ MC2-AC100V | ▲ MT2-DC100V |
| Refer to page 98. · The model name is SLD if using a DC operated closing coil. | Select the coil designation from page 42. | | | |

5. Delay Open Magnetic Starters/Contactors

MSO-T □ DL, S-T □ DL Type

| Model Name | Main Circuit Specifications | Operation Coil |
|------------------------|---|---|
| MSO-T21DLKP S-T12DL | ▲ 15A ▲ 200V | ▲ AC200V ▲ AC200V |
| Specify from page 107. | Specify the rated voltages of the thermal overload relay heater designation and main circuit. Be sure to specify the rated voltage as there are strict criteria for the internal wiring of magnetic contactors. | The operation coil designation is available in AC100V and AC200V. |

6. Magnetic Starters with Delay Trip Thermal Overload Relays

■ MSO-T □ SR Type

| Model Name | Motor Capacity or Heater Designation (Knob Setpoint) | Main Circuit Voltage | Operation Coil Designation or Control Circuit Voltage/Frequency | (Note) Auxiliary Contact |
|------------------------|--|--|---|---|
| MSO-T12SR | 2.2kW | 200V | AC200V | |
| Specify from page 110. | Select from page 46 or 129. | Do not apply AC voltage to the main circuit. | Select the coil designation from page 41 or specify the control circuit voltage and frequency used. | Specify if using a special contact arrangement. Refer to page 39. |

7. Magnetic Starters with Quick Trip Thermal Overload Relays

■ MSO-T □ FS/FSKP Type

| Model Name | Motor Capacity or Heater Designation (Knob Setpoint) | Main Circuit Voltage | Operation Coil Designation or Control Circuit Voltage/Frequency | (Note) Auxiliary Contact |
|------------------------|--|--|---|---|
| MSO-T12FSKP | 2.2kW | 200V | AC200V | |
| Specify from page 112. | Select from page 46 or 129. | Do not apply AC voltage to the main circuit. | Select the coil designation from page 41 or specify the control circuit voltage and frequency used. | Specify if using a special contact arrangement. Refer to page 39. |

8. Magnetic Starters with Push-Buttons

■ MS-T □ KPPM Type

| Model Name | Motor Capacity | Main Circuit Voltage | Operation Coil Designation or Control Circuit Voltage/Frequency | (Note) Auxiliary Contact |
|------------------------|-----------------------------|---|---|---|
| MS-T21KPPM | 3.7kW | 200V | AC200V | |
| Specify from page 113. | Select from page 46 or 129. | Do not apply AC voltage to the main circuit. (To distinguish it from the control circuit voltage) | Select the coil designation from page 41 or specify the control circuit voltage and frequency used. | Specify if using a special contact arrangement. Refer to page 39. |

9. Magnetic Starters/Magnetic Contactors with Wiring Streamlining Terminals

■ MSO-T □ BC Type

| Model Name | Motor Capacity or Heater Designation (Knob Setpoint) | Main Circuit Voltage | Operation Coil Designation or Control Circuit Voltage/Frequency | (Note) Auxiliary Contact |
|------------------------|--|--|---|---|
| MSO-T12BCKP | 2.2kW | 200V | AC200V | |
| Specify from page 115. | Select from page 46 or 129. | Do not apply AC voltage to the main circuit. | Select the coil designation from page 41 or specify the control circuit voltage and frequency used. | Specify if using a special contact arrangement. Refer to page 39. |

■ S-T □ BC Type

| Model Name | Operation Coil Designation or Control Circuit Voltage and Frequency | (Note) Auxiliary Contact |
|------------------------|---|---|
| S-T12BC | AC200V | |
| Specify from page 115. | Select the coil designation from page 41 or specify the control circuit voltage and frequency used. | Specify if using a special contact arrangement. Refer to page 39. |

10. Main Circuit 3-Pole Magnetic Contactors

■ S-T Type, S-2xT Type

| Model Name | Operation Coil Designation or Control Circuit Voltage and Frequency |
|------------------------|---|
| S-T32 | AC200V |
| Specify from page 117. | Select the coil designation from page 41 or specify the control circuit voltage and frequency used. |

■ SD-T Type, SD-2xT Type

| Model Name | Operation Coil Designation or Control Circuit Voltage and Frequency |
|------------------------|---|
| SD-T32 | DC100V |
| Specify from page 117. | Select the coil designation from page 42 or specify the control circuit voltage and frequency used. |

MS-N Series

1. Standard (AC Operated) Magnetic Starters

MS-(2x)N Type (Enclosed Type)

| Model Name | Motor Capacity | Main Circuit Voltage | Operation Coil Designation or Control Circuit Voltage/Frequency | (Note) Auxiliary Contact |
|---------------------------|-----------------------------|---|---|---|
| MS-N125KP | 30kW | 200V | AC200V | |
| Refer to pages 70 and 71. | Select from page 46 or 129. | Do not apply AC voltage to the main circuit. (To distinguish it from the control circuit voltage) | Select the coil designation from page 41 or specify the control circuit voltage and frequency used. | Specify if using a special contact arrangement. Refer to page 39. |

MSO-(2x)N Type (Open Type)

| Model Name | Motor Capacity or Heater Designation (Knob Setpoint) | Main Circuit Voltage | Operation Coil Designation or Control Circuit Voltage/Frequency | (Note) Auxiliary Contact |
|---------------------------|--|---|---|---|
| MSO-N125KP | 105A | 200V | AC200V | |
| Refer to pages 70 and 71. | Select from page 46 or 129. | Do not apply AC voltage to the main circuit. (To distinguish it from the control circuit voltage) | Select the coil designation from page 41 or specify the control circuit voltage and frequency used. | Specify if using a special contact arrangement. Refer to page 39. |

2. Standard (AC Operated) Magnetic Contactors

S-N Type, S-2xN Type

| Model Name | Operation Coil Designation or Control Circuit Voltage and Frequency | (Note) Auxiliary Contact |
|---------------------------|---|---|
| S-N125 | AC200V | |
| S-N125 | AC110V 50Hz | |
| Refer to pages 70 and 71. | Select the coil designation from page 41 or specify the control circuit voltage and frequency used. | Specify if using a special contact arrangement. Refer to page 39. |

3. DC Operated Magnetic Starters/Contactors

MSOD-N Type

| Model Name | Motor Capacity or Heater Designation (Knob Setpoint) | Main Circuit Voltage | Operation Coil Designation | (Note) Auxiliary Contact |
|-------------------|--|--|---|---|
| MSOD-N125KP | 30kW | 200V | DC100V | |
| Refer to page 87. | Select from page 46 or 129. | Do not apply AC voltage to the main circuit. | Select the coil designation from page 42. | Specify if using a special contact arrangement. Refer to page 39. |

SD-N Type

| Model Name | Operation Coil Designation | (Note) Auxiliary Contact |
|--|---|---|
| SD-N125 | DC110V | |
| Refer to page 87. SD-2 x N50 is a reversing type. | Select the coil designation from page 42. | Specify if using a special contact arrangement. Refer to page 39. |

4. Mechanically Latched Magnetic Starters/Contactors

MSOL-N Type

| Model Name | Motor Capacity or Heater Designation (Knob Setpoint) | Main Circuit Voltage | Closing Coil | Tripping Coil |
|--|--|---|---|---------------|
| MSOL-N125KP | 30kW | 200V | MC-AC200V | MT-AC200V |
| MSOLD-N125KP | 105A | 200V | MC-DC100V | MT-DC200V |
| Specify "MSOLD" if using a DC operated closing coil. Refer to page 98. | Select from page 46 or 129. | Do not apply AC voltage to the main circuit. (To distinguish it from the control circuit voltage) | Select the coil designation from page 42. | |

SL-N Type, SLD-N Type

| Model Name | Closing Coil Designation | Tripping Coil Designation |
|---|---|---------------------------|
| SL-N125 | MC-AC100V | MT-AC100V |
| SLD-N125 | MC-DC100V | MT-DC100V |
| Refer to page 98. · The model name is SLD if using a DC operated closing coil. | Select the coil designation from page 42. | |

SL-2xN Type, SLD-2xN Type

Specify using the SL-N or SL-D-N type listed above if the left and right closing coils or tripping coils have the same ratings. However, specify using the following if the left and right coils have different ratings.

| Model Name | Closing Coil Designation (Left Side) | Tripping Coil Designation (Left Side) | Closing Coil Designation (Right Side) | Tripping Coil Designation (Right Side) |
|---|---|---------------------------------------|---------------------------------------|--|
| SLD-2xN125 | MC1-DC100V | MT1-AC100V | MC2-AC100V | MT2-DC100V |
| Refer to page 98. · The model name is SLD if using a DC operated closing coil. | Select the coil designation from page 42. | | | |

5. Capacitive Tripping Device

CTU- □□ Type

| Model Name | Operating Voltage Symbol |
|--|---|
| CTU-A | 2 |
| Refer to page 99. Combinable Mechanically Latched Magnetic Starters · Model names differ depending on contactor frame. | Operating Voltage is AC100V or AC200V 1: AC100V 2: AC200V |

6. Delay Open Magnetic Starters/Contactors

MSO-N DLKP, S-N DL Type

| Model Name | Main Circuit Specifications | Operation Coils |
|--------------------------|---|---|
| MSO-N150DLKP S-N400DL | ▲ 125A ▲ 200V ▲ 200V | ▲ AC200V ▲ AC200V |
| Specify from page 107. | Specify the rated voltages of the thermal overload relay heater designation and main circuit. Be sure to specify the rated voltage as there are strict criteria for the internal wiring of magnetic contactors. | The operation coil designation is available in AC100V and AC200V. |

7. Magnetic Starters with Delay Trip Thermal Overload Relays

MSO-N KPSR Type

| Model Name | Motor Capacity or Heater Designation (Knob Setpoint) | Main Circuit Voltage | Operation Coil Designation or Control Circuit Voltage/Frequency | (Note) Auxiliary Contact |
|------------------------|--|--|---|---|
| MSO-N125KPSR | ▲ 30kW | ▲ 200V | ▲ AC200V | |
| Specify from page 110. | Select from page 46 or 129. | Do not apply AC voltage to the main circuit. | Select the coil designation from page 41 or specify the control circuit voltage and frequency used. | Specify if using a special contact arrangement. Refer to page 39. |

8. Main Circuit 3-Pole Magnetic Contactors

S-N Type, S-2xN Type

| Model Name | Operation Coil Designation or Control Circuit Voltage and Frequency |
|-----------------------|---|
| S-N48 | ▲ AC200V |
| Specify from page 117 | Select the coil designation from page 41 or specify the control circuit voltage and frequency used. |






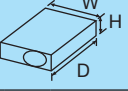


5

TH-T/N Type Thermal Overload Relays






| | | |
|------|--|-----|
| 5.1 | Model List | 126 |
| 5.2 | Contact Rating | 128 |
| 5.3 | Operating Properties | 128 |
| 5.4 | Selection and Application | 128 |
| 5.5 | Structure | 131 |
| 5.6 | Precautions for Use | 132 |
| 5.7 | Standard/Overload and Open-Phase Protection Type Thermal Overload Relays TH- □ /KP | 135 |
| 5.8 | Thermal Overload Relays with Saturable Reactor TH- □ (KP)SR | 136 |
| 5.9 | Quick-acting Characteristics Thermal Overload Relays TH- □ FS (KP) | 137 |
| 5.10 | Outline Drawings/Contact Arrangements | 138 |
| 5.11 | Operating Characteristic Curve | 143 |
| 5.12 | How to Order | 148 |

5.1 Model List

| Frame | | | T18 | T25 | T50 | T65 | T100 | | |
|--|--------------------------------|--------------------------|--|---|--|---|---|-----------------------|-------------------|
| Appearance | | |  |  |  |  |  | | |
| Model Name | Standard with 2-Element | For Magnetic Starters | TH-T18 | TH-T25 | TH-T50 | TH-T65 | TH-T100 | | |
| | With 3-Element (2E) | For Independent Mounting | UT-HZ18 + TH-T18 | | — | | — | | |
|  | Outline Drawing [mm] W x H x D | For Magnetic Starters | 46 x 55 x 76.5 | 63 x 53 x 80 | 74.3 x 74 x 88 | 89 x 57 x 83.5 | 89 x 68.5 x 83.5 | | |
| | Product Weight [kg] | For Independent Mounting | 46 x 63 x 82.4 | | — | | — | | |
| Applicable Standard | | | JIS C8201-4-1, IEC60947-4-1, EN60947-4-1, GB14048.4 | | | | | | |
| Use Conditions | | | Ambient Temperature [°C] -10 to +40 (Standard is 20°C, Inner Panel Maximum Temperature is 55°C) | | | | | | |
| | | | Frequency [Hz] 0 (DC) to 400 | | | | | | |
| Rated Insulation Voltage [V] | | | 690 | | | | | | |
| Rated Impulse Withstand Voltage [kV] | | | 6 | | | | | | |
| Pollution Degree | | | 3 | | | | | | |
| Specifications of the Main Circuit | | | 0.12 (0.1 to 0.16) | 0.24 (0.2 to 0.32) | 29 (24 to 34) | 15 (12 to 18) | 67 (54 to 80) | | |
| | | | 0.17 (0.14 to 0.22) | 0.35 (0.28 to 0.42) | 35 (30 to 40) | 22 (18 to 26) | 82 (65 to 100) | | |
| | | | 0.24 (0.2 to 0.32) | 0.5 (0.4 to 0.6) | 42 (34 to 50) | 29 (24 to 34) | 95 (85 to 105) | | |
| | | | 0.35 (0.28 to 0.42) | 0.7 (0.55 to 0.85) | — | 35 (30 to 40) | — | | |
| | | | 0.5 (0.4 to 0.6) | 0.9 (0.7 to 1.1) | — | 42 (34 to 50) | — | | |
| | | | 0.7 (0.55 to 0.85) | 1.3 (1 to 1.6) | — | 54 (43 to 65) | — | | |
| | | | 0.9 (0.7 to 1.1) | 1.7 (1.4 to 2) | — | — | — | | |
| | | | 1.3 (1 to 1.6) | 2.1 (1.7 to 2.5) | — | — | — | | |
| | | | 1.7 (1.4 to 2) | 2.5 (2 to 3) | — | — | — | | |
| | | | 2.1 (1.7 to 2.5) | 3.6 (2.8 to 4.4) | — | — | — | | |
| | | | 2.5 (2 to 3) | 5 (4 to 6) | — | — | — | | |
| | | | 3.6 (2.8 to 4.4) | 6.6 (5.2 to 8) | — | — | — | | |
| | | | 5 (4 to 6) | 9 (7 to 11) | — | — | — | | |
| | | | 6.6 (5.2 to 8) | 11 (9 to 13) | — | — | — | | |
| | | | 9 (7 to 11) | 15 (12 to 18) | — | — | — | | |
| 11 (9 to 13) | 22 (18 to 26) | — | — | — | | | | | |
| 15 (12 to 18) | — | — | — | — | | | | | |
| Power Consumption [VA/Element] Minimum/Maximum Settling | | | 0.8/1.8 | 1.0/2.1 | 1.6/3.2 | 2.4/5.5 | 2.5/6.0 | | |
| Terminal Screw Size | | | M3.5 | M4 | M5 | M6 | M6 | | |
| Terminal-Compatible | | | Wire Size [mm ²] | φ 1.6, 0.75 to 2.5 | φ 1.6 to 2.6, 1.25 to 6 | φ 2 to 3.6, 4 to 14 | — | — | |
| | | | Crimp Lug Size | 1.25-3.5 to 2-3.5, 5.5-53 | 1.25-4 to 5.5-4 | 5.5-5 to 14-5 | 5.5-6 to 22-6 | 14-6 to 22-6, 38-S6 | |
| Contact Arrangement | | | 1a1b | 1a1b | 1a1b | 1a1b | 1a1b | | |
| Conventional Free Air Thermal Current Ith [A] | | | 2 | 5 | 5 | 5 | 5 | | |
| Rating Use Current [A] <small>The value in parentheses is the rating during auto reset</small> | | | Category AC-15 (AC Contactors) Coil Switching Make Contact/Break Contact | AC24 V | 2 (0.5)/2 (0.5) | 2 (0.5)/3 (0.5) | 2 (0.5)/3 (0.5) | 2 (0.5)/3 (0.5) | |
| | | | | AC120 V | 2 (0.5)/2 (0.5) | 2 (0.5)/3 (0.5) | 2 (0.5)/3 (0.5) | 2 (0.5)/3 (0.5) | |
| | | | | AC240 V | 1 (0.5)/1 (0.5) | 1 (0.5)/2 (0.5) | 1 (0.5)/2 (0.5) | 1 (0.5)/2 (0.5) | |
| | | | Category DC-13 (DC Contactors) Coil Switching <small>The value in parentheses is the rating during auto reset</small> | AC550 V | 0.3 (0.3)/0.3 (0.3) | 0.3 (0.3)/0.3 (0.3) | 0.3 (0.3)/0.3 (0.3) | 0.5 (0.5)/1 (0.5) | 0.5 (0.5)/1 (0.5) |
| | | | | DC24 V | 0.5 (0.3) | 1 (0.3) | 1 (0.3) | 1 (0.3) | 1 (0.3) |
| DC110 V | 0.2 (0.2) | 0.2 (0.2) | 0.2 (0.2) | 0.2 (0.2) | 0.2 (0.2) | | | | |
| DC220 V | 0.1 (0.1) | 0.1 (0.1) | 0.1 (0.1) | 0.1 (0.1) | 0.1 (0.1) | | | | |
| Minimum Applicable Load Level | | | 20 V 5 mA | 20 V 5 mA | 20 V 5 mA | 20 V 5 mA | 20 V 5 mA | | |
| Terminal Screw Size | | | M3.5 | M3.5 | M3.5 | M4 | M4 | | |
| Terminal-Compatible | | | Wire Size [mm ²] | φ 1.6, 0.75 to 2.5 | φ 1.6, 0.75 to 2.5 | φ 1.6, 1.25 to 2 | φ 1.6, 1.25 to 2 | | |
| | | | Crimp Lug Size | 1.25-3.5 to 2-3.5 | 1.25-3.5 to 2-3.5 | 1.25-3.5 to 2-3.5 | 1.25-4 to 2-4, 5.5-S4 | 1.25-4 to 2-4, 5.5-S4 | |
| Operating Characteristic Curve Page | | | 143 | | | | | | |
| Vibration Resistance (Vibration and Malfunction Resistance Performance) | | | 10 to 55Hz 19.6m/s ² | | | | | | |
| Trip Free | | | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | | |
| Reset Method | | | Manual/Automatic Switchable | Manual/Automatic Switchable | Manual/Automatic Switchable | Manual/Automatic Switchable | Manual/Automatic Switchable | | |
| Operation Indicator (Lever Display) | | | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | | |
| Manual Tripping Check | | | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | | |
| Frame of the Combined Magnetic Contactor | | | T10, T12, T20 T12, T20 T20 | T21, T25, T35, T50 | T35, T50 T50 | T65, T80, T100 | T80, T100 T100 | | |
| Applied Products | | | With Saturable Reactor [See Page 136] | With 2-Element (TH-□SR) | ○ (TH-T18SR) | ○ (TH-T25SR) | ○ (TH-T50SR) | ○ (TH-T65SR) | ○ (TH-T100SR) |
| | | | | With 3-Element (2E) (TH-□KPSR) | — | ○ (TH-T25KPSR) | ○ (TH-T50KPSR) | ○ (TH-T65KPSR) | ○ (TH-T100KPSR) |
| Quick Trip Type [See Page 137] | | | With 2-Element (TH-□FS) With 3-Element (2E) (TH-□FSKP, KF) | — | △ (TH-T25FS) | △ (TH-T50FS) | △ (TH-T65FS) | △ (TH-T100FS) | |
| | | | | △ (TH-T18FSKP) | △ (TH-T25FSKP) | △ (TH-T50FSKP) | △ (TH-T65FSKP) | △ (TH-T100FSKP) | |
| Live Part Protection Cover | | | (Standard Equipment) | (Standard Equipment) | (Standard Equipment) | ⊙ (UN-CZ605) | — | | |
| Reset Release | | | ⊙ (UT-RR□5) | ⊙ (UN-RR□0) | ⊙ (UN-RR□0) | ⊙ (UN-RR□6) | ⊙ (UN-RR□6) | | |
| Operation Indicator Lamp | | | ⊙ (UN-TL12) | ⊙ (UN-TL20) | ⊙ (UN-TL20) | ⊙ (UN-TL60) | ⊙ (UN-TL60) | | |
| Independent/IEC 35 mm Rail Mounting Unit | | | ⊙ (UT-HZ18) | ⊙ (UN-RM20) | — | — | — | | |
| Misoperation Prevention Cover | | | — | ⊙ (UN-CV203) | ⊙ (UN-CV203) | ⊙ (UN-CV603) | ⊙ (UN-CV603) | | |

Note 1. All model names come with ambient temperature compensation device.

Note 2. ⊙ indicates standard type (standard equipment), ○ indicates semi-standard type, △ indicates special products and - indicates products outside production range.

| | N120 | N120TA | N220 | N400 | N600 |
|--|---|---|---|---|---|
| |  |  |  |  |  |
| | TH-N120 | TH-N120TA TH-N120TAHZ | TH-N220RH TH-N220HZ | TH-N400RH TH-N400HZ | TH-N600(Note 3) |
| | TH-N120KP | TH-N120TAKP TH-N120TAHZKP | TH-N220RHKP TH-N220HZKP | TH-N400RHKP TH-N400HZKP | TH-N600KP(Note 3) |
| | 103 x 67 x 105 | 112 x 87 x 105 112 x 103 x 105 | 144 x 114 x 179.5 144 x 104 x 166.5 | 144 x 160 x 193.5 144 x 173 x 166.5 | 63 x 42 x 83.5 |
| | 0.48 | 0.75 1.0 | 2.5 2.5 | 2.7 2.7 | 0.14 |
| JIS, JEM, IEC, VDE, BS, UL, GB | | | | | |
| -10 to +40 (Standard is 20°C, Inner Panel Maximum Temperature is 55°C) | | | | | |
| 0 (DC) to 400 | | | 50 to 60 | | |
| 690 | | | | | |
| 6 | | | | | |
| 3 | | | | | |
| | 42 (34 to 50) 54 (43 to 65) 67 (54 to 80) 82 (65 to 100) | 105 (85 to 125) 125 (100 to 150) | 82 (65 to 100) 105 (85 to 125) 125 (100 to 150) 150 (120 to 180) 180 (140 to 220) 210 (170 to 250) | 105 (85 to 125) 125 (100 to 150) 150 (120 to 180) 180 (140 to 220) 250 (200 to 300) 330 (260 to 400) | 250 (200 to 300) (Current Transformer Ratio: 400/5 A) 330 (260 to 400) (Current Transformer Ratio: 500/5 A) 500 (400 to 600) (Current Transformer Ratio: 750/5 A) 660 (520 to 800) (Current Transformer Ratio: 1000/5 A) |
| | 3.0/7.1 | 3.8/8.6 | 1.0/2.3 (Note 4) | 1.0/2.3 (Note 4) | 1.0/2.3 (Note 4) |
| | M8 | M8 | M10 | M12 | — |
| | — | — | — | — | — |
| | 8-8 to 38-8 | 38-8 to 100-8 | 22-10 to 150-10 | 22-12 to 200-12 | — |
| | 1a1b | 1a1b | 1a1b | 1a1b | 1a1b |
| | 5 | 5 | 5 | 5 | 5 |
| | 2(0.5)/3(0.5) | 2(0.5)/3(0.5) | 2(0.5)/3(0.5) | 2(0.5)/3(0.5) | 2(0.5)/3(0.5) |
| | 2(0.5)/3(0.5) | 2(0.5)/3(0.5) | 2(0.5)/3(0.5) | 2(0.5)/3(0.5) | 2(0.5)/3(0.5) |
| | 1(0.5)/2(0.5) | 1(0.5)/2(0.5) | 1(0.5)/2(0.5) | 1(0.5)/2(0.5) | 1(0.5)/2(0.5) |
| | 0.5(0.5)/1(0.5) | 0.5(0.5)/1(0.5) | 0.5(0.5)/1(0.5) | 0.5(0.5)/1(0.5) | 0.5(0.5)/1(0.5) |
| | 1(0.3) | 1(0.3) | 1(0.3) | 1(0.3) | 1(0.3) |
| | 0.2(0.2) | 0.2(0.2) | 0.2(0.2) | 0.2(0.2) | 0.2(0.2) |
| | 0.1(0.1) | 0.1(0.1) | 0.1(0.1) | 0.1(0.1) | 0.1(0.1) |
| | 20V 5mA | 20V 5mA | 20V 5mA | 20V 5mA | 20V 5mA |
| | M4 | M4 | M4 | M4 | M4 |
| | φ 1.6, 1.25 to 2 | φ 1.6, 1.25 to 2 | φ 1.6, 1.25 to 2 | φ 1.6, 1.25 to 2 | φ 1.6, 1.25 to 2 |
| | 1.25-4 to 2-4, 5.5-S4 | 1.25-4 to 2-4, 5.5-S4 | 1.25-4 to 2-4, 5.5-S4 | 1.25-4 to 2-4, 5.5-S4 | 1.25-4 to 2-4, 5.5-S4 |
| | 146 | | 146 | | 146 |
| | 10 to 55Hz 19.6m/s ² | | | | |
| | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| | Manual/Automatic Switchable | Manual/Automatic Switchable | Manual/Automatic Switchable | Manual/Automatic Switchable | Manual/Automatic Switchable |
| | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| | N125, N150 | N125, N150 N150 | N180, N220 N220 | N300, N400 N400 | N600, N800 |
| | ⊙ (TH-N120SR) | ⊙ (TH-N120TASR) | ⊙ (TH-N220 □ SR) | ⊙ (TH-N400 □ SR) | ⊙ (TH-N600SR) |
| | ⊙ (TH-N120KPSR) | ⊙ (TH-N120TAKPSR) | ⊙ (TH-N220 □ KPSR) | ⊙ (TH-N400 □ KPSR) | ⊙ (TH-N600KPSR) |
| | — | — | — | — | — |
| | — | — | — | — | — |
| | — | — | — | — | — |
| | ⊙ (UN-RR□6) | ⊙ (UN-RR□6) | ⊙ (UN-RR□6) | ⊙ (UN-RR□6) | ⊙ (UN-RR□6) |
| | ⊙ (UN-TL60) | ⊙ (UN-TL60) | ⊙ (UN-TL60) | ⊙ (UN-TL60) | ⊙ (UN-TL60) |
| | — | — | — | — | — |
| | ⊙ (UN-CV603) | ⊙ (UN-CV603) | ⊙ (UN-CV603) | ⊙ (UN-CV603) | ⊙ (UN-CV603) |

Note 3. Use TH-N600(KP) in combination with current transformer for measuring instruments (rated secondary load of 15 VA or more). The recommended model names are CW-15LM or CW-15L for 250, 330 and 500 A, and CW-40LM for 660 A. The ratio of current transformation is as shown in the heater designation field in the table.

Note 4. The power consumption indicates the amount consumed by the heater element only. (The current transformer consumption amounts of the N220 to N600 frames are not included.)

5.2 Contact Rating

● Main circuit specifications... as shown on page126 ● Specifications of the control circuit (contact) ● The contact rating is as shown in the following table

| Frame | T18 | | T25, T50 | | T65, T100, N120 to N600 | | |
|--|---------------|--------------|---------------|--------------|-------------------------|--------------|-----------|
| | Break Contact | Make Contact | Break Contact | Make Contact | Break Contact | Make Contact | |
| Conventional Free Air Thermal Current Ith [A] | 2 | 2 | 5 | 5 | 5 | 5 | |
| Class AC-15 Rated Operating Current [A] | AC24V | 2 (0.5) | 2 (0.5) | 3 (0.5) | 2 (0.5) | 3 (0.5) | 2 (0.5) |
| | AC120V | 2 (0.5) | 2 (0.5) | 3 (0.5) | 2 (0.5) | 3 (0.5) | 2 (0.5) |
| | AC240V | 1 (0.5) | 1 (0.5) | 2 (0.5) | 1 (0.5) | 2 (0.5) | 1 (0.5) |
| | AC550V | 0.3 (0.3) | 0.3 (0.3) | 0.3 (0.3) | 0.3 (0.3) | 1 (0.5) | 0.5 (0.5) |
| Class DC-13 Rated Operating Current [A] | DC24V | 0.5 (0.3) | 0.5 (0.3) | 1 (0.3) | 1 (0.3) | 1 (0.3) | 1 (0.3) |
| | DC110V | 0.2 (0.2) | 0.2 (0.2) | 0.2 (0.2) | 0.2 (0.2) | 0.2 (0.2) | 0.2 (0.2) |
| | DC220V | 0.1 (0.1) | 0.1 (0.1) | 0.1 (0.1) | 0.1 (0.1) | 0.1 (0.1) | 0.1 (0.1) |

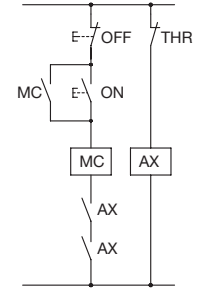
Note 1. The withstand voltage is AC2500 V for 1 minute.

Note 2. The contact arrangement is 1a1b.

Note 3. If the coil current of the DC operated magnetic contactor (SD) exceeds 0.2 A at DC110 V or 0.1 A at DC220 V (SD-N125 or higher), conduct through the SR or SRD contactor relay. (Refer to the figure on the right)

Note 4. The minimum available voltage and current level in a clean atmosphere is 20 V 5 mA.

Note 5. The value in parentheses is the rating during auto reset.



MC : SD Type
AX : SRD Type
THR : TH Type

5.3 Operating Properties (Standard Value)

The operating properties of the thermal overload relays are specified as shown in the table below according to the standards.

| Standard | Conditions | Operation in Balanced Circuit | | | | Operation in Unbalanced Circuit | | Ambient Temperature |
|---------------------------|-----------------------------|-------------------------------|----------------------|--------------------------------|---|---------------------------------|-------------------------|---------------------|
| | | Limit Operations | | Operation During Overload | Operation During Constraint | Non-Operation | Operation | |
| | | A (Cold Start) | B (Continued From A) | C (Hot Start) | D (Cold Start) | A (Cold Start) | B (Continued From A) | |
| JIS C8201-4-1 | Multiple of Setting Current | 1.05 | 1.2 | 1.5 | 7.2 | 2-Pole 1.0 1-Pole 0.9 | 2-Pole 1.15 1-Pole 0 | 20°C |
| | Operating Time | Non-Operation (2 Hours) | Within 2 Hours | (5) Less Than 2 Minutes | (5) $T_p \leq 5$ Seconds | Non-Operation (2 Hours) | Within 2 Hours | |
| | | | | (10A) Less Than 2 Minutes | (10A) $2 < T_p \leq 10$ Seconds | | | |
| | | | | (10) Less Than 4 Minutes | (10) $4 < T_p \leq 10$ Seconds | | | |
| (20) Less Than 8 Minutes | | | | (20) $6 < T_p \leq 20$ Seconds | | | | |
| IEC 60947-4-1 | Multiple of Setting Current | 1.05 | 1.2 | 1.5 | 7.2 | 2-Pole 1.0 1-Pole 0.9 | 2-Pole 1.15 1-Pole 0 | 20°C |
| | Operating Time | Non-Operation (2 Hours) | Within 2 Hours | (10A) Less Than 2 Minutes | (10A) $2 < T_p \leq 10$ Seconds | Non-Operation (2 Hours) | Within 2 Hours | |
| | | | | (10) Less Than 4 Minutes | (10) $4 < T_p \leq 10$ Seconds | | | |
| | | | | (20) Less Than 8 Minutes | (20) $6 < T_p \leq 20$ Seconds | | | |
| (30) Less Than 12 Minutes | | | | (30) $9 < T_p \leq 30$ Seconds | | | | |
| JEM 1356 | Multiple of Setting Current | 1.05 | 1.2 | 1.5 | 7.2 | 2-Pole 1.0 1-Pole 0.9 | 2-Pole 1.15 1-Pole 0 | 20°C |
| | Operating Time | Non-Operation (2 Hours) | Within 2 Hours | (Quick) Within 4 Minutes | (Quick) $T_p \leq 5$ Seconds | Non-Operation (2 Hours) | Within 2 Hours | |
| | | | | (Standard) Within 8 Minutes | (Standard) $2 \leq T_p \leq 15$ Seconds | | | |
| | | | | (Delay) Within 12 Minutes | (Delay) $9 \leq T_p \leq 30$ Seconds | | | |

Note 1. It shows the case of the thermal overload relay with ambient temperature compensation and open phase detection.

Note 2. T_p shows the operating time while restrained.

Note 3. The operating time field () of the operation during overload and constraint represents the trip class in JIS and IEC, and type in JEM.

5.4 Selection and Application

● Selecting Thermal Overload Relays

The principles in the selection of the thermal overload relay are that its operating characteristic curve falls below the thermal properties (overcurrent - service lifetime properties) of the motor, and exceeds the startup properties (startup current - time properties) curve of the motor. Judge the suitability of the thermal properties and starting properties of the motor by superposing them on the operating characteristic curve (see page 143) of the thermal overload relay. (Refer to Figure 4 on page 133)

| Motor, Running, Protection Conditions, etc. | Selection | Applicable Thermal Overload Relays | |
|---|---|------------------------------------|------------------------|
| | | With 2-Element | With 3-Element (2E) |
| Standard Start, Stop (Low Frequency) | Standard Thermal Overload Relays | TH- □ Type | TH- □ KP Type |
| Fan, blower, etc. with long start-up time | Thermal Overload Relays With Saturable Reactor | TH- □ SR Type | TH- □ KPSR Type |
| Submersible motor and compressor motor with short allowable constraint time | Quick-acting Characteristics Thermal Overload Relays | TH- □ FS Type | TH-T □ FSKP Type |
| Inching, High Frequency Intermittent Running | Although unnecessary trips may be avoided by the thermal overload relay with a saturable reactor to provide the adequate protection, detailed consideration is required | Consideration Required | Consideration Required |
| For Open-Phase Protection | Thermal Overload Relays With 3-Element (2E) | — | TH- □ KP Type |
| Reverse-Phase and Open-Phase Protection Dual Use | Electronic Motor Protection Relays (3E) | — | (ET- □ Type) |

Note 1. For more information on the startup time of motors and application of thermal overload relays, refer to page 130.

● Thermal Overload Relay Heater Designation Selection Table

Guidelines for the selection of general thermal overload relays are shown in the following table.

| Voltage Motor Capacity [kW] | Three-Phase Motors | | | | | | | | Single-Phase Motors | | | | Voltage Capacity [kW] |
|--------------------------------|--------------------|-------------|-------------|-------|-------------|-------------|-------------|------|---------------------|-------------|-------------|-------------|--------------------------|
| | 200 to 220V | 230 to 240V | 346 to 350V | 380V | 400 to 440V | 460 to 500V | 550 to 600V | 660V | 100 to 110V | 115 to 120V | 200 to 220V | 230 to 240V | |
| 0.03 | 0.24A | 0.24A | — | — | — | — | — | — | | | | | 0.03 |
| 0.035 | 0.35A | 0.24A | 0.24A | 0.24A | — | — | — | — | 1.7A | | 0.9A | | 0.035 |
| 0.05 | 0.35A | 0.35A | 0.24A | 0.24A | 0.24A | — | — | — | | | | | 0.05 |
| 0.06 to 0.065 | 0.5A | 0.35A | 0.35A | 0.24A | 0.24A | 0.24A | — | — | 2.5A | | 1.3A | | 0.06 to 0.065 |
| 0.07 | 0.5A | 0.5A | 0.35A | 0.35A | 0.35A | 0.24A | — | — | | | | | 0.07 |
| 0.09 | 0.7A | 0.7A | 0.35A | 0.35A | 0.35A | 0.24A | 0.24A | — | | | | | 0.09 |
| 0.1 | 0.7A | 0.7A | 0.35A | 0.35A | 0.35A | 0.35A | 0.24A | — | 3.6A | | 1.7A | | 0.1 |
| 0.12 | 0.9A | 0.7A | 0.5A | 0.5A | 0.5A | 0.35A | 0.24A | — | | 3.6A | | 2.1A | 0.12 |
| 0.15 | 0.9A | 0.9A | 0.7A | 0.7A | 0.5A | 0.5A | 0.35A | — | 5A | | 2.5A | | 0.15 |
| 0.18 | 1.3A | 0.9A | 0.7A | 0.7A | 0.7A | 0.5A | 0.5A | — | 5A | 5A | | 2.5A | 0.18 |
| 0.2 | 1.3A | 0.9A | 0.7A | 0.7A | 0.7A | 0.7A | 0.5A | — | 5A | | 2.5A | | 0.2 |
| 0.25 | 1.7A | 1.3A | 0.9A | 0.9A | 0.7A | 0.7A | 0.5A | — | 6.6A | 6.6A | 3.6A | 3.6A | 0.25 |
| 0.3 | 1.7A | 1.3A | 0.9A | 0.9A | 0.9A | 0.9A | 0.7A | — | 6.6A | | 3.6A | | 0.3 |
| 0.37 to 0.4 | 2.1A | 2.1A | 1.3A | 1.3A | 1.3A | 0.9A | 0.7A | — | 9A | 9A | 5A | 5A | 0.37 to 0.4 |
| 0.55 | 2.5A | 2.5A | 1.7A | 1.7A | 1.3A | 1.3A | 0.9A | — | 11A | 11A | 5A | 6.6A | 0.55 |
| 0.75 | 3.6A | 3.6A | 2.1A | 2.1A | 1.7A | 1.7A | 1.3A | 1.3A | 15A | 15A | 6.6A | 9A | 0.75 |
| 1.0 | 5A | 5A | 2.5A | 2.5A | 2.5A | 2.1A | 1.7A | 1.7A | | | | | 1.0 |
| 1.1 | 5A | 5A | 3.6A | 2.5A | 2.5A | 2.1A | 1.7A | 1.7A | 22A | 22A | 9A | 9A | 1.1 |
| 1.3 | 6.6A | 5A | 3.6A | 3.6A | 2.5A | 2.5A | 2.1A | 2.1A | | | | | 1.3 |
| 1.5 | 6.6A | 6.6A | 3.6A | 3.6A | 3.6A | 2.5A | 2.5A | 2.1A | 29A | 22A | 15A | 11A | 1.5 |
| 2.2 | 9A | 9A | 5A | 5A | 5A | 3.6A | 3.6A | 3.6A | | | | | 2.2 |
| 3 | 11A | 11A | 6.6A | 6.6A | 6.6A | 5A | 5A | 3.6A | | | | | 3 |
| 3.7 to 4 | 15A | 15A | 9A | 9A | 6.6A | 6.6A | 5A | 5A | | 35A | | 15A | 3.7 to 4 |
| 5.5 | 22A | 22A | 15A | 11A | 11A | 9A | 9A | 6.6A | | 54A | | 29A | 5.5 |
| 7.5 | 29A | 29A | 15A | 15A | 15A | 11A | 9A | 9A | | 82A | | 42A | 7.5 |
| 9 | 35A | 29A | 22A | 22A | 15A | 15A | 11A | 11A | | 105A | | 54A | 9 |
| 11 | 42A | 42A | 22A | 22A | 22A | 22A | 15A | 15A | | | | | 11 |
| 15 | 54A | 54A | 35A | 29A | 29A | 22A | 22A | 15A | | | | | 15 |
| 18.5 to 19 | 67A | 67A | 42A | 35A | 35A | 29A | 22A | 22A | | | | | 18.5 to 19 |
| 22 | 82A | 82A | 54A | 42A | 42A | 35A | 29A | 22A | | | | | 22 |
| 25 | 82A | 82A | 54A | 54A | 54A | 35A | 35A | 29A | | | | | 25 |
| 30 | 105A | 105A | 67A | 54A | 54A | 42A | 42A | 35A | | | | | 30 |
| 37 | 125A | 125A | 82A | 67A | 67A | 54A | 54A | 42A | | | | | 37 |
| 45 | 150A | 150A | 105A | 82A | 82A | 67A | 54A | 54A | | | | | 45 |
| 55 to 60 | 180A | 180A | 125A | 105A | 105A | 82A | 67A | 67A | | | | | 55 to 60 |
| 75 | 250A | 250A | 150A | 125A | 125A | 105A | 105A | 82A | | | | | 75 |
| 90 | 330A | 330A | 180A | 150A | 150A | 125A | 105A | 105A | | | | | 90 |
| 110 | 330A | 330A | 250A | 180A | 180A | 150A | 125A | 105A | | | | | 110 |
| 132 | 500A | 500A | 250A | 250A | 250A | 180A | 150A | 150A | | | | | 132 |
| 150 to 160 | 500A | 500A | 330A | 250A | 250A | 250A | 180A | 180A | | | | | 150 to 160 |
| 185 | 660A | 500A | 330A | 330A | 330A | 250A | 250A | 180A | | | | | 185 |
| 200 | 660A | 660A | 500A | 330A | 330A | 330A | 250A | 180A | | | | | 200 |
| 220 | 660A | 660A | 500A | 500A | 500A | 330A | 250A | 250A | | | | | 220 |
| 250 | — | — | 500A | 500A | 500A | 330A | 330A | 250A | | | | | 250 |
| 300 to 315 | — | — | 660A | 500A | 500A | 500A | 330A | 330A | | | | | 300 to 315 |
| 370 to 400 | — | — | — | 660A | 660A | 500A | 500A | 500A | | | | | 370 to 400 |

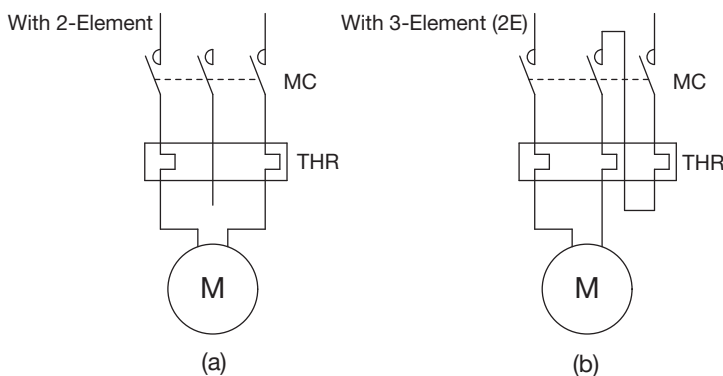
Note 1. The table above shows the selection of heater designation based on the full-load current value of the 4-pole standard three-phase motor and single-phase motor manufactured by Mitsubishi Electric.

When ordering by motor capacity, determine the heater designation of the thermal overload relay with this table. Specify the voltage and capacity accurately.

Note 2. If the number of poles in the three-phase motor is different, or in the case of special motors, the full-load current value may be different.

In such a case, specify by the heater designation upon investigating the full-load current of the motor.

Note 3. For single-phase motors, the full-load current varies depending on the start-up and running methods. Therefore, treat the values in the above table as guidelines, and specify the appropriate heater designation upon checking the full-load current for actual use. For single-phase motors, connect as shown in the figure below.



Connecting Thermal Overload Relays to a Single-Phase Motor

5.5 Structure

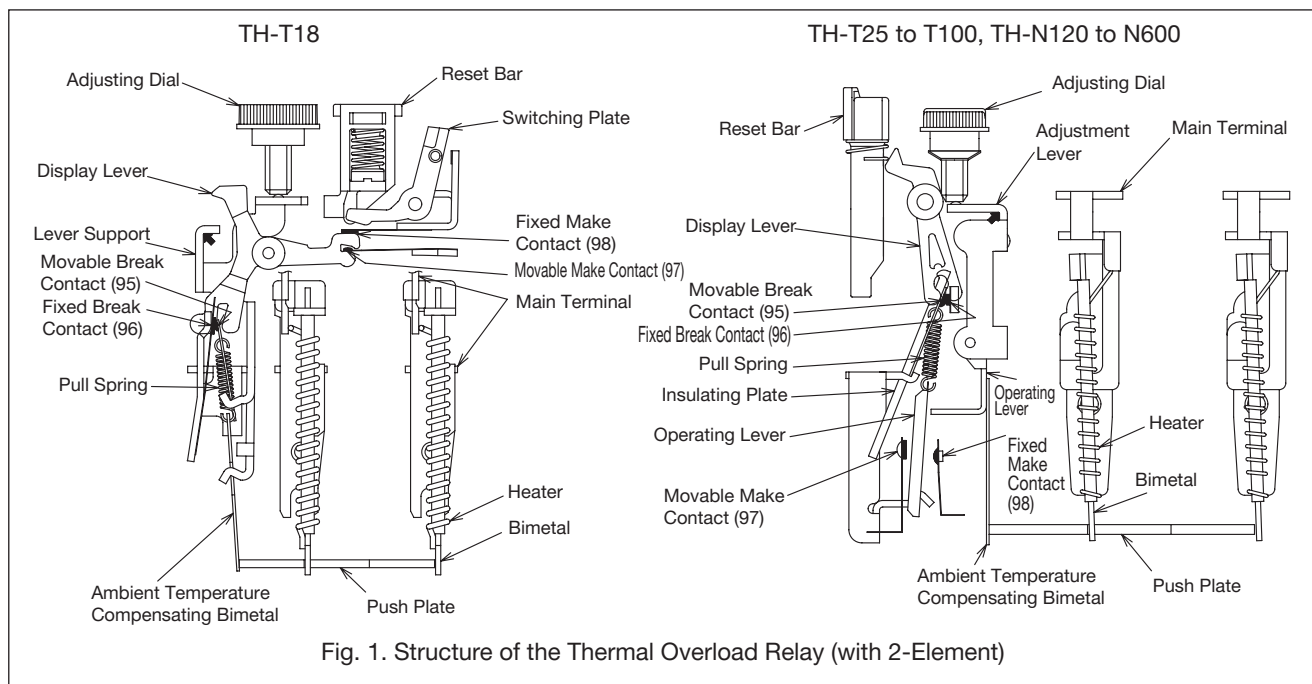


Fig. 1. Structure of the Thermal Overload Relay (with 2-Element)

Reset Method

All models of TH-T/N Series thermal overload relays have a structure that allows manual/automatic reset switching. The factory default (standard) is manual reset.

Structure of the Thermal Overload Relay With Open-Phase Protection Function

The push plate of the thermal overload relay with overload and open-phase protection (TH- □ KP) has a differential amplification mechanism that transmits the action of the bimetal to the contact mechanism as shown in Figure 2. Its design is suitable for protection during open phase.

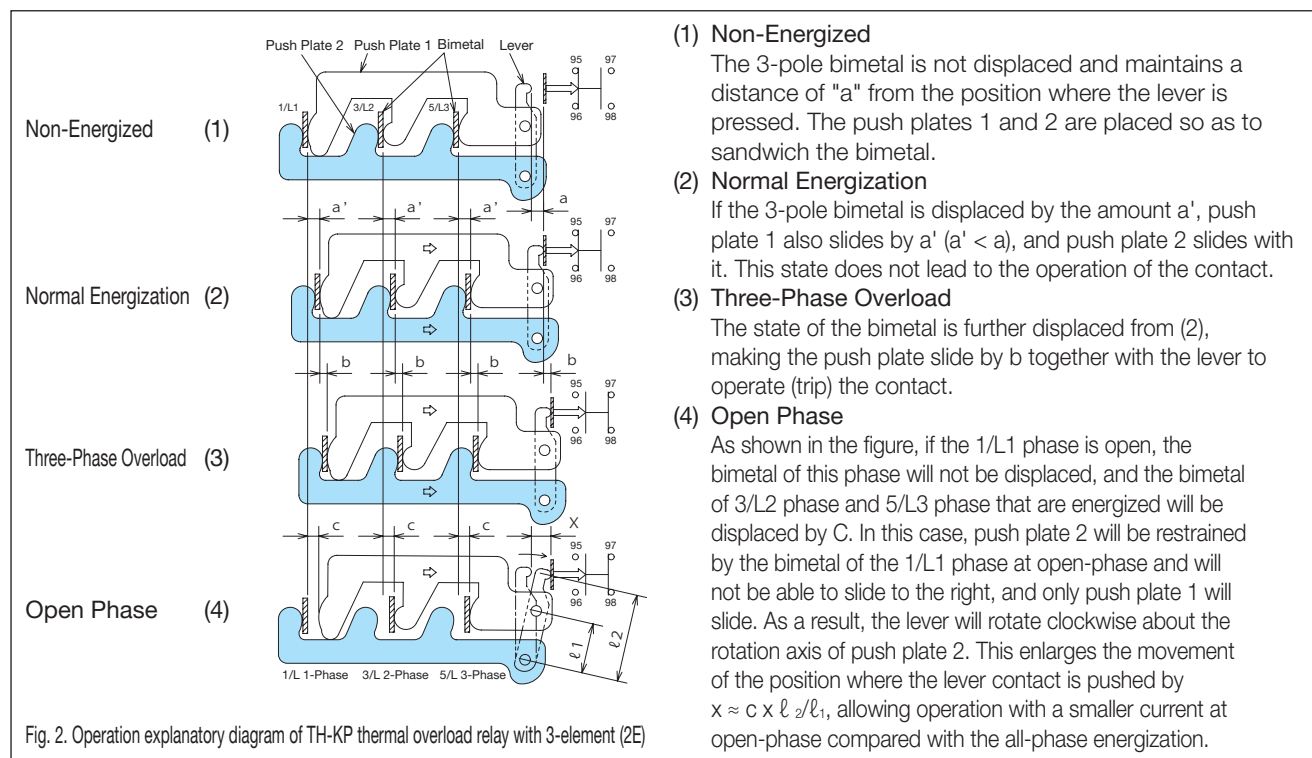


Fig. 2. Operation explanatory diagram of TH-KP thermal overload relay with 3-element (2E)

(1) Non-Energized

The 3-pole bimetal is not displaced and maintains a distance of "a" from the position where the lever is pressed. The push plates 1 and 2 are placed so as to sandwich the bimetal.

(2) Normal Energization

If the 3-pole bimetal is displaced by the amount a' , push plate 1 also slides by a' ($a' < a$), and push plate 2 slides with it. This state does not lead to the operation of the contact.

(3) Three-Phase Overload

The state of the bimetal is further displaced from (2), making the push plate slide by b together with the lever to operate (trip) the contact.

(4) Open Phase

As shown in the figure, if the 1/L1 phase is open, the bimetal of this phase will not be displaced, and the bimetal of 3/L2 phase and 5/L3 phase that are energized will be displaced by C . In this case, push plate 2 will be restrained by the bimetal of the 1/L1 phase at open-phase and will not be able to slide to the right, and only push plate 1 will slide. As a result, the lever will rotate clockwise about the rotation axis of push plate 2. This enlarges the movement of the position where the lever contact is pushed by $x \approx c \times l_2 / l_1$, allowing operation with a smaller current at open-phase compared with the all-phase energization.

5.6 Precautions for Use

● Model Name Identification by Mounting Method

Note 1. T25, T65 and N120 can be independently mounted as standard.

Note 2. T18, T50, T100, N120TA, N220RH and N400RH are for magnetic starters. (No Independent Mounting)
N120TAHZ, N220HZ and N400HZ are for independent mounting.

Note 3. For T18, independent mounting and IEC 35 mm rail mounting may be enabled by combining with UT-HZ18.
For T25, IEC 35 mm rail mounting may be enabled by combining with UN-RM20.

● Disassembly

The Thermal Overload Relays are adjusted at the time of assembly. Do not disassemble it.
Do not use with the terminal removed, as the properties may change.

● Ambient Temperature Compensation

The TH-T/N type Thermal Overload Relays are adjusted with the Magnetic Starters in the standard box (the MS type) relative to the ambient temperature of 20°C (The temperature on the control board of the MSO type Magnetic Starters is 35°C). The ambient temperature compensator is mounted on the TH-T/N type Thermal Overload Relays. Therefore, the ambient temperature less affects the operational characteristic change. The minimum operating current change according to the ambient temperature change relative to the ambient temperature of 20°C (the temperature on the control board of 35°C) generally depends on the characteristics in the diagrams 1 and 2. The Thermal Overload Relays have a characteristic that the operating current becomes high when the ambient temperature is low and becomes low when the ambient temperature is high. If the ambient temperature of the installation site is significantly different from 20°C (the temperature on the control board of 35°C), the setting current of the Thermal Overload Relays needs to be corrected as shown in diagrams 1 and 2. In addition, note that the compensation factor has a characteristic to be the minimum scale>middle scale>maximum scale at the adjustment knob location. (Note that the Thermal Overload Relays may operate at a current of less than 100% stabilized current if in use at temperatures exceeding the allowable working temperature of 40°C (55°C).)

Fig. 3.1 Ambient temperature compensation curve (T18 frame)

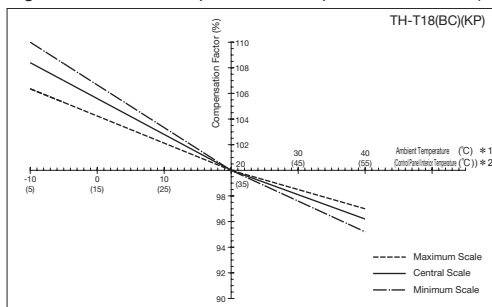


Fig. 3.2 Ambient temperature compensation curve (T25/T50/T65/T100 frame)

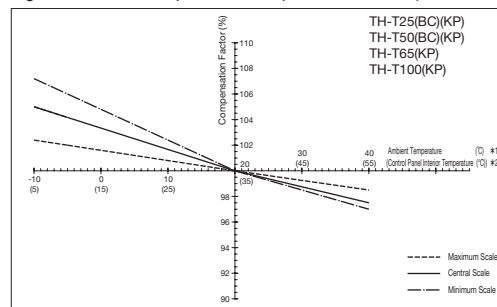


Fig. 3.3 Ambient temperature compensation curve (N120 frame)

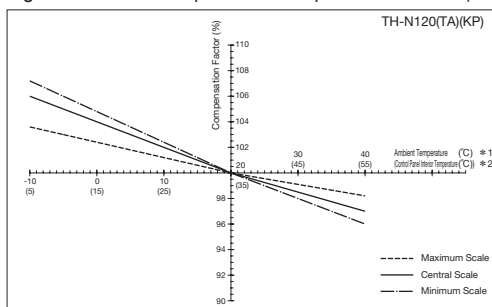


Fig. 3.4 Ambient temperature compensation curve (N220/N400 frame)

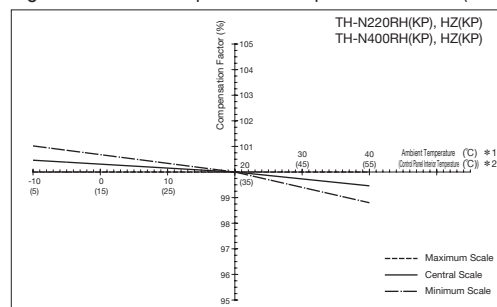
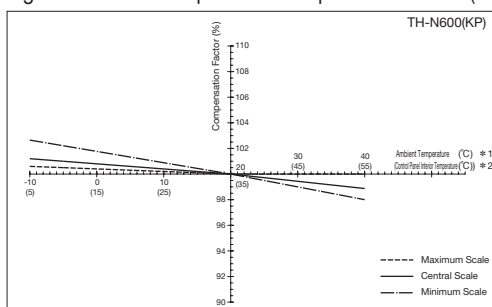


Fig. 3.5 Ambient temperature compensation curve (N600 frame)



Compensation factor: Percentage of the minimum operating current at the ambient temperature of 20°C (the temperature on the control board of 35°C)

<Compensation procedure of setting current>
Determine the compensation factor of the working ambient temperature according to the curves in diagrams 3.1 and 3.5 and use the value of all load currents of the motor divided by the determined compensation factor as the stabilization value.
Example: The ambient temperature compensation factor for TH-T50 at the ambient temperature of 40°C (the temperature on the control board of 55°C) is 97% at the minimum scale according to diagram 3.2. If the motor rated current is 43A, the stabilization value is 44.3A (=43/0.97).

Note 1. The ambient temperature applied to MS type indicates the outside temperature of the box.

Note 2. The temperature including the temperature increase on the control board applied to the MSO type is indicated.

Note 2. When the thermal overload relay is independently mounted, divide the settling value obtained in Figure 3.1 to 3.5 by the compensation factors in the table below.

● Compensation factor when using the thermal overload relay independently

| Model Name | Independent Thermal Overload Relays TH- □ |
|-----------------------------|---|
| TH-T18(BC)(KP) 0.12 to 2.5A | 1.04 |
| TH-T18(BC)(KP) 3.6A | 1.05 |
| TH-T18(BC)(KP) 5 to 15A | 1.06 |
| TH-T25(BC)(KP) | 1.06 |
| TH-T65(KP) | 1.05 |

| Model Name | Independent Thermal Overload Relays TH- □ |
|----------------------|---|
| TH-N120(KP) 42A 54A | 1.08 |
| TH-N120(KP) 67A 82A | 1.16 |
| TH-N220(KP)/N400(KP) | 1.01 |
| TH-N600(KP) | 1.02 |

● Connecting Electric Wire Size And Operating Current

The minimum operating current of TH-T/N has been adjusted by the standard wire size as shown in the table below. If the electric wire is thicker or thinner than this standard electric wire size, the operating current becomes high or low, respectively. Therefore, correct the stabilized current (divide it by the change rate of the minimum operating current) to use a size different from the standard connecting electric wire size.

● Connecting Electric Wire Size and Minimum Operating Current

| Model Name | Heater Designation [A] | Standard Electric Wire Size [mm ²] | Connecting Electric Wire Size [mm ²] | Change Rate of Minimum Operating Current [%] |
|------------|------------------------|--|--|--|
| TH-T18(KP) | 0.12 to 15 | 2 | 1.25 | 98 |
| TH-T25(KP) | 0.24 to 11 | | 2.5 | 103 |
| TH-T25(KP) | 15, 22 | 3.5 | 2 6 | 97 104 |
| TH-T50(KP) | 29 | 8 | 5.5 | 96 |
| | 35 | | 14 | 104 |
| | 42 | 14 | 8 | 95 |
| TH-T65(KP) | 15 | 3.5 | 2 5.5 | 95 105 |
| | 22, 29 | 5.5 | 3.5 8 | 96 105 |
| | 35 | 8 | 5.5 14 | 95 105 |
| | 42 | 14 | 8 22 | 95 104 |
| | 54 | 22 | 14 30 | 96 104 |

| Model Name | Heater Designation [A] | Standard Electric Wire Size [mm ²] | Connecting Electric Wire Size [mm ²] | Change Rate of Minimum Operating Current [%] |
|---------------|------------------------|--|--|--|
| TH-T100(KP) | 67 | 22 | 14 30 | 97 103 |
| | 82 | 38 | 30 | 97 |
| TH-N120(KP) | 42 | 14 | 8 22 | 95 104 |
| | 54, 67 | 22 | 14 30 | 96 104 |
| | 82 | 38 | 30 50 | 97 103 |
| TH-N120TA(KP) | 105 | 60 | 38 60 | 97 103 |
| | 125 | 60 | 50 80 | 98 103 |

5

● Combination With No-Fuse Breaker (Protection Coordination)

Magnetic starters are responsible for the starting and stopping of motors, and protection from burnout due to overload, constraint or open-phase. Short-circuit protection devices such as no-fuse breakers are responsible for the current larger than the interruption capability of the magnetic starter caused by a short circuit, etc.

Properly performing these allocations is called protection coordination and the principles are as follows (see Figure 4)

- (1) The combined operating properties of the thermal overload relay and no-fuse breaker must be on the lower side of the thermal properties of the motor, which are on the upper side (right side) of the start-up properties and full-load current of the motor.
- (2) For overload current of less than the constraint (startup) current, the thermal overload relay must operate earlier than the no-fuse breaker.
- (3) The no-fuse breaker must operate if the current is larger than the interruption capability of the magnetic starter.
- (4) The no-fuse breaker should operate if the current is less than the overload resistance of the magnetic starter.
- (5) The operating properties of the no-fuse breaker must be lower than the allowable current - time properties of the wire.

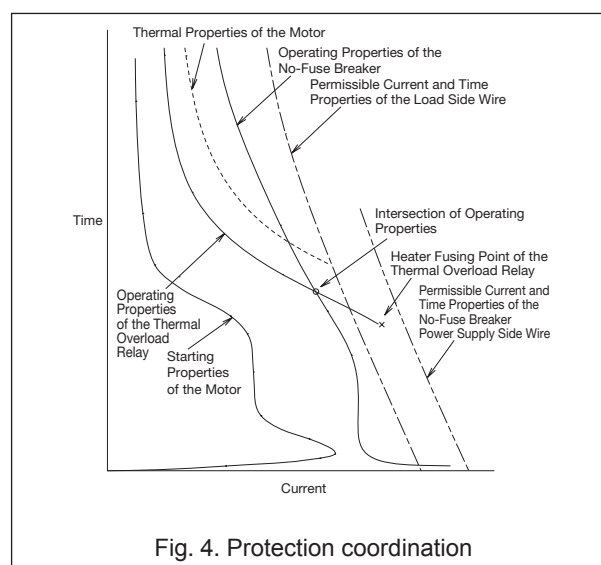


Fig. 4. Protection coordination

For more information, refer to the catalog and technical documents of the no-fuse breaker.

● Handling (Precautions)

- (1) When restarting the tripped thermal overload relay, remove the cause of the trip.
When the automatic reset method is used, in order to prevent the motor from automatically restarting due to reset, implement measures such as adopting a self-retaining circuit. Regardless of the method, the resettable time will be from about 10 seconds to 10 minutes depending on the heating temperature of the bimetal.
- (2) Never touch the inside of the thermal overload relay.
- (3) The heater wire of the thermal overload relay may blow before tripping if it is charged with a current of 13 times higher than the rating.
- (4) The reset method is changed as follows.

Changing the reset method of TH-T18

- Manual → automatic switching method:
After removing the stopper by cutting it with a nipper or the like, slide the switching plate to the right and align it with A as shown in Figure 3.
(In the state as shown in Figure 4.2)
- Automatic → manual switching method:
Slide the switching plate to the left to align with H.
(In the state as shown in Figure 4.1)

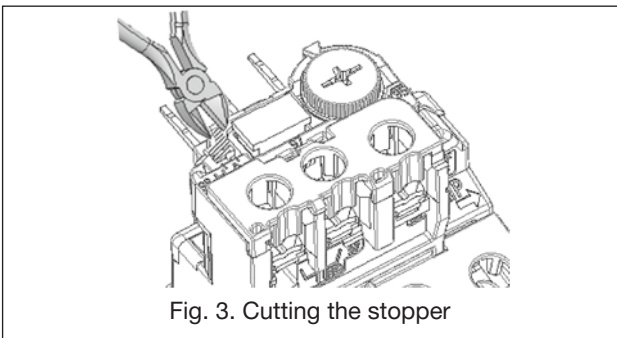


Fig. 3. Cutting the stopper

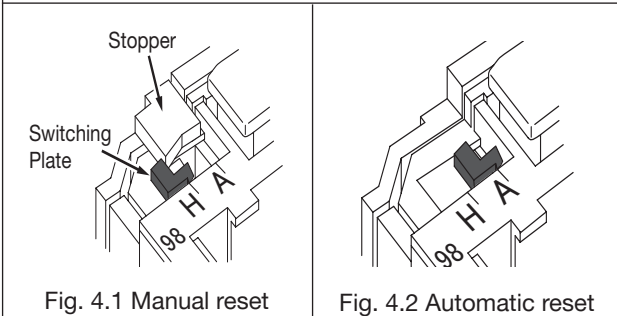


Fig. 4.1 Manual reset

Fig. 4.2 Automatic reset

- Note 1. Take precautions as follows when cutting off the stopper.
- Be careful not to let fragments enter the eyes.

(5) Manual tripping

Manual tripping is enabled by inserting a screwdriver or the like into the display window in manual reset. (Fig. 8)

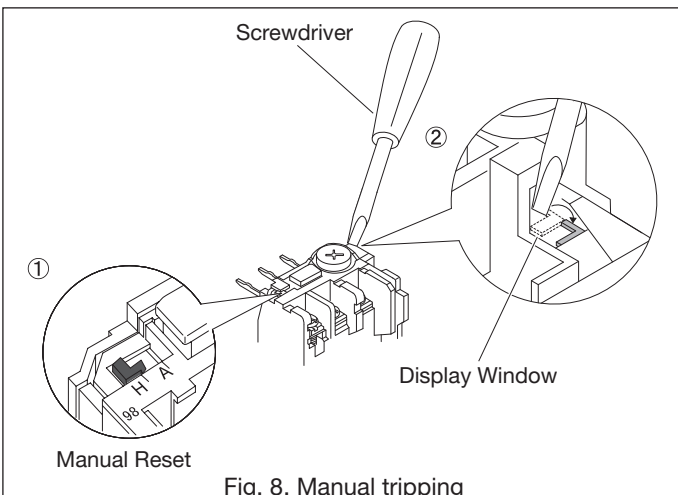


Fig. 8. Manual tripping

- Note. For TH-T18, do not perform manual tripping in the automatic reset mode, as this leads to internal component failure. When performing a sequence check, be sure that the automatic reset is switched to manual reset.

Changing the reset method of TH-T25 to T100, TH-N120 to N600

- Manual → automatic switching method:
After cutting off the stopper on the tip of the reset bar, fully push it in, then rotate it in the direction of A. (Figs. 5, 6)
- Automatic → manual switching method:
Rotate the reset bar in the direction of H, to pop out the reset bar. (Fig. 7)

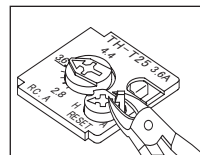


Fig. 5. Cutting the stopper

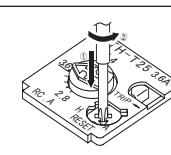


Fig. 6. Automatic reset

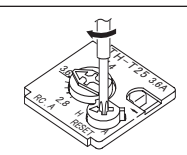
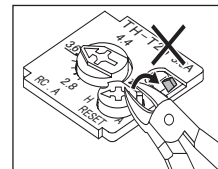


Fig. 7. Manual reset

- Note 1. Take precautions as follows when cutting off the stopper on the tip of the reset bar.

- Make sure that segments do not enter from the display window.
The display lever may stop moving.
Block the display window when cutting off the stopper to prevent segments from entering it.
- Be careful not to let fragments enter the eyes.



(6) Precautions When Combining With the Magnetic Contactor

For the assembling method and precautions when using in combination with the thermal overload relay and magnetic contactor, refer to page 217.

5.7 Standard/Overload and Open-Phase Protection Type Thermal Overload Relays TH-□/KP

TH (standard with 2-element) is suitable for the overload and constraint protection of standard motors, and TH-KP (with 3-element (2E)) is suitable for the overload, constraint and open-phase protection of motors.

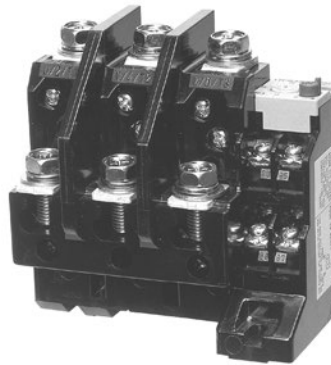
TH-KP has the same shape and size as TH (standard with 2-element), and can be easily combined with magnetic contactors.

● Features

- Extensive lineup
 - 2-Element
 - With 3-Element (2E)

Same Dimensions
- Changing the reset method

Changing between the manual reset and automatic reset is easy
- Easy wiring



TH-N120

Features of the TH Thermal Overload Relay

- Easy current setting

The motor current direct setting can be adjusted by both Phillips and flathead screwdrivers
- Can be manually checked

Allows manual tripping from the surface using a screwdriver
- With operation indicator
- Trip-Free structure
- With 1a1b contact

Make and break contacts with different voltage can be used

● Application

For the selection of heater designation for the capacity of the standard three-phase motor, refer to page 46 or 129. The manufactured model name, heater designation and combined magnetic contactor frame are shown in the table below.

- Manufactured model name, heater designation and combined magnetic contactor frame (standard 2-element, 3-element, and overload and open-phase protection type)

| Model Name | Standard with 2-Element | For Magnetic Starters For Independent Mounting | TH-T18 (See Note 1) | TH-T25 | TH-T50 | TH-T65 | TH-T100 | TH-N120 | TH-N120TA | TH-N220RH | TH-N400RH | TH-N600 |
|---|--|---|--|--|--|---|------------------------------------|---|--|--|---|-----------|
| | With 3-Element (2E) | For Magnetic Starters For Independent Mounting | TH-T18KP (See Note 1) | TH-T25KP | TH-T50KP | TH-T65KP | TH-T100KP | TH-N120KP | TH-N120TAHZP | TH-N220RHKP | TH-N400RHKP | TH-N600KP |
| Operating Frequency Range [Hz] | 0 (DC) to 400 (Note 5) | | | | | | | | 50 to 60 | | | |
| Heater Designation (Adjustment Range of Settling Current) [A] | 0.12 (0.1 to 0.16) 0.17 (0.14 to 0.22) 0.24 (0.2 to 0.32) 0.35 (0.28 to 0.42) 0.5 (0.4 to 0.6) 0.7 (0.55 to 0.85) 0.9 (0.7 to 1.1) 1.3 (1 to 1.6) 1.7 (1.4 to 2) 2.1 (1.7 to 2.5) 2.5 (2 to 3) 3.6 (2.8 to 4.4) 5 (4 to 6) 6.6 (5.2 to 8) 9 (7 to 11) 11 (9 to 13) 15 (12 to 18) | 0.24 (0.2 to 0.32) 0.35 (0.28 to 0.42) 0.5 (0.4 to 0.6) 0.7 (0.55 to 0.85) 0.9 (0.7 to 1.1) 1.3 (1 to 1.6) 1.7 (1.4 to 2) 2.1 (1.7 to 2.5) 2.5 (2 to 3) 3.6 (2.8 to 4.4) 5 (4 to 6) 6.6 (5.2 to 8) 9 (7 to 11) 11 (9 to 13) 15 (12 to 18) | 29(24 to 34) 35(30 to 40) 42(34 to 50) | 15(12 to 18) 22(18 to 26) 29(24 to 34) 35(30 to 40) 42(34 to 50) 54(43 to 65) | 67(54 to 80) 82 (65 to 100) 95 (85 to 105) | 42(34 to 50) 54(43 to 65) 67(54 to 80) 82(65 to 100) | 105(85 to 125) 125 (100 to 150) | 82(65 to 100) 105(85 to 125) 125 (100 to 150) 150 (120 to 180) 180 (140 to 220) 210 (170 to 250) | 105(85 to 125) 125 (100 to 150) 150 (120 to 180) 180 (140 to 220) 210 (170 to 250) | 250 (200 to 300) 330 (260 to 400) 500 (400 to 600) 660 (520 to 800) | (Current Transformer Ratio 400/5 A) (Current Transformer Ratio 500/5 A) (Current Transformer Ratio 750/5 A) (Current Transformer Ratio 1000/5 A) | |
| Trip Class (see page 128) | 10A | 10A | 10A | 10A | 15A to 42A : 10 54A : 10A | 67A : 10 82A : 10A | 10 | 10 | 10 | 10 | 10 | 10A |
| Frame of the Combined Magnetic Contactor | T10, T12, T20 T12, T20 T20 | T21, T25 T35, T50 | T35, T50 T50 | T65, T80 T100 | T80, T100 | N125, N150 | N125, N150 N150 | N180, N220 N220 | N300, N400 N400 | N600, N800 | | |

Note 1. For TH-T18(KP), independent mounting and IEC 35 mm rail mounting may be enabled by combining with UT-HZ18.

For TH-T25(KP), IEC 35 mm rail mounting may be enabled by combining with UN-RM20.

Note 2. Use TH-N600(KP) in combination with current transformer for measuring instruments (rated secondary load of 15 VA or more: recommended model names are CW-15LM, CW-15L or CW-40LM).

The ratio of current transformation is as shown in the heater designation field in the table.

Note 3. The - mark in the model name field indicates that it is outside production range.

Note 4. TH-T18(KP), T25(KP), T50(KP) with BC and TH-T65(KP) with CW can also be manufactured.

However, TH-T50BC(KP) has no screw holder attached to the main circuit terminal (3-pole) on the power supply side.

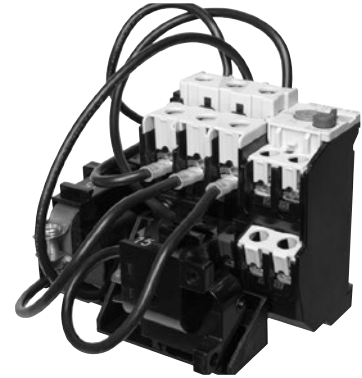
Note 5. It is standardly used at the commercial frequency of 50/60 Hz. Make sure that the protection coordination with motor characteristics is possible before use.

5.8 Thermal Overload Relays with Saturable Reactor TH-□(KP)SR

As the standard thermal overload relay operates at startup, suitable protective properties may not be obtained for motors that take a long time to start, such as those that are started with a large inertial load.

The thermal overload relay with saturable reactor has a structure with a small reactor with an iron-containing core connected in parallel with the heater. It causes little change to the operating properties in the current range of up to about 200% of settling current, and in the current range beyond that, the iron core of the reactor is saturated to increase the shunt current to the reactor and limit the current to the heater in order to increase the operating time limit.

In addition, it helps achieve protection coordination with a low voltage circuit breaker.



TH-T25KPSR

● Application

For selection of heater designation for the capacity of the standard three-phase motor, refer to pages 46 and 129. Selection guidelines for motor start-up time are shown on page 130. The manufactured model name, heater designation and combined magnetic contactor frame are indicated in the table below.

● Manufactured model name, heater designation and combined magnetic contactor frame (with saturable reactor)

| Model Name | With 2-Element | For Magnetic Starters | For Non-Reversing For Reversing | TH-T18SR | TH-T18HZSR | TH-T25SR | TH-T50SR | TH-T65SR | TH-T100SR | TH-N120SR | TH-N120TASR | TH-N220RHSR | TH-N400RHSR | TH-N600SR | |
|---|---------------------|--------------------------|---------------------------------|---|---|---|--|-------------------|---|--------------------|---|-------------------------------------|--|---|---|
| | | For Independent Mounting | (See Note 1) | (Note 5) | --- | --- | --- | --- | --- | --- | --- | --- | TH-N220HZSR | TH-N400HZSR | --- |
| Model Name | With 3-Element (2E) | For Magnetic Starters | For Non-Reversing For Reversing | --- | TH-T25KPSR | TH-T50KPSR | TH-T65KPSR | TH-T100KPSR | TH-N120KPSR | TH-N120TAKP | TH-N220RHKP | TH-N400RHKP | TH-N600KPSR | | |
| | | For Independent Mounting | --- | (Note 5) | --- | --- | --- | --- | --- | --- | SR | SR | SR | SR | |
| Operating Frequency Range [Hz] | | | | 50 to 60 | | | | | | | | | | | |
| Heater Designation (Adjustment Range of Settling Current) [A] | | | | 0.24 (0.2 to 0.32) 0.35 (0.28 to 0.42) 0.5 (0.4 to 0.6) 0.7 (0.55 to 0.85) 0.9 (0.7 to 1.1) 1.3 (1 to 1.6) 1.7 (1.4 to 2) 2.1 (1.7 to 2.5) 2.5 (2 to 3) 3.6 (2.8 to 4.4) 5 (4 to 6) 6.6 (5.2 to 8) 9 (7 to 11) 11 (9 to 13) 15 (12 to 18) | 0.24 (0.2 to 0.32) 0.35 (0.28 to 0.42) 0.5 (0.4 to 0.6) 0.7 (0.55 to 0.85) 0.9 (0.7 to 1.1) 1.3 (1 to 1.6) 1.7 (1.4 to 2) 2.1 (1.7 to 2.5) 2.5 (2 to 3) 3.6 (2.8 to 4.4) 5 (4 to 6) 6.6 (5.2 to 8) 9 (7 to 11) 11 (9 to 13) 15 (12 to 18) | 29 (24 to 34) 35 (30 to 40) 42 (34 to 50) | 15 (12 to 18) 22 (18 to 26) 29 (24 to 34) 35 (30 to 40) 42 (34 to 50) 54 (43 to 65) | --- | 67 (54 to 80) 82 (65 to 100) 95 (85 to 105) | --- | 42 (34 to 50) 54 (43 to 65) 67 (54 to 80) 82 (65 to 100) | 105 (85 to 125) 125 (100 to 150) | 82 (65 to 100) 125 (100 to 150) 150 (120 to 180) 180 (140 to 220) 210 (170 to 250) | 105 (85 to 125) 125 (100 to 150) 150 (120 to 180) 180 (140 to 220) 250 (200 to 300) 330 (260 to 400) *The thermal overload relay with heater designation of 180A or less is the same as the N220 frame. | 250 (200 to 300) { Current Transformer Ratio 400/5 A } 330 (260 to 400) { Current Transformer Ratio 500/5 A } 500 (400 to 600) { Current Transformer Ratio 750/5 A } 660 (520 to 800) { Current Transformer Ratio 1000/5 A } |
| Frame of the Combined Magnetic Contactor | | | | T10, T12, T20 T12, T20 T20 | T21, T25 T35, T50 | T35, T50 T50 | T65, T80 T100 | T80, T100 T100 | N125, N150 | N125, N150 N150 | N180, N220 N220 | N300, N400 N400 | N600, N800 | | |

Note 1. For TH-T18HZSR, independent mounting and IEC 35 mm rail mounting may be enabled by combining with UT-HZ18.

Note 2. Use TH-N600(KP)SR in combination with current transformer for measuring instruments (rated secondary load of 15 VA or more: recommended model names are CW-15LM, CW-15L or CW-40LM).

The alternating current ratio is as shown in the heater designation field in the table.

Note 3. The - mark in the model name field indicates that it is outside production range.

Note 4. TH-T18(HZ)SR, T25(KP)SR, T50(KP)SR with BC can also be manufactured.

However, TH-T50BC(KP)SR has no screw holder attached to the main circuit terminal (3-pole) on the power supply side.

Note 5. TH-T25BC (KP) SR with wiring streamlining terminal and S(D)-2 x T21 to T50BC cannot be combined. Order with MSO(D) (MSO(D)-2 x T21 to T50BC (KP) SR).

5.9 Quick-acting Characteristics Thermal Overload Relays TH- □ FS(KP)

TH-FSKP and FS quick-acting characteristics thermal overload relays have quicker operation time than the standard TH type, so that they can be applied to motors such as submersible motors that have short allowable time during constraint.

Please note that TH-T □ FSKP has 3 elements and can be used for 2E thermal, while TH-FS has 2 elements.



TH-T25FSKP

● Application

The manufactured model name, heater designation and combined magnetic contactor frame are shown in the table below.

| Model Name | With 2-Element | For Magnetic Starters For Independent Mounting | — — | TH-T25FS | TH-T50FS | TH-T65FS | TH-T100FS | |
|--|---------------------|---|---|--|------------------------------|------------------------------|-------------|---|
| | With 3-Element (2E) | For Magnetic Starters For Independent Mounting | TH-T18FSKP (See Note 1) | TH-T25FSKP | TH-T50FSKP | TH-T65FSKP | TH-T100FSKP | |
| Operating Frequency Range [Hz] | | 0 (DC) to 400 (Note 4) | | | | | | |
| Heater Designation (Adjustment Range of Settling Current) [A] | | 2.1(1.7 to 2.5) 3.6(2.8 to 4.4) 5(4 to 6) 6.6(5.2 to 8) 9(7 to 11) 11(9 to 13) 15(12 to 18) | 2.1(1.7 to 2.5) 3.6(2.8 to 4.4) 5(4 to 6) 6.6(5.2 to 8) 9(7 to 11) 11(9 to 13) 15(12 to 18) 22(18 to 26) | 29(24 to 34) 35(30 to 40) 42(34 to 50) | 42(34 to 50) 54(43 to 65) | 67(54 to 80) 82(65 to 93) | | |
| Trip Class (see page 128) | | 5 | | | | | | 5 |
| Frame of the Combined Magnetic Contactor | | T10, T12, T20 T12, T20 T20 | T21, T25, T35, T50 | T35, T50 T50 | T65, T80, T100 | T80, T100 T100 | | |

Note 1. For TH-T18FSKP, independent mounting and IEC 35 mm rail mounting may be enabled by combining with UT-HZ18.

For TH-T25FS(KP), IEC 35 mm rail mounting may be enabled by combining with UN-RM20.

Note 2. TH-T18FSKP, T25FS(KP), T50FS(KP) with BC can also be manufactured.

Note 3. The - mark in the model name field indicates that it is outside production range.

Note 4. It is standardly used at the commercial frequency of 50/60 Hz. Make sure that the protection coordination with motor characteristics is possible before use.

● Outline Drawings

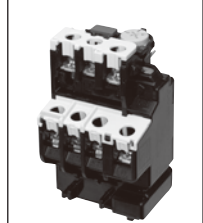
The same as the standard (with 2-element and 3-element (2E)). Refer to page 138.

5 TH-T/N Type Thermal Overload Relays

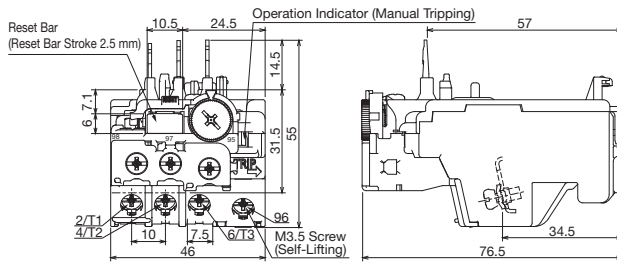
5.10 Outline Drawings/Contact Arrangements

T18

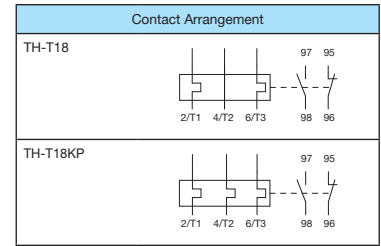
TH-T18(BC)(KP)



0.11kg

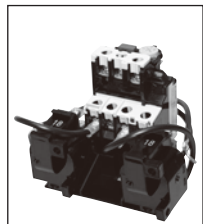


For combination with the following magnetic contactors
TH-T18: S-T10, T12, T20 SD-T12, T20
Independent use is possible by combining with the independent mounting unit UT-HZ18

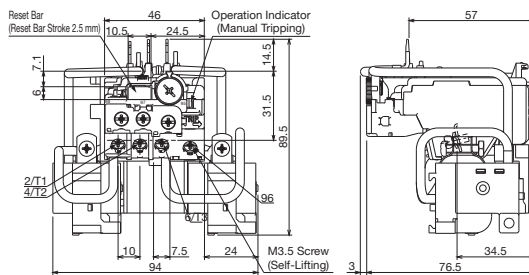


| Model Name | | Model Name | |
|------------|----------------------|------------|----------------------|
| TH-T18 | 0.12A to 11A 15 A | TH-T18BC | 0.12A to 11A 15 A |

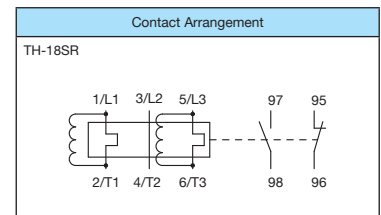
TH-T18SR



0.29kg



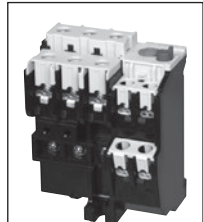
For combination with the following magnetic contactors
TH-T18SR: S-T10, T12, T20 SD-T12, T20
Independent use is possible by combining with the independent mounting unit UT-HZ18



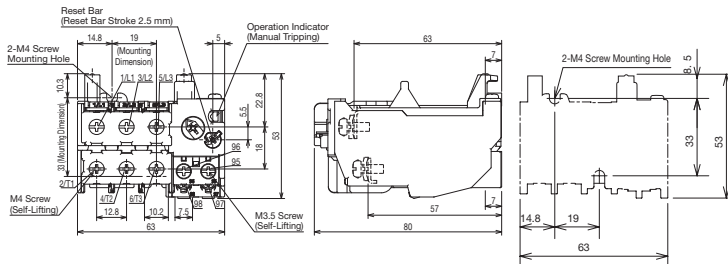
| Model Name | | Model Name | |
|------------|----------------------|------------|----------------------|
| TH-T18BCSR | 0.12A to 11A 15 A | TH-T18SR | 0.12A to 11A 15 A |

T25

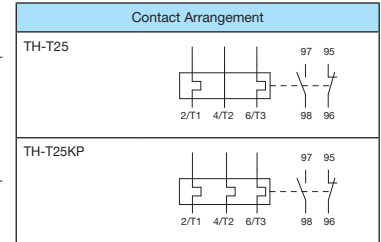
TH-T25(BC)(KP)



0.16kg

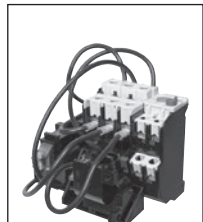


When combining with a magnetic contactor, the following connecting conductor kits (sold separately) are used
Combination with S-T21/T25(BC), SD-T21(BC), SL(D)-T21(BC); UN-TH21
Combination with S-T35/T50(BC), SD-T35/T50(BC), SL(D)-T35/T50(BC); UT-TH50
Independent DIN rail mounting is possible by combining with the independent mounting unit UN-RM20

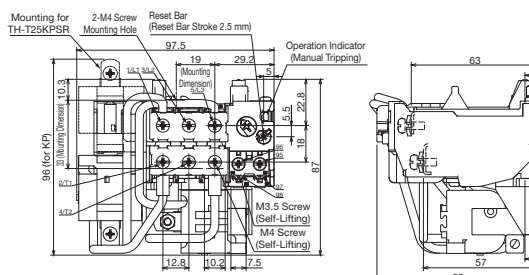


| Model Name | | Model Name | |
|------------|----------------------|------------|----------------------|
| TH-T25 | 0.24A to 15A 22 A | TH-T25BC | 0.24A to 15A 22 A |

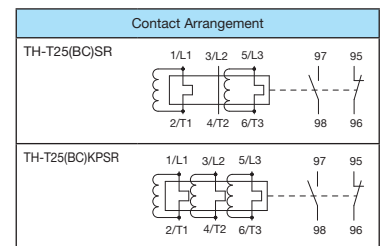
TH-T25(BC)(KP)SR



0.36(0.44)kg



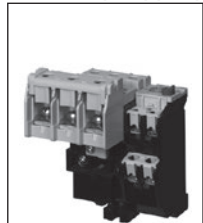
When combining with a magnetic contactor, the following connecting conductor kits (sold separately) are used
Combination with S-T21/T25(BC), SD-T21(BC), SL(D)-T21(BC); UN-TH21
Combination with S-T35/T50(BC), SD-T35/T50(BC), SL(D)-T35/T50(BC); UT-TH50
* Reversible magnetic contactor with wiring streamlining terminal S-2X121/T25BC and TH-T25BC(KP)SR cannot be combined.



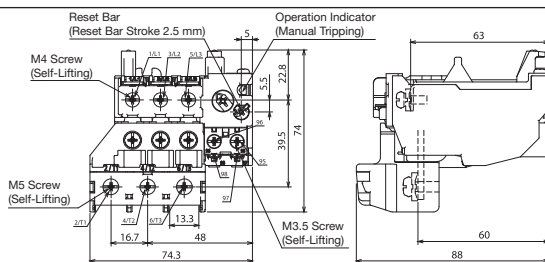
| Model Name | | Model Name | |
|------------|----------------------|------------|----------------------|
| TH-T25BCSR | 0.24A to 15A 22 A | TH-T25SR | 0.24A to 15A 22 A |

T50

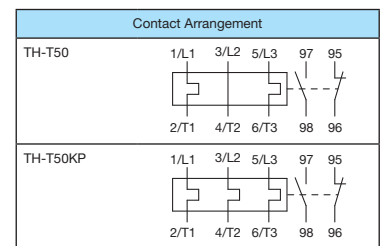
TH-T50(BC)(KP)



0.2kg

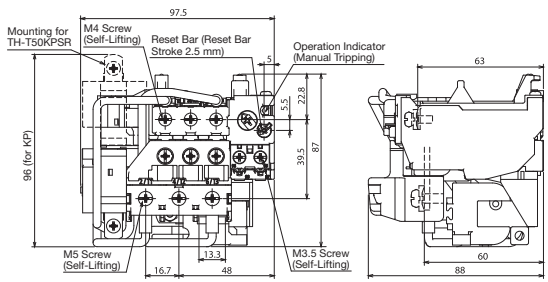
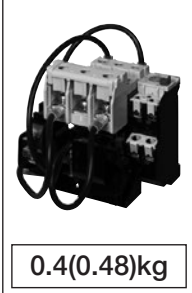


Cannot be used in independent mounting
When combining with a magnetic contactor, the following connecting conductor kit (sold separately) is used
Combination with S-T35/T50(BC) and SD-T35/T50(BC); UT-TH50



| Model Name | | Model Name | |
|------------|-------------------|------------|-------------------|
| TH-T50 | 29 A 35 A/42 A | TH-T50BC | 29 A 35 A/42 A |

TH-T50(BC)(KP)SR

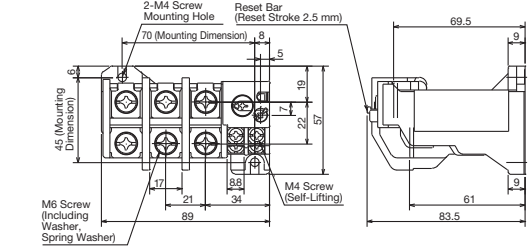
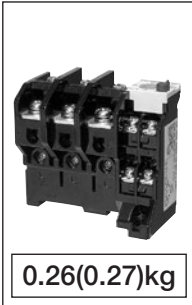


Cannot be used in independent mounting
When combining with a magnetic contactor, the following connecting conductor kit (sold separately) is used
Combination with S-T35/T50(BC) and SD-T35/T50(BC): UT-TH50

| Contact Arrangement | |
|---------------------|-----------|
| TH-T50(BC)SR | |
| TH-T50(BC)KPSR | |
| Model Name | |
| TH-T50SR | 29 A |
| | 35 A/42 A |

T65

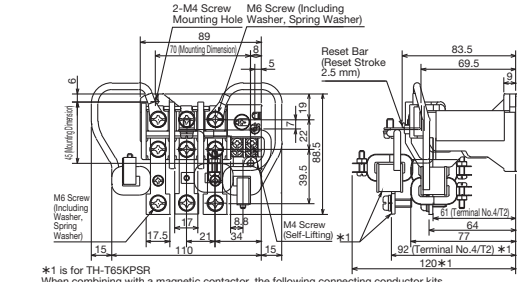
TH-T65(CW)(KP)



When combining with a magnetic contactor, the following connecting conductor kits (sold separately) are used
Combination with S(D)-T65/T80: BH559N350
Combination with S-T100: BH569N350
Combination with SD-T100: BH569N352

| Contact Arrangement | |
|---------------------|------------|
| TH-T65 | |
| TH-T65KP | |
| Model Name | |
| TH-T65 | 15A to 54A |

TH-T65(KP)SR

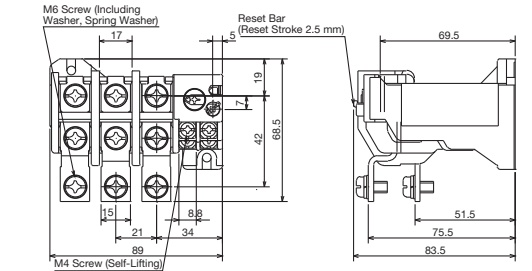


*1 is for TH-T65KPSR
When combining with a magnetic contactor, the following connecting conductor kits (sold separately) are used
Combination with S(D)-T65/T80: BH559N350
Combination with S-T100: BH569N350
Combination with SD-T100: BH569N352

| Contact Arrangement | |
|---------------------|------------|
| TH-T65SR | |
| TH-T65KPSR | |
| Model Name | |
| TH-T65SR | 15A to 54A |

T100

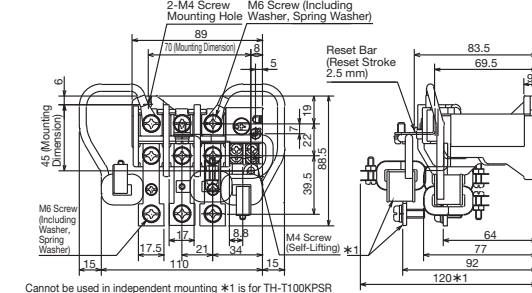
TH-T100(KP)



Cannot be used in independent mounting
When combining with a magnetic contactor, the following connecting conductor kits (sold separately) are used
Combination with S(D)-T80: BH559N350
Combination with S-T100: BH569N350
Combination with SD-T100: BH569N352

| Contact Arrangement | |
|---------------------|---------|
| TH-T100 | |
| TH-T100KP | |
| Model Name | |
| TH-T100 | 67A/82A |

TH-T100(KP)SR



Cannot be used in independent mounting *1 is for TH-T100KPSR
When combining with a magnetic contactor, the following connecting conductor kits (sold separately) are used
Combination with S(D)-T80: BH559N350
Combination with S-T100: BH569N350
Combination with SD-T100: BH569N352

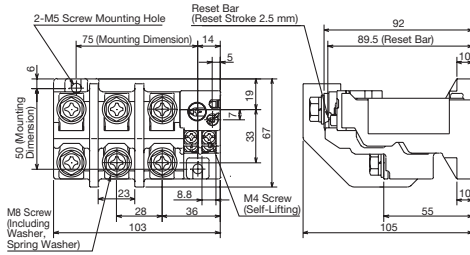
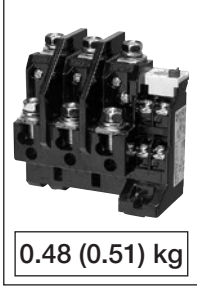
| Contact Arrangement | |
|---------------------|---------|
| TH-T100SR | |
| TH-T100KPSR | |
| Model Name | |
| TH-T100SR | 67A/82A |

5

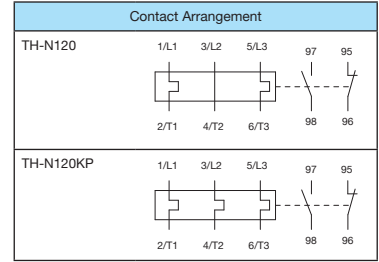
5 TH-T/N Type Thermal Overload Relays

N120/N120TA

TH-N120(KP)

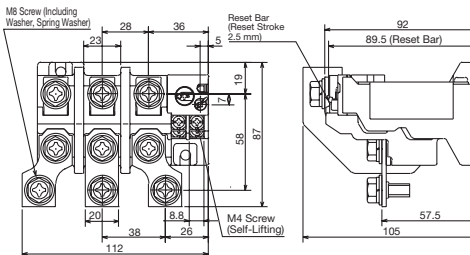
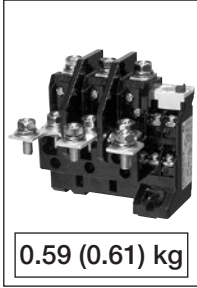


When combining with a magnetic contactor, the following connecting conductor kit (sold separately) is used
 Combination with S(D)-N125, SL(D)-N125: BH579N355
 Combination with S(D)-N150, SL(D)-N150: BH589N355
 TH-N120 and TH-N120KP can be used for both magnetic starter (MSO) or independent mounting

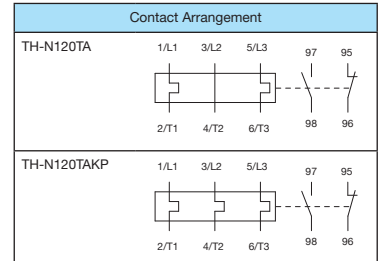


| Model Name | Model Number |
|------------|--------------|
| TH-N120 | THN65 □ □ |

TH-N120TA(KP)

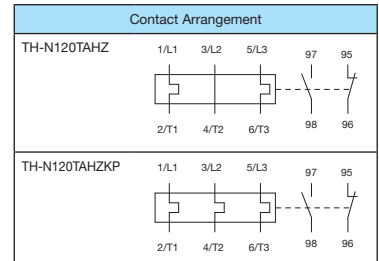
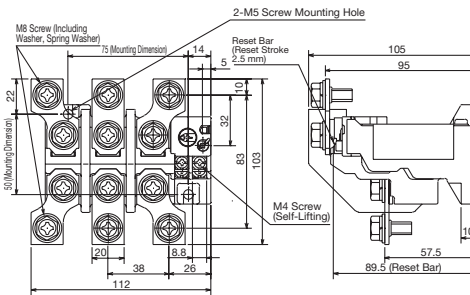


Cannot be used in independent mounting When combining with a magnetic contactor, the following connecting conductor kits (sold separately) are used
 Combination with S(D)-N125, SL(D)-N125: BH579N355
 Combination with S(D)-N150, SL(D)-N150: BH589N355



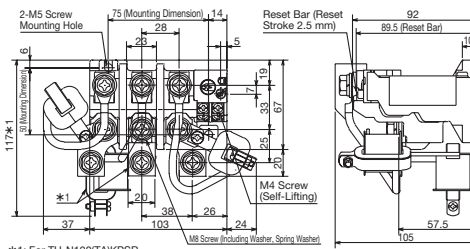
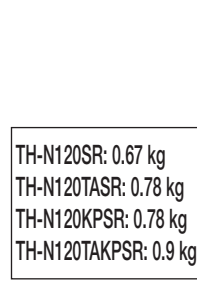
| Model Name | Model Number |
|------------|--------------|
| TH-N120TA | THN65 □ □ |

TH-N120TAHZ(KP)

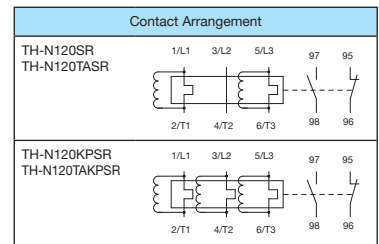


| Model Name |
|-------------|
| TH-N120TAHZ |

TH-N120(TA)(KP)SR



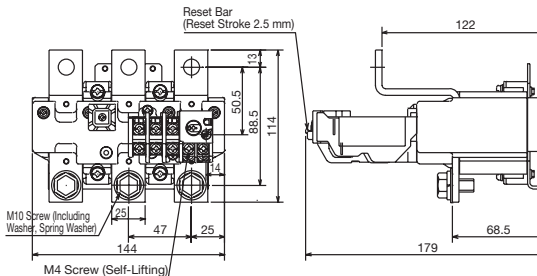
*1: For TH-N120(TA)KPSR
 TH-N120(TA)KPSR cannot be used in independent mounting
 When combining with a magnetic contactor, the following connecting conductor kit (sold separately) is used
 Combination with S(D)-N125, SL(D)-N125: BH579N355
 Combination with S(D)-N150, SL(D)-N150: BH589N355



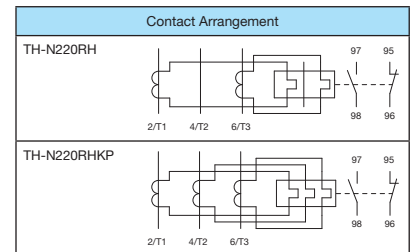
| Model Name |
|-------------|
| TH-N120SR |
| TH-N120TASR |

N220RH/N220HZ

TH-N220RH(KP)

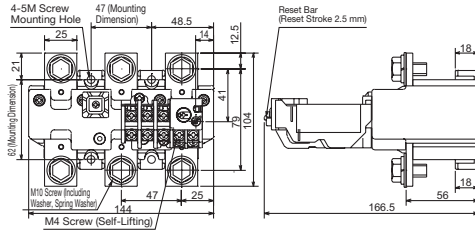


Cannot be used in independent mounting
 Attached 2 M4 screws and wiring screws for magnetic contactor are used when combining with S-N180/N220, SD-N220 and SL(D)-N220



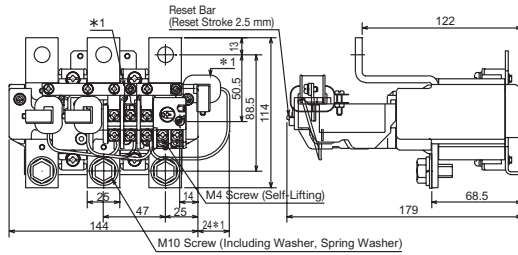
| Model Name | Model Number |
|------------|--------------|
| TH-N220RH | THN70 □ □ |

TH-N220HZ(KP)



| Contact Arrangement | |
|---------------------|---|
| TH-N220HZ | |
| TH-N220HZKP | |
| Model Name | Model Number |
| TH-N220HZ | THN72 <input type="checkbox"/> <input type="checkbox"/> |

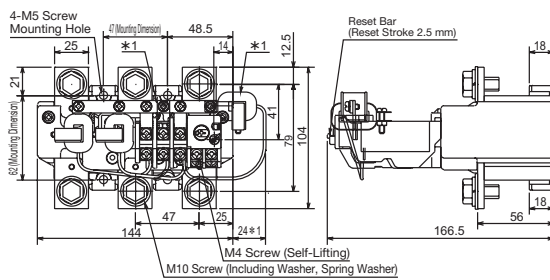
TH-N220RH(KP)SR



*1: For TH-N220RH(KP)SR
 Cannot be used in independent mounting
 The attached 2 M4 screws and wiring screws for magnetic contactor are used when combining with S-N180/N220, SD-N220 and SL(D)-N220

| Contact Arrangement | |
|---------------------|---|
| TH-N220RH(SR) | |
| TH-N220RH(KP)SR | |
| Model Name | Model Number |
| TH-N220RH(SR) | THN72 <input type="checkbox"/> <input type="checkbox"/> |

TH-N220HZ(KP)SR

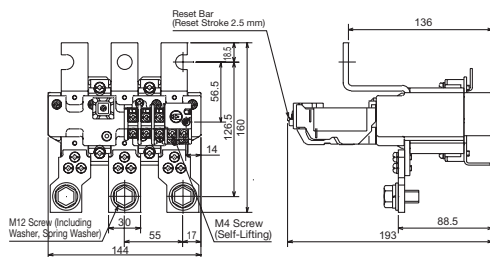
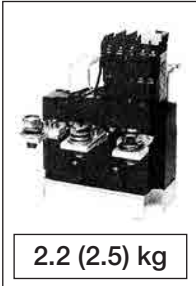


*1: TH-N220HZ(KP)SR

| Contact Arrangement | |
|---------------------|---|
| TH-N220HZ(SR) | |
| TH-N220HZ(KP)SR | |
| Model Name | Model Number |
| TH-N220HZ(SR) | THN72 <input type="checkbox"/> <input type="checkbox"/> |

N400RH/N400HZ

TH-N400RH(KP)

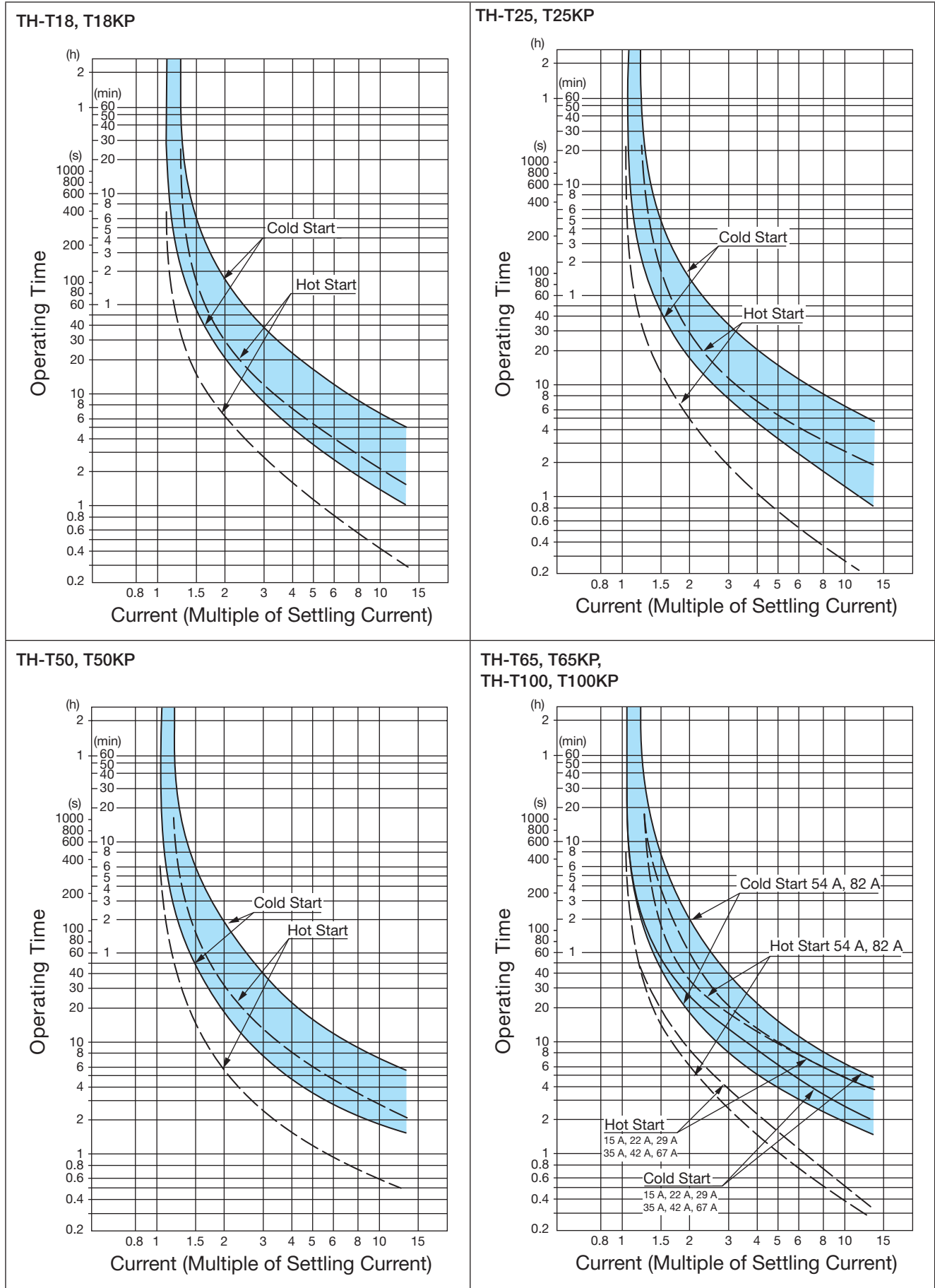


Cannot be used in independent mounting
 Attached M5 screw and wiring screws for magnetic contactor are used when combining with S(D)-N300/N400 and SL(D)-N300/N400

| Contact Arrangement | |
|---------------------|---|
| TH-N400RH | |
| TH-N400RH(KP) | |
| Model Name | Model Number |
| TH-N400RH | THN75 <input type="checkbox"/> <input type="checkbox"/> |

5.11 Operating Characteristic of Thermal Over Relay (Ambient Temperature of 20°C)

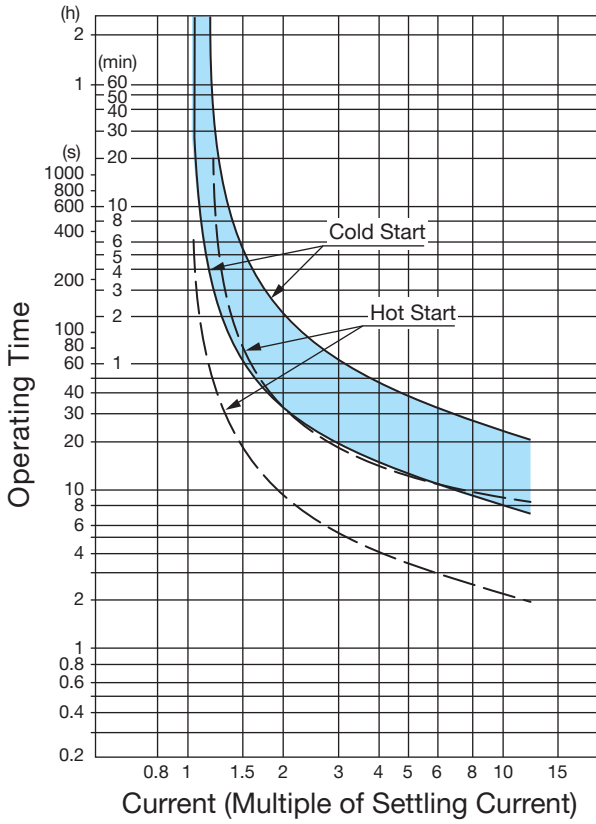
Refer to page 133 regarding the connecting electric wire size.



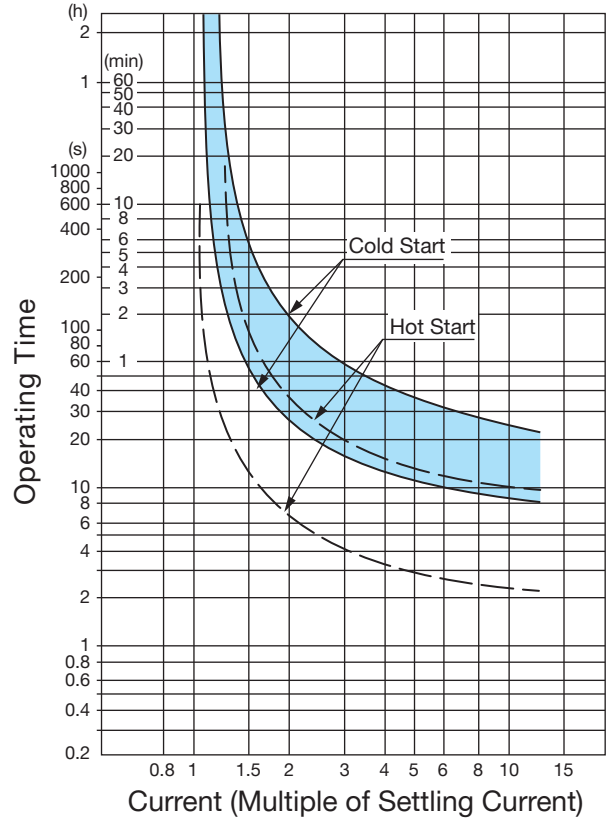
5

TH-T/N Type Thermal Overload Relays

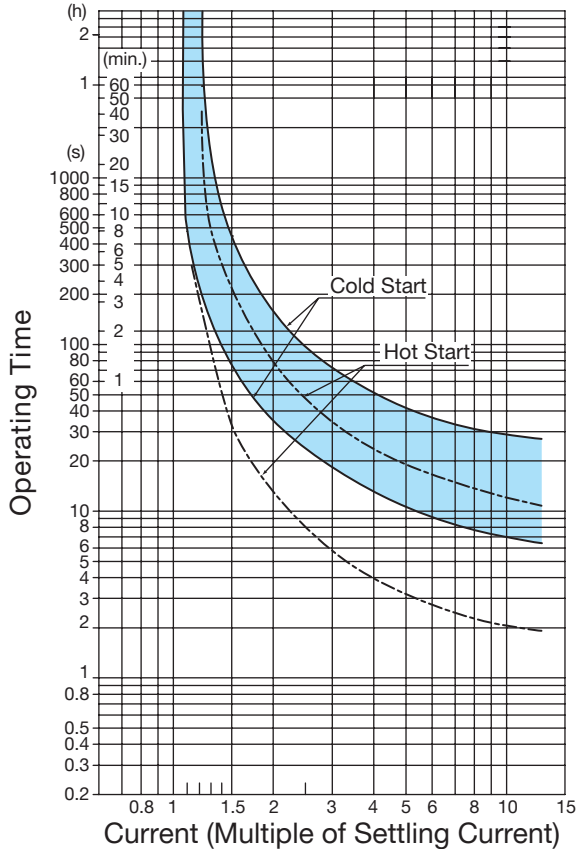
TH-T18SR



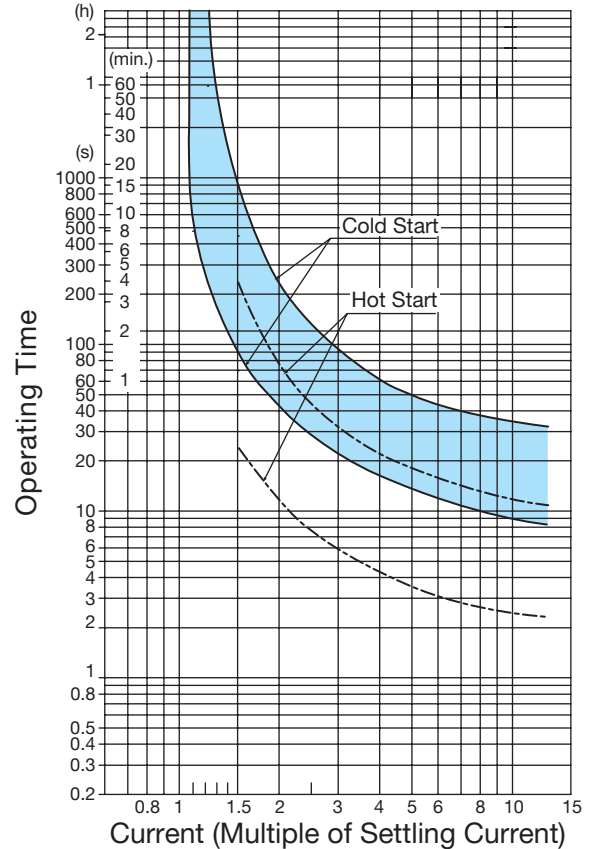
TH-T25SR, T25KPSR



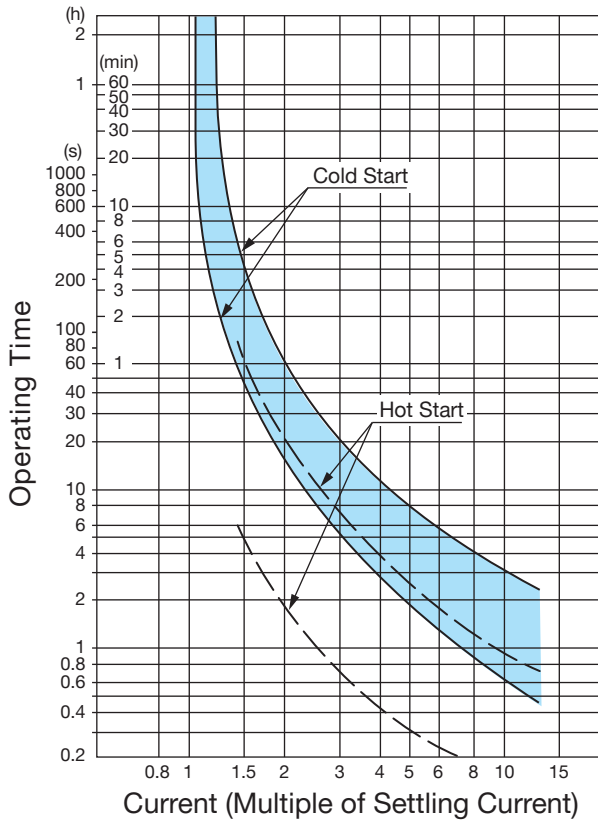
TH-T50SR, T50KPSR



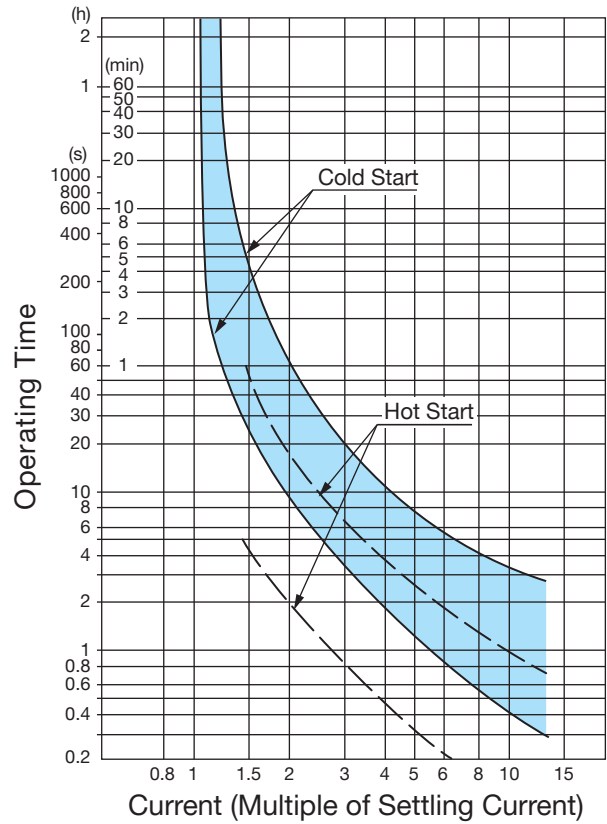
TH-T65SR, T65KPSR,
TH-T100SR, T100KPSR



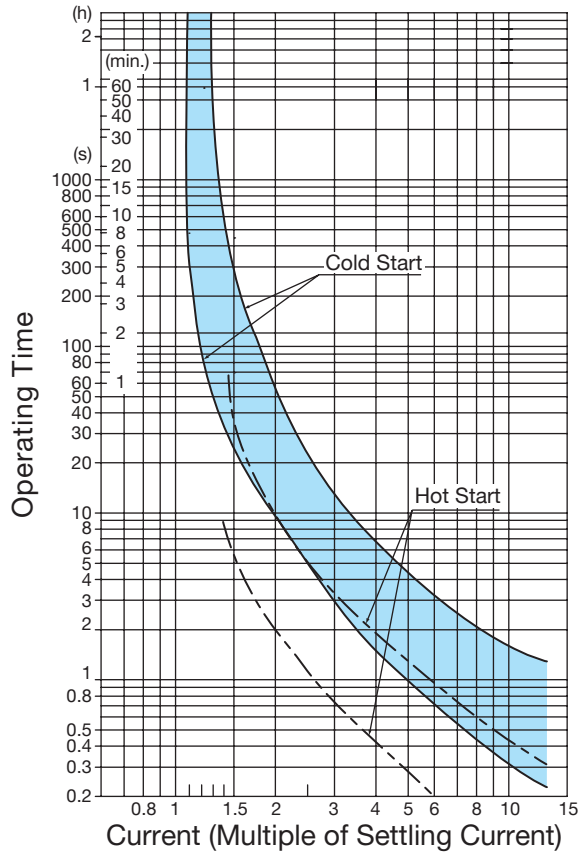
TH-T18FSKP



TH-T25FS, TH-T25FSKP,
TH-T50FS, TH-T50FSKP



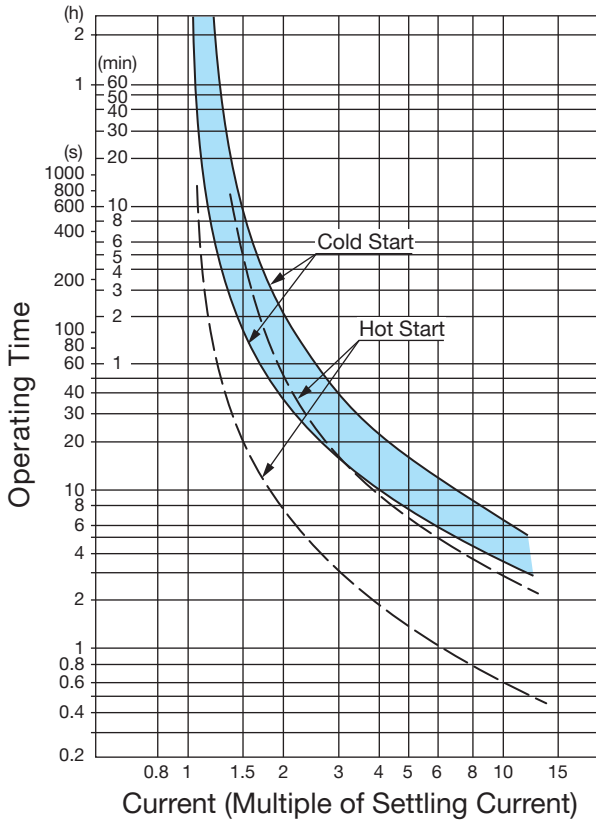
TH-T65FS, T65FSKP,
TH-T100FS, T100FSKP



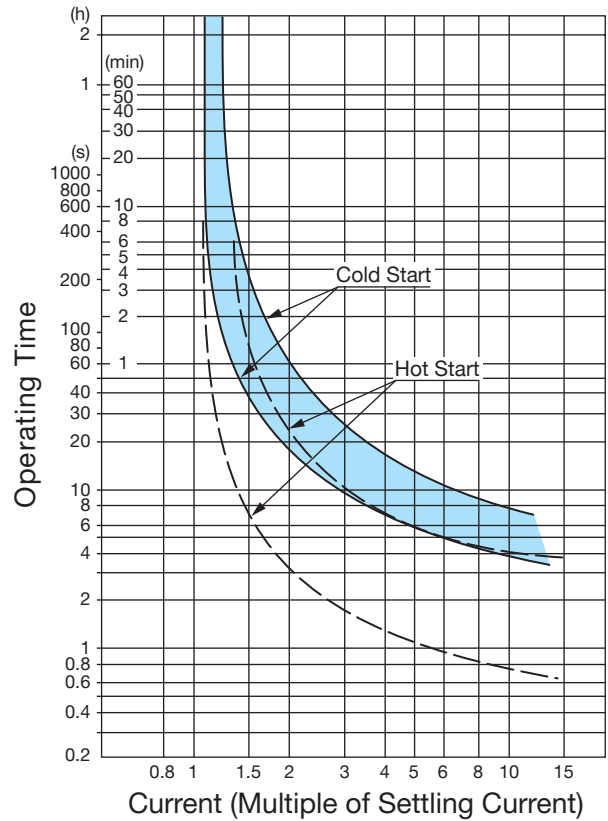
5

TH-T/N Type Thermal Overload Relays

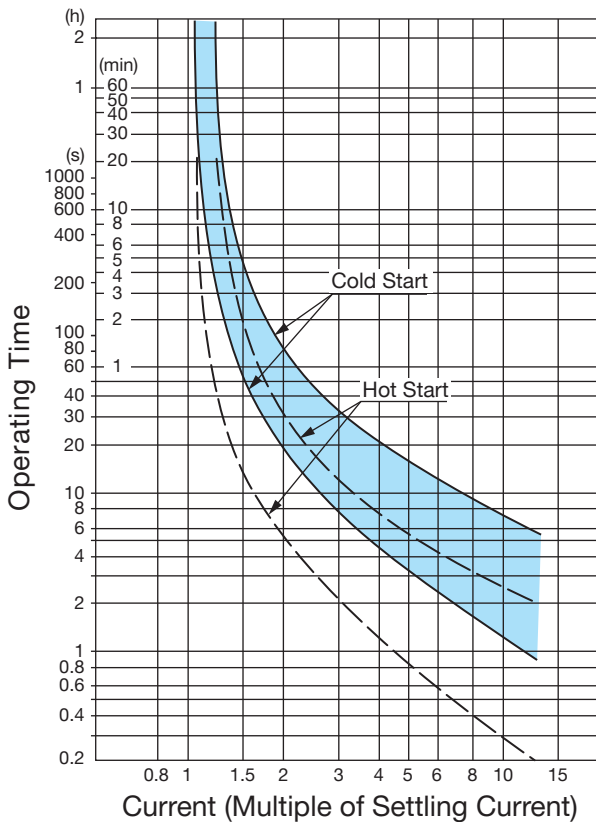
TH-N120, N120TA, N120KP, N120TAKP



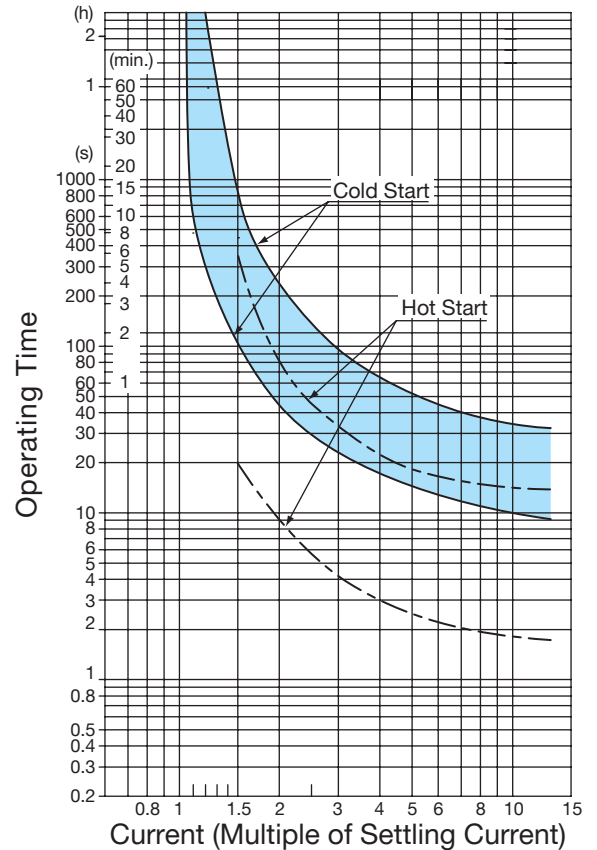
TH-N220RH/HZ(KP), N400RH/HZ(KP)



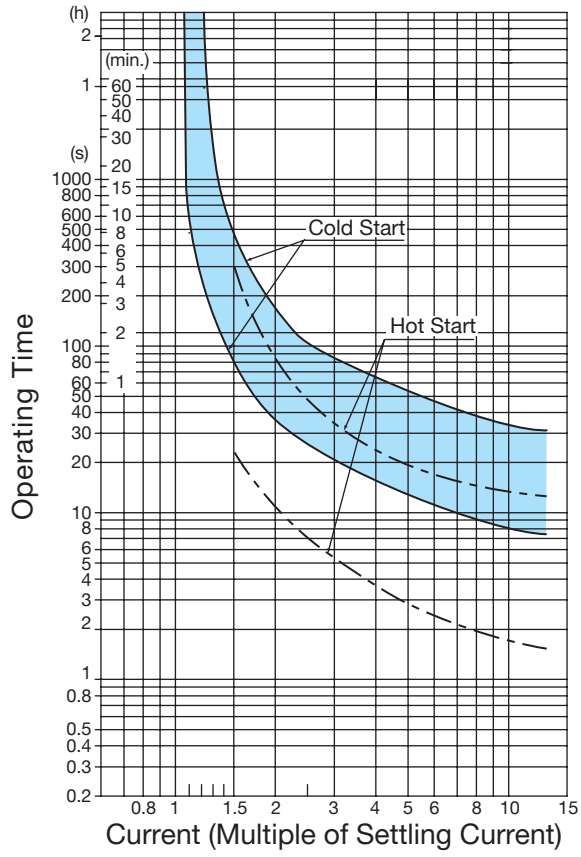
TH-N600, N600KP



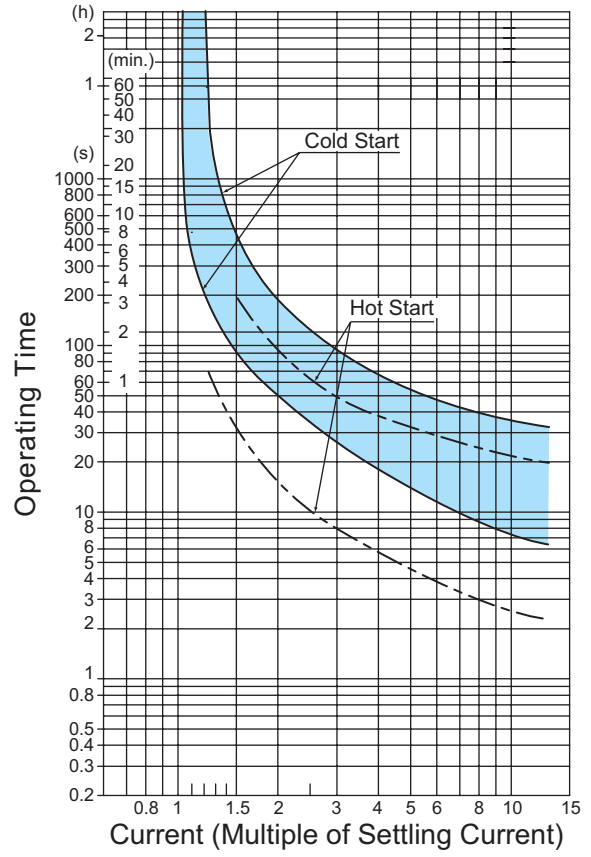
TH-N120SR, N120TASR, N120KPSR, N120TAKPSR



TH-N220RH/HZ(KP)SR, N400RH/HZ(KP)SR



TH-N600SR, N600KPSR



5 TH-T/N Type Thermal Overload Relays

5.12 How to Order

Follow the steps below when ordering. (Enter a space in ▲.)

● TH-T Thermal Overload Relays

| | |
|----------------------|-----------------------------|
| Model Name TH-T25 | Heater Designation ▲ 15A |
|----------------------|-----------------------------|

Specify from the following model name codes.

Specify the heater designation from pages 135, 136 or 137. When the full-load current of the motor is included in 2 heater designations, give priority to the heaters listed in the table on page 46.

● Model Name Codes of Thermal Overload Relays

| | | | | | |
|----|---|-----|----|---|--------------------|
| TH | - | T18 | KP | ▲ | Heater Designation |
|----|---|-----|----|---|--------------------|

| Frame | Symbol | Specifications |
|-------|--------|--|
| T18 | None | With 2-Element |
| T25 | KP | With 3-Element (2E) |
| T50 | FS | Quick Trip Type with 2-Element |
| T65 | FSKP | Quick Trip Type with 3-Element (2E) |
| T100 | SR | With Saturable Reactor |
| | KPSR | With 3-Element (2E) Saturable Reactor |
| | BC | Wiring Streamlining Terminal |
| | AR | Automatic Reset |

● TH-N Thermal Overload Relays

| | |
|-------------------------|-----------------------------|
| Model Name TH-N120KP | Heater Designation ▲ 82A |
|-------------------------|-----------------------------|

Specify from the following model name codes.

Specify the heater designation from pages 135, 136 or 137. When the full-load current of the motor is included in 2 heater designations, give priority to the heaters listed in the table on page 46.

● Model Name Codes of Thermal Overload Relays

| | | | | | |
|----|---|------|----|---|--------------------|
| TH | - | N220 | KP | ▲ | Heater Designation |
|----|---|------|----|---|--------------------|

| Frame | Symbol | Specifications |
|--------|--------|--------------------------------|
| N120 | None | With 2-Element |
| N120TA | KP | With 3-Element (2E) |
| N220 | FS | Quick Trip Type with 2-Element |
| N220RH | HZ | For Independent Mounting |
| N400 | SR | With Saturable Reactor |
| N400RH | AR | Automatic Reset |
| N600 | | |

Note 1. Model names that correspond to mounting methods (for magnetic starters, independent mounting and DIN rail mounting) are shown in the table below.

| For Magnetic Starters | For Independent Mounting | For DIN Rail Mounting |
|-----------------------|--------------------------|-----------------------|
| TH-T18 *1 | TH-T18 + UT-HZ18 *2 | TH-T18 + UT-HZ18 *2 |
| TH-T25 *1 | TH-T25 | TH-T25 + UN-RM20 *2 |
| TH-T50 *1 | — | — |
| TH-T65 | TH-T65 | — |
| TH-T100 *1 | — | — |
| TH-N120 | TH-N120 | — |
| TH-N120TA *1 | TH-N120TAHZ | — |
| TH-N220RH *1 | TH-N220HZ | — |
| TH-N400RH *1 | TH-N400HZ | — |
| — | TH-N600 + CT *3 | — |

- *1 Cannot be independently mounted.
- *2 Order UT-HZ18 and UN-RM20 separately from the thermal overload relay body (TH-T18 and TH-T25). (Refer to page 216)
- *3 Use TH-N600 in combination with current transformer for measuring instruments (rated secondary load of 15 VA or more). (Refer to page 126)





6

MS-T Series Contactor Type Contactor Relays

| | | |
|------|--|-----|
| 6.1 | Model List..... | 150 |
| 6.2 | Selection and Application..... | 151 |
| 6.3 | Standard Type (AC Operated) Contactor Relays | |
| | SR-T□ | 153 |
| 6.4 | DC Operated Contactor Relays | |
| | SRD-T□..... | 156 |
| 6.5 | Mechanically Latched Contactor Relays | |
| | SRL-T□, SRLD-T□..... | 158 |
| 6.6 | Contactor Relays with Large Rated Auxiliary Contacts | |
| | SR-T□JH, SRD-T□JH..... | 160 |
| 6.7 | Contactor Relays with Overlap Contacts | |
| | SR-T□LC, SRD-T□LC..... | 161 |
| 6.8 | Delay Open Contactor Relays | |
| | SR-T□DL..... | 162 |
| 6.9 | Contactor Relays with Wiring Streamlining Terminals | |
| | SR-T□BC, SRD-T□BC..... | 163 |
| 6.10 | How to Order..... | 164 |

6 MS-T Series Contactor Type Contactor Relays

6.1 Model List

| | | | | |
|---|---------------------------------------|---|---|-----|
| Appearance | |  |  | |
| Frame | | T5 | T9 | |
| Number of Contacts | | 5 | 9 | |
| Contact Arrangement | | 5a | 9a | |
| | | 4a1b | 7a2b | |
| | | 3a2b | 5a4b | |
| Rated Insulation Voltage [V] | | 690 | | |
| Applicable Standard | | JIS C8201-5-1, IEC60947-5-1, EN60947-5-1, GB14048.5 | | |
| Rated Impulse Withstand Voltage [kV] | | 6 | | |
| Rated Frequency [Hz] | | 50/60 | | |
| Pollution Degree | | 3 | | |
| Conventional Free Air Thermal Current Ith [A] | | 10 | | |
| Contact Rating (Note 2) | AC Rated Operational Current [A] | Category AC-15 (Coil Load) | AC120 V | 6 |
| | | | AC240 V | 3 |
| | | | AC440 V | 1.5 |
| | | | AC550 V | 1.2 |
| | Category AC-12 (Resistive Load) | AC120 V | 10 | |
| | | AC240 V | 8 | |
| | | AC440 V AC550 V | 5 5 | |
| | DC Rated Operational Current [A] | Category DC-13 (Coil Load) | DC24 V | 3 |
| DC48 V | | | 1.5 | |
| DC110 V | | | 0.6 (2) | |
| DC220 V | | | 0.3 (0.8) | |
| Category DC-12 (Resistive Load) | DC24 V | 10 | | |
| | DC48 V | 8 | | |
| | DC110 V DC220 V | 5 (8) 1 (3) | | |
| Minimum Applicable Load Level | | 20 V 3 mA (Note 5) | | |
| Standard Type | SR-□ | ◎ | ◎ | |
| DC Operated Type | SRD-□ | ◎ | ◎ | |
| Mechanically Latched Type | SRL-□ SRLD-□ | ◎ ◎ | - - | |
| With Large Rated Auxiliary Contacts | SR-□JH SRD-□JH | ○ ○ | ○ ○ | |
| With Overlap Contacts | SR-□LC SRD-□LC | ○ ○ | ○ ○ | |
| Delay Open Type | SR-□DL | ○ | ○ | |
| With Wiring Streamlining Terminals | SR-□BC SRD-□BC | ○ ○ | ○ ○ | |
| With Surge Absorbers (Varistors) | SR-□SA SRD-□SA | ○ ○ | ○ ○ | |
| Optional Units | Surge Absorber (Note 3) | ○ | ○ | |
| | Additional Auxiliary Contact (Note 4) | ○ | - | |
| | DC/AC Interface | ○ | ○ | |
| IEC 35 mm Rail Mounting | | ◎ | ◎ | |

Note 1. ◎ indicates standard, ○ indicates semi-standard and - indicates products outside production range.

Note 2. Refer to the individual ratings chart for the contact ratings of large rated auxiliary contacts and overlap contacts. The value in parentheses indicates that when switching a 2-pole load in series.

Note 3. For the mechanically latched type (SRL-T□, SRLD-T□), 1 piece can be mounted on each closing coil and tripping coil.

Note 4. For the mechanically latched type SRL-T5 and SRLD-T5 only the side clip-on auxiliary contact unit UT-AX11 can be mounted.

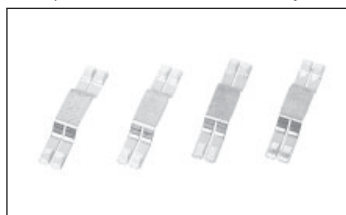
Note 5. The contact minimum applicable load level of the front clip-on (4 upper terminals) of SR (D)-T9 is the same as that of UT-AX2/4.

6.2 Selection and Application

● Features

● **Rail mounting is fully adopted**
IEC 35 mm rail mounting mechanism that dramatically reduces assembly time has been fully adopted.

● **High contact reliability**
The full adoption of twin contacts improves the contact reliability.

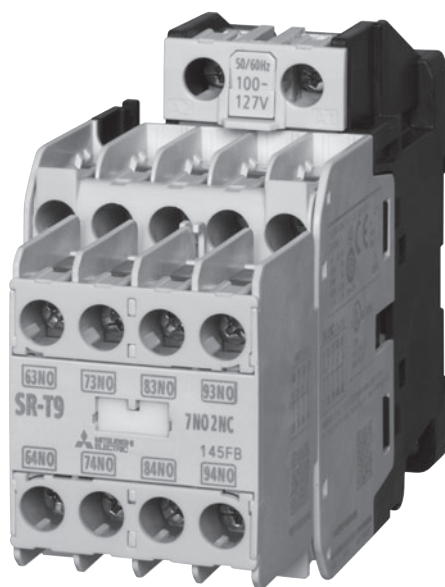


● **Clearly visible coil rating**

● **The make and break contacts can be used at different voltages**
Strengthened insulation between poles and between upper and lower contacts of the same pole.

● **Easy wiring**
Uses self-lifting terminal screws that can reliably tighten wires, ring crimp lugs and square-tip crimp lugs.

● **Live part protection covers** are standard equipment



SR-T9

● **Wide range of types**

In addition to the basic frame, extensive applied products such as the DC operated type and the mechanically latched type are also available.

● **A wide selection of optional units**

auxiliary contact units (UT-AX□)

The 2-pole and 4-pole contact units can be easily added to SR-T5.

Surge Absorber Units (UT-SA□)

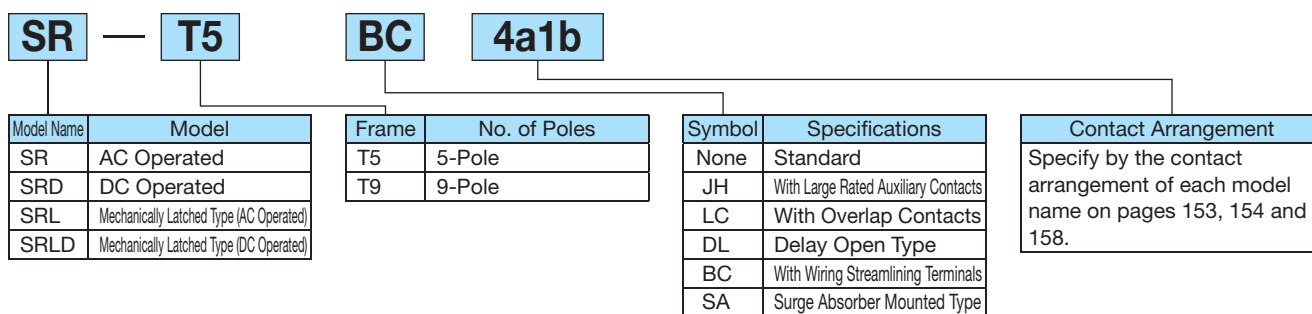
For the surge absorber unit that can be mounted in one-touch, the C-R type and indicator type are available aside from the varistor type.

With Wiring Streamlining Terminal (SR-T□BC)

The terminal screw does not fall off and wiring is easy (open-tip crimp lugs and bare wires, ring crimp lugs can be used).

● Type Designations

■ MS-T Series



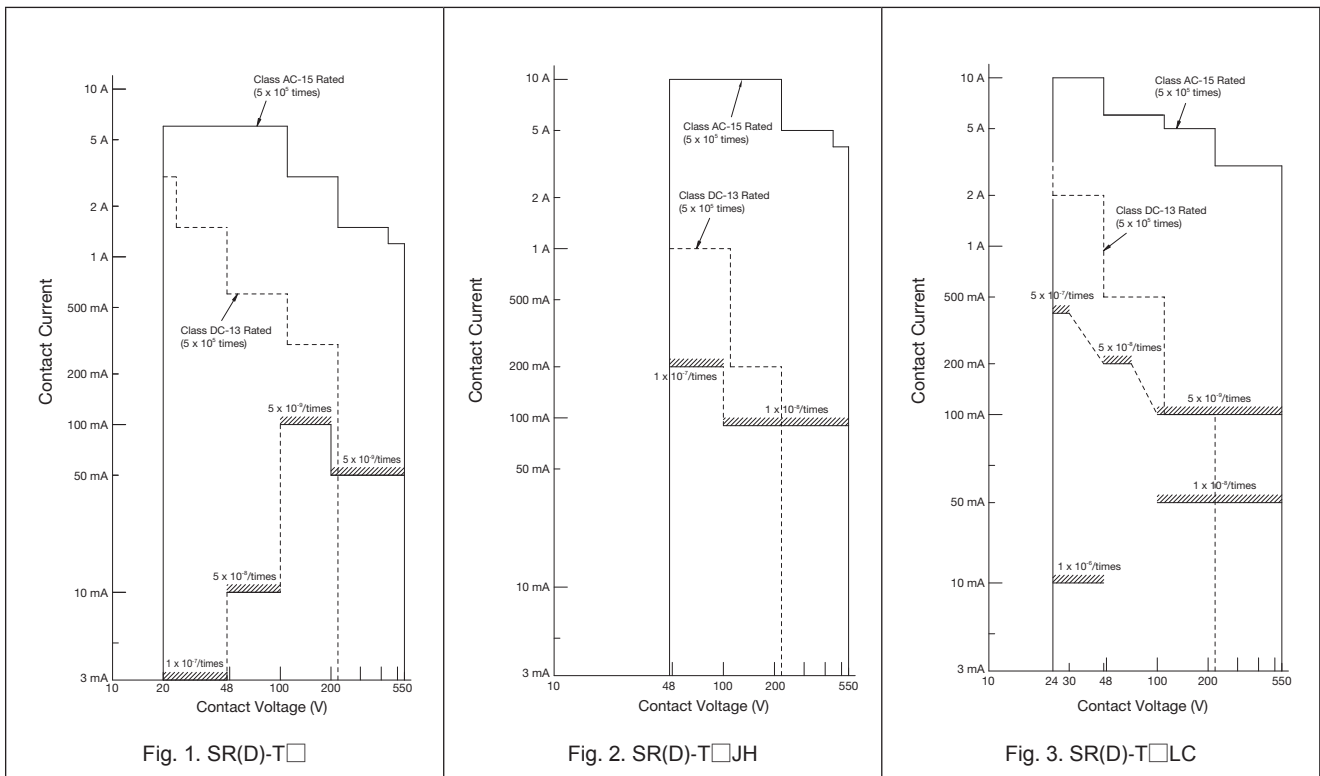
6 MS-T Series Contactor Type Contactor Relays

● Function and Operation Classification by Application Type

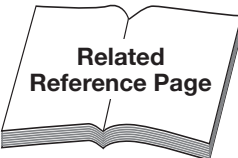
| Model Name | Operation Category | Application | Reference Page | Model Name | Operation Category | Application | Reference Page |
|------------|--------------------|---|----------------|------------|--------------------|--|----------------|
| SR-T□ | AC | General control circuit sequence relay for magnetic contactor command contacts etc. | Page 153 | SR-T□LC | AC | Applications that require the overlap switching of the make and break contacts | Page 161 |
| SRD-T□ | DC | | Page 156 | SRD-T□LC | DC | | Page 161 |
| SRL-T□ | AC | Same applications as SR and SRD types and also those requiring memory functionality | Page 158 | SR-T□DL | AC | For 2 nd -Second Delayed Release | Page 162 |
| SRLD-T□ | DC | | | SRD-T□DL | DC | | Page 162 |
| SR-T□JH | AC | AC100 to 220 V, 3 to 10 A control of large breakers and solenoids | Page 160 | SR-T□BC | AC | With Wiring Streamlining Terminal | Page 163 |
| SRD-T□JH | DC | | | SRD-T□BC | DC | | Page 163 |
| | | | | SR-T□SA | AC | With Built-In Surge Absorber (Varistor) | Page 41 |
| | | | | SRD-T□SA | DC | | Page 42 |

● Application by Contact Voltage, Current, Electrical Durability and Contact Reliability

For applications requiring greater contact reliability than indicated in Figs. 1 to 3, parallel contact connections (redundancy) are required. The reliability of the contacts decreases for contacts connected in series.



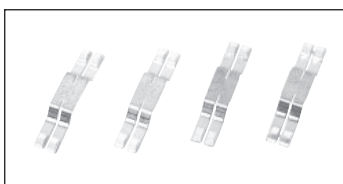
Note 1. The contact reliability indicates a 60% confidence rate for a λ 60 failure rate (no. of faults/times switching, no. of contacts)

|  | Item | Reference Page | Remarks |
|---|-----------------------|----------------|---------|
| | • Working Environment | Page 62 | — |
| • Mounting | Page 62 | — | |
| • Wiring | Page 66 | — | |
| • Control Circuit Power Supply Voltage Fluctuation Range | Page 67 | — | |
| • Applicable Wire Size and Terminal Screw Tightening Torque | Page 65 | — | |

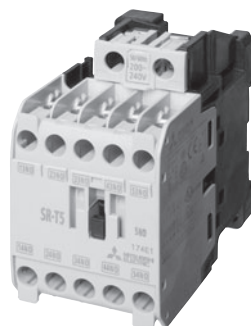
6.3 SR-T□ Standard Type (AC Operated) Contactor Relays

● Features

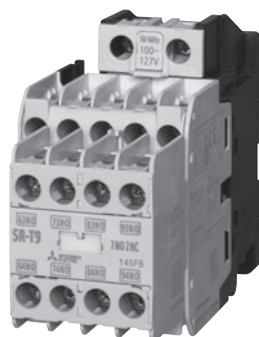
- Rail mounting is fully adopted
IEC 35 mm rail mounting mechanism that dramatically reduces assembly time has been fully adopted.
- High contact reliability
The full adoption of twin contacts improves the contact reliability.



- Clearly visible coil rating
- The make and break contacts can be used at different voltages
Strengthened insulation between poles and between upper and lower contacts of the same pole.
- Live part protection covers are standard equipment



SR-T5



SR-T9

- Easy wiring
Uses self-lifting terminal screws that can reliably tighten wires, ring crimp lugs and square-tip crimp lugs.
- Extensive contact arrangements
Selectable according to the required number of contacts.
- A Wide selection of optional units
Auxiliary Contact Units (UT-AX□)
The 2-pole and 4-pole contact units can be easily added to SR-T5.
Surge Absorber Units (UT-SA□)
For the surge absorber unit that can be mounted in one-touch, the C-R type and indicator type are available aside from the varistor type.

● Rating (SR, SRD, SRL, SRLD, SR-T□DL, SR-T□BC and SRD-T□BC)

| Frame | | T5 | T9 | | |
|---|----------------------------------|----------------------------------|----------------------------|-------|-----|
| No. of Contacts | | 5 | 9 | | |
| Contact Arrangement | | 5a | 9a | | |
| | | 4a1b | 7a2b | | |
| | | 3a2b | 5a4b | | |
| Rated Insulation Voltage [V] | | 690 | | | |
| Conventional Free Air Thermal Current I _{th} [A] | | 10 | | | |
| Contact Rating | AC Rated Operational Current [A] | Category AC-15 (Coil Load) | AC120V | 6 | |
| | | | AC240V | 3 | |
| | | | AC440V | 1.5 | |
| | | | AC550V | 1.2 | |
| | | | AC120V | 10 | |
| | Category AC-12 (Resistive Load) | AC240V | 8 | | |
| | | AC440V | 5 | | |
| | | AC550V | 5 | | |
| | | DC Rated Operational Current [A] | Category DC-13 (Coil Load) | DC24V | 3 |
| | | | | DC48V | 1.5 |
| DC110V | 0.6(2) | | | | |
| DC220V | 0.3(0.8) | | | | |
| Category DC-12 (Resistive Load) | DC24V | | | 10 | |
| | DC48V | 8 | | | |
| | DC110V | 5(8) | | | |
| | DC220V | 1(3) | | | |

Note 1. JIS C8201-5-1 classifications are class AC-15 applicable to AC solenoid and class DC-13 applicable to DC solenoid switching. JIS C8201-5-1 classifications are class AC-12 applicable to AC resistive load switching and class DC-12 applicable to DC resistive load switching.

Note 2. The value in parentheses for the DC rated operational current indicates the rated operating current when switching a 2-pole load in series.

Note 3. The making and breaking capacities are 10 times with AC-15 and 1.1 times with DC-13.

Note 4. Electrical durability of 500,000 operations. (For AC-15, it is 1 million times at 220 V 2 A and 3 million times at 1 A.)

Note 5. The minimum operating voltage and current differ depending on the allowable fault rate. Select them from Figure 1 on page 152.

Note 6. The withstand voltage is AC2500 V for 1 minute.

6 MS-T Series Contactor Type Contactor Relays

● Performance (SR, SRD, SRL, SRLD, SR-T□DL, SR-T□BC and SRD-T□BC)

| Frame | Making and Breaking Capacities | | | | Switching Frequency | Switching Durability | | |
|-------------|--------------------------------|-------------------------|--------------------|----------------------|---------------------|--|---|--|
| | Category | Rated Operating Voltage | Making Current [A] | Breaking Current [A] | | Electrical | Mechanical | |
| SR-T Series | T5 T9 | AC-15 | AC120V | 66 | 66 | 1800 Times/Hour [Standard Type] | Class AC-15 (AC Coil Load) 240 V 3 A, 0.5 mil. times 240 V 2 A, 1 mil. times 440 V 1.5 A, 0.5 mil. times | 10 mil. times [Standard Type] 0.5 mil. times [Mechanically Latched Type] |
| | | | AC240V | 55 | 55 | | | |
| | | | AC550V | 33 | 33 | | | |
| | DC-13 | DC24V | DC24V | 20 | 20 | 1200 Times/Hour [Mechanically Latched] [Delay Open Type] | Class DC-13 (DC Coil Load) 110 V 0.6 A, 0.5 mil. times 220 V 0.3 A, 0.5 mil. times | 0.5 mil. times [Mechanically Latched Type] 0.5 mil. times [Delay Open Type] |
| | | | DC48V | 10 | 10 | | | |
| | | | DC110V | 2(5) | 2(5) | | | |
| | | DC220V | 0.4(1.5) | 0.4(1.5) | | | | |

Note 1. The DC values in parentheses are the making and breaking capacities when using 2-poles in series.

Note 2. Making current capacity tests are performed 100 times, while breaking current capacity tests are performed 25 times.

● Properties (SR-T□, SR-T□JH, SR-T□BC)

| Frame | Coil Input [VA] | | Coil Power Consumption [W] | Coil Current [A] | Contact Arrangement | Operating Voltage [V] | | Operating Time [ms] | | | |
|-------|-----------------|--------|----------------------------|------------------|---------------------|-----------------------|-----------|---------------------------|-----------------------------|-----------------------------|-----------------------------|
| | Inrush | Normal | | | | Operation | Open | Coil ON → Make Contact ON | Coil ON → Break Contact OFF | Coil OFF → Make Contact OFF | Coil OFF → Break Contact ON |
| T5 | 45 | 7 | 2.2 | 0.03 | 5a | 115 to 145 | 75 to 115 | 12 to 20 | — | 4 to 16 | — |
| T9 | | | | | 3a2b | 120 to 150 | 75 to 115 | 12 to 20 | 7 to 14 | 4 to 16 | 6 to 17 |
| | | | | | 9a | 125 to 156 | 85 to 125 | 12 to 20 | — | 4 to 16 | — |
| | | | | | 5a4b | 130 to 160 | 80 to 120 | 12 to 20 | 7 to 15 | 4 to 16 | 5 to 16 |

Note 1. The above indicates rough property indices for AC200V coils.

Note 2. The drive voltage is that at a 20°C cold state at 60 Hz. Voltages for coils other than AC200V can be calculated proportionately.


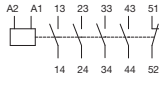
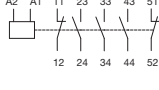
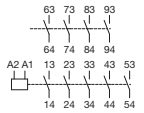
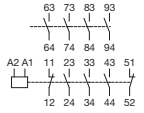
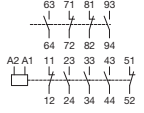
Note 3. The input and power consumption are average values. These are almost the same for coils other than AC200V.

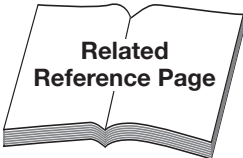
Note 4. The operating time is the value when applying 200 V at 60 Hz. These are almost the same for coils other than AC200V.

Make contacts and break contacts cannot be overlapped in time.

Note 5. The coil current is the average normal value with a 220 V, 60 Hz applied voltage. Divide the regular input by the coil voltage for coils other than AC200V.

● Contact Arrangement/Contact Placement

| Frame | T5 | T9 |
|---------------------|---|---|
| Contact Arrangement | 5a 4a1b 3a2b | 9a 7a2b 5a4b |
| Contact Placement |  5a  4a1b  3a2b |  9a  7a2b  5a4b |

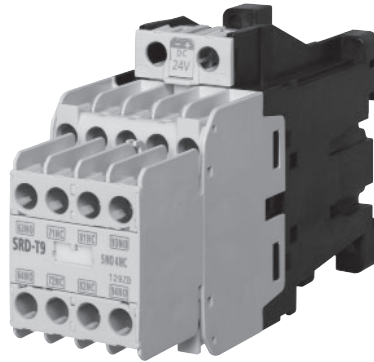
|  | Item | Reference Page | Remarks |
|---|---------------------------------|----------------|---------|
| | • Operation Coil | Page 41 | — |
| | • How to Order | Page 164 | — |
| | • Combining with Optional Units | Pages 155, 182 | — |

6 MS-T Series Contactor Type Contactor Relays

6.4 SRD-T□DC Operated Contactor Relays

● Features

- IEC 35 mm rail mounting is adopted
- High contact reliability
The adoption of twin contacts improves the contact reliability.
- Excellent operational reliability and high frequency switching capacity
Uses a DC full-applied voltage type solenoid.
- Live part protection covers are standard equipment



SRD-T9

- No buzzing sound
- No coil inrush current
The coil doesn't use saving resistance so there is no inrush current.
- Extensive options
Auxiliary Contact Units (UT-AX□)
Surge Absorber Units (UT-SA□)

● Operation Coil Properties (SRD-T□, SRD-T□JH, SRD-T□BC)

| Coil Designation | Coil Current 20°C [mA] | Coil Resistance 20°C [Ω] |
|------------------|------------------------|--------------------------|
| | SRD-T | SRD-T |
| DC100V | 33 | 3018 |
| DC110V | 30 | 3576 |
| DC200V | 16 | 12200 |
| DC220V | 15 | 14784 |
| DC24V | 93 | 253 |
| DC48V | 71 | 688 |
| DC125V | 26 | 4625 |

Note 1. The coil current and coil resistance are the average values in the cold state.

Note 2. Please note that operation coil terminals have polarity. A1 (+), A2 (-)

● Properties (SRD-T□, SRD-T□JH, SRD-T□BC)

| Frame | Coil | | Operating Voltage [V] | | Operating Time [ms] | | | |
|-------|-----------------------|--------------------|-----------------------|----------|---------------------------|-----------------------------|-----------------------------|-----------------------------|
| | Power Consumption [W] | Time Constant [ms] | Operation | Open | Coil ON → Make Contact ON | Coil ON → Break Contact OFF | Coil OFF → Make Contact OFF | Coil OFF → Break Contact ON |
| T5 | 3.3(2.2) | 40(45) | 60 to 75 | 10 to 30 | 55 to 75(75 to 95) | 50 to 70(70 to 90) | 5 to 15 | 10 to 20 |
| T9 | | | 60 to 75 | 10 to 30 | 55 to 75(75 to 95) | 50 to 70(70 to 90) | 5 to 15 | 10 to 20 |

Note 1. The above indicates rough property indices for DC100V coils. The values in the parentheses for SRD-T5, T9 indicate rough property indices for DC12V or DC24V coils.

Note 2. The drive voltage is that at a 40°C cold state. Voltages for coils other than DC100V can be calculated proportionately.

Note 3. The power consumption and coil time constant are average values. These are almost the same for coils other than DC100V.

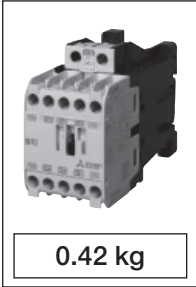
Note 4. The operating time is the value when applying DC100V (with 5% or less ripple). These are almost the same for coils other than DC100V. Make contacts and break contacts cannot be overlapped in time.

Note 5. The drive time (coil OFF → make contact OFF/break contact ON) slows down when combined with a surge absorber element, so care should be taken with sequence timing. Furthermore, use only after confirming there is no fault with the real-life application.

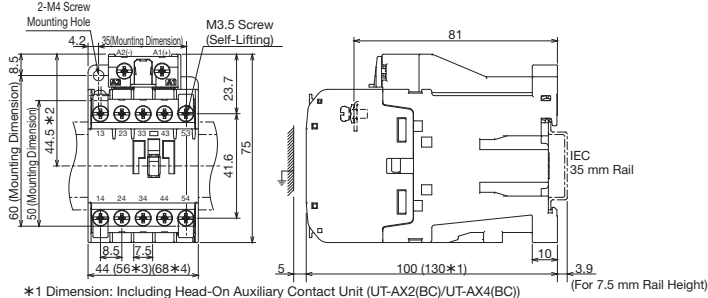
| | Item | Reference Page | Remarks |
|--|---|----------------|---------|
| | • Operation Coil | Page 42 | — |
| | • Rating | Pages 150, 153 | — |
| | • Performance | Page 154 | — |
| | • Contact Arrangement/Contact Placement | Page 154 | — |
| | • How to Order | Page 164 | — |
| | • Combining with Optional Units | Pages 155, 182 | — |

● Outline Drawings

SRD-T5(BC)



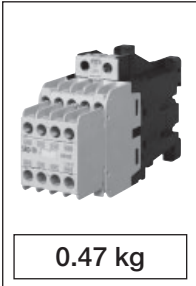
0.42 kg



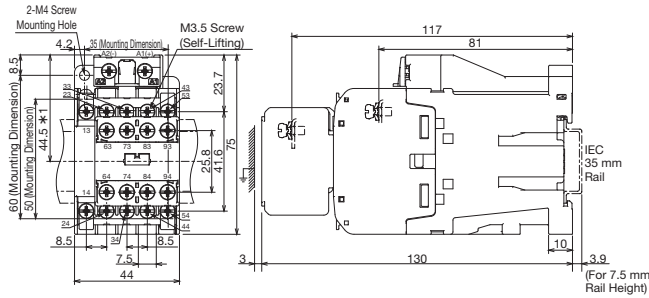
*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC)/UT-AX4(BC))
 *2 Dimension: Width Dimension from Center of IEC 35 mm Rail
 *3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) -
 *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)

| Model Name | Model Name |
|------------|------------|
| SRD-T5 | SRD-T5BC |

SRD-T9(BC)



0.47 kg



*1 Dimension: Width Dimension from Center of IEC 35 mm Rail

| Model Name | Model Name |
|------------|------------|
| SRD-T9 | SRD-T9BC |

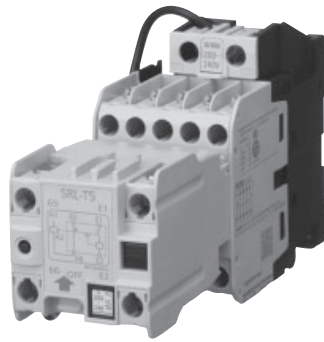
6 MS-T Series Contactor Type Contactor Relays

6.5 SRL-T□, SRLD-T□ Mechanically Latched Contactor Relays

SRL is SR with a mechanical latch mechanism attached at the top. The closed state is mechanically maintained by simply exciting the closing coil for 0.3 seconds or more, and tripping is done by energizing the tripping coil. Closing coils are available as SRL AC operated types or SRLD DC operated types. These are sometimes called keep relays or momentary energizing relays.

Features

- Can be used as a memory relay
The mechanical retention prevents opening due to power failures or voltage drops.
- Reduced coil power consumption
The constant power consumption of the solenoid of the operation coil can be reduced.
- Allows manual closing
- Allows manual tripping
- Live part protection covers are standard equipment



SRL-T

- No buzzing sound
- Stable operation
The self-demagnetizing break contact of the closing coil has been built into the latch mechanism.
- High contact reliability
The adoption of twin contacts improves the contact reliability.
- IEC 35 mm rail mounting is fully adopted

Performance

| Closing Coil Operation Category | Model Name | Tripping Coil Self-Demagnetizing | Closing Coil Self-Demagnetizing | Contact Arrangement (Valid) | Switching Frequency [Times/Hour] | Switching Durability (Ten Thousand Times) | |
|---------------------------------|-------------|----------------------------------|---------------------------------|-----------------------------|----------------------------------|---|------------|
| | | | | | | Electrical | Mechanical |
| AC Operated | SRL-T5(BC) | Incl. | Incl. | 5a, 4a1b, 3a2b | 1200 | 50 | 50 |
| DC Operated | SRLD-T5(BC) | | | | | | |

Properties

| Frame | Operation Coil Input [VA] | Contact Arrangement | Operating Voltage [V] | | Operating Time [ms] | | | | |
|-------------|---------------------------|----------------------------|-----------------------|------------|-----------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|----------|
| | | | Closing | Tripping | Closing Coil ON → Make Contact ON | Closing Coil ON → Break Contact OFF | Tripping Coil ON → Make Contact OFF | Tripping Coil ON → Break Contact ON | |
| AC Operated | SRL-T5(BC) | Closing 80 Tripping 110 | 5a | 122 to 128 | 90 to 96 | 10 to 16 | — | 9 to 14 | — |
| | | | 3a2b | 139 to 147 | 90 to 94 | 10 to 15 | 8 to 13 | 8 to 13 | 10 to 15 |
| DC Operated | SRLD-T5(BC) | Closing 90 Tripping 180 | 5a | 60 to 70 | 44 to 60 | 10 to 20 | — | 8 to 15 | — |
| | | | 3a2b | 60 to 70 | 44 to 60 | 10 to 20 | 9 to 16 | 8 to 15 | 10 to 20 |

Note 1. The above indicates rough property indices for AC200V coils under AC operation (SRL-T□) and for DC100V coils under DC operation (SRLD-T□).

Note 2. The drive voltage is the value at a 20°C cold state for both AC (at 60 Hz) and DC operation. Voltages for coils other than AC200V or DC100V can be calculated proportionately.

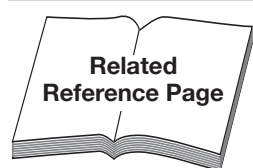
Note 3. The coil input indicates the average value. These are almost the same for coils other than AC200V or DC100V.

Note 4. The drive time is the time taken from when the closing coil or tripping coil is excited until the contact transitions (ON or OFF) when 200 V, 60 Hz is applied for AC operation or DC100V is applied for DC operation. These are almost the same for coils other than AC200V or DC100V.

Make contacts and break contacts cannot be overlapped in time.

Note 5. The closing coil and tripping coil have the 15-second rating.

| Item | Reference Page | Remarks |
|---------------------------------|----------------|---------------|
| · Rating | Pages 150, 153 | Same as SR-□. |
| · Operation Coil of SRL/SRLD-□ | Page 42 | — |
| · How to Order | Page 164 | — |
| · Combining with Optional Units | Page 182 | — |



6 MS-T Series Contactor Type Contactor Relays

6.6 SR-T□JH, SRD-T□JH Contactor Relays with Large Rated Auxiliary Contacts

Through the use of S-T12 magnetic contactor contacts, the SR(D)-T □ JH type is suitable for applications requiring use of comparatively large currents and great electrical durability.

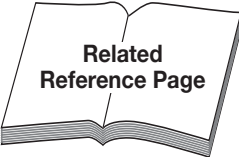
● Rating

| Model Name | | SR-T5JH SRD-T5JH | SR-T9JH SRD-T9JH |
|---|----------------------------------|------------------------------------|--|
| Contact Arrangement | | 5a 4a1b 3a2b | 9a 7a2b 5a4b |
| Rated Insulation Voltage [V] | | 690 | |
| Conventional Free Air Thermal Current Ith [A] | | 20 | |
| Contact Rating | AC Rated Operational Current [A] | Category AC-15 (Coil Load) | AC120V 10(6) AC240V 10(5) AC440V 5(3) AC550V 4(3) |
| | | Category AC-12 (Resistive Load) | AC120V 20 AC240V 16 AC440V 10 AC550V 10 |
| | DC Rated Operational Current [A] | Category DC-13 (Coil Load) | DC24V 7 DC48V 5 DC110V 1.2 DC220V 0.2 |
| | | Category DC-12 (Resistive Load) | DC24V 10 DC48V 8 DC110V 5 DC220V 1 |

Note 1. Electrical durability of 500,000 operations.

Note 2. The value in parentheses for the AC rated operational current indicates the rated operating current when using different voltages.

Note 3. The minimum operating voltage and current differ depending on the allowable fault rate. Select from Figure 2 on page 152.

| | Item | Reference Page | Remarks |
|---|---|----------------|-------------------------|
|  | · Operation Coil | Pages 41, 42 | Same as SR-□ and SRD-□. |
| | · Properties | Pages 154, 156 | Same as SR-□ and SRD-□. |
| | · Contact Arrangement/Contact Placement | Page 154 | Same as SR-□ and SRD-□. |
| | · Outline Drawings | Pages 155, 157 | Same as SR-□ and SRD-□. |
| | · How to Order | Page 164 | — |
| | · Combining with Optional Units | Pages 155, 182 | — |

6.7 SR-T□LC, SRD-T□LC Contactor Relays with Overlap Contacts

SR(D)- □ LC types with overlap contacts turn off the break contact after the make contact turns on.

● Rating (SR, SRD)

| Frame | | T5LC | T9LC |
|--|--|---|------|
| Contact Arrangement | | 4a1b | 7a2b |
| | | 3a2b | 5a4b |
| Rated Insulation Voltage [V] | | 690 | |
| Conventional Free Air Thermal Current I _{th} [A] | | 16 | |
| Contact Rating (Note 2) | AC Rated Operational Current [A] | Category AC-15 (Coil Load) AC120 V AC240 V AC440 V AC550 V | 6 |
| | | | 5 |
| | | | 3 |
| | | | 3 |
| | Category AC-12 (Resistive Load) AC120 V AC240 V AC440 V AC550 V | 16 | |
| | | 12 | |
| | | 5 | |
| | | 5 | |
| | DC Rated Operational Current [A] | Category DC-13 (Coil Load) DC24 V DC48 V DC110 V DC220 V | 3 |
| | | | 2 |
| 0.5 | | | |
| 0.1 | | | |
| Category DC-12 (Resistive Load) DC24 V DC48 V DC110 V DC220 V | 8 | | |
| | 5 | | |
| | 3 | | |
| | 0.5 | | |

Note 1. The AC rated operational current for the make contact is shown in the table above.

The break contact rated making current is 20 A and the rated breaking current AC 24 to 550 V 3 A. (However, $\text{COS } \phi = 0.3$ to 1.0)

Note 2. The contacts may not overlap when worn out through current switching and chattering. Take sufficient precautions.

● Contact Arrangement/Contact Placement

| SR-T5LC SRD-T5LC | SR-T9LC SRD-T9LC |
|---------------------|---------------------|
| 4a1b | 7a2b |
| 3a2b | 5a4b |
| | |
| 4a1b | 7a2b |
| | |
| 3a2b | 5a4b |

| | Item | Reference Page | Remarks |
|--|---------------------------------|----------------|--|
| | · Operation Coil | Pages 41, 42 | Same as SR-□ and SRD-□. |
| | · Properties | Pages 154, 156 | Same as SR-□ and SRD-□. However, break contact operating times differ. |
| | · Outline Drawings | Pages 155, 157 | Same as SR-□ and SRD-□. |
| | · How to Order | Page 164 | — |
| | · Combining with Optional Units | Page 182 | Auxiliary contact units and front clip-on timer units cannot be combined together. |

6 MS-T Series Contactor Type Contactor Relays

6.8 SR-T□DL Delay Open Contactor Relays

SR-T□DL functions to hold the contactor relay for 2^{+2}_{-1} seconds with the use of a capacitor, so that the relay does not open due to a momentary power failure or voltage drop caused by lightning, etc.

Specifications (SR-T□DL Delay Open Contactor Relays)

| Model Name | Contact Arrangement (Valid) | Designation (Rated Voltage) | Switching Frequency | Switching Durability [x 10000] | | Retention Time |
|------------|-----------------------------|--|---------------------|--------------------------------|------------|---------------------------------|
| | | | | Mechanical | Electrical | |
| SR-T5DL | 2a1b | AC100V (100 to 110 V 50 Hz/ 100 to 110 V 60 Hz) | 1800 Times/Hour | 50 | 50 | 2 ⁺² Seconds (Fixed) |
| SR-T9DL | 6a1b, 4a3b | AC200V (200 to 220 V 50 Hz/ 200 to 220 V 60 Hz) | | | | |

Note 1. The rating is the same as that on pages 150 and 153.

Note 2. The retention time is a value where the rated voltage is applied.

Note 3. Uses an electrolytic capacitor, so the retention time should be checked periodically.

Note 4. The contactor relay to be combined is an exclusive product that uses the AC operated type, and cannot be replaced by itself.

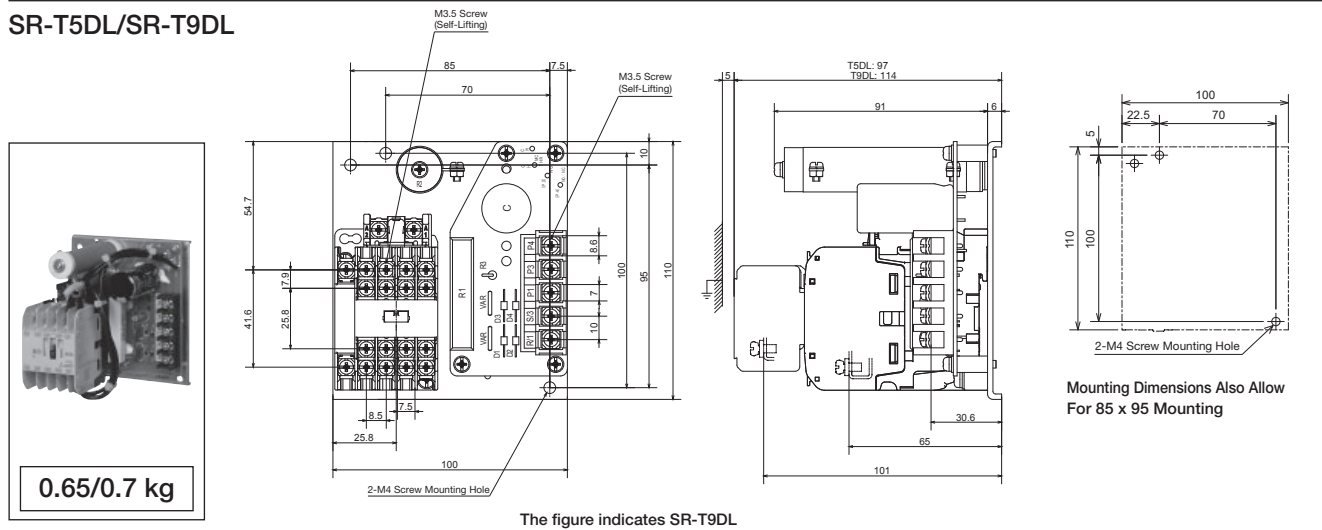
Note 5. For the operation coil, only AC100V and AC200V can be manufactured.

Coil Properties

| Model Name | Input [VA] | | Operating Voltage [V] | | Operating Time [ms] | |
|--------------------|------------|--------|---|---|-------------------------------------|---------------------------------------|
| | Momentary | Normal | Operation | Open | Operating Power ON --> Contact a ON | Operating Power OFF --> Contact a OFF |
| SR-T5DL SR-T9DL | 70 | 13 | 85% or Less of Control Coil Rated Voltage | 10% or More of Control Coil Rated Voltage | 7 to 100 | 10 to 100 |

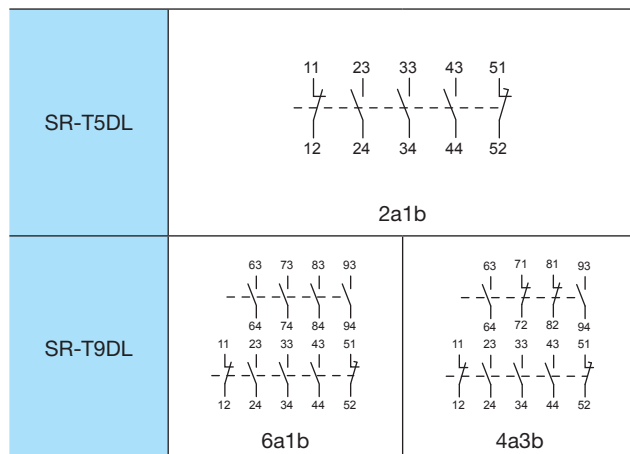
Outline Drawings

SR-T5DL/SR-T9DL

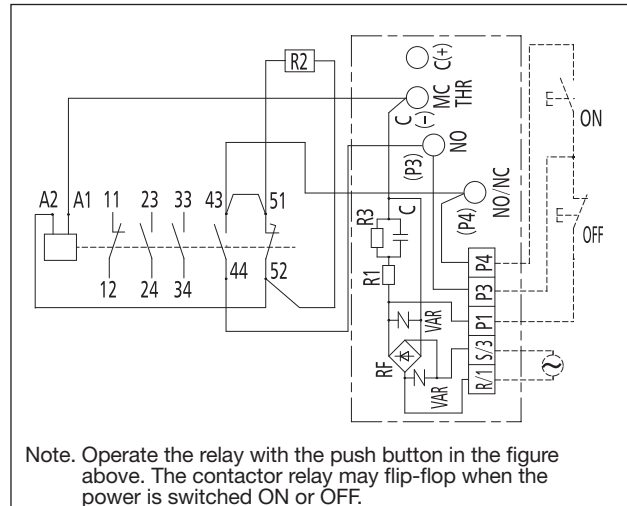


SR-T □ DL

Contact Arrangement



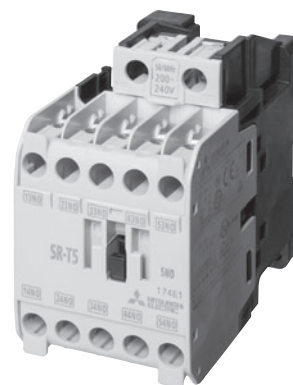
Connection Diagram



6.9 SR-T □ BC, SRD-T □ BC Contactor Relays with Wiring Streamlining Terminals

● SR(D)-T □ BC

SR-T □ BC with wiring streamlining terminal is capable of crimp lug wiring and bare wire wiring without removing the terminal cover.



● Specifications

(1) Specifications of the Contactor Relay With Wiring Streamlining Terminal

SR-T5BC

| Standard Specifications (Terminal Cover) + Wiring Streamlining Terminal | |
|---|---------------------|
| Model Name | Contact Arrangement |
| SR-T5BC | 5a, 4a1b |
| SRD-T5BC | 3a2b |
| SR-T9BC | 9a |
| SRD-T9BC | 7a2b 5a4b |

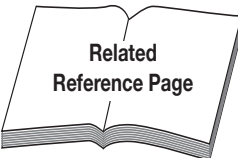
(2) Specifications of the Auxiliary Contact Unit With Wiring Streamlining Terminal

| Standard Specifications (Terminal Cover) | | |
|--|---------------------|---------------------------------------|
| Model Name | Contact Arrangement | Combinable Contactor Relay Model Name |
| UT-AX2BC | 2a | SR, SRD-T5BC |
| | 1a1b | |
| | 2b | |
| UT-AX4BC | 4a | |
| | 3a1b | |
| | 2a2b | |
| UT-AX11BC | 1a1b | |

● Application

Although all terminals are for the insertion wiring, it is also possible to wire using open-tip crimp lugs. (Ring crimp lugs can also be wired.)

To comply with DIN EN 50274/VDE 0660 Teil 514 finger safe specifications, be sure to completely cover the entire crimp portion of the crimp lug with an insulating sleeve.

|  | Item | Reference Page | Remarks |
|---|---------------------------------|----------------|---------------|
| | · Operation Coil | Page 41 | Same as SR-□. |
| | · Rating | Pages 150, 153 | Same as SR-□. |
| | · Properties | Page 154 | Same as SR-□. |
| | · Outline Drawings | Page 155 | Same as SR-□. |
| | · How to Order | Page 164 | — |
| | · Combining with Optional Units | Page 182 | — |

6 MS-T Series Contactor Type Contactor Relays

6.10 How to Order

Follow the steps below when ordering. (Enter a space in ▲.)

■ SR, SRD-T Contactor Relays

| Model Name | Operation Coil Designation | Contact Arrangement |
|---------------------------------|---|---|
| SR-T5 SRD-T5 | ▲ AC200V ▲ DC100V | ▲ 3A2B ▲ 4A1B |
| Specify from pages 150 and 151. | Select the coil designation from page 41 or specify the control circuit voltage and frequency used. | Specify the contact arrangement described on pages 150, 158, 159 and 161. |

■ SRL, SRLD-T(BC) Contactor Relays

| Model Name | Closing Control Coil | Tripping Control Coil | Contact Arrangement |
|---------------------------------|---|----------------------------|--|
| SRL-T5BC SRLD-T5BC | ▲ MC-AC200V ▲ MC-DC100V | ▲ MT-DC100V ▲ MT-DC100V | ▲ 3A2B ▲ 3A2B |
| Specify from pages 150 and 151. | Specify the closing (MC) and tripping (MT) operation coil designation (or coil voltage and frequency) from the ratings on pages 42 and 158. | | Specify a (valid) contact arrangement from page 159. |

■ SR-T DL Delay Open Contactor Relays

| Model Name | Operation Coil Designation | Contact Arrangement |
|------------------------|---|---|
| SR-T5DL | ▲ AC200V | ▲ 2A1B |
| Specify from page 162. | The operation coil designation is available in AC100V and AC200V. | Specify from the contact arrangement on page 162. |

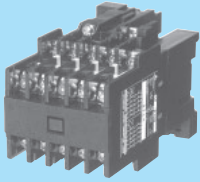


7

MS-K Series Contactor Type Contactor Relays

| | | |
|-----|--|-----|
| 7.1 | Model List | 166 |
| 7.2 | Selection and Application | 167 |
| 7.3 | Standard Type (AC Operated) Contactor Relays | |
| | SR-K100 | 168 |
| 7.4 | DC Operated Contactor Relays | |
| | SRD-K100 | 171 |
| 7.5 | Mechanically Latched Contactor Relays | |
| | SRL-K100, SRLD-K100 | 172 |
| 7.6 | Contactor Relays with Large Rated Auxiliary Contacts | |
| | SR/SRD-K100JH | 174 |
| 7.7 | Contactor Relays with Overlap Contacts | |
| | SR/SRD-K100LC | 175 |
| 7.8 | How to Order | 176 |

7.1 Model List

| | | | | |
|-------------------------------------|---|---|-----------|----|
| Appearance | |  | | |
| | | SR-K100 | | |
| Frame | | K100 | | |
| No. of Contacts | | 10 | | |
| Contact Arrangement | | 10a, 9a1b | | |
| | | 8a2b, 7a3b | | |
| | | 6a4b, 5a5b | | |
| Contact Rating (Note 2) | Conventional Free Air Thermal Current Ith [A] | | 16 | |
| | AC Rated Operational Current [A] | Category AC-15 (Coil Load) | AC110 V | 6 |
| | | | AC220 V | 5 |
| | | | AC440 V | 3 |
| | | | AC550 V | 3 |
| | AC Rated Operational Current [A] | Category AC-12 (Resistive Load) | AC110 V | 16 |
| | | | AC220 V | 12 |
| | | | AC440 V | 5 |
| | | | AC550 V | 5 |
| | DC Rated Operational Current [A] | Category DC-13 (Coil Load) | DC24 V | 5 |
| DC48 V | | | 3 | |
| DC110 V | | | 0.8 (2) | |
| DC220 V | | | 0.2 (0.8) | |
| DC Rated Operational Current [A] | Category DC-12 (Resistive Load) | DC24 V | 10 | |
| | | DC48 V | 8 | |
| | | DC110 V | 5 (8) | |
| | | DC220 V | 1 (3) | |
| Standard Type | | SR-□ | ◎ | |
| DC Operated Type | | SRD-□ | ◎ | |
| Mechanically Latched Type | | SRL-□ | ◎ | |
| | | SRLD-□ | ◎ | |
| With Large Rated Auxiliary Contacts | | SR-□JH | ○ | |
| | | SRD-□JH | ○ | |
| With Overlap Contacts | | SR-□LC | ○ | |
| | | SRD-□LC | ○ | |
| With Terminal Cover | | SR-□CX | - | |
| | | SRD-□CX | - | |
| Optional Units | Surge Absorber (Note 3) (Note 4) | | ○ | |
| | DC/AC Interface (Note 4) | | ○ | |
| | Live Part Protection Cover | | - | |
| IEC 35 mm Rail Mounting | | ◎ | | |
| 690 V Application | | ◎ | | |

Note 1. ◎ indicates standard, ○ indicates semi-standard and - indicates products outside production range.

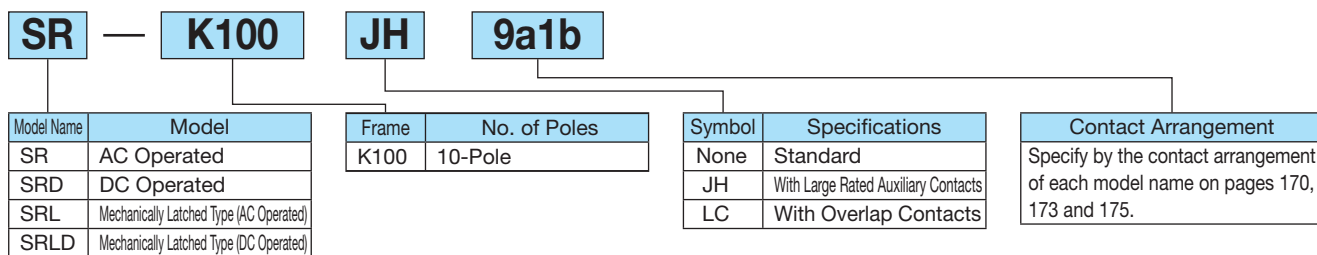
Note 2. Refer to the individual ratings chart for the contact ratings of large rated auxiliary contacts and overlap contacts. The value in parentheses indicates that when switching a 2-pole load in series.

Note 3. For the mechanically latched type (SRL-K100, SRLD-K100), 1 piece can be mounted on each closing coil and tripping coil.

Note 4. The coil terminal of the contactor relay does not allow the attachment of both the surge absorber and DC/AC interface unit.

7.2 Selection and Application

● Type Designations

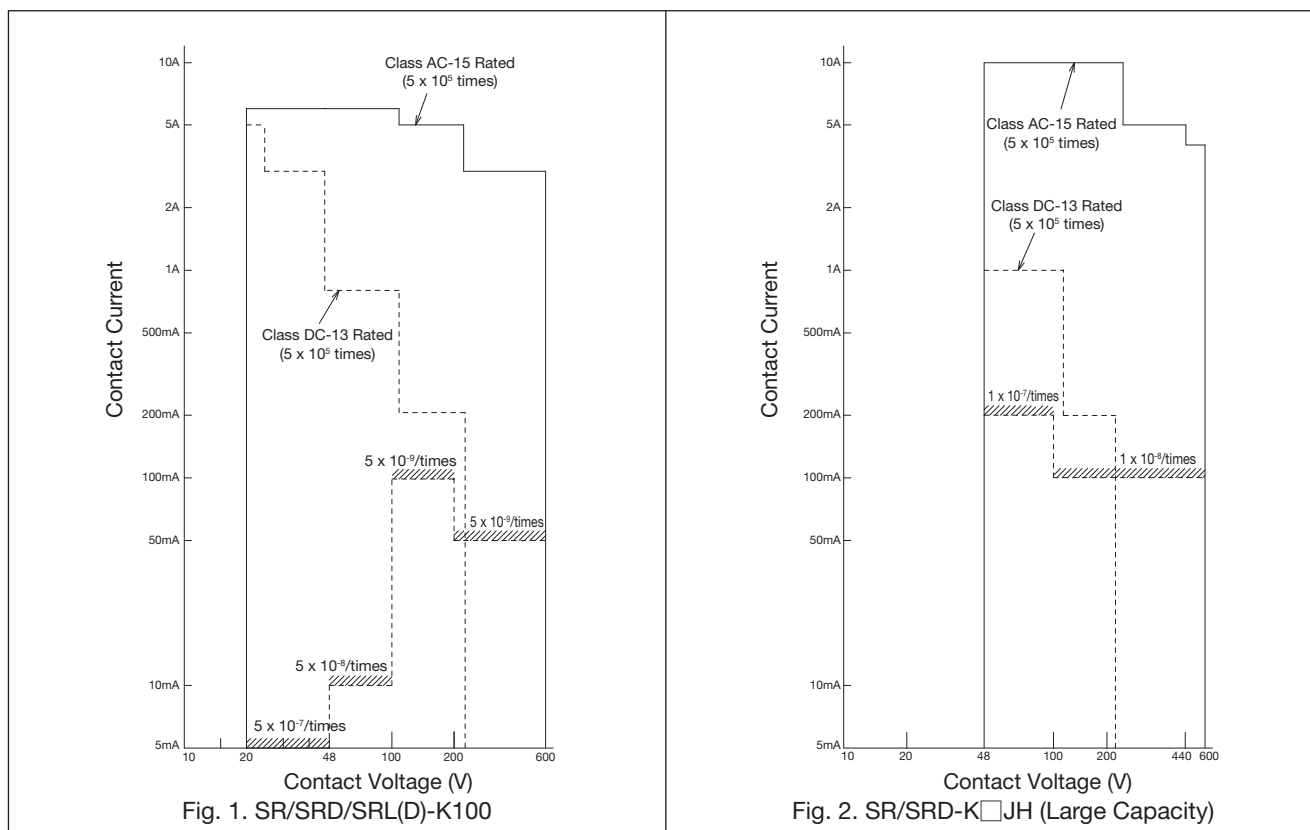


● Function and Operation Classification by Application Type

| Model Name | Operation Category | Application | Reference Page | Model Name | Operation Category | Application | Reference Page |
|------------|--------------------|---|----------------|------------|--------------------|--|----------------|
| SRD-K100 | DC | General control circuit sequence relay for magnetic contactor command contacts etc | Page 171 | SR-K100LC | AC | Applications that require the overlap switching of the make and break contacts | Page 175 |
| | | | | SRD-K100LC | DC | | |
| SRL-K100 | AC | Same applications as SR and SRD types and also those requiring memory functionality | Page 172 | | | | |
| SRLD-K100 | DC | | | | | | |
| SR-K100JH | AC | AC100 to 220 V, 3 to 10 A control of large breakers and solenoids | Page 174 | | | | |
| SRD-K100JH | DC | | | | | | |

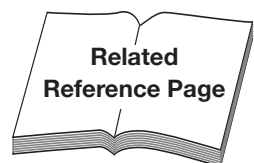
● Application by Contact Voltage, Current, Electrical Durability and Contact Reliability

For applications requiring greater contact reliability than indicated in Figs. 1 to 2, parallel contact connections (redundancy) are required. The reliability of the contacts decreases for contacts connected in series.



Note 1. The contact reliability indicates a 60% confidence rate for a λ 60 failure rate (no. of faults/times switching, no. of contacts)

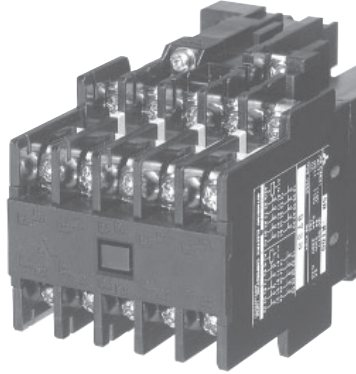
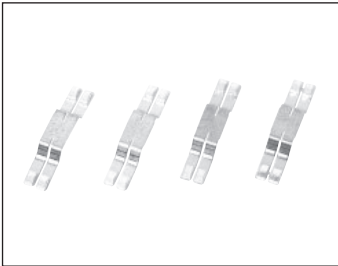
| Item | Reference Page | Remarks |
|---|----------------|---------|
| · Working Environment | Page 62 | — |
| · Mounting | Page 62 | — |
| · Wiring | Page 66 | — |
| · Control Circuit Power Supply Voltage Fluctuation Range | Page 67 | — |
| · Applicable Wire Size and Terminal Screw Tightening Torque | Page 65 | — |



7.3 SR-K100 Standard Type (AC Operated) Contactor Relays

● Features

- Rail mounting is fully adopted
IEC 35 mm rail mounting mechanism that dramatically reduces assembly time has been fully adopted.
- High contact reliability
The full adoption of twin contacts improves the contact reliability.



SR-K100

- Easy wiring
Uses self-lifting terminal screws that can reliably tighten wires, ring crimp lugs and square-tip crimp lugs.
- Clearly visible coil rating
- The make and break contacts can be used in different voltages
Strengthened insulation between poles and between upper and lower contacts of the same pole.

● Ratings (SR, SRD-K100/SRL, SRLD-K100)

| Frame | | K100 Note 7 | | |
|---|------------------------------------|------------------------------------|-----------|----|
| Contact Arrangement | | 10a, 9a1b (9a, 8a1b) | | |
| | | 8a2b, 7a3b (7a2b, 6a3b) | | |
| | | 6a4b, 5a5b (5a4b, 4a5b) | | |
| Rated Insulation Voltage [V] | | 660 | | |
| Conventional Free Air Thermal Current I _{th} [A] | | 16 | | |
| Contact Rating (Note 2) | AC Rated Operational Current [A] | Category AC-15 (Coil Load) | AC110 V | 6 |
| | | | AC220 V | 5 |
| | | | AC440 V | 3 |
| | | | AC550 V | 3 |
| | AC Rated Operational Current [A] | Category AC-12 (Resistive Load) | AC110 V | 16 |
| | | | AC220 V | 12 |
| | | | AC440 V | 5 |
| | | | AC550 V | 5 |
| | DC Rated Operational Current [A] | Category DC-13 (Coil Load) | DC24 V | 5 |
| | | | DC48 V | 3 |
| DC110 V | | | 0.8 (2) | |
| DC220 V | | | 0.2 (0.8) | |
| DC Rated Operational Current [A] | Category DC-12 (Resistive Load) | DC24 V | 10 | |
| | | DC48 V | 8 | |
| | | DC110 V | 5 (8) | |
| | | DC220 V | 1 (3) | |

Note 1. JIS C8201-5-1 classifications are class AC-15 applicable to AC solenoid and class DC-13 applicable to DC solenoid switching.
JIS C8201-5-1 classifications are class AC-12 applicable to AC resistive load switching and class DC-12 applicable to DC resistive load switching.

Note 2. The value in parentheses for the DC rated operational current indicates the rated operating current when switching a 2-pole load in series.

Note 3. The making and breaking capacities are 10 times with AC-15 and 1.1 times with DC-13.

Note 4. Electrical durability of 500,000 operations. (Class AC-15 at 220 V 3 A is 1 million operations, or 5 million operations at 1 A.)

Note 5. The minimum operating voltage and current differ depending on the allowable fault rate. Refer to Figure 1 and 2 on page 167 for details.

Note 6. The withstand voltage is AC2500 V for 1 minute.

Note 7. The contact arrangement for latched SRL-K100 and SRLD-K100 types is shown in parentheses.

● Performance (SR, SRD-K100/SRL, SRLD-K100)

| Frame | Making and Breaking Capacities | | | | Switching Frequency | Switching Durability | | |
|--------|--------------------------------|-------------------------|--------------------|----------------------|--|---|------------|---|
| | Category | Rated Operating Voltage | Making Current [A] | Breaking Current [A] | | Electrical | Mechanical | |
| K100 | AC-15 | AC110V | 66 | 66 | 1800 Times/Hour [Standard Type] [DC Operated Type] 1200 Times/Hour [Mechanically Latched Type] | Class AC-15 (AC Coil Load) 220 V 5 A, 0.5 mil. times 220 V 3 A, 1 mil. times 440 V 3 A, 0.5 mil. times Class DC-13 (DC Coil Load) 110 V 0.8 A, 0.5 mil. times 220 V 0.2 A, 0.5 mil. times | | 10 mil. times [Standard Type, DC Operated Type] 1 mil. times [Mechanically Latched Type] |
| | | AC220V | 55 | 55 | | | | |
| AC550V | | 33 | 33 | | | | | |
| DC-13 | DC24V | 20 | 20 | | | | | |
| | DC48V | 10 | 10 | | | | | |
| | DC110V | 2(5) | 2(5) | | | | | |
| | | DC220V | 0.4(1.5) | 0.4(1.5) | | | | |

Note 1. The DC values in parentheses are the making and breaking capacities when using 2-poles in series.

Note 2. Making current capacity tests are performed 100 times, while breaking current capacity tests are performed 25 times.

● Properties (SR, SR-K100JH)

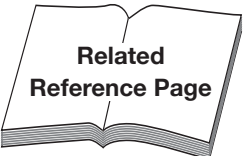
| Frame | Coil Input [VA] | | Coil Power Consumption [W] | Contact Arrangement | Operating Voltage [V] | | Operating Time [ms] | | | |
|-------|-----------------|--------|----------------------------|---------------------|-----------------------|-----------|--------------------------------|----------------------------------|----------------------------------|----------------------------------|
| | Inrush | Normal | | | Operation | Open | Coil ON→ Make Contact ON | Coil ON→ Break Contact OFF | Coil OFF→ Make Contact OFF | Coil OFF→ Break Contact ON |
| K100 | 50 | 10 | 3.0 | 10a | 125 to 156 | 85 to 120 | 9 to 17 | — | 4 to 13 | — |
| | | | | 5a5b | 120 to 153 | 87 to 123 | 9 to 17 | 7 to 14 | 4 to 12 | 5 to 14 |

Note 1. The above indicates rough property indices for AC200V coils.

Note 2. The drive voltage is that at a 20°C cold state at 60 Hz. Voltages for coils other than AC200V can be calculated proportionately.

Note 3. The input and power consumption are average values. These are almost the same for coils other than AC200V.

Note 4. The operating time is the value when applying 200 V at 60 Hz. These are almost the same for coils other than AC200V.
Make contacts and break contacts cannot be overlapped in time.

|  | Item | Reference Page | Remarks |
|---|---------------------------------|----------------|---------|
| | · Operation Coil | Page 41 | — |
| | · How to Order | Page 176 | — |
| | · Combining with Optional Units | Page 182 | — |

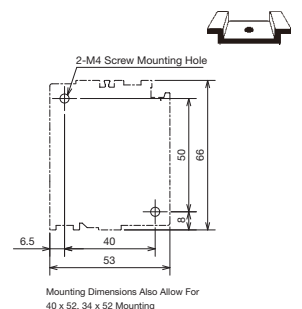
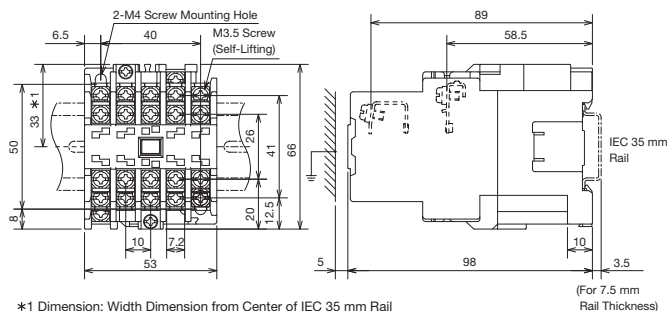
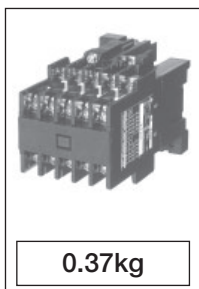
7 MS-K Series Contactor Type Contactor Relays

● Contact Arrangement/Contact Placement

| Frame | K100 |
|---------------------|------------|
| Contact Arrangement | 10a, 9a1b |
| | 8a2b, 7a3b |
| | 6a4b, 5a5b |
| Contact Placement | |
| | 10a |
| | 9a1b |
| | 8a2b |
| | 7a3b |
| | 6a4b |
| | 5a5b |

● Outline Drawings

SR-K100



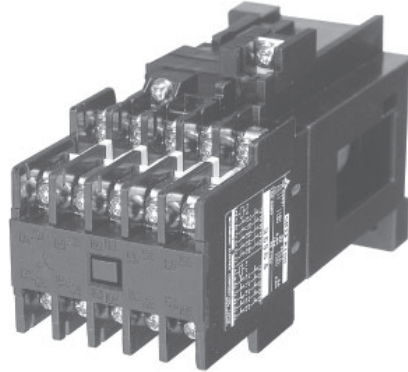
| Model Name | Model Number |
|------------|-------------------------------|
| SR-K100 | SR08 <input type="checkbox"/> |

mark indicates that it can be mounted on IEC 35 mm rails.

7.4 SRD-K100 DC Operated Contactor Relays

● Features

- IEC 35 mm rail mounting is adopted
- High contact reliability
The adoption of twin contacts improves the contact reliability.
- Excellent operational reliability and high frequency switching capacity
Uses a DC full-applied voltage type solenoid.



SRD-K100

- No buzzing sound
- No coil inrush current
The coil doesn't use saving resistance so there is no inrush current.

● Operation Coil Properties (SRD, SRD-K100JH, SRD-K100LC)

| Coil Designation | Coil Current 20°C [mA] | | Coil Resistance 20°C [Ω] | | Coil Designation | Coil Current 20°C [mA] | | Coil Resistance 20°C [Ω] | |
|------------------|------------------------|-------|--------------------------|-------|------------------|------------------------|-------|--------------------------|-------|
| | SRD-K | SRD-K | SRD-K | SRD-K | | SRD-K | SRD-K | SRD-K | SRD-K |
| DC100V | 67 | 1485 | DC24V | 276 | 87 | | | | |
| DC110V | 65 | 1692 | DC48V | 138 | 347 | | | | |
| DC200V | 34 | 5855 | DC125V | 56 | 2220 | | | | |
| DC220V | 31 | 7115 | | | | | | | |

Note. The coil current and coil resistance are the average values in the cold state.

● Properties (SRD, SRD-K100JH)

| Frame | Coil | | Operating Voltage [V] | | Operating Time [ms] | | | |
|-------|-----------------------|--------------------|-----------------------|----------|-----------------------------|-------------------------------|-------------------------------|-------------------------------|
| | Power Consumption [W] | Time Constant [ms] | Operation | Open | Coil ON→ Make Contact ON | Coil ON→ Break Contact OFF | Coil OFF→ Make Contact OFF | Coil OFF→ Break Contact ON |
| K100 | 7 | 40 | 52 to 70 | 12 to 30 | 40 to 63 | 37 to 53 | 7 to 15 | 11 to 20 |

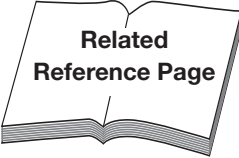
Note 1. The above indicates rough property indices for DC100V coils.

Note 2. The drive voltage is that at a 40°C cold state. Voltages for coils other than DC100V can be calculated proportionately.

Note 3. The power consumption and coil time constant are average values. These are almost the same for coils other than DC100V.

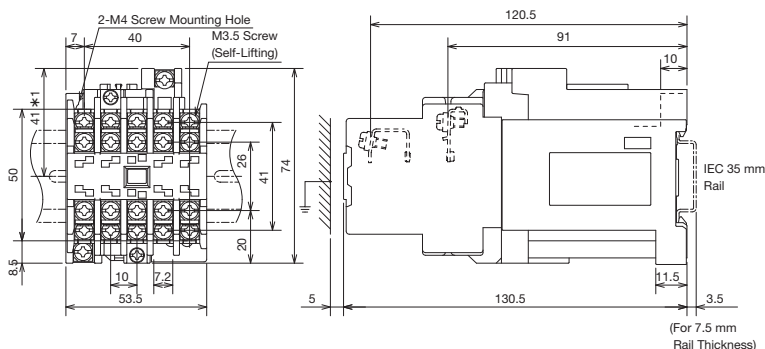
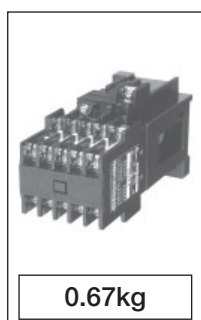
Note 4. The operating time is the value when applying DC100V (with 5% or less ripple). These are almost the same for coils other than DC100V.

Make contacts and break contacts cannot be overlapped in time.

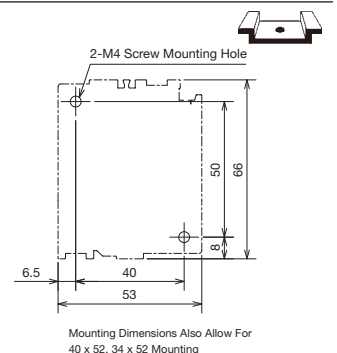
|  | Item | Reference Page | Remarks |
|---|---|------------------|---------|
| | | · Operation Coil | Page 42 |
| | · Rating | Pages 166, 168 | — |
| | · Performance | Page 169 | — |
| | · Contact Arrangement/Contact Placement | Page 170 | — |
| | · How to Order | Page 176 | — |
| | · Combining with Optional Units | Page 182 | — |

● Outline Drawings

SRD-K100



*1 Dimension: Width Dimension from Center of IEC 35 mm Rail



| Model Name | Model Number |
|------------|-------------------------------|
| SRD-K100 | SR13 <input type="checkbox"/> |

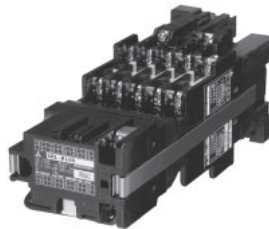
7 MS-K Series Contactor Type Contactor Relays

7.5 SRL-K100, SRLD-K100 Mechanically Latched Contactor Relays

SRL is SR with a mechanical latch mechanism attached at the top. Simply energizing the closing coil for approximately 0.5 seconds causes mechanical retention in the closed state, tripping only when the tripping coil is energized. Closing coils are available as SRL AC operated types or SRLD DC operated types. These are sometimes called keep relays or momentary energizing relays.

Features

- Can be used as a memory relay
The mechanical retention prevents opening due to power failures or voltage drops.
- Reduced coil power consumption
The constant power consumption of the solenoid of the operation coil can be reduced.
- Allows manual closing
- Allows manual tripping



SRL-K100

- No buzzing sound
- Stable operation
The self-demagnetizing break contact of the closing coil has been built into the latch mechanism.
- High contact reliability
The adoption of twin contacts improves the contact reliability.
- IEC 35 mm rail mounting is fully adopted

Performance

| Closing Coil Operation Category | Model Name | Tripping Coil Self-Demagnetizing | Closing Coil Self-Demagnetizing | Contact Arrangement (Valid) | Switching Frequency [Times/Hour] | Switching Durability (Ten Thousand Times) | |
|---------------------------------|------------|----------------------------------|---------------------------------|----------------------------------|----------------------------------|---|------------|
| | | | | | | Electrical | Mechanical |
| AC Operated | SRL-K100 | Incl. | Incl. | 9a, 8a1b, 7a2b, 6a3b, 5a4b, 4a5b | 1200 | 50 | 100 |
| DC Operated | SRLD-K100 | | | | | | |

Properties

| Frame | Operation Coil Input [VA] | Contact Arrangement | Operating Voltage [V] | | Operating Time [ms] | | | | |
|-------------|---------------------------|----------------------------|-----------------------|------------|-------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|----------|
| | | | Closing | Tripping | Closing Coil ON→ Make Contact ON | Closing Coil ON→ Break Contact OFF | Tripping Coil ON→ Make Contact OFF | Tripping Coil ON→ Break Contact ON | |
| AC Operated | SRL-K100 | Closing 100 Tripping 90 | 8a1b | 115 to 156 | 68 to 110 | 8 to 16 | 6 to 15 | 10 to 18 | 11 to 20 |
| | | | 4a5b | 115 to 155 | 70 to 115 | 8 to 16 | 6 to 15 | 10 to 18 | 11 to 20 |
| DC Operated | SRLD-K100 | Closing 90 Tripping 100 | 8a1b | 50 to 80 | 35 to 75 | 10 to 18 | 10 to 19 | 10 to 18 | 10 to 19 |
| | | | 4a5b | 45 to 80 | 35 to 80 | 10 to 20 | 10 to 19 | 10 to 18 | 10 to 19 |

Note: The above indicates rough property indices for AC200 V coils under AC operation (SRL-K100) and for DC100 V coils under DC operation (SRLD-K100).

Operation Coil Rating (SRL, SRLD-K100)

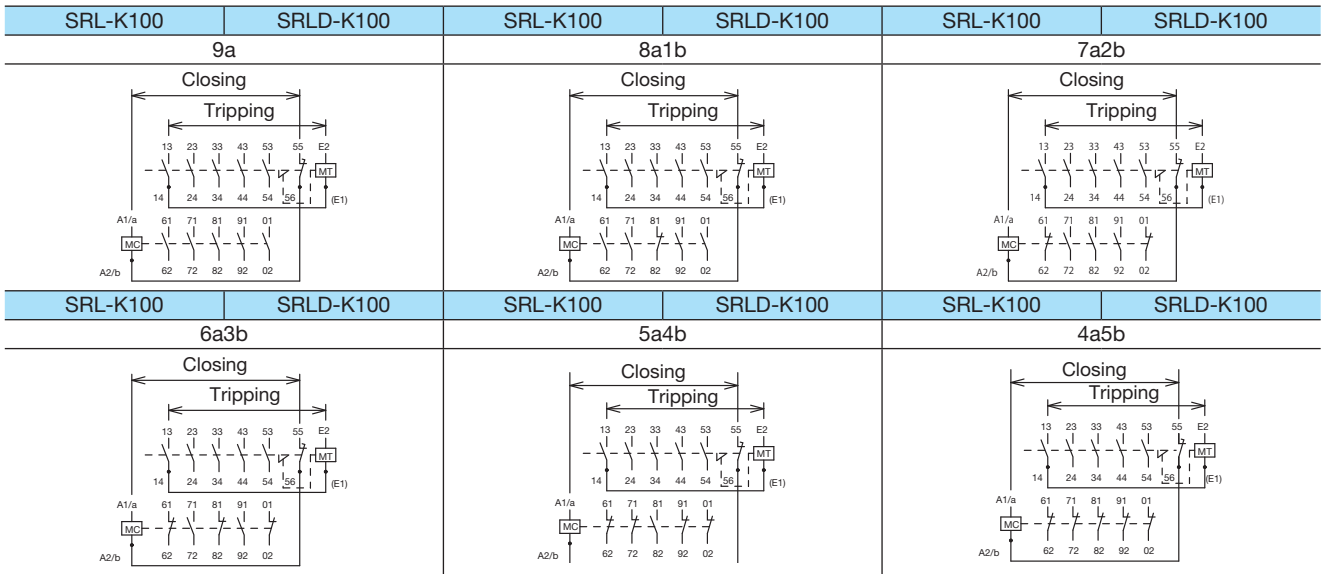
| Coil Designation | For AC | | Coil Indicator | For DC | | Coil Indicator |
|------------------|-------------------|------------|-----------------------------|------------------|-----------------|----------------|
| | Rated Voltage [V] | | | Coil Designation | Rated Voltage | |
| AC12V | 12 | 12 | Rated Voltage/ Frequency | DC12V | DC12 V | Rated Voltage |
| AC24V | 24 | 24 | | DC24V | DC24 V | |
| AC48V | 48 to 50 | 48 to 50 | | DC48V | DC48 V | |
| AC100V | 100 | 100 to 110 | | DC100V | DC100V to 110 V | |
| AC120V | 110 to 120 | 115 to 120 | | DC125V | DC120V to 125 V | |
| AC200V | 200 | 200 to 220 | | DC200V | DC200V to 220 V | |
| AC220V | 208 to 220 | 220 | | | | |
| AC260V | 240 to 260 | 260 to 280 | | | | |
| AC400V | 380 to 415 | 400 to 440 | | | | |
| AC440V | 415 to 440 | 460 to 480 | | | | |
| AC500V | 500 | 500 to 550 | | | | |

Note 1. DC coils have no polarity.

The designation is a symbol to be specified when ordering.

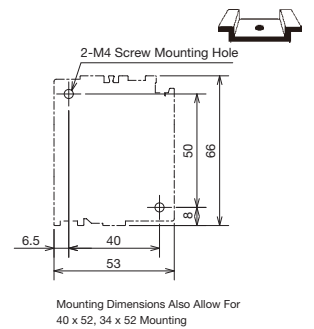
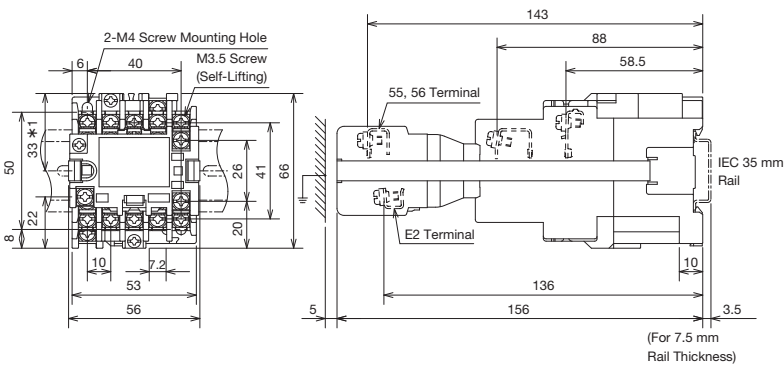
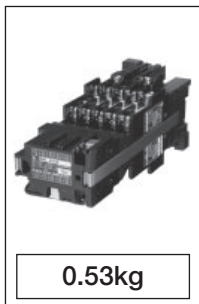
| | Item | Reference Page | Remarks |
|--|---------------------------------|----------------|------------------------|
| | · Rating | Pages 166, 168 | Same as SR- □ . |
| | · Handling | Page 159 | Same as SRL, SRLD- □ . |
| | · How to Order | Page 176 | — |
| | · Combining with Optional Units | Page 182 | — |

● Contact Arrangement/Contact Placement



● Outline Drawings

SRL-K100
SRLD-K100



| |
|------------|
| Model Name |
| SRL-K100 |
| SRLD-K100 |

* 1 Dimension: Width Dimension from Center of IEC 35 mm Rail

7.6 SR/SRD-K100JH Contactor Relays with Large Rated Auxiliary Contacts

SR-□JH type uses S-N11, S-N12 magnetic contactor contacts to be suitable for applications requiring use of comparatively large currents and great electrical durability.

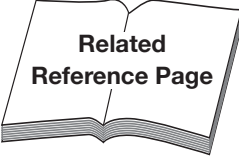
● Rating

| Model Name | | SR-K100JH SRD-K100JH | |
|--|--|-------------------------|--------|
| Contact Arrangement | | 10a, 9a1b | |
| | | 8a2b, 7a3b | |
| | | 6a4b, 5a5b | |
| Rated Insulation Voltage [V] | | 660 | |
| Conventional Free Air Thermal Current I _{th} [A] | | 20 | |
| Contact Rating | AC Rated Operational Current [A] Category AC-15 (Coil Load) | AC110 V | 10 (6) |
| | | AC220 V | 10 (5) |
| | | AC440 V | 5 (3) |
| | | AC550 V | 4 (3) |
| | AC Rated Operational Current [A] Category AC-12 (Resistive Load) | AC110 V | 20 |
| | | AC220 V | 16 |
| | | AC440 V | 10 |
| | | AC550 V | 10 |
| | DC Rated Operational Current [A] Category DC-13 (Coil Load) | DC24 V | 5 |
| | | DC48 V | 3 |
| | | DC110 V | 0.8 |
| | | DC220 V | 0.2 |
| DC Rated Operational Current [A] Category DC-12 (Resistive Load) | DC24 V | 10 | |
| | DC48 V | 8 | |
| | DC110 V | 5 | |
| | DC220 V | 1 | |

Note 1. Electrical durability of 500,000 operations.

Note 2. The value in parentheses for the AC rated operational current indicates the rated operating current when using different voltages.

Note 3. The minimum operating voltage and current differ depending on the allowable fault rate. Select from Figure 2 on page 167.

|  | Item | Reference Page | Remarks |
|---|---|----------------|-------------------------|
| | · Operation Coil | Pages 41, 42 | Same as SR-□ and SRD-□. |
| | · Properties | Pages 169, 171 | Same as SR-□ and SRD-□. |
| | · Contact Arrangement/Contact Placement | Page 170 | Same as SR-□ and SRD-□. |
| | · Outline Drawings | Pages 170, 171 | Same as SR-□ and SRD-□. |
| | · How to Order | Page 176 | — |
| | · Combining with Optional Units | Page 182 | — |

7.7 SR/SRD-K100LC Contactor Relays with Overlap Contacts

SR-□LC types with overlap contacts overlap operation by turning the break contact OFF after the make contact turns ON.

● Rating (SR, SRD)

| Model Name | | K100LC | | |
|---|------------------------------------|-------------------------------|---------|-----|
| Contact Arrangement | | 8a2b | | |
| | | 6a4b, 5a5b | | |
| Rated Insulation Voltage [V] | | 600 | | |
| Conventional Free Air Thermal Current I _{th} [A] | | 16 | | |
| Contact Rating | AC Rated Operational Current [A] | Category AC-15 (Coil Load) | AC110 V | 6 |
| | | | AC220 V | 5 |
| | | | AC440 V | 3 |
| | | | AC550 V | 3 |
| | Category AC-12 (Resistive Load) | AC110 V | 16 | |
| | | AC220 V | 12 | |
| | | AC440 V | 5 | |
| | | AC550 V | 5 | |
| | DC Rated Operational Current [A] | Category DC-13 (Coil Load) | DC24 V | 3 |
| | | | DC48 V | 2 |
| | | | DC110 V | 0.5 |
| | | | DC220 V | 0.1 |
| Category DC-12 (Resistive Load) | DC24 V | 8 | | |
| | DC48 V | 5 | | |
| | DC110 V | 3 | | |
| | DC220 V | 0.5 | | |

Note 1. The AC rated operational current for the make contact is shown in the table above.

The break contact rated making current is 20 A and the rated breaking current AC 24 to 550 V 3 A. (However, $\text{COS } \phi = 0.3$ to 1.0)

Note 2. The contacts may wear out through current switching and may not overlap. Take sufficient precautions.

● Contact Arrangement/Contact Placement

| SR-K100LC SRD-K100LC | | |
|-------------------------|------|------|
| 8a2b | 6a4b | 5a5b |
| | | |

| | Item | Reference Page | Remarks |
|---------------------------------|--------------------|--|--|
| | · Operation Coil | Pages 41, 42 | Same as SR-□ and SRD-□. |
| | · Properties | Pages 169, 171 | Same as SR-□ and SRD-□. However, break contact operating times differ. |
| | · Outline Drawings | Pages 170, 171 | Same as SR-□ and SRD-□. |
| | · How to Order | Page 176 | — |
| · Combining with Optional Units | Page 182 | Auxiliary contact units and front clip-on timer units cannot be combined together. | |

7 MS-K Series Contactor Type Contactor Relays

7.8 How to Order

Follow the steps below when ordering. (Enter a space in ▲.)

■ SR, SRD-K Type Contactor Relays

| Model Name | Operation Coil and Designation | Contact Arrangement |
|---------------------------------|--|---|
| SR-K100 SRD-K100 | ▲ AC200V ▲ DC100V | ▲ 5A1B ▲ 5A5B |
| Specify from pages 166 and 167. | Select the operation coil designation (or coil voltage and frequency) from the ratings on pages 41 and 42. | Specify from the contact arrangement on page 170. |

■ SRL, SRLD-K Type Mechanically Latched Contactor Relays

| Model Name | Closing Control Coil | Tripping Control Coil | Contact Arrangement |
|---------------------------------|---|----------------------------|--|
| SRL-K100 SRLD-K100 | ▲ MC-AC200V ▲ MC-DC100V | ▲ MT-DC100V ▲ MT-DC100V | ▲ 5A4B ▲ 5A4B |
| Specify from pages 166 and 167. | Specify the closing (MC) and tripping (MT) operation coil designation (or coil voltage and frequency) from the ratings on page 172. | | Specify a (valid) contact arrangement from page 173. |





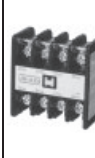





















8

Optional Units











| | | |
|------|--|-----|
| 8.1 | Model List (for MS-T/N Series) | 178 |
| 8.2 | Applicable Model List (for MS-T/N Series) | 180 |
| 8.3 | Auxiliary Contact Units UT/UN-AX□ | 183 |
| 8.4 | Auxiliary Contact Units with Contact for Low-Level Signals UN-LL22 ... | 189 |
| 8.5 | Operation Coil Surge Absorber Units UT/UN-SA□ | 191 |
| 8.6 | Main Circuit Surge Absorber Units UT/UN-SA33□ | 198 |
| 8.7 | Mechanical Interlock Units UT/UN-ML□ | 199 |
| 8.8 | Main Circuit Conductor Kits UT/UN-SD□, SG□, YD□, UN-RY□, YG□ | 202 |
| 8.9 | 3-Pole Array Connection Units UT/UN-YY□ | 203 |
| 8.10 | DC/AC Interface Units for Operation Coils UT/UN-SY□ | 204 |
| 8.11 | Live Part Protection Cover Units UT/UN-CV□, CZ□ | 207 |
| 8.12 | Terminal Cover Units UT-CW□ | 213 |
| 8.13 | Reset Release for Thermal Overload Relays UT/UN-RR□ | 214 |
| 8.14 | Fluorescent Display Lamps for Thermal Overload Relays UN-TL□ | 215 |
| 8.15 | Independent Mounting Units for Thermal Overload Relays UT-HZ18, UN-RM20 | 216 |
| 8.16 | Connecting Conductor Kits for Magnetic Starters UT/UN-TH□ | 217 |
| 8.17 | Fault Detection Units (Contact Weld Detection Relays) UN-FD, UN-FD4 | 218 |
| 8.18 | How to Order | 220 |
| 8.19 | Model List (for MS-K Series) | 221 |
| 8.20 | Applicable Model List (for MS-K Series) | 221 |
| 8.21 | DC/AC Interface Units for Operation Coils UA-SY□ | 222 |
| 8.22 | How to Order | 224 |


















8.1 Model List (for MS-T/N Series)

| Model Name | Auxiliary Contact Blocks | | | | | | | | | Auxiliary Contact Units for Low-level Signals |
|--------------------------|---|---|---|---|---|---|---|--|---|--|
| Type | UT-AX2(BC) | UT-AX4(BC) | UT-AX11(BC) | UN-AX2(CX) | UN-AX4(CX) | UN-AX11(CX) | UN-AX80 | UN-AX150 | UN-AX600 | UN-LL22(CX) |
| Mounting | Front Clip-on | | Side Clip-on | Front Clip-on | | Side Clip-on | | | | Front Clip-on |
| Specification/ Functions | Twin Contact Built-in 2-Pole Auxiliary Contact (2a, 1a1b, 2b) | Twin Contact Built-in 4-Pole Auxiliary Contact (4a, 2a2b, 3a1b) | Twin Contact Built-in 2-Pole Auxiliary Contact (1a1b) | Twin Contact Built-in 2-Pole Auxiliary Contact (2a, 1a1b, 2b) | Twin Contact Built-in 4-Pole Auxiliary Contact (4a, 2a2b, 3a1b) | Twin Contact Built-in 2-Pole Auxiliary Contact (1a1b) | Twin Contact Built-in 2-Pole Auxiliary Contact (1a1b) | Twin Contact Built-in 2-Pole Auxiliary Contact (1a1b) | Twin Contact Built-in 4-Pole Auxiliary Contact (2a2b) | Total 4-Pole Structure Auxiliary Contacts for Low-Level Signal and Twin (Standard) Types For Low-Level Signals 1a1b (5 V 5 mA) Twin Contact 1a1b (20 V 5 mA) |
| Appearance |  |  |  |  |  |  |  |  |  |  |
| (Typical Example) | UT-AX2 | UT-AX4 | UT-AX11 | UN-AX2 | UN-AX4 | UN-AX11 | UN-AX80 | UN-AX150 | UN-AX600 | UN-LL22 |
| Acquired Standards | UL/CSA | UL/CSA | UL/CSA | UL/CSA | UL/CSA | UL/CSA | UL/CSA | UL/CSA | UL/CSA | UL/CSA |
| Mass [g] | 20 | 50 | 50 | 30 | 50 | 40 | 55 | 35 | 200 | 60 |
| Other | Cannot be used in combination with UT-AX11(BC). | | Cannot be used in combination with UT-AX2 or 4(BC). | Cannot be used in combination with UN-AX11(CX). | | Cannot be used in combination with UN-AX2, 4, or LL22(CX). | | — | | Cannot be used in combination with UN-AX11(CX). |
| Reference Page | 183 | | | | | | | | | 189 |

| Model Name | DC/AC Interface Units for Operation Coils | | | | | | | | Protection Cover Units | | | | | | | | |
|--------------------------|---|---|---|---|---|--|---|---|---|--|---|--|---|---|----------------------------------|--|---|
| Type | UT-SY21(BC) | UT-SY22(BC) | UN-SY11 | UN-SY12 | UN-SY21(CX) | UN-SY22(CX) | UN-SY31 | UN-SY32 | UN-CV□0 | UN-CV251, CV□2 | UN-CZ605 | UN-CZ□0 | UN-CZ□2 | UN-CZ□1 | UN-CZ□4 | UT-CV□, UN-CV□ | UT-CW□ |
| Mounting | Top-On | | For Independent Mounting | | Top-On | | | Front Clip-on | | | | | | | | | |
| Specification/ Functions | Enables AC-operated magnetic contactors and relays to be operated at DC24 V | | | | | | | | Live Part Protection Cover | | | | | | | Misoperation Prevention Cover | Terminal Cover |
| | Triac Output | Relay Output | Triac Output | Relay Output | Triac Output | Relay Output | Triac Output | Relay Output | For Magnetic Contactors For Contactor Relays | For Magnetic Starters (MSO-) | For Thermal Overload Relays (TH-T65, TH-N60) | For Magnetic Contactors (Power Supply Side, Load Side) For Magnetic Starters (Power Supply Side) | For Reversible Magnetic Contactors | For Magnetic Starters (Load Side) | For Reversible Magnetic Starters | UT-CV107 For Magnetic Contactors/ Contactor Relays UN-CV□3 For Thermal Overload Relays (TH-) | For Magnetic Contactors For Magnetic Starters For Thermal Overload Relays |
| | Input DC24 V 15 mA | Input DC24 V 10 mA | Input DC24 V 15 mA | Input DC24 V 10 mA | Input DC24 V 15 mA | Input DC24 V 10 mA | Input DC24 V 15 mA | Input DC24 V 10 mA | | | | | | | | | |
| Appearance |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | | |
| (Typical Example) | UT-SY21 | | UN-SY11 | | UN-SY21 | | UN-SY32 | | UN-CV250 | UN-CZ605 | UN-CZ500 | UN-CZ501 | UN-CV203 | UT-CW800 | | | |
| Acquired Standards | | | | | | | | | | | | | | | | | |
| Mass [g] | 30 | 60 | 40 | 40 | | | | | | | | | | | | | |
| Other | — | | | | | | | | — | | | | | | | | |
| Reference Page | 204 | | | | | | | | 207 | | | | | | | 213 | |

Note 1. There are limitations on models, rated voltage and combined use.

| Operation Coils Surge Absorber Unit | | | | | | | | | | Main Circuit Surge Absorber Unit | |
|---|---|---|---|--|--|---|---|---|---|-----------------------------------|----------------------|
| UT-SA□3 | UT-SA21 | UT-SA22 | UT-SA25 | UN-SA721 | UN-SA712 | UN-SA722 | UN-SA713 | UN-SA723 | UN-SA725 | UT-SA33□ | UN-SA33 |
| Top-On | | | | | | | | | | Front Clip-on | Independent Mounting |
| Surge Absorbers for Operation Coils | | | | | | | | | | Surge Absorbers for Main Circuits | |
| With CR | With Varistor | With Varistor + Indicator Lamp | With Varistor + CR | With Varistor | With Varistor | With Varistor + Indicator Lamp | With CR | With CR | With Varistor + CR | With CR | |
| UT-SA23 AC200V AC48 V UT-SA13 DC200V | AC24 V (DC Shared Use) AC48 V (DC Shared Use) AC200 V (DC Shared Use) AC400 V | AC200 V (DC Shared Use) | AC48 V (DC Shared Use) AC200 V (DC Shared Use) | AC48 V (DC Shared Use) AC100 V (DC Shared Use) AC200 V (DC Shared Use) AC400 V | AC48 V (DC Shared Use) AC100 V (DC Shared Use) AC200 V (DC Shared Use) AC400 V | AC100 V (DC Shared Use) AC200 V (DC Shared Use) | DC200 V | AC200 V | AC48 V (DC Shared Use) AC100 V (DC Shared Use) AC200 V (DC Shared Use) | AC240 V (AC100 to 240 V) | |
|  |  |  |  |  |  |  |  |  |  | | |
| UL/CSA | UL/CSA | | UL/CSA | UL/CSA | | | | | | | |
| 13 | | 18 | 17 | 20 | 25 | 25 | 25 | 20 | 25 | | 78 |
| — | | | | | | | | | | — | |
| 191 | | | | | | | | | | 198 | |

| Mechanical Interlock Units | | Main Circuit Conductor Kits | | | | | | | 3-Pole Array Connection Units | Connecting Conductor Kits | Fault Detection Units | Reset Releases | Fluorescent Display Lamps | Independent Mounting Units | | | |
|---|--|---|---|---|---|---|--|---|---|---|---|---|---|---|---|---|--|
| UT-ML20 (BC) | UN-ML□ | UT-SD□ | UN-SD□ | UT-SG□ | UN-SG□ | UN-YG□ | UT-YD20 | UN-YD□ | UT-YY20, UN-YY□ | UT-TH50, UN-TH□ | UN-FD□ (CX) | UT-RR□ | UN-RR□ | UN-TL□ | UT-HZ18 (BC) | UN-RM20 | |
| Side Clip-on | | Main Circuit | | | | | | | | | | Independent Mounting | Front Clip-on | | Front Clip-on | — | |
| Combines with 2 units of independent magnetic contactors to constitute a reversing type. Electrical Interlock 2-Break Contact Built-in Type | Combines with 2 units of independent magnetic contactors to constitute a reversing type. | Connecting Conductors for Reversing Type Magnetic Contactors | | Connecting Conductors for Reversing Type Magnetic Contactors Crossover | | 3-Pole Short-Circuit Connecting Conductors | 2-Pole Short-Circuit Connecting Conductors | | 3-Pole Parallel Connecting Conductors | Connecting Conductors for Magnetic Contactors and Thermal Overload Relays | Detects the conduction mode of the main circuit (contact welding) AC100 V AC200 V | For Thermal Reset From Outside the Panel 200 mm 400 mm 550 mm 700 mm | | Thermal Overload Relay Trip Display AC100 V AC200 V DC24 V | Allows screwmounting and IEC 35 mm railmounting for TH-T18 | Allows IEC 35 mm railmounting for TH-T25 | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |
| UL/CSA | UL/CSA | | | | | | | | | | 120 | | | | 35 | 20 | |
| — | | — | | | | | | | | | | — | — | | — | — | |
| 199 | | 202 | | | | | | | 203 | 217 | 218,313 | 214 | 214 | 215 | 216 | | |

Type Designation Structure

(E.g.) **UT** - **SA** **21** ▲ **AC200V**

Symbol Indicates Unit

Symbol Indicates Unit Product Name (Table at right)

Rated Voltage Designation Indicates specifications, applicable models etc. of the units. (Enter a space in ▲.)

| Symbol | Product Name | Symbol | Product Name |
|--------|---|--------|--|
| AX | Auxiliary Contact Units | ML | Mechanical Interlock Units |
| LL | Auxiliary Contact Units with Contact for Low-level Signals | SD | Reversing Main Circuit Conductor Kits |
| SA | For Operation Coils or Main Circuit Surge Absorber Units | SG | Main Circuit Conductor Kits for Crossover |
| SY | DC24 V → AC100 to 240 V DC/AC Interface Units for Operation Coils | YG | 3-Pole Short Circuit Main Circuit Conductor Kits |
| CV | Live Part Protection Covers (Magnetic Starters, Contactor Relays) | YD | 2-Pole Short Circuit Main Circuit Conductor Kits |
| CZ | | RR | Thermal Overload Relay Reset Release Units |
| CW | Misoperation Prevention Covers (Magnetic Contactors, Relays, Thermal Overload Relays) | TL | Thermal Overload Relay Trip Indicator Lamps |
| CV | | HZ | Independent Mounting Units for Thermal Overload Relays |
| | | RM | |

8.2 Applicable Model List

Those with an x in the Applicable Models column cannot be combined

Magnetic Starters/Magnetic Contactors

| Section | Product Name | Model Name | Specifications | See Page | Applicable Models | | | | | | | |
|---------|--|------------|---|----------|--|---|---|----------------------------------|--|---|--------------------|------------------|
| | | | | | Magnetic Starters, Magnetic Contactors | | | | | | | |
| | | | | | AC Operated | DC Operated | Latched Type | Enclosed Type (MS-T/N/□) | Delay Open Type (S-T/N/□DL) | With Saturable Reactor (MSO-T/N/□SR) | | |
| 1 | Auxiliary Contact Units | UT-AX2 | 2-Pole | 183 | S-T10 to T50 | SD-T12 to T50 | x | x | x | MSO-T10SR to T50SR | | |
| | | UT-AX4 | 4-Pole | | | | SL(D)-T21 | | | | | |
| | | UT-AX11 | 2-Pole 1A1B | | UN-AX2 | 2-Pole | S-T65, T80 S-N38, N48 DU-N30 | SD-T65, T80 DUD-N30 | x | x | x | MSO-T65SR, T80SR |
| | | UN-AX4 | 4-Pole | | | | | | | | | |
| | | UN-AX11 | 2-Pole 1A1B | | S-T65, T80 DU-N30 | SD-T65, T80 DUD-N30 | SL(D)-T65, T80 | x | x | MSO-T65SR, T80SR | | |
| | | UN-AX80 | 2-Pole 1A1B | | S-T100, S-N125 DU-N60 | SD-T100, SD-N125 DUD-N60 | SL(D)-T100 SL(D)-N125 | x | x | MSO-T100SR MSO-N125SR | | |
| | | UN-AX150 | 2-Pole 1A1B | | S-N150 to N400 DU-N120, N180, N260 | SD-N150 to N400 DUD-N120, N180, N260 | SL(D)-N150 to N400 | MS-N150 to N400 | S-N150DL to N400DL (Left Side Only) | MSO-N150SR to N400SR | | |
| | | UN-AX600 | 4-Pole 2A2B | | S-N600, N800 | SD-N600, N800 | SL(D)-N600, N800 | x | x | x | | |
| 2 | Auxiliary Contact Units with Contact for Low-level Signals | UN-LL22 | 4-Pole 1A1B (Low-Level) + 1A1B (Standard Contact) | 189 | S-T65, T80 DU-N30 | SD-T65, T80 DUD-N30 | x | x | x | MSO-T65SR to T80SR | | |
| 3 | Operation Coil Surge Absorber Units | UT-SA13 | C + R | 191 | S-T10 to T50 B-T21 S-N38, N48 | SD-T12 to T50 BD-T21 | SLD-T21 to T50 (Closing Coil) | MS-T10, 12, 21 | x | x | MSO-T10SR to T50SR | |
| | | UT-SA21 | Varistor | | | | SL(D)-T21 to T50 (Closing Coil) | | x | | | |
| | | UT-SA22 | Varistor + Indicator Lamp | | x | SL-T21 to T50 (Closing Coil) | x | x | x | | | |
| | | UT-SA23 | C + R | | | SD-T12 to T50 BD-T21 | SL(D)-T21 to T50 (Closing Coil) | x | x | | | |
| | | UT-SA25 | Varistor + CR | | x | SD-T65, T80 DUD-N30 | SL(D)-T21 to T50 (Tripping Coil) | x | x | x | | |
| | | UN-SA712 | Varistor + Indicator Lamp | | | | SLD-T21 to T80 (Tripping Coil) | x | x | x | | |
| | | UN-SA713 | C + R | | x | SD-T65, T80 DUD-N30 | SL(D)-T21 to T80 (Tripping Coil) | x | x | x | | |
| | | UN-SA721 | Varistor | | | | SL(D)-T65, T80 (Tripping Coil) | x | x | x | | |
| | | UN-SA722 | Varistor + Indicator Lamp | | x | SD-T65, T80 DUD-N30 | SL(D)-T65, T80 (Tripping Coil) | x | x | x | | |
| | | UN-SA723 | C + R | | | | SL(D)-T65, T80 (Tripping Coil) | | | | | |
| | | UN-SA725 | Varistor + C + R | | x | SD-T65, T80 DUD-N30 | SL(D)-T21 to T80 (Tripping Coil) | x | x | x | | |
| 4 | Main Circuit Surge Absorber Units | UT-SA3320 | C + R Delta Connection | 198 | S-T10 to T20 | SD-T12, T20 | x | x | S-T12DL | MSO-T10SR to T20SR | | |
| | | UT-SA3332 | | | S-T21 to T32 | SD-T21, T32 | x | x | S-T21DL | MSO-T21SR to T25SR | | |
| | | UN-SA33 | | | S-T10 to T100 S-N125 to N800 | SD-T12 to T100 SD-N125 to N800 | SL(D)-T21 to T100 SL(D)-N125 to N800 | MS-T10 to T21 MS-N125 to N400 | S-T21DL S-N125DL to N400DL | MSO-T10SR to T100SR MSO-N125 to N400SR | | |
| 5 | DC/AC Interface Units for Operation Coils | UT-SY21 | Triac Output | 204 | S-T10 to T50 B-T21 | x | x | x | x | MSO-T10SR to T50SR | | |
| | | UT-SY22 | Contact Output | | | | | | | | | |
| | | UN-SY11 | Triac Output | | S-T10 to T100 S-N125 to N400 | | | | | | | |
| | | UN-SY12 | Contact Output | | | | | | | | | |
| | | UN-SY21 | Triac Output | | S-N38, N48 | | | | | | | |
| | | UN-SY22 | Contact Output | | | | | | | | | |
| UN-SY31 | Triac Output | S-T65, T80 | | | | | | | | | | |
| UN-SY32 | Contact Output | | | | | | | | | | | |

| Section | Product Name | Model Name | Specifications | See Page | Applicable Models | | | | | |
|-----------|---|------------------|--|---|---|---------------------------------|----------------------|---|-------------------------------|---|
| | | | | | Magnetic Starters, Magnetic Contactors | | | | | |
| | | | | | AC Operated | DC Operated | Latched Type | Enclosed Type (MS-N□) | Delayed Release Type (S-N□DL) | With Saturable Reactor (MSO-N□SR) |
| 6 | Protection Cover Units | UT-CV107 | Operation Prevention Covers Magnetic Contactors/ Contactor Relays Manual Operation Prevention | 207 | S-T10 to T50, B-T21 | SD-T12 to T50, BD-T21 | × | × | × | × |
| | | UN-CV117 | | | S-T65,T80 | SD-T65,T80 | × | × | × | × |
| | | UN-CZ500 | Power Supply Side Terminals Load Side Terminals For Magnetic Contactors For Magnetic Starters (Power Supply Side Terminals) | | S-T65,T80, DU-N30 | SD-T65,T80, DUD-N30 | SL(D)-T65, T80 *1 | <ul style="list-style-type: none"> ● No UN-CZ□ types can be combined with enclosed types, delay open types or saturable reactor attached types. ● Use the following covers for the latch mechanism. <ul style="list-style-type: none"> * 1 : UN-CZ506(1 pc) * 2 : UN-CZ806(1 pc) * 3 : UN-CZ506(2 pcs) * 4 : UN-CZ806(2 pcs) | | |
| | | UN-CZ800 | | | S-T100, B-N65 | SD-T100, BD-N65 | SL(D)-T100 *2 | | | |
| | | UN-CZ1250 | | | S-N125, B-N100, DU-N60 | SD-N125, BD-N100, DUD-N60 | SL(D)-N125 *2 | | | |
| | | UN-CZ1500 | | | S-N150, DU-N120 | SD-N150, DU-N120 | SL(D)-N150 *2 | | | |
| | | UN-CZ2200 | | | S-N180,N220, DU-N180 | SD-N220, DUD-N180 | SL(D)-N220 *2 | | | |
| | | UN-CZ3000 | | | S-N300,N400, DU-N260 | SD-N300,N400, DUD-N260 | SL(D)N300, N400 *2 | | | |
| | | UN-CZ501 | | | For Magnetic Starters (Load Side Terminals) | MSO-T65,T80 | MSOD-T65,T80 | | MSOL(D)-T65,T80 *1 | |
| | | UN-CZ801 | MSO-T100 | | | MSOD-T100 | MSOL(D)-T100 *2 | | | |
| | | UN-CZ1251 | MSO-N125 | | | MSOD-N125 | MSOL(D)-N125 *2 | | | |
| | | UN-CZ1501 | MSO-N150 | | | MSOD-N150 | MSOL(D)-N150 *2 | | | |
| | | UN-CZ2201 | MSO-N180,N220 | | | MSOD-N220 | MSOL(D)N220 *2 | | | |
| | | UN-CZ3001 | MSO-N300,N400 | | MSOD-N300,400 | MSOL(D)-N300,N400 *2 | | | | |
| | | UN-CZ502 | For Reversible Magnetic Contactors | | S-2×T65,T80 | SD-2×T65,T80 | SL(D)-2×T65,T80 *3 | | | |
| | | UN-CZ802 | | | S-2×T100 | SD-2×T100 | SL(D)-2×T100 *4 | | | |
| | | UN-CZ1252 | | | S-2×N125 | SD-2×N125 | SL(D)-2×N125 *4 | | | |
| | | UN-CZ1502 | | | S-2×N150 | SD-2×N150 | SL(D)-2×N150 *4 | | | |
| | | UN-CZ2202 | | | S-2×N180,N220 | SD-2×N220 | SL(D)-2×N220 *4 | | | |
| | | UN-CZ3002 | S-2×N300,N400 | | SD-2×N300,N400 | SL(D)-2×N300,N400 *4 | | | | |
| | | UN-CZ504 | For Reversible Magnetic Starters | | MSO-2×T65,T80 | MSOD-2×T65,T80 | MSOL(D)-2×T65,T80 *3 | | | |
| | | UN-CZ804 | | | MSO-2×T100 | MSOD-2×T100 | MSOL(D)-2×T100 *4 | | | |
| | | UN-CZ1254 | | | MSO-2×N125 | MSOD-2×N125 | MSOL(D)-2×N125 *4 | | | |
| UN-CZ1504 | MSO-2×N150 | MSOD-2×N150 | | MSOL(D)-2×N150 *4 | | | | | | |
| UN-CZ2204 | MSO-2×N180,N220 | MSOD-2×N220 | | MSOL(D)-2×N220 *4 | | | | | | |
| UN-CZ3004 | MSO-2×N300,N400 | MSOD-2×N300,N400 | MSOL(D)-2×N300,N400 *4 | | | | | | | |
| UN-CZ506 | Latch Mechanism Live Part Protection Covers | × | × | SL(D)-(2×)T65,T80 MSOL(D)-(2×)T65,T80 | × | × | × | | | |
| UN-CZ806 | | × | × | SL(D)-2×T100 MSOL(D)-2×T100 SL(D)-2×N125 to N400 MSOL(D)-2×N125 to N400' | × | × | × | | | |
| 7 | Mechanical Interlock Units | UT-ML20 | For Reversing Configuration ML11 Only Electrical Interlock 2-Break Contact Built-in Type | 199 | S-T10 to T20(Note1) | SD-T12,T20 | × | × | × | × |
| | | UN-ML21 | | | S-T21 to T80 | SD-T21 to T80 | SL(D)-T21 | × | × | × |
| | | UN-ML80 | | | S-T100, S-N125 | SD-T100, SD-N125 | SL(D)-N125 | × | × | × |
| | | UN-ML150 | | | S-N150 | SD-N150 | SL(D)-N150 | × | × | × |
| | | UN-ML220 | | | S-N180 to N400 | SD-N220 to N400 | SL(D)N220 to N400 | × | × | × |
| 8 | Main Circuit Conductor Kits | UT-SD | For Reversing for Magnetic Contactors For Crossover for Magnetic Contactors For Reversing for Magnetic Contactors For Crossover for Magnetic Contactors For 3-Pole Short-Circuit For 2-Pole Short-Circuit For 2-Pole Short-Circuit | 202 | S-2×T10 to T25 | SD-2×T12,T20 T21,T32 | SL(D)-2×T21 | <ul style="list-style-type: none"> ● Refer to page 202 for "□" of the model names and applicable models. ● None of these can be combined with enclosed types, delay open types or saturable reactor attached types. | | |
| | | UT-SG □ | | | S-2×T32 to T100 | SD-2×T32 to T100 | SL(D)-2×N125 to N800 | | | |
| | | UN-SD □ | | | S-2×N125 to N800 | SD-2×N125 to N800 | SL(D)-N125 to N400 | | | |
| | | UN-SG □ | | | S-T21 to T100, S-N125 to N400 | SD-T21 to T100, SD-N125 to N400 | SL(D)-N125 to N400 | | | |
| | | UN-YG □ | | | S-T10 to T20 | SD-T12 to T20 | × | | | |
| | | UT-YD20 | | | S-T21 to T100, S-N125 to N400 | SD-T21 to T100, SD-N125 to N400 | SL(D)-N125 to N400 | | | |
| 9 | Fault Detection Units | UN-FD | 200 V Main Circuit, 1c Output | 218, 313 | S-T10 to T100 | SD-T12 to T100 | × | MS-T10 to T100 MS-N125 to N400 (External) | × | MSO-T10SR to T100SR MSO-N125SR to N400SR (Separate) |
| | | UN-FD4 | 400 V Main Circuit, 1a/1b Output | | S-N125 to N400 | SD-N125 to N400 | × | | × | |

Note 1. The units can be combined only with S-T10 to T20 produced in March, 2019 and later.

Thermal Overload Relays (Including ET-N Electronic Thermal)

| Section | Product Name | Model Name | Specifications | See Page | Applicable Models | |
|---------|---------------------------------|-------------------|---|----------|--------------------------------|--|
| | | | | | Thermal Overload Relays | |
| | Protection Cover (Note 1) Units | UN-CZ605 | Live Part Protection Cover | 207, 329 | TH-T65 | |
| | | UN-CV203 | Current Setting Dial Misoperation Prevention Covers | | TH-T25/T50 | |
| | | UN-CV603 (Note 2) | | | TH-T65/T100, TH-N120 to N600 | |
| | | UN-CV602 | Terminal Cover | | ET-N60 | |
| 11 | Reset Releases | UT-RR□5 | Release Length 200 mm to 700 mm | 214 | TH-T18 | |
| | | UN-RR□0 | | | TH-T25/T50 | |
| | | UN-RR□6 (Note 3) | | | TH-T65/T100 TH-N120 to N600 | |
| 12 | Fluorescent Display Lamps | UN-TL12 | Tripping Display | 215 | TH-T18 | |
| | | UN-TL20 | | | TH-T25, T50 | |
| | | UN-TL60 (Note 4) | | | TH-T65, T100 | |
| 13 | Independent Mounting Units | UT-HZ18 | Screw Mounting, IEC 35 mm Mounting | 216 | TH-T18 | |
| | | UN-RM20 | IEC 35 mm Rail Mounting | | TH-T25 | |

- Note 1. Protective covers cannot be combined with saturable reactor attached types (TH-□SR).
- Note 2. UN-CV603 cannot be combined with TH-N120TAHZ.
- Note 3. UN-RR□□6 cannot be combined with TH-N120TAHZ.
- Note 4. UN-TL60 cannot be combined with TH-N120TAHZ.

Contactors Relays

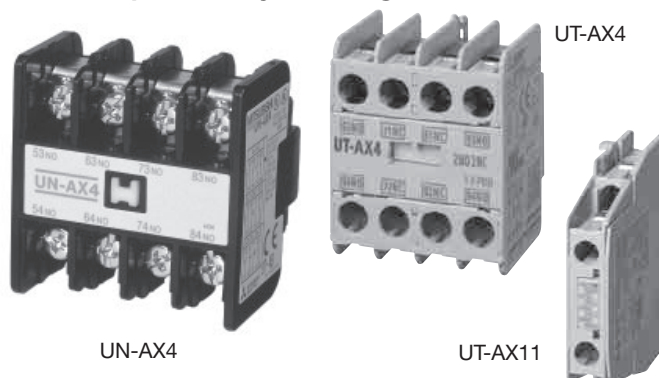
| Section | Product Name | Model Name | Specifications | See Page | Applicable Models | | |
|----------|---|------------|--|---|---|-------------|--|
| | | | | | Contactors Relays | | |
| | | | | | AC Operated | DC Operated | Latched Type |
| 1 | Auxiliary Contact Units | UT-AX2 | 2-Pole | 183 | SR-T5 | SRD-T5 | x |
| | | UT-AX4 | 4-Pole | | | | SRL(D)-T5 |
| | | UT-AX11 | 2-Pole 1A1B | | | | |
| 3 | Operation Coil Surge Absorber Units | UT-SA21 | Varistor | 191 | SR-T5, T9 | SRD-T5, T9 | SRL(D)-T5 (Closing Coil) |
| | | UT-SA22 | Varistor + Indicator Lamp | | | | |
| | | UT-SA13 | C + R | | | | |
| | | UT-SA23 | C + R | | x | | |
| | | UT-SA25 | Varistor + CR | | SR-T5, T9 | SRD-T5, T9 | |
| | | UN-SA712 | Varistor + Indicator Lamp | | SR-K100 | SRD-K100 | SRL(D)-K100(Closing Coil), SRL(D)-K100 (Tripping Coil) SRL(D)-T5 (Tripping Coil) |
| | | UN-SA713 | C + R | | x | | SRLD-K100(Closing Coil), SRLD-K100(Tripping Coil) SRL(D)-T5 (Tripping Coil) |
| | | UN-SA721 | Varistor | | SR-K100 | | SRL(D)-K100(Closing Coil), SRL(D)-K100 (Tripping Coil) SRL(D)-T5 (Tripping Coil) |
| UN-SA723 | C + R | SR-K100 | x | SRL-K100(Closing Coil), SRL-K100(Tripping Coil) SRL(D)-T5 (Tripping Coil) | | | |
| UN-SA725 | Varistor + C + R | | | SRD-K100 | SRL(D)-K100(Closing Coil), SRL(D)-K100(Tripping Coil) SRL(D)-T5 (Tripping Coil) | | |
| 5 | DC/AC Interface Units for Operation Coils | UT-SY21 | Triac Output | 204 | SR-T5, T9 | x | x |
| | | UT-SY22 | Contact Output | | | | x |
| | | UN-SY11 | Triac Output | | SR-K100 | | x |
| | | UN-SY12 | Contact Output | | | | x |
| 6 | Protection Cover Units | UT-CV107 | Operator Prevention Covers Magnetic Contactors/Contactor Relays Manual Operation Prevention | 207 | SR-T5 | SRD-T5 | x |
| 9 | Conductor Kits | UT-YD20 | For 2-Pole Short-Circuit | 202 | SR-T5, T9 | SRD-T5, T9 | SRL(D)-T5, T9 |

8.3 UT/UN-AX □ Auxiliary Contact Units

Auxiliary contacts can be easily expanded from compact relays to large contactors.

All contacts adopt twin contacts, providing high contact reliability.

- Auxiliary contacts can be added to almost all series of contactor relays and magnetic contactors.
- Highly effective for on-site modifications etc., as mounting does not require special tools.
- As both side clip-on and front clip-on types are thin and require less mounting area, they greatly contribute to the miniaturization of panel area.
- The use of twin contacts achieves high contact reliability and allows application for low-level signals.



Type

| Unit Model Name | Contact Arrangement Per Unit | Unit Mounting Method | Model Names of Applicable Magnetic Contactors and Contactor Relays | | | Total Number of Units That Can Be Added to Non-Reversible Type |
|----------------------|------------------------------|----------------------|--|--|--|--|
| | | | AC Operated | DC Operated | Mechanically Latched Type | |
| UT-AX2 UT-AX2BC | 2a 1a1b 2b | Front Clip-on | S-T10 to T50 SR-T5 | SD-T12 to T50, SRD-T5 | — | 1 |
| UT-AX4 UT-AX4BC | 4a 3a1b 2a2b | Front Clip-on | | | | |
| UT-AX11 UT-AX11BC | 1a1b | Side Clip-on | | | | |
| UN-AX2 UN-AX2CX | 2a 1a1b 2b | Front Clip-on | S-T65, T80 S-N38, N48 DU-N30 (Note 6) | SD-T65, T80 DUD-N30 (Note 6) | — | 1 |
| UN-AX4 UN-AX4CX | 4a 3a1b 2a2b | Front Clip-on | | | | |
| UN-AX11 UN-AX11CX | 1a1b | Side Clip-on | | | | |
| UN-AX80 | 1a1b | Side Clip-on | S-T100, S-N125, DU-N60 | SD-T100, SD-N125, DUD-N60 | SL(D)-T100 SL(D)-N125 | 2 (Note 4) |
| UN-AX150 | 1a1b | Side Clip-on | S-N150, S-N180, N220, S-N300, N400, DU-N120, N180, N260 | SD-N150 SD-N220 SD-N300, N400, DUD-N120, N180, N260 | SL(D)-N150 SL(D)-N220 SL(D)-N300, N400 | 2 (Note 4) |
| UN-AX600 | 2a2b | Side Clip-on | S-N600, N800 | SD-N600, N800 | SL(D)-N600, N800 | 1 (Note 5) |

Note 1. Front clip-on and side clip-on cannot be mounted on the same body.

Note 2. For the reversible type, 1 unit each can be mounted on the left and right exterior, for a total of 2 units.

Note 3. UT-AX□BC is the model name with wiring streamlining terminals, while UN-AX□CX is with CAN terminals.

Note 4. 1 unit each can be mounted on the left and right sides for a total of 2 units. (For the reversible type, additional mounting is not possible for UN-AX150, while 1 unit each can be additionally mounted on the left and right exterior for a total of 2 units for UN-AX80.)

Note 5. Mount on the right side. (4a4b x 2 are mounted on the reversible type and additional mounting is not allowed.)

Note 6. When applied to T65 or T80, the auxiliary terminal screw size for the T65 and T80 body will be M4, and the terminal screw size of the auxiliary contact unit will be M3.5. As the screw sizes are different, they cannot be used interchangeably.

Rating

| Unit Model Name | UT-AX2(BC),UT-AX4(BC) | UT-AX11(BC) | UN-AX2(CX),UN-AX4(CX),UN-AX11(CX) | UN-AX80,UN-AX150,UN-AX600 | |
|---|--|-------------|-----------------------------------|---------------------------|-----|
| Rated Insulation Voltage [V] | 690 | | | | |
| Applicable Standard | JIS C8201-5-1,IEC60947-5-1,EN60947-5-1,GB14048.5 | | | | |
| Rated Impulse Withstand Voltage [kV] | 6 | | | | |
| Rated Frequency [Hz] | 50/60 | | | | |
| Pollution Degree | 3 | | | | |
| Conventional Free Air Thermal Current Ith [A] | 10 | | | | |
| Contact Rating (Note 1) | AC Rated Operational Current [A] | | DC Rated Operational Current [A] | | |
| | Category AC-15 (Coil Load) (Note 2) | AC120V | 6 | 6 | 6 |
| | | AC240V | 3 | 3 | 3 |
| | | AC440V | 1.5 | 1.5 | 1.5 |
| | | AC550V | 1.2 | 1.2 | 1.2 |
| | Category AC-12 (Resistive Load) (Note 2) | AC120V | 10 | 10 | 10 |
| | | AC240V | 8 | 8 | 8 |
| | Category DC-13 (Coil Load) (Note 2) | DC24V | 3 | 3 | 3 |
| | | DC48V | 1.5 | 1.5 | 1.5 |
| | | DC110V | 0.6(2) | 0.6(2) | 0.6 |
| DC220V | | 0.3(0.8) | 0.3(0.8) | 0.3 | |
| Category DC-12 (Resistive Load) (Note 2) | DC110V | 5(8) | 5(8) | 5 | |
| | DC220V | 1(3) | 1(3) | 1 | |
| Minimum Applicable Load Level | 5V 3mA | | 20V 3mA | | |

Note 1. The value in parentheses for the DC rated operational current indicates the rated operating current when switching a 2-pole load in series.

Note 2. AC-15, AC-12, DC-13 and DC-12 are the classifications of JISC8201-5-1.

Note 3. Electrical durability of 500,000 operations.

Note 4. The mechanical durability and switching frequency depend on the magnetic contactor and contactor relay to be applied.

● Combination With Contactor Relays

Contactor relays and auxiliary contact units can be used in the contact arrangements of the following combinations.

| Auxiliary Contact Unit | | Front Clip-on | | | | | | Side Clip-on | |
|------------------------|---------------------|---------------|------|------|------------|------|------|--------------|-------------|
| | | UT-AX4(BC) | | | UT-AX2(BC) | | | UT-AX11(BC) | UT-AX11(BC) |
| Model | Contact Arrangement | 4a | 3a1b | 2a2b | 2a | 1a1b | 2b | 1a1b + 1a1b | 1a1b |
| SR-T5(BC) | 5a | 9a | 8a1b | 7a2b | 7a | 6a1b | 5a2b | 7a2b | 6a1b |
| | 4a1b | 8a1b | 7a2b | 6a3b | 6a1b | 5a2b | 4a3b | 6a3b | 5a2b |
| SRD-T5(BC) | 3a2b | 7a2b | 6a3b | 5a4b | 5a2b | 4a3b | 3a4b | 5a4b | 4a3b |

Note 1. The auxiliary contact unit cannot be mounted on SR(D)-T9(BC).

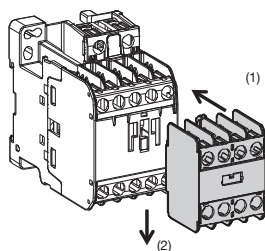
Note 2. Front clip-on and side clip-on cannot be mounted simultaneously.

Note 3. The contact arrangement inside the is the standard combination.

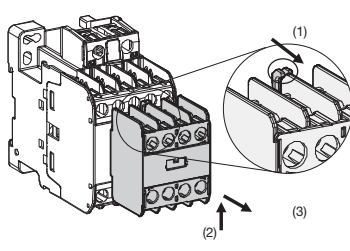
● Mounting Method/Removal Method

UT-AX2(BC), UT-AX4(BC)

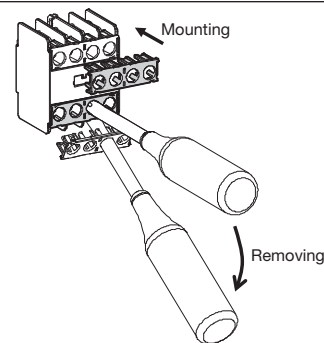
● Mounting Method



● Removal Method

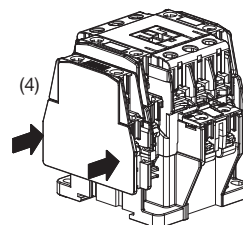
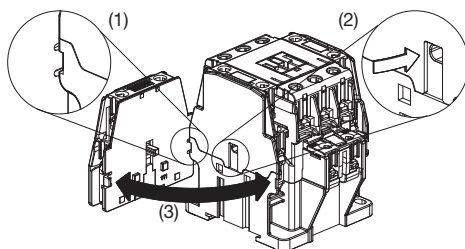


● Mounting and Removal of Terminal Covers



UT-AX11(BC)

● Mounting Method

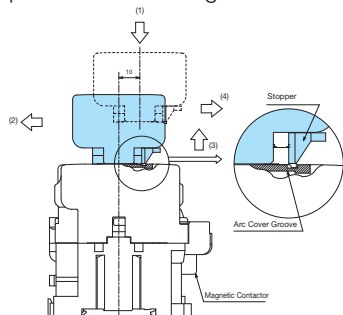


UN-AX2 (CX), UN-AX4 (CX)

● Mounting Method

Mount according to the guidelines below.

- (1) Place the auxiliary contact unit on the head of the magnetic contactor, about 10 mm off center toward the power supply side.
- (2) Slide the unit to the load side to engage the stopper of the unit and groove of the arc cover.



● Removal Method

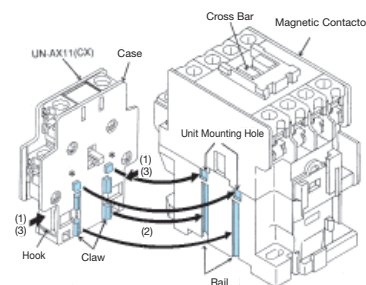
- (3) Pull up the stopper of the unit.
- (4) Remove the unit by sliding to the power supply side.

UN-AX11 (CX)

● Mounting Method

Mount according to the guidelines below.

- (1) Pinch the hooks (in 2 places) with your fingers and push into the case of UN-AX11.
- (2) While aligning the protrusion (* mark) of the UN-AX11 case with the unit mounting hole on the magnetic contactor side, engage the claw of the hook to the rail on the bottom of the magnetic contactor.



Note: Confirm the following after mounting.

1. Lightly pull the UN-AX11 body to make sure that it is securely mounted.
2. Make sure that the cross bar on the front of the magnetic contactor is pushed in.

● Removal Method

- (3) Remove by pinching the hooks (in 2 places) with fingers.

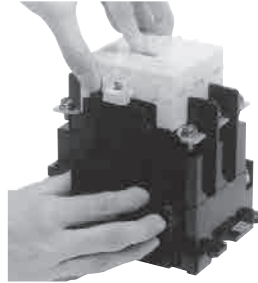
● Mounting Method

UN-AX80

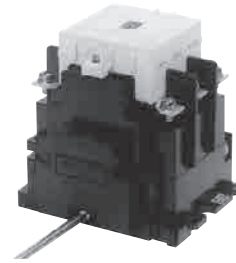
(1) Press the head of the cross bar.



(2) Insert the lever of the auxiliary contact unit (UN-AX80) into the window of the contactor side, and bring it into close contact with the contactor.

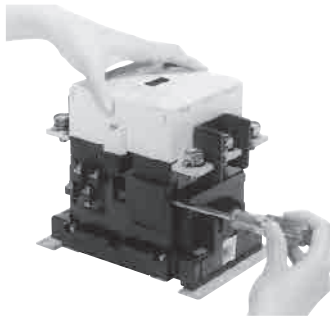


(3) Tighten the screws. Push in the cross bar after mounting.

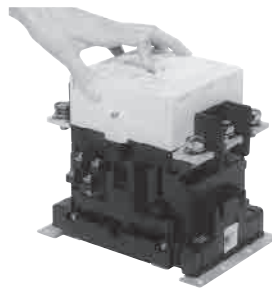


UN-AX150

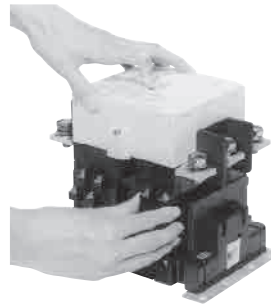
(1) Remove the dust cover from the place where additional mounting is to take place.



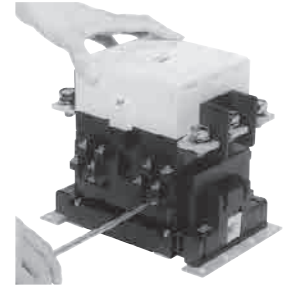
(2) Push down the head of the cross bar. (Press until the main contact touches)



(3) Push in the auxiliary contact unit (UN-AX150).

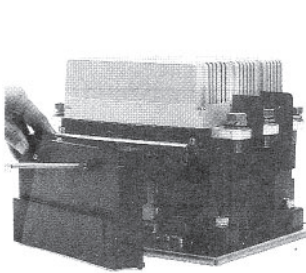


(4) Tighten the screws. Push in the cross bar after mounting.

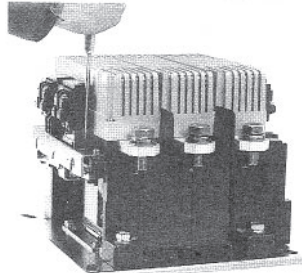


UN-AX600

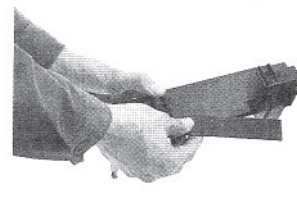
(1) Remove the 2 screws that fasten the cover on the right side of the contactor. (M4 Screw)



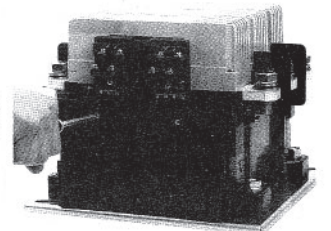
(2) Fasten the auxiliary contact unit (UN-AX600) with the attached 2 screws.



(3) Remove the dust-proof plate (127 x 28 x 1) that's fitted to the cover. (The dust-proof plate is not used)



(4) Combine the cover with the contactor and tighten with the 2 screws that were removed in (1). Push in the cross bar of the auxiliary contact unit after mounting.



● Removal Method

Remove in reverse order to that described above.

● Mounting Screw Tightening Torque

| Auxiliary Contact Units | Tightening Torque (N·m) |
|-------------------------|-------------------------|
| UN-AX80 | 1.47 to 1.96 |
| UN-AX150 | 1.18 to 1.86 |
| UN-AX600 | 1.18 to 1.86 |

MS-T Series

Outline Drawings (Figure Has No BC)

UT-AX2(BC)

| Applicable Models | H Dimension |
|---------------------|-------------|
| S-T10, T12, T20 | 108 |
| S-T21, T25, T32 | 111 |
| S-T35, T50* | 120 |
| SR-T5 | 108 |
| SD-T12/20 SRD-T5 | 130 |
| SD-T21, T32 | 138 |
| SD-T35, T50* | 152 |

| Applicable Terminal Wire Size [ϕ mm, mm ²] | Applicable Crimp Lug Size | Terminal Screw Tightening Torque N·m |
|--|---------------------------|--------------------------------------|
| ϕ 1.6 0.75 to 2.5 | 1.25-3.5 to 2-3.5 | 0.9 to 1.5 |

0.02 kg

Note: The figure shows the contact arrangement 2a.

Contact Arrangement

2a

1a1b

2b

UT-AX4(BC)

| Applicable Models | H Dimension |
|---------------------|-------------|
| S-T10, T12, T20 | 108 |
| S-T21, T25, T32 | 111 |
| S-T35, T50* | 120 |
| SR-T5 | 108 |
| SD-T12/20 SRD-T5 | 130 |
| SD-T21, T32 | 138 |
| SD-T35, T50* | 152 |

| Applicable Terminal Wire Size [ϕ mm, mm ²] | Applicable Crimp Lug Size | Terminal Screw Tightening Torque N·m |
|--|---------------------------|--------------------------------------|
| ϕ 1.6 0.75 to 2.5 | 1.25-3.5 to 2-3.5 | 0.9 to 1.5 |

0.05 kg

Note: The figure shows the contact arrangement 4a.

Contact Arrangement

4a

3a1b

2a2b

UT-AX11(BC)

| Applicable Models | L Dimension |
|---------------------|-------------|
| S-T10, T12, T20 | 18 |
| S-T21, T25 | 19 |
| S-T32 | 22.5 |
| S-T35, T50 | 18.8 |
| SR-T5 | 18 |
| SD-T12/20 SRD-T5 | 40 |
| SD-T21 | 46 |
| SD-T32 | 44 |
| SD-T35, T50 | 50.8 |

| Applicable Terminal Wire Size [ϕ mm, mm ²] | Applicable Crimp Lug Size | Terminal Screw Tightening Torque N·m |
|--|---------------------------|--------------------------------------|
| ϕ 1.6 0.75 to 2.5 | 1.25-3.5 to 2-3.5 | 0.9 to 1.5 |

0.04kg

Note 1. Cannot be used with UT-AX2 and UT-AX4 mounted simultaneously.
Note 2. Can be mounted on one or both sides of the magnetic contactors and contactor relays in the table at right.

Contact Arrangement

When mounted on the left side of the body

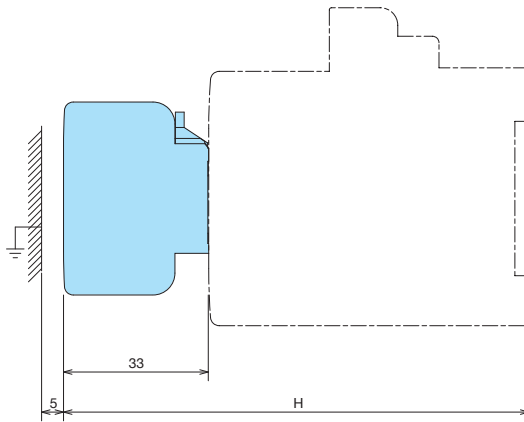
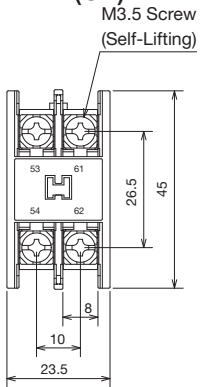
When mounted on the right side of the body

| Model Name | Model Name |
|------------|------------|
| UT-AX2 | UT-AX2BC |
| UT-AX4 | UT-AX4BC |
| UT-AX11 | UT-AX11BC |

MS-N Series

Outline Drawings (Figure Has No CX)

UN-AX2(CX)



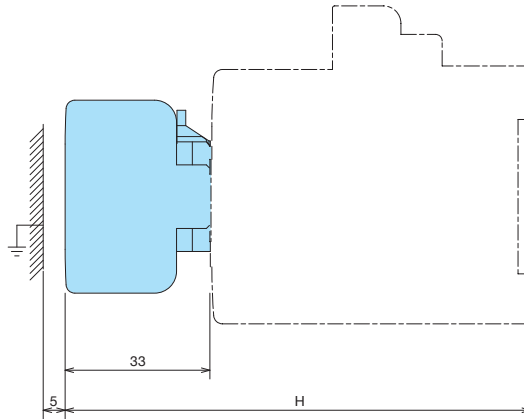
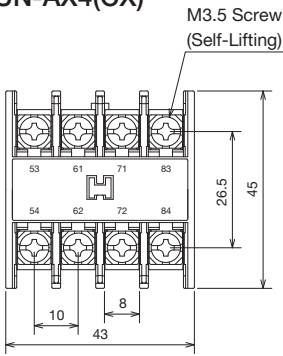
| Applicable Models | H Dimension |
|----------------------|-------------|
| S-T65, T80, DU-N30 | 134 |
| S-N38, N48 | 121 |
| SD-T65, T80, DUD-N30 | 161 |

| Contact Arrangement | |
|---------------------|----------|
| 2a(2NO) | |
| 53 54 | 63 64 |
| 1a1b(1NO1NC) | |
| 53 54 | 61 62 |
| 2b(2NC) | |
| 51 52 | 61 62 |

0.03 kg

| Applicable Terminal Wire Size [φ mm, mm ²] | Applicable Crimp Lug Size | Terminal Screw Tightening Torque N·m |
|---|---------------------------|--------------------------------------|
| φ 1.6 1.25 to 2 | 1.25-3.5 to 2-3.5 | 0.94 to 1.51 |

UN-AX4(CX)



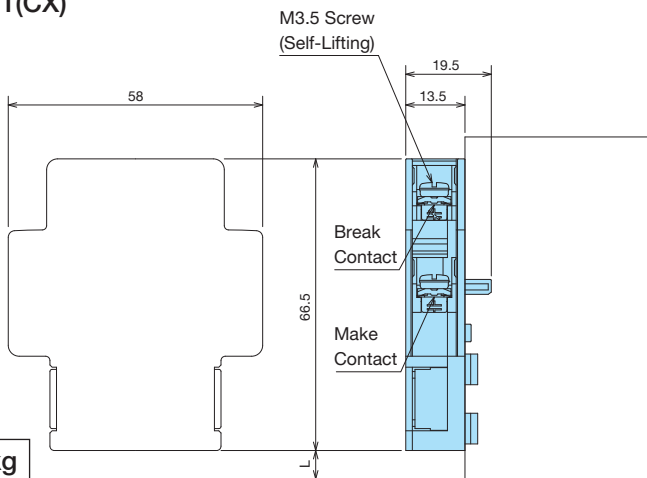
| Applicable Models | H Dimension |
|----------------------|-------------|
| S-T65, T80, DU-N30 | 134 |
| S-N38, N48 | 121 |
| SD-T65, T80, DUD-N30 | 161 |

| Contact Arrangement | |
|---------------------|----------------------------------|
| 4a(4NO) | |
| 53 54 | 63 64 73 74 83 84 |
| 3a1b(3NO1NC) | |
| 53 54 | 61 62 73 74 83 84 |
| 2a2b(2NO2NC) | |
| 53 54 | 61 62 71 72 83 84 |

0.05kg

| Applicable Terminal Wire Size [φ mm, mm ²] | Applicable Crimp Lug Size | Terminal Screw Tightening Torque N·m |
|---|---------------------------|--------------------------------------|
| φ 1.6 1.25 to 2 | 1.25-3.5 to 2-3.5 | 0.94 to 1.51 |

UN-AX11(CX)



| Applicable Models | L Dimension |
|----------------------|-------------|
| S-T65, T80, DU-N30 | 16 |
| SD-T65, T80, DUD-N30 | 43 |

| Contact Arrangement | |
|--|----------|
| 53 54 | 61 62 |
| When mounted on the left side of the body | |
| 83 84 | 71 72 |
| When mounted on the right side of the body | |

0.04kg

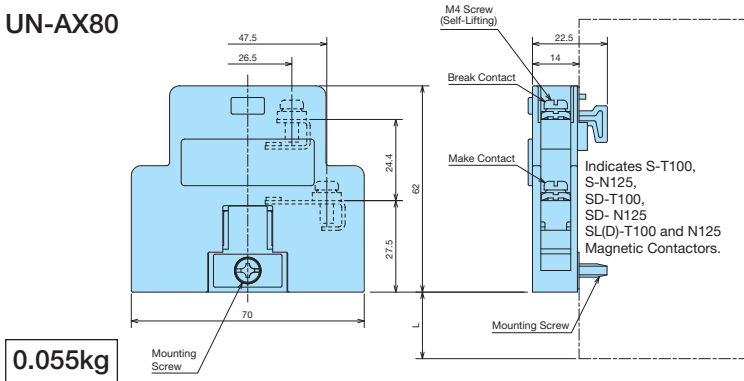
| Applicable Terminal Wire Size [φ mm, mm ²] | Applicable Crimp Lug Size | Terminal Screw Tightening Torque N·m |
|---|---------------------------|--------------------------------------|
| φ 1.6 1.25 to 2 | 1.25-3.5 to 2-3.5 | 0.94 to 1.51 |

This unit can be mounted on the left and right sides of the body for a total of 2 units.
Since this unit is mounted to the side of the body, each additional unit increases the body width by 13.5 mm.

| Model Name | Model Name |
|------------|------------|
| UN-AX2 | UN-AX2CX |
| UN-AX4 | UN-AX4CX |
| UN-AX11 | UN-AX11CX |

Outline Drawings

UN-AX80



0.055kg

This unit can be mounted on the left and right sides of the magnetic contactor for a total of 2 units. Since this unit is mounted on the side of the magnetic contactor, each additional unit increases the width of the magnetic contactor by 14 mm.

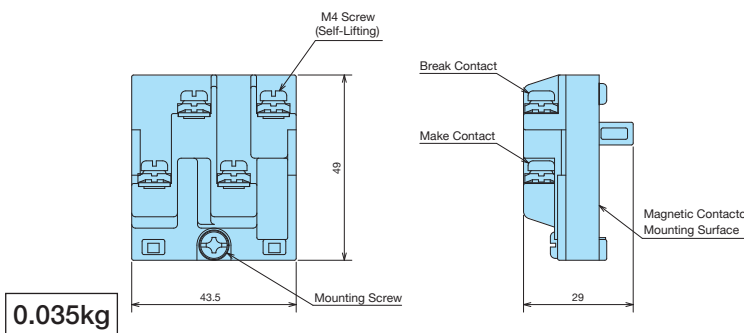
| Applicable Models | L Dimension |
|-------------------|-------------|
| S-T100 | 10 |
| S-N125 | 11 |
| SD-T100 | 41 |
| SD-N125 | 36 |
| SL(D)-T100 | 10 |
| SL(D)-N125 | 11 |

| Applicable Terminal Wire Size [φ mm, mm ²] | Applicable Crimp Lug Size | Terminal Screw Tightening Torque N·m |
|--|---------------------------|--------------------------------------|
| φ 1.6 1.25 to 2 | 1.25-4 to 2-4 | 1.18 to 1.86 |

Contact Arrangement

| | | | |
|--|----|---|----|
| 53 | 61 | 83 | 71 |
| 54 | 62 | 84 | 72 |
| When additionally mounted on the left side of the magnetic contactor | | When additionally mounted on the right side of the magnetic contactor | |

UN-AX150



0.035kg

This unit can be mounted on the left and right sides of the magnetic contactor for a total of 2 units. The addition of this unit does not change the maximum outline drawings of the magnetic contactor.

| Applicable Models |
|--------------------------------|
| S-N150, N180, N220, N300, N400 |
| SD-N150, N220, N300, N400 |
| SL(D)-N150, N220, N300, N400 |

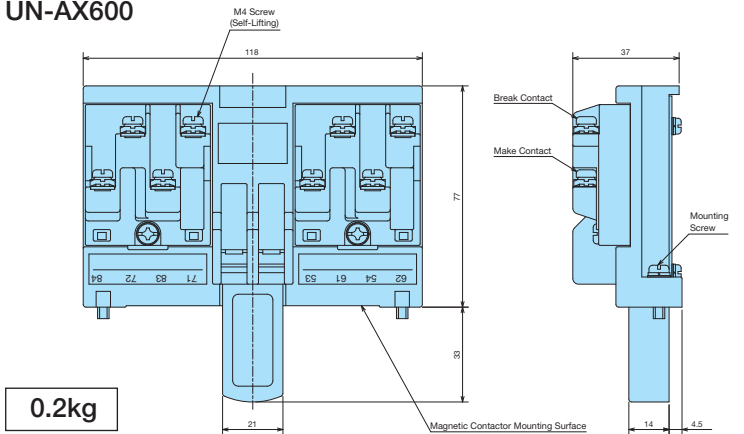
| Applicable Terminal Wire Size [φ mm, mm ²] | Applicable Crimp Lug Size | Terminal Screw Tightening Torque N·m |
|--|---------------------------|--------------------------------------|
| φ 1.6 1.25 to 2 | 1.25-4 to 2-4 | 1.18 to 1.86 |

Contact Arrangement

(The terminal number is displayed on the side of the magnetic contactor.)

| | | | |
|--|----|---|----|
| 53 | 61 | 83 | 71 |
| 54 | 62 | 84 | 72 |
| When additionally mounted on the left side of the magnetic contactor | | When additionally mounted on the right side of the magnetic contactor | |

UN-AX600



0.2kg

This unit is to be mounted to the right side of the magnetic contactor. The addition of this unit does not change the maximum outline drawings of the magnetic contactor.

| Applicable Models |
|-------------------|
| S-N600, N800 |
| SD-N600, N800 |
| SL(D)-N600, N800 |

| Applicable Terminal Wire Size [φ mm, mm ²] | Applicable Crimp Lug Size | Terminal Screw Tightening Torque N·m |
|--|---------------------------|--------------------------------------|
| φ 1.6 1.25 to 2 | 1.25-4 to 2-4 | 1.18 to 1.86 |

Contact Arrangement

| | | | |
|----|----|----|----|
| 53 | 61 | 83 | 71 |
| 54 | 62 | 84 | 72 |

| Model Name |
|------------|
| UN-AX80 |
| UN-AX150 |
| UN-AX600 |

8.4 UN-LL22 Auxiliary Contact Units with Contact for Low-Level Signals

Capable of controlling DC5 V 5 mA.

- This is an auxiliary contact unit with built-in low-level contacts that are capable of switching the low voltage and small current of electronic control circuits.
- It can be mounted with a single touch on a magnetic contactor or contactor relay that performs power switching of a motor or the like, eliminating the need for a relay for switching low voltage and small current, thus making it ideal for switching the electronic input circuits of PLCs etc.
- Compact micro switches are used for the low-level contacts.
- Since it has built-in 1a1b low-level contacts and 1a1b standard contacts, a single unit allows switching of AC200 V and DC24 V, for example.



UN-LL22

Type

| Unit Model Name | Contact Arrangement | | Unit Mounting Method | Model Names of Applicable Magnetic Contactors and Contactor Relays | | Total Number of Addable Units |
|----------------------|---------------------|---------|----------------------|--|------------------------|-------------------------------|
| | Name | Contact | | AC Operated | DC Operated | |
| UN-LL22 UN-LL22CX | Low-Level Contact | 1a1b | Front Clip-on | S-T65, T80 S-N38, N48 DU-N30 | SD-T65, T80 DUD-N30 | 1 (Note 1) |
| | Standard Contact | 1a1b | | | | |

Note 1. UN-LL22 (CX) and UN-AX11 (CX) cannot be mounted on the same body.

Note 2. UN-LL22CX is the model name with CAN terminals.

Note 3. When applied to T65 or T80, the auxiliary contact terminal screws of the T65 and T80 body will be M4, and the terminal screws of UN-LL22 will be M3.5.

As the screw sizes are different, they cannot be used interchangeably.

Rating

| | | Low-Level Contact | Standard Contact |
|---|--------------------------------|------------------------------|-------------------------------|
| Minimum Rated Capacity 1 mil. times (Note 1) | | 5 V 5 mA | 20 V 5 mA |
| Maximum Rated Capacity | Category DC-12 Resistive Load | DC24 V 100 mA, DC48 V 100 mA | DC110 V 1.5 A, DC220 V 0.25 A |
| | Category DC-13 Large Coil Load | - | DC110 V 0.6 A, DC220 V 0.3 A |
| | Category AC-12 Resistive Load | AC48 V 200 mA, AC240 V 20 mA | AC110 V 10 A, AC220 V 8 A |
| | Category AC-15 Large Coil Load | - | AC110 V 6 A, AC220 V 3 A |
| Conventional Free Air Thermal Current I _{th} | | 1 A | 10 A |
| Rated Insulation Voltage | | AC250 V | AC500 V |
| Switching Durability | Electrical | 0.5 mil. times | 0.5 mil. times |
| | Mechanical | 2.5 mil. times | |
| Compliant Standards | | JIS C8201-5-1 | |

Note 1. The contact reliability may decrease if it exceeds 1 million times.

The contact reliability when the input circuit of the PLC is switched is shown in the table below.

- Failure Rate at Confidence Rate 60% λ_{60} (No. of faults/times switching, no. of contacts)

| PLC MELSEC Input Circuit Rating | Low-Level Contact | Standard Contact |
|---------------------------------|--------------------|--------------------|
| DC24 V 10 mA, DC24 V 5 mA | 5×10^{-8} | 5×10^{-7} |
| DC12 V 5 mA | 1×10^{-7} | — |
| DC 5 V 5 mA | 1×10^{-6} | — |
| AC100 V 10 mA | 1×10^{-8} | 5×10^{-8} |

[Conditions] 1. One million times switching.

2. In a typical environment without a large amount of dust or corrosive gas.

3. Contact failure is detected by the PLC program.

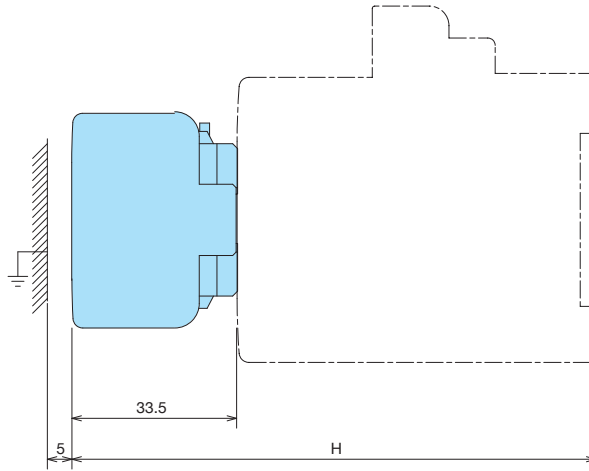
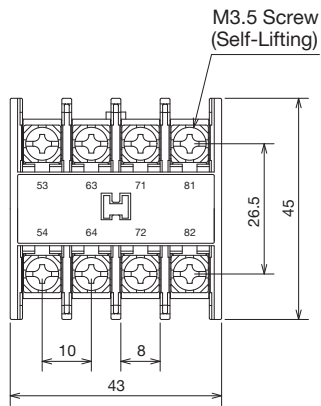
Note 2. The classification of the maximum rated capacity is the classification of JISC8201-5-1.

Mounting Method

The mounting method is the same as UN-AX4 (CX). Refer to page 184.

● Outline Drawings (Figure Has No CX)

UN-LL22(CX)

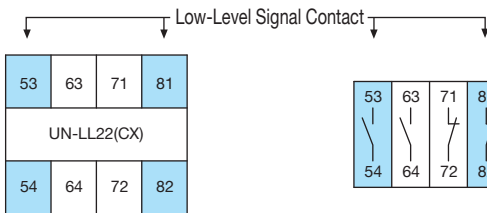


| Applicable Models | H Dimension |
|---------------------|-------------|
| S-N38/N48 | 121.5 |
| S-T65/T80, DU-N30 | 134 |
| SD-T65/T80, DUD-N30 | 161 |

0.06kg

| Applicable Terminal Wire Size [φ mm, mm ²] | Applicable Crimp Lug Size | Terminal Screw Tightening Torque N·m |
|--|---------------------------|--------------------------------------|
| φ 1.6 0.75 to 2 | 1.25-3.5 to 2-3.5 | 0.94 to 1.51 |

● Contact Arrangement



[Placement]

[Contact Arrangement]

(When viewed from the front)

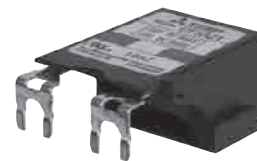
| Name | Make Contact Terminal Number | Break Contact Terminal Number | Application |
|-------------------|------------------------------|-------------------------------|---|
| Low-Level Contact | 53-54 | 81-82 | For Low Voltages/Very Small Currents |
| Standard Contact | 63-64 | 71-72 | For Standard Voltage and Coil Switching |

| Model Name |
|------------|
| UN-LL22 |
| UN-LL22CX |

8.5 UT/UN-SA□ Operation Coil Surge Absorber Units

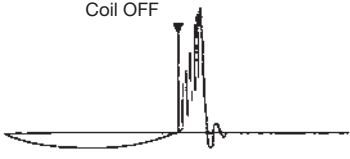

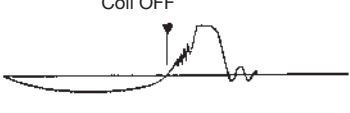
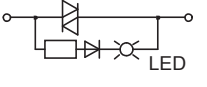

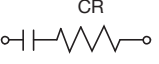
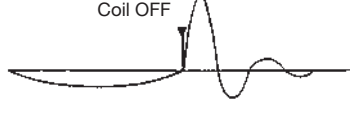
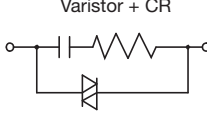
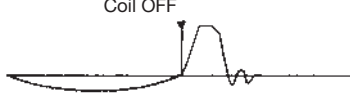
It suppresses noise during coil current interruption, and reduces malfunction, damage and the like of electronic circuits.

- It can be mounted on a magnetic contactor or contactor relay with a single touch.
 UT-SA13 to SA25 are space-saving types that utilize the dead space of the lower side of the coil terminal.
- A wide variety is available, allowing easy selection according to the application.



UT-SA21

● Proper Use

| Surge Suppressing Element | Performance | Surge Waveform (Representative) Example |
|--|--|---|
| None | · Waveform with no surge suppressing element. |  |
| Varistor  | · Limits the peak voltage. High-frequency components below the limit voltage cannot be limited. |  |
| Varistor + Indicator Lamp  | · Limits the peak voltage · Displays the operation. (Indicates that voltage is applied to the operation coil.) |  |
| CR  | · Limits the high-frequency components. (There are types for AC coils and DC coils.) |  |
| Varistor + CR  | · Limits both the peak voltage and high-frequency components. |  |

Types and Ratings

| Surge Absorber Element | Model | | Internal Element Specifications | Applicable Voltage Range | | | | | | | | | | | | | | | |
|----------------------------|-------------|--------|--|--------------------------|-----|-----|------|------|------|------|------|-------------------------------|-----|-----|-----|-----|------|------|------|
| | Designation | | | AC 50/60Hz | | | | | | | | DC | | | | | | | |
| | | | | 12V | 24V | 50V | 100V | 127V | 200V | 240V | 346V | 480V | 12V | 24V | 48V | 60V | 100V | 125V | 200V |
| Varistor | UT-SA21 | AC24V | Varistor Voltage 47 V | [Applicable Voltage] | | | | | | | | [Recommended Applied Voltage] | | | | | | | |
| | | AC48V | Varistor Voltage 120 V | [Applicable Voltage] | | | | | | | | [Recommended Applied Voltage] | | | | | | | |
| | | AC200V | Varistor Voltage 470 V | [Applicable Voltage] | | | | | | | | [Recommended Applied Voltage] | | | | | | | |
| | | AC400V | Varistor Voltage 910 V | [Applicable Voltage] | | | | | | | | [Recommended Applied Voltage] | | | | | | | |
| Varistor + Indicating Lamp | UT-SA22 | AC200V | Varistor Voltage 470 V | [Applicable Voltage] | | | | | | | | [Recommended Applied Voltage] | | | | | | | |
| CR | UT-SA13 | DC200V | 0.5 μ F120 Ω | [Applicable Voltage] | | | | | | | | [Recommended Applied Voltage] | | | | | | | |
| | UT-SA23 | AC200V | 0.2 μ F120 Ω | [Applicable Voltage] | | | | | | | | [Recommended Applied Voltage] | | | | | | | |
| Varistor + CR | UT-SA25 | AC48V | Varistor Voltage 120 V 0.1 μ F47 Ω | [Applicable Voltage] | | | | | | | | [Recommended Applied Voltage] | | | | | | | |
| | | AC200V | Varistor Voltage 470 V 0.1 μ F47 Ω | [Applicable Voltage] | | | | | | | | [Recommended Applied Voltage] | | | | | | | |
| Varistor | UN-SA721 | AC48V | Varistor Voltage 120 V | [Applicable Voltage] | | | | | | | | [Recommended Applied Voltage] | | | | | | | |
| | | AC100V | Varistor Voltage 270 V | [Applicable Voltage] | | | | | | | | [Recommended Applied Voltage] | | | | | | | |
| | | AC200V | Varistor Voltage 470 V | [Applicable Voltage] | | | | | | | | [Recommended Applied Voltage] | | | | | | | |
| | | AC400V | Varistor Voltage 910 V | [Applicable Voltage] | | | | | | | | [Recommended Applied Voltage] | | | | | | | |
| Varistor + Indicator Lamp | UN-SA712 | AC100V | Varistor Voltage 270 V | [Applicable Voltage] | | | | | | | | [Recommended Applied Voltage] | | | | | | | |
| | UN-SA722 | AC200V | Varistor Voltage 470 V | [Applicable Voltage] | | | | | | | | [Recommended Applied Voltage] | | | | | | | |
| CR | UN-SA713 | DC200V | 0.5 μ F120 Ω | [Applicable Voltage] | | | | | | | | [Recommended Applied Voltage] | | | | | | | |
| | UN-SA723 | AC200V | 0.2 μ F120 Ω | [Applicable Voltage] | | | | | | | | [Recommended Applied Voltage] | | | | | | | |
| Varistor + CR | UN-SA725 | AC48V | Varistor Voltage 120 V 0.1 μ F47 Ω | [Applicable Voltage] | | | | | | | | [Recommended Applied Voltage] | | | | | | | |
| | | AC100V | Varistor Voltage 270 V 0.1 μ F47 Ω | [Applicable Voltage] | | | | | | | | [Recommended Applied Voltage] | | | | | | | |
| | | AC200V | Varistor Voltage 470 V 0.1 μ F47 Ω | [Applicable Voltage] | | | | | | | | [Recommended Applied Voltage] | | | | | | | |

□ Applicable Voltage ■ Recommended Applied Voltage

- Note 1. The surge suppression effect for the applied circuit is smaller in the □ (applicable voltage) than in the ■ (recommended voltage) range.
2. Even in the ■ (recommended voltage) range, the surge suppression effect may not be enough depending on the characteristics of the connected device. (Check the influence of surge using the actual device in advance.)
3. Refer to page 41 for the surge absorber mounted type and built-in magnetic contactors and contactor relays.

● Application and Selection

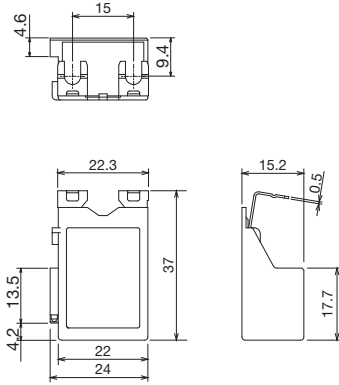
| Surge Absorber Element | Application | | | | | |
|------------------------|--|--|---|-------------------------------|------------------------------------|---------------------------------|
| | AC Operated | DC Operated | Mechanically Latched Type (AC Operated) | | Mechanically Latched (DC Operated) | |
| | | | Closing Coil | Tripping Coil | Closing Coil | Tripping Coil |
| UT-SA21 | S-T10 to T50, B-T21 S-N38, N48 SR-T5, T9 | SD-T12 to T50, BD-T21 SRD-T5, T9 | SL-T21 to T50 SRL-T5 | — | SLD-T21 to T50 SRLD-T5 | — |
| UT-SA22 | S-T10 to T50, B-T21 S-N38, N48 SR-T5, T9 | SD-T12 to T50, BD-T21 SRD-T5, T9 | SL-T21 to T50 SRL-T5 | — | SLD-T21 to T50 SRLD-T5 | — |
| UT-SA13 | — | SD-T12 to T50, BD-T21 SRD-T5, T9 | — | — | SLD-T21 to T50 SRLD-T5 | — |
| UT-SA23 | S-T10 to T50, B-T21 S-N38, N48 SR-T5, T9 | — | SL-T21 to T50 SRL-T5 | — | — | — |
| UT-SA25 | S-T10 to T50, B-T21 S-N38, N48 SR-T5, T9 | SD-T12 to T50, BD-T21 SRD-T5, T9 | SL-T21 to T50 SRL-T5 | — | SLD-T21 to T50 SRLD-T5 | — |
| UN-SA721 | SR-K100 | SD-T65, T80 SRD-K100, DUD-N30 | SRL-K100 | SL-T21 to T80 SRL-T5, K100 | SRLD-K100 | SLD-T21 to T80 SRLD-T5, K100 |
| UN-SA712 | SR-K100 | SRD-K100 | SRL-K100 | SL-T21 to T50 SRL-T5, K100 | SRLD-K100 | SLD-T21 to T50 SRLD-T5, K100 |
| UN-SA722 | — | SD-T65, T80 DUD-N30 | — | SL-T65, T80 | — | SLD-T65, T80 |
| UN-SA713 | — | SD-T65, T80 SRD-K100, DUD-N30 | — | — | SRLD-K100 | SLD-T21 to T80 SRLD-T5, K100 |
| UN-SA723 | SR-K100 | — | SRL-K100 | SL-T21 to T80 SRL-T5, K100 | — | — |
| UN-SA725 | SR-K100 | SD-T65, T80 SRD-K100, DUD-N30 | SRL-K100 | SL-T21 to T80 SRL-T5, K100 | SRLD-K100 | SLD-T21 to T80 SRLD-T5, K100 |

● Precautions for Application

- Connect the terminals of surge absorber units in parallel with the operation coils of magnetic contactors or contactor relays.
- As only the surge absorber units with operation indicators (UT-SA22, UN-SA712 and SA722) have polarity, pay attention to the polarity when applying to the DC circuit. If the wrong polarity is used, the operation indicator will not turn on. (The surge suppression function is not affected, but the magnetic contactor of UT-SA22 will not work.)
- When used in combination with the surge absorber, the opening time of the magnetic contactor or contactor relay may be 1.5 to 3 times longer. (Excluding the mechanically latched type.)
- As the bodies of magnetic contactors and contactor relays have common mounting grooves, if the additional mounting type UN-SY21, SY22, SY31 and SY32 DC/AC interface units for operation coils are mounted, surge absorber units cannot be mounted. (However, combinations with UT-SY21, SY22 and UT-SA21, SA13, SA23 allow for mounting)
- Since the operation coils of the S-T65 to T100 and S-N125 to N800 AC-operated constant excitation type magnetic contactors use an AC-operated DC excitation system that does not generate switching surge, an exterior surge absorber is not required.
- Refer to Note 5 on page 44 for the SL-T65 to T100 and N125 to N800 mechanically latched contactors.
- The lead terminals of UN-SA7 □ are square-tipped crimp lugs.
- The surge absorber is designed to suppress the surge from magnetic contactors. The warranty does not cover external surges. Extreme external surges may damage the product.

● Outline Drawings

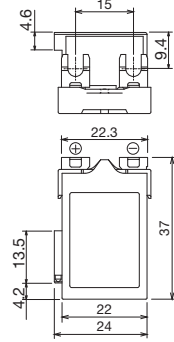
UT-SA21
UT-SA23
UT-SA13



0.013kg

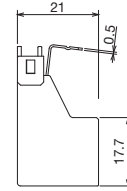
The outline drawings of magnetic contactors and contactor relays do not change after mounting.

UT-SA22
UT-SA25

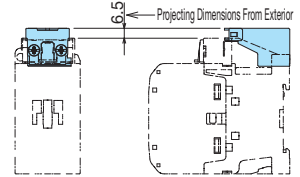


0.018kg

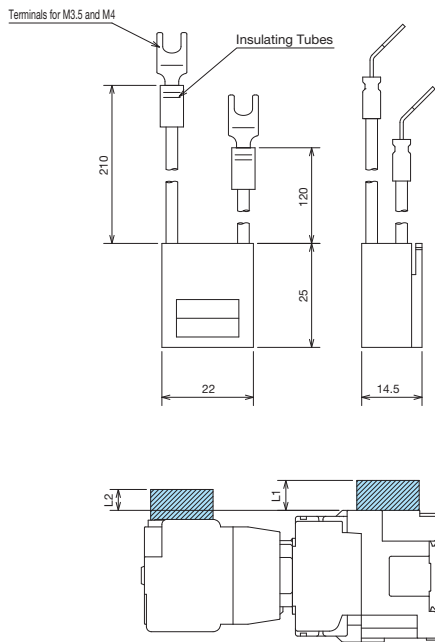
(Note)
Polarity
for UT-SA22



Outline Drawing After Mounting Surge Absorber

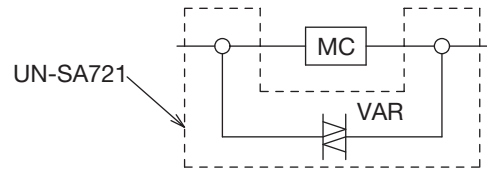


UN-SA721



0.02kg

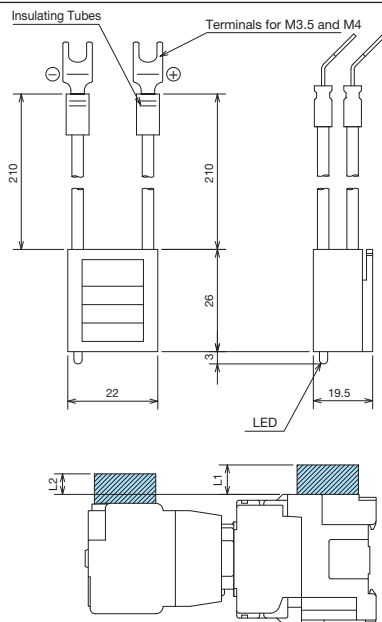
Connection Example (Connection Diagram)



When attached to the body of a magnetic contactor or contactor relay, the body exterior becomes larger by the following dimensions.

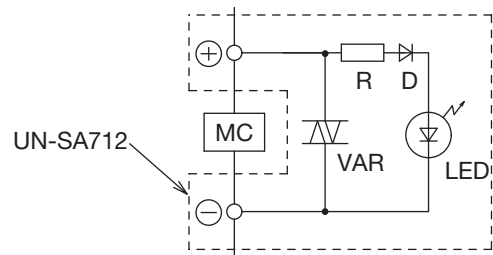
| Applicable Models | L1 Dimension | L2 Dimension |
|----------------------------------|--------------|--------------|
| SL(D)-T21 to T50 (Tripping Coil) | / | 2 |
| SRL(D)-T5 (Tripping Coil) | | |
| SD-T65, T80 | 4.5 | / |
| DUD-N30 | | |
| SL(D)-T65, T80 (Tripping Coil) | 12.5 | / |
| SR-K100 | | |
| SRD-K100 | 6.5 | / |
| SRL(D)-K100 | 12.5 | 0.5 |

UN-SA712



0.025kg

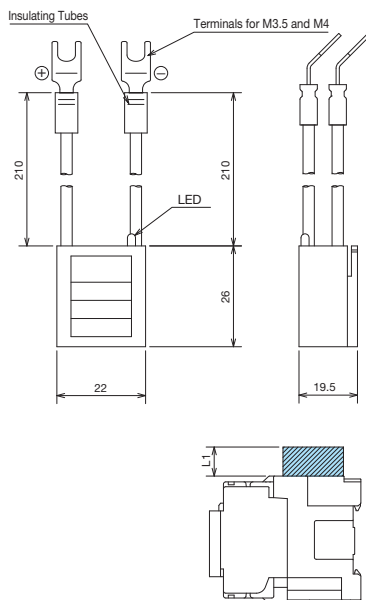
Connection Example (Connection Diagram)



When attached to the body of a magnetic contactor or contactor relay, the body exterior becomes larger by the following dimensions.

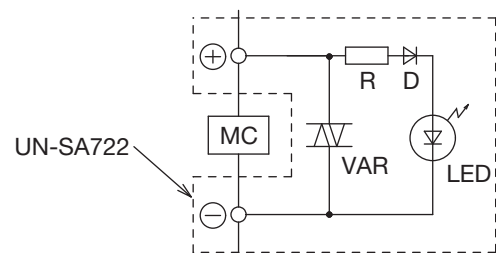
| Applicable Models | L1 Dimension | L2 Dimension |
|----------------------------------|--------------|--------------|
| SL(D)-T21 to T50 (Tripping Coil) | / | 7 |
| SRL(D)-T5 (Tripping Coil) | | |
| SR-K100 | 17.5 | / |
| SRD-K100 | 11.5 | / |
| SRL(D)-K100 | 17.5 | 5.5 |

UN-SA722



0.025kg

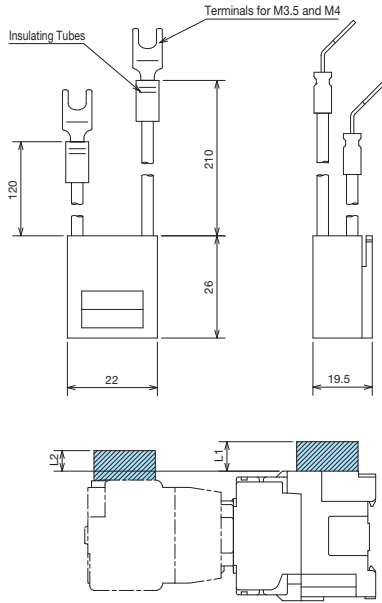
Connection Example (Connection Diagram)



When attached to the body of a magnetic contactor, the body exterior becomes larger by the following dimensions.

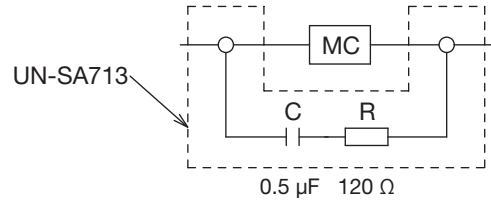
| Applicable Models | L1 Dimension |
|--------------------------------|--------------|
| SD-T65, T80 | 9.5 |
| DUD-N30 | |
| SL(D)-T65, T80 (Tripping Coil) | |

UN-SA713



0.025kg

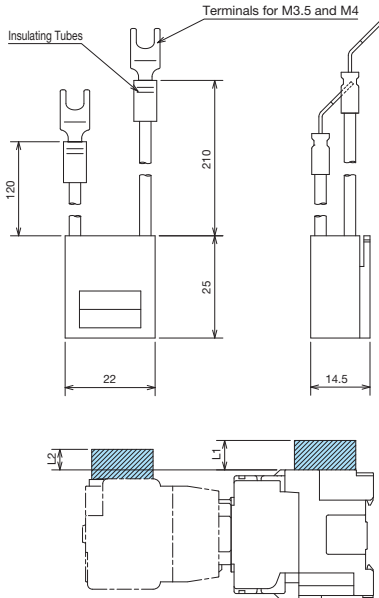
Connection Example (Connection Diagram)



When attached to the body of a magnetic contactor or contactor relay, the body exterior becomes larger by the following dimensions.

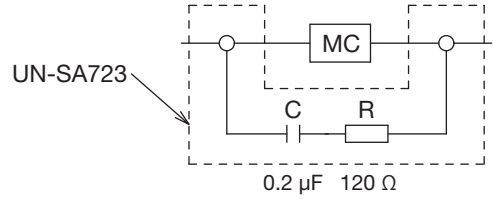
| Applicable Models | L1 Dimension | L2 Dimension |
|----------------------------------|--------------|--------------|
| SL(D)-T21 to T50 (Tripping Coil) | / | 7 |
| SRL(D)-T5 (Tripping Coil) | | |
| SD-T65, T80 | 4.5 | / |
| DUD-N30 | | |
| SL(D)-T65, T80 (Tripping Coil) | | |
| SRD-K100 | 11.5 | / |
| SRLD-K100 | 17.5 | |

UN-SA723



0.02kg

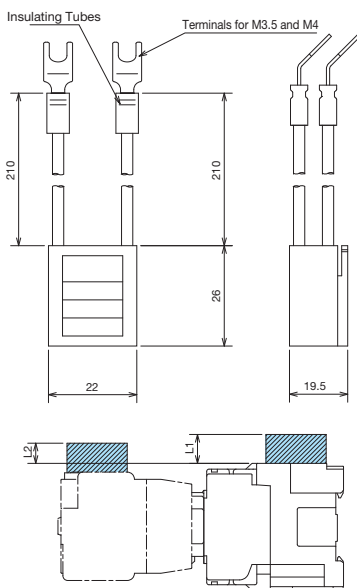
Connection Example (Connection Diagram)



When attached to the body of a magnetic contactor or contactor relay, the body exterior becomes larger by the following dimensions.

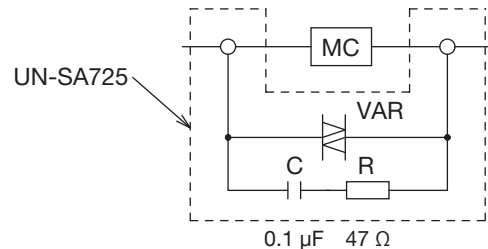
| Applicable Models | L1 Dimension | L2 Dimension |
|----------------------------------|--------------|--------------|
| SL(D)-T21 to T50 (Tripping Coil) | / | 2 |
| SRL(D)-T5 (Tripping Coil) | | |
| SL(D)-T65, T80 (Tripping Coil) | 12.5 | / |
| SR-K100 | | |
| SRL-K100 | | |

UN-SA725



0.025kg

Connection Example (Connection Diagram)



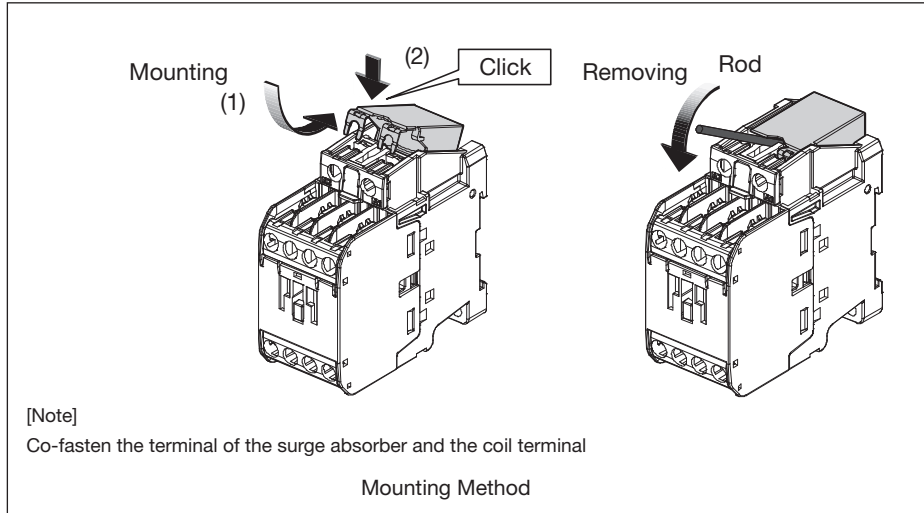
When attached to the body of a magnetic contactor, the body exterior becomes larger by the following dimensions.

| Applicable Models | L1 Dimension | L2 Dimension |
|----------------------------------|--------------|--------------|
| SL(D)-T21 to T50 (Tripping Coil) | / | 7 |
| SRL(D)-T5 (Tripping Coil) | | |
| SD-T65, T80 | 9.5 | / |
| DUD-N30 | | |
| SL(D)-T65, T80 (Tripping Coil) | | |
| SR-K100 | 17.5 | / |
| SRD-K100 | 11.5 | |
| SRL(D)-K100 | 17.5 | 5.5 |

● Mounting Method

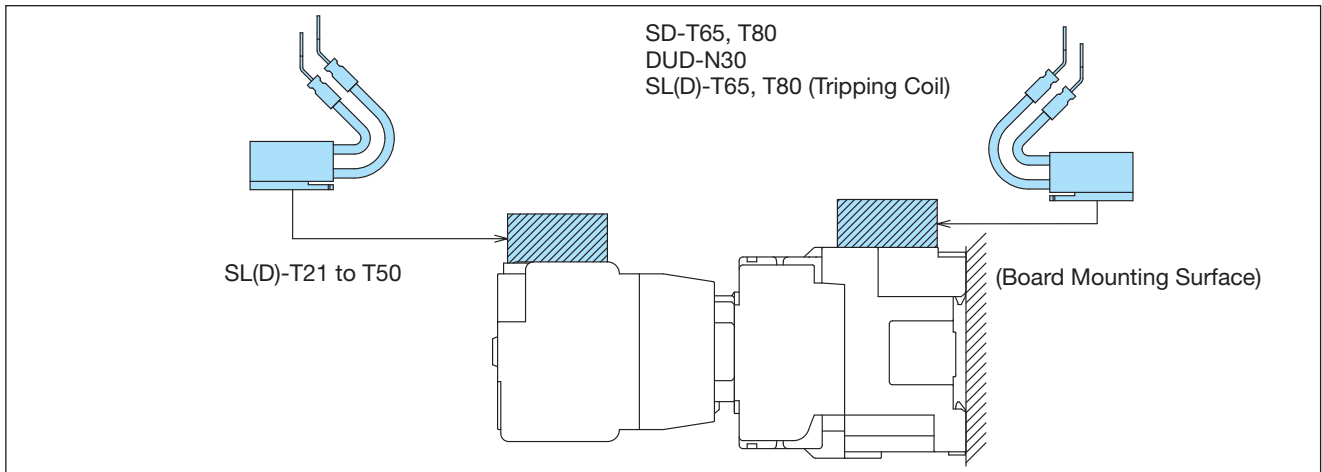
(1) UT-SA13, SA21, SA22, SA23, SA25

Loosen the screws of the coil terminals A1 and A2 of the magnetic contactor or contactor relay (not necessary for models with wiring streamlining terminals (model names "BC" and "CX")), then insert in the direction of the arrow in the figure below (insert the protrusion into the groove after the conductor is inserted into the coil terminal).



(2) UN-SA712, SA713, SA721, SA722, SA723, SA725

(1) The body of the surge absorber is pushed into the groove provided in the upper part of the magnetic contactor or contactor relay in the direction of the arrow as shown in the figure below.



(2) Mount the magnetic contactor or contactor relay on the mounting surface of the panel.

(3) Co-fasten the terminal of the surge absorber to the operation coil terminal. (As the lead wire of the surge absorber is made long, bundle it, etc. as needed.)

| Model Name | Model Name |
|------------|------------|
| UT-SA13 | UN-SA712 |
| UT-SA21 | UN-SA713 |
| UT-SA22 | UN-SA721 |
| UT-SA23 | UN-SA722 |
| UT-SA25 | UN-SA723 |
| | UN-SA725 |

8.7 UT/UN-ML Mechanical Interlock Units

A reversible magnetic contactor can be configured.

- The mechanical interlock prevents the simultaneous energization of 2 magnetic contactors by mechanically locking them. It can be combined with a connecting conductor kit (UT/UN-SD , UN-SG) to easily configure the reversible magnetic contactor and magnetic contactor for power switching.
- UT-ML20(BC) has 2 built-in break contacts, which can be used to configure an electrical interlock. Do not use these break contacts for applications other than the electrical interlock. As models other than UT-ML20(BC) have no built-in break contact, be sure to use the auxiliary break contacts of the magnetic contactor for the electrical interlock.

Format

| Mechanical Interlock Model Name | Applicable Magnetic Contactor Model | | |
|---------------------------------|--|---|--|
| | AC Operated | DC Operated | Mechanically Latched Type |
| UT-ML20 | S-T10,T12,T20 (Note 3) | SD-T12,T20 | — |
| UT-ML20BC | S-T10BC,T12BC,T20BC (Note 3) | SD-T12BC,T20BC | — |
| UN-ML21 | S-T21 to T80 S-T21BC to T50BC DU-N30 | SD-T21 to T80 SD-T21BC to T50BC DUD-N30 | SL(D)-T21 to T80 SL(D)-T21 to T50BC |
| UN-ML80 | S-T100 S-N125 DU-N60 | SD-T100 SD-N125 DUD-N60 | SL(D)-T100 SL(D)-N125 |
| UN-ML150 | S-N150,DU-N120 | SD-N150,DUD-N120 | SL(D)-N150 |
| UN-ML220 | S-N180,N220,N300,N400 DU-N180,N260 | SD-N220,N300,N400 DUD-N180,N260 | SL(D)-N220 SL(D)-N300,N400 |



UT-ML20



UN-ML21

Note 1. "-" indicates outside production range.

Note 2. UT-ML11BC and UT-ML20BC are the model names with wiring streamlining terminals.

Note 3. The units can be combined with the contactors produced in March, 2019 and later.

Mounting

Hole Drilling Dimension

(Drilling of holes is not required when mounting the IEC 35 mm rail mountable model is mounted to the IEC 35 mm rail for reversing.)

| | <table border="1"> <thead> <tr> <th rowspan="2">Model</th> <th rowspan="2">Applicable Frames</th> <th colspan="3">Dimensions [mm]</th> <th rowspan="2">Applicable Terminal Wire Size [φ mm, mm²]</th> <th rowspan="2">Applicable Crimp Lug Size</th> <th rowspan="2">Terminal Screw Tightening Torque N·m</th> </tr> <tr> <th>A ±0.2</th> <th>B ±0.2</th> <th>C ±0.3</th> </tr> </thead> <tbody> <tr> <td rowspan="3">UT-ML20(BC)</td> <td>T10</td> <td>74</td> <td>—</td> <td>60</td> <td rowspan="3">φ 1.6 0.75 to 2</td> <td rowspan="3">1.25-3.5 to 2-3.5</td> <td rowspan="3">0.94 to 1.51</td> </tr> <tr> <td>S-T12,T20</td> <td>89</td> <td>—</td> <td>60</td> </tr> <tr> <td>SD-T12,T20</td> <td>89</td> <td>—</td> <td>60</td> </tr> </tbody> </table> | Model | Applicable Frames | Dimensions [mm] | | | Applicable Terminal Wire Size [φ mm, mm ²] | Applicable Crimp Lug Size | Terminal Screw Tightening Torque N·m | A ±0.2 | B ±0.2 | C ±0.3 | UT-ML20(BC) | T10 | 74 | — | 60 | φ 1.6 0.75 to 2 | 1.25-3.5 to 2-3.5 | 0.94 to 1.51 | S-T12,T20 | 89 | — | 60 | SD-T12,T20 | 89 | — | 60 | | | | | | |
|----------------------|--|----------------------|-------------------|-----------------|--------------------|-------------------|--|---------------------------|--------------------------------------|--|---------------------------|--------------------------------------|-------------|-----|---------|-----|----|--------------------|-------------------|--------------|-----------|-----|--------|----------|------------|-----|---------|-----|----|-----------|-----|----|-----|----|
| Model | Applicable Frames | | | Dimensions [mm] | | | | | | Applicable Terminal Wire Size [φ mm, mm ²] | Applicable Crimp Lug Size | Terminal Screw Tightening Torque N·m | | | | | | | | | | | | | | | | | | | | | | |
| | | A ±0.2 | B ±0.2 | C ±0.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UT-ML20(BC) | T10 | 74 | — | 60 | φ 1.6 0.75 to 2 | 1.25-3.5 to 2-3.5 | 0.94 to 1.51 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | S-T12,T20 | 89 | — | 60 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | SD-T12,T20 | 89 | — | 60 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th rowspan="2">Mechanical Interlock</th> <th rowspan="2">Applicable Frames</th> <th colspan="3">Dimensions [mm]</th> </tr> <tr> <th>A ±0.2</th> <th>B ±0.2</th> <th>C ±0.3</th> </tr> </thead> <tbody> <tr> <td rowspan="5">UN-ML21</td> <td>T21,T25</td> <td>54</td> <td>19</td> <td>60</td> </tr> <tr> <td>T35,T50</td> <td>65</td> <td>20</td> <td>70</td> </tr> <tr> <td>S-T32</td> <td>30</td> <td>23</td> <td>60</td> </tr> <tr> <td>SD-T32</td> <td>32</td> <td>21</td> <td>67</td> </tr> <tr> <td>N38,N48</td> <td>40</td> <td>24</td> <td>80</td> </tr> </tbody> </table> | Mechanical Interlock | Applicable Frames | Dimensions [mm] | | | A ±0.2 | B ±0.2 | C ±0.3 | UN-ML21 | T21,T25 | 54 | 19 | 60 | T35,T50 | 65 | 20 | 70 | S-T32 | 30 | 23 | 60 | SD-T32 | 32 | 21 | 67 | N38,N48 | 40 | 24 | 80 | | | | |
| Mechanical Interlock | Applicable Frames | | | Dimensions [mm] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | A ±0.2 | B ±0.2 | C ±0.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UN-ML21 | T21,T25 | 54 | 19 | 60 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | T35,T50 | 65 | 20 | 70 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | S-T32 | 30 | 23 | 60 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | SD-T32 | 32 | 21 | 67 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | N38,N48 | 40 | 24 | 80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Mechanical Interlock</th> <th>Applicable Frames</th> </tr> </thead> <tbody> <tr> <td>UN-ML21</td> <td>T65,T80</td> </tr> </tbody> </table> | Mechanical Interlock | Applicable Frames | UN-ML21 | T65,T80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mechanical Interlock | Applicable Frames | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UN-ML21 | T65,T80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Mechanical Interlock</th> <th>Applicable Frames</th> </tr> </thead> <tbody> <tr> <td>UN-ML80</td> <td>T100</td> </tr> </tbody> </table> | Mechanical Interlock | Applicable Frames | UN-ML80 | T100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mechanical Interlock | Applicable Frames | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UN-ML80 | T100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th rowspan="2">Mechanical Interlock</th> <th rowspan="2">Applicable Frames</th> <th colspan="4">Dimensions</th> </tr> <tr> <th>A ±0.2</th> <th>B ±0.2</th> <th>C ±0.3</th> <th>D</th> </tr> </thead> <tbody> <tr> <td>UN-ML80</td> <td>N125</td> <td>90</td> <td>49</td> <td>125</td> <td>M4</td> </tr> <tr> <td>UN-ML150</td> <td>N150</td> <td>100</td> <td>39.5</td> <td>125</td> <td>M5</td> </tr> <tr> <td rowspan="2">UN-ML220</td> <td>N180,N220</td> <td>120</td> <td>40</td> <td>190</td> <td>M6</td> </tr> <tr> <td>N300,N400</td> <td>145</td> <td>37</td> <td>225</td> <td>M8</td> </tr> </tbody> </table> | Mechanical Interlock | Applicable Frames | Dimensions | | | | A ±0.2 | B ±0.2 | C ±0.3 | D | UN-ML80 | N125 | 90 | 49 | 125 | M4 | UN-ML150 | N150 | 100 | 39.5 | 125 | M5 | UN-ML220 | N180,N220 | 120 | 40 | 190 | M6 | N300,N400 | 145 | 37 | 225 | M8 |
| Mechanical Interlock | Applicable Frames | | | Dimensions | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | A ±0.2 | B ±0.2 | C ±0.3 | D | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UN-ML80 | N125 | 90 | 49 | 125 | M4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UN-ML150 | N150 | 100 | 39.5 | 125 | M5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UN-ML220 | N180,N220 | 120 | 40 | 190 | M6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | N300,N400 | 145 | 37 | 225 | M8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

● UT-ML20(BC)

- (1) Hook the load side barrier of the magnetic contactor to the load side claw A of the interlock unit.
- (2) Allot the lever (1) of the interlock unit to the lever insert hole (2) of the magnetic contactor side, and the insert protrusion (3) to the unit mounting hole (4).
- (3) Press the interlock unit and magnetic contactor against each other, and hook up the power supply side claw B and power supply side barrier of the magnetic contactor.

Important Matters

In this state, make sure that the cross bar head (5) on one side moves smoothly when pressed. Similarly, check the other magnetic contactor.

If the cross bar head is constrained and does not move, rearrange.

When rearranging, refer to the following * (2).

- (4) Align the rail (7) of the connecting plate in the groove (6) at the bottom of the left and right magnetic contactors, and push until you hear a click.
- (5) Connect the lead wire (8) of the interlock unit to the coil terminal A1.
Lead R02 (Red) → To Right Magnetic Contactor Coil Terminal A1
Lead L02 (Black) → To Left Magnetic Contactor Coil Terminal A1

- (6) Wire the control circuit as follows.

| | | | | |
|-------------|---|-----------------|---|--------------|
| Right Coil | ← | Right Contactor | → | Interlock |
| Terminal A2 | | Control Circuit | | Unit |
| | | | | Terminal R01 |
| Left Coil | ← | Left Contactor | → | Interlock |
| Terminal A2 | | Control Circuit | | Unit |
| | | | | Terminal L01 |

Important Matters

When the cross bar head (5) of one of the magnetic contactors is pushed in, if it moves smoothly and one side is pushed in, make sure for both left and right that the other side is not pushed in.

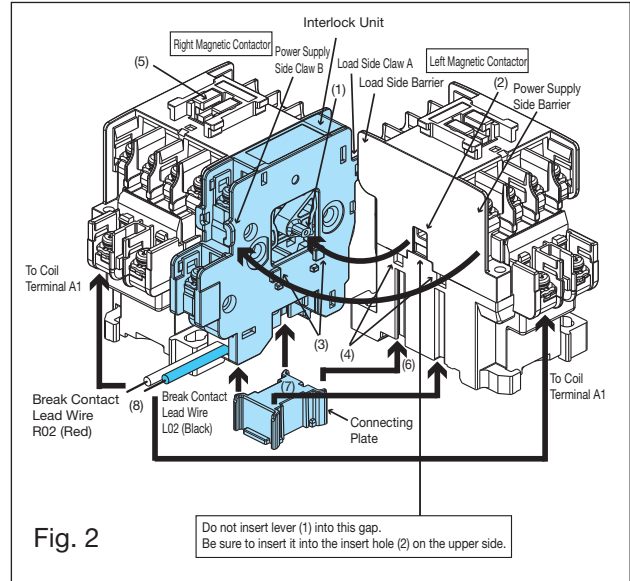


Fig. 2

Do not insert lever (1) into this gap.
Be sure to insert it into the insert hole (2) on the upper side.

● Mounting Method

● UN-ML21[See Fig. 4]

- (1) Allot the lever (1) of the interlock unit to the lever insert hole (2) of the magnetic contactor side, and the insert protrusion (3) to the unit mounting hole (4), then sandwich the interlock unit with the left and right magnetic contactors without a gap.
- (2) Align the rail (7) of the connecting plate in the groove (6) at the bottom of the left and right magnetic contactors, and push the connecting plate until the protrusion (9) fits into the hook (8) of the interlock and you hear a click.

Important Matters

When the cross bar head (5) of one of the magnetic contactors is pushed in, if it moves smoothly and one side is pushed in, make sure for both left and right that the other side is not pushed in.

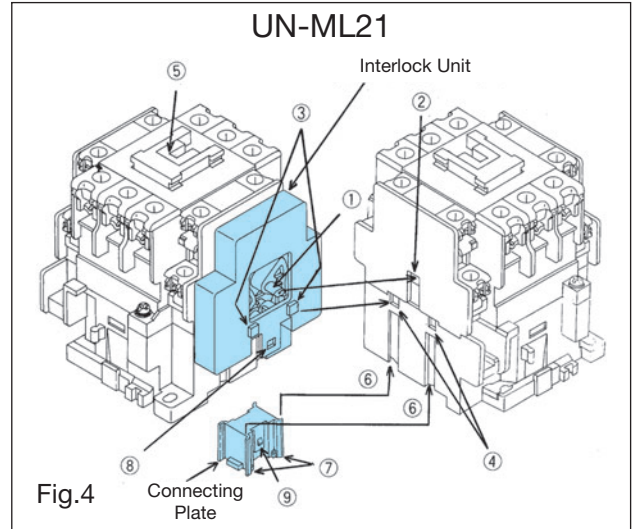


Fig.4

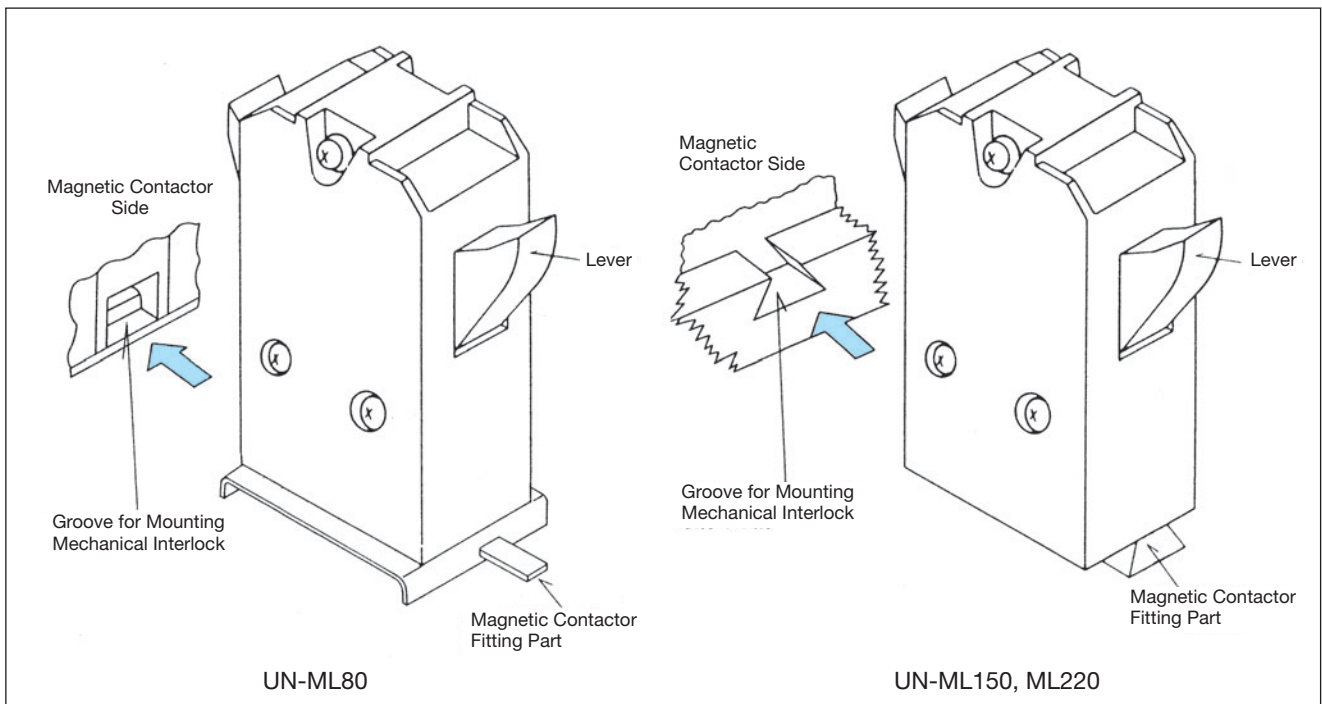
● UN-ML80, ML150, ML220

- (1) Drill holes for the mounting screws of the magnetic contactor in the panel.
- (2) Mount one of the magnetic contactors on the panel.
- (3) Insert the lever of the mechanical interlock unit into the square hole provided on the magnetic contactor side, and insert the fitting portion provided at the bottom into the mounting groove of the magnetic contactor side.

- (4) Mount the panel on the other magnetic contactor to sandwich the mechanical interlock unit. Make sure that the mechanical interlock unit is sandwiched by the left and right magnetic contactors without a gap.

Important Matters

When the cross bar head of one of the magnetic contactors is pushed in, if it moves smoothly and one side is pushed in, make sure for both left and right that the other side is not pushed in.



● Outline Drawings

Refer to the reversible types on pages 73, 89 and 102 for the outline drawings when combined with a magnetic contactor.

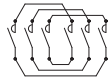
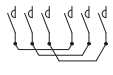


| Model Name | Model Name | Model Name | Model Name |
|------------|------------|------------|------------|
| UT-ML11 | UT-ML20 | UN-ML21 | UN-ML150 |
| UT-ML11BC | UT-ML20BC | UN-ML80 | UN-ML220 |

8.8 UT/UN-SD□, SG□, YD□, UN-RY□, YG□ Main Circuit Conductor Kits

Main circuit conductor kits can be used for the wiring rationalization of reversible magnetic contactors, power switches, star-delta starters, etc.

Combine the mechanical interlock unit (UT/UN-ML□) and electrical interlock when configuring the reversible type.



| Applicable Magnetic Contactor Frame | Reversing Type  | Crossover Type  | 3-Pole Short-Circuit Type  | 2-Pole Short-Circuit Type  |
|-------------------------------------|--|--|--|--|
| T10 | UT-SD10 | UT-SG10 | — | UT-YD20 |
| T12,T20 | UT-SD20 | UT-SG20 | — | |
| T21,T25 | UT-SD25 | UT-SG25 | UN-YG21 | UN-YD21 |
| T32 | UN-SD18CX | UN-SG18CX | UN-YG21 | UN-YD21 |
| T35,T50 | UN-SD25CX | UN-SG25CX | UN-YG25 | UN-YD25 |
| N38,N48 | — | — | | |
| T65,T80 | UN-SD50 | UN-SG50 | UN-YG50 | UN-YD50 |
| T100 | UN-SD80 | UN-SG80 | UN-YG80 | UN-YD80 |
| N125 | UN-SD125 | UN-SG125 | UN-YG80 | UN-YD80 |
| N150 | UN-SD150 | UN-SG150 | UN-YG150 | UN-YD150 |
| N180,N220 | UN-SD220 | UN-SG220 | UN-YG220 | UN-YD220 |
| N300,N400 | UN-SD300 | UN-SG300 | UN-YG300 | UN-YD300 |
| N600,N800 | UN-SD600 | UN-SG600 | — | — |
| Remarks | The kit contains six conductors per set. Power supply side and load side conductors are available, and therefore care should be taken when connecting. | The kit contains three conductors per set. The conductors can be connected to the power supply terminal. | 2 conductors are required when configuring the 3-pole parallel circuit. When using on the power supply side, mount after wiring the coil. | 2 conductors are required when configuring the 3-pole series circuit. |

Note 1. For UN-SD□ CX/SG□ CX, ring crimp lugs have insulation tubes.

Note 2. UN-YG□ and UN-YD□ are to be purchased separately from the magnetic contactor and mounted by the customer. While UN-YG21 to YG80 and UN-YD21 to YD80 can be mounted directly to the magnetic contactor terminal, perform the following procedure when mounting UN-YG150 to YG300 and UN-YD150 to YD300.

- (1) Loosen the arc box mounting screws (2 pcs.) and remove the arc box.
- (2) Remove the insulation barrier of the terminal where the conductor will be mounted.
- (3) Mount the arc box.
- (4) Mount the conductor.

Note 3. UT/UN-SD□ and SG□ are for magnetic contactors. A thermal overload relay cannot be added after mounting. (Excluding UT-SD10 to SD25, UN-SD18CX, UN-SD50 and SD80)

Note 4. When using UN-YG□ and YD□, UN-CZ□ live part protection cover cannot be mounted.

| Model Name | Minimum Order Unit | Model Name | Minimum Order Unit |
|------------|--------------------|------------|--------------------|
| UT-SD10 | 5 (for 5 Units) | UT-SG10 | 5 |
| UT-SD20 | 5 (for 5 Units) | UT-SG20 | 5 |
| UT-SD25 | 5 (for 5 Units) | UT-SG25 | 5 |
| UN-SD18CX | 5 (for 5 Units) | UN-SG18CX | 5 |
| UN-SD25CX | 5 (for 5 Units) | UN-SG25CX | 5 |
| UN-SD50 | 1 (for 1 Unit) | UN-SG50 | 1 |
| UN-SD80 | 1 (for 1 Unit) | UN-SG80 | 1 |
| UN-SD125 | 1 (for 1 Unit) | UN-SG125 | 1 |
| UN-SD150 | 1 (for 1 Unit) | UN-SG150 | 1 |
| UN-SD220 | 1 (for 1 Unit) | UN-SG220 | 1 |
| UN-SD300 | 1 (for 1 Unit) | UN-SG300 | 1 |
| UN-SD600 | 1 (for 1 Unit) | UN-SG600 | 1 |
| UN-YG21 | 20 | UT-YD20 | 20 |
| UN-YG25 | 20 | UN-YD21 | 20 |
| UN-YG50 | 10 | UN-YD25 | 20 |
| UN-YG80 | 10 | UN-YD50 | 10 |
| UN-YG150 | 10 | UN-YD80 | 10 |
| UN-YG220 | 5 | UN-YD150 | 10 |
| UN-YG300 | 5 | UN-YD220 | 5 |
| | | UN-YD300 | 5 |

8.9 UT/UN-YY□ 3-Pole Array Connection Units

Ideal for single-phase resistive loads of power supply devices, electric heaters, water heaters, etc.
 By attaching a 3-pole array connection unit to the main circuit terminal (power supply side, load side) of the standard type magnetic contactor, it can be used as a magnetic contactor for single-phase resistive loads.

● Model Name

| Unit Model Name | Applicable Models | | | Rating [A] AC-1 AC100 to 220 V | Terminal Screw Size | Switching Life [x 10000] | | |
|-----------------|---------------------|---------------------|--------------|--------------------------------------|---------------------|--------------------------|----|----|
| | AC Operated Product | DC Operated Product | Latched Type | | | | | |
| UT-YY20 | S-T10/T12/T20 | SD-T12 | — | 40 | M6 | 50 | | |
| | S-T21 | SD-T21 | SL(D)-T21 | 65 | | | | |
| UN-YY21 | S-T25 | — | — | 80 | | | | |
| | S-T32 | SD-T32 | — | 100 | | | | |
| UN-YY35 | S-T35 | SD-T35 | SL(D)-T35 | 125 | | | M8 | 25 |
| | S-T50 | SD-T50 | SL(D)-T50 | 200 | | | | |
| UN-YY50 | S-T65 | SD-T65 | SL(D)-T65 | 250 | | | | |
| | S-T80 | SD-T80 | SL(D)-T80 | 315 | | | | |
| UN-YY80 | S-T100 | SD-T100 | SL(D)-T100 | 400 | M8x2 | | | |
| UN-YY125 | S-N125 | SD-N125 | SL(D)-N125 | 400 | M10x2 | | | |
| UN-YY150 | S-N150 | SD-N150 | SL(D)-N150 | 500 | M12x2 | | | |



UN-YY35

Note 1. Please consult us regarding the combination of models other than the above.

Note 2. The power supply side and load side make up a set of 2.

Note 3. When installing UN-YY150, follow the steps below.

- (1) Loosen the arc box mounting screws (2 pcs.) and remove the arc box.
- (2) Remove the insulation barrier of the terminal where the conductor will be mounted.
- (3) Mount the arc box. (4) Mount the conductor.

Note 4. Minimum Order Unit 1 (for 1 Unit)

● Outline Drawing

| When Combining UT-YY20 | When Combining UN-YY21 | When Combining UN-YY35 |
|-------------------------|--|-------------------------|
| | | |
| When Combining UN-YY50 | When Combining UN-YY80 | When Combining UN-YY125 |
| | | |
| When Combining UN-YY150 | <p>*1 : Install the 3-pole array connection unit once the coil terminal has been tightened.</p> <p>*2 : A live part protection cover cannot be attached.</p> <p>*3 : UN-YY21 and UN-YY35 cannot be installed together with UT-SY□.</p> | |
| | | |

| Model Name | Model Name |
|------------|------------|
| UT-YY20 | UN-YY50 |
| UN-YY21 | UN-YY80 |
| UN-YY35 | UN-YY125 |
| | UN-YY150 |

● Terminal Screw Tightening Torque

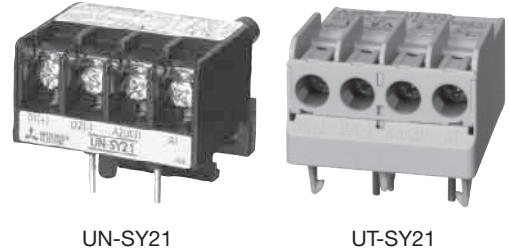
| Screw Size | Tightening Torque (N·m) |
|------------|-------------------------|
| M6 | 3.53 to 5.78 |
| M8 | 6.28 to 10.29 |
| M10 | 11.8 to 19.1 |
| M12 | 19.6 to 31.3 |

8.10 UT/UN-SY□ DC/AC Interface Units for Operation Coils

DC/AC interface unit for operation coils that switches AC-operated magnetic contactors and contactor relays at the output (DC24 V) of electronics such as PLCs. Both contactless (triac) output and contact (relay) output are available.

Model

| Unit Model | Output Method | Unit Mounting Method | Applicable Magnetic Contactor, Contactor Relay Model |
|------------|-----------------------------------|----------------------------|---|
| UT-SY21 | Contactless Output (Triac Output) | Top-On Additional Mounting | S-T10 to T50 SR-T5, T9 |
| UT-SY21BC | | | |
| UT-SY22 | Contact Output (Relay Output) | Independent Mounting | S-T10 to T100 SR-T5, T9 S-N125 to N400 SR-K100 |
| UT-SY22BC | | | |
| UN-SY11 | Contactless Output (Triac Output) | Independent Mounting | S-T10 to T100 SR-T5, T9 S-N125 to N400 SR-K100 |
| UN-SY12 | Contact Output (Relay Output) | | |
| UN-SY21 | Contactless Output (Triac Output) | Top-On Additional Mounting | S-N38, N48 S-N38CX, N48CX |
| UN-SY21CX | | | |
| UN-SY31 | Contact Output (Relay Output) | Top-On Additional Mounting | S-T65, T80 S-N38, N48 S-N38CX, N48CX |
| UN-SY22 | | | |
| UN-SY22CX | Contact Output (Relay Output) | Top-On Additional Mounting | S-T65, T80 |
| UN-SY32 | | | |



Note 1. The coil voltage designation of AC100V or AC200V can be applied for the operation coil.

Note 2. UT-SY□BC is the model name with wiring streamlining terminals.

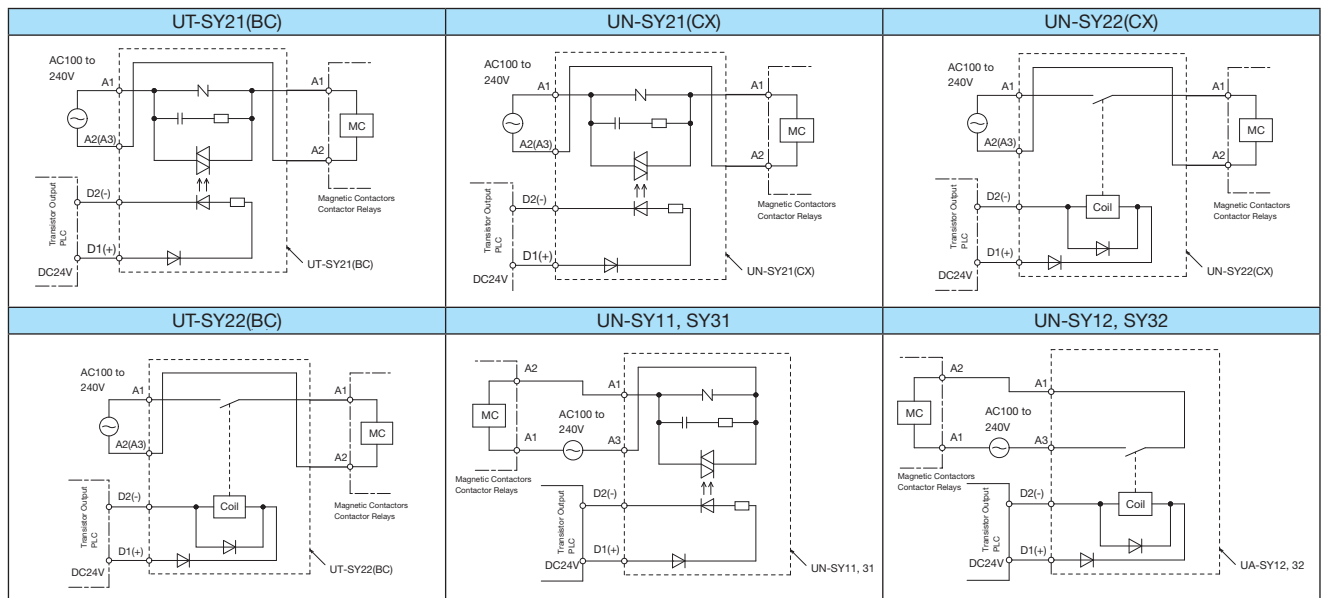
Note 3. UN-SY□CX is the model name with CAN terminals.

Specifications

| Model | | UT-SY21(BC) | UT-SY22(BC) | UN-SY11 | UN-SY21(CX) | UN-SY31 | UN-SY12 | UN-SY22(CX) | UN-SY32 | |
|--------------------------|-------------------------------|--|----------------|--|---------------------------------------|---------|----------------|-----------------------|--------------|--------------|
| Input Section | Rated working Voltage | DC24 V | | | DC24 V | | | | | |
| | Tolerable Voltage Fluctuation | 85 to 110% of Rated Operating Voltage | | | 85 to 110% of Rated Operating Voltage | | | | | |
| | Current | 15 mA | 10 mA | 15 mA | | | 10 mA | | | |
| | Power Consumption | 0.4 W | 0.24 W | 0.4 W | | | 0.24 W | | | |
| | Minimum Operating Voltage | 18 V | 18 V | 18 V | | | 18 V | | | |
| | Maximum Open Voltage | 4 V | 1 V | 4 V | | | 1 V | | | |
| Output Section | Output Specifications | Contactless Output (Triac Output) | Contact Output | Contactless Output (Triac Output) | | | Contact Output | | | |
| | Rated working Voltage | AC100 to AC240 V 50/60 Hz | | | AC100 to AC240 V 50/60 Hz | | | | | |
| | Output Current | 0.5 A, AC-15 | | | 0.5 A, AC-15 | | | | | |
| | Leakage Current when open | 5 mA/240 V | None | 5 mA/240 V | | | None | | | |
| | Operating Time | 1 ms in Operation, 0.5 Cycles + 1 ms or Less in Open Circuit | 10 ms or less | 1 ms in Operation, 0.5 Cycles + 1 ms or Less in Open Circuit | | | 10 ms or less | | | |
| | Switching Durability | Mechanical | — | 5 mil. times | — | | | 5 mil. times | | |
| | | Electrical | — | 5 mil. times | — | | | 1 mil. times (Note 1) | 5 mil. times | 1 mil. times |
| | Working Temperature | -10°C to 55°C | | | -10°C to 55°C | | | | | |
| Applicable Terminal Wire | Wire | φ 1.6mm, 0.75 to 2.5mm ² | | | φ 1.6mm, 1.25 to 2mm ² | | | | | |
| | Crimp minimal | 1.25-3.5, 2-3.5 | | | 1.25-3.5, 2-3.5 | | | | | |
| | Tightening Torque | 0.9 to 1.5 N · m | | | 0.9 to 1.5 N · m | | | | | |

Note 1. Using UN-SY12 and SR-K100 in combination achieves 5 million times.

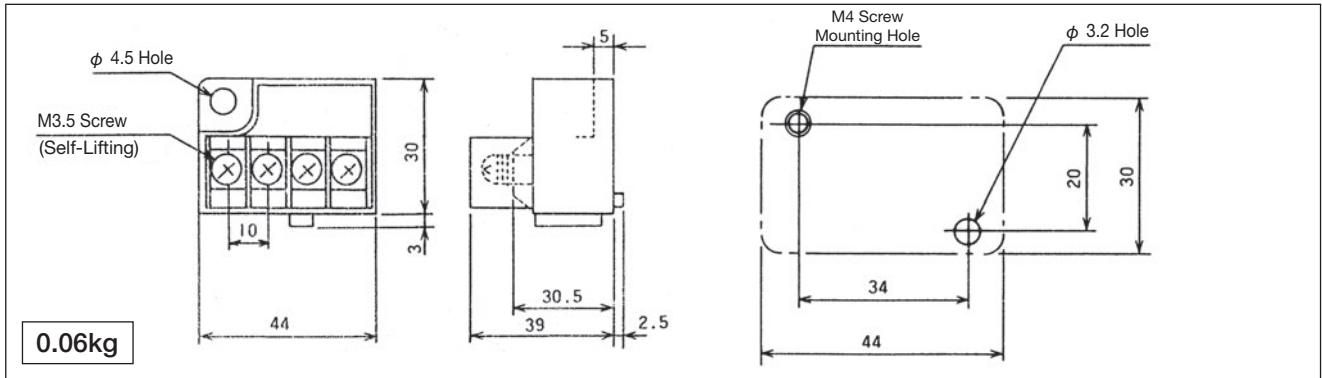
Connection Example (Connection Diagram)



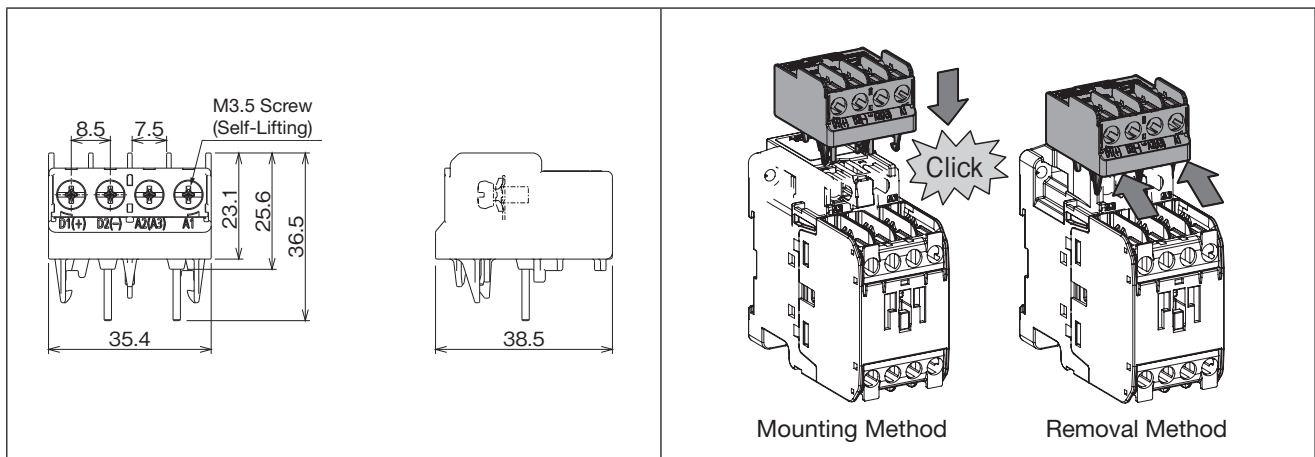
● Outline Drawings/Mounting

(1) UN-SY11, SY12 (Independent Mounting)

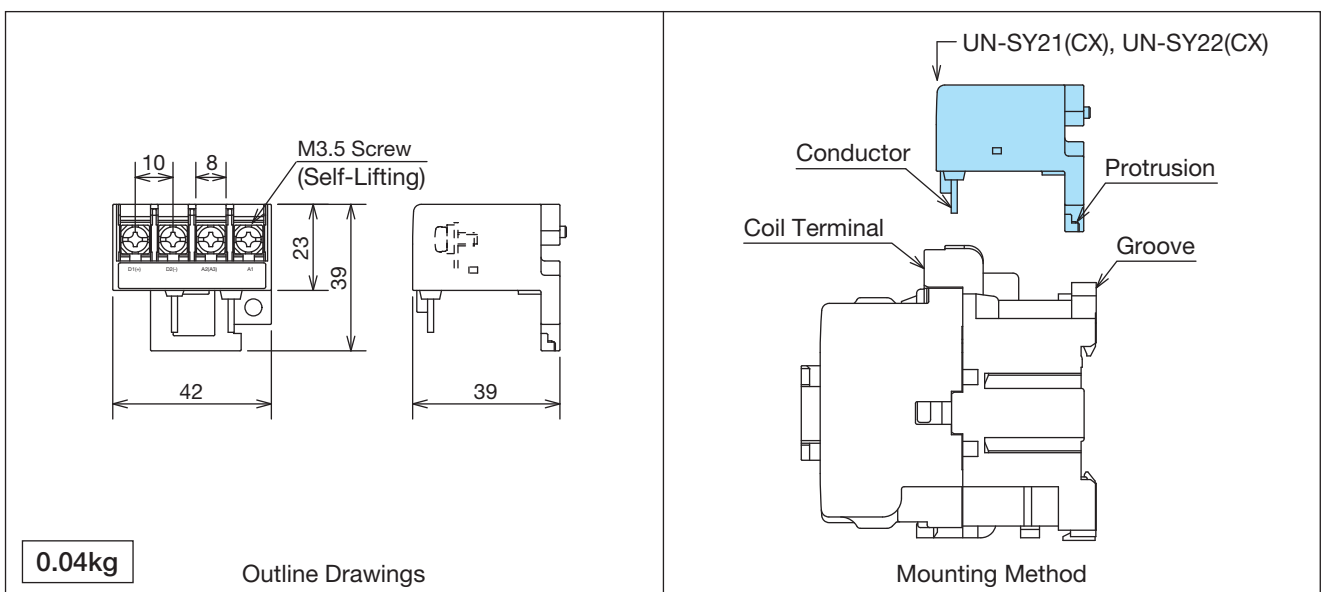
Cannot be directly attached to a magnetic contactor or contactor relay: screw-mount into holes drilled at the following dimensions near the magnetic contactor.



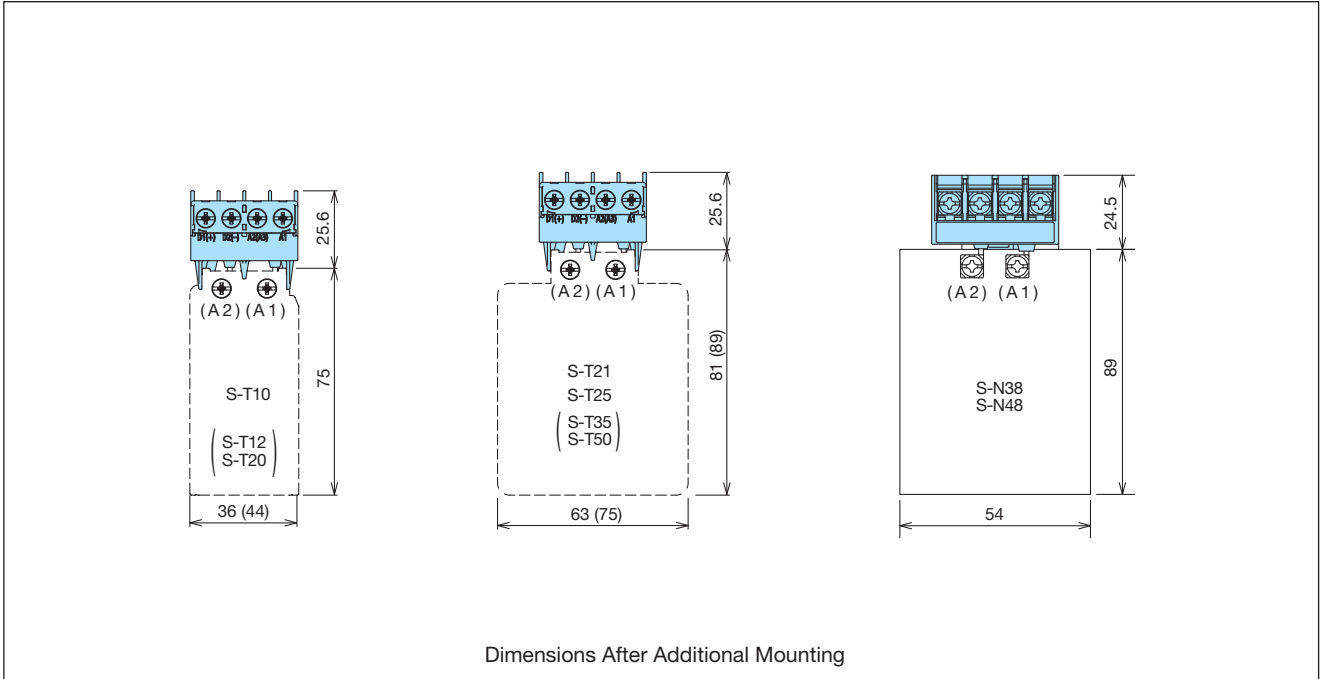
(2) UT-SY21, SY22



(3) UN-SY21(CX), SY22(CX) [Figure Has No CX]



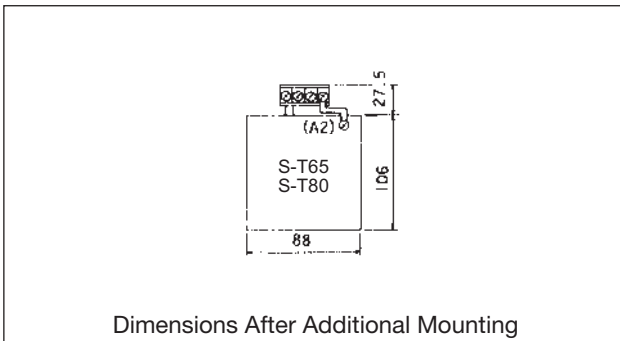
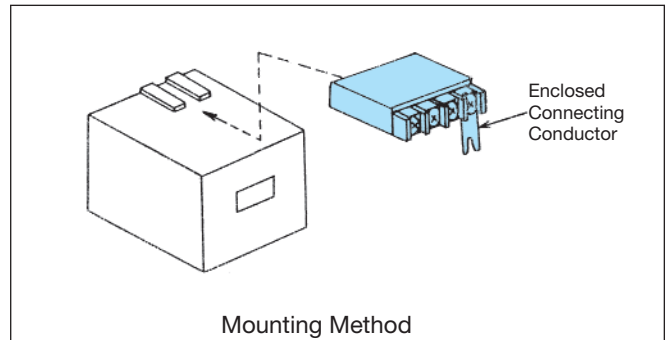
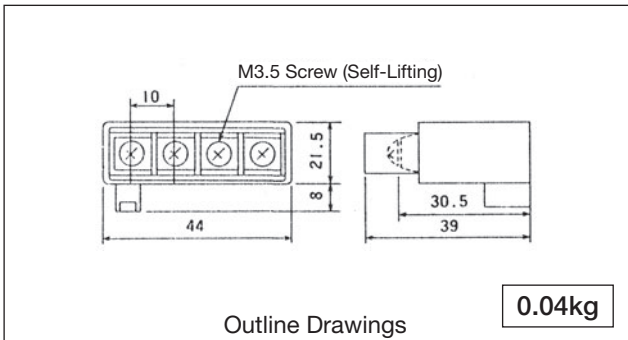
<Mounting Method> Loosen the screws of the coil terminals A1 and A2 of the magnetic contactor or contactor relay, insert the protrusion of the DC/AC interface unit into the groove, then insert and fasten the conductor into the coil terminal.



(4) UN-SY31, SY32

Mount according to the guidelines below.

Remove the screws of the coil terminal A2 of the magnetic contactor, align the protrusion of the DC/AC interface unit and groove of the magnetic contactor while the supplied connecting conductor is mounted on the A1 terminal of the DC/AC interface unit, then tighten the connecting conductor with the removed coil terminal screws.



| Model Name | Model Name | Model Name |
|------------|------------|------------|
| UT-SY21 | UN-SY11 | UN-SY12 |
| UT-SY21BC | UN-SY21 | UN-SY21CX |
| UT-SY22 | UN-SY22 | UN-SY22CX |
| UT-SY22BC | UN-SY31 | UN-SY32 |

8.11 UT/UN-CV □ and CZ □ Live Part Protection Cover Units

Covers for preventing inadvertent contact with live parts after wiring in panel mounting.

● Applicable Models → Model Names for Live Part Protection Covers

| | | Applicable Models | | | Model Names for Live Part Protection Covers | |
|---------------------------------------|--------------------------------|------------------------------|---|---|---|-----------------------------|
| | | AC Operated | DC Operated | Mechanically Latched Type | For Magnetic Contactors | For Thermal Overload Relays |
| Magnetic Starters/Magnetic Contactors | Non-Reversing | S-N38/N48 | — | — | UN-CV250 | — |
| | | S-T65/T80, DU-N30 | SD-T65/T80, DUD-N30 | SL(D)-T65/T80 | UN-CZ500 (2 Units Required for Power Supply and Load Sides) *1 | — |
| | | S-T100, B-N65 | SD-T100, BD-N65 | SL(D)-T100 | UN-CZ800 (2 Units Required for Power Supply and Load Sides) *2 | — |
| | | S-N125,B-N100,DU-N60 | SD-N125,BD-N100, DUD-N60 | SL(D)-N125 | UN-CZ1250 (2 Units Required for Power Supply and Load Sides) *2 | — |
| | | S-N150,DU-N120 | SD-N150,DUD-N120 | SL(D)-N150 | UN-CZ1500 (2 Units Required for Power Supply and Load Sides) *2 | — |
| | | S-N180/N220,DU-N180 | SD-N220,DUD-N180 | SL(D)-N220 | UN-CZ2200 (2 Units Required for Power Supply and Load Sides) *2 | — |
| | | S-N300/N400,DU-N260 | SD-N300/N400,DUD-N260 | SL(D)-N300/N400 | UN-CZ3000 (2 Units Required for Power Supply and Load Sides) *2 | — |
| | | MSO-T65/T80 | MSOD-T65/T80 | MSOL(D)-T65/T80 | UN-CZ500 (Power Supply Side), UN-CZ501 (Load Side) *1 | — |
| | | MSO-T100 | MSOD-T100 | MSOL(D)-T100 | UN-CZ800 (Power Supply Side), UN-CZ801 (Load Side) *2 | — |
| | | MSO-N125 | MSOD-N125 | MSOL(D)-N125 | UN-CZ1250 (Power Supply Side), UN-CZ1251 (Load Side) *2 | — |
| | MSO-N150 | MSOD-N150 | MSOL(D)-N150 | UN-CZ1500 (Power Supply Side), UN-CZ1501 (Load Side) *2 | — | |
| | MSO-N180/N220 | MSOD-N220 | MSOL(D)-220 | UN-CZ2200 (Power Supply Side), UN-CZ2201 (Load Side) *2 | — | |
| | MSO-N300/N400 | MSOD-N300/N400 | MSOL(D)-N300/N400 | UN-CZ3000 (Power Supply Side), UN-CZ3001 (Load Side) *2 | — | |
| | Reversing | S-2 x T65/T80, DU-2 x N30 | SD-2 x T65/T80, DUD-2 x N30 | SL(D)-2 x T65/T80 | UN-CZ502 *3 | — |
| | | S-2 x T100 | SD-2 x T100 | SL(D)-2 x T100 | UN-CZ802 *4 | — |
| | | S-2 x N125, DU-2 x N60 | SD-2 x N125, DUD-2 x N60 | SL(D)-2 x N125 | UN-CZ1252 *4 | — |
| | | S-2 x N150, DU-2 x N120 | SD-2 x N150, DUD-2 x N120 | SL(D)-2 x N150 | UN-CZ1502 *4 | — |
| | | S-2 x N180/N220, DU-2 x N180 | SD-2 x N220, DUD-2 x N180 | SL(D)-2 x N220 | UN-CZ2202 *4 | — |
| | | S-2 x N300/N400, DU-2 x N260 | SD-2 x N300/N400, DUD-2 x N260 | SL(D)-2 x N300/N400 | UN-CZ3002 *4 | — |
| | | MSO-2 x T65/T80 | MSOD-2 x T65/T80 | MSOL(D)-2 x T65/T80 | UN-CZ504 *3 | — |
| MSO-2 x T100 | | MSOD-2 x T100 | MSOL(D)-2 x T100 | UN-CZ804 *4 | — | |
| MSO-2 x N125 | | MSOD-2 x N125 | MSOL(D)-2 x N125 | UN-CZ1254 *4 | — | |
| MSO-2 x N150 | | MSOD-2 x N150 | MSOL(D)-2 x N1150 | UN-CZ1504 *4 | — | |
| MSO-2 x N180/N220 | MSOD-2 x N220 | MSOL(D)-2 x N220 | UN-CZ2204 *4 | — | | |
| MSO-2 x N300/N400 | MSOD-2 x N300/N400 | MSOL(D)-2 x N300/N400 | UN-CZ3004 *4 | — | | |
| Thermal Overload Relays | TH-T65 (Not available with SR) | | | — | UN-CZ605 (Live Part Protection Cover) | |
| | TH-T25/T50 | | | — | * 5 UN-CV203 (Current Setting Dial Misoperation Prevention Cover) | |
| | TH-T65/T100,TH-N120 to N600 | | | — | * 5 UN-CV603 (Current Setting Dial Misoperation Prevention Cover) (Note 11) | |
| | ET-N60 | | | — | UN-CV602(Live Part Protection Cover) | |
| Other | UN-AX2 | | — | UN-CV20 | | |
| | UN-AX4 | | — | | | |
| | UN-LL22 | | — | | | |
| | UN-AX80 | | | UN-CZ808 | | |
| | S-T65/T80 | SD-T65/T80 | — | * 5 UN-CV117 (Magnetic Contactor/Contactor Relay Manual Operation Prevention Cover) | | |
| S-T10 to T50/B-T21/SR-T5 | SD-T12 to T50/BD-T21/SRD-T5 | — | * 5 UT-CV107 (Magnetic Contactor/Contactor Relay Manual Operation Prevention Cover) | | | |

Note 1. Refer to page 180 for model names → applicable models for live part protection covers.

Note 2. UN-CZ □ 1 collectively covers the load-side terminals and thermal overload relays of magnetic contactors. Since it is used by mounting on the magnetic contactor side, it cannot be used for the thermal overload relay alone.

Note 3. Avoid solvents such as strong alkali, aromatic hydrocarbons and chlorine, adhesion of oil or use in an excessively gaseous atmosphere.

Note 4. Since deformation may occur due to humidity, avoid use under high humidity as much as possible.

Note 5. UN-CZ □ 2 and CZ □ 4 come in a set as 4 covers that are necessary for the reversible magnetic contactor and reversible magnetic starter.

Note 6. When the live part protection covers UN-CV □ and CZ □ are used, the reset release UN-RR □ for thermal overload relays cannot be used.

Note 7. Refer to page 329 regarding the live part protection cover UN-CV602 for ET-N60.

Note 8. Use the following live part protection covers for the mechanically latched mechanism of the mechanically latched type.

* 1: UN-CZ506 (1 pc) *2: UN-CZ806 (1 pc) *3: UN-CZ506 (2 pcs) *4: UN-CZ806 (2 pcs)

Note 9. UN-CV603 cannot be combined with TH-N120TAHZ.

Note 10. * 5 is a misoperation prevention cover and not a live part protection cover.

Potential Combinations of Live Part Protection Covers and Other Optional Units

| Live Part Protection/Misoperation Prevention Covers | | Auxiliary Contact Units (Including Low-Level Signals) | | | | Main Circuit Surge Absorber Units | Reset Releases | Fluorescent Display Lamps | Main Circuit Conductor Kits | |
|---|------------------------------|--|---------|---------|----------|---|-------------------|---------------------------------|-----------------------------------|--------------------|
| Type | Model Name | UN-AX2 UN-AX4 UN-LL22 | UN-AX11 | UN-AX80 | UN-AX150 | UT-SA3320 UT-SA3332 | UN-RR□□ | UN-TL□□ | UN-SD□□ UN-SG□□ | UN-YG□□ UN-YD□□ |
| Contact Manual Operation Prevention Cover | UT-CV107/UN-CV117 | x | ○ | — | — | x/ — | — | — | ○ | ○ |
| Live Part Protection Cover for UN-AX2/4 | UN-CV20 | ○ | ○*1 | — | — | — | x | x | — | — |
| Contact Live Part Protection Cover | UN-CV200 | x | x | — | — | — | x | x | — | — |
| Contact Live Part Protection Cover | UN-CZ500 | ○*2 | ○*1 | — | — | — | — | — | — | x |
| | UN-CZ800, CZ1250 | — | — | ○*3 | — | — | — | — | — | x |
| | UN-CZ1500, CZ2200, CZ3000 | — | — | — | ○ | — | — | — | — | x |
| Contact/Thermal Relay Live Part Protection Cover | UN-CZ501 | ○*2 | ○*1 | — | — | — | x | x | — | — |
| | UN-CZ801, CZ1251 | — | — | ○*3 | — | — | x | x | — | — |
| | UN-CZ1501, CZ2201, CZ3001 | — | — | — | ○ | — | x | x | — | — |
| Contact Live Part Protection Cover | UN-CZ502 | ○*2 | ○*1 | — | — | — | — | — | ○ | — |
| | UN-CZ802, CZ1252 | — | — | ○*3 | — | — | — | — | ○ | — |
| | UN-CZ1502, CZ2202, CZ3002 | — | — | — | ○ | — | — | — | ○ | — |
| Contact/Thermal Relay Live Part Protection Cover | UN-CZ504 | ○*2 | ○*1 | — | — | — | x | x | — | — |
| | UN-CZ804, CZ1254 | — | — | ○*3 | — | — | x | x | — | — |
| | UN-CZ1504, CZ2204, CZ3004 | — | — | — | ○ | — | x | x | — | — |
| Latch Mechanism Live Part Protection Cover | UN-CZ506 | x | ○*1 | — | — | — | — | — | x | x |
| | UN-CZ806 | — | — | ○*3 | — | — | — | — | x | x |
| TH-T65 Live Part Protection Cover | UN-CZ605 | — | — | — | — | — | x | x | — | — |
| Thermal Dial Misoperation Prevention Cover | UN-CV203, CV603 | — | — | — | — | — | x | x | — | — |

Note 1. Meaning of the Symbols: ○ : Applicable, x: Not Applicable, -: Not Combinable

Note 2. Models with * have the following conditions.

*1: Since the body side is protected by a live part protection cover but UN-AX11 is not, use UN-AX11CX.

*2: Since the body side is protected by a live part protection cover but UN-AX2/4 is not, use UN-AX2/4CX or UN-CV20.

*3: Since the body side is protected by a live part protection cover but UN-AX80 is not, use the UN-CZ808 protection cover for UN-AX80.

Note 3. The following units other than the ones in the above table can be combined regardless of whether there is a live part protection cover.

(1) Operation Coil Surge Absorber Units: UN-SA721, SA712, SA722, SA713, SA723, SA725

(2) Main Circuit Surge Absorber Unit: UN-SA33 (Separate)

(3) Interface Units: UN-SY11, SY12 (Separate Type), SY21, SY31, SY22, SY32

(4) Reversing Units: UN-ML21, ML80, ML150, ML220

(5) Fault Detection Units: UN-FD, FD4 (Separate Type)

● Outline Drawings

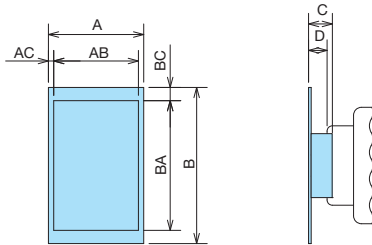
(1) UN-CV □ □ (Table at right)

Cover Outline Drawings: A x B x C

Outline Drawings of Applicable Models: AB x BA

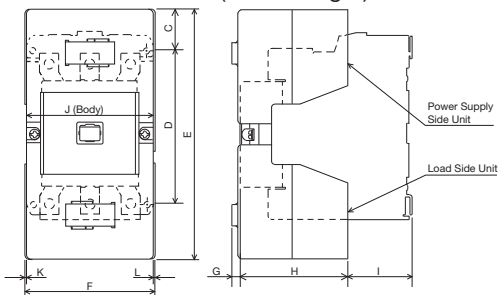
Depth that increases when the cover is attached: D

(- indicates that there is no change in the depth when the cover is attached.)



| Model Name | Variable Dimensions | | | | | | | |
|------------|---------------------|------|------|-----|----|----|----|-----|
| | A | B | C | D | AB | BA | AC | BC |
| UN-CV20 | 43 | 80 | 6 | 1 | 43 | 78 | 0 | 0 |
| UN-CV250 | 75 | 107 | 2.8 | - | 75 | 91 | 0 | 7.5 |
| UN-CV203 | 27 | 28 | 20 | 5.5 | | | | |
| UN-CV603 | 29 | 27.5 | 19.2 | 5.5 | | | | |
| UN-CV30 | 48.5 | 49 | 43 | 6 | 44 | 45 | 1 | 2 |
| UN-CV117 | 23 | 29 | 7 | 2 | | | | |

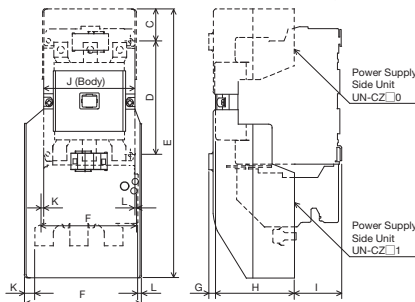
(2) UN-CZ500 to CZ3000 (Table at right)



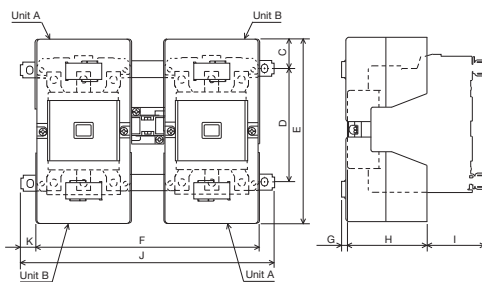
| | Combined Unit Name | | Outline Drawings | | | | | | | | | | |
|---------------------|------------------------|----------------|------------------|------------|-----|-----|------|------|-------|---------|----------|------|------|
| | Power Supply Side Unit | Load Side Unit | C | D | E | F | G | H | I | | J (Body) | K | L |
| | | | | | | | | | S/MSO | SD/SMOD | | | |
| Magnetic Contactors | UN-CZ500 | UN-CZ500 | 32.5 | 75 | 140 | 92 | -3.5 | 60.5 | 45.5 | 72.5 | 88 | 2 | 2 |
| | UN-CZ800 | UN-CZ800 | 36.5 | 110 | 183 | 104 | 2 | 67.5 | 59.5 | 90.5 | 100 | 2 | 2 |
| | UN-CZ1250 | UN-CZ1250 | 34.5 | 125 | 204 | 104 | 7 | 86 | 51 | 76 | 100 | 2 | 2 |
| | UN-CZ1500 | UN-CZ1500 | 49.5 to 52 | 125 to 130 | 229 | 154 | 7 | 96 | 49 | 73.5 | 120 | 17 | 17 |
| | UN-CZ2200 | UN-CZ2200 | 42 | 190 | 274 | 170 | 7 | 113 | 62 | 87.5 | 138 | 16 | 16 |
| Magnetic Starters | UN-CZ3000 | UN-CZ3000 | 46.5 | 225 | 318 | 192 | 7 | 126 | 69 | 95 | 163 | 14.5 | 14.5 |
| | UN-CZ500 | UN-CZ501 | 32.5 | 75 | 188 | 96 | -3.5 | 60.5 | 45.5 | 72.5 | 90 | 4 | 2 |
| | UN-CZ800 | UN-CZ801 | 36.5 | 110 | 254 | 104 | 2 | 67.5 | 59.5 | 90.5 | 100 | 2 | 2 |
| | UN-CZ1250 | UN-CZ1251 | 34.5 | 125 | 296 | 125 | 7 | 86 | 51 | 76 | *112 | *9.8 | *3.2 |
| | UN-CZ1500 | UN-CZ1501 | 49.5 to 52 | 125 to 130 | 325 | 154 | 7 | 96 | 49 | 73.5 | 120 | 17 | 17 |
| Magnetic Starters | UN-CZ2200 | UN-CZ2201 | 42 | 190 | 363 | 170 | 10 | 128 | 47 | 72.5 | 144 | 13 | 13 |
| | UN-CZ3000 | UN-CZ3001 | 46.5 | 225 | 445 | 192 | 7 | 135 | 60 | 86 | 163 | 14.5 | 14.5 |

*Dimensions shown are that of TH-N120TA.

(3) UN-CZ501 to CZ3001 (Table at right)



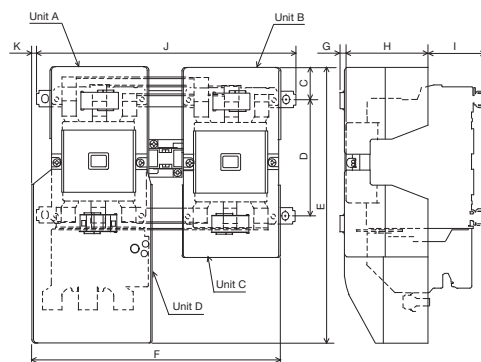
(4) UN-CZ502 to CZ3002 (Table below)



| | Frame | Set Model Name | Outline Drawings | | | | | | | | | |
|---------------------|-----------|----------------|------------------|-----|-----|-----|------|------|------|-------|-----|------|
| | | | C | D | E | F | G | H | I | | J | K |
| | | | | | | | | | S | SD | | |
| Magnetic Contactors | T65/T80 | UN-CZ502 | 25 | 100 | 140 | 190 | -3.5 | 60.5 | 51.5 | 78.5 | 216 | 13 |
| | T100 | UN-CZ802 | 58.5 | 100 | 183 | 241 | 2 | 67.5 | 69.5 | 100.5 | 270 | 14.5 |
| | N125 | UN-CZ1252 | 34.5 | 125 | 204 | 243 | 7 | 86 | 62 | 87 | 276 | 16.5 |
| | N150 | UN-CZ1502 | 52 | 125 | 229 | 294 | 7 | 96 | 60 | 84.5 | 296 | 1 |
| | N180/N200 | UN-CZ2202 | 42 | 190 | 274 | 330 | 7 | 113 | 76 | 101.5 | 370 | 20 |
| | N300/N400 | UN-CZ3002 | 46.5 | 225 | 318 | 374 | 7 | 126 | 83 | 109 | 395 | 10.5 |

Note 1. The model name display of the units is UN-CZ □ 0.
 Note 2. Since the mounting position of the reversing connecting conductor is processed, units A and B are respectively stamped with "A" and "B" for identification.

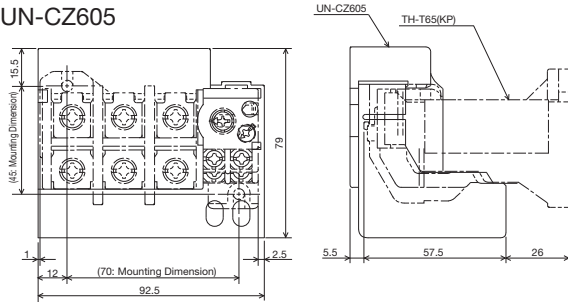
(5) UN-CZ504 to CZ3004 (Table below)



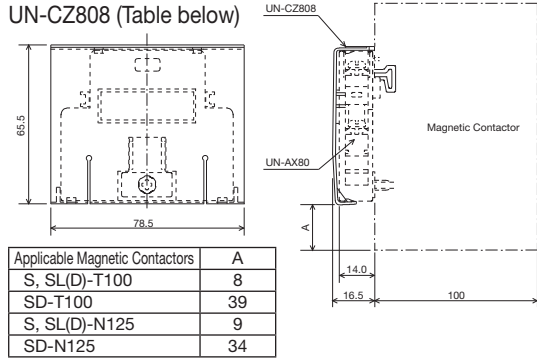
| | Frame | Set Model Name | Outline Drawings | | | | | | | | | |
|-------------------|-----------|----------------|------------------|-----|-----|-----|------|------|------|-------|-------|------|
| | | | C | D | E | F | G | H | I | | J | K |
| | | | | | | | | | MSO | MSOD | | |
| Magnetic Starters | T65/T80 | UN-CZ504 | 25 | 100 | 188 | 190 | -3.5 | 60.5 | 51.5 | 78.5 | 216 | 13 |
| | T100 | UN-CZ804 | 58.5 | 100 | 254 | 241 | 2 | 67.5 | 69.5 | 100.5 | 270 | 14.5 |
| | N125 | UN-CZ1254 | 34.5 | 125 | 296 | 260 | 7 | 86 | 62 | 87 | 276.5 | -0.5 |
| | N150 | UN-CZ1504 | 52 | 125 | 325 | 296 | 7 | 96 | 60 | 84.5 | 297 | 1 |
| | N180/N220 | UN-CZ2204 | 42 | 190 | 363 | 330 | 7 | 113 | 76 | 101.5 | 370 | 20 |
| | N300/N400 | UN-CZ3004 | 46.5 | 225 | 445 | 374 | 7 | 126 | 83 | 109 | 395 | 10.5 |

Note 1. The model name display is UN-CZ □ 0 for units A, B and C, and UN-CZ □ 1 for unit D.
 Note 2. Since the mounting position of the reversing connecting conductor is processed, units A, B, C and D are respectively stamped with "A", "B", "C" and "D" for identification.

(6) UN-CZ605

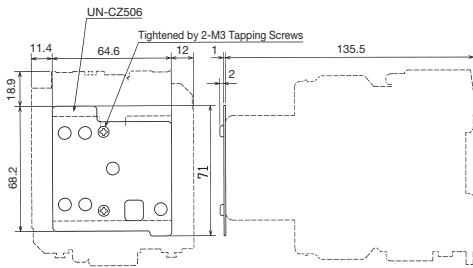


(7) UN-CZ808 (Table below)

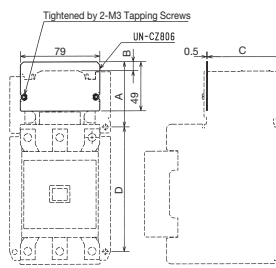


| Applicable Magnetic Contactors | A |
|--------------------------------|----|
| S, SL(D)-T100 | 8 |
| SD-T100 | 39 |
| S, SL(D)-N125 | 9 |
| SD-N125 | 34 |

(8) UN-CZ506



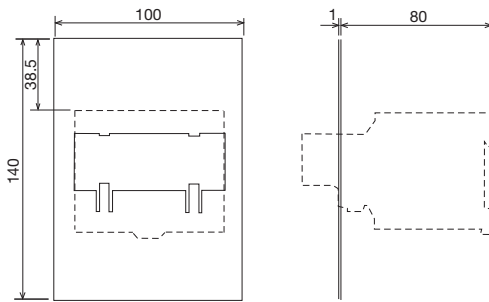
(9) UN-CZ806 (Table at right)



● Dimensions when mounted on the magnetic contactor (figure at left shows SL-N125.)

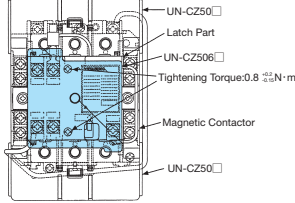
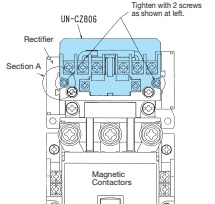
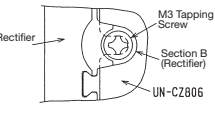
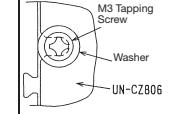
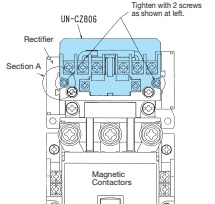
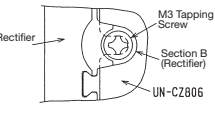
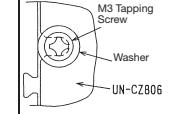
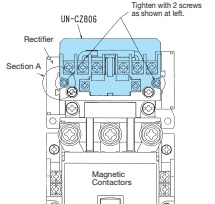
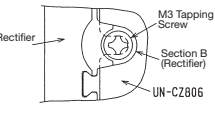
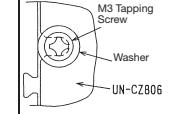
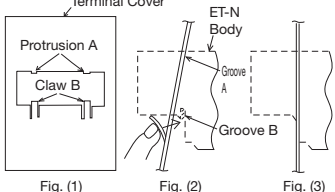
| Applicable Magnetic Contactors | Outline Drawing | | | |
|--------------------------------|-----------------|---|----|------------|
| | A | B | C | D |
| SL(D)-T100 | 64 | 9 | 74 | 110 |
| SL(D)-N125 | 65 | 9 | 76 | 125 |
| SL(D)-N150 | 67 to 69.5 | 9 | 76 | 125 to 130 |
| SL(D)-N220 | 39 | 9 | 78 | 190 |
| SL(D)-N300/N400 | 37 | 9 | 81 | 225 |

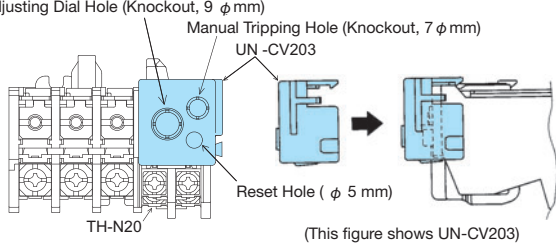
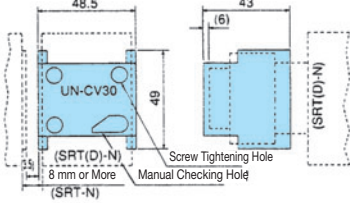
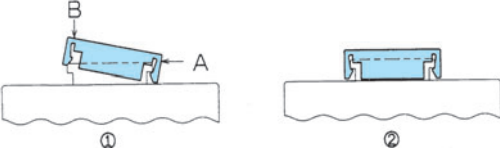
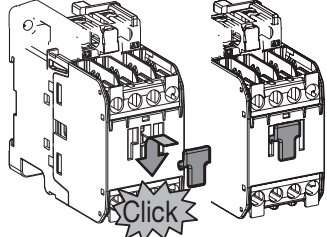
(10) UN-CV602



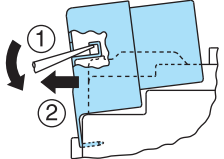
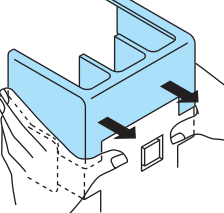
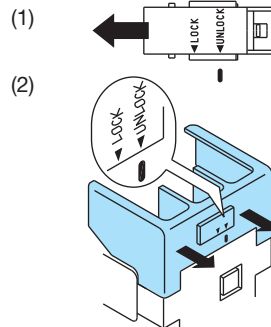
● Mounting Method

| Live Part Protection Cover | Mounting Method | |
|--|-----------------|--|
| UN-CV20 | | <ol style="list-style-type: none"> 1. Align the positioning portion of the cover between the barriers of the body as in the dashed line. 2. Push in the direction of Arrow A, and hook the claw of the cover to the protrusion of the body barrier. |
| UN-CZ500 UN-CZ501 UN-CZ502 UN-CZ504 UN-CZ800 UN-CZ801 UN-CZ802 UN-CZ804 UN-CZ605 | | Align the position of the cover between the barriers of the body from the front and push it in. (Arrow Direction in Figure at Left) |
| UN-CZ1250 UN-CZ1251 UN-CZ1252 UN-CZ1254 UN-CZ1500 UN-CZ1501 UN-CZ1502 UN-CZ1504 UN-CZ2200 UN-CZ2201 UN-CZ2202 UN-CZ2204 UN-CZ3000 UN-CZ3001 UN-CZ3002 UN-CZ3004 | | Make sure that the stopper of the cover is in the UNLOCK position, then align the position of the cover to the arc box of the body from the front and push it in. (Arrow Direction in Figure at Left) After pushing in the cover to the end, slide (in the direction of the arrow on the left) the stopper to the LOCK position to secure the cover. |

| Live Part Protection Cover | Mounting Method | | | | | | | | | |
|---|---|---|--|--|-------------------|--|---|---|---|--|
| UN-CZ506 |  <p>Tighten the enclosed two M3 screws, then attach the cover.</p> | | | | | | | | | |
| UN-CZ806 | <p>[A Detailed View]</p> <table border="1"> <thead> <tr> <th>With Rectifier</th> <th></th> <th>Without Rectifier</th> <th></th> </tr> </thead> <tbody> <tr> <td>  </td> <td>  <p>As shown at left, loosen the screws that are tightening the rectifier, place UN-CZ806 under the B section of the rectifier, then tighten the screws.</p> </td> <td>  </td> <td> <p>Tighten using the provided screws and washers. (Place the washer between the screw and UN-CZ806.)</p> </td> </tr> </tbody> </table> | | With Rectifier | | Without Rectifier | |  |  <p>As shown at left, loosen the screws that are tightening the rectifier, place UN-CZ806 under the B section of the rectifier, then tighten the screws.</p> |  | <p>Tighten using the provided screws and washers. (Place the washer between the screw and UN-CZ806.)</p> |
| With Rectifier | | Without Rectifier | | | | | | | | |
|  |  <p>As shown at left, loosen the screws that are tightening the rectifier, place UN-CZ806 under the B section of the rectifier, then tighten the screws.</p> |  | <p>Tighten using the provided screws and washers. (Place the washer between the screw and UN-CZ806.)</p> | | | | | | | |
| UN-CV602 |  <ol style="list-style-type: none"> 1. Insert protrusion A of the live part protection cover into groove A of the ET-N upper surface. (Figs. (1) and (2)) 2. Press the live part protection cover B claw into the direction of the arrow and insert it into the B groove of the ET-N lower surface. (Figs. (1) and (2)) | | | | | | | | | |

| Misoperation Prevention Cover | Mounting Method | |
|-------------------------------|---|--|
| UN-CV203 UN-CV603 |  <p>UN-CV203 and CV603 (transparent plastic) can be mounted with one touch by pushing in from the top of the adjusting dial of the thermal overload relay. If a misoperation prevention cover with fluorescent display lamp is needed, use UN-TL20 or TL60.</p> | |
| UN-CV30 |  <p>The UN-CV30 misoperation prevention cover can be mounted with one touch by pushing in from the top of the adjusting dial of the pneumatic time limit relay. It can be easily removed by pulling out the cover while gently twisting in the clockwise direction. As the cover opens by 3 mm on one side during mounting, position the unit so as not to interfere with adjacent structures.</p> | |
| UN-CV117 |  <ol style="list-style-type: none"> 1. Place the cover over the notch of the central body as shown in Figure (1). 2. While pressing in the direction of Arrow A, press in the direction of Arrow B. | |
| UT-CV107 |  <p>Note. Push in the cover until you hear a click.</p> | |

Removal Method

| Live Part Protection Cover | Removal Method | |
|--|--|---|
| UN-CZ500 UN-CZ501 UN-CZ502 UN-CZ504 |  | Insert a flat head screwdriver into the square hole with the UNLOCK arrow in the cover center and move the screwdriver in the direction as shown on the left to remove the cover. (Arrow Direction in Figure at Left) |
| UN-CZ800 UN-CZ801 UN-CZ802 UN-CZ804 UN-CZ605 |  | Hold the cover with both hands and remove it. (Arrow Direction in Figure at Left) |
| UN-CZ1250 UN-CZ1251 UN-CZ1252 UN-CZ1254 UN-CZ1500 UN-CZ1501 UN-CZ1502 UN-CZ1504 UN-CZ2200 UN-CZ2201 UN-CZ2202 UN-CZ2204 UN-CZ3000 UN-CZ3001 UN-CZ3002 UN-CZ3004 |  | Slide (in the direction of the arrow at left) the stopper to the UNLOCK position to remove the lock of the cover. Make sure that the stopper of the cover is in the UNLOCK position, then remove the cover while supporting it by hand. (Arrow Direction in Figure at Left) |

Minimum Order Unit

| Model Name | Minimum Order Unit (Sheet or Piece) | Model Name | Minimum Order Unit (Sheet or Piece) |
|------------|-------------------------------------|------------|-------------------------------------|
| UN-CV20 | 10 | UN-CZ802 | 1 |
| UN-CZ500 | 1 | UN-CZ1502 | 1 |
| UN-CZ800 | 1 | UN-CZ2202 | 1 |
| UN-CZ1250 | 1 | UN-CZ3002 | 1 |
| UN-CZ1500 | 1 | UN-CZ504 | 1 |
| UN-CZ2200 | 1 | UN-CZ804 | 1 |
| UN-CZ3000 | 1 | UN-CZ1254 | 1 |
| UN-CZ501 | 1 | UN-CZ1504 | 1 |
| UN-CZ801 | 1 | UN-CZ2204 | 1 |
| UN-CZ506 | 1 | UN-CZ3004 | 1 |
| UN-CZ806 | 1 | UN-CZ605 | 1 |
| UN-CZ808 | 1 | UN-CV203 | 1 |
| UN-CZ1251 | 1 | UN-CV603 | 1 |
| UN-CZ1501 | 1 | UN-CV30 | 1 |
| UN-CZ2201 | 1 | UN-CV117 | 10 |
| UN-CZ3001 | 1 | UT-CV107 | 10 |
| UN-CZ502 | 1 | | |

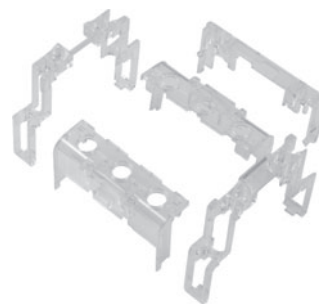
Note 1. Those with the minimum order unit of 10 will be shipped with 10 (sheets or pieces) per bag.

Note 2. Order those with the minimum order unit of 10 in a multiple of 10.

8.12 UT-CW□ Terminal Cover Units

Terminal cover with high safety that can be attached later.

- Finger protection function that complies with the DIN and VDE standards, improving electric shock prevention and safety during maintenance and inspection.
- The auxiliary terminal cover of the UT-CW□ terminal protection cover cannot be installed after wiring work. Also, ring crimp lugs wiring to the auxiliary contact terminal cannot be applied.

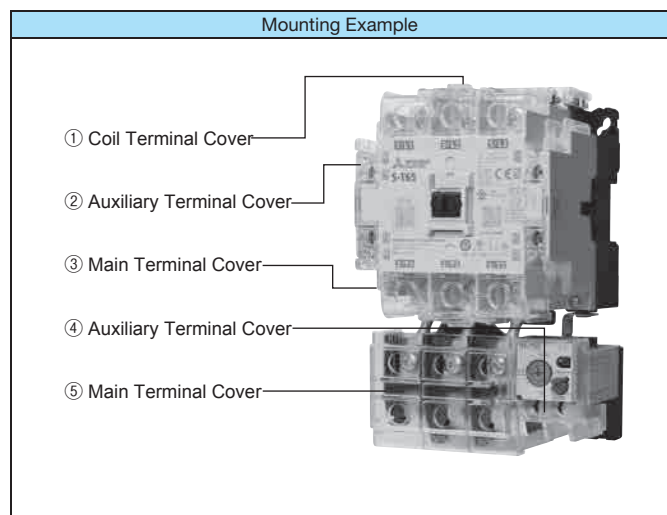


UT-CW800
Terminal Protection Covers

● Applicable Models

| Model Name | Applicable Models: Magnetic Contactors | | Model Name | Applicable Models: Thermal Overload Relays |
|------------|--|-------------|------------|--|
| | AC Operated | DC Operated | | |
| UT-CW800 | S-T65,T80 | SD-T65,T80 | UT-CW655 | TH-T65 (Not available with SR) |

● Mounting Example



● Packaging Type

| Model Name | Package Contents (Per Set) | Minimum Order Unit |
|------------|--|--------------------|
| UT-CW800 | Main Terminal Cover x 2, Auxiliary Terminal Cover x 2, Coil Terminal Cover x 1 | 1 Set |

| Model Name | Package Contents (Per Set) | Minimum Order Unit |
|------------|---|--------------------|
| UT-CW655 | Main Terminal Cover x 1, Auxiliary Terminal Cover x 1 | 1 Set |

8.13 UT/UN-RR□ Thermal Overload Relays Reset Release

Performs thermal reset from outside the control panel.

- A reset release can be additionally mounted.
 - As the release length indicates the length from the back of a door or the like to the attachment, specify the length from the table below.
- Although the release can be bent, minimize the bend and keep the minimum bending radius greater than 50 mm. Although the bend is covered with an insulating material, arrange it so as not to touch the bare live parts.
- As transparent plastic is used for the attachment, it is easy to check the operation of the thermal overload relay as well as the set current value even after the reset release is attached.



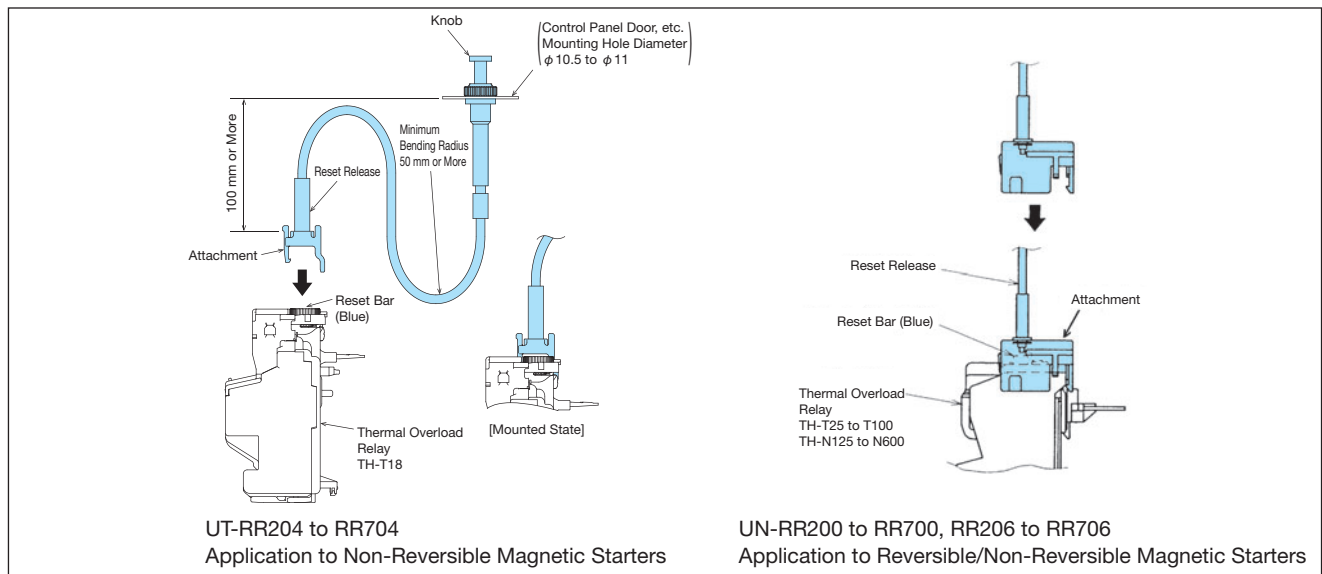
UT-RR200

| Model Name | | | Release Length |
|-------------------|------------------------------|---------------------------------|----------------|
| For TH-T18 Note 2 | For TH-T25/T50, TH-N20/N20TA | For TH-T65/T100, TH-N60 to N600 | |
| UT-RR204 | UN-RR200 | UN-RR206 | 200 mm |
| UT-RR404 | UN-RR400 | UN-RR406 | 400 mm |
| UT-RR554 | UN-RR550 | UN-RR556 | 550 mm |
| UT-RR704 | UN-RR700 | UN-RR706 | 700 mm |

Note 1. UN-RR206, RR406, RR556 and RR706 cannot be combined with TH-N120TAHZ.

Note 2. Cannot be combined with TH-T18 model numbers earlier than August 2017 (178W).

● Mounting Method



Note 1. When using UN-RR200 to RR700 and UN-RR206 to RR706, the live part protection cover units cannot be used.

● Outline Drawings

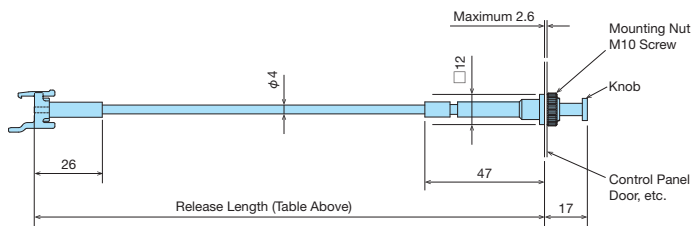


Figure shows UT-RR □□ 4

| Model Name |
|------------|
| UT-RR204 |
| UT-RR404 |
| UT-RR554 |
| UT-RR704 |
| UN-RR200 |
| UN-RR400 |
| UN-RR550 |
| UN-RR700 |
| UN-RR206 |
| UN-RR406 |
| UN-RR556 |
| UN-RR706 |

8.14 UN-TL □ Fluorescent Display Lamps for Thermal Overload Relays

Displays the trip state of the thermal overload relay with a light-emitting diode.

- Can be easily mounted on thermal overload relays.

| Model Name | Rated Voltage | Applicable Models | Power Consumption |
|----------------|----------------|-------------------|-------------------|
| UN-TL12 DC24V | AC24 V/DC24 V | TH-T18 | 0.2 W |
| UN-TL12 AC100V | AC100 to 127 V | | 0.18 W |
| UN-TL12 AC200V | AC200 to 240 V | | 0.2 W |
| UN-TL20 DC24V | AC24 V/DC24 V | TH-T25/T50 | 0.2 W |
| UN-TL20 AC100V | AC100 to 127 V | | 0.18 W |
| UN-TL20 AC200V | AC200 to 240 V | | 0.2 W |
| UN-TL60 DC24V | AC24 V/DC24 V | TH-T65/T100 | 0.2 W |
| UN-TL60 AC100V | AC100 to 127 V | TH-N120 to N600 | 0.18 W |
| UN-TL60 AC200V | AC200 to 240 V | | 0.2 W |

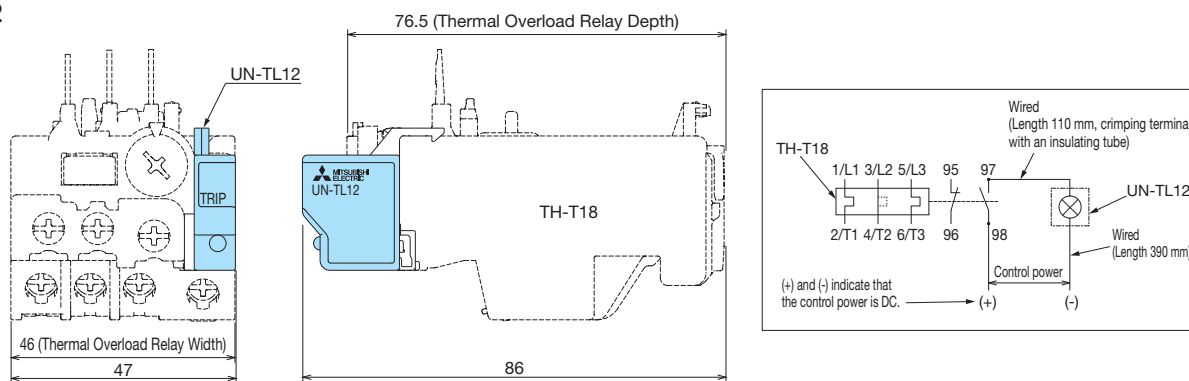
Note 1. UN-TL60 cannot be combined with TH-N120TAHZ.



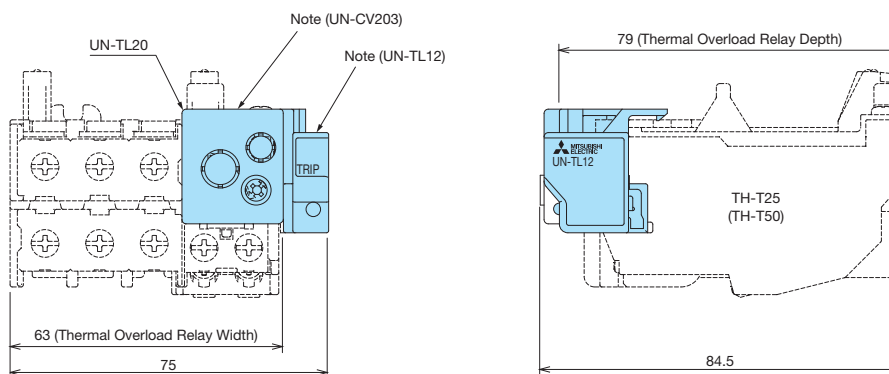
UN-TL12

● Outline Drawings

UN-TL12

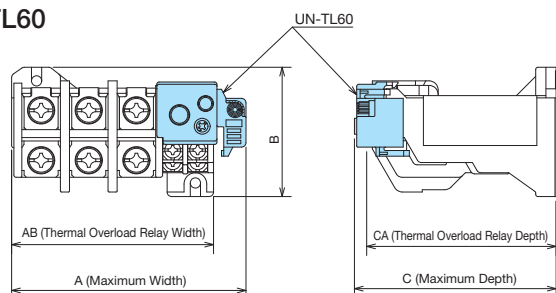


UN-TL20



Note. UN-TL20 fluorescent display lamp is a combination of UN-TL12 and operation prevention cover (UN-CV203).

UN-TL60



| Indicator Lamps Model Names | Applicable Models Thermal Overload Relays | Variable Dimensions | | | | |
|-----------------------------|---|---------------------|-----|----|-----|------|
| | | A | AB | B | C | CA |
| UN-TL60 | TH-N220 TH-N400 TH-N600 | 77.5 | 63 | 42 | 89 | 83.5 |
| | TH-T65, T100 | 103.5 | 88 | 53 | 89 | 83.5 |
| | TH-N120 | 117.5 | 103 | 67 | 105 | 105 |

| Model Name | Model Name |
|------------|------------|
| UN-TL12 | UN-TL20 |
| UN-TL60 | |

Note. Minimum Order Unit
 UN-TL12, TL20 : 5 (5-Piece Set)
 UN-TL60 : 1

8.15 UT-HZ18 and UN-RM20 Independent Mounting Units for Thermal Overload Relays

● Features

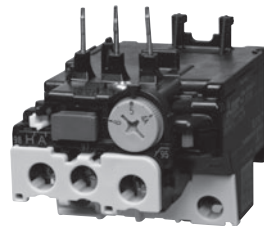
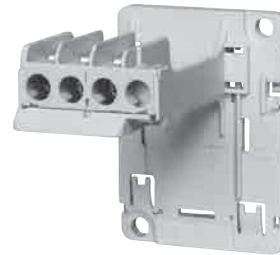
Screw mounting and IEC 35 mm rail mounting are enabled by combining with a thermal overload relay.

In addition, UT-HZ18BC can be combined with TH-T18BC to form an independent mounting thermal overload relay with wiring streamlining terminals.

● Types and Applicable Models

| Model Name | Mounting | Applicable Models |
|------------|-------------------------|----------------------------------|
| UT-HZ18 | Screw Mounting | TH-T18(KP), TH-T18HZSR |
| UT-HZ18BC | IEC 35 mm Rail Mounting | TH-T18BC(KP), TH-T18BCHZSR |
| UN-RM20 | IEC 35 mm Rail Mounting | TH-T25(BC)(KP), TH-T25(BC)(KP)SR |

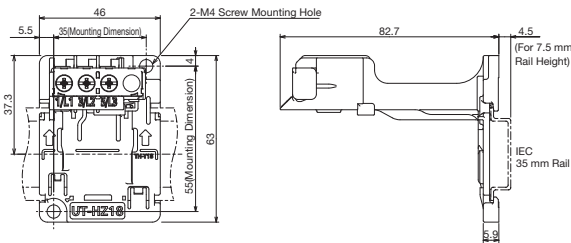
Note 1. □ BC is the model name with wiring streamlining terminals.



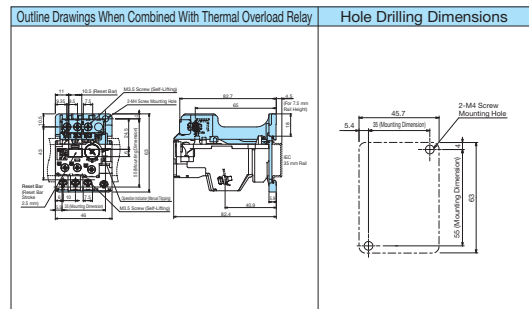
UT-HZ18 + TH-T18

● Outline Drawings

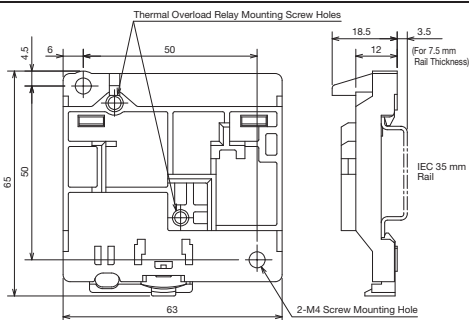
UT-HZ18 UT-HZ18BC



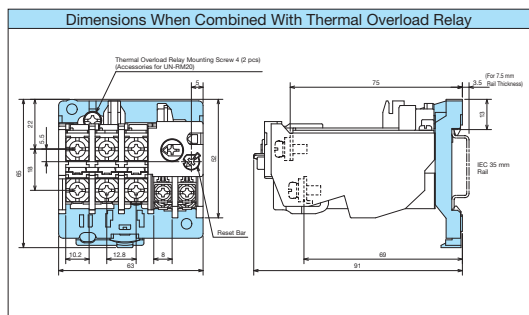
0.035 kg



UN-RM20



0.02 kg



| Model Name | Model Name |
|------------|------------|
| UT-HZ18 | UN-RM20 |
| UT-HZ18BC | |

8.16 UT/UN-TH□ Connecting Conductor Kits for Magnetic Starters

A magnetic contactor and thermal overload relay can be combined to configure the magnetic starter.

- Can be mounted on a thermal overload relay to combine with a magnetic contactor.
- Kit with connecting conductors, connecting conductor covers, terminal screws and the like needed for combination.

Types and Applicable Models

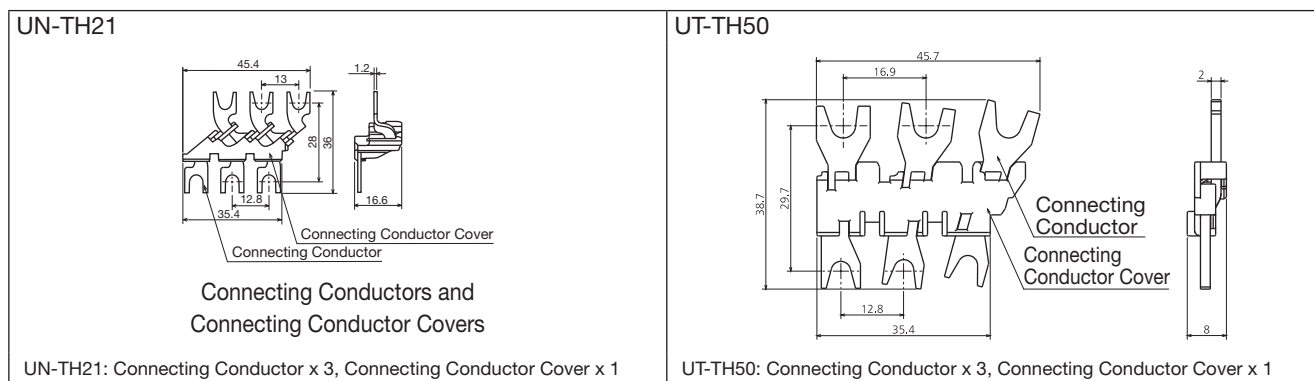
| Kit Model Name | Parts Included in the Kit | | Model Names of Applicable Thermal Overload Relays and Magnetic Contactors | | | |
|----------------|-----------------------------|----------|---|------------------------|--------------------------|--------------------------------|
| | | | Thermal Overload Relays | Magnetic Contactors | | |
| | Part Name | Quantity | | | AC Operated | DC Operated |
| UN-TH21 | Connecting Conductors | 3 | TH-T25(BC)(KP) | S-T21(BC),T25(BC) | SD-T21(BC) | SL(D)-T21(BC) |
| | Connecting Conductor Covers | 1 | | | | |
| UT-TH50 | Connecting Conductors | 3 | TH-T25(BC)(KP) TH-T50(BC)(KP) | S-T35(BC) S-T50(BC) | SD-T35(BC) SD-T50(BC) | SL(D)-T35(BC) SL(D)-T50(BC) |
| | Connecting Conductor Covers | 1 | | | | |

Note 1. "BC" in the model names of the applicable thermal overload relays and magnetic contactors refers to "wiring streamlining terminal".

Note 2. Since TH-T18(BC)(KP) used for magnetic contactors with T10 to T20 frames is for magnetic starters with connecting conductor and conductor cover integrated, a kit is not required.

Note 3. For connecting conductor kits of TH-T65 or higher and TH-N120 or higher, refer to the thermal overload relay outline drawings.

Outline Drawings



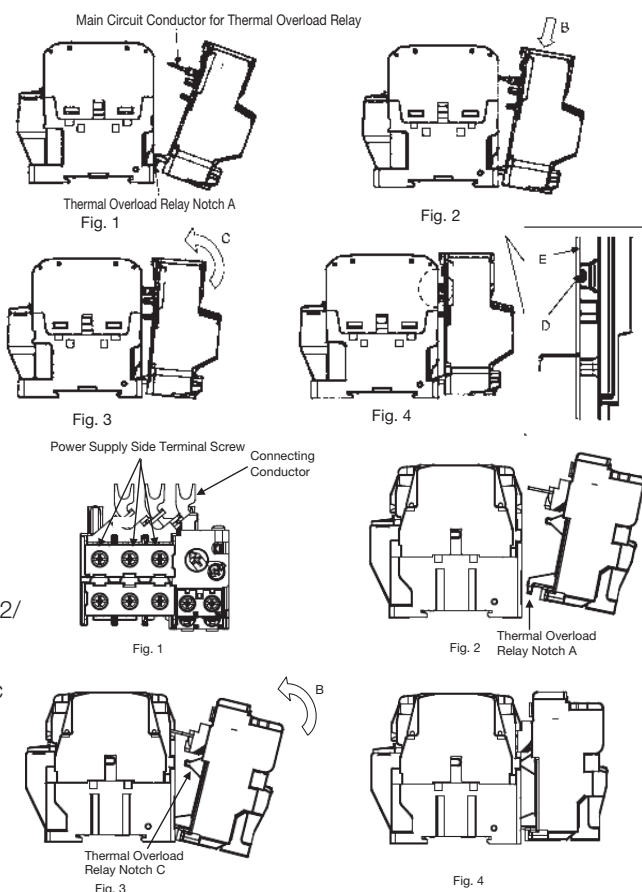
Mounting Method

For MSO-T10/T12/T20

- Loosen the 3 main terminal screws of the magnetic contactor (2/T1, 4/T2 and 6/T3).
- Tilt the thermal overload relay, guide the notch A of the thermal overload relay (2 places) into the indent of the magnetic contactor (2 places), then position the 3 main circuit conductors of the thermal overload relay so that they are at the left side of the main terminal screws. (Fig. 1)
- Push in the thermal overload relay in the B direction so that the notch A of the thermal overload relay and indent of the magnetic contactor are engaged. (Fig. 2)
- Rotate the thermal overload relay in the direction of Arrow C, and rotate the protrusion D of the thermal overload relay up to the E surface of the magnetic contactor. (Figs. 3, 4)
- While pressing the thermal overload relay to the magnetic contactor side, tighten the main terminal screws (2/T1, 4/T2 and 6/T3).

For MSO-T21/T25/T35/T50(BC)

- Attach the connecting conductor (3-pole integral product) to the power supply side terminal of the thermal overload relay with screws. (Fig. 1)
- Loosen the 3 main terminal screws of the magnetic contactor (2/T1, 4/T2 and 6/T3).
- Tilt the thermal overload relay and set the notch A of the thermal overload relay (2 places) to the indent of the magnetic contactor (2 places). (Fig. 2)
- Rotate the thermal overload relay in the direction of Arrow B, and confirm that the notch C of the thermal overload relay (1 point) has been inserted into the square hole of the indent of the magnetic contactor. (Fig. 3)
- While pressing the thermal overload relay to the magnetic contactor side, tighten the main terminal screws.



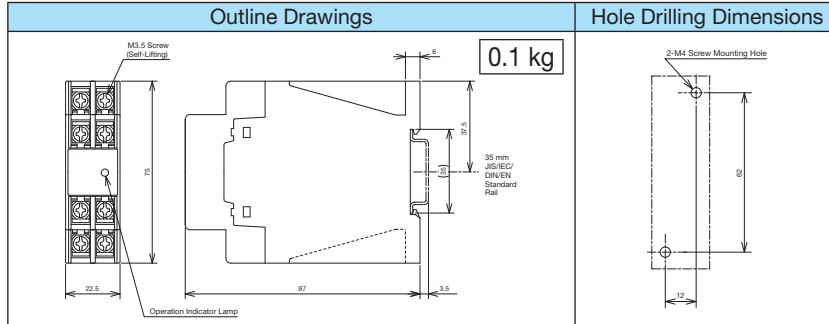
| Model Name | Model Name |
|------------|------------|
| UN-TH21 | UT-TH50 |

Note: Minimum Order Unit of 10 (Set for 10 Units)

8.17 UN-FD and UN-FD4 Fault Detection Units (Contact Weld Detection Relays)

Detects faults (contact welding) that occur to the main circuit contact of a magnetic starter when in conduction mode, and can be used to prevent load devices running out of control by interrupting the power supply by combining a no-fuse breaker or magnetic contactor. For fault detection units, UN-FD for the 200 V main circuit and UN-FD4 for the 400 V main circuit are available.

● Outline Drawings



UN-FD4

● Ratings/Specifications

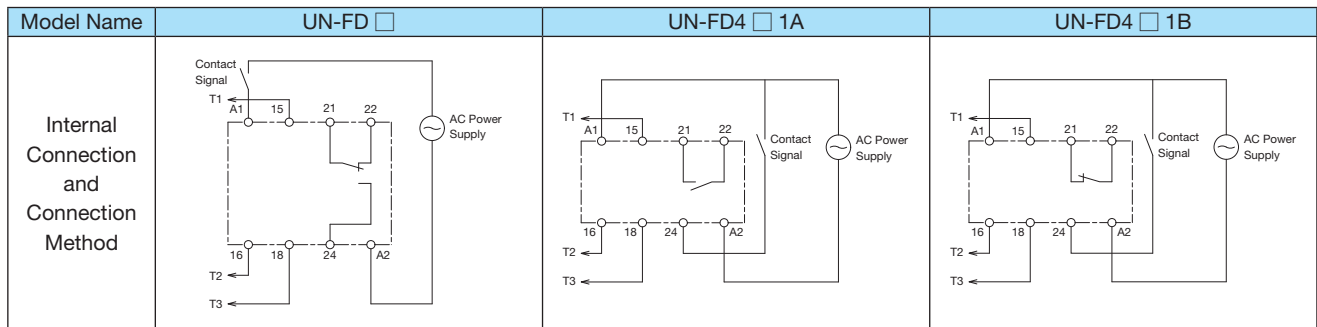
| Application | For 200 V Main Circuit | | For 400 V Main Circuit | | | |
|------------------------------------|---|------------------------------------|---|--|---|--|
| Model Name | UN-FD AC100V UN-FDCX AC100V | UN-FD AC200V UN-FDCX AC200V | UN-FD4 AC100V 1A UN-FD4CX AC100V 1A | UN-FD4 AC100V 1B UN-FD4CX AC100V 1B | UN-FD4 AC200V 1A UN-FD4CX AC200V 1A | UN-FD4 AC200V 1B UN-FD4CX AC200V 1B |
| Rated Operating Voltage (Note 1) | AC100 to 120 V 50/60 Hz | | AC100 to 120 V 50/60 Hz | | AC200 to 240 V 50/60 Hz | |
| Rated Main Circuit Voltage | AC200 to 240 50/60 Hz | | AC380 to 440 V 50/60 Hz | | | |
| Input Current | 17 mA | | Operation (A1-A2): 17 mA, Signal (24): 10 mA | | | |
| Output | Contact Arrangement | 1c | 1a | 1b | 1a | 1b |
| | Contact Rating | AC120 V 1.5 A, AC240 V 1 A (AC-15) | AC120 V 1.5 A, AC240 V 1 A (AC-15) | | | |
| Minimum Control Input Time | 20 ms | | 20 ms | | | |
| Detection Time | 0.2 to 0.5 s | | 0.2 to 0.5 s | | | |
| Allowable Detection Retention Time | 1 s (Short Time Rating) | | Continuous Rating | | | |
| Allowable Voltage Fluctuation | 85 to 110% of Rated Voltage (Both Main Circuit and Control Circuit) | | 85 to 110% of Rated Voltage (Both Main Circuit and Control Circuit) | | | |
| Operating Temperature/Humidity | -10 to 60°C/45 to 85% RH | | -10 to 50°C/45 to 85% RH | | | |
| Operation Indicator | None | | Lights When Power is Applied (LED Green) Lights in Fault Condition (LED Red) | | | |
| Combined Protection Devices | · No-Fuse Breaker With Voltage Tripping Device · Magnetic Contactors | | No-Fuse Breaker With Voltage Tripping Device | Magnetic Contactors | No-Fuse Breaker With Voltage Tripping Device | Magnetic Contactors |
| Fault Detection Retention | No Retention Function | | Electric Retention via Operating Power Supply | | | |
| Fault Detection Reset | When Main Circuit Power Supply Is Open | | When Operating Power Supply is Turned Off | | | |

Note 1. The DC24 V rated operating voltage specification can also be manufactured.

Note 2. □CX is the model name with the CAN terminal.

Note 3. Refer to page 313 when using in combination with a solid state contactor.

● Connecting



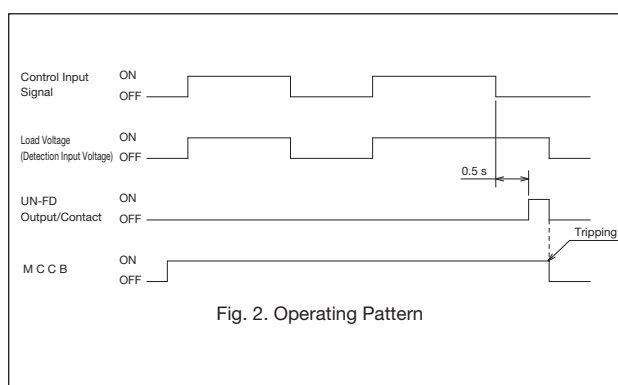
● Handling

- (1) As UN-FD and UN-FD4 have different functions, take care during use.
- (2) As UN-FD and UN-FD4 have fault detection time of 0.2 to 0.5 seconds, they may malfunction when applied to a magnetic starter for motors with a long residual voltage decline time. UN-FD4 can also be manufactured with a longer fault detection time.
- (3) Fault detection units cannot be used for capacitor load circuits, star-delta starting circuits or inverter circuits.
- (4) A no-fuse breaker or magnetic contactor should be configured to open-circuit the main circuit after fault detection. When combining with a no-fuse breaker with a voltage tripping device, use the output make contact of the fault detection unit to trip the no-fuse breaker during fault detection. When combining with a magnetic contactor, run the magnetic contactor in the self-retaining state using the self-retaining circuit, cancel the self-retaining state with the break contact of the fault detection unit during fault detection, and make a connection so that the magnetic contactor is opened.
- (5) UN-FD units are rated for only short periods of time, so the detection state should not be maintained for more than 1 second.
- (6) Although UN-FD is reset when the main circuit power supply is opened, UN-FD4 is not reset until the operating power supply is turned off. When resetting, turn off the operating power supply with a switch, etc.
- (7) When applying to the reversing running circuit, enter the forward and reverse signals to the input circuit of the fault detection unit.

● Operation

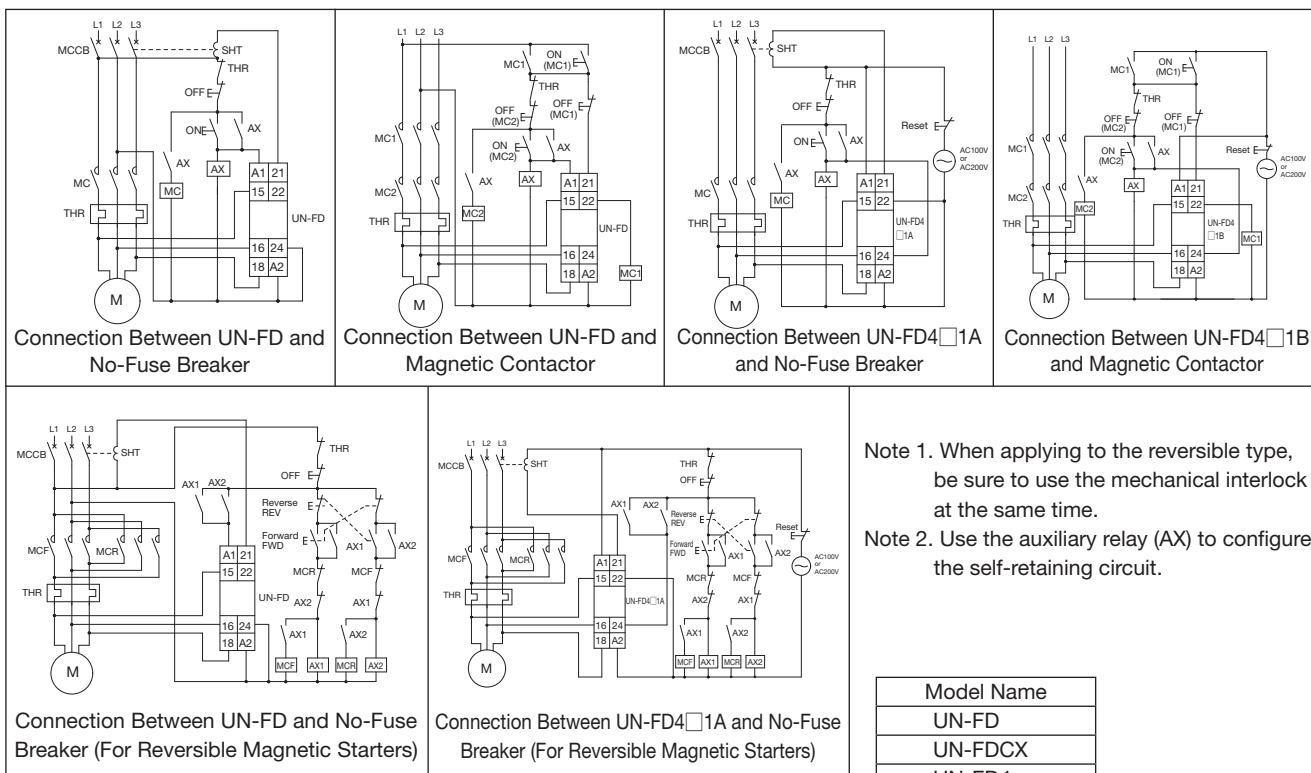
The UN-FD fault detection unit determines that the magnetic starter is abnormal when the load-side voltage and coil voltage of the magnetic starter are input and the 2 signals are mismatched, and detects contact welding failure and non-operation failure. (Inactive fault detection is only possible with UN-FD4.)

- (1) If voltage is applied to the load device while the operating input signal is being input, it is determined as the normal state.
- (2) Fault detection operation starts when voltage is applied (2 or more poles energized) to the load device while the operating input signal is off.
- (3) For UN-FD4, fault detection operation also starts if voltage is not applied to the load device while the operating input signal is being input (non-operation of the magnetic starter).



● Operating Circuit

- (1) Connect the input circuit (UN-FD: A1 and A2 terminals, UN-FD4: 24 and A2 terminals) in parallel with the coil of the magnetic starter.
- (2) Apply the rated operating voltage to the control circuit (A1 and A2 terminals) of UN-FD4 at all times.
- (3) Connect the main circuit voltage input circuit (15, 16 and 18 terminals) to the load side of the magnetic starter.



Note 1. When applying to the reversible type, be sure to use the mechanical interlock at the same time.

Note 2. Use the auxiliary relay (AX) to configure the self-retaining circuit.

| Model Name |
|------------|
| UN-FD |
| UN-FDCX |
| UN-FD4 |
| UN-FD4CX |

8.18 How to Order

Follow the steps below when ordering. (Enter a space in ▲ .)

■ UT-AX Auxiliary Contact Units

| Model Name | Contact Arrangement |
|-------------------|--|
| UT-AX4 | ▲ 2A2B |
| Refer to page 183 | For UT-AX2/AX4, specify the contact arrangement described on page 183. UT-AX11 does not need to be specified as it has fixed 1A1B. |

■ UT-SA Operation Coil Surge Absorber Units

| Model Name | Voltage Designation |
|-------------------|--|
| UT-SA21 | ▲ AC400V |
| UT-SA22 | ▲ AC200V |
| UT-SA25 | ▲ AC48V |
| Refer to page 192 | Select according to the control circuit voltage. |

■ UT-ML Mechanical Interlock Units

| Model Name |
|-------------------|
| UT-ML11 |
| UT-ML20 |
| Refer to page 199 |

■ UT-SY□(BC) DC/AC Interface Units for Operation Coils

| Model Name |
|-------------------|
| UT-SY21 |
| UT-SY21BC |
| Refer to page 204 |

■ UN-AX□(CX) Auxiliary Contact Units

| Model Name | Contact Arrangement |
|-------------------|---|
| UN-AX4 | ▲ 2A2B |
| UN-AX11CX | ▲ |
| Refer to page 183 | The default for UN-AX11(CX), AX80, AX150 is 1a1b and that for UN-AX600 is 2a2b, meaning specification is not required |

■ UN-LL22(CX) Auxiliary Contact Units With Contact for Low-level Signals

| Model Name | |
|-------------------|---|
| UN-LL22 | |
| UN-LL22CX | |
| Refer to page 189 | Default contact arrangement is 1A1B low-level contact plus 1A1B standard contact. |

■ UN-SA□ Operation Coil Surge Absorber Units

| Model Name | Voltage Designation |
|-------------------|---|
| UN-SA721 | ▲ AC400V |
| UN-SA722 | ▲ AC200V |
| UN-SA725 | ▲ AC48V |
| Refer to page 192 | Select according to the control circuit voltage |

■ UT-SA33□, UN-SA33 Main Circuit Surge Absorber Units

| Model Name |
|-------------------|
| UT-SA3320 |
| UT-SA3332 |
| UN-SA33 |
| Refer to page 198 |

■ UT-SY□(BC), UN-SY□(CX) DC/AC Interface Units for Operation Coils

| Model Name |
|-------------------|
| UT-SY21 |
| UT-SY21BC |
| UN-SY21 |
| Refer to page 204 |

■ UT-CV□, UN-CV□, CZ□ Live Part Protection Cover Units

| Model Name |
|-------------------|
| UN-CZ500 |
| Refer to page 207 |

■ UT-CW□ Terminal Cover Units

| Model Name |
|-------------------|
| UT-CW800 |
| Refer to page 213 |

■ UN-ML□(CX) Mechanical Interlock Unit

| Model Name |
|-------------------|
| UN-ML21 |
| Refer to page 199 |

■ UT/UN-□ Main Circuit Conductor Kits

| Model Name |
|-------------------|
| UT-SD10 |
| UT-SD20 |
| UN-YG50 |
| UN-YD50 |
| Refer to page 202 |

■ UT/UN-YY□ 3-Pole Array Connection Units

| Model Name |
|-------------------|
| UT-YY21 |
| UN-YY35 |
| Refer to page 203 |

■ UN-FD□(CX) Fault Detection Units

| Model Name | Voltage Designation | Output Contact Arrangement |
|-------------------|---|--|
| UN-FD | ▲ AC100V | |
| UN-FD4CX | ▲ AC100V | ▲ 1A |
| Refer to page 218 | Select according to the control circuit voltage | Specify a contact arrangement according to the application |

■ UT/UN-RR□ Thermal Overload Relay Reset Releases

| Model Name |
|-------------------|
| UT-RR205 |
| UN-RR200 |
| Refer to page 214 |

■ UN-TL□ Fluorescent Display Lamps for Thermal Overload Relays

| Model Name | Voltage Designation |
|-------------------|---|
| UN-TL20 | ▲ AC100V |
| Refer to page 215 | Select according to the control circuit voltage |

■ UT-HZ18(BC)/UN-RM20 Independent Mounting Units for Thermal Overload Relays

| Model Name |
|-------------------|
| UT-HZ18 |
| UN-RM20 |
| Refer to page 216 |

8.19 Model List (for MS-K Series)

| Product Name | | DC/AC Interface Units for Operation Coils | | | |
|------------------------------|-------------------------|--|---------------------------------------|---------------------------------------|---------------------------------------|
| Format | | UN-SY11 | UN-SY12 | UA-SY21 | UA-SY22 |
| Mounting | | Independent Mounting | | Top-On | |
| Specifications/ Functions | | Enables AC-operated contactor relays and contactors to be operated at DC24 V | | | |
| | | Triac Output Input DC24 V 15 mA | Relay Output Input DC24 V 10 mA | Triac Output Input DC24 V 15 mA | Relay Output Input DC24 V 10 mA |
| Acquired Standards | | | | | |
| Mass (g) | | 60 | | 40 | |
| Applicable Models | Contactor Relays | SR-K100 | | SR-K100 | |
| | Thermal Overload Relays | — | | — | |
| Reference Page | | 204 | | | |

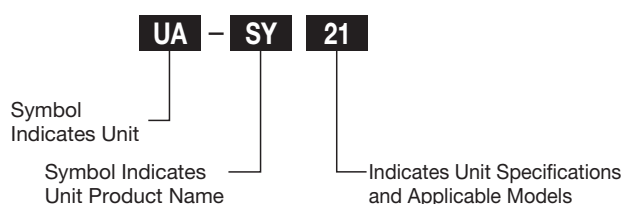
| Product Name | | Operation Coil Surge Absorber Units | | | | |
|------------------------------|-------------------------|---|--|--|--|---|
| Format | | UN-SA721 | UN-SA712 | UN-SA713 | UN-SA723 | UN-SA725 |
| Mounting | | Top-On | | | | |
| Specifications/ Functions | | With Varistor For Both AC and DC Operation AC48 V/AC100 V AC200 V/AC400 V | With Varistor + Indicator Lamp For Both AC and DC Operation AC100 V AC200 V | With CR For DC Operation DC200 V | With CR For AC Operation AC200 V | With Varistor + CR For Both AC and DC Operation AC48 V/AC100 V AC200 V |
| | | Acquired Standards | UL/CSA | | | |
| Mass (g) | | 20 | 25 | 25 | 20 | 25 |
| Applicable Models | Contactor Relays | SR(D)-K100 SRL(D)-K100 | SR(D)-K100 SRL(D)-K100 | SRD-K100 SRLD-K100 | SR-K100 SRL-K100 | SR(D)-K100 SRL(D)-K100 |
| | Thermal Overload Relays | — | — | — | — | — |
| Reference Page | | 191 | | | | |

8.20 Applicable Model List (for MS-K Series)

| Section | Product Name | Model Name | Specifications | Applicable Models | | |
|---------|---|------------|---------------------------|-------------------|-------------|---------------------------|
| | | | | Contactor Relays | | |
| | | | | AC Operated | DC Operated | Mechanically Latched Type |
| 1 | Operation Coil Surge Absorber Units | UN-SA712 | Varistor + Indicator Lamp | K100 | SRD-K100 | SRL(D)-K100 |
| | | UN-SA713 | C + R | | SRD-K100 | SRLD-K100 |
| | | UN-SA721 | Varistor | K100 | SRD-K100 | SRL(D)-K100 |
| | | UN-SA723 | C + R | K100 | | SRL-K100 |
| | | UN-SA725 | Varistor + C + R | K100 | SRD-K100 | SRL(D)-K100 |
| 2 | DC/AC Interface Units for Operation Coils | UN-SY11 | Triac Output | K100 | | |
| | | UN-SY12 | Contact Output | K100 | | |
| | | UA-SY21 | Triac Output | K100 | | |
| | | UA-SY22 | Contact Output | K100 | | |

Note. UN-□ indicates shared application with MS-N Series optional units. For more information, refer to the MS-N Series optional units.

● Type Designations



| Symbol | Product Name |
|--------|---|
| SY | (Input) (Output) DC24 V → AC100 to 240 V DC/AC Interface Units for Operation Coils |
| CV | Live Part Protection Covers (Magnetic Starters, Contactor Relays) Current Dial Misoperation Prevention Cover (Thermal Overload Relays) |
| SD | Reversing Connecting Wire (Conductor) Kits |
| SG | Electric Wire (Conductor) Kits for Crossover |

8.21 UA-SY □ DC/AC Interface Units for Operation Coils

DC/AC interface unit for operation coils that switches AC-operated contactor relays at the output (DC24 V) of electronics such as PLCs

A thin unit that can be mounted to the main body of the SR-K contactor relay and an independent mounting unit are available. Both contactless output and contact (relay) output are also available.

● Model Name

| Unit Model Name | Output Method | Unit Mounting Method | Model Names of Applicable Contactor Relays |
|-----------------|--------------------------------------|----------------------------|--|
| UN-SY11 | Contactless Output (Triac Output) | Independent Mounting | SR-K100 |
| UA-SY21 | | Top-On Additional Mounting | SR-K100 |
| UN-SY12 | Contact Output | Independent Mounting | SR-K100 |
| UA-SY22 | | Top-On Additional Mounting | SR-K100 |

Note 1. The coil voltage designation of AC100V or AC200V can be applied for the operation coil.

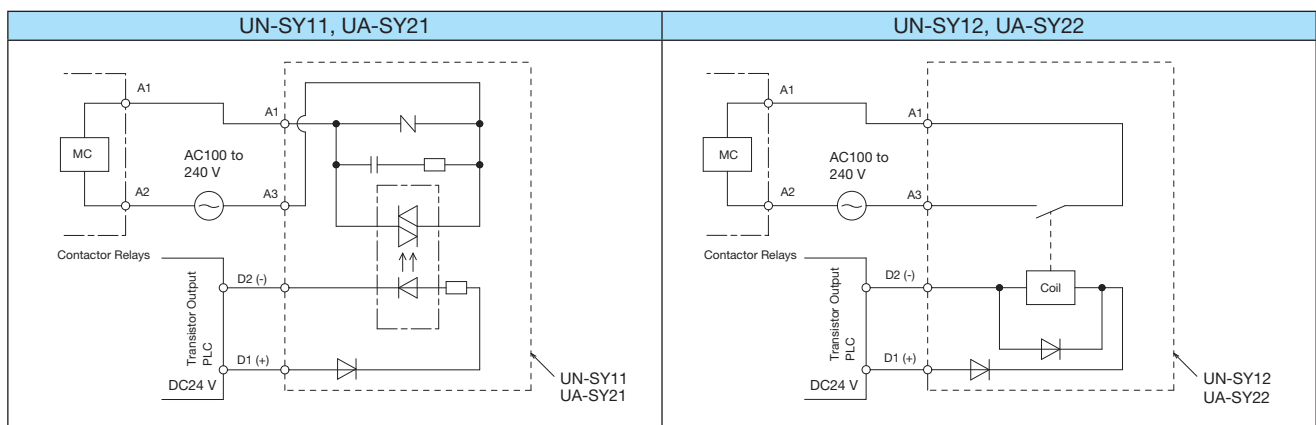
Note 2. Refer to page 204 for information regarding UN-SY11 and SY12.

● Specifications

| Model Name | | UN-SY11 | UA-SY21 | UN-SY12 | UA-SY22 | |
|-------------|-------------------------------|--|-------------------------------------|----------------|-----------------------|--------------|
| Input Unit | Rated Operating Voltage | DC24 V | | | | |
| | Allowable Voltage Fluctuation | 85 to 110% of Rated Operating Voltage | | | | |
| | Current | 15 mA | | | 10 mA | |
| | Power Consumption | 0.4 W | | | 0.24 W | |
| | Minimum Operating Voltage | 18 V | | | 18 V | |
| Output Unit | Maximum Open Voltage | 4 V | | | 1 V | |
| | Output Specifications | Contactless Output (Triac Output) | | Contact Output | | |
| | Rated Operating Voltage | AC100 to AC240 V 50/60 Hz | | | | |
| | Output Current | 0.5 A, AC-15 | | | | |
| | Open Circuit Leakage Current | 5 mA/240 V | | None | | |
| | Operating Time | 1 ms in Operation, 0.5 Cycles + 1 ms or Less in Open Circuit | | 10 ms or less | | |
| | Switching Durability | Mechanical | — | | 5 mil. times | |
| | | Electrical | — | | 1 mil. times (Note 1) | 5 mil. times |
| | Operating Temperature | | -10°C to 55°C | | | |
| | Applicable Terminal Wires | Electric Wires | φ 1.6 mm, 1.25 to 2 mm ² | | | |
| Crimp Lugs | | 1.25-3.5, 2-3.5 | | | | |

Note 1. Using UN-SY12 and SR-K100 in combination achieves 5 million times.

● Connection Example (Connection Diagram)

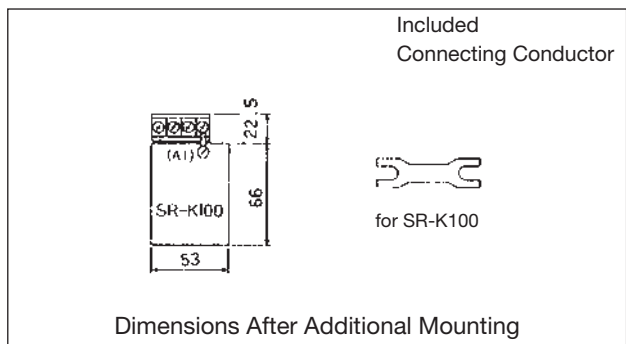
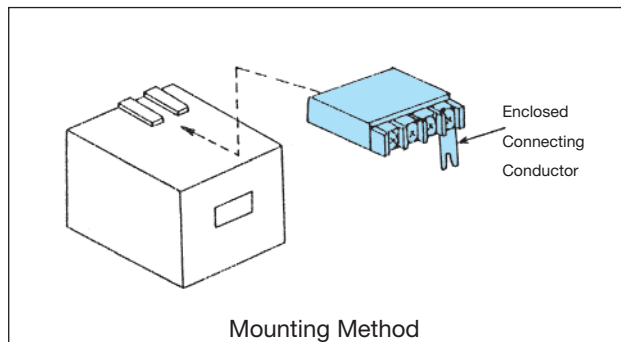
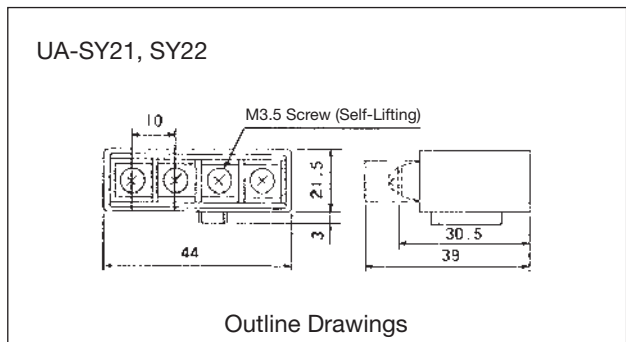


● Outline Drawings/Mounting

UA-SY21, SY22 (Additional Mounting)

Mount according to the guidelines below.

Remove the screws of the coil terminal A1 of the contactor relay, align the protrusion of the DC/AC interface unit and groove of the magnetic contactor or contactor relay while the supplied connecting conductor is mounted on the A1 terminal of the DC/AC interface unit, then tighten the connecting conductor with the removed coil terminal screws.



8.22 How to Order

Follow the steps below when ordering. (Enter a space in ▲.)

■ UN-SA□ Operation Coil Surge Absorber Units

| Model Name | Voltage Designation |
|-------------------|---|
| UN-SA721 | ▲ AC24V |
| Refer to page 192 | Select according to the control circuit voltage |

■ UA-SY□ DC/AC Interface Units for Operation Coils

| Model Name |
|-------------------|
| UA-SY21 |
| Refer to page 222 |









9

Magnetic Starters/Magnetic Contactors/Contactor Relays According to Application

| | | |
|-----|--|-----|
| 9.1 | Model List | 226 |
| 9.2 | DC Interface Contactors | |
| | SD/MSOD-Q □ | 228 |
| 9.3 | NC Main Contact Contactors | |
| | B-T/N □ | 235 |
| 9.4 | Magnetic Contactors for DC | |
| | DU-N □ | 239 |
| 9.5 | Magnetic Contactors for High-Frequency Switching | |
| | S-N □ KG | 244 |
| 9.6 | Vacuum Magnetic Contactors | |
| | SH-V □ | 245 |
| 9.7 | How to Order | 249 |

9.1 Model List

| Series | SD-Q□ | B-T□, B-N□ | DU-N□ | S-N□KG | |
|---|---|---|--|--|--|
| Application Based Name | DC Interface Contactors | NC Main Contact Contactors | Magnetic Contactors For DC | Magnetic Contactors For High-Frequency Switching | |
| Application/ Function | <ul style="list-style-type: none"> Capable of being directly driven by the transistor output (DC24 V 0.1 A) of PLCs etc. | <ul style="list-style-type: none"> Main circuit break contact (normally closed contact) can be used for motor control and power switching for lighting circuits. Applications <ul style="list-style-type: none"> For Motor Starting Resistance Short-circuits For Cushioned Starting of AC Motors For Dynamic Brakes | <ul style="list-style-type: none"> Can be used for applications controlling DC motors at 440 V or less and other general DC circuits. Applications <ul style="list-style-type: none"> For Variable Speed Motor Control For Dynamic Brakes | <ul style="list-style-type: none"> Ideal for applications with frequent inching operations such as with hoists and cranes. Has reinforced main contacts. | |
| External Appearance of Representative Model |  |  |  |  | |
| | SD-Q11 | B-T21 | DU-N30 | S-N125KG | |
| Type | Magnetic Starters | MSOD-Q11 MSOD-Q12 MSOD-QR11 MSOD-QR12 | — | — | — |
| | Magnetic Contactors | SD-Q11 SD-Q12 SD-QR11 SD-QR12 | B-T21(BC) B-N65 B-N100 BD-T21(BC) BD-N65 BD-N100 | DU-N30 DU-N60 DU-N120 DU-N180 DU-N260 DUD-N30 DUD-N60 DUD-N120 DUD-N180 DUD-N260 | S-N125KG S-N220KG Reversible types (S-2 x N□KG) are also manufactured. |
| | Contactor Relays | — | — | — | — |
| ● Listing Page | 228 | 235 | 239 | 244 | |

| | Safety Contactors | SH-V□ Vacuum Magnetic Contactors |
|--|---|---|
| | <ul style="list-style-type: none"> · Suitable for standard products in which the auxiliary break contact is a mirror contact. · Can be applied to mechanical safety category 4 circuits. (Can detect malfunction of break contacts) | <ul style="list-style-type: none"> · A large capacity magnetic contactor with a shut-off within a vacuum valve that does not arc and excellent safety. |
| |  <p>S(D)-T SD-Q S(D)-N</p> |  <p>SH-V320</p> |
| | (Can Be Combined With Thermal Overload Relays) | — |
| | Refer to Listing Page Below | SH-V160 SHL-V160 SH-V320 SHL-V320 SH-V400 SHL-V400 SH-V600 SHLD-V160 SHD-V160 SHLD-V320 SHD-V320 SHLD-V400 SHD-V400 |
| | — | — |
| | 268 | 245 |

9.2 SD/MSOD-Q□ DC Interface Contactors

Compact, high-performance DC operated type contactors that are capable of being directly driven by the transistor output (DC24 V 0.1 A) of PLCs etc.

● Features

- (1) **Non-reversible type:** DC interface contactors compatible with up to 3 ϕ 220 V 2.5 kW motor loads.
SD-Q11, SD-Q12 / With Thermal Overload Relay: MSOD-Q11, MSOD-Q12

- **Direct Drive of Contactors Using Semiconductor Output (Transistor Output)**
Adopts a high-sensitivity polar solenoid that allows all models to be directly driven by output of DC24 V 0.1 A rated transistors

- **Minimal Load for Auxiliary Contacts DC5 V 3 mA**
By doubling the auxiliary contacts, support for levels as low as DC5 V 3 mA has been made possible. (The failure rate in normal environments free of dust or corrosive gas is $5 \times 10^{-7}/\text{cycle}$.)

- **An Extensive Line of Installable Optional Units**
 - Auxiliary Contact Units: (Q(R)11 Only)
UQ-AX2 (For Left-Side of Single and Reversible Types)
UQ-AX2KR (For Right-Side of Reversible Types)
 - Indicator Lamp Unit
UQ-PL

- **Rail Mounting Standardized**
Can be mounted on an IEC and DIN regulation compliant 35 mm width rail

- **Provides Support for a Large Number of International Standards**

| Model | Model Name | Applicable Standard | | | | Safety Certified Standard | | EC Directives | Certifying Body | CCC Certification |
|---------------------|--|---------------------|----------------------|-----------------------|---|---------------------------|---------------|-------------------|-----------------|-------------------|
| | | JIS*1 JEM | IEC International | DIN VDE Germany | BS EN United Kingdom Europe | UL US | CSA Canada | CE Mark Europe | TÜV Germany | GB China |
| Magnetic Contactors | SD-Q11, Q12 SD-QR11, QR12 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○*3 |
| Magnetic Starters | MSOD-Q11(BC)KP to Q12(BC)KP MSOD-QR11(BC)KP to QR12(BC)KP | ○*2 | ○ | ○ | ○ | ○*2 | ○*2 | ○ | ○ | ○*2 |

- ○: Standard product that conforms, is compliant, or for which certification has been obtained.
- *1: If JIS conformity declaration is required, please request.
- *2: Compliance, conformity and certification have been obtained for 2-element models (MSOD-Q□(BC), MSOD-QR□(BC)) as well.
- *3: Excluding the coil designation of DC12V.
- UL(CSA) can be used in applications rated up to AC480 V and TÜV rated up to AC440 V.
- Certification mark is displayed on the product's name plate.



SD-Q11

- **Achieves Large Capacity/Long Lifespan**
SD-Q types have an increased conventional free air thermal current (rated continuity current). (SD-M11/M12 15A → SD-Q11/Q12 20A)
Suitable only for circuit continuity duty. Also, they can be applied to AC440 V circuits despite their compact size.

| Model Name | Rated Capacity (kW) AC-3 200 to 240 V | 380 to 440 V | Conventional Free Air Thermal Current (A) | Electrical Durability (x 10000) |
|------------|--|--------------|--|------------------------------------|
| SD-Q11/Q12 | 2.5 | 4 | 20 | 100 |

- **Surge Absorber Comes Standard Built-in**
 - The integrated surge absorber function suppresses coil surge voltages
 - Suppresses damage to peripheral electronic devices due to the harmful surge voltages generated when switching the coil OFF
- **Mirror contacts (Turning off the auxiliary break contact when the main contact is welded)**
Complies with requirements for "control functionality during failures" stipulated in the section "Electrical Devices of Industrial Equipment" in EN regulation EN60204-1 and can be used as an interlocking circuit contact. (TÜV Compliant Certification Acquired)

- **Thermal Overload Relays Mountable Without Adapter**
Can be directly mounted to contactors allowing for conversion to a magnetic starter by simply purchasing a thermal overload relay

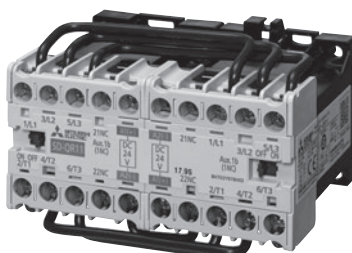
- **Magnetic Contactors Equipped With Terminal Covers As Standard**
 - Easily attachable terminal covers are equipped as standard, separating the body and units
 - Improved maintenance and inspection safety and electric shock prevention due to the finger protection functionality

- (2) **Reversible type:** Reversible integrated DC interface contactors suitable for the forward/reverse operation of three-phase motors.
SD-QR11, SD-QR12 Types / Models with Thermal Overload Relay: MSOD-QR11, MSOD-QR12 Types

- **Integrated Mechanical Interlock**
- **Electrical Interlock Wiring Included**
- **1b x 2 or 1a1b x 2 Auxiliary Contacts**
Standardly equipped with an electrically interlocked break contact with twin contacts for high contact reliability auxiliary contacts

Capable of preventing both left and right contactors from being closed simultaneously

- **Powerful and Compact**
Has the same outline drawing as 2 SD-Q11 or SD-Q12 units and the same ratings as non-reversible types



SD-QR11

- **Surge Absorber Comes Standard Built-in**
 - The integrated surge absorber function suppresses surge voltages
 - Suppresses damage to peripheral electronic devices due to the harmful surge voltages generated when switching the coil OFF
- **Magnetic Contactors Equipped With Terminal Covers As Standard**
 - Easily attachable terminal covers are equipped as standard, separating the body and units
 - Auxiliary units can be mounted without removing the body's terminal cover
- **Rail Mounting Standardized**
Can be mounted on an IEC and DIN regulation compliant 35 mm width rail

● Manufactured Model List

| Model | | | Model Name |
|---------------------|--------------------------------------|---|--------------------------------------|
| | | | Q11/Q12 |
| Magnetic Contactors | Non-Reversible Type | Auxiliary Contact 1-Pole | SD-Q11 |
| | | Auxiliary Contact 2-Pole | SD-Q12 |
| | Reversible Type | Auxiliary Contact 2-Pole | SD-QR11 |
| | | Auxiliary Contact 4-Pole | SD-QR12 |
| Magnetic Starters | Non-Reversible Type | Auxiliary Contact 1-Pole | MSOD-Q11 |
| | | Auxiliary Contact 2-Pole | MSOD-Q12 |
| | | With 2E Thermal | MSOD-Q□KP <small>Note 1</small> |
| | | With Thermal Wiring Streamlining Terminal (with 2E Thermal) <small>Note 4</small> | MSOD-Q□BC(KP) <small>Note 1</small> |
| | Reversible Type | Auxiliary Contact 2-Pole | MSOD-QR11 |
| | | Auxiliary Contact 4-Pole | MSOD-QR12 |
| | | With 2E Thermal | MSOD-QR□KP <small>Note 1</small> |
| | | With Thermal Wiring Streamlining Terminal (with 2E Thermal) <small>Note 4</small> | MSOD-QR□BC(KP) <small>Note 1</small> |
| Units | Front Clip-on Auxiliary Contact Unit | | UQ-AX2 <small>Note 2</small> |
| | | | UQ-AX2KR <small>Note 3</small> |
| | Indicator Lamp Unit | | UQ-PL |

Note 1. The □ in the model name column is a placeholder for 11 or 12
 Note 2. Q11 or QR11 are only applicable to the left side of UQ-AX2.
 Note 3. QR11 are only applicable to the right side of UQ-AX2KR.

Note 4. Thermal overload relays have wiring streamlining terminals, but contactors (SD-Q□) use an all-pole integrated terminal cover with no wiring streamlining terminal. (Model Name: MSOD-Q□BC(KP), MSOD-QR□BC(KP))

● Rating/Performance

(1) Ratings and Performance

| Model Name | Type | | Non-Reversing | | Reversing | | |
|---|---|---|---------------|-----|-----------|------|--|
| | Magnetic Contactor SD- | | Q11 | Q12 | QR11 | QR12 | |
| | Magnetic Starter MSOD- | | Q11 | Q12 | QR11 | QR12 | |
| Rated Insulation Voltage [V] | | | 690 | | | | |
| Rated Operating Current [A] | Three-Phase Squirrel-cage Motor (Category AC-3) | 200 to 240 V | 12 | | | | |
| | | 380 to 440 V | 9 | | | | |
| | | 500 to 550 V | 7 | | | | |
| | Single-Phase Motor (Category AC-3) | 100 to 110 V | 8 | | | | |
| | | 200 to 220 V | 6 | | | | |
| | Resistive Load (Category AC-1) | 100 to 220 V | 10 (15) | | | | |
| | | 380 to 440 V | 10 | | | | |
| | DC Motor * (Category DC2, DC4) | 2-Pole Series | 24 V | 12 | | | |
| | | | 48 V | 6 | | | |
| | | | 100 to 110 V | 1.2 | | | |
| | | 3-Pole Series | 24 V | 12 | | | |
| | | | 48 V | 10 | | | |
| | | | 100 to 110 V | 2.5 | | | |
| | DC Solenoid (Category DC-13) | Single Pole | 24 V | 3 | | | |
| | | | 48 V | 1.5 | | | |
| | | | 100 to 110 V | 0.6 | | | |
| | | | 200 to 220 V | 0.3 | | | |
| | | 2-Pole Series | 24 V | 5 | | | |
| | | | 48 V | 2.5 | | | |
| | | | 100 to 110 V | 1.2 | | | |
| 200 to 220 V | | | 0.6 | | | | |
| 3-Pole Series | | | 24 V | 5 | | | |
| | | | 48 V | 2.5 | | | |
| Rated Capacity [kW] | | Three-Phase Squirrel-cage Motor (Category AC-3) | 200 to 240 V | 2.5 | | | |
| | | | 380 to 440 V | 4 | | | |
| | 500 to 550 V | | 4 | | | | |
| | Single-Phase Motor (Category AC-3) | 100 to 110 V | 0.2 | | | | |
| | | 200 to 220 V | 0.4 | | | | |
| Conventional Free Air Thermal Current [A] | | | 20 | | | | |
| Breaking Capacity [A] | | 220 V | 120 | | | | |
| | | 440 V | 90 | | | | |
| Making Current Capacity [A] | | 220 V | 120 | | | | |
| | | 440 V | 90 | | | | |
| Switching Frequency [Times/Hour] | | | 1800 | | | | |
| Switching Durability [x 10000] | Electrical (Category AC-3) | | 100 | | | | |
| | Mechanical | | 1000 | | | | |

Note 1. Electrical durability when operated with the following ripple rate after three-phase full-wave rectification. 0.8 mil. times for single-phase full-wave rectification. The electrical durability for three-phase cage motors (class AC-3) is listed below.
 Class AC-1: 0.5 mil. times (however, the rating for 200 to 220 V resistive loads shown in parentheses is 0.25 mil. times), Class DC2/DC4: 0.5 mil. times, Class DC-13: 0.25 mil. times

Note 2. Compliant Standards: JIS C8201-4-1, JIS C8201-5-1, IEC 60947-4-1, IEC 60947-5-1 (* symbol indicates class DC2, DC4 are JEM 1038 only)
 Note 3. Refer to page 40 for details about applications at main contact low voltage and current.

(2) Auxiliary Contact Rating

| Type | | | Body | Front Clip-on Auxiliary Contact Unit |
|---|----------------|--------|--------------------------|--------------------------------------|
| Model Name | | | SD-Q11/Q12/ QR11/QR12 | UQ-AX2(KR) |
| Rated Operating Current [A] | Category AC-15 | AC240V | 3 | 3 |
| | | AC440V | 1 | 1 |
| | Category DC-12 | DC24V | 10 | 10 |
| | Category DC-13 | DC110V | 0.6 | 0.6 |
| Conventional Free Air Thermal Current [A] | | | 10 | 10 |
| Electrical Durability [x 10000] | | | 50 (Class DC-13: 25) | 25 |

Note 1. The minimal applicable load is 5 V, 3 mA. (Refer to page 40 for details.)

Note 2. JISC8201-5-1 classifications are class AC-15 applicable to AC inductive loads (AC coil load (exceeding 72 VA) control), class DC-12 applicable to DC resistive loads, and class DC-13 applicable to DC coil loads.

● Properties

| Model Name | Type | Non-Reversing | | Reversing | |
|---------------------------|-----------------------------|------------------------------|-----|-----------|------|
| | | Q11 | Q12 | QR11 | QR12 |
| Operating Voltage | | 85% or Less of Rated Voltage | | | |
| Open Voltage | | 10% or More of Rated Voltage | | | |
| Operating Time | Coil ON → Main Contact ON | 50 ms or less | | | |
| | Coil OFF → Main Contact OFF | 20 ms or less | | | |
| Operation Coil Properties | Average Coil Current | 55 mA | | | |
| | Average Power Consumption | 1.3 W (1.65 W) | | | |

Note 1. The above indicates rough property indices for DC24V coils. The values in the parentheses for the operation coil properties indicate rough property indices for DC48V coils.

Note 2. Operable Range: Applying the rated voltage to the coil at 40°C ambient temperature allows operation without trouble at 85 to 120% of rated voltage after temperature rise saturation.

Note 3. Voltage For Continuous Use: 95 to 100% of coil rated voltage

Note 4. The operating time is the value when applying DC24V at a 20°C cold state.

● Rated Operation Coil

| Coil Designation | Rated Voltage |
|------------------|---------------|
| DC12V | DC12 V |
| DC24V | DC24 V |
| DC48V | DC48 V |

Note 1. Please note that operation coil terminals have polarity. A1 (+), A2 (-)

● Thermal Overload Relay Model Names and Heater Types Combinable With Magnetic Contactors

| Magnetic Starter Model Name | Compatible Thermal Overload Relay Model Name | Heater Designation [A] | Adjustment Range of Settling Current [A] | Standard Three-Phase Motor Capacity [kW] | | Control Circuit (Contact) | |
|--|--|------------------------|--|--|--------------|---------------------------|--|
| | | | | 200 to 220 V | 380 to 440 V | Contact Arrangement | Rating |
| MSOD-Q11(KP) MSOD-Q12(KP) MSOD-QR11(KP) MSOD-QR12(KP) | TH-T18(KP) | 0.12 | 0.1 to 0.16 | | | 1a1b | Class AC-15 AC110 V: 2 A AC220 V: 1 A Class DC-13 DC110 V: 0.2 A |
| | | 0.17 | 0.14 to 0.22 | | | | |
| | | 0.24 | 0.2 to 0.32 | 0.03 | 0.05 | | |
| | | 0.35 | 0.28 to 0.42 | 0.05 | 0.1 | | |
| | | 0.5 | 0.4 to 0.6 | 0.07 | | | |
| | | 0.7 | 0.55 to 0.85 | 0.1 | 0.2 | | |
| | | 0.9 | 0.7 to 1.1 | | | | |
| | | 1.3 | 1 to 1.6 | 0.2 | 0.4 | | |
| | | 1.7 | 1.4 to 2 | | 0.75 | | |
| | | 2.1 | 1.7 to 2.5 | 0.4 | | | |
| MSOD-Q11BC(KP) MSOD-Q12BC(KP) MSOD-QR11BC(KP) MSOD-QR12BC(KP) | TH-T18BC(KP) | 2.5 | 2 to 3 | | 1 | | |
| | | 3.6 | 2.8 to 4.4 | 0.75 | 1.5 | | |
| | | 5 | 4 to 6 | 1 | 2.2 | | |
| | | 6.6 | 5.2 to 8 | 1.5 | 3.7 | | |
| | | 9 | 7 to 11 | 2.2 | | | |
| | | 11 | 9 to 13 | | | | |

Note 1. KP includes 3-element 2E function

Note 2. Delay trip thermal overload relays are not manufactured

(3) No. of Installed Auxiliary Contacts and Contact Arrangement

| Frame Model | Non-Reversible Type | | Reversible Type | |
|-------------|---------------------|------|-----------------|----------|
| | Q11 | Q12 | QR11 | QR12 |
| Standard | 1a | 1a1b | 1b x 2 | 1a1b x 2 |
| Special | 1b | 2a | — | — |
| Maximum | 2a1b 1a2b | — | 1a2b x 2 | — |

Note 1. The auxiliary break contacts of reversible types are wired as an electrical interlock.

Note 2. Auxiliary contact arrangements for reversible types are displayed by twos, in a contact arrangement combining two contactors.

Note 3. No specification needs to be made for standard contact arrangements. Specify only for special arrangements.

Note 4. The maximum number of units is shown when mounting front clip-on UQ-AX2(KR) auxiliary contact units. The body and auxiliary contact unit can be additionally installed by the customer as a separate arrangement. Refer to notes 2 and 3 of the Manufactured Model List on page 229 for details about auxiliary contact unit combination.

● Handling

● Mounting

See below for the correct mounting method. Standard mounting puts the power terminal at the top and the load terminal at the bottom, but the mounting methods in the table below are also possible. Horizontal mounting is not possible.

Furthermore, MSOD-Q11, Q12, QR11 and QR12 type magnetic starters use only standard, diagonal, or floor mounting.

Be sure to securely fasten both the left and right of the units to the rail when rail-mounting reversible types (MSOD-QR11, QR12, SD-QR11, QR12).

Mounting Direction

| Top | Top | Top | Top | Top | Top |
|-------------------|-------------------|---------------------|------------------|----------------|------------------|
| | | | | | |
| Bottom | Bottom | Bottom | Bottom | Bottom | Bottom |
| Standard Mounting | Diagonal Mounting | Horizontal Mounting | Reverse Mounting | Floor Mounting | Ceiling Mounting |
| ○ | ○ | x | ○ (MSOD: x) | ○ | ○ (MSOD: x) |

● Connecting

| Model Name | Main Circuit | | | Control Circuit | | |
|----------------------------|--|---------------------------|---|--|---------------------------|---|
| | Applicable Wire Size | Applicable Crimp Lug Size | Tightening Torque N·m Parentheses show standard value | Applicable Wire Size | Applicable Crimp Lug Size | Tightening Torque N·m Parentheses show standard value |
| Q11 Q12 QR11 QR12 | ϕ 1.6, 1.25 to 2 mm ² | 1.25-3.5 to 2-3.5 | 0.94 to 1.17 (1.0) | ϕ 1.6, 1.25 to 2 mm ² | 1.25-3.5 to 2-3.5 | 0.94 to 1.17 (1.0) |

Note 1. Use a crimp terminal with insulation tube if using crimp lugs at voltages exceeding 380 V.

Note 2. Remove the terminal cover for wiring if using ring crimp lugs. Be sure to reattach the terminal cover once wiring is completed.
(Not required for thermal overload relays with MSOD-Q□BC, as wiring streamlining terminals are included.)

Note 3. This is a compact product that may deform if terminal screws are tightened with a greater torque than listed above. Take care when tightening as this may affect the product's properties.

● Disassembly

SD-Q contactors are calibrated when assembled, so the coil and contacts cannot be replaced. (Do not disassemble.)

● Connection Method

● Connecting Various Models

(1) SD-Q11, Q12 types have integrated surge absorber function.

(DC12V, DC24V Coil: Varistor Voltage 68 V, DC48V Coil: Varistor Voltage 100 V)

There is no need to connect external surge absorbers to regular sequence circuits.

(2) The integrated surge protection element increases the return time when connected to various DC output type devices.

The figure below shows the connections when connecting to transistor output type devices.

| Output Type | Transistor Output (Sink Type) | Transistor Output (Source Type) | Transistor Output (Sink Type) |
|-------------------|---|--|---|
| Protection Method | Zener Diode or Varistor | | Protection Diode |
| Connection Method | | | |
| Example | Mitsubishi PLC A, Q Series (Typical) | AY50, 51, AY60 AISY40P, 41P, 42P, AISY50, AISY60 Output Unit QY40P, 41P, 42P, QY50 | AY60E AISY60E, AISY80, AISY81 Output Unit QY80, QY81P |
| | Other | Proximity Switches Photoelectric Switches etc. | Proximity Switches Photoelectric Switches etc. |
| Return Time | Approx. 10 ms longer | | Approx. 30 ms longer |

(3) Operation coil terminals have polarity. Refer to the Precautions in the Outline Drawings/Contact Arrangements column.

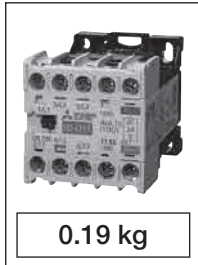
● Outline Drawings

● Magnetic Contactors

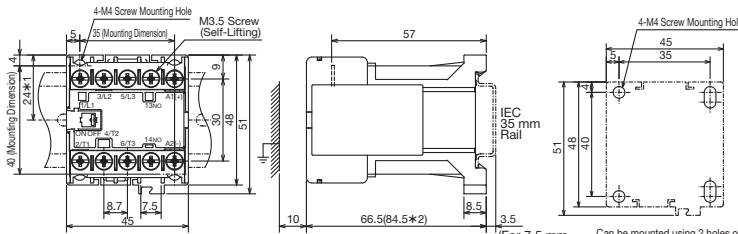


Can be mounted on IEC 35 mm rails.

SD-Q11



0.19 kg



*1 dimension is the length from the center of the IEC 35 mm rail.
*2 dimension includes the head-on auxiliary contact unit (UQ-AX2).

Can be mounted using 2 holes on opposing corners. Mounting Dimensions Also Allow For 0 x 32.5 Mounting

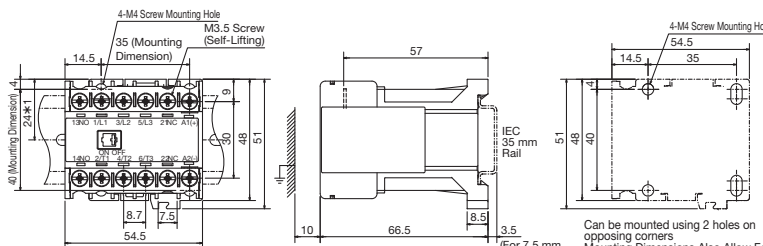
| Auxiliary Contact | Contact Arrangement |
|-------------------|---------------------|
| 1a | |
| 1b | |

Model Name
SD-Q11

SD-Q12



0.21 kg



*1 dimension is the length from the center of the IEC 35 mm rail.

Can be mounted using 2 holes on opposing corners. Mounting Dimensions Also Allow For 0 x 32.5 Mounting

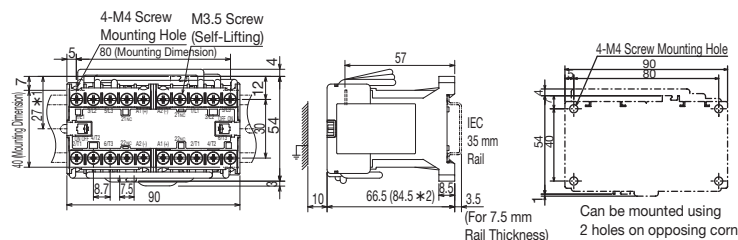
| Auxiliary Contact | Contact Arrangement |
|-------------------|---------------------|
| 1a1b | |
| 2a | |

Model Name
SD-Q12

SD-QR11

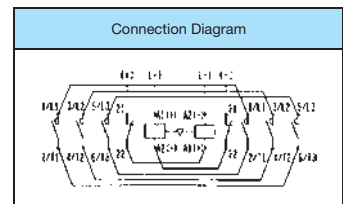


0.42 kg



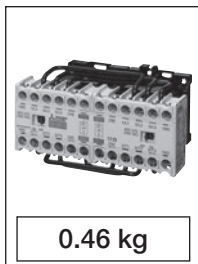
*1 dimension is the length from the center of the IEC 35 mm rail.
*2 dimension includes the head-on auxiliary contact unit (UQ-AX2, AX2KR).

Can be mounted using 2 holes on opposing corners

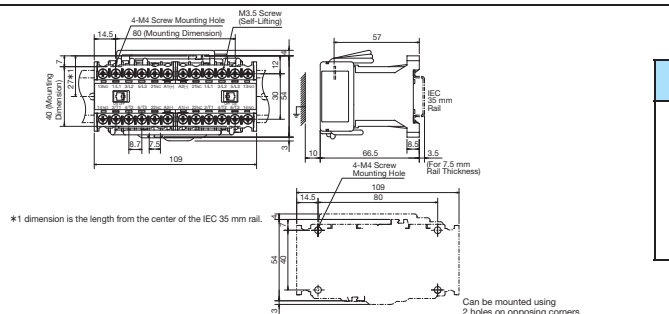


Model Name
SD-QR11

SD-QR12

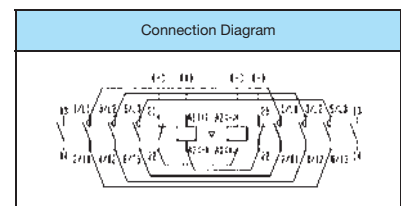


0.46 kg



*1 dimension is the length from the center of the IEC 35 mm rail.

Can be mounted using 2 holes on opposing corners




Model Name
SD-QR12

Note 1. The contact arrangement and coil terminal location differ between non-reversible and reversible types. Reversible types, in particular, have reversed coil polarity so extra care should be taken when wiring.

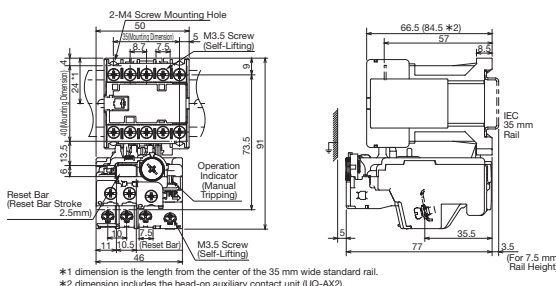
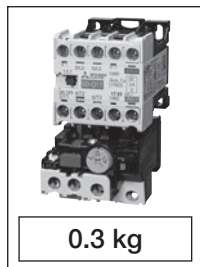
Note 2. The 2 auxiliary break contacts of reversible types are wired as an electrical interlock so should be used in an electrically interlocked state.

Note 3. Operation coil terminals have polarity. Connect terminal number A1 (+) to the positive and A2 (-) to the negative sides.

● Magnetic Starters

 Can be mounted on IEC 35 mm rails.

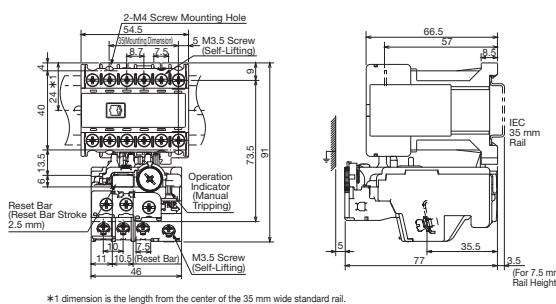
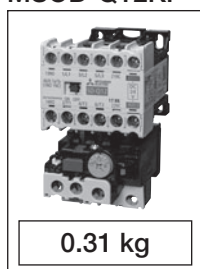
MSOD-Q11KP



| Auxiliary Contact | Contact Arrangement |
|-------------------|---------------------|
| 1a | |
| 1b | |

Model Name
MSOD-Q11KP

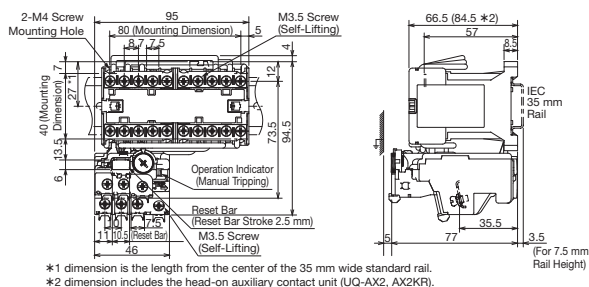
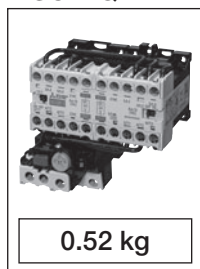
MSOD-Q12KP



| Auxiliary Contact | Contact Arrangement |
|-------------------|---------------------|
| 1a1b | |
| 2a | |

Model Name
MSOD-Q12KP

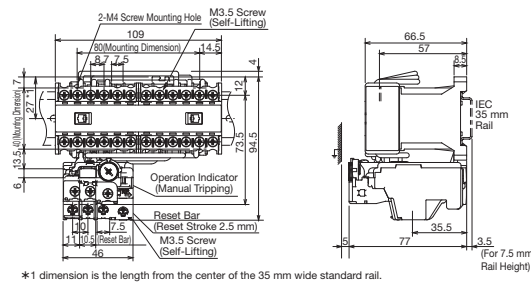
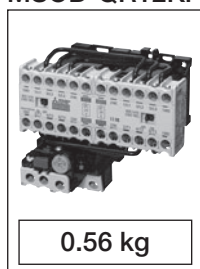
MSOD-QR11KP



| Connection Diagram |
|--------------------|
| |

Model Name
MSOD-QR11KP

MSOD-QR12KP



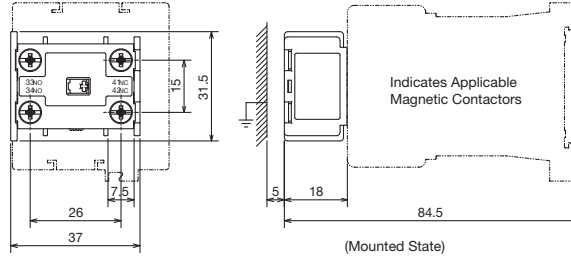
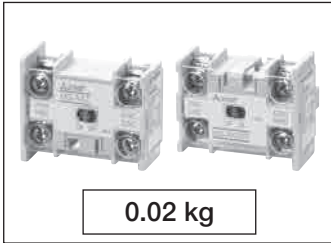
| Connection Diagram |
|--------------------|
| |

Model Name
MSOD-QR12KP

- Note 1. The contact arrangement and coil terminal location differ between non-reversible and reversible types. Reversible types, in particular, have reversed coil polarity so extra care should be taken when wiring.
- Note 2. The 2 auxiliary break contacts of reversible types are wired as an electrical interlock so should be used in an electrically interlocked state.
- Note 3. Operation coil terminals have polarity. Connect terminal number A1 (+) to the positive and A2 (-) to the negative sides.

● Optional

UQ-AX2 UQ-AX2KR

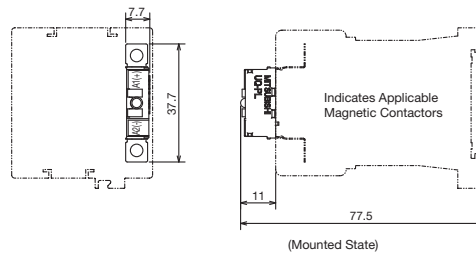


This figure shows UQ-AX2. (UQ-AX2KR also has the same outline drawings.)

| Contact Arrangement | |
|---------------------|----------|
| UQ-AX2 | UQ-AX2KR |
| | |

| |
|------------|
| Model Name |
| UQ-AX2 |
| UQ-AX2KR |

UQ-PL



Connect terminals A1(+) and A2(-) of the main coil to terminals A1(+) and A2(-) of the unit, respectively.

| |
|------------|
| Model Name |
| UQ-PL |

- Note 1. The contact arrangement and coil terminal location differ between non-reversible and reversible types. **Reversible types, in particular, have reversed coil polarity so extra care should be taken when wiring.**
- Note 2. The 2 auxiliary break contacts of reversible types are wired as an electrical interlock so should be used in an electrically interlocked state.
- Note 3. **Operation coil terminals have polarity.**
Connect terminal number A1 (+) to the positive and A2 (-) to the negative sides.

9.3 B-T/N □ NC Main Contact Contactors

Can be used for motor control and power switching for lighting circuits

B-T/N type magnetic contactors have a break contact as the main contact (normally closed contact) that is suited for use shorting motor starting resistance, cushion-starting AC motors, power generation (dynamic braking) and AC/DC power switching for lighting circuits. AC operated types are B-T/N type, DC operated types are BD-T/N type.

● Features

● Compact and Space-Saving

Dramatically reduced outline drawings and mounting area compared to conventional products

● Featuring an AC Operated DC Excitation Type Magnet (B-N65/N100)

- Completely eliminates buzzing
- Wide range rated coil (designation AC200V: rated AC200 to 240 V 50/60 Hz)
- Surge absorber comes built-in
- Dramatically reduced power consumption



B-T21

● Supports Live Part Protection

- Live part protection covers are standard equipment (B(D)-T21)
- Applicable with live part protection cover units UN-CV/CZ □ (B(D)-N □)

● Adopts Auxiliary Twin Contacts

All auxiliary contacts are high contact reliability twin contacts that can be applied with 20 V 5 mA loads

● Improved Safety

A main circuit inter-phase barrier is equipped as standard

● Improved Environmental Applicability

Materials used are indicated on main plastic components

● Rating/Performance

| Operating Method | Model Name | Main Contact Arrangement | DC Rated Operational Current [A] | | | | Conventional Free Air Thermal Current I _{th} [A] | Auxiliary Contact Arrangement |
|------------------|------------|--------------------------|---|--------------|--|--------------|---|-------------------------------|
| | | | DC Motor Load (Category DC-3, DC-5, DC2, DC4) | | DC Resistive Load (Category DC-1, DC1) | | | |
| | | | 100 to 110 V | 200 to 220 V | 100 to 110 V | 200 to 220 V | | |
| AC Operated | B-T21(BC) | 1a2b, 3b | 8 (15) | 1 (5) | 15 (20) | 5 (10) | 25 | 2a2b |
| | B-N65 | | 20 (50) | 3 (20) | 30 (65) | 10 (30) | 80 | 2a2b |
| | B-N100 | 1a2b | 30 | 3 | 40 | 20 | 120 | 2a2b |
| DC Operated | BD-T21(BC) | 1a2b | 8 | 1 | 15 | 5 | 25 | 2a2b |
| | BD-N65 | | 20 | 3 | 30 | 10 | 80 | 2a2b |
| | BD-N100 | | 30 | 3 | 40 | 20 | 120 | |

Note 1. The DC rating indicated is for 2-poles in series. The value in parentheses is for 3-poles in series.

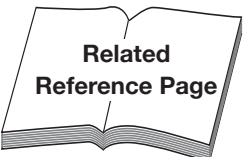
Note 2. Electrical durability of 500,000 operations, mechanical durability of 5 million operations and switching frequency of 1200 times/hour

Note 3. Auxiliary contact ratings are the same as N35 to N800 types or greater. (Refer to page 39)

Note 4. Use the following table when applying AC to main circuit contacts.

| Operating Method | Model Name | Main Contact Arrangement | AC Rated Operational Current [A] | | | | |
|--|------------|--------------------------|---|--------------|---------------------------------------|--|---------------------------------------|
| | | | Break Contact | | | Make Contact | |
| | | | Three-Phase | | 2-Pole Series Single Phase | 1-Pole Single Phase | 1-Pole Single Phase |
| | | 200 to 220 V | 380 to 440 V | 200 to 220 V | 200 to 220 V | 200 to 220 V | |
| AC Operated | B-T21(BC) | 1a2b, 3b | 18 | 13 | 18 | 18 | 18 |
| | B-N65 | | 50 | 35 | 50 | 50 | 50 |
| | B-N100 | 1a2b | 80 | 55 | 80 | 80 | 80 |
| DC Operated | BD-T21(BC) | 1a2b | 18 | 13 | 18 | 18 | 18 |
| | BD-N65 | | 50 | 35 | 50 | 50 | 50 |
| | BD-N100 | | 80 | 55 | 80 | 80 | 80 |
| Making/Breaking Duty Conditions/ Switching Durability | | | Making Only, Without Breaking/ 500,000 Times | | Making and Breaking/ 500,000 Times | Making Only, Without Breaking/500,000 Times | Making and Breaking/ 500,000 Times |

Note 1. Switching durability is the value when making at 6 times the rated current, breaking at 1 time the rated current or without breaking.

|  | Item | Reference Page | Remarks |
|---|---------------------------------|----------------|---------|
| | · Auxiliary Contact Rating | Page 39 | — |
| | · Operation Coil | Pages 41, 42 | — |
| | · How to Order | Page 249 | — |
| | · Combining with Optional Units | Page 180 | — |

● Properties

| Model Name | Input [VA] | | Power Consumption [W] | Operating Voltage [V] | | Coil Current [mA] | Operating Time [ms] | |
|------------|------------|--------|-----------------------|-----------------------|-----------|-------------------|--------------------------|--------------------------|
| | Inrush | Normal | | Operation | Open | | Coil ON → Main Break OFF | Coil OFF → Main Break ON |
| B-T21 | 75 | 7 | 2.4 | 125 to 155 | 75 to 110 | 30 | 7 to 15 | 13 to 25 |
| B-N65 | 210 | 23 | 2.8 | 110 to 140 | 50 to 100 | 85 | 12 to 28 | 45 to 105 |
| B-N100 | 270 | 24 | 2.9 | 110 to 140 | 60 to 130 | 100 | 20 to 25 | 110 to 130 |
| BD-T21 | — | — | 3.3 (2.2) | 50 to 65 | 10 to 30 | 33 | 45 to 60 (70 to 85) | 10 to 30 |
| BD-N65 | — | — | 24 | 55 to 65 | 12 to 30 | 240 | 68 to 92 | 13 to 29 |
| BD-N100 | — | — | 31 | 50 to 65 | 12 to 30 | 310 | 104 to 156 | 30 to 70 |

Note 1. The above indicates rough property indices for AC200V coils under AC operation (B-T/N□) and for DC100V coils under DC operation (BD-T/N□).

The values in the parentheses for BD-T21 indicate rough property indices for DC12V or DC24V coils.

Note 2. The drive voltage is the value at a 20°C cold state for both AC (at 60 Hz) and DC operation. Voltages for coils other than AC200V or DC100V can be calculated proportionately.

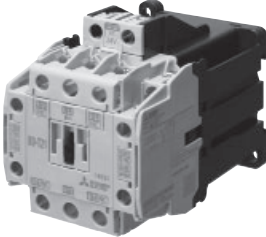
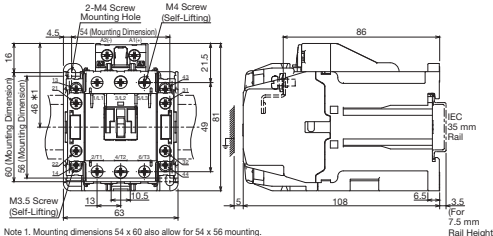
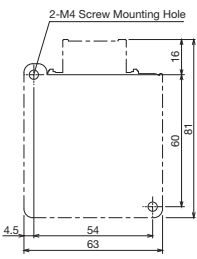
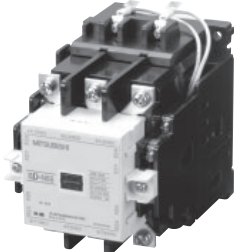
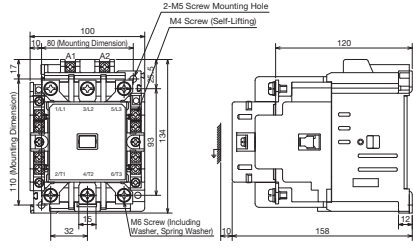
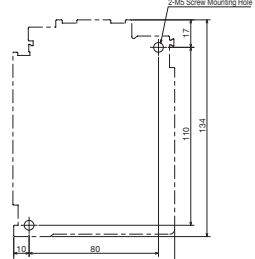

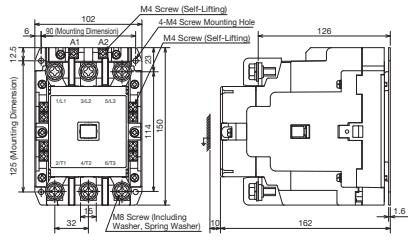
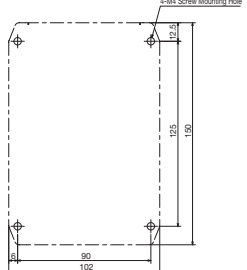
Note 3. The input and power consumption indicated are average values. These are almost the same for coils other than AC200V or DC100V.

Note 4. The coil current is the average normal value with 220 V 60 Hz applied for AC operated types and DC100V applied for DC operated types. Divide the regular input for coils other than AC200V, or the power consumption for coils other than DC100V, by the coil voltage.

Note 5. The operating time is the value with 220 V 60 Hz applied for AC operated types and DC100 V applied for DC operated types. These are almost the same for coils other than AC200V or DC100V.

● Contact Arrangement

| Model Name | Main 1a2b | Main 3b | Model Name | Main 1a2b | Main 3b |
|------------|---------------|---------------|------------|---------------|---------|
| B-T21 | Aux. 2a2b | Aux. 2a2b | BD-T21 | Aux. 2a2b | — |
| B-N65 | Aux. 2a2b | Aux. 2a2b | BD-N65 | Aux. 2a2b | — |
| B-N100 | Aux. 2a2b | — | BD-N100 | Aux. 2a2b | — |

| Model Name/Appearance | Outline Drawings | Hole Drilling Dimensions | Weight [kg] |
|---|---|--|-------------|
| <p>BD-T21</p>  |  <p>Note 1. Mounting dimensions 54 x 60 also allow for 54 x 56 mounting. 2. #1 dimension is the length from the center of the 35 mm wide standard rail. 3. Auxiliary contact units (UT-AX2, UT-AX4, UT-AX11) are not applicable. 4. Please read "Mitsubishi Electric Magnetic Starters MS-17N Series" [L (NA) 02031] carefully before using the product.</p> |  | <p>0.59</p> |
| <p>BD-N65</p>  |  <p>Auxiliary contact units are not applicable.</p> |  | <p>3.0</p> |
| <p>BD-N100</p>  |  <p>Auxiliary contact units are not applicable.</p> |  | <p>4.3</p> |

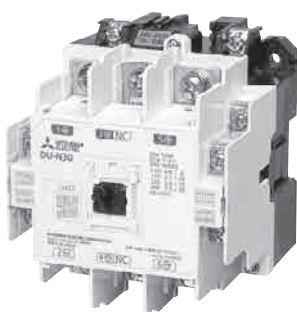
9.4 DU-N □ Magnetic Contactors for DC

Ideal for controlling DC motors of 440 V or less, or for switching general DC circuits

DU-N types are compact, high-performance DC contactors applicable with voltages DC440 V or less. Can be used for variable speed DC motor control and other general DC circuits and available as AC operated type DU-N (main contact 2a1b) and DC operated type DUD-N (main contact 2a).

● Features

- **Compact and Space-Saving**
Dramatically reduced outline drawings and mounting area compared to conventional products
- **Featuring an AC Operated DC Excitation Type Magnet (DU-N □)**
 - Completely eliminates buzzing
 - Wide range rated coil (designation AC200V: rated AC200 to 240 V 50/60 Hz)
 - Surge absorber comes built-in
 - Dramatically reduced power consumption (DU-N30: 2.2 W, DU-N120: 2.9 W)
- **Supports Finger Protection**
Applicable with live part protection cover units UN-CZ □ used by MS-N series



DU-N30

- **Adopts Auxiliary Twin Contacts**
Auxiliary contacts are high contact reliability twin contacts that can be applied with DC20 V 5 mA loads
- **Additional Auxiliary Contact Units Applicable**
Applicable with auxiliary contact units UN-AX □ used by MS-N series
- **Improved Environmental Applicability**
Materials used are indicated on main plastic components
- **Improved Plastic Component Strength (DU/DUD-N30)**
Adopts thermoplastic resin around the terminals

● Rating

| Operating Method | Model Name | Main Contact Arrangement | Main Contact Series Connection | | Rated Operating Current [A] | | | | | | Rated Capacity [kW] | | | Conventional Free Air Thermal Current I _{th} [A] | Rated Insulation Voltage | Auxiliary Contact Arrangement |
|------------------|---------------|--------------------------|--------------------------------|-------------|--|--------|--------|---|--------|--------|---|--------|--------|---|--------------------------|-------------------------------|
| | | | | | Variable Speed Motor Control: Make Contact Dynamic Braking: Break Contact | | | General DC Motors (Category DC2 and DC4) | | | General DC Motors (Category DC2 and DC4) | | | | | |
| | | | | | DC110V | DC220V | DC440V | DC110V | DC220V | DC440V | DC110V | DC220V | DC440V | | | |
| AC Operated | DU-N30 | 2a1b | Make | Single Pole | 40 | 40 | 15 | 30 | 20 | — | 2.2 | 3.7 | — | 60 | 660V | 2a2b |
| | | | Contact | 2-Pole | 50 | 50 | 40 | 40 | 30 | 20 | 3.7 | 5.5 | 7.5 | | | |
| | DU-N60 | | Break Contact | Single-Pole | 120 *1 | 120 *1 | 120 *1 | 20 | 15 | — | 1.5 | 2.2 | — | 120 | | |
| | | | Make | Single Pole | 80 | 80 | 30 | 60 | 40 | — | 5.5 | 7.5 | — | | | |
| | DU-N120 | | Contact | 2-Pole | 90 | 90 | 80 | 80 | 60 | 40 | 7.5 | 11 | 15 | 160 | | |
| | | | Break Contact | Single-Pole | 240 *1 | 240 *1 | 240 *1 | 40 | 30 | — | 3.7 | 5.5 | — | | | |
| | DU-N180 | | Make | Single Pole | 160 | 160 | 60 | 120 | 80 | — | 11 | 15 | — | 270 | | |
| | | | Contact | 2-Pole | 160 | 160 | 160 | 160 | 120 | 80 | 15 | 22 | 30 | | | |
| | DU-N260 | | Break Contact | Single-Pole | 480 *1 | 480 *1 | 480 *1 | 80 | 60 | — | 7.5 | 11 | — | 260 | | |
| | | | Make | Single Pole | 260 | 260 | 90 | 180 | 120 | — | 15 | 22 | — | | | |
| | | | Contact | 2-Pole | 260 | 260 | 260 | 240 | 180 | 120 | 22 | 35 | 45 | 360 | | |
| | | | Break Contact | Single-Pole | 720 *1 | 720 *1 | 720 *1 | 100 | 75 | — | 7.5 | 11 | — | | | |
| | Make | Single Pole | 360 | 360 | 130 | 260 | 175 | — | 22 | 30 | — | 360 | | | | |
| | Contact | 2-Pole | 360 | 360 | 360 | 350 | 260 | 175 | 30 | 45 | 55 | | | | | |
| | Break Contact | Single-Pole | 1040 *1 | 1040 *1 | 1040 *1 | 150 | 100 | — | 11 | 18.5 | — | | | | | |
| | | | | | | | | | | | | | | | | |
| DC Operated | DUD-N30 | 2a | Make | Single Pole | 40 | 40 | 15 | 30 | 20 | — | 2.2 | 3.7 | — | 60 | 660V | 2a2b |
| | | | Contact | 2-Pole | 50 | 50 | 40 | 40 | 30 | 20 | 3.7 | 5.5 | 7.5 | | | |
| | DUD-N60 | | Make | Single Pole | 80 | 80 | 30 | 60 | 40 | — | 5.5 | 7.5 | — | 120 | | |
| | | | Contact | 2-Pole | 90 | 90 | 80 | 80 | 60 | 40 | 7.5 | 11 | 15 | | | |
| | DUD-N120 | | Make | Single Pole | 160 | 160 | 60 | 120 | 80 | — | 11 | 15 | — | 160 | | |
| | | | Contact | 2-Pole | 160 | 160 | 160 | 160 | 120 | 80 | 15 | 22 | 30 | | | |
| | DUD-N180 | | Make | Single Pole | 260 | 260 | 90 | 180 | 120 | — | 15 | 22 | — | 270 | | |
| | | | Contact | 2-Pole | 260 | 260 | 260 | 240 | 180 | 120 | 22 | 35 | 45 | | | |
| | DUD-N260 | | Make | Single Pole | 360 | 360 | 130 | 260 | 175 | — | 22 | 30 | — | 360 | | |
| | | | Contact | 2-Pole | 360 | 360 | 360 | 350 | 260 | 175 | 30 | 45 | 55 | | | |

Note 1. Variable speed motor control (make contact) duty applied 2 times tripping/no voltage open-circuit, dynamic braking (break contact) duty applied 1 times tripping/no voltage open-circuit.

Note 2. General DC motors are applicable with JEM1038 class DC2 (shunt motor starting/stopping), class DC4 (series-wound motor starting/stopping) motor loads.

Note 3. Allowable continuity current of *1 is for 30 seconds. Inching operations should be conducted at the rated operating current of general DC motors.

Note 4. Auxiliary contact ratings are the same as N125 to N800 types. (Refer to page 39)

Note 5. Reversible types (DU-2xN □ , DUD-2xN □) can also be manufactured.

● Performance

| Model Name | Main Contact Series Connection | | Breaking Capacities [A] *1 | | | Making Current Capacity [A] *2 | Switching Frequency [Times/Hour] | Switching Durability [x 10000] | | |
|------------|--------------------------------|-------------|----------------------------|---------|---------|--------------------------------|----------------------------------|--------------------------------|------------|-----|
| | | | DC110 V | DC220 V | DC440 V | | | Mechanical | Electrical | |
| DUD-N30 | Make Contact | Single Pole | 120 | 80 | — | 160 | 1200 | 250 | 50 | |
| DU-N30 | | 2-Pole | 160 | 120 | 80 | | | | | |
| DU-N30 | Break Contact Single-Pole | | 80 | 60 | — | | | | | |
| DUD-N60 | Make Contact | Single Pole | 240 | 160 | — | | | | | 320 |
| DU-N60 | | 2-Pole | 320 | 240 | 160 | | | | | |
| DU-N60 | Break Contact Single-Pole | | 160 | 120 | — | | | | | |
| DUD-N120 | Make Contact | Single Pole | 480 | 320 | — | 640 | | | | |
| DU-N120 | | 2-Pole | 640 | 480 | 320 | | | | | |
| DU-N120 | Break Contact Single-Pole | | 320 | 240 | — | | | | | |
| DUD-N180 | Make Contact | Single Pole | 720 | 480 | — | | 960 | | | |
| DU-N180 | | 2-Pole | 960 | 720 | 480 | | | | | |
| DU-N180 | Break Contact Single-Pole | | 400 | 300 | — | | | | | |
| DUD-N260 | Make Contact | Single Pole | 1040 | 700 | — | 1400 | | | | |
| DU-N260 | | 2-Pole | 1400 | 1040 | 700 | | | | | |
| DU-N260 | Break Contact Single-Pole | | 600 | 400 | — | | | | | |

Note 1. *1 Time constant L/R = 15 ms, 25 shut-off transitions. *2 Time constant L/R = 15 ms, 100 closings

● Properties

| Model Name | Input [VA] | | Power Consumption [W] | Operating Voltage [V] | | Coil Current [mA] | Operating Time [ms] | | | |
|------------|------------|--------|-----------------------|-----------------------|------|-------------------|------------------------|--------------------------|--------------------------|--------------------------|
| | Inrush | Normal | | Operation | Open | | Coil ON → Main Make ON | Coil ON → Main Break OFF | Coil OFF → Main Make OFF | Coil OFF → Main Break ON |
| DU-N30 | 115 | 20 | 2.2 | 133 | 57 | 67 | 12 to 15 | 10 to 13 | 66 to 72 | 65 to 76 |
| DU-N60 | 270 | 24 | 2.9 | 112 | 68 | 100 | 20 to 23 | 17 to 20 | 75 to 103 | 78 to 108 |
| DU-N120 | 270 | 24 | 2.9 | 125 | 76 | 100 | 25 to 27 | 20 to 22 | 75 to 103 | 80 to 110 |
| DU-N180 | 440 | 40 | 4.2 | 109 | 76 | 165 | 32 to 34 | 24 to 26 | 85 to 105 | 90 to 140 |
| DU-N260 | 440 | 50 | 6.1 | 112 | 58 | 200 | 37 to 39 | 29 to 31 | 100 to 130 | 105 to 140 |
| DUD-N30 | — | — | 18 | 61 | 22 | 180 | 42 to 52 | — | 14 to 17 | — |
| DUD-N60 | — | — | 31 | 52 | 18 | 310 | 100 to 103 | — | 16 to 18 | — |
| DUD-N120 | — | — | 31 | 54 | 16 | 310 | 102 to 110 | — | 18 to 20 | — |
| DUD-N180 | — | — | 41 | 56 | 15 | 410 | 112 to 120 | — | 20 to 25 | — |
| DUD-N260 | — | — | 55 | 54 | 13 | 550 | 140 to 150 | — | 30 to 50 | — |

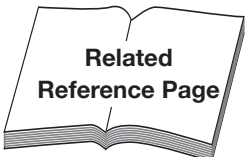
Note 1. The above indicates rough property indices for AC200V coils under AC operation (DU-N□) and for DC100V coils under DC operation (DUD-N□).

Note 2. The drive voltage is the average value at a 20°C cold state for both AC (at 60 Hz) and DC operation. Voltages for coils other than AC200V or DC100V can be calculated proportionately.

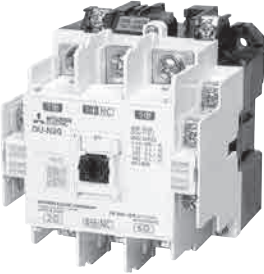
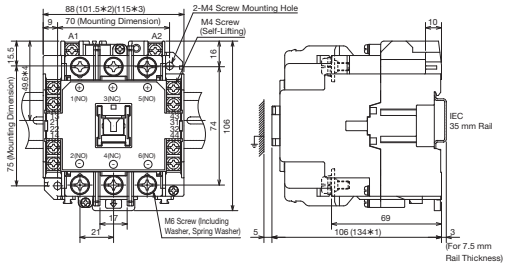
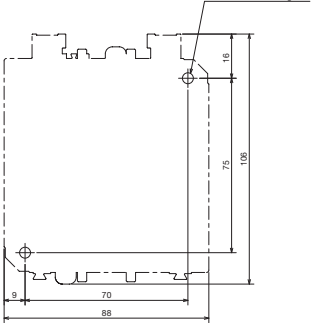
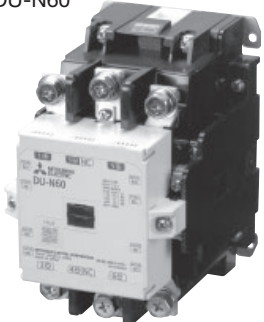
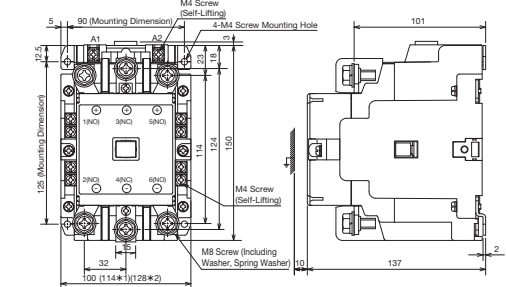
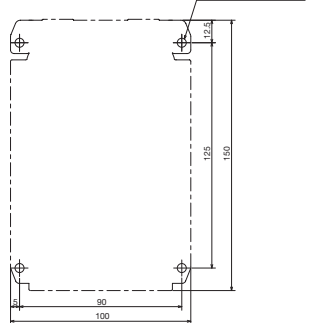
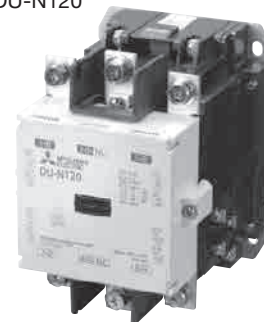
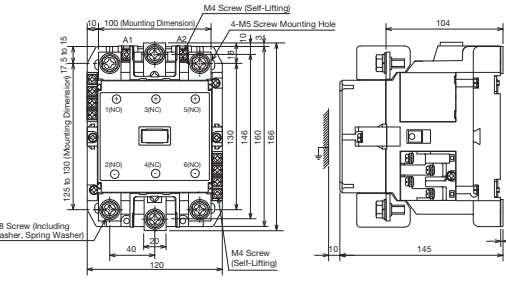
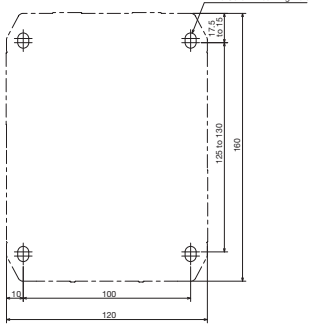
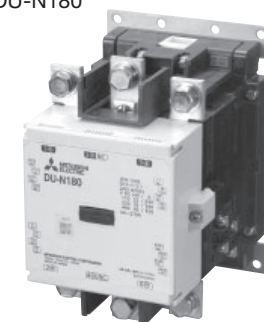
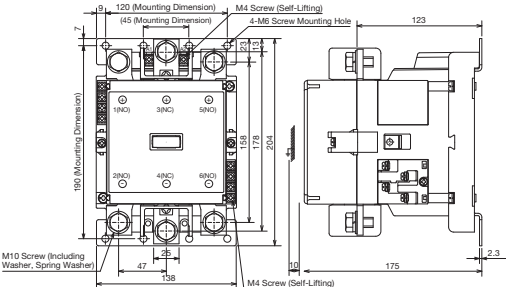
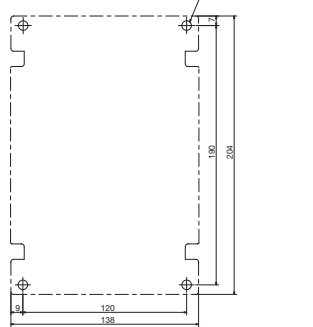
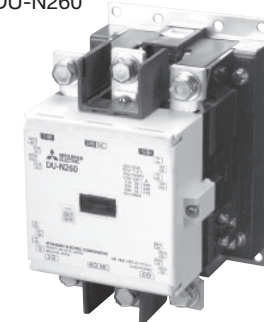
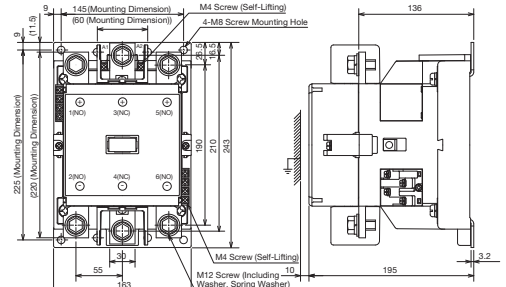
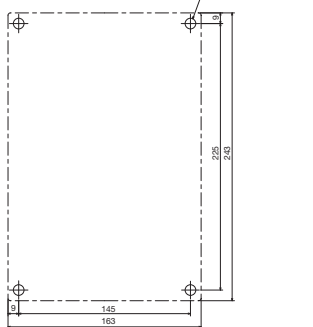
Note 3. The input and power consumption indicated are average values. These are almost the same for coils other than AC200V or DC100V.

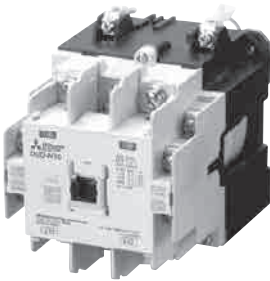
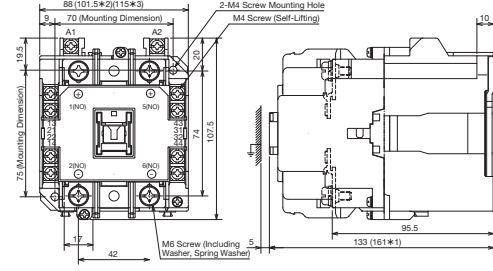
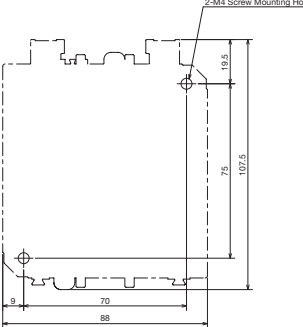
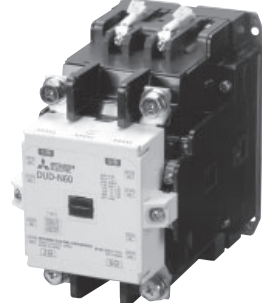
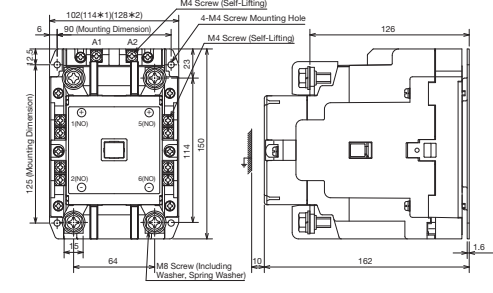
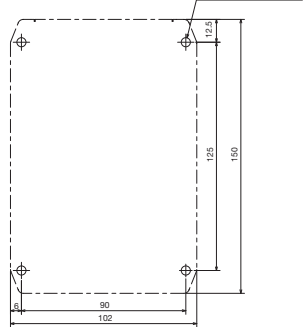
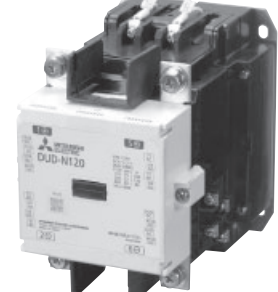
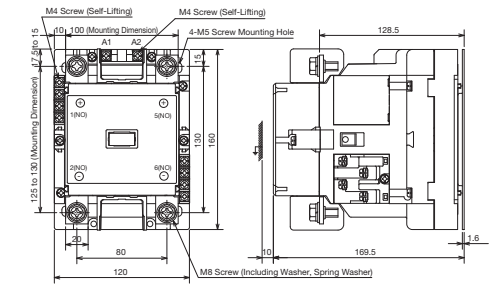
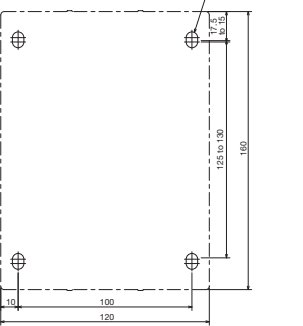
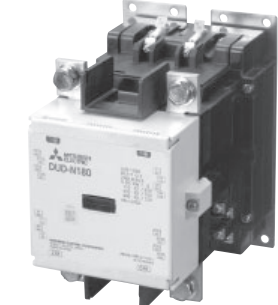
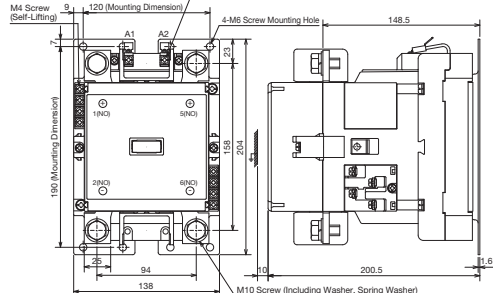
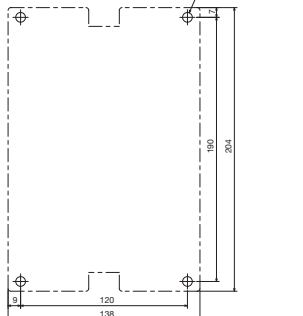
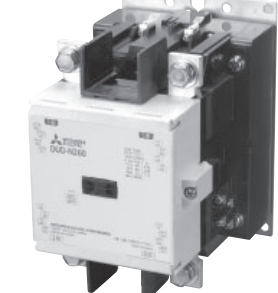
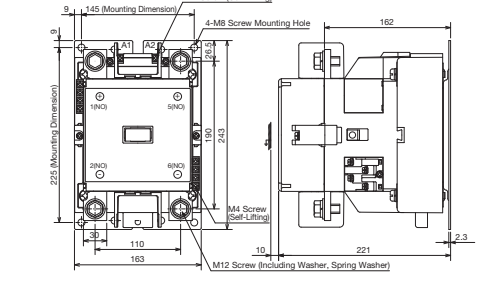
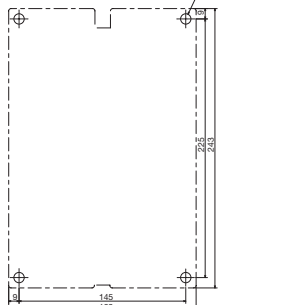
Note 4. The coil current is the average value with 220 V 60 Hz applied for AC operated types and DC100V applied for DC operated types. Divide the regular input for coils other than AC200V, or the power consumption for coils other than DC100V, by the coil voltage.

Note 5. The operating time is the value with 220 V 60 Hz applied for AC operated types and DC100V applied for DC operated types. These are almost the same for coils other than AC200V or DC100V.

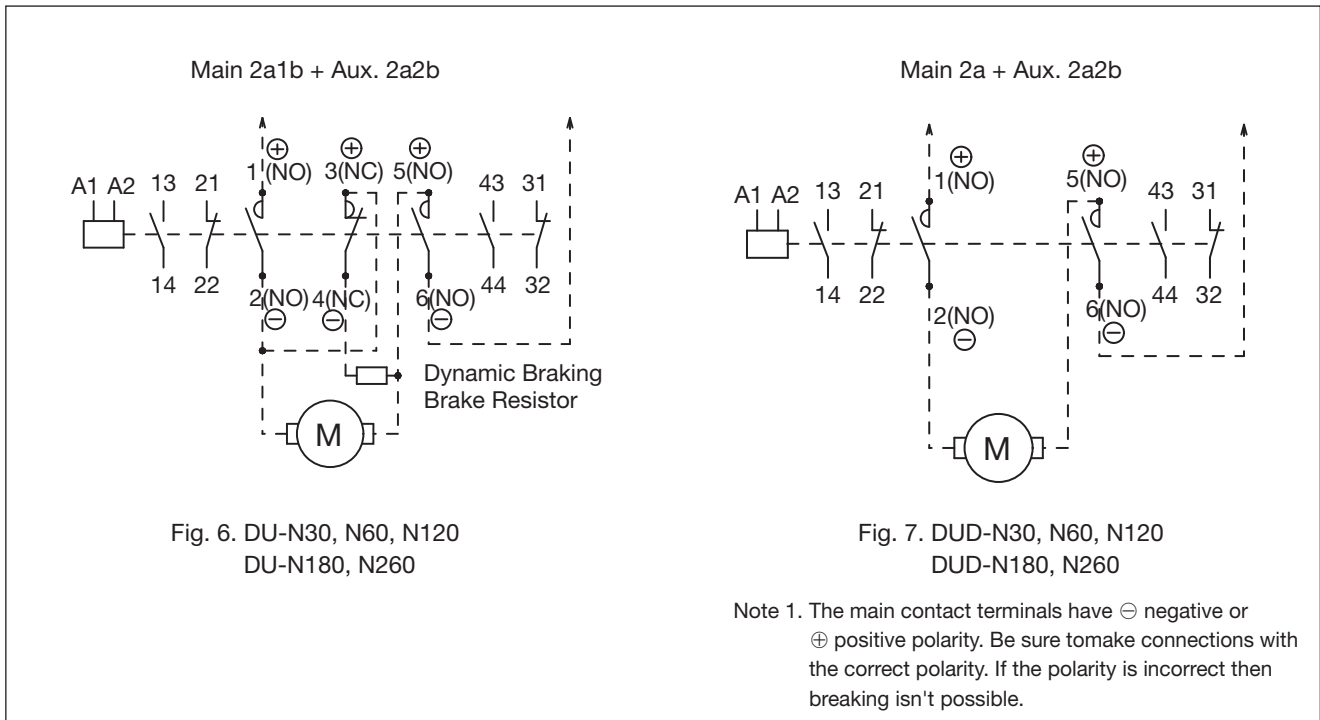
|  | Item | Reference Page | Remarks |
|---|---------------------------------|----------------|---------|
| | · Auxiliary Contact Rating | Page 39 | — |
| | · Operation Coil | Pages 41, 42 | — |
| | · How to Order | Page 249 | — |
| | · Combining with Optional Units | Page 180 | — |

● Outline Drawings

| Model Name/Appearance | Outline Drawings | Hole Drilling Dimensions | Weight [kg] |
|---|---|---|-------------|
|  |  <p>*1 dimension includes the head-on auxiliary contact unit (UN-AX2, UN-AX4). *2, *3 dimensions indicate when using a side-on auxiliary contact unit (UN-AX11) - *2 indicates 1 piece, *3 indicates 2 pieces (both sides). It should be noted that it cannot be used with the head-on and side-on auxiliary contact units mounted at the same time. *4 dimension is the length from the center of the 35 mm wide standard rail.</p> |  | 0.77 |
|  |  <p>*1, *2 dimensions indicate when using a side-on auxiliary contact unit (UN-AXB) - *1 indicates 1 piece, *2 indicates 2 pieces (both sides).</p> |  | 2.6 |
|  |  <p>2 auxiliary contact units (UN-AX150) can be installed.</p> |  | 3.2 |
|  |  <p>2 auxiliary contact units (UN-AX150) can be installed.</p> |  | 5.3 |
|  |  <p>2 auxiliary contact units (UN-AX150) can be installed.</p> |  | 9.0 |

| Model Name/Appearance | Outline Drawings | Hole Drilling Dimensions | Weight [kg] |
|---|---|---|-------------|
|  <p>DUD-N30</p> |  <p>*1 dimension includes the head-on auxiliary contact unit (UN-AX2, AX4). *2, *3 dimensions indicate when using a side-on auxiliary contact unit (UN-AX11) - *2 indicates 1 piece, *3 indicates 2 pieces (both sides). It should be noted that it cannot be used with the head-on and side-on auxiliary contact units mounted at the same time.</p> |  | 2.1 |
|  <p>DUD-N60</p> |  <p>*1, *2 dimensions indicate when using a side-on auxiliary contact unit (UN-AX8) - *1 indicates 1 piece, *2 indicates 2 pieces (both sides).</p> |  | 4.3 |
|  <p>DUD-N120</p> |  <p>2 auxiliary contact units (UN-AX15) can be installed.</p> |  | 4.9 |
|  <p>DUD-N180</p> |  <p>2 auxiliary contact units (UN-AX15) can be installed.</p> |  | 7.4 |
|  <p>DUD-N260</p> |  <p>2 auxiliary contact units (UN-AX15) can be installed.</p> |  | 12.3 |

● Contact Arrangement/Connection Diagram



● Handling

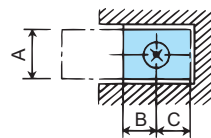
● Applicable Wire Size and Terminal Screw Tightening Torque

| Model Name | Terminal Dimensions | | | Applicable Wire Size [mm ²] | | Applicable Crimp Lug Size | | Terminal Screw Tightening Torque N·m | |
|-------------------|---------------------|------------------------------------|-----------------|---|--------------------|---------------------------|-----------------------------|--------------------------------------|------------------------|
| | Main Circuit | | Control Circuit | | | | | Parentheses show standard value | |
| | Screw Size | Terminal Dimensions A x B x C [mm] | Screw Size | Main Circuit | Control Circuit | Main Circuit | Control Circuit | Main Circuit | Control Circuit |
| DU-N30, DUD-N30 | M6 | 15 x 7 x 8.5 | M4 | — | φ 1.6 1.25 to 2 | 1.25-6 to 22-6 38-S6 | 1.25-4 to 2-4, 5.5-S4 | 3.53 to 5.78(4.41) | 1.18 to 1.86 (1.47) |
| DU-N60, DUD-N60 | M8 | 15 x 8.5 x 16 | M4 | — | | 5.5-8 to 60-8 | | 6.28 to 10.29(7.84) | |
| DU-N120, DUD-N120 | M8 | 20 x 10 x 16 | M4 | — | | 8-8 to 100-8 | | 6.28 to 10.29(7.84) | |
| DU-N180, DUD-N180 | M10 | 25 x 12.5 x 18 | M4 | — | | 14-10 to 150-10 | | 11.8 to 19.1(14.7) | |
| DU-N260, DUD-N260 | M12 | 30 x 15 x 22.5 | M4 | — | 22-12 to 200-12 | 19.6 to 31.3(24.5) | | | |

Note 1. The terminal dimension is a dimension for bus bar connection. (Refer to the figure on the right)

Note 2. Control circuits are auxiliary contact terminals or coil terminals of magnetic contactors.

Note 3. In each terminal, a wire or two crimp lugs may be connected.



9.5 S-N□KG Magnetic Contactors for High-Frequency Switching

Ideal for applications with frequent inching operations such as hoists and cranes

S-N□KG type magnetic contactors have a reinforced main contact compared to standard magnetic contactors (adopts a large, hardened silver alloy contact) to be suitable for applications with frequent inching operations such as hoists and cranes.

● Rated Capacity, Rated Operating Current and Rated Continuity Current (JISC8201-4-1)

| Application Model Name | Inching Duty - Category AC-4 | | | | Standard Duty - Category AC-3 | | | | Conventional Free Air Thermal Current I _{th} [A] |
|---------------------------|------------------------------|--------------|-----------------------------|--------------|-------------------------------|--------------|-----------------------------|--------------|---|
| | Rated Capacity [kW] | | Rated Operating Current [A] | | Rated Capacity [kW] | | Rated Operating Current [A] | | |
| | 200 to 220 V | 380 to 440 V | 200 to 220 V | 380 to 440 V | 200 to 220 V | 380 to 440 V | 200 to 220 V | 380 to 440 V | |
| S-N125KG | 15 | 22 | 65 | 47 | 30 | 60 | 125 | 120 | 150 |
| S-N220KG | 30 | 45 | 125 | 90 | 55 | 110 | 220 | 220 | 260 |

Note 1. Reversible types are also manufactured. In this case, the model name is S-2xN□KG.

Note 2. Electrical durability of Class AC-4 is 100,000 operations.

Electrical durability of Class AC-3 is 1.5 mil. operations.

Note 3. Magnetic starters (combined with thermal overload relay: MSO-N□KG) can also be manufactured.

Note 4. DC operated types can also be manufactured.

| |
|------------|
| Model Name |
| S-N125KG |
| S-N220KG |

● Operation Coil/Properties/Contact Arrangement/Outline Drawings

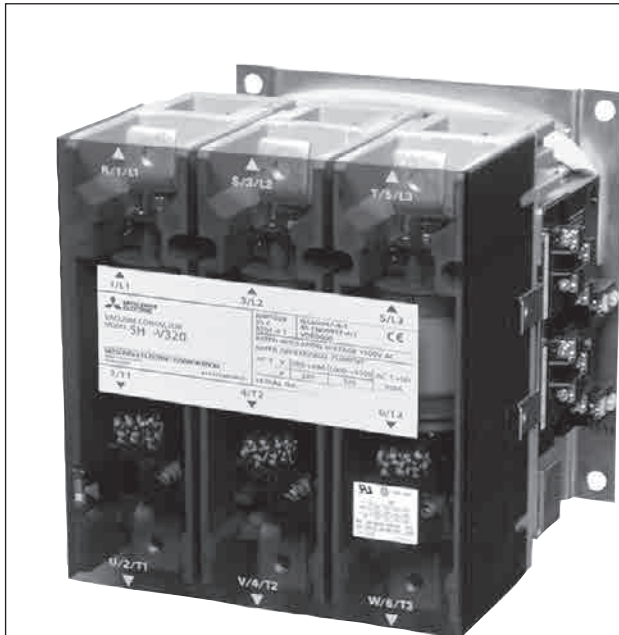
The above are the same as the standard product, so refer to pages 39, 41 and 43 for the operation coil, properties and contact arrangements, and page 80, 82 for outline drawings.

9.6 SH-V □ Vacuum Magnetic Contactors

Large capacity vacuum magnetic contactors with excellent safety properties

A large-capacity vacuum magnetic contactor boasting high-performance, long lifespan and maintenance-free characteristics through combination of a vacuum switch and AC operated, DC energizing solenoid. SH-V160 to V600 types are UL standard recognized and CSA standard accredited products.

● Features



SH-V320

- High-Performance, Long Lifespan
- Large Capacitor Switching Capacity
- Latched Types Available (Excluding V600)
- Compact
Allows for more compact panels without requiring any arc clearance.
- Excellent Operational Reliability and High Frequency Switching Capacity
Combination of a vacuum switch with a DC solenoid.
- Zero Noise
No buzzing or current shut-off noise.
- Extremely Easy Maintenance and Inspection
- High Degree of Safety
Zero arc ejection allowing for safe use in atmospheres with poor ambient conditions.

● Rating/Performance

| | | Frame | 160 | | 320 | | 400 | | 600 | |
|-----------------------------------|---|---|-----------------------------|-----------------------|---------------------|-----------------------|---------------------|-----------------------|-----------|------------|
| | | Model Name | SH-V160 SHD-V160 | SHL-V160 SHLD-V160 | SH-V320 SHD-V320 | SHL-V320 SHLD-V320 | SH-V400 SHD-V400 | SHL-V400 SHLD-V400 | SH-V600 | |
| Rating/Performance | | | | | | | | | | |
| Main Contact | Rated Insulation Voltage [V] | | 1500 (Three-Phase 50/60 Hz) | | | | | | | |
| | Rating | Three-Phase Motor Category AC-3 Rated Operating Current [A] () Shows Rated Capacity [kW] | AC220V | 180 (45) | | 320 (75) | | 400 (95) | | 630 (160) |
| | | | AC440V | 180 (90) | | 320 (150) | | 400 (200) | | 630 (300) |
| | | | AC550V | 180 (110) | | 320 (200) | | 400 (250) | | 630 (350) |
| | | Three-Phase Capacitor Rated Capacity A [kVA] | AC1000V | 160 (220) | | 320 (400) | | 400 (500) | | 600 (750) |
| | | | AC1500V | 160 (315) | | 320 (600) | | 400 (750) | | 600 (1000) |
| | | | AC220V | 150 (50) | | 250 (75) | | 300 (100) | | 580 (200) |
| | | AC440V | 150 (100) | | 250 (150) | | 300 (200) | | 580 (400) | |
| | | AC550V | 150 (125) | | 250 (200) | | 300 (250) | | 580 (500) | |
| | Conventional Free Air Thermal Current Ith [A] | | 200 | | 350 | | 450 | | 750 | |
| Switching Frequency [Times/Hour] | | 1200 | | | | | | | | |
| Switching Durability [x 10000] | Electrical | Three-Phase Motor (Category AC-3) | 50 | 25 | 50 | 25 | 50 | 25 | 25 | |
| | | Three-Phase Capacitor | 10 | 10 | 10 | 10 | 10 | 10 | 5 | |
| | | Mechanical | 250 | 25 | 250 | 25 | 250 | 25 | 250 | |
| Compliant Standards | | JISC8201-4-1, JEM 1038, IEC 60947-4-1 | | | | | | | | |
| Auxiliary Contact | Rated Operating Current [A] | Category AC-15 | AC220V | | | | | | 5 | |
| | | | AC440V | | | | | | 3 | |
| | | Category DC-13 | DC110V | | | | | | 0.6 | |
| | | | DC220V | | | | | | 0.2 | |
| Compliant Standards | | JIS C4531 (1994) | | | | | | | | |

Note 1. Surge absorbers are not required for SH-V series models with motor loads of 7.5 kW or more, but should be used for motor loads of 5.5 kW or less.

● Properties

(1) Constant Excitation Type

| Operating Method | | Model Name | SH-V160 SH-V320 SH-V400 | SHD-V160 SHD-V320 SHD-V400 | SH-V600 |
|-------------------------------|-----------------------|---|--------------------------------------|--------------------------------------|---------|
| | | AC Operated Constant Excitation Type | DC Operated Constant Excitation Type | AC Operated Constant Excitation Type | |
| Operating Voltage | Operating Voltage | 85% or Less of Rated Voltage (40°C Ambient Temperature, After Coil Temperature Rise Saturation) | | | |
| | Open Voltage | 10% or More of Rated Voltage (20°C Ambient Temperature) | | | |
| Operating Time (Average) [ms] | Main Contact ON | 40 | 40 | 65 | |
| | Main Contact OFF | 130 | 130 | 80 | |
| Operation Coil Input [VA] | Operating Or Tripping | Inrush | 480 | 480 | 1,150 |
| | | Normal | 44 | 40 | 55 |

Note 1. The above indicates rough property indices for AC200V coils under AC operation (SH-V□) and for DC100V coils under DC operation (SHD-V□).

Note 2. The input indicates the average value. These are almost the same for coils other than AC200V or DC100V.

Note 3. The operating time is the average value with 220 V 60 Hz applied for AC operated types and DC100V applied for DC operated types.

These are almost the same for coils other than AC200V or DC100V.

(2) Mechanically Latched Type

| Properties | | Model Name | SHL-V160, SHLD-V160 SHL-V320, SHLD-V320 SHL-V400, SHLD-V400 | |
|-------------------------------|------------------|---|---|--------------|
| | | Operating Method | AC Operation | DC Operation |
| Operating Voltage | Closing | 85% or Less of Rated Voltage (40°C Ambient Temperature) | | |
| | Tripping | | | |
| Operating Time (Average) [ms] | Main Contact ON | 40 | | |
| | Main Contact OFF | 30 | | |
| Inrush Coil Input [VA] | Closing | 480 | 480 | |
| | Tripping | 650 | 300 | |

Note 1. The above indicates rough property indices for AC200V coils under AC operation (SHL-V□) and for DC100V coils under DC operation (SHLD-V□).

Note 2. The momentary input indicates the average value. These are almost the same for coils other than AC200V or DC100V.

Note 3. The drive time is the time taken from when the closing coil or tripping coil is excited until the main contact transitions (ON or OFF) when 220 V, 60 Hz is applied for AC operation or DC100V is applied for DC operation. These are almost the same for coils other than AC200V or DC100V.

● Rated Operation Coil

(1) SH-V AC Operation Coils, SHL-V Closing/Tripping Coils

| SH-V160, 320, 400 AC Operation Coils SHL-V160, 320, 400 Closing/Tripping Coils | | | | SH-V600 AC Operation Coil | | | |
|---|-------------------|------------|-----------------------------|---------------------------|-------------------|------------|-----------------------------|
| Coil Designation | Rated Voltage [V] | | Coil Indicator | Coil Designation | Rated Voltage [V] | | Coil Indicator |
| | 50Hz | 60Hz | | | 50Hz | 60Hz | |
| AC100V | 100 to 127 | 100 to 127 | Rated Voltage/ Frequency | AC100V | 100 to 127 | 100 to 127 | Rated Voltage/ Frequency |
| AC200V | 200 to 240 | 200 to 240 | | AC200V | 200 to 240 | 200 to 240 | |
| AC300V | 260 to 350 | 260 to 350 | | | | | |
| AC400V | 380 to 440 | 380 to 440 | | | | | |
| AC500V | 460 to 550 | 460 to 550 | | | | | |

(2) SHD-V160, 320, 400 DC Operation Coils SHLD-V160, 320, 400 Closing/Tripping Coils

| Coil Designation | Rated Voltage | Coil Indicator |
|------------------|---------------|----------------|
| DC100V | DC100 to 110V | Rated Voltage |
| DC200V | DC200 to 220V | |

The designation is a symbol to be specified when ordering.

Contact Arrangement/Connection Diagram

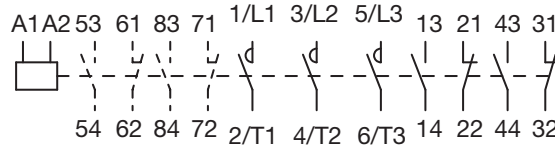


Fig. 17. SH-V160, SH-V320, SH-V400, SH-V600 Types

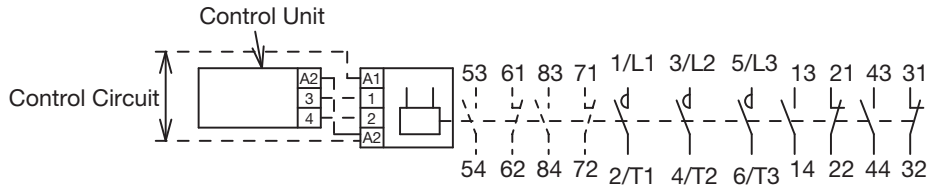


Fig. 18. SHD-V160, SHD-V320, SHD-V400 Types

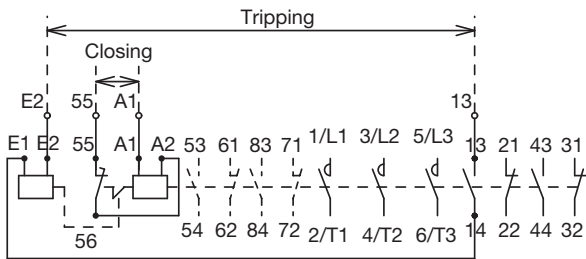


Fig. 19. SHL-V160, SHL-V320, SHL-V400 Types

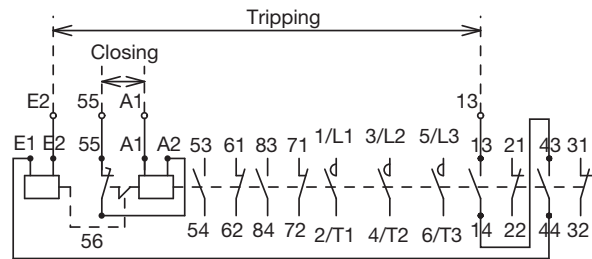


Fig. 20. SHLD-V160, SHLD-V320, SHLD-V400 Types

Note. Auxiliary contact arrangements are 2a2b as standard but can be manufactured as 4a4b (broken line in figure above) upon request. (Excluding SHLD-V. SHLD-V auxiliary contact arrangement is fixed as 2a4b)

Model Name Structure/Production Range

SH - **V160** ▲ Operation Coil Designation or Control Circuit Voltage and Frequency

| Symbol | Excitation Type |
|--------|---|
| SH | AC Constant Excitation Type |
| SHD | DC Constant Excitation Type |
| SHL | Mechanically Latched Type |
| SHLD | Mechanically Latched Type (Closing Current) |

| Symbol | Current Frame |
|--------|---------------|
| V160 | 160A |
| V320 | 320A |
| V400 | 400A |
| V600 | 600A |

Production Range

| Frame | 160A | 320A | 400A | 600A |
|-----------------|------------------------|------------|------------|------------|
| Constant | AC Operated ○ (Note 3) | ○ (Note 3) | ○ (Note 3) | ○ (Note 2) |
| Excitation Type | DC Operated ○ (Note 3) | ○ (Note 3) | ○ (Note 3) | — |
| Latched | AC Operated ○ | ○ | ○ | — |
| Type | DC Operated ○ | ○ | ○ | — |

Note 1. ○ : Manufactured, - : Not Manufactured

Note 2. Coil designation AC100V or AC200V only can be manufactured.

Note 3. Reversible types can also be manufactured for constant excitation types with 160, 320 and 400 A frames.

9.7 How to Order

Follow the steps below when ordering. (Enter a space in ▲.)

1. DC Interface Contactors

■ SD-Q Type

| Model Name | Operation Coil Designation or Control Circuit Voltage | (Note) Auxiliary Contact |
|--------------------|--|--|
| SD-Q11 SD-QR12 | ▲ DC24V ▲ DC24V | |
| Refer to page 228. | Select the coil designation from page 230 or specify the control circuit voltage used. | Specify if using a special contact arrangement. If not specified, then the standard contact arrangement will be used. Refer to page 230. |

■ MSOD-Q Type

| Model Name | Motor Capacity or Heater Designation (Knob Setpoint) | Main Circuit Voltage | Operation Coil Designation or Control Circuit Voltage | (Note) Auxiliary Contact |
|---------------------------|--|--|--|--|
| MSOD-Q11KP MSOD-QR12KP | ▲ 9A ▲ 9A | ▲ 200V ▲ 200V | ▲ DC24V ▲ DC24V | |
| Refer to page 228. | Select from page 230. | Do not apply AC voltage to the main circuit. (To distinguish it from the control circuit voltage.) | Select the coil designation from page 230 or specify the control circuit voltage used. | Specify if using a special contact arrangement. If not specified, then the standard contact arrangement will be used. Refer to page 230. |

■ UQ-AX2 Type (Auxiliary Contact Units for DC Interface Contactors)

| Model Name |
|--------------------|
| UQ-AX2 |
| Refer to page 229. |

■ UQ-PL Type (Indicator Lamp Units for DC Interface Contactors)

| Model Name | Operation Coil Designation or Control Circuit Voltage |
|--------------------|---|
| UQ-PL | ▲ DC24V |
| Refer to page 229. | Specify the coil designation from page 230. |

2. NC Main Contact Contactors

| Model Name | Operation Coil Designation or Control Circuit Voltage and Frequency | (Note) Main Contact |
|--------------------|---|--|
| B-T21 BD-N100 | ▲ AC200V ▲ DC100V | ▲ 3B ▲ |
| Refer to page 235. | Refer to pages 41, 42. | B-T or B-N type contactors are available with 1A2B and 3B main contacts. If not specified then the 1A2B contact arrangement will be used. Refer to page 235. |

3. DC Contactors

| Model Name | Operation Coil Designation or Control Circuit Voltage and Frequency |
|--------------------|---|
| DU-N30 DUD-N180 | ▲ AC200V ▲ DC110V |
| Refer to page 239. | Select the coil designation from the ratings on page 41 for AC coils or page 42 for DC coils, or else specify the control circuit voltage and frequency used. |

4. Magnetic Contactors For High Frequency Switching

■ S-N KG Type

| Model Name | Operation Coil Designation or Control Circuit Voltage and Frequency | (Note) Auxiliary Contact |
|--------------------|---|---|
| S-N125KG | ▲ AC200V | |
| Refer to page 244. | Select the coil designation from page 41 or specify the control circuit voltage and frequency used. | Specify if using a special contact arrangement. Refer to page 39. |

5. Vacuum Magnetic Contactors

■ SH-V , SHD-V Types

| Model Name | Operation Coil Designation or Control Circuit Voltage and Frequency | (Note) Auxiliary Contact |
|---------------------|---|--|
| SH-V400 SHD-V320 | ▲ AC100V ▲ DC100V | |
| Refer to page 245. | Specify the operation coil designation or control circuit voltage and frequency from the ratings on page 246. | Specify only if using the 4a4b contact arrangement. If not specified then 2a2b will be used. |

■ SHL-V , SHLD-V Types

| Model Name | Closing Coil Designation | Tripping Coil Designation | (Note) Auxiliary Contact |
|---|---|----------------------------|--|
| SHL-V160 SHLD-V320 | ▲ MC-AC200V ▲ MC-DC100V | ▲ MT-AC200V ▲ MT-DC100V | |
| Refer to page 245. The model name is SHLD if using a DC operated closing coil. | Specify the closing (MC) and tripping (MT) operation coil designation from the ratings on page 246. | | Specify only if using the 4a4b contact arrangement. If not specified then 2a2b will be used. |



10

Application to Domestic and International Standards

| | | |
|-------|--|-----|
| 10.1 | Standards Application List | 252 |
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10.1 Standards Application List

● Application to Domestic and International Standards

| Series | Model | Format | Compliance and Applicable Standards | | | | | Safety Certification Standards ^{Note 5} | | | EC Directives | Third Party Certification Body ^{Note 5} | Note 5 CCC Certification | Marine Certification Standards ^{Note 5} | | | | | Heat Resistance Certification Standards | | |
|---|---------------------------------|---------------------------------|-------------------------------------|-------|---------------|---------|-----------------------|--|--------|-------------------|---------------|--|--------------------------|--|-----------------|------------|--------------------|-----------|---|-------------------------------|---|
| | | | Note 4 JIS | JEM | IEC | DIN VDE | BS EN | Electrical Appliance | UL | CSA | CE Mark | TÜV | GB | NK | KR | BV | LR | CCS | Class 1 Heat Resistant | Note 5 Class 2 Heat Resistant | |
| | | | Japan | Japan | International | Germany | United Kingdom Europe | Japan | US | Canada | Europe | | China | Japan | South Korea | France | United Kingdom | China | Japan | | |
| MSIT Series | Magnetic Contactors | Non-Reversing | S-T10 to T32 | ○ | — | ○ | ○ | ○ | * | — | ○ | ○ | ○ | ○ | ○ | ○ | ○ | — | — | ☆ | |
| | | S-T35 to T100 | ○ | — | ○ | ○ | ○ | * | — | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | — | — | ☆ | |
| | | Reversing | S-2xT10 to T100 | ○ | — | ○ | ○ | ○ | * | — | ○ | ○ | ○ | — | — | — | — | — | — | ☆ | |
| | | DC Operated | SD-T12 to T100 | ○ | — | ○ | ○ | ○ | * | — | ○ | ○ | ○ | ○ | — | ○ | ○ | ○ | — | — | |
| | | Mechanically Latched Type | SL(D)-T21 to T100 | ○ | — | ○ | ○ | ○ | * | — | ☆ | ☆ | — | — | ○ | — | — | — | — | ☆ | |
| | Open Type Magnetic Starters | Non-Reversing 2-Element | MSO-T10 to T100 | ○ | — | ○ | ○ | ○ | * | — | — | — | — | — | — | — | — | — | — | — | |
| | | Non-Reversing 3-Element (2E) | MSO-T10KP to T100KP | ○ | — | ○ | ○ | ○ | * | — | — | — | ○ | — | — | — | — | — | — | — | |
| | | Reversing 2-Element | MSO-2xT10 to T100 | ○ | — | ○ | ○ | ○ | * | — | — | — | — | — | — | — | — | — | — | — | |
| | | Reversing 3-Element (2E) | MSO-2xT10KP to T100KP | ○ | — | ○ | ○ | ○ | * | — | — | — | ○ | — | — | — | — | — | — | — | |
| | | DC Operated Type 2-Element | MSOD-T12 to T100 | ○ | — | ○ | ○ | ○ | * | — | — | — | — | — | — | — | — | — | — | — | |
| | | DC Operated Type 2-Element (2E) | MSOD-T12KP to T100KP | ○ | — | ○ | ○ | ○ | * | — | — | — | ○ | — | — | — | — | — | — | — | |
| | Enclosed Magnetic Starters | Non-Reversing 2-Element | MS-T10 to T100 | ○ | — | ○ | ○ | ○ | ○ | — | — | — | — | — | — | — | — | — | — | — | |
| | | Non-Reversing 3-Element (2E) | MS-T10KP to T100KP | ○ | — | ○ | ○ | ○ | ○ | — | — | — | — | — | — | — | — | — | — | — | |
| | Thermal Overload Relays | 2-Element | TH-T18 to T100 | ○ | — | ○ | ○ | ○ | * | — | — | — | — | — | * | * | — | — | — | — | |
| | | 3-Element (2E) | TH-T18KP/T25KP | ○ | — | ○ | ○ | ○ | * | — | ○ | ○ | ○ | ○ | * | * | ○ | ○ | — | — | |
| TH-T50KP to T100KP | | | ○ | — | ○ | ○ | ○ | * | — | ○ | ○ | ○ | ○ | * | * | ○ | ○ | ○(Note 6) | — | — | |
| Contactor Relays | AC Operated | SR-T5/T9 | ○ | — | ○ | ○ | ○ | * | — | ○ | ○ | ○ | ○ | * | * | ○ | ○ | — | ☆ | ☆ | |
| | DC Operated | SRD-T5/T9 | ○ | — | ○ | ○ | ○ | * | — | ○ | ○ | ○ | ○ | * | * | ○ | ○ | — | — | | |
| | Mechanically Latched Type | SRL(D)-T5 | ○ | — | ○ | ○ | ○ | * | — | — | — | — | ○ | — | — | — | — | — | ☆ | | |
| Optional Units | Additional Auxiliary Contact | UT-AX2, 4, 11 | ○ | — | ○ | ○ | ○ | * | ○ | — | — | ○ | ○ | * | * | ○ | ○ | ○ | — | — | |
| | Surge Absorber | UT-SA13 to 25 | ○ | — | ○ | ○ | ○ | * | ○ | — | — | — | — | * | * | * | — | — | — | — | |
| | Mechanical Interlock | UT-ML20 | ○ | — | ○ | ○ | ○ | * | ○ | — | — | — | — | * | * | * | — | — | — | — | |
| MSIN Series | Magnetic Contactors | Non-Reversing | S-N125 to N400 | ○ | ○ | ○ | ○ | ○ | * | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ☆ | ☆ | |
| | | Reversing | S-2xN125 to N400 | ○ | ○ | ○ | ○ | ○ | * | ○ | ○ | ○ | ○ | — | — | — | — | — | — | ☆ | ☆ |
| | | DC Operated | SD-N125 to N400 | ○ | ○ | ○ | ○ | ○ | * | ○ | ○ | ○ | ○ | ○ | ○ | — | ○ | ○ | ○ | — | — |
| | | Mechanically Latched Type | SL-N125 to N400 | ○ | ○ | ○ | ○ | ○ | * | ☆ | — | — | — | — | ○ | ☆ | — | — | — | — | ☆ |
| | Open Type Magnetic Starters | Non-Reversing 2-Element | MSO-N125 to N400 | ○ | ○ | ○ | ○ | ○ | * | — | — | — | — | ○/— | — | — | — | — | — | — | — |
| | | Non-Reversing 3-Element (2E) | MSO-N125 to 400KP | ○ | ○ | ○ | ○ | ○ | * | ○ | ○ | ○ | ○ | — | — | ○ | ○ | — | — | — | — |
| | | Reversing 2-Element | MSO-2xN125 to N400 | ○ | ○ | ○ | ○ | ○ | * | — | — | — | — | — | ○/— | — | — | — | — | — | — |
| | | Reversing 3-Element (2E) | MSO-2xN125 to N400KP | ○ | ○ | ○ | ○ | ○ | * | ☆ | ☆ | ☆ | ○ | — | — | — | — | — | — | — | — |
| | | DC Operated Type 2-Element | MSOD-N125 to N400 | ○ | ○ | ○ | ○ | ○ | * | — | — | — | — | — | ○/— | — | — | ○ | ○ | — | — |
| | DC Operated Type 3-Element (2E) | MSOD-N125 to N400KP | ○ | ○ | ○ | ○ | ○ | * | — | — | — | — | — | ○/— | — | — | ○ | ○ | — | — | |
| | Enclosed Magnetic Starters | Non-Reversing 2-Element | MS-N125 to N400 | ○ | ○ | ○ | ○ | ○ | ○ | — | — | — | — | — | ○/— | — | — | — | — | — | — |
| | | Non-Reversing 3-Element (2E) | MS-N125 to N400KP | ○ | ○ | ○ | ○ | ○ | ○ | — | — | — | — | — | ○ | — | — | — | — | — | — |
| | Thermal Overload Relays | Standard 2-Element | TH-N120 to N400 | ○ | ○ | ○ | ○ | ○ | * | — | — | — | — | — | ○/— | * | * | — | — | — | — |
| | | 3-Element (2E) | TH-N120KP to N400KP | ○ | ○ | ○ | ○ | ○ | * | — | ○ | ○ | ○ | ○ | ○ | * | * | ○ | ○ | ○ | — |
| | Optional Units | Additional Auxiliary Contact | UN-AX2, 4, 11/80, 150 | ○ | ○ | ○ | ○ | ○ | * | ○ | — | — | ○ | ○ | ○/● | * | * | ○ | ○ | ○ | — |
| Surge Absorber | | UN-SA | ○ | ○ | ○ | ○ | ○ | * | ○ | — | — | — | — | * | * | * | — | — | — | — | — |
| Mechanical Interlock | | UN-ML | ○ | ○ | ○ | ○ | ○ | * | ○ | — | — | — | — | * | * | * | — | — | — | — | — |
| Specific Use DC Interface Contactors | Non-Reversing | SD-Q | ○ | ○ | ○ | ○ | ○ | * | ○ | ○ | ○ | ○ | ○ | — | — | — | — | — | — | — | |
| | Reversing | SD-QR | ○ | ○ | ○ | ○ | ○ | * | ○ | ○ | ○ | ○ | ○ | — | — | — | — | — | — | — | |
| Reference Page | | | | | | | | 253 | 255 | 255 256 261 | 266 | 268 | 271 | 287 | 287 | 287 | 287 | | | | |
| Product Marking □ is displayed on the product) | Standard Number | | | | | | | | | | | | | | | | | | | | |
| | Certification Mark | | | | | | | | Note 2 | Note 2 | | Note 3 | Note 2 | Note 2 | | | | | | | |
| | Certification Number | | | | | | | | | | | | | | | | | | | | |

Note 1. ○: Complies or conforms as standard product ●: Certified (add "CN" at the end of the model name when ordering)
 ◎: Standard product and certified ◇: Certification (pending) scheduled model —: Models not yet certified (non-pending)
 ☆: Dedicated product and certified *: Standard certification non-applicable model

Note 2. Refer to page 254 for details regarding the standard certification marks and product model names. Consult us with any questions.

Note 3. Mark display by self-declaration rather than certification standard

Note 4. If JIS conformity declaration is required, make a request.

Note 5. For the MS-T series with its standard terminal cover removed, safety certification standards (UL certification, CSA certification), third-party certification standards, CCC certification, marine certification standards, and heat resistance certification standards (class 2 heat resistance) are not valid.

Note 6. TH-T50KP is not certified.

10.2 Applicable Standard

● National Standards (Compliance, Regulatory Compliance and Model Names)

| Type | Model Name | Standards | Application |
|-------------------------|-----------------|---------------|-----------------------------------|
| Magnetic Starters | MS-T/N, MSO-T/N | JIS C8201-4-1 | Applicable with standard products |
| Magnetic Contactors | S-T/N, SD-T/N | | |
| Thermal Overload Relays | TH-T/N | | |
| Contactors Relays | SR-T/K | JIS C8201-5-1 | |

● International Standards (Standards and Conformance Methods)

| Model | NEMA Standards | IEC Standards | EN Standards | BS Standards | VDE Standards |
|--------------------------------------|---|---|--|--------------|---------------|
| Magnetic Contactor S-T/N | Applicable with standard products. (600 V or less) The selection is outlined below. (However, since the applicable capacity is slightly different from the size, select from the UL/CSA certified product page.) Size 00 : S-T12 Size 3 : S-T100 0 : S-T20 4 : S-N150 1 : S-T25 5 : S-N300 2 : S-T50 6 : S-N600 | Applicable with standard product (690 V or less) | IEC 60947-4-1 EN 60947-4-1 BS EN 60947-4-1 DIN EN 60947-4-1(VDE 0660-102) | | |
| Thermal Overload Relay TH-T/N Note 1 | Applicable with the standard selection. | IEC 60947-4-1 EN 60947-4-1 BS EN 60947-4-1 DIN EN 60947-4-1(VDE 0660-102) | | | |
| Contactors Relay SR-T | Standard products are compliant with A600 and Q300 | Applicable with classes AC-15 and DC-13 The rated current is the same as the standard (see page 150) | IEC 60947-5-1 EN 60947-5-1 BS EN 60947-5-1 DIN EN 60947-5-1(VDE 0660-200) | | |

Note 1. Apply the 2-element thermal overload relay to single-phase (1 φ), and 3-element (3 φ) load to three-phase.

10.3 Targeted Electrical Appliances

The Electrical Appliance and Material Control Law came into force in April 2001 as the Electrical Appliance and Material Safety Law, in which the enclosed magnetic starter is considered an item other than the specific electrical appliances (formerly Class B), and no longer needs certification. However, the manufacturer is obliged to register the business, self-validate compliance and display the PS-E mark on the product.

The target products of the Electrical Appliance and Material Safety Law are shown in the following table.



| Circuit | | Three-Phase 200 to 220 V | | | | | | | | | |
|------------|---------------|---|---------------------------|--------------------------|--------------------------|-------------------------|---|---------------------------|--------------------------|--------------------------|-------------------------|
| Model Name | Capacity [kW] | MS-□ (Thermal Overload Relay with 2 Elements) | | | | | MS-□KP (Thermal Overload Relay with 3 Elements) | | | | |
| | | 0.75 or Less | Over 0.75 and 2.2 or Less | Over 2.2 and 3.7 or Less | Over 3.7 and 7.5 or Less | Over 7.5 and 12 or Less | 0.75 or Less | Over 0.75 and 2.2 or Less | Over 2.2 and 3.7 or Less | Over 3.7 and 7.5 or Less | Over 7.5 and 12 or Less |
| MS-T10 | Ⓟ | Ⓟ | — | — | — | Ⓟ | Ⓟ | — | — | — | |
| MS-T12 | Ⓟ | Ⓟ | Ⓟ (2.7 kW or Less) | — | — | Ⓟ | Ⓟ | Ⓟ (2.7 kW or Less) | — | — | |
| MS-T21 | Ⓟ | Ⓟ | Ⓟ | — | — | Ⓟ | Ⓟ | Ⓟ | — | — | |
| MS-T35 | Ⓟ | Ⓟ | Ⓟ | Ⓟ | — | Ⓟ | Ⓟ | Ⓟ | Ⓟ | — | |
| MS-T50 | — | — | Ⓟ | Ⓟ | Ⓟ | — | — | Ⓟ | Ⓟ | Ⓟ | |
| MS-T65 | — | — | Ⓟ | Ⓟ | Ⓟ | — | — | Ⓟ | Ⓟ | Ⓟ | |
| MS-T80 | — | — | Ⓟ | Ⓟ | Ⓟ | — | — | Ⓟ | Ⓟ | Ⓟ | |
| MS-T100 | — | — | Ⓟ | Ⓟ | Ⓟ | — | — | Ⓟ | Ⓟ | Ⓟ | |

| Circuit | | Single-Phase 100 to 110 V | | | |
|------------|---------------|---|--------------------------|---------------------------|---------------------------|
| Model Name | Capacity [kW] | MS-□DP (Thermal Overload Relay with 2 Elements) | | | |
| | | 0.2 or Less | Over 0.2 and 0.4 or Less | Over 0.4 and 0.75 or Less | Over 0.75 and 1.5 or Less |
| MS-T10DP | Ⓟ | Ⓟ | — | — | |
| MS-T12DP | Ⓟ | Ⓟ | — | — | |
| MS-T21DP | Ⓟ | Ⓟ | Ⓟ | — | |
| MS-T35DP | — | — | Ⓟ | Ⓟ | |

Note 1. The single-phase reversible type and 200 V class cannot be manufactured.

Note 2. In the table, the Ⓟ mark indicates that the “Ⓟ” mark is displayed on the product”, whereas “—” indicates that there is no product with the targeted capacity.

10.4 MS-T/N series Certification Standards/CE Mark List

| Format | Europe | | North America/UL | | | | China | Steel Ship Standards | | | | | | |
|---------------------------------|-------------------|----------|------------------|------------|-----------------|------------|-----------------------|----------------------|------------|-----------------|-----------|-----------|----------|----------|
| | CE Mark | TÜV | Listing | | Recognition | | CCC Certification | United Kingdom | France | South Korea | Japan | China | | |
| | | | US | Canada | US | Canada | | | | | | | | |
| AC Operated Magnetic Contactors | S-T10(BC) | (Note 2) | (Note 2) | (Note 2) | - | - | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | - | |
| | S-T12(BC)/T20(BC) | | | | | | | | | | | | | |
| | S-T21(BC)/T25(BC) | | | | | | | | | | | | | |
| | S-T32(BC) | | | | | | | | | | | | | |
| | S-T35(BC)/T50(BC) | | | | | | | | | | | | | |
| | S-T65(CW)/T80(CW) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | |
| | S-T100 | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) |
| | S-N38(CX) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) |
| | S-N48(CX) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) |
| | S-N125 | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) |
| | S-N150 | | | | | | | | | | | | | |
| | S-N180 | | | | | | | | | | | | | |
| | S-N220 | | | | | | | | | | | | | |
| | S-N300 | | | | | | | | | | | | | |
| S-N400 | | | | | | | | | | | | | | |
| S-N600 | | | | | | | | | | | | | | |
| S-N800 | | | | | | | | | | | | | | |
| TH-T18(BC)KP | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | |
| TH-T25(BC)KP | | | | | | | | | | | | | | |
| TH-T50(BC)KP | | | | | | | | | | | | | | |
| TH-T65(CW)KP | | | | | | | | | | | | | | |
| TH-T100KP | | | | | | | | | | | | | | |
| TH-N120(TA)KP | | | | | | | | | | | | | | |
| TH-N220RHKP/HZKP | | | | | | | | | | | | | | |
| TH-N400RHKP/HZKP | | | | | | | | | | | | | | |
| SD-T12(BC) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | |
| SD-T20(BC) | | | | | | | | | | | | | | |
| SD-T21(BC) | | | | | | | | | | | | | | |
| SD-T32(BC) | | | | | | | | | | | | | | |
| SD-T35(BC) | | | | | | | | | | | | | | |
| SD-T50(BC) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | |
| SD-T65(CW) | | | | | | | | | | | | | | |
| SD-T80(CW) | | | | | | | | | | | | | | |
| SD-T100 | | | | | | | | | | | | | | |
| SD-N125 | | | | | | | | | | | | | | |
| SD-N150 | | | | | | | | | | | | | | |
| SD-N220 | | | | | | | | | | | | | | |
| SD-N300 | | | | | | | | | | | | | | |
| SD-N400 | | | | | | | | | | | | | | |
| SD-N600 | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | | |
| SD-N800 | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | |
| AC Operated Contactor Relays | SR-T5(BC) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | |
| DC Operated Contactor Relays | SRD-T5(BC) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | (Note 2) | |

| Format | Europe | | North America/UL | | | | China | Steel Ship Standards | | | |
|------------------------|-------------|---------|------------------|------------|-----------------|------------|-----------------------|----------------------|------------|-----------------|-----------|
| | CE Mark | TÜV | Listing | | Recognition | | CCC Certification | United Kingdom | France | South Korea | Japan |
| | | | US | Canada | US | Canada | | | | | |
| Auxiliary Contact Unit | UT-AX2(BC) | ◎ | ○ | - | - | ◎ | ◎ | ○ | ○ | - | - |
| | UT-AX4(BC) | | | | | | | | | | |
| | UT-AX11(BC) | | | | | | | | | | |
| | UN-AX2(CX) | | | | | | | | | | |
| | UN-AX4(CX) | | | | | | | | | | |
| | UN-AX11(CX) | | | | | | | | | | |
| | UN-AX80 | | | | | | | | | | |
| UN-AX150 | ○ | - | ● | | | | | | | | |

Note 1. ◎: CE Mark (Self-Declaration) = Standard Product and Displayed on the Product, UL Standards/CSA Standards, TÜV Certification, CCC Certification = Standard Product with Certification Mark Displayed
 NK Standards = Standard Product with Certification Number Displayed
 ●: Certified with the certification mark. Always add "CN" at the end of the model name to specify when ordering. The certification mark is affixed to the product or displayed on the product.
 ○: Standard product with no certification or certification mark.
 ☆: Dedicated product with certification and certification mark. Add "UL" (listing) or "UR" (recognition) at the end of the model name to specify when ordering.
 ◇: Standard Certification Acquisition Scheduled
 -: Standard certification non-applicable model or no schedule for acquisition.

Note 2. The SA specification (the model name is □-□SA for magnetic contactors and contactor relays) is equipped with a surge absorber and has been certified.

Note 3. For the applicable rating, see individual standard documents.

10.5 UL/CSA Standards Certified Products

The MS-T series magnetic contactors and thermal overload relays have acquired the certification of the United States UL Standards (UL60947-4-1) and Canada CSA Standards (CSA C22.2 No.60947-4-1), making them optimal for export to North America. The MS-N series magnetic starter has acquired the certification of the United States UL Standards (UL508) and Canada CSA Standards (CSA C22.2 No.14), making it optimal for export to North America. The UL/CSA certification status of this product can be verified by entering and searching for the UL file number in the "Online Certification Directory" in the UL online site of Underwriters Laboratories, Inc.

● UL Standards (Underwriter's Laboratories) United States Safety Standards

UL is an institution of the United States that has established the UL standards as safety standards, conducts safety confirmation tests based on the UL standards, issues certificates for certified products and recognizes certification marks. The UL certification mark is widely used throughout the United States. UL certification is mandated depending on the state and city, and therefore required when exporting devices, control panels and equipment to the United States. The MS-T/N series complies with the Controller UL Standards (UL508) and has acquired the UL Component Certification (recognition) or UL Product Certification (listing), and can be incorporated in control panels, equipment or the like for export to the United States.

- : UL Recognition
This product is referred to as component certified, and is intended to be incorporated into other products and equipment. In other words, for incorporation into control panels, machine tools, control devices or the like, a component certified product can be used.
- : UL Listing
This product is referred to as product certified, allowing direct sales to final consumers and use by final consumers. It can also be used for incorporation into control panels, machine tools, control devices or the like. As there are models whose outline drawings and terminal structure differ from standard products, refer to the UL/CSA safety standards certified product catalog for more information.

● CSA Standards (Canadian Standard Association) Canadian Standards

The CSA standards are product safety standards that have been established by the CSA (Canadian Standard Association). In Canada, the safety of electrical products has been prescribed by state laws, some of which require that the product be CSA standards certified. Therefore, the CSA standards certification is required when exporting devices, control panels, equipment and the like to Canada. The MS-T/N series has acquired the CSA standards certification given by the UL testing organization and can be incorporated into control panels, equipment or the like for export to Canada. In addition, UL has been recognized by SCC (Standards Council of Canada) as a testing, certification and quality certification body, and CSA standards certified products as determined by UL are recognized by the safety regulations of all Canadian provinces.

- : Recognition for Canada
CSA standards component certification by the UL testing organization.
- : Listing for Canada
CSA standards product certification by the UL testing organization.

For the UL/CSA standards compliant certified products, the following certification marks have been recognized. (As usual, separate marks for the United States and Canada are also recognized.)











- : Recognition for both United States and Canada
UL/CSA standards component certification by the UL testing organization
- : Listing for both United States and Canada
UL/CSA standards product certification by the UL testing organization


10.5.1 UL/CSA Certified Model List

T Series: UL60947-4-1, CSA C22.2 No.60947-4-1

● Magnetic Contactors/Starters

N Series: UL508, CSA C22.2 No.14

| Frame Size | AC Operated Magnetic Contactors | | | | DC Operated Magnetic Contactors | | Mechanically Latched Contactors | | AC Operated Magnetic Starters (Open Type) | |
|------------|---|---|---|---|---|---|--|---|---|---|
| | Non-Reversing (S-) | | Reversing (S-2x) | | Non-Reversing (SD-) | Reversing (SD-2x) | Non-Reversing (SL, SLD-) | | Non-Reversing (MSO-□KP) | Reversing (MSO-2x□KP) |
| |  |  |  |  |  |  |  |  |  |  |
| T10 | — | ○ | — | ○ | — | — | — | — | — | — |
| T12 | — | ○ | — | ○ | ○ | ○ | — | — | — | — |
| T20 | — | ○ | — | ○ | ○ | ○ | — | — | — | — |
| T21 | — | ○ | — | ○ | ○ | ○ | — | (3) | — | — |
| T25 | — | ○ | — | ○ | — | — | — | — | — | — |
| T32 | — | ○ | — | ○ | ○ | ○ | — | — | — | — |
| T35 | — | ○ | — | ○ | ○ | ○ | — | (3) | — | — |
| T50 | — | ○ | — | ○ | ○ | ○ | — | (3) | — | — |
| T65 | — | ○ | — | ○ | ○ | ○ | — | (3) | — | — |
| T80 | — | ○ | — | ○ | ○ | ○ | — | (3) | — | — |
| T100 | — | ○ | — | ○ | ○ | ○ | — | (3) | — | — |
| N125 | ○ (Note 2) | | ○ (Note 2) | | ○ | ○ | (1) | — | ○ (Note 2) | ● (Note 1) (Note 2) |
| N150 | ○ (Note 2) | | ○ (Note 2) | | ○ | ○ | (1) | — | ○ (Note 2) | ● (Note 1) (Note 2) |
| N180 | ○ (Note 2) | | ○ (Note 2) | | — | — | — | — | ○ (Note 2) | ● (Note 1) (Note 2) |
| N220 | ○ (Note 2) | | ○ (Note 2) | | ○ | ○ | (1) | — | ○ (Note 2) | ● (Note 1) (Note 2) |
| N300 | ○ (Note 2) | | ○ (Note 2) | | ○ | ○ | (1) | — | ○ (Note 2) | ● (Note 1) (Note 2) |
| N400 | ○ (Note 2) | | ○ (Note 2) | | ○ | ○ | (1) | — | ○ (Note 2) | ● (Note 1) (Note 2) |
| N600 | ○ | — | ○ | — | — | — | — | — | — | — |
| N800 | (2) | — | — | — | — | — | — | — | — | — |

: UL/CSA Component Certification (Recognition)
Some models do not display a certification mark.

: UL/CSA Product Certification (Listing)

○: Standard Product and Certified (S/SD/MSO-2x□ and MSO-□ with no model name on the product)

●: Dedicated Product (MSO-2xN□KPCS) and Certified (no model name on the product)

(1): Dedicated Product (SL(D)-N□UR) and Certified

(2): Dedicated Product (S-N800UR) and Certified

(3): Dedicated Product (SL(D)-T□UL) and Certified

Note 1. The control circuit wire of MSO-2xN□KP can be replaced with a UL certified wire and main circuit connecting wire and conductor with a UL certified product for UL compliance.

Note 2. As there are also certified products with solderless terminal structure, order with "UL" added at the end of the model name if the product requires solderless terminal structure.

10.5.2 UL Standards Certified Products

(1) AC Operating Magnetic Contactor (Non-Reversing) T Series

(File No. E58968)

| Model | Magnetic Contactors | Applicable | Rated Capacity [HP] | | | | Rated Energizing Current [A] | Auxiliary Contact | | Remarks | | |
|---------------|---------------------|------------|------------------------------------|----------------|----------------|----------------|------------------------------|-------------------|------|--|---|--|
| | | | Single-Phase (Non Reversible Type) | | Three-Phase | | | Rating | | | | |
| | | | 110 to 120 V | 220 to 240 V | 200 V | 220 to 240 V | 440 to 480 V | 550 to 600 V | | | | |
| S-T10(BC)(SA) | ○ | | $\frac{1}{2}$ | $1\frac{1}{2}$ | 3 | 3 | 5 | 5 | 13 | A600 AC600 V max Making 7200 VA Breaking 720 VA | Q300 DC250 V max Making 69 VA Breaking 69 VA | The standard product is certified with . |
| S-T12(BC)(SA) | ○ | | $\frac{1}{2}$ | $1\frac{1}{2}$ | 3 | 3 | $7\frac{1}{2}$ | $7\frac{1}{2}$ | 20 | | | |
| S-T20(BC)(SA) | ○ | | 1 | 2 | 3 | 5 | $7\frac{1}{2}$ | $7\frac{1}{2}$ | 20 | | | |
| S-T21(BC)(SA) | ○ | | 1 | 3 | 5 | 5 | 10 | 10 | 30 | | | |
| S-T25(BC)(SA) | ○ | | 2 | 3 | $7\frac{1}{2}$ | $7\frac{1}{2}$ | 15 | 15 | 30 | | | |
| S-T32(BC)(SA) | ○ | | 2 | 5 | 10 | 10 | 20 | 15 | 32.5 | | | |
| S-T35(BC)(SA) | ○ | | 2 | 5 | 10 | 10 | 20 | 20 | 40 | | | |
| S-T50(BC)(SA) | ○ | | 3 | $7\frac{1}{2}$ | 15 | 15 | 30 | 30 | 65 | | | |
| S-T65(CW) | ○ | | 3 | 10 | 15 | 20 | 40 | 40 | 95 | | | |
| S-T80(CW) | ○ | | 5 | 15 | 20 | 25 | 50 | 50 | 100 | | | |
| S-T100 | ○ | | $7\frac{1}{2}$ | 15 | 25 | 30 | 60 | 60 | 100 | | | |

Note 1. Applicable..... ○: Standard Product

(2) AC Operating Magnetic Contactor (Non-Reversing) N Series

(File No. E58968)

| Model | Magnetic Contactors | Applicable | Rated Capacity [HP] | | | | Rated Energizing Current [A] | Auxiliary Contact | | Remarks | | |
|----------|---------------------|------------|------------------------------------|--------------|-------------|--------------|------------------------------|-------------------|-----|--|---|--|
| | | | Single-Phase (Non Reversible Type) | | Three-Phase | | | Rating | | | | |
| | | | 110 to 120 V | 220 to 240 V | 200 V | 220 to 240 V | 440 to 480 V | 550 to 600 V | | | | |
| S-N125 | ○ | | 10 | 20 | 40 | 40 | 75 | 75 | 125 | A600 AC600 V max Making 7200 VA Breaking 720 VA | R300 DC250 V max Making 28 VA Breaking 28 VA | The standard product is certified with . |
| S-N150 | ○ | | 15 | 25 | 40 | 50 | 100 | 100 | 150 | | | |
| S-N180 | ○ | | 15 | 30 | 60 | 60 | 125 | 125 | 220 | | | |
| S-N220 | ○ | | 15 | 40 | 60 | 75 | 150 | 150 | 220 | | | |
| S-N300 | ○ | | 50 | 100 | 100 | 100 | 200 | 200 | 300 | | | |
| S-N400 | ○ | | 50 | 150 | 125 | 150 | 300 | 300 | 400 | | | |
| S-N600 | ○ | | — | — | 150 | 200 | 400 | 400 | 680 | | | |
| S-N800UR | ☆ | | — | — | 250 | 300 | 600 | 600 | 910 | | | |

Note 1. Applicable..... ○: Standard Product, —: Not Applicable, ☆: Dedicated Product

Note 2. 125 A to 400 A frames with "UL" at the end of the model name are certified for solderless terminal structure.

(3) AC Operating Magnetic Contactor (Reversing) T Series

(File No. E58968)

| Model | Magnetic Contactors | Applicable | Rated Capacity [HP] | | | | Rated Energizing Current [A] | Auxiliary Contact | | Remarks |
|-----------------|---------------------|------------|------------------------------------|----------------|----------------|----------------|------------------------------|--|---|--|
| | | | Single-Phase (Non Reversible Type) | | Three-Phase | | | Rating | | |
| | | | 200 V | 220 to 240 V | 440 to 480 V | 550 to 600 V | | | | |
| S-2xT10(BC)(SA) | ○ | | 3 | 3 | 5 | 5 | 13 | A600 AC600 V max Making 7200 VA Breaking 720 VA | Q300 DC250 V max Making 69 VA Breaking 69 VA | The standard product is certified with . |
| S-2xT12(BC)(SA) | ○ | | 3 | 3 | $7\frac{1}{2}$ | $7\frac{1}{2}$ | 20 | | | |
| S-2xT20(BC)(SA) | ○ | | 3 | 5 | $7\frac{1}{2}$ | $7\frac{1}{2}$ | 20 | | | |
| S-2xT21(BC)(SA) | ○ | | 5 | 5 | 10 | 10 | 30 | | | |
| S-2xT25(BC)(SA) | ○ | | $7\frac{1}{2}$ | $7\frac{1}{2}$ | 15 | 15 | 30 | | | |
| S-2xT32(BC)(SA) | ○ | | 10 | 10 | 20 | 15 | 32.5 | | | |
| S-2xT35(BC)(SA) | ○ | | 10 | 10 | 20 | 20 | 40 | | | |
| S-2xT50(BC)(SA) | ○ | | 15 | 15 | 30 | 30 | 65 | | | |
| S-2xT65(CW) | ○ | | 15 | 20 | 40 | 40 | 95 | | | |
| S-2xT80(CW) | ○ | | 20 | 25 | 50 | 50 | 100 | | | |
| S-2xT100 | ○ | | 25 | 30 | 60 | 60 | 100 | | | |

Note 1. Applicable..... ○: Standard Product

(4) AC Operating Magnetic Contactor (Reversing) N Series


(File No. E58968)


| Model | Magnetic Contactors | Applicable | Rated Capacity [HP] | | | | Rated Energizing Current [A] | Auxiliary Contact | | Remarks |
|----------|---------------------|------------|------------------------------------|--------------|--------------|--------------|------------------------------|--|---|--|
| | | | Single-Phase (Non Reversible Type) | | Three-Phase | | | Rating | | |
| | | | 200 V | 220 to 240 V | 440 to 480 V | 550 to 600 V | | | | |
| S-2xN125 | ○ | | 40 | 40 | 75 | 75 | 125 | A600 AC600 V max Making 7200 VA Breaking 720 VA | R300 DC250 V max Making 28 VA Breaking 28 VA | The magnetic contactor is certified as a standard product. The magnetic starter is a dedicated product. (Standard products are applicable to if all connected wires are replaced with the UL certified wire.) |
| S-2xN150 | ○ | | 40 | 50 | 100 | 100 | 150 | | | |
| S-2xN180 | ○ | | 60 | 60 | 125 | 125 | 220 | | | |
| S-2xN220 | ○ | | 60 | 75 | 150 | 150 | 220 | | | |
| S-2xN300 | ○ | | 100 | 100 | 200 | 200 | 300 | | | |
| S-2xN400 | ○ | | 125 | 150 | 300 | 300 | 400 | | | |
| S-2xN600 | ○ | | 150 | 200 | 400 | 400 | 680 | | | |

Note 1. Application..... ○: Standard Product, ☆: Dedicated Product, —: Not Applicable

Note 2. 125 A to 400 A frames with "UL" at the end of the model name are certified for solderless terminal structure.


(5) DC Operated Magnetic Contactor (Non-Reversing/Reversing) T Series


 (File No. E58968)

| Model | | | | Rated Capacity [HP] | | | | | Rated Energizing Current [A] | Auxiliary Contact | | Remarks | |
|----------------|------------|------------------|------------|------------------------------------|----------------|-------------|--------------|----------------|------------------------------|-------------------|--|---|--|
| Non-Reversing | Applicable | Reversing (2) | Applicable | Single-Phase (Non Reversible Type) | | Three-Phase | | | | Rating | | | |
| | | | | 110 to 120 V | 220 to 240 V | 200 V | 220 to 240 V | 440 to 480 V | 550 to 600 V | | | | |
| SD-T12(BC)(SA) | ○ | SD-2xT12(BC)(SA) | ○ | $\frac{1}{2}$ | $1\frac{1}{2}$ | 3 | 3 | $7\frac{1}{2}$ | $7\frac{1}{2}$ | 20 | A600 AC600 V max Making 7200 VA Breaking 720 VA | Q300 DC250 V max Making 69 VA Breaking 69 VA | The standard product is certified with  . |
| SD-T20(BC)(SA) | ○ | SD-2xT20(BC)(SA) | ○ | 1 | 2 | 3 | 5 | $7\frac{1}{2}$ | $7\frac{1}{2}$ | 20 | | | |
| SD-T21(BC)(SA) | ○ | SD-2xT21(BC)(SA) | ○ | 1 | 3 | 5 | 5 | 10 | 10 | 30 | | | |
| SD-T32(BC)(SA) | ○ | SD-2xT32(BC)(SA) | ○ | 2 | 5 | 10 | 10 | 20 | 15 | 32.5 | | | |
| SD-T35(BC)(SA) | ○ | SD-2xT35(BC)(SA) | ○ | 2 | 5 | 10 | 10 | 20 | 20 | 40 | | | |
| SD-T50(BC)(SA) | ○ | SD-2xT50(BC)(SA) | ○ | 3 | $7\frac{1}{2}$ | 15 | 15 | 30 | 30 | 65 | | | |
| SD-T65(CW) | ○ | SD-2xT65(CW) | ○ | 3 | 10 | 15 | 20 | 40 | 40 | 95 | | | |
| SD-T80(CW) | ○ | SD-2xT80(CW) | ○ | 5 | 15 | 20 | 25 | 50 | 50 | 100 | | | |
| SD-T100 | ○ | SD-2xT100 | ○ | $7\frac{1}{2}$ | 15 | 25 | 30 | 60 | 60 | 100 | | | |


Note 1. Applicable..... ○: Standard Product

(6) DC Operated Magnetic Contactor (Non-Reversing/Reversing) N Series


 (File No. E58968)


| Model | | | | Rated Capacity [HP] | | | | | Rated Energizing Current [A] | Auxiliary Contact | | Remarks | |
|---------------|------------|---------------|------------|------------------------------------|--------------|-------------|--------------|--------------|------------------------------|-------------------|--|---|--|
| Non-Reversing | Applicable | Reversing (2) | Applicable | Single-Phase (Non Reversible Type) | | Three-Phase | | | | Rating | | | |
| | | | | 110 to 120 V | 220 to 240 V | 200 V | 220 to 240 V | 440 to 480 V | 550 to 600 V | | | | |
| SD-N125 | ○ | SD-2xN125 | ○ | 10 | 20 | 40 | 40 | 75 | 75 | 125 | A600 AC600 V max Making 7200 VA Breaking 720 VA | R300 DC250 V max Making 28 VA Breaking 28 VA | The standard product is certified with  . |
| SD-N150 | ○ | SD-2xN150 | ○ | 15 | 25 | 40 | 50 | 100 | 100 | 150 | | | |
| SD-N220 | ○ | SD-2xN220 | ○ | 15 | 40 | 60 | 75 | 150 | 150 | 220 | | | |
| SD-N300 | ○ | SD-2xN300 | ○ | 50 | 100 | 100 | 100 | 200 | 200 | 300 | | | |
| SD-N400 | ○ | SD-2xN400 | ○ | 50 | 150 | 125 | 150 | 300 | 300 | 400 | | | |

Note 1. Applicable..... ○: Standard Product

Note 2. 125 A frames or higher with "UL" at the end of the model name are  certified for solderless terminal structure.

(7) Mechanically Latched Magnetic Contactor T Series


 (File No. E58968)

| Model | | | | Rated Capacity [HP] | | | | | Rated Energizing Current [A] | Auxiliary Contact | | Remarks | |
|---------------------|------------|-----------------------|------------|------------------------------------|----------------|-------------|--------------|--------------|------------------------------|-------------------|--|---|---|
| Non-Reversing | Applicable | Reversing | Applicable | Single-Phase (Non Reversible Type) | | Three-Phase | | | | Rating | | | |
| | | | | 110 to 120 V | 220 to 240 V | 200 V | 220 to 240 V | 440 to 480 V | 550 to 600 V | | | | |
| SL(D)-T21UL(BC)(SA) | ☆ | SL(D)-2xT21UL(BC)(SA) | ☆ | 1 | 3 | 5 | 5 | 10 | 10 | 30 | A600 AC600 V max Making 7200 VA Breaking 720 VA | Q300 DC250 V max Making 69 VA Breaking 69 VA | The dedicated product is certified with  . |
| SL(D)-T35UL(BC)(SA) | ☆ | SL(D)-2xT35UL(BC)(SA) | ☆ | 2 | 5 | 10 | 10 | 20 | 20 | 40 | | | |
| SL(D)-T50UL(BC)(SA) | ☆ | SL(D)-2xT50UL(BC)(SA) | ☆ | 3 | $7\frac{1}{2}$ | 15 | 15 | 30 | 30 | 65 | | | |
| SL(D)-T65UL | ☆ | SL(D)-2xT65UL | ☆ | 3 | 10 | 15 | 20 | 40 | 40 | 95 | | | |
| SL(D)-T80UL | ☆ | SL(D)-2xT80UL | ☆ | 5 | 15 | 20 | 25 | 50 | 50 | 100 | | | |
| SL(D)-T100UL | ☆ | SL(D)-2xT100UL | ☆ | $7\frac{1}{2}$ | 15 | 25 | 30 | 60 | 60 | 100 | | | |

Note 1. Applicable..... ☆: Dedicated Product


(8) Mechanically Latched Magnetic Contactor N Series

 (File No. E58968)

| Model | | | | Rated Capacity [HP] | | | | | Rated Energizing Current [A] | Auxiliary Contact | | Remarks | |
|---------------|------------|----------------|------------|------------------------------------|--------------|-------------|--------------|--------------|------------------------------|-------------------|--|---|---|
| Non-Reversing | Applicable | Reversing | Applicable | Single-Phase (Non Reversible Type) | | Three-Phase | | | | Rating | | | |
| | | | | 110 to 120 V | 220 to 240 V | 200 V | 220 to 240 V | 440 to 480 V | 550 to 600 V | | | | |
| SL(D)-N125UR | ☆ | SL(D)-2xN125UR | ☆ | 10 | 20 | 40 | 40 | 75 | 75 | 125 | A600 AC600 V max Making 7200 VA Breaking 720 VA | R300 DC250 V max Making 28 VA Breaking 28 VA | The dedicated product is certified with  . |
| SL(D)-N150UR | ☆ | SL(D)-2xN150UR | ☆ | 15 | 25 | 40 | 50 | 100 | 100 | 150 | | | |
| SL(D)-N220UR | ☆ | SL(D)-2xN220UR | ☆ | 15 | 40 | 60 | 75 | 150 | 150 | 220 | | | |
| SL(D)-N300UR | ☆ | SL(D)-2xN300UR | ☆ | — | — | 100 | 100 | 200 | 200 | 300 | | | |
| SL(D)-N400UR | ☆ | SL(D)-2xN400UR | ☆ | — | — | 125 | 150 | 300 | 300 | 400 | | | |

Note 1. Applicable..... ☆: Dedicated Product

(9) Thermal Overload Relays T Series

 (File No. E58969)

| Model | Applicable | Heater Designation [Adjustment Range (RC Value) (A) of Settling Current] | Auxiliary Contact |
|--------------|------------|---|--|
| TH-T18(BC)KP | ○ | 0.12A (0.1 to 0.16), 0.17 (0.14 to 0.22), 0.24A (0.2 to 0.32), 0.35A (0.28 to 0.42), 0.5A (0.4 to 0.6), 0.7A (0.55 to 0.85), 0.9A (0.7 to 1.1), 1.3A (1 to 1.6), 1.7A (1.4 to 2), 2.1A (1.7 to 2.5), 2.5A (2 to 3), 3.6A (2.8 to 4.4), 5A (4 to 6), 6.6A (5.2 to 8), 9A (7 to 11), 11A (9 to 13), 15A (12 to 18) Note 2 | Rating Code C600 AC600 Vmax Making Breaking 1800 VA (15 A max) 180 VA (1.5 A max) |
| TH-T25(BC)KP | ○ | 0.24A (0.2 to 0.32), 0.35A (0.28 to 0.42), 0.5A (0.4 to 0.6), 0.7A (0.55 to 0.85), 0.9A (0.7 to 1.1), 1.3A (1 to 1.6), 1.7A (1.4 to 2), 2.1A (1.7 to 2.5), 2.5A (2 to 3), 3.6A (2.8 to 4.4), 5A (4 to 6), 6.6A (5.2 to 8), 9A (7 to 11), 11A (9 to 13), 15A (12 to 18), 22A (18 to 26) | Rating Code B600 AC600 Vmax Making Breaking 3600 VA (30 A max) 360 VA (3 A max) |
| TH-T50(BC)KP | ○ | 29A (24 to 34), 35A (30 to 40), 42A (34 to 50) | |
| TH-T65(CW)KP | ○ | 15A (12 to 18), 22A (18 to 26), 29A (24 to 34), 35A (30 to 40), 42A (34 to 50), 54A (43 to 65) | |
| TH-T100KP | ○ | 67A (54 to 80), 82A (65 to 100) | |

Note 1. Applicable..... ○: Standard Product

Note 2. The maximum applicable current is 16 A.

The maximum applicable current other than the heater designation of 15 A is the largest current value within the adjustment range of settling current.

(10) Thermal Overload Relays N Series


 (File No. E58969)

| Model | Applicable | Heater Designation [Adjustment Range (RC Value) (A) of Settling Current] | Auxiliary Contact | | | |
|----------------------------------|-----------------------|---|-------------------|--------------------|----------|--------------------|
| | | | | | | |
| TH-N120KP | <input type="radio"/> | 42A (34 to 50), 54A (43 to 65), 67A (54 to 80), 82A (65 to 100) | Rating Code | B600 AC600 Vmax | | |
| TH-N120TAKP ☆ TH-N120TAHZKP ★ | <input type="radio"/> | 105A (85 to 125) 125A (100 to 150) | | | | |
| TH-N220RHKP ☆ TH-N220HZKP ★ | <input type="radio"/> | 82A (65 to 100), 105A (85 to 125), 125A (100 to 150), 150A (120 to 180) 180A (140 to 220) | | | Making | 3600 VA (30 A max) |
| TH-N400RHKP ☆ TH-N400HZKP ★ | <input type="radio"/> | 105A (85 to 125), 125A (100 to 150), 150A (120 to 180), 180A (140 to 220), 250A (200 to 300) 330A (260 to 400) | | | Breaking | 360 VA (3 A max) |


Note 1. Applicable : standard product






Note 2. ☆ is for combination with the magnetic contactor and cannot be independently mounted. ★ is exclusively for independent mounting.

Note 3. The symbol "KP" in the model name indicates 3-element 2E, and HZ indicates the independent mounting type.

Note 4. Frame N120 or higher with "UL" at the end of the model name is  certified for solderless terminal structure.


(11) Contactor Relays T Series

 (File No. E58969)

| Model | | Rated | | Remarks |
|---|--|--|---|--|
| AC Operating | DC Operating | | | |
|  SR-T5(BC)(SA) |  SRD-T5(BC)(SA) | A600 AC600 V max Making 7200 VA Breaking 720 VA | Q300 DC250 V max Making 69 VA Breaking 69 VA | The standard product is certified with  . |
|  SR-T9(BC)(SA) |  SRD-T9(BC)(SA) | | | |

(12) Optional Unit T Series

(File No. E58969)

| Model |  |
|---------------------------------|---|
| UT-AX2(BC), AX4(BC), AX11(BC) | <input type="radio"/> |
| UT-ML20(BC) | (1) |
| UT-SA13, SA21, SA22, SA23, SA25 | <input type="radio"/> |

Note 1. : Standard product and certified. (Mark displayed on the product)


(1): Certified as a contactor component.

(mark not displayed on the product)

(13) Optional Unit N Series

(File No. E58969)

(File No. E58968 (AX80/AX150/AX600/UN-ML11(CX), ML21 to ML220))

| Model Name |  |
|----------------------------------|---|
| UN-AX2 (CX), AX4 (CX), AX11 (CX) | <input type="radio"/> |
| UN-AX80, AX150, AX600 | (1) |
| UQ-AX2(KR) | <input type="radio"/> |
| UN-ML11(CX), ML21 | (1) |
| UN-ML80, ML150, ML220 | (1) |
| UN-SA721, SA725 | <input type="radio"/> |
| UN-SA3310, 3320 | <input type="radio"/> |
| UN-SA33 | <input type="radio"/> |
| UN-HZ12(CX) | <input type="radio"/> |
| UN-RY10(L) | <input type="radio"/> |


Note 1. : Standard product and certified. (mark displayed on the product)


: Standard product and certified. (mark not displayed on the product)

(1): Certified as a contactor component. (mark not displayed on the product)

Note 2. Products used in isolation from live parts (live part protection cover, reset release, etc.) are not subject to certification.



(14) DC Interface Contactors

 (File No. E58968)


| Model Name | | Rated Capacity [HP] | | | | | Rated Continuity Current [A] | Auxiliary Contact | | Remarks |
|---------------------|-----------------|---|--------------|--------------|--------------|--------------|------------------------------|-------------------|-------------|--|
| | | Single-Phase (Non-Reversible Type Only) | | Three-Phase | | | | Rating | | |
| Non-Reversible Type | Reversible Type | 110 to 120 V | 220 to 240 V | 200 to 208 V | 220 to 240 V | 440 to 480 V | | | | |
| SD-Q11 | SD-QR11 | 1/3 | 1 | 3 | 3 | 5 | 20 | A300 | Q300 | The standard product is certified with  . |
| SD-Q12 | SD-QR12 | | | | | | 13 | AC240 V max | DC250 V max | |
| MSOD-Q11(KP) | MSOD-QR11(KP) | | | | | | Making 7200 VA | Making 69 VA | | |
| MSOD-Q12(KP) | MSOD-QR12(KP) | | | | | | Breaking 720 VA | Breaking 69 VA | | |


(15) Vacuum Magnetic Contactors

 (File No. E58968)


| Model Name | Rated Capacity [HP] | | | | Rated Continuity Current [A] | Auxiliary Contact | Remarks |
|------------|---------------------|--------------|--------------|--------------|------------------------------|---|--|
| | Three-Phase | | | | | Rating | |
| | 200 V | 220 to 240 V | 440 to 480 V | 550 to 600 V | | | |
| SH-V160 | 60 | 60 | 150 | 150 | 200 | A600 AC600 V max Making 7200 VA Breaking 720 VA  | The standard product is certified with  . |
| SH-V320 | 100 | 125 | 250 | 300 | 350 | | |
| SH-V400 | 125 | 150 | 350 | 400 | 450 | | |
| SH-V600 | 200 | 250 | 500 | 600 | 610 | | |


(16) Solid State Contactors for Motor/Heater Loads

 (File No. E144063)

| Model Name | | Rated Capacity [HP] | | | | Rated Continuity Current [A] | Remarks |
|-----------------------|-----------------------|---------------------|--------------|--------------|--------------|------------------------------|--|
| 3-Pole 2-Element Type | 3-Pole 3-Element Type | Single-Phase | | Three-Phase | | | |
| | | 110 to 120 V | 220 to 240 V | 220 to 240 V | 440 to 480 V | | |
| US-N5SS | US-N5SSSTE | 1/10 | 1/4 | 3/4 | — | 5 | The standard product is certified with  . |
| US-N8SS | US-N8SSSTE | 1/10 | 1/4 | 3/4 | — | 8 | |
| US-N20(CX)(RM) | US-N20TE(CX)(RM) | 1/2 | 1 1/2 | 3 | 5 | 20 | |
| US-N30(CX) | US-N30TE(CX) | 1 | 3 | 5 | 10 | 30 | |
| US-N40(CX) | US-N40TE(CX) | 2 | 3 | 7 1/2 | 20 | 40 | |
| US-N50(CX) | US-N50TE(CX) | 2 | 3 | 7 1/2 | 20 | 50 | |
| US-N70NS | US-N70NSTE | 3 | 7 1/2 | 15 | — | 70 | |
| US-N80NS | US-N80NSTE | 3 | 7 1/2 | 15 | — | 80 | |
| US-NH70NS | US-NH70NSTE | 3 | 7 1/2 | 15 | 30 | 70 | |
| US-NH80NS | US-NH80NSTE | 3 | 7 1/2 | 15 | 30 | 80 | |

(17) UL Standards Certified Solid State Contactors for Heater Loads

 (File No. E144063)

| Model Name | | Rated Continuity Current [A] | Remarks |
|--------------------|-------------------------|------------------------------|--|
| Batch Control Type | Individual Control Type | | |
| US-H20(RM)(HZ)(UF) | US-H20DD(RM)(HZ)(UF) | 20 | The standard product is certified with  . |
| US-H30(RM)(HZ)(UF) | US-H30DD(RM)(HZ)(UF) | 30(27) (Note 4) | |
| US-H40(HZ) | US-H40DD(HZ) | 40 | |
| US-H50 Note 3 | US-H50DD Note 3 | 50 | |

Note 1. (HZ) has no cooling fin. (RM) can be rail-mounted.

Note 2. US-H□ (DD) HZ is certified at the rated continuity current when combined with the fin used for US-H□ (DD).

Note 3. US-H50 (DD) HZ has UR certification only.


Note 4. () is the rating for US-H30 (DD) UF.


10.5.3 CSA Standards Certified Product

There are the following 2 types of certification marks.

: CSA Standards Certification by the UL Testing Organization


(1) AC Operated Magnetic Contactor (Non-Reversible) T Series


 (File No. E58968)

| Model Name | Magnetic Contactors | Rated Capacity [HP] | | | | | | Rated Continuity Current [A] | Auxiliary Contact | | Remarks |
|---------------|---------------------|---|--------------|-------------|--------------|--------------|--------------|------------------------------|--|---|--|
| | | Single-Phase (Non-Reversible Type Only) | | Three-Phase | | | | | Rating | | |
| | Application | 110 to 120 V | 220 to 240 V | 200 V | 220 to 240 V | 440 to 480 V | 550 to 600 V | | | | |
| S-T10(BC)(SA) | ○ | 1/2 | 1 1/2 | 3 | 3 | 5 | 5 | 13 | A600 AC600 V max Making 7200 VA Breaking 720 VA | Q300 DC250 V max Making 69 VA Breaking 69 VA | The standard product is certified with  . |
| S-T12(BC)(SA) | ○ | 1/2 | 1 1/2 | 3 | 3 | 7 1/2 | 7 1/2 | 20 | | | |
| S-T20(BC)(SA) | ○ | 1 | 2 | 3 | 5 | 7 1/2 | 7 1/2 | 20 | | | |
| S-T21(BC)(SA) | ○ | 1 | 3 | 5 | 5 | 10 | 10 | 30 | | | |
| S-T25(BC)(SA) | ○ | 2 | 3 | 7 1/2 | 7 1/2 | 15 | 15 | 30 | | | |
| S-T32(BC)(SA) | ○ | 2 | 5 | 10 | 10 | 20 | 15 | 32.5 | | | |
| S-T35(BC)(SA) | ○ | 2 | 5 | 10 | 10 | 20 | 20 | 40 | | | |
| S-T50(BC)(SA) | ○ | 3 | 7 1/2 | 15 | 15 | 30 | 30 | 65 | | | |
| S-T65(CW) | ○ | 3 | 10 | 15 | 20 | 40 | 40 | 95 | | | |
| S-T80(CW) | ○ | 5 | 15 | 20 | 25 | 50 | 50 | 100 | | | |
| S-T100 | ○ | 7 1/2 | 15 | 25 | 30 | 60 | 60 | 100 | | | |

Note 1. Applicable..... ○: Standard Product

(2) AC Operated Magnetic Contactor (Non-Reversible) N Series


 (File No. E58968)


| Model Name | Magnetic Contactors | Rated Capacity [HP] | | | | | | Rated Continuity Current [A] | Auxiliary Contact | | Remarks |
|------------|---------------------|---|--------------|-------------|--------------|--------------|--------------|------------------------------|--|---|---|
| | | Single-Phase (Non-Reversible Type Only) | | Three-Phase | | | | | Rating | | |
| | Application | 110 to 120 V | 220 to 240 V | 200 V | 220 to 240 V | 440 to 480 V | 550 to 600 V | | | | |
| S-N125 | ○ | 10 | 20 | 40 | 40 | 75 | 75 | 125 | A600 AC600 V max Making 7200 VA Breaking 720 VA | R300 DC250 V max Making 28 VA Breaking 28 VA | The standard product is certified with  . |
| S-N150 | ○ | 15 | 25 | 40 | 50 | 100 | 100 | 150 | | | |
| S-N180 | ○ | 15 | 30 | 60 | 60 | 125 | 125 | 220 | | | |
| S-N220 | ○ | 15 | 40 | 60 | 75 | 150 | 150 | 220 | | | |
| S-N300 | ○ | — | — | 100 | 100 | 200 | 200 | 300 | | | |
| S-N400 | ○ | — | — | 125 | 150 | 300 | 300 | 400 | | | |
| S-N600 | ○ | — | — | 150 | 200 | 400 | 400 | 680 | | | |
| S-N800UR | ☆ | — | — | 250 | 300 | 600 | 600 | 910 | | | |

Note 1. Applicable..... ○: Standard Product, —: Not Applicable, ☆: Dedicated Product

Note 2. 125 A to 400 A frames with "UL" at the end of the model name are  certified for solderless terminal structure.


(3) AC Operated Magnetic Contactor (Reversible) T Series


 (File No. E58968)

| Model Name | Magnetic Contactors | Rated Capacity [HP] | | | | Rated Continuity Current [A] | Auxiliary Contact | | Remarks |
|-----------------|---------------------|---------------------|--------------|--------------|--------------|------------------------------|--|---|--|
| | | Three-Phase | | | | | Rating | | |
| | Application | 200 V | 220 to 240 V | 440 to 480 V | 550 to 600 V | | | | |
| S-2xT10(BC)(SA) | ○ | 3 | 3 | 5 | 5 | 13 | A600 AC600 V max Making 7200 VA Breaking 720 VA | Q300 DC250 V max Making 69 VA Breaking 69 VA | The standard product is certified with  . |
| S-2xT12(BC)(SA) | ○ | 3 | 3 | 7 1/2 | 7 1/2 | 20 | | | |
| S-2xT20(BC)(SA) | ○ | 3 | 5 | 7 1/2 | 7 1/2 | 20 | | | |
| S-2xT21(BC)(SA) | ○ | 5 | 5 | 10 | 10 | 30 | | | |
| S-2xT25(BC)(SA) | ○ | 7 1/2 | 7 1/2 | 15 | 15 | 30 | | | |
| S-2xT32(BC)(SA) | ○ | 10 | 10 | 20 | 15 | 32.5 | | | |
| S-2xT35(BC)(SA) | ○ | 10 | 10 | 20 | 20 | 40 | | | |
| S-2xT50(BC)(SA) | ○ | 15 | 15 | 30 | 30 | 65 | | | |
| S-2xT65(CW) | ○ | 15 | 20 | 40 | 40 | 95 | | | |
| S-2xT80(CW) | ○ | 20 | 25 | 50 | 50 | 100 | | | |
| S-2xT100 | ○ | 25 | 30 | 60 | 60 | 100 | | | |


Note 1. Applicable..... ○: Standard Product

(4) AC Operated Magnetic Contactor (Reversible) N Series

 (File No. E58968)

| Model Name | Magnetic Contactors | Rated Capacity [HP] | | | | Rated Continuity Current [A] | Auxiliary Contact | | Remarks |
|------------|---------------------|---------------------|--------------|--------------|--------------|------------------------------|--|---|--|
| | | Three-Phase | | | | | Rating | | |
| | Application | 200 V | 220 to 240 V | 440 to 480 V | 550 to 600 V | | | | |
| S-2xN125 | ○ | 40 | 40 | 75 | 75 | 125 | A600 AC600 V max Making 7200 VA Breaking 720 VA | R300 DC250 V max Making 28 VA Breaking 28 VA | The magnetic contactor is certified as a  standard product. |
| S-2xN150 | ○ | 40 | 50 | 100 | 100 | 150 | | | |
| S-2xN180 | ○ | 60 | 60 | 125 | 125 | 180 | | | |
| S-2xN220 | ○ | 60 | 75 | 150 | 150 | 220 | | | |
| S-2xN300 | ○ | 100 | 100 | 200 | 200 | 300 | | | |
| S-2xN400 | ○ | 125 | 150 | 300 | 300 | 400 | | | |
| S-2xN600 | ○ | 150 | 200 | 400 | 400 | 680 | | | |


Note 1. Application..... ○: Standard Product, ☆: Dedicated Product, —: Not Applicable


Note 2. 125 A to 400 A frames with "UL" at the end of the model name are  certified for solderless terminal structure.

Note 3. The rated continuity current is applicable to magnetic contactors.

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(5) DC Operated Magnetic Contactor (Non-Reversible/Reversible) T Series


 (File No. E58968)

| Model Name | | | | Rated Capacity [HP] | | | | | | Rated Continuity Current [A] | Auxiliary Contact | | Remarks |
|---------------------|-------------|---------------------|-------------|---|----------------|-------------|--------------|----------------|----------------|------------------------------|---|---|--|
| Non-Reversible Type | Application | Reversible Type (2) | Application | Single-Phase (Non-Reversible Type Only) | | Three-Phase | | | | | Rating | | |
| | | | | 110 to 120 V | 220 to 240 V | 200 V | 220 to 240 V | 440 to 480 V | 550 to 600 V | | | | |
| SD-T12(BC)(SA) | ○ | SD-2xT12(BC)(SA) | ○ | $\frac{1}{2}$ | $1\frac{1}{2}$ | 3 | 3 | $7\frac{1}{2}$ | $7\frac{1}{2}$ | 20 | A600 AC600 V max Making 720 VA Breaking 720 VA | Q300 DC250 V max Making 69 VA Breaking 69 VA | The standard product is certified with  . |
| SD-T20(BC)(SA) | ○ | SD-2xT20(BC)(SA) | ○ | 1 | 2 | 3 | 5 | $7\frac{1}{2}$ | $7\frac{1}{2}$ | 20 | | | |
| SD-T21(BC)(SA) | ○ | SD-2xT21(BC)(SA) | ○ | 1 | 3 | 5 | 5 | 10 | 10 | 30 | | | |
| SD-T32(BC)(SA) | ○ | SD-2xT32(BC)(SA) | ○ | 2 | 5 | 10 | 10 | 20 | 15 | 32.5 | | | |
| SD-T35(BC)(SA) | ○ | SD-2xT35(BC)(SA) | ○ | 2 | 5 | 10 | 10 | 20 | 20 | 40 | | | |
| SD-T50(BC)(SA) | ○ | SD-2xT50(BC)(SA) | ○ | 3 | $7\frac{1}{2}$ | 15 | 15 | 30 | 30 | 65 | | | |
| SD-T65(CW) | ○ | SD-2xT65(CW) | ○ | 3 | 10 | 15 | 20 | 40 | 40 | 95 | | | |
| SD-T80(CW) | ○ | SD-2xT80(CW) | ○ | 5 | 15 | 20 | 25 | 50 | 50 | 100 | | | |
| SD-T100 | ○ | SD-2xT100 | ○ | $7\frac{1}{2}$ | 15 | 25 | 30 | 60 | 60 | 100 | | | |


Note 1. Applicable..... ○: Standard Product

(6) DC Operated Magnetic Contactor (Non-Reversible/Reversible) N Series


 (File No. E58968)


| Model Name | | | | Rated Capacity [HP] | | | | | | Rated Continuity Current [A] | Auxiliary Contact | | Remarks |
|---------------------|-------------|---------------------|-------------|---|--------------|-------------|--------------|--------------|--------------|------------------------------|---|---|--|
| Non-Reversible Type | Application | Reversible Type (2) | Application | Single-Phase (Non-Reversible Type Only) | | Three-Phase | | | | | Rating | | |
| | | | | 110 to 120 V | 220 to 240 V | 200 V | 220 to 240 V | 440 to 480 V | 550 to 600 V | | | | |
| SD-N125 | ○ | SD-2xN125 | ○ | 10 | 20 | 40 | 40 | 75 | 75 | 125 | A600 AC600 V max Making 720 VA Breaking 720 VA | R300 DC250 V max Making 28 VA Breaking 28 VA | The standard product is certified with  . |
| SD-N150 | ○ | SD-2xN150 | ○ | 15 | 25 | 40 | 50 | 100 | 100 | 150 | | | |
| SD-N220 | ○ | SD-2xN220 | ○ | 15 | 40 | 60 | 75 | 150 | 150 | 220 | | | |
| SD-N300 | ○ | SD-2xN300 | ○ | — | — | 100 | 100 | 200 | 200 | 300 | | | |
| SD-N400 | ○ | SD-2xN400 | ○ | — | — | 125 | 150 | 300 | 300 | 400 | | | |

Note 1. Applicable..... ○: Standard Product

Note 2. 125 A frames or higher with "UL" at the end of the model name are  certified for solderless terminal structure.

(7) Mechanically Latched Contactor T Series


 (File No. E58968)

| Model Name | | | | Rated Capacity [HP] | | | | | | Rated Continuity Current [A] | Auxiliary Contact | | Remarks |
|---------------------|-------------|-----------------------|-------------|---|----------------|-------------|--------------|--------------|--------------|------------------------------|---|---|---|
| Non-Reversible Type | Application | Reversible Type | Application | Single-Phase (Non-Reversible Type Only) | | Three-Phase | | | | | Rating | | |
| | | | | 110 to 120 V | 220 to 240 V | 200 V | 220 to 240 V | 440 to 480 V | 550 to 600 V | | | | |
| SL(D)-T21UL(BC)(SA) | ☆ | SL(D)-2xT21UL(BC)(SA) | ☆ | 1 | 3 | 5 | 5 | 10 | 10 | 30 | A600 AC600 V max Making 720 VA Breaking 720 VA | Q300 DC250 V max Making 69 VA Breaking 69 VA | The dedicated product is certified with  . |
| SL(D)-T35UL(BC)(SA) | ☆ | SL(D)-2xT35UL(BC)(SA) | ☆ | 2 | 5 | 10 | 10 | 20 | 20 | 40 | | | |
| SL(D)-T50UL(BC)(SA) | ☆ | SL(D)-2xT50UL(BC)(SA) | ☆ | 3 | $7\frac{1}{2}$ | 15 | 15 | 30 | 30 | 65 | | | |
| SL(D)-T65UL | ☆ | SL(D)-2xT65UL | ☆ | 3 | 10 | 15 | 20 | 40 | 40 | 95 | | | |
| SL(D)-T80UL | ☆ | SL(D)-2xT80UL | ☆ | 5 | 15 | 20 | 25 | 50 | 50 | 100 | | | |
| SL(D)-T100UL | ☆ | SL(D)-2xT100UL | ☆ | $7\frac{1}{2}$ | 15 | 25 | 30 | 60 | 60 | 100 | | | |

Note 1. Applicable..... ☆: Dedicated Product


(8) Mechanically Latched Contactor N Series

 (File No. E58968)

| Model Name | | | | Rated Capacity [HP] | | | | | | Rated Continuity Current [A] | Auxiliary Contact | | Remarks |
|---------------------|-------------|-----------------|-------------|---|--------------|-------------|--------------|--------------|--------------|------------------------------|---|---|---|
| Non-Reversible Type | Application | Reversible Type | Application | Single-Phase (Non-Reversible Type Only) | | Three-Phase | | | | | Rating | | |
| | | | | 110 to 120 V | 220 to 240 V | 200 V | 220 to 240 V | 440 to 480 V | 550 to 600 V | | | | |
| SL(D)-N125UR | ☆ | SL(D)-2xN125UR | ☆ | 10 | 20 | 40 | 40 | 75 | 75 | 125 | A600 AC600 V max Making 720 VA Breaking 720 VA | R300 DC250 V max Making 28 VA Breaking 28 VA | The dedicated product is certified with  . |
| SL(D)-N150UR | ☆ | SL(D)-2xN150UR | ☆ | 15 | 25 | 40 | 50 | 100 | 100 | 150 | | | |
| SL(D)-N220UR | ☆ | SL(D)-2xN220UR | ☆ | 15 | 40 | 60 | 75 | 150 | 150 | 220 | | | |
| SL(D)-N300UR | ☆ | SL(D)-2xN300UR | ☆ | — | — | 100 | 100 | 200 | 200 | 300 | | | |
| SL(D)-N400UR | ☆ | SL(D)-2xN400UR | ☆ | — | — | 125 | 150 | 300 | 300 | 400 | | | |

Note 1. Applicable..... ☆: Dedicated Product

(9) Thermal Overload Relay T Series

 (File No. E58969)


| Model Name | Application | Heater Designation [Adjustment Range (RC Value) (A) of Settling Current] | Auxiliary Contact |
|--------------|-------------|---|--|
| TH-T18(BC)KP | ○ | 0.12A (0.1 to 0.16), 0.17 (0.14 to 0.22), 0.24A (0.2 to 0.32), 0.35A (0.28 to 0.42), 0.5A (0.4 to 0.6), 0.7A (0.55 to 0.85), 0.9A (0.7 to 1.1), 1.3A (1 to 1.6), 1.7A (1.4 to 2), 2.1A (1.7 to 2.5), 2.5A (2 to 3), 3.6A (2.8 to 4.4), 5A (4 to 6), 6.6A (5.2 to 8), 9A (7 to 11), 11A (9 to 13), 15A (12 to 18) Note 2 | Rating Code C600 AC600 Vmax Making 1800 VA (15 A max) Breaking 180 VA (1.5 A max) |
| TH-T25(BC)KP | ○ | 0.24A (0.2 to 0.32), 0.35A (0.28 to 0.42), 0.5A (0.4 to 0.6), 0.7A (0.55 to 0.85), 0.9A (0.7 to 1.1), 1.3A (1 to 1.6), 1.7A (1.4 to 2), 2.1A (1.7 to 2.5), 2.5A (2 to 3), 3.6A (2.8 to 4.4), 5A (4 to 6), 6.6A (5.2 to 8), 9A (7 to 11), 11A (9 to 13), 15A (12 to 18), 22A (18 to 26) | Rating Code B600 AC600 Vmax Making 3600 VA (30 A max) Breaking 360 VA (3 A max) |
| TH-T50(BC)KP | ○ | 29A (24 to 34), 35A (30 to 40), 42A (34 to 50) | |
| TH-T65(CW)KP | ○ | 15A (12 to 18), 22A (18 to 26), 29A (24 to 34), 35A (30 to 40), 42A (34 to 50), 54A (43 to 65) | |
| TH-T100KP | ○ | 67A (54 to 80), 82A (65 to 100) | |

Note 1. Applicable..... ○: Standard Product

Note 2. The maximum applicable current is 16 A.

The maximum applicable current other than the heater designation of 15 A is the largest current value within the adjustment range of settling current.

(10) Thermal Overload Relay N Series

 (File No. E58969)

| Model Name | Application | Heater Designation [Adjustment Range (RC Value) (A) of Settling Current] | Auxiliary Contact | |
|-----------------|-----------------------|--|--------------------|--|
| | | | Rating Code | Making Breaking |
| TH-N120KP | <input type="radio"/> | 42A (34 to 50), 54A (43 to 65), 67A (54 to 80), 82A (65 to 100) | B600 AC600 Vmax | 3600 VA (30 A max) 360 VA (3 A max) |
| TH-N120TAKP ☆ | <input type="radio"/> | 105A (85 to 125) | | |
| TH-N120TAHZKP ★ | | 125A (100 to 150) | | |
| TH-N220RHKP ☆ | <input type="radio"/> | 82A (65 to 100), 105A (85 to 125), 125A (100 to 150), 150A (120 to 180) | | |
| TH-N220HZKP ★ | | 180A (140 to 220) | | |
| TH-N400RHKP ☆ | <input type="radio"/> | 105A (85 to 125), 125A (100 to 150), 150A (120 to 180), 180A (140 to 220), 250A (200 to 300) | | |
| TH-N400HZKP ★ | | 330A (260 to 400) | | |


Note 1. Applicable : standard product




Note 2. ☆ is for combination with the magnetic contactor and cannot be independently mounted. ★ is exclusively for independent mounting.

Note 3. The symbol "KP" in the model name indicates 3-element 2E, and HZ indicates the independent mounting type.

Note 4. Frame N120 or higher with "UL" at the end of the model name is  certified for solderless terminal structure.


(11) Contactor Relay T Series

 (File No. E58969)

| Model Name | | | | Rating | | Remarks |
|---|---------------|---|----------------|--|---|--|
| AC Operated | | DC Operated | | A600 AC600 V max Making 7200 VA Breaking 720 VA | Q300 DC250 V max Making 69 VA Breaking 69 VA | |
|  | SR-T5(BC)(SA) |  | SRD-T5(BC)(SA) | | | The standard product is certified with  . |
| | SR-T9(BC)(SA) | | SRD-T9(BC)(SA) | | | |

(12) Optional Unit T Series

(File No. E58969)

| Model Name |  |
|---------------------------------|---|
| UT-AX2(BC), AX4(BC), AX11(BC) | <input type="radio"/> |
| UT-ML20(BC) | (1) |
| UT-SA13, SA21, SA22, SA23, SA25 | <input type="radio"/> |


Note 1. : Standard product and certified. (mark displayed on the product)

(1): Certified as a contactor component. (mark not displayed on the product)

(13) Optional Unit N Series

(File No. E58969)

(File No. E58968 (AX80/AX150/AX600/UN-ML11(CX), ML21 to ML220))

| Model Name |  |
|----------------------------------|---|
| UN-AX2 (CX), AX4 (CX), AX11 (CX) | <input type="radio"/> |
| UN-AX80, AX150, AX600 | (1) |
| UQ-AX2(KR) | <input type="radio"/> |
| UN-ML21 | (1) |
| UN-ML80, ML150, ML220 | (1) |
| UN-SA721, SA725 | <input type="radio"/> |
| UN-SA13, 22, 3310, 3320 | <input type="radio"/> |
| UN-SA33 | <input type="radio"/> |
| UN-RY10(L) | <input type="radio"/> |


Note 1. : Standard product and certified. (mark displayed on the product)


: Standard product and certified. (mark not displayed on the product)

(1): Certified as a contactor component. (mark not displayed on the product)

Note 2. Products used in isolation from live parts (live part protection cover, reset release, etc.) are not subject to certification.


(14) DC Interface Contactors

 (File No. E58968)


| Model Name | | Rated Capacity [HP] | | | | | Rated Continuity Current [A] | Auxiliary Contact | | Remarks |
|------------------------------|--------------------------------|---|--------------|--------------|--------------|--------------|------------------------------|--|---|--|
| | | Single-Phase (Non-Reversible Type Only) | | Three-Phase | | | | Rating | | |
| Non-Reversible Type | Reversible Type | 110 to 120 V | 220 to 240 V | 200 to 208 V | 220 to 240 V | 440 to 480 V | | | | |
| SD-Q11 SD-Q12 | SD-QR11 SD-QR12 | 1/3 | 1 | 3 | 3 | 5 | 20 | A300 AC240 V max Making 7200 VA Breaking 720 VA | Q300 DC250 V max Making 69 VA Breaking 69 VA | The standard product is certified with  . |
| MSOD-Q11(KP) MSOD-Q12(KP) | MSOD-QR11(KP) MSOD-QR12(KP) | | | | | | 13 | | | |


(15) Vacuum Magnetic Contactors

 (File No. E58968)


| Model Name | Rated Capacity [HP] | | | | Rated Continuity Current [A] | Auxiliary Contact | Remarks |
|------------|---------------------|--------------|--------------|--------------|------------------------------|-------------------|--|
| | Three-Phase | | | | | Rating | |
| | 200 V | 220 to 240 V | 440 to 480 V | 550 to 600 V | | | |
| SH-V160 | 60 | 60 | 150 | 150 | 200 | A600 | The standard product is certified with  . |
| SH-V320 | 100 | 125 | 250 | 300 | 350 | AC600 V max | |
| SH-V400 | 125 | 150 | 350 | 400 | 450 | Making 7200 VA | |
| SH-V600 | 200 | 250 | 500 | 600 | 610 | Breaking 720 VA | |


(16) Solid State Contactors for Motor/Heater Loads

 (File No. E144063)

| Model Name | | Rated Capacity [HP] | | | | Rated Continuity Current [A] | Remarks |
|-----------------------|-----------------------|---------------------|--------------|--------------|--------------|------------------------------|--|
| 3-Pole 2-Element Type | 3-Pole 3-Element Type | Single-Phase | | Three-Phase | | | |
| | | 110 to 120 V | 220 to 240 V | 220 to 240 V | 440 to 480 V | | |
| US-N5SS | US-N5SSTE | 1/10 | 1/4 | 3/4 | — | 5 | The standard product is certified with  . |
| US-N8SS | US-N8SSTE | 1/10 | 1/4 | 3/4 | — | 8 | |
| US-N20(CX)(RM) | US-N20TE(CX)(RM) | 1/2 | 1 1/2 | 3 | 5 | 20 | |
| US-N30(CX) | US-N30TE(CX) | 1 | 3 | 5 | 10 | 30 | |
| US-N40(CX) | US-N40TE(CX) | 2 | 3 | 7 1/2 | 20 | 40 | |
| US-N50(CX) | US-N50TE(CX) | 2 | 3 | 7 1/2 | 20 | 50 | |
| US-N70NS | US-N70NSTE | 3 | 7 1/2 | 15 | — | 70 | |
| US-N80NS | US-N80NSTE | 3 | 7 1/2 | 15 | — | 80 | |
| US-NH70NS | US-NH70NSTE | 3 | 7 1/2 | 15 | 30 | 70 | |
| US-NH80NS | US-NH80NSTE | 3 | 7 1/2 | 15 | 30 | 80 | |

(17) Solid State Contactors for Heater Loads

 (File No. E144063)

| Model Name | | Rated Continuity Current [A] | Remarks |
|--------------------|-------------------------|------------------------------|--|
| Batch Control Type | Individual Control Type | | |
| US-H20(RM)(HZ)(UF) | US-H20DD(RM)(HZ)(UF) | 20 | The standard product is certified with  . |
| US-H30(RM)(HZ)(UF) | US-H30DD(RM)(HZ)(UF) | 30(27) (Note 4) | |
| US-H40(HZ) | US-H40DD(HZ) | 40 | |
| US-H50(HZ) | US-H50DD(HZ) | 50 | |


Note 1. (HZ) has no cooling fin. (RM) can be rail-mounted.

Note 2. US-H □ (DD) HZ is certified at the rated continuity current when combined with the fin used for US-H □ (DD).

Note 3. US-H50 (DD) HZ has UR certification only.

Note 4. () is the rating for US-H30 (DD) UF.


10.5.4 Applicable Wire Size, Lug Size and Tightening Torques under UL Certification

| Model | S-T10/S(D)-T12/T20 | | | S(D)-T21/S-T25 | | | S(D)-T32 | | |
|--|--|-------------------------|-------------------------|-----------------------|--------------------------|-------------------------|-----------------------|---------------------------|-------------------|
| | Main | Auxiliary | Control | Main | Auxiliary | Control | Main | Control | |
| Terminal | M3.5 | M3.5 | M3.5 | M4 | M3.5 | M3.5 | M4 | M3.5 | |
| Screw Size | M3.5 | M3.5 | M3.5 | M4 | M3.5 | M3.5 | M4 | M3.5 | |
| Wire Strip Length  | 10 mm | 10 mm | 9 mm | 11.5 mm | 11.5 mm | 9 mm | 11.5 mm | 9 mm | |
| Wire Size (60/75°C) (copper only) (Sol./Str.) | 14 - 12 AWG | 14 AWG | 14 AWG | 14 - 10 AWG | 14 - 8 AWG | 14 AWG | 14 AWG | 14-10 AWG 8 AWG Note 1 | 14 AWG |
| Recommended Crimp Lug Size (JST Cat No.) Note 2 | 1.25-3.5 to 2-3.5 5.5-S3 | 1.25-3.5 to 2-3.5 | 1.25-3.5 to 2-3.5 | 1.25-4 to 5.5-4 | 1.25-4 to 5.5-4 8-NK4 | 1.25-3.5 to 2-3.5 | 1.25-3.5 to 2-3.5 | 1.25-4 to 5-5.4 8-NK4 | 1.25-3.5 to 2-3.5 |
| Connection to Terminal Max. qty. | Each Terminal - 2 Wires or 2 Crimp Lugs Note 3 | | | | | | | | |
| Tightening Torque | 10.3 lb-in (1.17 N-m) | 10.3 lb-in (1.17N-m) | 10.3 lb-in (1.17N-m) | 15 lb-in (1.69N-m) | 10.3 lb-in (1.17N-m) | 10.3 lb-in (1.17N-m) | 15 lb-in (1.69N-m) | 10.3 lb-in (1.17N-m) | |

Note 1. When using 8 AWG with a three-phase AC200 to 208 V, use a copper wire with wire temperature rating of 75°C.

Note 2. Please use swaging tool which is recommended by JST.

Note 3. 2 conductors of the same size can be connected.


| Model | S(D)-T35/T50 | | | S(D)-T65/T80 | | | S(D)-T100 | | | |
|--|--|--------------------------|--------------------------|--------------------------|-------------------------|------------------------|--------------------------|-------------------------------|------------------------|---------------|
| | Main | Auxiliary | Control | Main | Auxiliary | Control | Main | Auxiliary | Control | |
| Terminal | M5 | M3.5 | M3.5 | M6 | M4 | M4 | M6 | M4 | M4 | |
| Screw Size | M5 | M3.5 | M3.5 | M6 | M4 | M4 | M6 | M4 | M4 | |
| Wire Strip Length  | 15 mm | 11.5mm | 9 mm | — | 11 mm | 11 mm | — | 11 mm | 11 mm | |
| Wire Size (60/75°C) (copper only) (Sol./Str.) | 14-6 AWG Note 1 | 14 AWG | 14 AWG | 14-2 AWG | 14-1 AWG Note 2 | 14 AWG | 14 AWG | 14-1/0 AWG Note 3 | 14 AWG | 14 AWG |
| Recommended Crimp Lug Size (JST Cat No.) | 1.25-5 to 14-5 | 1.25-3.5 to 2-3.5 | 1.25-3.5 to 2-3.5 | 1.25-6 to 22-6 | 1.25-6 to 22-6 38-S6 | 1.25-4 to 2-4 | 1.25-4 to 2-4 | 1.25-6 to 22-6 38-S6, 60-6 | 1.25-4 to 2-4 | 1.25-4 to 2-4 |
| Connection to Terminal Max. qty. | Each Terminal - 2 Wires or 2 Crimp Lugs Note 4 | | | | | | | | | |
| Tightening Torque | 22.5 lb-in (2.54 N-m) | 10.3 lb-in (1.17 N-m) | 10.3 lb-in (1.17 N-m) | 39.1 lb-in (4.41 N-m) | 15 lb-in (1.69 N-m) | 15 lb-in (1.69 N-m) | 39.1 lb-in (4.41 N-m) | 15 lb-in (1.69 N-m) | 15 lb-in (1.69 N-m) | |

Note 1. When using 6 AWG, use a copper wire with wire temperature rating of 75°C.

Note 2. When using 1 AWG, use a copper wire with wire temperature rating of 75°C.

Note 3. When using 1/0 AWG, use a copper wire with wire temperature rating of 75°C.

Note 4. Please use swaging tool which is recommended by JST.

| Model | TH-T18KP | | TH-T25KP | | TH-T50KP | | TH-T65KP | | TH-T100KP | | SR(D)-T5/T9 | |
|--|--|--------------------------|--------------------------|--------------------------|---|--------------------------|--------------------------|------------------------|--------------------------|------------------------|---|--------------------------|
| | Main | Auxiliary | Main | Auxiliary | Main | Auxiliary | Main | Auxiliary | Main | Auxiliary | Auxiliary | Main |
| Terminal | M3.5 | M3.5 | M4 | M3.5 | M5 | M3.5 | M6 | M4 | M6 | M4 | M3.5 | M3.5 |
| Screw Size | M3.5 | M3.5 | M4 | M3.5 | M5 | M3.5 | M6 | M4 | M6 | M4 | M3.5 | M3.5 |
| Wire Strip Length  | 10.5 mm | 10.5 mm | 10 mm | 10.5 mm | 13.5 mm | 10.5 mm | — | 11 mm | — | 11 mm | 10 mm | 9 mm |
| Wire Size (60/75°C) (copper only) (Sol./Str.) | 14 - 12 AWG Note 1 | 14 AWG | 14 - 8 AWG | 14 AWG | 14-6 AWG Note 2 | 14 AWG | 14-3 AWG | 14 AWG | 14-1 AWG Note 3 | 14 AWG | 14 AWG | 14 AWG |
| Recommended Crimp Lug Size (JST Cat No.) Note 4 | 1.25-3.5 to 2-3.5 5.5-S3 | 1.25-3.5 to 2-3.5 | 1.25-4 to 5.5-4 8-NK4 | 1.25-3.5 to 2-3.5 | 1.25-5 to 14-5 | 1.25-3.5 to 2-3.5 | 2-6 to 22-6 | 1.25-4 to 2-4 | 2-6 to 22-6 | 1.25-4 to 2-4 | 1.25-3.5 to 2-3.5 | 1.25-3.5 to 2-3.5 |
| Connection to Terminal Max. qty. | Each Terminal - 2 Wires or 2 Crimp Lugs Note 5 | | | | Each Terminal - 2 Wires or 2 Crimp Lugs | | | | | | Each Terminal - 2 Wires or 2 Crimp Lugs Note 5 | |
| Tightening Torque | 10.3 lb-in (1.17 N-m) | 10.3 lb-in (1.17 N-m) | 15 lb-in (1.69 N-m) | 10.3 lb-in (1.17 N-m) | 22.5 lb-in (2.54 N-m) | 10.3 lb-in (1.17 N-m) | 39.1 lb-in (4.41 N-m) | 15 lb-in (1.69 N-m) | 39.1 lb-in (4.41 N-m) | 15 lb-in (1.69 N-m) | 10.3 lb-in (1.17 N-m) | 10.3 lb-in (1.17 N-m) |

Note 1. The applicable current for the heater designation 15A is 16A or less.

Note 2. When using 6 AWG, use a copper wire with wire temperature rating of 75°C.

Note 3. Use copper wire with wire temperature rating of 75°C.

Note 4. Please use swaging tool which is recommended by JST.

Note 5. 2 conductors of the same size can be connected.

10.6 Compliance with EC Directives



Compliance with EC Directives of Magnetic Starters Used as Components

Although the CE marking is required in order to distribute the magnetic starter within the EU for component use compliant with the EC Directives, when displaying the CE marking on machine tools, control devices or the like, it is not required for the magnetic starter as an embedded component.

When displaying the CE marking on machine tools, control devices or the like, the use of third party certification (TÜV certification) is recommended for the magnetic starter. As shown on page 268, the MS-T/N Series magnetic starters, SD-Q Series DC interface contactors and the like are TÜV certified.

● Compliance with Low Voltage Directive

Compliance of Magnetic Starters in Single Exports

In single exports to the EU, magnetic starters are subject to the Low Voltage Directive. The Low Voltage Directive is module A and the compliance certificate is basically carried out by self-declaration; the applicable product specifications are as follows.

EN-60947-4-1 Magnetic Starter Standards

EN-60947-5-1 Contactor Relay Standards

As shown on page 267, MS-T/N series magnetic starters, SD-Q Series DC interface contactors and the like are standard products and comply with the Low Voltage Directive.

● Compliance with EMC Directives

As the MS-T/N series magnetic starter does not incorporate an internal electronic circuit, it is outside the scope of the EMC Directive.

(As the DC exciting circuits of S-T65 to T100 and S-N125 to N800 are simple rectifier circuits, they are EMC-excluded items.) The solid state contactor US-N/H is subject to the EMC Directive.

● Compliance with RoHS Directive

In single exports to the EU, magnetic starters are subject to the RoHS Directive. (Category 9 "Monitoring and control equipment" of the RoHS Directive applies to the products). Six substances (lead, mercury, cadmium, hexavalent chromium, PBB, and PBDE) are restricted under the revised RoHS Directive (2011/65/EU commonly known as RoHS 2). As shown on page 267, MS-T/N series magnetic starters, SD-Q Series DC interface contactors, and the like are standard products and comply with the RoHS Directive.

Note that, US-N(H)70/N(H)80(TE) types containing restricted substances, cannot be exported as single products, but can be exported as spare parts to which the RoHS Directive does not apply.

In the official gazette Directive (EU) 2015/863 published in June 2015, four phthalates were newly added, totaling 10 substances under restriction. Magnetic starters are subject to RoHS 2 from July 22, 2021. However, to meet the needs of the customers who manufacture the products of category 1 to 7, 10, and 11, such as household appliances, to which RoHS 2 starts to apply from July 22, 2019, we have been manufacturing products not containing the four additional substances since January, 2019. For the models compliant with RoHS 2, consult with your dealer or with us.

● Compliance with Machinery Directive

- (1) The MS-T/N series magnetic starter is a component used in equipment such as machine tools and control devices, and is outside the scope of the Machinery Directive.
- (2) With respect to EN60204-2, the safety standards for mechanical equipment, compliances are as below.

| Item | Requirements | Request Content | Support |
|-------------------------------------|--------------|--|--|
| Control Function in Case of Failure | 9.4 | If the failure of an electrical device would lead to hazardous conditions, take appropriate measures to minimize the probability of such risks. | A magnetic contactor with mirror contact (safety separation function) is available (*) |
| | 9.4.2.2 | Provide redundancy. The probability of a single failure of an electric circuit causing a serious risk can be minimized by providing partial or total redundancy. (The safety circuit will turn off if one of the relays fails. The relay status (normal or otherwise) will be checked at each on/off cycle of the machine. Cannot restart when one of the relays fails.) | |

* The mirror contact is a function in which even if the main contact is welded, the auxiliary break contact withstands the impulse voltage of 2500 V without contact.

● Low Voltage Directive/RoHS Directive Compatible Models and CE Marking Display Locations



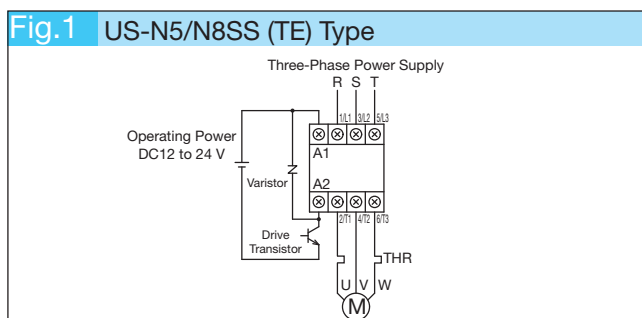
| Model | Model Name | Display Location |
|---|--|--|
| Magnetic Contactors (AC Operated) | S-(2x)T10(BC)(SA), S-(2x)T12(BC)(SA) S-(2x)T20(BC)(SA), S-(2x)T21(BC)(SA) S-(2x)T25(BC)(SA), S-(2x)T32(BC)(SA) S-(2x)T35(BC)(SA), S-(2x)T50(BC)(SA) S-(2x)T65, S-(2x)T80, S-(2x)T100 S-(2x)N38(CX)(SA), S-(2x)N48(CX)(SA) S-(2x)N125, S-(2x)N150 S-(2x)N180, S-(2x)N220, S-(2x)N300, S-(2x)N400, S-(2x)N600, S-(2x)N800 | Displayed on the product name plate (Note 2) |
| Magnetic Starters (AC Operated) | MSO-(2x)T10(BC)KP(SA), MSO-(2x)T12(BC)KP(SA) MSO-(2x)T20(BC)KP(SA), MSO-(2x)T21(BC)KP(SA) MSO-(2x)T25(BC)KP(SA) MSO-(2x)T35(BC)KP(SA), MSO-(2x)T50(BC)KP(SA) MSO-(2x)T65KP, MSO-(2x)T80KP, MSO-(2x)T100KP MSO-(2x)N125KP, MSO-(2x)N150KP, MSO-(2x)N180KP, MSO-(2x)N220KP, MSO-(2x)N300KP, MSO-(2x)N400KP | |
| Thermal Overload Relays | TH-T18(BC)KP, TH-T25(BC)KP, TH-T50(BC)KP, TH-T65KP, TH-T100KP TH-N120KP, TH-N120TAKP, TH-N220RHKP, TH-N220HZKP, TH-N400RHKP, TH-N400HZKP | |
| Contactor Relays (AC Operated) | SR-T5(BC)(SA), SR-T9(BC)(SA) | |
| Auxiliary Contact Unit | UT-AX2(BC), UT-AX4(BC), UT-AX11(BC) UN-AX2(CX), UN-AX4(CX), UN-AX11(CX), UN-AX80, UN-AX150, UQ-AX2(KR) | |
| Magnetic Contactors (DC Operated) | SD-(2x)T12(BC)(SA), SD-(2x)T20(BC)(SA), SD-(2x)T21(BC)(SA), SD-(2x)T32(BC)(SA), SD-(2x)T35(BC)(SA), SD-(2x)T50(BC)(SA), SD-(2x)T65, SD-(2x)T80, SD-(2x)T100 SD-(2x)N125, SD-(2x)N150, SD-(2x)N220, SD-(2x)N300, SD-(2x)N400, SD-(2x)N600, SD-(2x)N800 | |
| Magnetic Starters (DC Operated) | MSOD-(2x)T12(BC)KP(SA), MSOD-(2x)T20(BC)KP(SA), MSOD-(2x)T21(BC)KP(SA), MSOD-(2x)T35(BC)KP(SA), MSOD-(2x)T50(BC)KP(SA) MSOD-(2x)T65KP, MSOD-(2x)T80KP, MSOD-(2x)T100KP MSOD-(2x)N125KP, MSOD-(2x)N150KP, MSOD-(2x)N220KP, MSOD-(2x)N300KP, MSOD-(2x)N400KP | |
| Contactor Relays (DC Operated) | SRD-T5 (BC) (SA), SRD-T9 (BC) (SA) | |
| DC Interface Contactors | SD-Q11, SD-Q12, SD-QR11, SD-QR12 MSOD-Q(R)11KP, MSOD-Q(R)12KP | |
| Solid State Contactors for Motor/Heater Loads | US-N5SS(TE), US-N8SS(TE), US-N20(TE), US-N30(TE), US-N40(TE), US-N50(TE), US-N70NS(TE), US-N80NS(TE), US-NH70NS(TE), US-NH80NS(TE), US-N20(TE)CX, US-N30(TE)CX, US-N40(TE)CX, US-N50(TE)CX US-N20(TE)RM | |
| Solid State Contactors for Heater Loads | US-H20(DD), US-H30(DD), US-H40(DD), US-H50(DD), US-H20(DD)RM, US-H30(DD)RM, US-H20(DD)UF, US-H30(DD)UF | |

Note 1. Standard products are compliant. The outline drawings, contact arrangement, rating, order model name and the like are the same as the standard product.

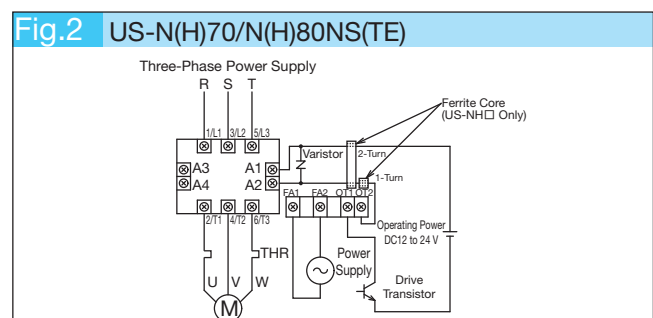
Note 2. As UN-AX80 and UN-AX150 have no product name plate, it is displayed on the individual product packaging.

Note 3. To keep the US-N5/N8SS (TE) and US-N (H) 70/N (H) 80NS (TE) compliant with the CE mark, use by connecting as shown in the figure below.

Note 4. US-N(H)70/N(H)80NS(TE) types contain substances restricted by the RoHS Directive and are dedicated as spare parts products within the EU region. They display CE markings as products for which the RoHS Directive does not apply.



Note: Connect the varistor (NVD05UCD039 [KOA]) in the location shown in the figure above.



Note: Connect the varistor (NVD05UCD039 [KOA]) and ferrite core (ZCAT3035-1330 [TDK]) in the locations shown in the figure above. (Ferrite core mounting is not required for US-N70/N80□)

10.7 TÜV Certified Products

● TÜV Rheinland Inspection Association Certified Product

(1) TÜV Certified Magnetic Contactor T Series (Certification Standard EN60947-4-1)



| Model Name | Certified Rating [A] (AC-3) | | Certification Number | Mirror Contact (Safety Separation Function) (Note 3) | | Remarks | |
|----------------|-----------------------------|--------------|-------------------------------|--|--|---|---|
| | 220 to 240 V | 380 to 440 V | | Body Built-In Auxiliary Break Contact | Auxiliary Contact Unit Auxiliary Break Contact | | |
| S-T10(BC)(SA) | 11 | 9 | R50255938 | ○ (Note 4) | ○ (UT-AX2(BC), UT-AX4(BC)) | Standard product with the certification mark. | |
| S-T12(BC)(SA) | 13 | 12 | | ○ | | | |
| S-T20(BC)(SA) | 18 | 18 | | | | | |
| S-T21(BC)(SA) | 25 | 23 | R50255941 | ○ | | | |
| S-T25(BC)(SA) | 30 | 30 | | — | | | |
| S-T32(BC)(SA) | 32 | 32 | R50319775 | ○ | | | |
| S-T35(BC)(SA) | 40 | 40 | | ○ (UN-AX2(BC), UN-AX4(BC)) | | | |
| S-T50(BC)(SA) | 55 | 50 | | | | | |
| S-T65(CW) | 65 | 65 | R50319817 | ○ | | | |
| S-T80(CW) | 85 | 85 | | — | | | |
| S-T100 | 105 | 105 | R9851138 | ○ | — | | |
| SD-T12(BC)(SA) | 13 | 12 | R50255938 | ○ | ○ (UT-AX2(BC), UT-AX4(BC)) | Standard product with the certification mark. | |
| SD-T20(BC)(SA) | 18 | 18 | | ○ | | | |
| SD-T21(BC)(SA) | 25 | 23 | | | | | |
| SD-T32(BC)(SA) | 32 | 32 | R50255941 | — | | | |
| SD-T35(BC)(SA) | 40 | 40 | | R50319775 | | | ○ |
| SD-T50(BC)(SA) | 55 | 50 | ○ (UN-AX2(BC), UN-AX4(BC)) | | | | |
| SD-T65(CW) | 65 | 65 | | | | | |
| SD-T80(CW) | 85 | 85 | R50319817 | ○ | | | |
| SD-T100 | 105 | 105 | | R9851138 | | | ○ |

Note 1. Certification Rating: Certified in the following range.

Main Circuit Contact : 440 V or Less at AC-3 Rating and Rated Continuity Current

Auxiliary Contact : 550 V or Less at AC-15 Rating and Rated Continuity Current

Operation Coil : AC Operation S-T10 to T80 : AC12V Coil to AC500V Coil

S-T100 : AC24V Coil to AC500V Coil

DC Operation : DC12V Coil to DC220V Coil

Note 2. The specification of the surge absorber mounting type (with "SA" in the model name) is also TÜV certified.

Note 3. Mirror contact compliance acquired from TÜV, making it optimal for the interlock circuit of machine tools. The mirror contact indicates a function in which even if the main contact is welded, the auxiliary break contact withstands impulse voltage of 2,500 V without contact.

Note 4. When ordering S-T10(BC)(SA) with 1b, indicate that it is with 1b.

(2) TÜV Certified Magnetic Contactor N Series (Certification Standard EN60947-4-1)

| Model Name | Certified Rating [A] (AC-3) | | Certification Number | Mirror Contact (Safety Separation Function) (Note 3) | | Remarks |
|---------------|-----------------------------|--------------|----------------------|--|--|---|
| | 220 to 240 V | 380 to 440 V | | Body Built-In Auxiliary Break Contact | Auxiliary Contact Unit Auxiliary Break Contact | |
| S-N38(CX)(SA) | 39 | 32 | R9651189 | — | — | Standard product with the certification mark. |
| S-N48(CX)(SA) | 50 | 40 | | | | |
| S-N125 | 125 | 120 | R9851169 | ○ | — | |
| S-N150 | 150 | 150 | R9851167 | ○ | ○ (UN-AX150) | |
| S-N180 | 180 | 180 | R9851164 | | | |
| S-N220 | 250 | 250 | | | | |
| S-N300 | 300 | 300 | | | | |
| S-N400 | 400 | 400 | R9851171 | ○ | ○ (UN-AX150) | |
| SD-N125 | 125 | 120 | R9851169 | | | |
| SD-N150 | 150 | 150 | R9851167 | | | |
| SD-N220 | 250 | 250 | R9851164 | | | |
| SD-N300 | 300 | 300 | R9851171 | ○ | ○ (UN-AX150) | |
| SD-N400 | 400 | 400 | | | | |

Note 1. Certification Rating: Certified in the following range.

Main Circuit Contact : 440 V or Less at AC-3 Rating and Rated Continuity Current

Auxiliary Contact : 550 V or Less at AC-15 Rating and Rated Continuity Current

Operation Coil : AC Operation S-N38, N48 : AC12V Coil to AC440V Coil

S-N125 to N150 : AC24V Coil to AC500V Coil

S-N180 to N400 : AC48V Coil to AC500V Coil

DC Operation : DC12V Coil to DC220V Coil

Note 2. The specification of the surge absorber mounted type (with "SA" in the model name) is also TÜV certified.

Note 3. Mirror contact compliance acquired from TÜV, making it optimal for the interlock circuit of machine tools. The mirror contact indicates a function in which even if the main contact is welded, the auxiliary break contact withstands impulse voltage of 2,500 V without contact.

(3) TÜV Certified DC Interface Contactor (Certification Standard: EN60947-4-1)

| Model Name | Certified Rating [A] (AC-3) | | Certification Number | Mirror Contact (Safety Separation Function) (Note 2) | | Remarks |
|------------|-----------------------------|--------------|----------------------|--|--|---------------------------------|
| | 220 to 240 V | 380 to 440 V | | Body Built-In Auxiliary Break Contact | Auxiliary Contact Unit Auxiliary Break Contact | |
| SD-Q11 | 12 | 9 | R50004919 | ○(Note 1) | ○(UQ-AX2) | Standard product and certified. |
| SD-Q12 | 12 | 9 | R50004919 | ○ | — | |
| SD-QR11 | 12 | 9 | R50004919 | — | — | |
| SD-QR12 | 12 | 9 | R50004919 | — | — | |

Note 1. When ordering SD-Q11 with 1b, indicate that it is with 1b.

Note 2. The ○ marked products have acquired mirror contact compliance from TÜV, making them optimal for the interlock circuit of machine tools. The mirror contact indicates a function in which even if the main contact is welded, the auxiliary break contact withstands impulse voltage of 2,500 V without contact.

(4) TÜV Certified Thermal Overload Relay T Series (Certification Standard EN60947-4-1)

| Model Name | Certification Number | Remarks |
|----------------------|----------------------|---------------------------------|
| TH-T18(AR)(BC)KP(YS) | R50257058 | Standard product and certified. |
| TH-T25(AR)(BC)KP(YS) | R50257062 | |
| TH-T50(AR)(BC)KP(YS) | R50319830 | |
| TH-T65KP | J9851140 | |
| TH-T100KP | J9851140 | |

(5) TÜV Certified Thermal Overload Relay N Series (Certification Standard EN60947-4-1)

| Model Name | Certification Number | Remarks |
|-------------|----------------------|---------------------------------|
| TH-N120KP | J9851168 | Standard product and certified. |
| TH-N120TAKP | J9851168 | |
| TH-N220RHKP | J9851166 | |
| TH-N220HZKP | J9851166 | |
| TH-N400RHKP | J9851172 | |
| TH-N400HZKP | J9851172 | |

Note 1. The thermal overload relay is TÜV certified for use in combination with magnetic contactors. (Excluding TH-N220/N400HZKP)

Note 2. TH-N120KP and N120TAKP are certified in combination with the UN-CZ live part protection cover.

(6) TÜV Certified Auxiliary Contact Unit T Series (Certification Standard EN60947-5-1)

| Model Name | Certification Number | Remarks |
|-------------|----------------------|---------------------------------|
| UT-AX2(BC) | R50255937 | Standard product and certified. |
| UT-AX4(BC) | R50255937 | |
| UT-AX11(BC) | R50255937 | |

Note 1. The AC-15 rating of 550 V or less and conventional free air thermal current are certified.

(7) TÜV Certified Auxiliary Contact Unit N Series (Certification Standard EN60947-5-1)

| Model Name | Certification Number | Remarks |
|-------------|----------------------|---------------------------------|
| UN-AX2(CX) | J9551337 | Standard product and certified. |
| UN-AX4(CX) | J9551337 | |
| UN-AX11(CX) | J9551337 | |
| UN-AX80 | R9851225 | |
| UN-AX150 | R9851225 | |
| UQ-AX2 | R50004919 | |

Note 1. The AC-15 rating of 550 V or less (440 V or less for UQ-AX2) and conventional free air thermal current are certified.

Note 2. The auxiliary contact unit is TÜV certified for use in combination with magnetic contactors (or contactor relays).

(8) TÜV Certified Contactor Relay T Series (Certification Standard EN60947-5-1)

| Model Name | Certification Number | Remarks | Model Name | Certification Number | Remarks |
|---------------|----------------------|---------------------------------|----------------|----------------------|---------------------------------|
| SR-T5(BC)(SA) | R50255933 | Standard product and certified. | SRD-T5(BC)(SA) | R50255933 | Standard product and certified. |
| SR-T9(BC)(SA) | R50255933 | | SRD-T9(BC)(SA) | R50255933 | |

Note 1. The AC-15 rating of 550 V or less and conventional free air thermal current are certified.

Note 2. The operation coil designations to be applied are AC12V to AC500V (alternating current) and DC12V to DC220V (direct current).

Note 3. The specification of the surge absorber mounted type (with "SA" in the model name) is also TÜV certified.

(9) TÜV Certified Solid State Contactor for Motor/Heater Loads (Certification Standards EN60947-4-2/EN60947-4-3)

| Certified Rating (A) | Frame | | | | N5SS (TE) | N8SS (TE) | N20 (TE) | N30 (TE) | N40 (TE) | N50 (TE) | N70NS (TE) | N80NS (TE) | NH70NS (TE) | NH80NS (TE) | | |
|----------------------|-----------------------|----------|----------------|---------------------|-----------|-----------|----------|----------|-----------|----------|------------|------------|-------------|-------------|----|---|
| | Load | Category | Voltage | Ambient Temperature | | | | | | | | | | | | |
| | Heater | AC-51 | AC100 to 240 V | 40°C | 5 | 8 | 20 | 30 | 40 | 50(45) | 70 | 80 | — | — | | |
| | | | | 60°C | 3 | 4.8 | 12 | 18 | 24 | 30(27) | 42 | 48 | — | — | | |
| | | | AC200 to 440 V | 40°C | — | — | 20 | 30 | 40 | 50(45) | — | — | 65 | 75 | — | — |
| | | | | 60°C | — | — | 12 | 18 | 24 | 30(27) | — | — | 39 | 45 | — | — |
| | Motor | AC-53 | AC200 to 240V | 40°C | 3.2 | 3.2 | 11.1 | 17.4 | 26 | 26 | 48 | 48 | 48 | 48 | 48 | |
| | | | AC400 to 440V | 40°C | — | — | 11.1 | 17.4 | 26 | 26 | — | — | 48 | 48 | 48 | |
| Type | Standard Product | | US-□ | R50037627 | | R50037628 | | | R50037629 | | R50037630 | | | | | |
| | CAN Terminal Product | | US-□CX | — | | R50037628 | | | — | | | — | | | | |
| | Rail Mounting Product | | US-□RM | — | | R50037628 | — | | | — | | | — | | | |

Note 1. The number in the Type column represents the certification number and "—" indicates no corresponding model.

Note 2. The value in the certified rating column () represents the rating for US-N50TE.

Note 3. The frame column (TE) represents the main circuit 3-pole 3-element type.

Note 4. TÜV mark is displayed on the product body (name plate).

(10) TÜV Certified Solid State Contactor for Heater Load (Certification Standards EN60947-4-3)

| Certified Rating (A) | Frame | | | | H20(DD) | H30(DD) | H40(DD) | H50(DD) |
|----------------------|-----------------------|----------|---------------|---------------------|---------|---------|---------|---------|
| | Load | Category | Voltage | Ambient Temperature | | | | |
| | Heater | AC-51 | AC24 to 480 V | 40°C | 20 | 30 | 40 | 50 |
| | | | | 60°C | 12 | 18 | 24 | 30 |
| Type | Standard Product | | US-□ | R50018958 | | | | |
| | No Cooling Fin | | US-□HZ | R50018958 | | | | |
| | Rail Mounting Product | | US-□RM | R50018958 | | | | |
| | Width Reduced Product | | US-□UF | R50018958 | | | | |

Note 1. The number in the Type column represents the certification number and "—" indicates no corresponding model.

Note 2. The frame column (DD) represents the 3-pole individual control.

Note 3. TÜV mark is displayed on the product body (name plate).

10.8 CCC Certified Products (China)



Magnetic starters are specified as a China Compulsory Certification Practice product, which requires CCC certification for export from Japan to China and for marketing in China.

For the detailed specifications of combinable symbols (application range field of the model name **) shown on page 275, refer to page 32. When ordering standard products other than certified models (● marked products in the table below), always add "CN" at the end of the model name to specify. The solid state contactor US-H□ for heater load and optional units (UN-CV, ML, RR, SA, etc.) that are used by attaching to a magnetic starter and are without load switching function are not subject to CCC certification.

In China, the "Energy Efficiency Labeling Management Regulation" has been implemented for the purpose of improving energy efficiency, which applies to the AC operated AC magnetic contactor (rated operating voltage: 380 V (400 V), rated operating current: 6 to 630 A).

Export to China and/or sale of these products in China will require an energy efficiency label.

If these products are to be indirectly exported to China, consult with your dealer or with us.

10.8.1 CCC Certified Model Name List

● Non-Reversible Magnetic Starter, Magnetic Contactor T Series

○ : Standard product and certified, □ : Out of production range

| | Product Specifications | Model Name | Frame Size | | | | | | | | | | |
|---|--|-------------|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| | | | T10 | T12 | T20 | T21 | T25 | T32 | T35 | T50 | T65 | T80 | T100 |
| Open Type Magnetic Starters | With 2E Thermal | MSO-T□KP | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | Wiring Streamlining Terminal, With 2E Thermal | MSO-T□BCKP | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | Surge Absorber Built-in Type with 2E Thermal | MSO-T□KPSA | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | With Terminal Cover, With 2E Thermal | MSO-T□CWKP | | | | | | | | | ○ | ○ | ○ |
| | Drop Time Shortened Type, With 2E Thermal | MSO-T□KPQM | | | | | | | | | ○ | ○ | ○ |
| | DC Operated Type, With 2E Thermal | MSOD-T□KP | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | DC Operated, Wiring Streamlining Terminal, With 2E Thermal | MSOD-T□BCKP | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | DC Operated Surge Absorber Built-in Type, With 2E Thermal | MSOD-T□KPSA | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| DC Operated Type With Terminal Cover and 2E Thermal | MSOD-T□CWKP | | | | | | | | | ○ | ○ | ○ | |
| Magnetic Contactors | Standard Specifications | S-T□ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | Wiring Streamlining Terminal | S-T□BC | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | Surge Absorber Built-in Type | S-T□SA | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | With Terminal Cover | S-T□CW | | | | | | | | | ○ | ○ | ○ |
| | Drop Time Shortened Type | S-T□QM | | | | | | | | | ○ | ○ | ○ |
| | DC Operated | SD-T□ | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | DC Operated, Wiring Streamlining Terminal | SD-T□BC | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | DC Operated Surge Absorber Built-in Type | SD-T□SA | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | DC Operated Type with Terminal Cover | SD-T□CW | | | | | | | | | ○ | ○ | ○ |
| | Mechanically Latched Type | SL(D)-T□ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | Mechanically Latched, Wiring Streamlining Terminal | SL(D)-T□BC | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | Mechanically Latched, Surge Absorber Built-in Type | SL(D)-T□SA | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

● Non-Reversible Magnetic Starter, Magnetic Contactor N Series

○ : Certified as standard product, ● : Certified (add "CN" at the end of the model name when ordering), x : Certification not acquired, □ : Out of production range

| | Product Specifications | Model Name | Frame Size | | | | | | | | | |
|----------------------------------|--|------------|------------|-----|------|------|------|------|------|------|------|------|
| | | | N38 | N48 | N125 | N150 | N180 | N220 | N300 | N400 | N600 | N800 |
| Enclosed Magnetic Starters | With 2E Thermal | MS-□KP | | | ● | ● | ● | ● | ● | ● | | |
| | Surge Absorber Built-in Type | MS-□SA | | | | | | | | | | |
| | With Push Button, with ON/OFF/Reset | MS-□PM | | | | | | | | | | |
| | With Push Button, with ON/OFF/Reset | MS-□KPPM | | | | | | | | | | |
| | With Push Button, with ON/OFF | MS-□PS | | | | | | | | | | |
| | With Push Button, with ON/OFF | MS-□KPPS | | | | | | | | | | |
| Drop Time Shortened Type | MS-□KPQM | | | ● | ● | ● | ● | ● | ● | | | |
| Open Type Magnetic Starters | With 2E Thermal | MSO-□KP | | | ○ | ○ | ○ | ○ | ○ | ○ | | |
| | With Saturable Reactor with 2E | MSO-□KPSR | | | ○ | ○ | ○ | ○ | ○ | ○ | | |
| | Drop Time Shortened Type with 2E Thermal | MSO-□KPQM | | | ○ | ○ | ○ | ○ | ○ | ○ | | |
| | DC Operated | MSOD-□ | | | | | | | | | | |
| DC Operated Type with 2E Thermal | MSOD-□KP | | | ○ | ○ | | ○ | ○ | ○ | | | |
| Magnetic Contactors | Standard Specifications | S-□ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | Drop Time Shortened Type | S-□QM | | | ○ | ○ | ○ | ○ | ○ | ○ | | |
| | DC Operated | SD-□ | | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | Mechanically Latched Type | SL(D)-□ | | | ○ | ○ | | ○ | ○ | ○ | ● | ● |

Note 1. The delay open types MSO-N□DL and S-N□DL and mechanically latched type MSOL(D)-N□(KP) are not certified.

● Reversible Magnetic Starter, Magnetic Contactor T Series

○ : Standard product and certified, ◻ : Out of production range

| | Product Specifications | Model Name | Frame Size | | | | | | | | | | |
|---|--|------------------|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| | | | T10 | T12 | T20 | T21 | T25 | T32 | T35 | T50 | T65 | T80 | T100 |
| Open Type Magnetic Starters | With 2E Thermal | MSO-2xT ◻ KP | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | Wiring Streamlining Terminal, With 2E Thermal | MSO-2xT ◻ BCKP | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | Surge Absorber Built-in Type with 2E Thermal | MSO-2xT ◻ KP SA | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | With Terminal Cover, With 2E Thermal | MSO-2xT ◻ CWKP | | | | | | | | | ○ | ○ | ○ |
| | Drop Time Shortened Type, With 2E Thermal | MSO-2xT ◻ KPQM | | | | | | | | | ○ | ○ | ○ |
| | DC Operated Type, With 2E Thermal | MSOD-2xT ◻ KP | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | DC Operated, Wiring Streamlining Terminal, With 2E Thermal | MSOD-2xT ◻ BCKP | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | DC Operated Surge Absorber Built-in Type, With 2E Thermal | MSOD-2xT ◻ KP SA | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| DC Operated Type With Terminal Cover and 2E Thermal | MSOD-2xT ◻ CWKP | | | | | | | | | ○ | ○ | ○ | |
| Magnetic Contactors | Standard Specifications | S-2xT ◻ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | Wiring Streamlining Terminal | S-2xT ◻ BC | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | Surge Absorber Built-in Type | S-2xT ◻ SA | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | With Terminal Cover | S-2xT ◻ CW | | | | | | | | | ○ | ○ | ○ |
| | Drop Time Shortened Type | S-2xT ◻ QM | | | | | | | | | ○ | ○ | ○ |
| | DC Operated | SD-2xT ◻ | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | DC Operated, Wiring Streamlining Terminal | SD-2xT ◻ BC | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | DC Operated Surge Absorber Built-in Type | SD-2xT ◻ SA | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | DC Operated Type with Terminal Cover | SD-2xT ◻ CW | | | | | | | | | ○ | ○ | ○ |
| | Mechanically Latched Type | SL(D)-2xT ◻ | | | | | | | | | ○ | ○ | ○ |
| | Mechanically Latched, Wiring Streamlining Terminal | SL(D)-2xT ◻ BC | | | | | | | | | ○ | ○ | ○ |
| | Mechanically Latched, Surge Absorber Built-in Type | SL(D)-2xT ◻ SA | | | | | | | | | ○ | ○ | ○ |

● Reversible Magnetic Starter, Magnetic Contactor N Series

○ : Certified as standard product, ● : Certified (add "CN" at the end of the model name when ordering), x : Certification not acquired, ◻ : Out of production range

| | Product Specifications | Model Name | Frame Size | | | | | | | | | | |
|---------------------------------------|--|----------------|------------|------|------|------|------|------|------|------|-----|-----|---|
| | | | N125 | N150 | N180 | N220 | N300 | N400 | N600 | N800 | N38 | N48 | |
| Reversible Open Type Magnetic Starter | Standard Specifications | MSO-2x ◻ | x | x | x | x | x | x | | | | | |
| | With 2E Thermal | MSO-2x ◻ KP | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | With Saturable Reactor | MSO-2x ◻ SR | x | x | x | x | x | x | | | | | |
| | With Saturable Reactor with 2E | MSO-2x ◻ KP SR | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | Drop Time Shortened Type | MSO-2x ◻ QM | x | x | x | x | x | x | | | | | |
| | Drop Time Shortened Type with 2E Thermal | MSO-2x ◻ KPQM | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | DC Operated | MSOD-2x ◻ | | | | | | | | | | | |
| | DC Operated Type with 2E Thermal | MSOD-2x ◻ KP | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Reversible Magnetic Contactors | Standard Specifications | S-2x ◻ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | Drop Time Shortened Type | S-2x ◻ QM | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | DC Operated | SD-2x ◻ | ○ | ○ | | | | | ○ | ○ | | | |
| | Mechanically Latched Type | SL(D)-2x ◻ | ○ | ○ | | | | | ○ | ○ | ● | ● | |

Note 1. The enclosed type MS-2xN ◻ and mechanically latched type MSOL(D)-2xN ◻ (KP) are not certified.

● Thermal Overload Relay T Series

○ : Standard product and certified, ◻ : Out of production range

| Product Specifications | Model Name | Frame Size | | | | |
|---|------------|------------|-----|-----|-----|------|
| | | T18 | T25 | T50 | T65 | T100 |
| Overload and Open-Phase Protection (2E) | TH- ◻ KP | ○ | ○ | ○ | ○ | ○ |
| 2E with Automatic Reset | TH- ◻ ARKP | ○ | ○ | ○ | ○ | ○ |
| 2E with Wiring Streamlining Terminal | TH- ◻ BCKP | ○ | ○ | ○ | | |
| 2E with Anti corrosion Treated Terminal | TH- ◻ KPYS | ○ | ○ | ○ | ○ | ○ |

● Thermal Overload Relay N Series

○ : Certified as standard product, ● : Certified (add "CN" at the end of the model name when ordering),

x : Certification not acquired, ◻ : Out of production range

| Product Specifications | Model Name | Frame Size | | | | | | |
|---|-------------|------------|--------|--------|--------|--------|--------|------|
| | | N120 | N120TA | N220RH | N220HZ | N400RH | N400HZ | N600 |
| Overload Protection | TH- ◻ | x | x | x | x | x | x | x |
| Overload and Open-Phase Protection (2E) | TH- ◻ KP | ○ | ○ | ○ | ○ | ○ | ○ | ● |
| Overload Protection (for Independent Mounting) | TH- ◻ HZ | | x | | | | | |
| Overload and Open-Phase Protection (for Independent Mounting) | TH- ◻ HZKP | | ○ | | | | | |
| With Saturable Reactor | TH- ◻ SR | x | x | x | x | x | x | x |
| 2E With Saturable Reactor | TH- ◻ KP SR | ○ | ○ | ○ | ○ | ○ | ○ | ● |
| Automatic Reset | TH- ◻ AR | x | x | x | x | x | x | x |

● Solid State Contactors ⊙: Standard product and certified, x: Certification not acquired, □: Out of production range

| Product Specifications | | Model Name | Frame Size | | | | | | | | | |
|------------------------|-------------------------|------------|--------------------|------|-----|-----|-----|-----|-------|-------|--------|--------|
| | | | N5SS | N8SS | N20 | N30 | N40 | N50 | N70NS | N80NS | NH70NS | NH80NS |
| 2-Element Type | Standard Specifications | US- □ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| | With Terminal Cover | US- □ CX | | | ⊙ | ⊙ | ⊙ | ⊙ | | | | |
| | IEC Rail Mounting | US- □ RM | Standard Equipment | | ⊙ | | | | | | | |
| 3-Element Type | Standard Specifications | US- □ TE | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| | With Terminal Cover | US- □ TECX | | | ⊙ | ⊙ | ⊙ | ⊙ | | | | |
| | IEC Rail Mounting | US- □ TERM | Standard Equipment | | ⊙ | | | | | | | |

Note 1. US-H□ for heater load is non-certified.

Note 2. The following optional units of the solid state contactor are not subject to certification.

UA-DR1, UA-SH1, UA-SH8, UA-PC, UA-RE, UA-CVDR1, UA-CVSH-8, UA-CV501US

● Contactor Relay T Series

⊙: Standard product and certified, □: Out of production range

| Product Specifications | | Model Name | Frame Size | |
|---------------------------|------------------------------|--------------|------------|----|
| | | | T5 | T9 |
| AC Operated Type | Standard Specifications | SR- □ | ⊙ | ⊙ |
| | Wiring Streamlining Terminal | SR- □ BC | ⊙ | ⊙ |
| | Surge Absorber Mounted Type | SR- □ SA | ⊙ | ⊙ |
| DC Operated Type | DC Operated | SRD- □ | ⊙ | ⊙ |
| | Wiring Streamlining Terminal | SRD- □ BC | ⊙ | ⊙ |
| | Surge Absorber Mounted Type | SRD- □ SA | ⊙ | ⊙ |
| Mechanically Latched Type | Mechanically Latched Type | SRL(D)- □ | ⊙ | |
| | Wiring Streamlining Terminal | SRL(D)- □ BC | ⊙ | |
| | Surge Absorber Mounted Type | SRL(D)- □ SA | ⊙ | |

● Contactor Relay K Series

⊙: Standard product and certified, □: Out of production range

| Product Specifications | | Model Name | Frame Size |
|---------------------------|---------------------------|--------------|------------|
| | | | K100 |
| Mechanically Latched Type | Mechanically Latched Type | SRL(D)- □ | ⊙ |
| | With Terminal Cover | SRL(D)- □ CX | |

Note 1. The delay open type SR-N□DL, SR(D)-N□JH with large rated auxiliary contact, and SR(D)-N□LC with overlap contact are not certified.

● Auxiliary Contact Unit T Series ⊙: Standard product and certified

| Product Specifications | | Model Name | Frame Size | | |
|------------------------------|--|------------|------------|---|----|
| | | | 2 | 4 | 11 |
| Standard Specifications | | UT-AX □ | ⊙ | ⊙ | ⊙ |
| Wiring Streamlining Terminal | | UT-AX □ BC | ⊙ | ⊙ | ⊙ |

● Auxiliary Contact Unit N Series

⊙: Standard product and certified, ●: Certified (add "CN" at the end of the model name when ordering), □: Out of production range

| Product Specifications | | Model Name | Frame Size | | | | | | |
|-------------------------------|--|------------|------------|----|---|----|----|-----|-----|
| | | | 2 | 22 | 4 | 11 | 80 | 150 | 600 |
| Standard Specifications | | UN-AX □ | ⊙ | | ⊙ | ⊙ | ● | ● | ● |
| With Terminal Cover | | UN-AX □ CX | ⊙ | | ⊙ | ⊙ | | | |
| With Low-Level Signal Contact | | UN-LL □ | | ⊙ | | | | | |

● DC Interface Contactors

⊙: Standard product and certified, x: Certification not acquired

| Product Specifications | | Model Name | Frame Size | | | |
|--|--|--------------|---------------------|-----|-----------------|------|
| | | | Non-Reversible Type | | Reversible Type | |
| | | | Q11 | Q12 | QR11 | QR12 |
| Standard Specification - Magnetic Starter | | MSOD- □ | ⊙ | ⊙ | ⊙ | ⊙ |
| With 2E Thermal | | MSOD- □ KP | ⊙ | ⊙ | ⊙ | ⊙ |
| With Terminal Cover | | MSOD- □ BC | ⊙ | ⊙ | ⊙ | ⊙ |
| With Terminal Cover, With 2E Thermal | | MSOD- □ BCKP | ⊙ | ⊙ | ⊙ | ⊙ |
| Standard Specifications - Magnetic Contactor | | SD- □ | ⊙ | ⊙ | ⊙ | ⊙ |

Note 1. The DC12 V coil voltage designation is not certified.

● Auxiliary Contact Units for DC Interface Contactors

◎: Standard product and certified

| Product Specifications | Model Name | Frame Size | |
|-------------------------|------------|------------|-----|
| | | 2 | 2KR |
| Standard Specifications | UQ-AX □ | ◎ | ◎ |

● Vacuum Magnetic Contactors

◎: Certified (add "CN" at the end of the model name when ordering), □: Out of production range

| Product Specifications | Model Name | Frame Size | | | |
|---------------------------|------------------|------------|------|------|------|
| | | V160 | V320 | V400 | V600 |
| AC Operated Type | SH- □ | ◎ | ◎ | ◎ | ◎ |
| DC Operated Type | SHD- □ | ◎ | ◎ | ◎ | □ |
| Mechanically Latched Type | AC Operated Type | ◎ | ◎ | ◎ | ◎ |
| | DC Operated Type | ◎ | ◎ | ◎ | □ |

● Voltage Detection Relays

◎: Certified (add "CN" at the end of the model name when ordering)

| Product Specifications | | Model Name | Application |
|------------------------|---|------------|-------------|
| For Standard Detection | Operating Voltage AC100 to 110, 200 to 220 V for 50/60 Hz | SRE-AA | ◎ |
| | Operating Voltage AC115 to 120, 230 to 240 V for 50/60 Hz | SRE-AAU | ◎ |
| For Power Detection | Set Value (Scale) is OFF Voltage | SRE-K | ◎ |
| | Set Value (Scale) is ON Voltage | SRE-KT | ◎ |

● Instantaneous Stop/Restart Relays

◎: Certified (add "CN" at the end of the model name when ordering)

| Product Specifications | Model Name | Application |
|-------------------------|------------|-------------|
| Standard Specifications | UA-DL2 | ◎ |

● Fault Detection Units

◎: Certified (add "CN" at the end of the model name when ordering)

| Product Specifications | | Model Name | Application |
|------------------------|-------------------------|------------|-------------|
| For 200 V Main Circuit | Standard Specifications | UN-FD | ◎ |
| | With Terminal Cover | UN-FDCX | ◎ |
| For 400 V Main Circuit | Standard Specifications | UN-FD4 | ◎ |
| | With Terminal Cover | UN-FD4CX | ◎ |

Note 1. The DC24 V rated operating voltage specification is not certified.

● DC/AC Interface Units for Operation Coils

◎: Certified (add "CN" at the end of the model name when ordering), □: Out of production range

| Product Specifications | Model Name | Frame Size | | |
|-------------------------|------------|------------|----|----|
| | | 12 | 22 | 32 |
| Standard Specifications | UN-SY | ◎ | ◎ | ◎ |
| With Terminal Cover | UN-SY □ CX | □ | ◎ | □ |

Note 1. The following optional units for contactless output (triac output) are not subject to certification.
UN-SY11, UN-SY21(CX), UN-SY31

10.8.2 Rating, Specification and Certification Number

● Magnetic Starters (Certification Standard: GB/T14048.4)

<Enclosed Type>

| Model Name MS: AC Operated | Certified Rating Category AC-3 (220 to 240 V/380 to 440 V) | | Heater Designation Range | Coil Designation Range | Applicable Range of Model Name ** (Combinable) | Auxiliary Contact Arrangement Standard | Certification Number |
|-------------------------------|---|-----------------------------|--------------------------------|---------------------------|--|--|----------------------|
| | Rated Capacity (kW) | Rated Operating Current (A) | | | | | |
| MS-N125CNKP | 37/60 | 125/120 | 42 to 105A | AC24V to AC500V | AR, QM | 2a2b | 20030103 04093067 |
| MS-N150CNKP | 45/75 | 150/150 | 42 to 125A | | | 2a2b | 20030103 04093079 |
| MS-N180CNKP | 55/90 | 180/180 | 82 to 150A | | | 2a2b | 20030103 04093070 |
| MS-N220CNKP | 75/132 | 250/250 | 82 to 180A | AC48V to AC500V | | 2a2b | |
| MS-N300CNKP | 90/160 | 300/300 | 105 to 250A | | | 2a2b | 20030103 04093066 |
| MS-N400CNKP | 125/220 | 400/400 | 105 to 330A | | | 2a2b | |

<Open Type>

| Model Name MSO: AC Operated MSOD: DC Operated 2x: Reversible | Certified Rating Category AC-3 (220 to 240 V/380 to 440 V) | | Heater Designation Range | Coil Designation Range | Applicable Range of Model Name ** (Combinable) | Auxiliary Contact Arrangement Non-Reversing/ Reversing Standard | Certification Number |
|---|---|-----------------------------|--------------------------------|------------------------------------|--|--|----------------------|
| | Rated Capacity (kW) | Rated Operating Current (A) | | | | | |
| MSO-(2x)T10KP** | 2.5/4 | 11/9 | 0.12 to 9A | AC12V to AC500V | AR, BC, SA, FS | 1a/1a x 2 + 2b | 2015010304817542 |
| MSO(D)-(2x)T12KP** | 3.5/5.5 | 13/12 | 0.12 to 11A | AC12V to AC500V | | 1a1b/1a1b x 2 + 2b | |
| MSO(D)-(2x)T20KP** | 4.5/7.5 | 18/18 | 0.12 to 15A | DC12V to DC220V | | | 2015010304817518 |
| MSO(D)-(2x)T21KP** | 5.5/11 | 25/23 | 0.24 to 15A | | AR, CW, FS, QM | 2a2b/2a2b x 2 | 2016010304835055 |
| MSO-(2x)T25KP** | 7.5/15 | 30/30 | 0.24 to 22A | AC12V to AC500V | | | |
| MSO(D)-(2x)T35KP** | 11/18.5 | 40/40 | 0.24 to 29A | | | | |
| MSO(D)-(2x)T50KP** | 15/22 | 55/50 | 0.24 to 42A | AC12V to AC500V | | | |
| MSO(D)-(2x)T65KP** | 18.5/30 | 65/65 | 15 to 54A | DC12V to DC220V | | | |
| MSO(D)-(2x)T80KP** | 22/45 | 85/85 | 15 to 67A | | | | |
| MSO(D)-(2x)T100KP** | 30/55 | 105/105 | 15 to 82A | | | 2016010304835279 | |
| MSO(D)-(2x)N125KP** | 37/60 | 125/120 | 42 to 105A | AC24V to AC500V DC12V to DC220V | AR, QM (AC Operation Only), SR | 2a2b/3a3b x 2 | 20030103 04093067 |
| MSO(D)-(2x)N150KP** | 45/75 | 150/150 | 42 to 125A | | | | 20030103 04093079 |
| MSO-(2x)N180KP** | 55/90 | 180/180 | 82 to 150A | AC48V to AC500V | | | 20030103 04093070 |
| MSO(D)-(2x)N220KP** | 75/132 | 250/250 | 82 to 180A | DC12V to DC220V | | | 20030103 04093066 |
| MSO(D)-(2x)N300KP** | 90/160 | 300/300 | 105 to 250A | | | | |
| MSO(D)-(2x)N400KP** | 125/220 | 400/400 | 105 to 330A | | | | |

● Magnetic Contactors (Certification Standard: GB/T14048.4)

<Standard Type>

| Model Name S: AC Operated SD: DC Operated 2x: Reversible | Certified Rating Category AC-3 (220 to 240 V/380 to 440 V) | | Conventional Free Air Thermal Current Ith (A) | Coil Designation Range | Applicable Range of Model Name ** (Combinable) | Auxiliary Contact Arrangement Non-Reversing/ Reversing Standard | Certification Number | |
|---|---|-----------------------------|--|------------------------------------|---|--|-------------------------------------|-------------------|
| | Rated Capacity (kW) | Rated Operating Current (A) | | | | | | |
| S-(2x)T10** | 2.5/4 | 11/9 | 20 | AC12V to AC500V DC12V to DC220V | BC, SA | 1a/1a x 2 + 2b | 20130103 04604263 | |
| S(D)-(2x)T12** | 3.5/5.5 | 13/12 | 20 | | | 1a1b/1a1b x 2 + 2b | | |
| S(D)-(2x)T20** | 4.5/7.5 | 18/18 | 20 | | | 2a2b/2a2b x 2 | | 20130103 04604262 |
| S(D)-(2x)T21** | 5.5/11 | 25/23 | 32 | | | | | |
| S-(2x)T25** | 7.5/15 | 30/30 | 32 | | | - /2a2b x 2 | 20150103 04790992 | |
| S(D)-(2x)T32** | 7.5/15 | 32/32 | 32 | | | 2a2b/2a2b x 2 | | 20150103 04790996 |
| S(D)-(2x)T35** | 11/18.5 | 40/40 | 60 | | | | | |
| S(D)-(2x)T50** | 15/22 | 55/50 | 80 | | | QM (AC Operation Only) CW | 20150103 04790995 | |
| S(D)-(2x)T65** | 18.5/30 | 65/65 | 100 | | | | | |
| S(D)-(2x)T80** | 22/45 | 85/85 | 135 | | | QM (AC Operation Only) | 2a2b/3a3b x 2 | |
| S(D)-(2x)T100** | 30/55 | 105/105 | 150 | | | | | |
| S(D)-(2x)N125** | 37/60 | 125/120 | 150 | | | AC24V to AC500V DC12V to DC220V | 20020103 04024706 | |
| S(D)-(2x)N150** | 45/75 | 150/150 | 200 | | | AC48V to AC500V DC12V to DC220V | | 20020103 04024707 |
| S-(2x)N180** | 55/90 | 180/180 | 260 | | | | AC100V to AC500V DC24V to DC220V | |
| S(D)-(2x)N220** | 75/132 | 250/250 | 260 | 20020103 04024709 | | | | |
| S(D)-(2x)N300** | 90/160 | 300/300 | 350 | | — | 2a2b/4a4b x 2 | | |
| S(D)-(2x)N400** | 125/220 | 400/400 | 450 | | | | | |
| S(D)-(2x)N600** | 190/330 | 630/630 | 660 | 20030103 04095569 | | | | |
| S(D)-(2x)N800** | 220/440 | 800/800 | 800 | | | | | |

<Mechanically Latched Type>

| Model Name SL: AC Operated SLD: DC Operated 2x: Reversible | Certified Rating Category AC-3 (220 to 240 V/380 to 440 V) | | Conventional Free Air Thermal Current Ith (A) | Coil Designation Range | Applicable Range of Model Name ** (Combinable) | Auxiliary Contact Arrangement Non-Reversing/ Reversing Standard (Effective Contact) | Certification Number | |
|---|---|-----------------------------|---|-------------------------------------|---|---|-------------------------------------|-------------------|
| | Rated Capacity (kW) | Rated Operating Current (A) | | | | | | |
| SL(D)-(2x)T21** | 5.5/11 | 25/23 | 32 | AC12V to AC500V DC12V to DC200V | BC, SA | 2a2b/2a2b x 2 | 20130103 04604262 | |
| SL(D)-(2x)T35** | 11/18.5 | 40/40 | 60 | | | | 20150103 04790992 | |
| SL(D)-(2x)T50 | 15/22 | 55/50 | 80 | | | | | 20150103 04790996 |
| SL(D)-(2x)T65 | 18.5/30 | 65/65 | 100 | | | | | |
| SL(D)-(2x)T80 | 22/45 | 85/85 | 135 | | | | 20150103 04790995 | |
| SL(D)-(2x)T100 | 30/55 | 105/105 | 150 | | | | | |
| SL(D)-(2x)N125 | 37/60 | 125/120 | 150 | AC100V to AC500V DC12V to DC200V | — | 1a2b/1a2b x 2 | 20020103 04024706 | |
| SL(D)-(2x)N150 | 45/75 | 150/150 | 200 | | | | 20020103 04024707 | |
| SL(D)-(2x)N220 | 75/132 | 250/250 | 260 | | | | | 20020103 04024708 |
| SL(D)-(2x)N300 | 90/160 | 300/300 | 350 | | | | 20020103 04024709 | |
| SL(D)-(2x)N400 | 125/220 | 400/400 | 450 | | | | | |
| SL(D)-(2x)N600CN** | 190/330 | 630/630 | 660 | | | | AC100V to AC500V DC24V to DC200V | — |
| SL(D)-(2x)N800CN** | 220/440 | 800/800 | 800 | | | | | |

<Main Circuit 3-Pole>

| Model Name S: AC Operated 2x: Reversible | Certified Rating Category AC-3 (220 to 240 V/380 to 440 V) | | Conventional Free Air Thermal Current Ith (A) | Coil Designation Range | Applicable Range of Model Name ** (Combinable) | Auxiliary Contact Arrangement Non-Reversing/ Reversing Standard | Certification Number |
|--|---|-----------------------------|---|---------------------------|--|---|----------------------|
| | Rated Capacity (kW) | Rated Operating Current (A) | | | | | |
| S-(2x)N38** | 11/15 | 39/32 | 60 | AC12V to AC500V | CX, SA | —/2a2b x 2 | 20020103 04024684 |
| S-(2x)N48** | 15/18.5 | 50/40 | 80 | | | | |

● Special Purpose Magnetic Contactors (Certification Standard: GB/T14048.4)

<DC>

| Model Name DU: AC Operated DUD: DC Operated | Main Contact Arrangement | Coil Designation Range | Applicable Range of Model Name ** (Combinable) | Auxiliary Contact Arrangement | Certification Number |
|---|--------------------------|------------------------------------|---|-------------------------------|----------------------|
| DU(D)-N30CN** | DU: 2a1b DUD: 2a | AC24V to AC500V DC12V to DC220V | QM (AC Operation Only) | 2a2b | 20020103 04024704 |
| DU(D)-N60CN** | | | | 2a2b | 20020103 04024706 |
| DU(D)-N120CN** | | AC48V to AC500V DC12V to DC220V | | 2a2b | 20020103 04024707 |
| DU(D)-N180CN** | | | | 2a2b | 20020103 04024708 |
| DU(D)-N260CN** | | | | 2a2b | 20020103 04024709 |

Note 1. Refer to page 239 for ratings.

<NC Main Contact Type>

| Model Name B: AC Operated BD: DC Operated | Main Contact Arrangement | Coil Designation Range | Applicable Range of Model Name ** (Combinable) | Auxiliary Contact Arrangement | Certification Number |
|---|--------------------------|------------------------------------|---|-------------------------------|----------------------|
| B(D)-T21** | B: 1a2b, 3b | AC24V to AC500V DC12V to DC220V | SA | 2a | 20130103 04604262 |
| B(D)-N65CN** | BD: 1a2b | | | 2a2b | 20020103 04024705 |
| B(D)-N100CN** | B: 1a2b BD: 1a2b | | QM (AC Operation Only) | 2a2b | 20020103 04024706 |

Note 1. Refer to page 235 for ratings.

● Thermal Overload Relays (Certification Standard: GB/T14048.4)

<With 3-Element (2E)>

| Model Name | Heater Designation | Applicable Range of Model Name ** (Combinable) | Combination Magnetic Contactor | Certification Number |
|---------------|--|--|--------------------------------|----------------------|
| TH-T18KP** | 0.12A, 0.17A, 0.24A, 0.35A, 0.5A, 0.7A, 0.9A, 1.3A, 1.7A, 2.1A, 2.5A, 3.6A, 5A, 6.6A, 9A, 11A, 15A | AR, BC, FS, YS | S-T10 to T20 | 20130103 09620822 |
| TH-T25KP** | 0.24A, 0.35A, 0.5A, 0.7A, 0.9A, 1.3A, 1.7A, 2.1A, 2.5A, 3.6A, 5A, 6.6A, 9A, 11A, 15A, 22A | | S-T21, T25 | 20130103 09620821 |
| TH-T50KP** | 29A, 35A, 42A | AR, BC, FS, YS | S-T21 to T50 | 2015010309794365 |
| TH-T65KP** | 15A, 22A, 29A, 35A, 42A, 54A | AR, CW, FS, YS | S-T65 to T100 | 2015010309794371 |
| TH-T100KP** | 67A, 82A | AR, CW, FS, YS | S-T65 to T100 | 2015010309794379 |
| TH-N120KP** | 42A, 54A, 67A, 82A | AR, HZ, SR | S-N125, N150 | 20020103 09024724 |
| TH-N120TAKP** | 105A, 125A | AR, SR | S-N125, N150 | |
| TH-N220RHKP** | 82A, 105A, 125A, 150A, 180A | AR, SR | S-N180, N220 | 20020103 09024719 |
| TH-N220HZKP** | | | Independent Mounting Only | |
| TH-N400RHKP** | 105A, 125A, 150A, 180A, 250A, 330A | | S-N300, N400 | |
| TH-N400HZKP** | | | Independent Mounting Only | |
| TH-N600KPCN** | 250A, 330A, 500A, 660A | | For Independent Mounting | 20020103 04095454 |

Note 1. TH-N□ becomes the quick trip type when changed from KP to KF.

● Contactor Relays, Pneumatic Timers (Certification Standard: GB/T14048.5)

<Standard Type>

| Model Name SR: AC Operated SRD: DC Operated | Coil Designation Range | Applicable Range of Model Name ** (Combinable) | Contact Arrangement | Certification Number |
|---|------------------------|--|---------------------|----------------------|
| SR(D)-T5** | AC12V to AC500V | BC, SA | 5a, 4a1b, 3a2b | 20130103 03604260 |
| SR(D)-T9** | DC12V to DC220V | | 9a, 7a2b, 5a4b | |

<Mechanically Latched Type>

| Model Name SRL: AC Operated SRLD: DC Operated | Coil Designation Range | Applicable Range of Model Name ** (Combinable) | Contact Arrangement | Certification Number |
|---|------------------------------------|--|----------------------------------|----------------------|
| SRL(D)-T5** | AC12V to AC500V DC12V to DC200V | BC, SA | 5a, 4a1b, 3a2b | 20130103 03604260 |
| SRL (D)-K100 | AC12V to AC440V DC12V to DC200V | — | 9a, 8a1b, 7a2b, 6a3b, 5a4b, 4a5b | 20020103 03024696 |

<Pneumatic Timer>

| Model Name SRT: AC Operated SRTD: DC Operated | Coil Designation Range | Applicable Range of Model Name ** (Combinable) | Contact Arrangement | Certification Number |
|---|------------------------|--|-------------------------------------|----------------------|
| SRT(D)-NNCN** | AC12V to AC440V | CX, SA | Momentary: 2a2b Time Limit: 1a1b | 20050103 03152666 |
| SRT(D)-NFCN** | DC12V to DC220V | | | |

● Auxiliary Contact Units (Certification Standard: GB/T14048.5)

| Model Name | Contact Arrangement | Applicable Range of Model Name ** (Combinable) | Applicable Magnetic Contactors | Certification Number |
|------------|---|---|--------------------------------|----------------------|
| UT-AX2** | 2a, 1a1b, 2b | BC | S-T10 to T32 | 20130103 04608269 |
| UT-AX4** | 4a, 3a1b, 2a2b | | | |
| UT-AX11** | 1a1b | | | |
| UN-AX2** | 2a, 1a1b | CX | S-N10 to N65 | 20020103 03024700 |
| UN-AX4** | 4a, 3a1b, 2a2b | | S-N10, N11, N20 to N65 | |
| UN-AX11** | 1a1b | | S-N80 to N125 | |
| UN-AX80CN | 1a1b | — | S-N150 to N400 | 20020103 03024720 |
| UN-AX150CN | 1a1b | | S-N600CN, N800CN | 20020103 03024722 |
| UN-AX600CN | 2a2b | — | SD-Q11, SD-QR11 (Left Side) | 20050103 04149321 |
| UQ-AX2** | 1a1b | — | SD-QR11 (Right Side) | |
| UQ-AX2KR** | 1a1b | — | SD-QR11 (Right Side) | 20050103 04149321 |
| UN-LL22** | Low-Level Contact: 1a1b Standard Contact: 1a1b | CX | S-N10 to N65, SR-N4/N5 | 20020103 03024700 |

● DC Interface Contactors (Certification Standard: GB/T14048.4)

<Magnetic Starters>

| Model Name Q: Non-Reversible QR: Reversible | Certified Rating Category AC-3 (220 to 240 V/380 to 440 V) | | Heater Designation Range (Note 1) | Coil Designation Range | Applicable Range of Model Name ** (Combinable) | Auxiliary Contact Arrangement Standard | Certification Number |
|---|---|-----------------------------|---|---------------------------|--|--|----------------------|
| | Rated Capacity (kW) | Rated Operating Current (A) | | DC Operated | | | |
| MSOD-Q11** | 3/4 | 12/9 | 0.12 to 11A | DC24V | AR, CX, KP, SR | 1a | 20030103 04093069 |
| MSOD-Q12** | | | | | | 1a1b | |
| MSOD-QR11** | 3/4 | 12/9 | 0.12 to 11A | DC24V | AR, CX, KP, SR | 1b x 2 | |
| MSOD-QR12** | | | | | | 1a1b x 2 | |

<Magnetic Contactors>

| Model Name Q: Non-Reversible QR: Reversible | Certified Rating Category AC-3 (220 to 240 V/380 to 440 V) | | Conventional Free Air Thermal Current Ith (A) | Coil Designation Range | Auxiliary Contact Arrangement Standard | Certification Number |
|---|---|-----------------------------|---|---------------------------|--|----------------------|
| | Rated Capacity (kW) | Rated Operating Current (A) | | DC Operated | | |
| SD-Q11 | 3/4 | 12/9 | 20 | DC24V | 1a | 20030103 04095567 |
| SD-Q12 | | | | | 1a1b | |
| SD-QR11 | 3/4 | 12/9 | 20 | DC24V | 2b | |
| SD-QR12 | | | | | 2a2b | |

● Solid State Contactors (Certification Standard: GB/T14048.6)

<3-Pole 2-Element Type>

| Model Name | 3 ϕ Motor Capacity 200/400 V AC-53a (kW(A)) | Rated Operating Voltage | Applicable Range of Model Name ** (Combinable) | Certification Number |
|------------|--|-------------------------|--|----------------------|
| US-N5SS | 0.4(3.2)/— | DC12 V to 24V | — | 20060103 04174448 |
| US-N8SS | 0.4(3.2)/— | | | |
| US-N20** | 2.2(11.1)/3.7(8.7) | | CX, RM | 20050103 04162980 |
| US-N30** | 3.7(17.4)/7.5(17.4) | | | |
| US-N40** | 5.5(26)/11(26) | | CX | |
| US-N50** | 5.5(26)/11(26) | | | |
| US-N70NS | 11(48)/— | | — | 20060103 04174451 |
| US-N80NS | 11(48)/— | | | |
| US-NH70NS | 11(48)/22(48) | | | |
| US-NH80NS | 11(48)/22(48) | | | |

<3-Pole 3-Element Type>

| Model Name | 3 ϕ Motor Capacity 200/400 V AC-53a (kW(A)) | Rated Operating Voltage | Applicable Range of Model Name ** (Combinable) | Certification Number |
|-------------|--|-------------------------|--|----------------------|
| US-N5SSTE | 0.4(3.2)/— | DC12 V to 24V | — | 20060103 04174448 |
| US-N8SSTE | 0.4(3.2)/— | | | |
| US-N20TE** | 2.2(11.1)/3.7(8.7) | | CX, RM | 20050103 04162980 |
| US-N30TE** | 3.7(17.4)/7.5(17.4) | | | |
| US-N40TE** | 5.5(26)/11(26) | | CX | |
| US-N50TE** | 5.5(26)/11(26) | | | |
| US-N70NSTE | 11(48)/— | | — | 20060103 04174451 |
| US-N80NSTE | 11(48)/— | | | |
| US-NH70NSTE | 11(48)/22(48) | | | |
| US-NH80NSTE | 11(48)/22(48) | | | |

● Vacuum Magnetic Contactors

| Model Name SH: AC Operated SHD: DC Operated SL: Mechanically Latched (AC Operated) SLD: Mechanically Latched (DC Operated) | Certified Rating Category AC-3 (220 to 240 V/380 to 440 V/1,000 V) | | Conventional Free Air Thermal Current Ith (A) | Coil Designation Range | Auxiliary Contact Arrangement Standard | Certification Number |
|--|---|-----------------------------|---|------------------------------------|--|----------------------|
| | Rated Capacity (kW) | Rated Operating Current (A) | | | | |
| SH(D)-V160CN | 45 /90/ 220 | 180 /180/ 160 | 200 | AC100V to AC500V DC100V, DC200V | 2a2b | 20060103 04201618 |
| SH(D)-V320CN | 75 /150/ 400 | 320 /320/ 320 | 350 | | | |
| SH(D)-V400CN | 95 /200/ 500 | 400 /400/ 400 | 450 | | | |
| SHL(D)-V160CN | 45 /90/ 220 | 180 /180/ 160 | 200 | AC100V to AC500V DC100V, DC200V | SHL: 2a2b SHLD: 2a4b | 20060103 04201618 |
| SHL(D)-V320CN | 75 /150/ 400 | 320 /320/ 320 | 350 | | | |
| SHL(D)-V400CN | 95 /200/ 500 | 400 /400/ 400 | 450 | | | |
| SH-V600CN | 160 /300/ 750 | 630 /630/ 600 | 750 | AC100V, AC200V | 2a2b | 20070103 04229815 |

● Voltage Detection Relays (Certification Standard: GB/T14048.5)

| Model Name | Detection Voltage Setting Range Minimum to Maximum | Output Contact | Certification Number |
|------------|---|----------------|----------------------|
| SRE-AACN | AC3V to 250V DC0.1V to 250V | 1c | 20070103 03224330 |
| SRE-AAUCN | | | |
| SRE-KCN | AC75V to 250V, DC9V to 105V | | |
| SRE-KTCN | AC80V to 260V, DC10V to 115V | | |

● Instantaneous Stop/Restart Relays (Certification Standard: GB/T14048.5)

| Model Name | Designation | Certification Number |
|------------|----------------|----------------------|
| UA-DL2CN | AC100V, AC200V | 20090103 03329883 |

● Fault Detection Units (Certification Standard: GB/T14048.5)

| Model Name | Rated Operating Voltage | Applicable Range of Model Name ** | Contact Arrangement | Certification Number |
|------------|-------------------------|-----------------------------------|---------------------|----------------------|
| UN-FDCN** | AC100V, AC200V | CX | 1c | 20090103 03329892 |
| UN-FD4CN** | AC100V, AC200V | | 1a, 1b | |

● DC/AC Interface Units for Operation Coils (Certification Standard: GB14048.5)

| Model Name | Applicable Range of Model Name ** | Applicable Magnetic Contactors | Certification Number |
|-------------|-----------------------------------|--------------------------------|----------------------|
| UN-SY12CN | — | For Independent Mounting | 20090103 03329884 |
| UN-SY22CN** | CX | S-N38, N48 | |
| UN-SY32CN | — | S-T65, T80 | |

Note 1. The following contactless output (triac output) optional units are not subject to certification.
UN-SY11, UN-SY21(CX), UN-SY31

10.9 KC Certified Products (South Korea)

● South Korea Electrical Appliance and Material Safety Management Act Target Certified Products
(Certification Standard: K60947-4-1)



| Model Name | Certified Rating (A) 440 V AC-3 | Certification Number |
|-------------------------|---------------------------------------|----------------------|
| S-T10(BC)(SA) | 9 | HU02021-13022A |
| S-T12(BC)(SA) | 12 | HU02021-13023A |
| SD-T12(BC)(SA) | 12 | HU02021-15035A |
| S-T20(BC)(SA) | 18 | HU02021-13024A |
| SD-T20(BC)(SA) | 18 | HU02021-15036A |
| S-T21(BC)(SA), SL-T21 | 23 | HU02021-13025B |
| SD-T21(BC)(SA), SLD-T21 | 23 | HU02021-15037B |
| S-T25(BC)(SA) | 30 | HU02021-13025B |
| S-T32(BC)(SA) | 32 | HU02021-13026A |
| S-T35(BC)(SA), SL-T35 | 40 | HU02021-16044A |
| SD-T35(BC)(SA), SLD-T35 | 40 | HU02021-16039A |
| S-T50(BC)(SA), SL-T50 | 50 | HU02021-16045A |
| SD-T50(BC)(SA), SLD-T50 | 50 | HU02021-16040A |
| S-T65(CW), SL-T65 | 85 | HU02021-16046A |
| SD-T65(CW), SLD-T65 | 85 | HU02021-16041A |
| S-T80(CW), SL-T80 | 85 | HU02021-16046A |
| SD-T80(CW), SLD-T80 | 85 | HU02021-16041A |
| S-T100, SL-T100 | 105 | HU02021-16048A |
| SD-T100, SLD-T100 | 105 | HU02021-16043A |

Note 1. Always add "KK" at the end of the model name to specify when ordering.

Certification Standard: KC60947-5-1, KS C IEC60947-5-1

| Model Name | Certified Rating (A) 220 V AC-15 | Certification Number |
|----------------------------------|--|----------------------|
| SR-T5(BC)(SA), SRL-T5(BC)(SA) | 3 | HU02021-13030 |
| SRD-T5(BC)(SA), SRL-D-T5(BC)(SA) | 3 | HU02021-15033 |
| SR-T9(BC)(SA) | 3 | HU02021-18057 |
| SRD-T9(BC)(SA) | 3 | HU02021-18034 |
| SR-K100, SRL-K100 | 5 | HU02021-18055 |
| SRD-K100, SRLD-K100 | 5 | HU02021-18056 |
| UA-DL2 | 1 | HU02021-18054 |
| UT-AX2(BC) | 3 | HU02021-18049 |
| UT-AX4(BC) | 3 | HU02021-13032 |
| UT-AX11(BC) | 3 | HU02021-18050 |
| UN-AX2(CX) | 3 | HU02021-18049 |
| UN-AX4(CX) | 3 | HU02021-13031 |
| UN-AX11(CX) | 3 | HU02021-18050 |
| UN-AX80 | 3 | HU02021-18051 |
| UN-AX150 | 3 | HU02021-18052 |
| UN-AX600 | 3 | HU02021-18053 |

10.10 Selection by Global Rating

The table below is the global rating selection table of the S-T/N series magnetic contactor.

Although the ratings of the S-T/N series differ as different standards (JIS/JEM, EN (IEC), UL) are applicable in Japan, Europe and North America, selection from the table below allows worldwide application.

| Model Name | Global Rating (3-Phase Motor) (Note 1, Note 2) | | | Electrical Durability (Note 3) | Selection by Electrical Durability of 2 mil. times (Rating is the same as indicated at left) | |
|------------|--|--------------|--------------|--------------------------------|--|--------------------------------|
| | 200 V | 220 to 240 V | 380 to 440 V | | Model Name | Electrical Durability (Note 3) |
| S-T10 | 11 A | 9.6 A | 7 A *3 | 2 mil. times | S-T10 | 2 mil. times |
| S-T12 | 11 A | 9.6 A | 9 A *3 | | S-T12 | |
| S-T20 | 15.2 A *1 | 15.2 A | 14 A | | S-T20 | |
| S-T21 | 17.5 A | 15.2 A | 18 A | | S-T21 | |
| S-T25 | 25 A | 22 A | 27 A | | S-T25 | |
| S-T32 | 32 A | 28 A | 32 A | | S-T32 | |
| S-T35 | 32 A | 28 A | 27 A | | S-T35 | |
| S-T50 | 48 A | 42 A | 40 A | | S-T50 | |
| S-T65 | 54 A *1 | 54 A | 52 A | | S-T65 | |
| S-T80 | 68 A *1 | 68 A | 65 A | | 1 mil. times | |
| S-T100 | 80 A *1 | 80 A | 77 A | 1 mil. times | | S-N180 |
| S-N125 | 119 A | 104 A | 96 A | | 2 mil. times | S-N300 |
| S-N150 | 130 A *1 | 130 A | 124 A | | | S-N600 |
| S-N180 | 177 A | 156 A *2 | 156 A | | | |
| S-N220 | 192 A *1 | 192 A | 180 A | | | |
| S-N300 | 285 A | 248 A | 240 A | | | |

Note 1. Shown as an integer (figure after decimal point discarded) with the current value converted from the UL horsepower rating (normal start and stop of the three-phase motor) as reference.

However, T21 and below are represented by the lower 1 digit with the lower two digits rounded off.

However, *1 to *3 are as follows.

* 1: Shows the current value converted from the UL horsepower rating of 220 V.

* 2: Shows the current value converted from the UL horsepower rating of 440 V.

* 3: Shows the JIS rating (JEM rating).

Note 2. Compatible with UL Certification (UL_{us}), TÜV Certification (TÜV), and CE Mark (CE).

Note 3. UL Standards do not regulate switching durability. Shows the confirmation results according to the JIS Standards (JEM standard).

(Commentary)

The rated current value of the S-T/N □ series magnetic contactor differs for each rating in Japan, Europe and North America. Therefore, the selection of JIS rating (JEM rating) standards (page 37) does not apply to North America.

In this way, the selection differs by location in accordance with the rating, requiring special attention when applying the same product to multiple regions such as Japan, Europe and North America.

The solution to this problem is the global rating selection table (above) for worldwide application. The above table shows the smallest values of rated current in Japan, Europe and North America as the global rating according to the model name of each magnetic contactor.

It should be noted that for switching durability, standards for both 1 million and 2 million times can be selected in the above table. (For S-T10 to S-T65, only 2 million times can be selected)

10.11 Short-Circuit Current Rating (SCCR) UL Standards Certified Products

● US Export Control Panel SCCR

1. SCCR

Initials for the Short Circuit Current Rating, it refers to the magnitude of the short-circuit current that the device or equipment can withstand.

2. Short-Circuit Performance of Control Panels and SCCR

(1) Short-Circuit Performance of Control Panels

On the name plate of a control panel, the value that represents the short-circuit performance of the control panel is given along with the manufacturer's name, rated voltage, number of phases, frequency, full load current, etc. When using the control panel, the estimated short-circuit current at the panel entry must be smaller than the short-circuit performance displayed on the name plate.

(2) Control Panel SCCR

Conventionally, the breaking capacity of overcurrent protection devices such as circuit breakers and fuses to be installed on the inlet port has been used as the short circuit performance of control panels (Figure 1 a) reference). However, due to the revision of the NEC (National Electric Code: the US equivalent of electrical equipment standards) in 2005, SCCR is now displayed as the short circuit performance of control panels rather than the breaking capacity of overcurrent protection devices of the inlet port. Typically, some sort of "coordination" between devices ("protection coordination" when including a protection device) is required when constructing an electrical system by combining several electrical devices. When considering the coordination of the entire control panel and especially during a short circuit, exactly what indicators are appropriate? Can the breaking capacity of the overcurrent protection device on the inlet port explain the short circuit coordination of the control panel? One of the solutions to such questions is SCCR.

3. Method of Determining SCCR

(1) Method of Determining SCCR

The method of determining SCCR is defined in Section 409 of NEC, but SCCR is commonly determined using the UL508A Supplement SB.

(2) UL508A SB

UL508A SB regulates the next steps.

- ◆ Determine SCCR for individual power circuit components.
- ◆ Correct SCCR for each current-limiting element.
- ◆ Determine SCCR for the entire control panel.

Details for each are described below.

(1) Determine SCCR for power circuit components.

Power circuit refers to circuits of motors, heaters, lighting, etc. Power transformers, reactors, CTs and the like are not included. SCCR of individual components is determined by one of the following methods.

- Values displayed in rating plates, instruction manuals, etc.
- Default values in SB Table 4.1

* For example, Circuit Breaker: 5 kA, Magnetic Starter (for motors with 50 hp or less): 5 kA, etc.

- For load controllers, motor overload relays and combination motor controllers, the values verified in the performance requirements in accordance with the provisions of UL60947-4-1A or UL508, and mentioned in the procedure of the manufacturer

(2) Correction for Transformer Capacity and Secondary Side SCCR

For SCCR of target circuits of the following cases, this is SCCR of devices on the transformer primary side.

- a) In cases where the short-circuit current ratings and breaking ratings of all components of the secondary side are larger than the calculated value of the short-circuit current directly below the power transformer secondary side. For impedance, use either what is known or calculate by assuming that the impedance is 2.1%.
- b) In cases where the short-circuit current ratings and breaking ratings of all components of the secondary side are larger than the values on the table as specified in UL 508A SB
- c) If it does not correspond to a/b above, the smallest SCCR of the transformer secondary side will be SCCR of the transformer primary side.

(3) Correction for Current Limiting Circuit Breaker and Current Limiting Fuse

When the feeder circuit has a current-limiting circuit breaker or current-limiting fuse, SCCR will be one of the following depending on the conditions of the branch circuit.

- a) If SCCR of all components of the branch circuit is equal to or greater than the passing current peak value I_p of the current-limiting circuit breaker or current-limiting fuse and SCCR of the branch circuit protection devices is equal to or greater than SCCR of the current-limiting circuit breaker or current-limiting fuse, SCCR of the current-limiting circuit breaker or current-limiting fuse of the feeder circuit will be SCCR of the branch circuit.
- b) If SCCR of all components of the branch circuit is equal to or greater than the passing current peak value I_p of the current-limiting circuit breaker or current-limiting fuse and SCCR of the branch circuit protection devices is less than SCCR of the current-limiting circuit breaker or current-limiting fuse, the smallest SCCR of the branch circuit protection device will be SCCR of the branch circuit.
- c) In conditions other than a/b above, the smallest SCCR of all components of the branch circuit will be SCCR of the branch circuit.

(4) Determination of SCCR for the Entire Control Panel

After determining SCCR of each circuit and component by the steps mentioned above, the minimum value of SCCR will be SCCR of the entire control panel. Looking at Fig. 1 b) as an example, 5 kA of the magnetic starter will be the minimum value, and the name plate of the control panel will display SCCR 5kA.

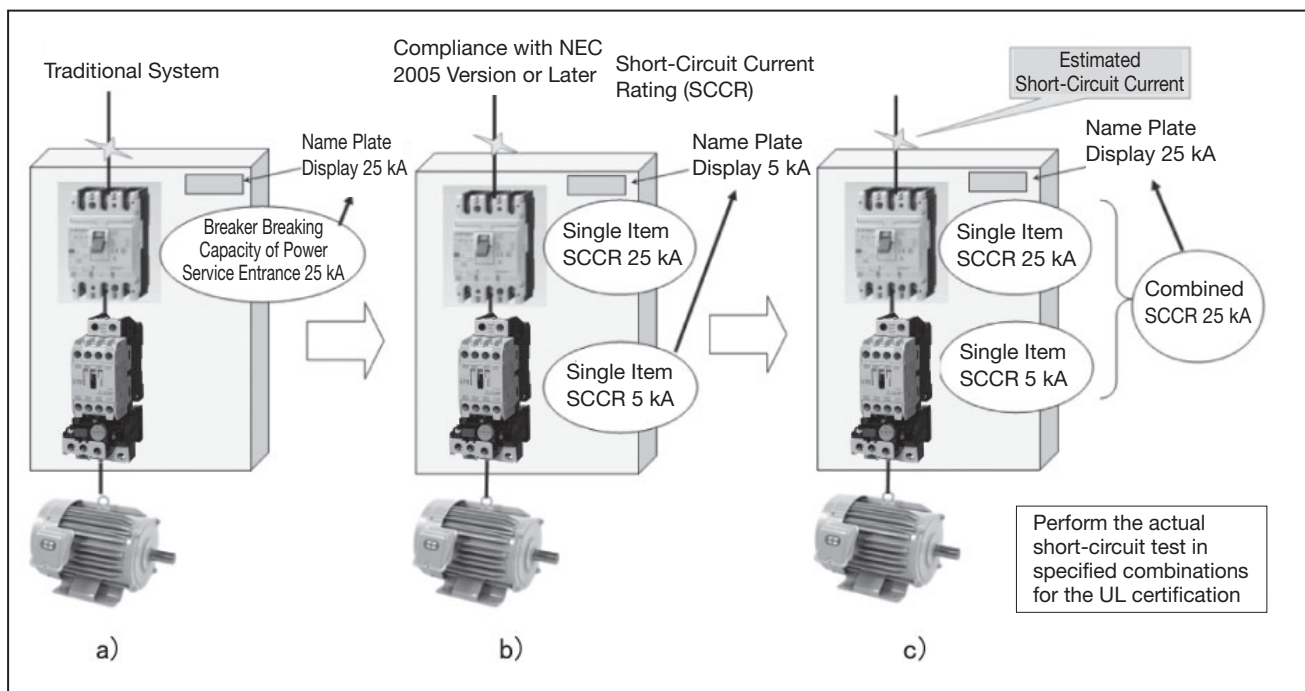


Fig. 1 SCCR of Control Plate

4. SCCR Problem Points

Although there is no general recommended value for SCCR of the control panel, in order to increase the degree of freedom in control panel application, relatively large SCCR is desirable. Given this perspective, SCCR 5 kA and the like of the magnetic starter applicable to motor load of 50 horsepower or less may become a problem. However, it is generally difficult to improve SCCR by magnetic starter alone.

5. Our Countermeasures Against SCCR Problem Points

We have acquired UL certification to enable large SCCR to be applied when combining breakers and magnetic starters (combination motor controllers) (Fig. 1 c) reference).

This shows the combination of a UL certified breaker (no fuse breaker) and magnetic starter. For example, although individual SCCR of the S-T10 magnetic contactor and TH-T18KP thermal overload relay is 5 kA, SCCR is improved to 25 kA at AC240 V when in combination with the NF100-SRU no-fuse breaker.

UL Certified Standard Products

1. Short-Circuit Current Rating (SCCR) of Magnetic Contactors

By using with a fuse or low voltage breaker that satisfies the rated current and rated breaking current shown in the table below, the short-circuit current rating (SCCR) in the table below can be applied to magnetic contactors.

| Magnetic Contactor Model | Main Circuit Voltage: AC600 V Maximum | | Main Circuit Voltage: AC240 V Maximum | | | | Main Circuit Voltage: AC480 V Maximum | | | | | | | | | |
|---|---------------------------------------|--|---------------------------------------|--------------------------|--------------------------|--|--|--|--------------------------------|--|--|-------|-------|----------------------|-------|--|
| | Short Circuit Current Rating (SCCR) | Maximum Rated Current of Fuse (Class K5) | Short Circuit Current Rating (SCCR) | Voltage Circuit Breakers | | | Short Circuit Current Rating (SCCR) | Circuit Breakers | | | | | | | | |
| | | | | Maximum Rated Current | Minimum Breaking Current | Recommended Model Name (Note 1) | | Maximum Rated Current | Minimum Breaking Current | Recommended Model Name (Note 1) | | | | | | |
| S-(2x)T10 S(D)-(2x)T12 | 5 kA | 30 A | 10 kA | 30 A | 10 kA | NF50-SMU, NF50-SVFU, NV50-SVFU | 10 kA | 30 A | 18 kA | NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU | | | | | | |
| SD-(2x)T12 | | | 25 kA | 15 A | 25 kA | NF100-SRU, NV100-SRU | | 15 A | 10 kA | | | | | | | |
| S(D)-(2x)T20 SD-(2x)T20 | | | 70 A | 10 kA | 50 A | 10 kA | | NF50-SMU, NF50-SVFU, NV50-SVFU | 30 A | | 30 A | 18 kA | | | | |
| | | | | 25 kA | 15 A | 25 kA | | NF100-SRU, NV100-SRU | | | 15 A | 10 kA | | | | |
| | | | | 14 kA | 30 A | 14 kA | | NF50-SVFU, NV50-SVFU | | | | | | | | |
| S(D)-(2x)T21 SL(D)-(2x)T21UL SD-(2x)T21 | | | 100 A | 100 A | 10 kA | 50 A | | 10 kA | NF50-SMU, NF50-SVFU, NV50-SVFU | | 35 kA | 50 A | 50 kA | NF125-HVU, NV125-HVU | | |
| S-(2x)T25 S(D)-(2x)T32 | | 75 A | | | 35 kA | 50 kA | 35 kA | NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU | 75 A | | | | | | | |
| | | | | | 10 kA | 40 A | 14 kA | NF50-SVFU, NV50-SVFU | | 50 kA | | | | | | |
| | | | | | 35 kA | 50 kA | 50 kA | NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU | | | | | | | | |
| S(D)-(2x)T35 SL(D)-(2x)T35UL | | 125 A | | | 10 kA | 50 A | 10 kA | NF50-SMU, NF50-SVFU, NV50-SVFU | 18 kA | 75 A | | | | | 18 kA | NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU |
| | | | | | 14 kA | 40 A | 14 kA | NF50-SVFU, NV50-SVFU | | | | | | | | |
| | | | 18 kA | 75 A | 18 kA | NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU | 35 kA | 50 kA | | | | | | | | |
| | | | 25 kA | 50 kA | 50 kA | NF100-HRU, NV100-HRU | | | | | | | | | | |
| S(D)-(2x)T50 SL(D)-(2x)T50UL | | 200 A | 10 kA | 50 A | 10 kA | NF50-SMU, NF50-SVFU, NV50-SVFU | 18 kA | 100 A | 18 kA | NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU | | | | | | |
| | | | 14 kA | 75 A | 14 kA | NF50-SVFU, NV50-SVFU | | | | | | | | | | |
| | | | 18 kA | 100 A | 18 kA | NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU | | | | | 35 kA | 50 kA | | | | |
| | | | 25 kA | 50 kA | 50 kA | NF100-HRU, NV100-HRU | | | | | | | | | | |
| S(D)-(2x)T65 SL(D)-(2x)T65UL | | 250 A | 14 kA | 75 A | 14 kA | NF50-SVFU, NV50-SVFU | 18 kA | 100 A | 18 kA | NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU | | | | | | |
| | | | 18 kA | 100 A | 18 kA | NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU | | | | | | | | | | |
| | | | 25 kA | 225 A | 35 kA | NF250-SVU, NV250-SVU | | | | | 25 kA | 225 A | 35 kA | NF250-SVU, NV250-SVU | | |
| S(D)-(2x)T80 SL(D)-(2x)T80UL | | 300 A | 14 kA | 75 A | 14 kA | NF50-SVFU, NV50-SVFU | 18 kA | 100 A | 18 kA | NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU | | | | | | |
| | | | 18 kA | 100 A | 18 kA | NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU | | | | | | | | | | |
| | | | 25 kA | 225 A | 35 kA | NF250-SVU, NV250-SVU | | | | | 25 kA | 225 A | 35 kA | NF250-SVU, NV250-SVU | | |
| S(D)-(2x)T100 SL(D)-(2x)T100UL | | 10 kA | 225 A | 18 kA | 100 A | 18 kA | NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU | 18 kA | 100 A | 18 kA | NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU | | | | | |
| | 25 kA | | | 225 A | 35 kA | NF250-SVU, NV250-SVU | 25 kA | | | | | 225 A | 35 kA | NF250-SVU, NV250-SVU | | |
| S(D)-(2x)N125 S(D)-(2x)N150 | 10 kA | 350 A | 25 kA | 350 A | 35 kA | NF250-CVU, NV250-CVU, NF250-SVU, NV250-SVU | 25 kA | 250 A | 35 kA | NF250-SVU, NV250-SVU | | | | | | |
| | | | | | | | | | | | 50 kA | 150 A | 50 kA | NF250-HVU, NV250-HVU | | |
| S-(2x)N180 S(D)-(2x)N220 | 10 kA | 500 A | 25 kA | 350 A | 35 kA | NF400-SWU, NV400-SWU, NF400-HWU, NV400-HWU | 25 kA | 350 A | 35 kA | NF400-SWU, NV400-SWU, NF400-HWU, NV400-HWU | | | | | | |
| | | | | | | | | | | | 50 kA | 250 A | 50 kA | NF250-HVU, NV250-HVU | | |
| S(D)-(2x)N300 | 18 kA | 500 A | 25 kA | 600 A | 35 kA | NF630-SWU, NF630-HWU | 25 kA | 600 A | 35 kA | NF630-SWU, NF630-HWU | | | | | | |
| | | | | | | | | | | | 50 kA | 400 A | 65 kA | NF400-HWU, NV400-HWU | | |
| S(D)-(2x)N400 | 18 kA | 500 A | 25 kA | 600 A | 35 kA | NF630-SWU, NF630-HWU | 25 kA | 600 A | 35 kA | NF630-SWU, NF630-HWU | | | | | | |
| | | | | | | | | | | | 50 kA | 400 A | 65 kA | NF400-HWU, NV400-HWU | | |
| SD-Q(R)11 SD-Q(R)12 | 5 kA | 40 A | 5 kA | 30 A | 10 kA | NF50-SMU | — | — | — | — | | | | | | |
| | | | 14 kA | 20 A | 14 kA | NF50-SVFU, NV50-SVFU | | | | | | | | | | |
| | | | 25 kA | 15 A | 25 kA | NF100-SRU, NV100-SRU | | | | | | | | | | |
| | | | 25 kA | 30 A | 35 kA | NF100-SRU, NV100-SRU | | | | | | | | | | |

Note 1. Examples of the recommended low-voltage breakers are given. UL489-listed low-voltage breaker (3-pole part) that satisfied the rating given above.

2. Short-Circuit Current Rating (SCCR) of Thermal Overload Relays

By using with a fuse or low voltage breaker that satisfies the rated current and rated breaking current shown in the table below, the short-circuit current rating (SCCR) in the table below can be applied to thermal overload relays.

| Thermal Overload Relay Model | Main Circuit Voltage: AC600 V Maximum | | Main Circuit Voltage: AC240 V Maximum | | | | Main Circuit Voltage: AC480 V Maximum | | | | | | | | | | |
|------------------------------|---------------------------------------|--|--|-------------------------------------|-----------------------|--------------------------|--|--|-----------------------|--------------------------------|--|-------|--|-------|-------|-------|--|
| | Heater Designation | Short Circuit Current Rating (SCCR) | Maximum Rated Current of Fuse (Class K5) | Short Circuit Current Rating (SCCR) | Circuit Breakers | | | Short Circuit Current Rating (SCCR) | Circuit Breakers | | | | | | | | |
| | | | | | Maximum Rated Current | Minimum Breaking Current | Recommended Model Name (Note 1) | | Maximum Rated Current | Minimum Breaking Current | Recommended Model Name (Note 1) | | | | | | |
| TH-T18KP | 0.12A | 5 kA | 15 A | 10 kA / 25 kA | 15 A | 10 kA / 25 kA | NF50-SMU NF50-SVFU, NV50-SVFU NF100-SRU, NV100-SRU | 10 kA | 15 A | 10 kA | NF100-HRU NV100-HRU NF125-SVU NV125-SVU | | | | | | |
| | 0.17A | | | | | | | | | | | | | | | | |
| | 0.24A | | | | | | | | | | | | | | | | |
| | 0.35A | | | | | | | | | | | | | | | | |
| | 0.5A | | | | | | | | | | | | | | | | |
| | 0.7A | | | | | | | | | | | | | | | | |
| | 0.9A | | | | | | | | | | | | | | | | |
| | 1.3A | | | | | | | | | | | | | | | | |
| | 1.7A | | | | | | | | | | | | | | | | |
| | 2.1A | | | | | | | | | | | | | | | | |
| | 2.5A | | | | | | | | | | | | | | | | |
| | 3.6A | | | | | | | | | | | | | | | | |
| | 5A | | | | | | | | | | | | | | | | |
| | 6.6A | | | | | | | | | | | | | | | | |
| TH-T25KP | 0.24A | 5 kA | 15 A | 10 kA / 35 kA | 15 A | 10 kA / 50 kA | NF50-SMU NF50-SVFU, NV50-SVFU NF100-HRU, NV100-HRU NF125-SVU, NV125-SVU | 35 kA | 15 A | 50 kA | NF125-HVU NV125-HVU | | | | | | |
| | 0.35A | | | | | | | | | | | | | | | | |
| | 0.5A | | | | | | | | | | | | | | | | |
| | 0.7A | | | | | | | | | | | | | | | | |
| | 0.9A | | | | | | | | | | | | | | | | |
| | 1.3A | | | | | | | | | | | | | | | | |
| | 1.7A | | | | | | | | | | | | | | | | |
| | 2.1A | | | | | | | | | | | | | | | | |
| | 2.5A | | | | | | | | | | | | | | | | |
| | 3.6A | | | | | | | | | | | | | | | | |
| | 5A | | | | | | | | | | | | | | | | |
| | 6.6A | | | | | | | | | | | | | | | | |
| | 9A | | | | | | | | | | | | | | | | |
| | 11A | | | | | | | | | | | | | | | | |
| 15A | | | | | | | | | | | | | | | | | |
| TH-T50KP | 29A | 5 kA | 125 A | 10 kA / 50 kA | 10 kA | 50 A | 10 kA | NF50-SMU, NF50-SVFU, NV50-SVFU | 18 kA | 75 A | NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU | | | | | | |
| | 14 kA | | | | 40 A | 14 kA | NF50-SVFU, NV50-SVFU | | | | | | | | | | |
| | 18 kA | | | | 75 A | 18 kA | NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU | | | | | | | | | | |
| | 25 kA | | | | | 35 kA | | | | | | | | | | | |
| | 35 kA | | | | | 50 kA | NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU | | | | | | | | | | |
| | 35A | | | | 150 A | 10 kA | 50 A | | | | | 10 kA | NF50-SMU, NF50-SVFU, NV50-SVFU | 18 kA | 100 A | 18 kA | NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU |
| | | | | | | 14 kA | 75 A | | | | | 14 kA | NF50-SVFU, NV50-SVFU | | | | |
| | | | | | | 18 kA | 100 A | | | | | 18 kA | NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU | | | | |
| | | | 25 kA | | | 35 kA | | | | | | | | | | | |
| | | | 35 kA | | | 50 kA | | NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU | | | | | | | | | |
| | | | 42A | | | 200 A | 10 kA | 50 A | 10 kA | NF50-SMU, NF50-SVFU, NV50-SVFU | 18 kA | 100 A | 18 kA | | | | |
| | 14 kA | | | | 75 A | | 14 kA | NF50-SVFU, NV50-SVFU | | | | | | | | | |
| | 18 kA | | | | 100 A | | 18 kA | NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU | | | | | | | | | |
| | 25 kA | | | | | | 35 kA | | | | | | | | | | |
| 35 kA | 50 kA | NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU | | | | | | | | | | | | | | | |

Note 1. Examples of the recommended low-voltage breakers are given. UL489-listed low-voltage breaker (3-pole part) that satisfied the rating can give above.

| Thermal Overload Relay Model | | Main Circuit Voltage: AC600 V Maximum | | Main Circuit Voltage: AC240 V Maximum | | | | Main Circuit Voltage: AC480 V Maximum | | | | |
|------------------------------|-------|---------------------------------------|-------------------------------------|--|-------------------------------------|-----------------------|--|---------------------------------------|-------------------------------------|-----------------------|--|---------------------------------|
| | | Heater Designation | Short Circuit Current Rating (SCCR) | Maximum Rated Current of Fuse (Class K5) | Short Circuit Current Rating (SCCR) | Circuit Breakers | | | Short Circuit Current Rating (SCCR) | Circuit Breakers | | |
| | | | | | | Maximum Rated Current | Minimum Breaking Current | Recommended Model Name (Note 1) | | Maximum Rated Current | Minimum Breaking Current | Recommended Model Name (Note 1) |
| | | | | | | | | | | | | |
| TH-T65KP | 15A | 5 kA | 70 A | 14 kA | 75 A | 14 kA | NF100-CVFU | 18 kA | 50 A | 18 kA | NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU | |
| | | | | 18 kA | 50 A | 18 kA | NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU | 25 kA | | 30 kA | NF125-SVU, NF125-HVU | |
| | | | | 25 kA | | 30 kA | | | | | | |
| | 22A | | 100 A | 14 kA | 75 A | 14 kA | NF100-CVFU | 18 kA | 60 A | 18 kA | NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU | |
| | | | | 18 kA | 60 A | 18 kA | NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU | 25 kA | | 30 kA | NF125-SVU, NF125-HVU | |
| | | | | 25 kA | | 30 kA | | | | | | |
| | 29A | | 125 A | 14 kA | 75 A | 14 kA | NF100-CVFU | 18 kA | 75 A | 18 kA | NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU | |
| | | | | 18 kA | | 18 kA | NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU | 25 kA | | 30 kA | NF125-SVU, NF125-HVU | |
| | | | | 25 kA | | 30 kA | | | | | | |
| | 35A | | 150 A | 14 kA | 100 A | 14 kA | NF100-CVFU | 18 kA | 75 A | 18 kA | NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU | |
| | | | | 18 kA | 75 A | 18 kA | NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU | 25 kA | | 30 kA | NF125-SVU, NF125-HVU | |
| | | | | 25 kA | | 30 kA | | | | | | |
| | 42A | | 200 A | 14 kA | 100 A | 14 kA | NF100-CVFU | 18 kA | 100 A | 18 kA | NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU | |
| | | | | 18 kA | | 18 kA | NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU | 25 kA | | 30 kA | NF125-SVU, NF125-HVU | |
| | | | | 25 kA | | 30 kA | | | | | | |
| | 54A | | 250 A | 14 kA | 100 A | 14 kA | NF100-CVFU | 18 kA | 100 A | 18 kA | NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU | |
| | | | | 18 kA | | 18 kA | NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU | 25 kA | | 30 kA | NF125-SVU, NF125-HVU | |
| | | | | 25 kA | | 30 kA | | | | | | |
| | 10 kA | | 225 A | 25 kA | 150 A | 35 kA | NF250-SVU | 25 kA | 150 A | 35 kA | NF250-SVU | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| TH-T100KP | 64A | 5 kA | 300 A | 18 kA | 100 A | 18 kA | NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU | 18 kA | 100 A | 18 kA | NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU | |
| | 82A | 10 kA | 225 A | 25 kA | 225 A | 35 kA | NF250-SVU, NV250-SVU | 25 kA | 225 A | 35 kA | NF250-SVU, NV250-SVU | |
| | | 10 kA | 225 A | 18 kA | 100 A | 18 kA | NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU | 18 kA | 100 A | 18 kA | NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU | |
| TH-N120KP | 42A | 10 kA | 200 A | 25 kA | 100 A | 35 kA | NF125-HVU | 25 kA | 100 A | 35 kA | NF125-HVU | |
| | 54A | | 250 A | | 100 A | | | | | | | |
| | 67A | | 300 A | | 225 A | | | | | | | |
| TH-N120TAKP | 82A | 10 kA | 350 A | 25 kA | 225 A | 35 kA | NF225-CWU NF250-SVU | 25 kA | 225 A | 35 kA | NF250-SVU | |
| | 105A | | 350 A | | 250 A | | | | | | | |
| | 125A | | 350 A | | 250 A | | | | | | | |
| TH-N220RHKP | 82A | 10 kA | 400 A | - | - | - | - | - | - | - | - | |
| | 105A | | 500 A | | | | | | | | | |
| | 125A | | | | | | | | | | | |
| | 150A | | | | | | | | | | | |
| 180A | | | | | | | | | | | | |
| TH-N400RHKP | 105A | 10 kA | 500 A | - | - | - | - | - | - | - | - | |
| | 125A | | 600 A | | | | | | | | | |
| | 150A | | | | | | | | | | | |
| | 180A | | | | | | | | | | | |
| | 250A | | | | | | | | | | | |
| 330A | 18 kA | 500 A | | | | | | | | | | |

Note 1. Examples of the recommended low-voltage breaker are given. UL489-listed low-voltage breaker (3-pole part) that satisfied the rating can given above.

10.12 Marine Certification Standard Products



● NK Standards (ClassNK Steel Ship Regulations) Certified Magnetic Contactors

| Magnetic Contactor Model | Certification Number | Magnetic Contactor Model | Certification Number | Magnetic Contactor Model | Certification Number |
|--------------------------|----------------------|--------------------------|----------------------|--------------------------|----------------------|
| S-T10(BC)(SA) | — | 14T401 | S-N125 | SD-N125 | 98T407 |
| S-T12(BC)(SA) | SD-T12(BC)(SA) | 14T402 | S-N150 | SD-N150 | 98T408 |
| S-T20(BC)(SA) | SD-T20(BC)(SA) | 14T403 | S-N180 | — | 98T409 |
| S-T21(BC)(SA) | SD-T21(BC)(SA) | 14T404 | S-N220 | SD-N220 | 98T410 |
| S-T25(BC)(SA) | — | 14T405 | S-N300 | SD-N300 | 98T411 |
| S-T32(BC)(SA) | SD-T32(BC)(SA) | 14T406 | S-N400 | SD-N400 | 98T412 |
| S-T35(BC)(SA) | SD-T35(BC)(SA) | 15T405 | S-N600 | SD-N600 | 85T406 |
| S-T50(BC)(SA) | SD-T50(BC)(SA) | 15T406 | S-N800 | SD-N800 | 85T407 |
| S-T65(CW) | SD-T65(CW) | 15T407 | S-N38(CX)(SA) | — | 96T402 |
| S-T80(CW) | SD-T80(CW) | 15T408 | S-N48(CX)(SA) | — | 96T403 |
| S-T100 | SD-T100 | 15T410 | B-N65 | BD-N65 | 01T401 |
| B-T21 | BD-T21 | 17T402 | B-N100 | BD-N100 | 01T402 |

Note 1. S-T, S-N, SD-N, B-N and BD-N can be used as NK standards certified products

(Applicable with class AC-3 rating at 440 V or less. Model names with “BC” come with wiring streamlining terminals, “CX” and “CW” with terminal covers, and “SA” with built-in surge absorbers).

Note 2. The thermal overload relay is not covered by the standards.

Note 3. For SL(D)-N□NK, there is no product display of “NK” in the model name. (SL(D) uses NK certified wires for connection)

● KR Standards (Korean Register of Shipping, South Korea Steel Ship Standards) Certified Magnetic Contactors



| Magnetic Contactor Model | Certification Number | Magnetic Contactor Model | Certification Number | Magnetic Contactor Model | Certification Number |
|--------------------------|----------------------|--------------------------|----------------------|--------------------------|----------------------|
| S-T10(BC)(SA) | TKY02571-EL021 | S-T35(BC)(SA) | TKY02571-EL021 | S-N125 | KOB02571-EL020 |
| S-T12(BC)(SA) | TKY02571-EL021 | S-T50(BC)(SA) | TKY02571-EL021 | S-N150 | KOB02571-EL020 |
| S-T20(BC)(SA) | TKY02571-EL021 | S-T65(CW) | TKY02571-EL021 | S-N180 | KOB02571-EL020 |
| S-T21(BC)(SA) | TKY02571-EL021 | S-T80(CW) | TKY02571-EL021 | S-N220 | KOB02571-EL020 |
| S-T25(BC)(SA) | TKY02571-EL021 | S-T100 | TKY02571-EL021 | S-N300 | KOB02571-EL020 |
| S-T32(BC)(SA) | TKY02571-EL021 | | | S-N400 | KOB02571-EL020 |

Note 1. The standard types of the model names above can also be used as KR Standard products. (Applicable with class AC-3 rating at 440 V or less.)

Note 2. The thermal overload relay is not covered by the standards.

● Lloyd Standards (Lloyd's Register of Shipping), BV Standards (Bureau Veritas, France Steel Ship Standards) Certified Magnetic Contactors, Thermal Overload Relays



| Model | Model Name | Lloyd Certification Number | BV Certification Number | Remarks |
|-------------------------|---|----------------------------|-------------------------|--|
| Magnetic Contactors | S-T10(BC)(SA), T12(BC)(SA), T20(BC)(SA), T21(BC)(SA), S-T25(BC)(SA), T32(BC)(SA), SD-T12(BC)(SA), T20(BC)(SA), T21(BC)(SA), T32(BC)(SA) | 14/10008 | 38175 | Applicable with class AC-3 standard product at 440 V or less. |
| | S-T35(BC)(SA), T50(BC)(SA), T65(CW), T80(CW), T100 SD-T35(BC)(SA), T50(BC)(SA), T65(CW), T80(CW), T100 | 16/10003 | | |
| | S-N125, N150, N180, N220, N300, N400, N600, N800 SD-N125, N150, N220, N300, N400, N600, N800 | 98/10016 | 07095 | |
| Thermal Overload Relays | TH-T18(AR)(BC)KP(YS), T25(AR)(BC)KP(YS) | 14/10010 | 38176 | Applicable with standard product at 440 V or less. |
| | TH-T50(AR)(BC)KP(YS), T65KP, T100KP | 16/10004 | | |
| | TH-N120(KP), N120TA(KP) TH-N220RH(KP), N220HZ(KP), N400RH(KP), N400HZ(KP), N600(KP) | 98/10017 | 07905 | Applicable with standard product at 690 V or less. |
| Contactor Relays | SR-T5(BC)(SA), T9(BC)(SA) SRD-T5(BC)(SA), T9(BC)(SA) | 14/10009 | 38177 | Applicable with class AC-15 standard product at 550 V or less. |
| Auxiliary Contact Unit | UT-AX2(BC), AX4(BC), AX11(BC) | 14/10009 | 38174 | |
| | UN-AX2 (CX), AX4 (CX), AX11 (CX) | 95/10010 | 06139 | |
| | UN-AX80, AX150, AX600 | 98/10016 | 07905 | |

Note 1. MSO is also applicable as standard.

Note 2. The control circuit contact is applicable at 550 V or less.



● Magnetic Contactors and Thermal Overload Relays Certified by China Classification Society (CCS)

| Model | Model Name | CCS Certification Number |
|-------------------------|--|--------------------------|
| Magnetic Contactors | SD-T12, T20, T21, T32, T35, T50, T65, T80, T100 S-N125, N150, N180, N220, N300, N400, N600, N800 SD-N125, N150, N220, N300, N400, N600, N800 | DB18T00165 |
| Thermal Overload Relays | TH-T65KP, T100KP TH-N120KP, N120TAKP, N220RHKP, N220HZKP TH-N400RHKP, N400HZKP, N600KP | DB18T00166 |
| Auxiliary Contact Unit | UT-AX2, AX4, AX11 UN-AX2, AX4, AX11, AX80, AX150, AX600 | DB18T00165 |

10.13 How to Order

1. Targeted Electrical Appliances

Enclosed magnetic starters applicable to three-phase 200 V and single-phase 100 V. Same as standard products, except for single-phase circuit use. Refer to the section (page 253) of MS (enclosed type). When ordering the single-phase circuit use type, add "DP" at the end of the model name.

MS-T10DP ▲ 0.2 kW ▲ 110 V ▲ AC100V

2. NK Standard Products

- Standard products are applied as they are for S-T, S-N, SD-N, B-N and BD-N.
- When ordering SL(D)-N, add "NK" at the end of the model name as it uses NK certified wires. The rest are the same as the standard product. Refer to page 287.

SL-N125NK ▲ MC-AC400V ▲ MT-AC400V

3. UL/CSA Standard Products

Other than the model name, the ordering method is the same as that of standard products. For model names (standard or dedicated products), refer to page 255.

4. CCC Certified Products

- Referring to page 271, always add "CN" at the end of the model name when ordering products marked "● Certified (add "CN" at the end of the model name when ordering)."

S-N600CN ▲ AC200V

It should be noted that although "CN" is displayed in the model name on the packaging box, it is not displayed on the product.

5. KC Certified Products

- Referring to page 280, always add "KK" at the end of the model name when ordering.

S-T10KK ▲ AC200V

6. Other International Standards

- Standard products are compliant with KR Standards (certified products), Lloyd Standards (certified products), BV Standards (certified product), NEMA Standards, IEC Standards, BS Standards, EN Standards and VDE Standards. Refer to pages 253 and 287 regarding application.
- If EAC certified products (for Russia) are needed, consult with your dealer or with us.



11





















Related Equipment

| | | |
|-------|--|-----|
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| 11.2 | Solid State Contactors for Motor/Heater Loads US-N□ , US-H□ | 292 |
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11 Related Equipment

11.1 Model List (US-N, US-H Series)

● US-N □ Solid State Contactors (Standard Models)

| | | | | | | | | | | |
|-----------------------------------|---|---|---|--|---|---|---|---|------|------|
| AC200 V Type | Category AC-1 Rated Operating Current (A) (Note 6) | 5 | 8 | 20 | 30 | 40 | 50 | 70 | 80 | |
| | Heater Capacity (kW) | 1 φ 200 V (Note 1) | 1 | 1.6 | 4 | 6 | 8 | 10 | 14 | 16 |
| | | 3 φ 200 V | 1.7 | 2.7 | 6.9 | 10.3 | 13.8 | 17.3 | 24.2 | 27.7 |
| | Maximum Applicable Motor Capacity (kW) 3 φ 200 V (Note 2) | 0.4 | 0.4 | 2.2 | 3.7 | 5.5 | 5.5 | 11 | 11 | |
| For 3-Phase Loads US-N□ |  |  |  |  |  |  |  |  | | |
| | US-N5SS US-N5SSTE | US-N8SS US-N8SSTE | US-N20 US-N20TE | US-N30 US-N30TE (Note 3) | US-N40 US-N40TE | US-N50 US-N50TE (Note 3) | US-N70NS US-N70NSTE | US-N80NS US-N80NSTE | | |
| AC400 V Type | Category AC-1 Rated Operating Current (A) (Note 6) | | | 20 | 30 | 40 | 50 | 70 | 80 | |
| | Heater Capacity (kW) | 1 φ 400 V (Note 1) | | 8 | 12 | 16 | 20 | 28 | 32 | |
| | | 3 φ 400 V | | 13.8 | 20.7 | 27.7 | 34.6 | 48.5 | 55.4 | |
| | Maximum Applicable Motor Capacity (kW) 3 φ 400 V (Note 2) | | | 3.7 | 7.5 | 11 | 11 | 22 | 22 | |
| For 3-Phase Loads US-N□ US-NH□ |  |  |  |  |  |  | | | | |
| | US-N20 US-N20TE | US-N30 US-N30TE (Note 3) | US-N40 US-N40TE | US-N50 US-N50TE (Note 3) | US-NH70NS US-NH70NSTE | US-NH80NS US-NH80NSTE | | | | |
| IEC 35 mm Rail Mounting | Possible With Standard Products | (Note 5) | | | | | | | | |
| Live Part Protection Cover Units | | | | | Equipped With Standard Products | | | | | |
| Drive Units | | | | | UA-DR1 | | | | | |
| Drive Units with Outputs | UA-SH8 (Note 9) | | | | UA-SH1 | | | | | |
| Reversing Units | | | | | UA-RE | | | | | |
| Fault Detection Units | | | | | UN-FD (For 200 V Main Circuits)/UN-FD4 (For 400 V Main Circuits) | | | | | |
| Power Control Units | | | | | UA-PC | | | | | |
| Options (Note 4) |  |  |  |  |  |  | | | | |
| | UA-SH8 | UA-DR1 | UA-SH1 | UA-RE | UN-FD | UA-PC | | | | |

● US-H □ Solid State Contactors

| Category AC-1 Rated Operating Current (A) (-10 to 40°C) (Note 6) | | 20 | 30 | 40 | 50 |
|--|---|---|---|---|------|
| Heater Capacity (kW) (-10 to 40°C) (Note 6, Note 7) | 1 φ 200 V | 4 | 6 | 8 | 10 |
| | 3 φ 200 V | 6.9 | 10.3 | 13.8 | 17.3 |
| | 3 φ 400 V | 13.8 | 20.7 | 27.7 | 34.6 |
| US-H□ |  US-H20 US-H20DD |  US-H30 US-H30DD |  US-H40 US-H40DD |  US-H50 US-H50DD | |
| US-H□UF (Width Reduced Product) |  US-H20UF US-H20DDUF |  US-H30UF US-H30DDUF | — | — | |
| IEC 35 mm Rail Mounting | US-H□ | (Note 5) | | — | |
| | US-H□UF | Standard Equipment | | — | |
| Optional | Fault Detection Units | UN-FD (For 200 V Main Circuits)/UN-FD4 (For 400 V Main Circuits) | | | |
| | Power Control Units | UA-PC | | | |
| | Live Part Protection Cover Units | UN-CV501US | | | |

- Note 1. Indicates the capacity per pole.
- Note 2. The applicable motor load capacities differ depending on operating conditions. Refer to page 301 for details.
- Note 3. The photo shows a US-N□TE type model. The outline drawings are smaller for US-N□ types. Refer to page 323 for details regarding outline drawings.
- Note 4. □ in the optional unit column indicates the applicable range.
- Note 5. Possible with a dedicated product (US-□RM).
- Note 6. If the ambient temperature is 40°C or more, use the rated operated current multiplied by the reduced rate shown in figure 1 on page 304.
- Note 7. Indicates the value when using batch control as the main circuit control method.
- Note 8. Refer to page 321 for optional live part protection covers.
- Note 9. When mounting UA-SH8 drive units with outputs to US-N5SS/N8SS(TE) types, first remove the US-N□ type body cover.

11 Related Equipment

11.2 US-N□ (For Motor/Heater Loads), US-H□ (For Heater Loads) Solid State Contactors

A combined series consisting of US-N series types for motor and heater loads together with US-H series types dedicated for heater loads.

US-N series are solid state contactors that are ideal for frequently switched motor loads such as on conveyor lines, and can be used for both motor and heater loads.

US-H series are dedicated heater load solid state contactors that are ideal for heater loads such as injection molding machinery or semiconductor manufacturing equipment.

Features

- **Realizes a Long Product Lifetime When Used for High-frequency Switching Applications**

Realizes a long product lifetime when used for frequently switching applications by using a power semiconductor element.

- **Applicable for a Wide Range of Main Circuit Voltages (US-N, US-H)**

Can be used over a wide range of main circuit voltages with US-N20 type supporting AC100 to 480 V and US-H20 to H50 types supporting AC24 to 480 V.

- **Compatible with a Large Number of International Standards (US-N, US-H)**

Our standard products comply with the domestic standards as well as various overseas standards and are certified as meeting all of the standards.

- JEM Standards

- IEC Standards

- UL, CSA Standards

- EC Directives

- TÜV Certified

- CCC Certification

(US-H types are not subject to CCC certification)



US-N20TE

- **No Noise and Clean Running**

Zero switching noise and clean running without generating dust due to wear.

- **Live Part Protection Covers for Improved Safety (US-N, US-H)**

Live part protection covers with finger protection functionality and compliance with DIN and VDE regulations have been made standard equipment for US-N series models and an optional add-on (UN-CV501US) for US-H series models.

- **Indicator Lamps for Confirmation of Operation Standardized**

With indicator lamps on the front surface, the operating voltage input status can be checked at a glance.

- **A Wide Selection of Optional Units**

The range of solid state contactor application is expanded greatly by using in combination with an abundant range of optional parts including drive units (UA-DR1) and reversing units (UA-RE).

Type Designations

(1) US-N Solid State Contactors (3-Pole Type)

| US - N20 TE CX RM | | | Symbol | | Terminal Cover | | Symbol | | Specifications | |
|-------------------|----------------|---|--------|------------------------|----------------|--|--------|-----------------------------------|----------------|----------------|
| Symbol | Rated Voltage | Rated Operating Current (Category AC-1) | Symbol | Main Circuit Structure | Symbol | Terminal Cover | Symbol | Specifications | Symbol | Specifications |
| N5SS | AC100 to 240 V | 5A | None | 3-Pole 2-Element Type | None | With Live Part Protection Cover | None | Standard | None | Standard |
| N8SS | | 8A | TE | 3-Pole 3-Element Type | CX | With CAN Terminal (N20(TE) to N50(TE)) | RM | Rail Mounting Only (N20(TE) Only) | | |
| N20 | AC100 to 480 V | 20A | | | | | | | | |
| N30 | | 30A | | | | | | | | |
| N40 | | 40A | | | | | | | | |
| N50 | | 50A | | | | | | | | |
| N70NS | AC100 to 240 V | 70A | | | | | | | | |
| N80NS | | 80A | | | | | | | | |
| NH70NS | AC200 to 480 V | 70A | | | | | | | | |
| NH80NS | | 80A | | | | | | | | |

Note 1. N5SS(TE) and N8SS (TE) types can be rail mounted as the standard product.

(2) US-H Solid State Contactors

| US - H20 DD HZ | | | Symbol | | Circuit Control Method | | Symbol | | Specifications | |
|----------------|---------------|---|--------|--------------------|------------------------|--|--------|--|----------------|--|
| Symbol | Rated Voltage | Rated Operating Current (Category AC-1) | None | Batch Control | None | Standard Specifications | | | | |
| H20 | AC24 to 480 V | 20A | DD | Individual Control | HZ | No Cooling Fin | | | | |
| H30 | | 30A | | | RM | Rail Mounting Only (20 A, 30 A Only) | | | | |
| H40 | | 40A | | | UF | Width Reduced Product (20 A, 30 A Only) | | | | |
| H50 | | 50A | | | | | | | | |

(3) Optional Units

| UA - DR1 AC100V | | | Symbol | | Rated Operating Voltage | |
|-----------------|---|--|--------|-------------------------|-------------------------|--|
| Symbol | Unit Name | | AC100V | AC100 to 120 V 50/60 Hz | | |
| DR1 | Drive Units | | AC200V | AC200 to 240 V 50/60 Hz | | |
| SH1 | Drive Units with Outputs | | | | | |
| SH8 | Drive Units with Outputs (For US-N5/N8SS(TE) Only) | | | | | |
| Symbol | Unit Name | | AC100V | AC100 to 120 V 50/60 Hz | | |
| RE | Reversing Unit | | AC200V | AC200 to 240 V 50/60 Hz | | |
| | | | DC24V | DC24 V | | |
| Symbol | Unit Name | | AC100V | AC100 to 120 V 50/60 Hz | | |
| PC | Power Control Units | | AC200V | AC200 to 240 V 50/60 Hz | | |
| Symbol | Unit Name | | Symbol | Resistor/Application | | |
| CVDR1 | UA-DR1/UA-SH1 Live Part Protection Cover Unit | | VR10 | 10 kΩ/Gradient Setter | | |
| CVSH8 | UA-SH8 Live Part Protection Cover Unit | | VR1 | 1 kΩ/Main Setter | | |





| UN - FD AC100V | | | Symbol | | Rated Operating Voltage | | Symbol | | Output Contact Arrangement (Note 1) | |
|----------------|--|--|--------|-------------------------|-------------------------|------------------|--------|--|-------------------------------------|--|
| Symbol | Unit Name | | AC100V | AC100 to 120 V 50/60 Hz | 1 A | 1a Make Contact | | | | |
| FD | 200 V Main Circuit Fault Detection Units | | AC200V | AC200 to 240 V 50/60 Hz | 1B | 1b Break Contact | | | | |
| FD4 | 400 V Main Circuit Fault Detection Units | | DC24V | DC24 V | | | | | | |
| Symbol | Unit Name | | | | | | | | | |
| CV501US | US-H□ Live Part Protection Cover Unit | | | | | | | | | |

Note 1. Output contact arrangement must be specified only for UN-FD4.

11 Related Equipment

11.2.1 US-N Solid State Contactors

● Ratings/Specifications

| | | 3-Pole Type | | | | |
|---|--|---|---|---|---|-----------------|
| Appearance | |  |  |  |  | |
| Model Name | Standard | Single-Pole Type | — | — | — | — |
| | | 3-Pole 2-Element Type | US-N5SS | US-N8SS | US-N20 | US-N30 |
| | | 3-Pole 3-Element Type | US-N5SSTE | US-N8SSTE | US-N20TE | US-N30TE |
| | With CAN Terminal | 3-Pole 2-Element Type | — | — | US-N20CX | US-N30CX |
| | | 3-Pole 3-Element Type | — | — | US-N20TECX | US-N30TECX |
| | IEC 35 mm Rail Mounting | 3-Pole 2-Element Type | (Note 1) | (Note 1) | US-N20RM | — |
| 3-Pole 3-Element Type | | (Note 1) | (Note 1) | US-N20TERM | — | |
| Rating | Rated Operating Current (-10 to 40°C) (Note 2) | JEM (Category AC-1) | 5 A | 8 A | 20 A | 30 A |
| | | IEC (Category AC-51) | 5 A | 8 A | 20 A | 30 A |
| | Applicable Heater Capacity (-10 to 40°C) | 1 ϕ 200 V (Note 4) | 1 kW | 1.6 kW | 4 kW | 6 kW |
| | | 3 ϕ 200 V | 1.7 kW | 2.7 kW | 6.9 kW | 10.3 kW |
| | | 1 ϕ 400 V (Note 4) | — | — | 8 kW | 12 kW |
| | Maximum Applicable Motor Capacity (Maximum Operating Current (Note 5)) | 3 ϕ 200 V | 0.4 kW (3.2 A) | 0.4 kW (3.2 A) | 2.2 kW (11.1 A) | 3.7 kW (17.4 A) |
| | | 3 ϕ 400 V | — | — | 3.7 kW (8.7 A) | 7.5 kW (17.4 A) |
| Minimum Load Current | | 150 mA | | 300 mA | | |
| Main Circuit Specifications | Main Circuit Control Method | Batch Control | | | | |
| | Rated Operating Voltage | AC100 to 240 V 50/60 Hz | | AC100 to 480 V 50/60 Hz | | |
| | Operating Voltage Range | 85 to 110% of Rated Operating Voltage | | | | |
| | Rated Insulation Voltage | AC250 V | | AC500 V | | |
| | Making Voltage Drop | 1.5 V/Phase | | | | |
| | Open Circuit Leakage Current | 15 mA or Less (AC240 V 60 Hz) | | 30 mA or Less (AC480 V 60 Hz) | | |
| | Surge ON Current (60 Hz, 1 Half-Wave Cycle Peak Value) | 160 A | | 800 A | 1300 A | |
| | Tolerance I ² t (A ² s) | 106 | | 2600 | 7000 | |
| | Trigger System | Zero Voltage Trigger System | | | | |
| | Making and Breaking Capacities | 32 A | 50 A | 111 A | 174 A | |
| | Control Circuit Specifications | Rated Operating Voltage | DC12 to 24 V (10% or Less Voltage Ripple) | | | |
| Operating Voltage Fluctuation Range | | 85 to 110% of Rated Operating Voltage | | | | |
| Control Circuit Maximum Applied Voltage | | DC26.4 V | | | | |
| Control Circuit Input Current | | 20 mA (DC12 to 24 V) | | 5 mA (DC12 to 24 V) | | |
| Input Impedance | | 0.6 to 1.2 k Ω | | 2.4 to 4.8 k Ω | | |
| Operating Voltage | | DC9 V or Less | | | | |
| Open Voltage | | DC3 V or More | | | | |
| Response Time | | Max. 1 ms + 1/2 Cycle | | | | |
| Operation Indicator | | LED Indicator (Lights When Operating Voltage Applied) | | | | |
| Cooling Fan Operating Voltage (Note 6) | | — | | | | |
| Fan Fault Detection Output | Contact Arrangement | — | | | | |
| | Contact Capacity | — | | | | |
| Common Specifications | Withstand Voltage | 2 kV | | 2.5 kV | | |
| | Insulation Resistance | 100 M Ω | | | | |
| | Rated Impulse Withstand Voltage (Note 7) | 4 kV | | 6 kV | | |
| | Operating Ambient Temperature | -10 to 60°C (Use at Reduced Current When 40°C or More) | | | | |
| | Relative Temperature | 45% to 85% RH | | | | |
| | Altitude | 2,000 m or below | | | | |
| | Vibration-Resistant | 10 to 55 Hz 19.6 m/s ² | | | | |
| Shock-Resistant | 98 m/s ² | | | | | |

Note 1. Applicable with standard products.

Note 2. If the ambient temperature is 40°C or more, use the rated operated current multiplied by the reduced rate shown in the figure at right.

Note 3. The value in [] indicates the IEC (class AC-51) rating for US-N50TE(CX) types.

Note 4. Indicates the capacity per element.

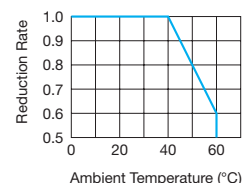
Note 5. Indicates the applicable capacities when selecting solid state contactors by their element capacities.





The applicable motor capacities differ depending on motor operating conditions. Refer to page 301 for information regarding selection.

Note 6. Special fan products with rated voltages of AC100 to 110 V can also be manufactured.

Note 7. In accordance with IEC60947-1.

Note 8. Consult with us separately if information on the amount of heat generated by the main circuit is required.

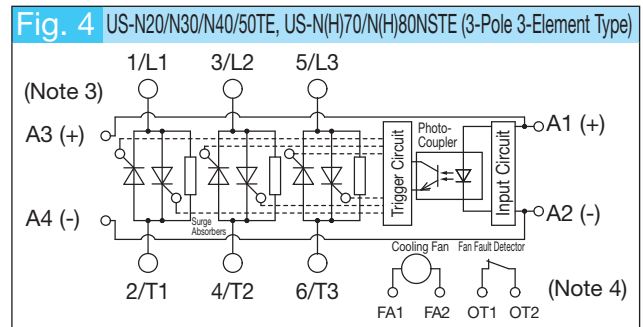
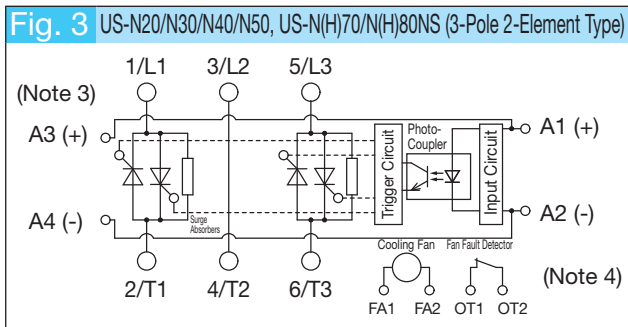
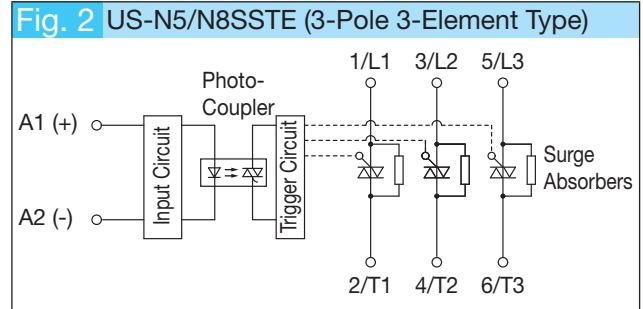
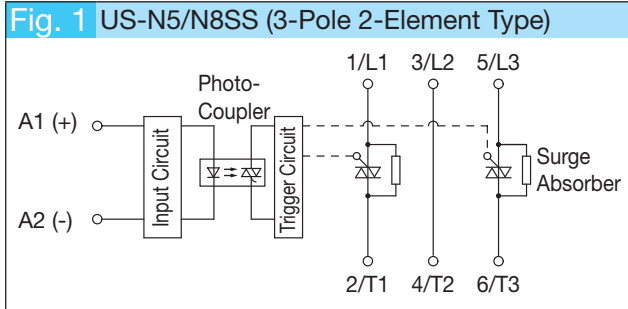


| 3-Pole Type | | | |
|---|---|--|---|
|  |  |  |  |
| — | — | — | — |
| US-N40 | US-N50 | US-N70NS | US-N80NS |
| US-N40TE | US-N50TE | US-N70NSTE | US-N80NSTE |
| US-N40CX | US-N50CX | — | — |
| US-N40TECX | US-N50TECX | — | — |
| — | — | — | — |
| — | — | — | — |
| 40 A | 50 A | 70 A | 80 A |
| 40 A | 50 A [45 A] ^{Note 3} | 70 A | 80 A |
| 8 kW | 10 kW [9 kW] ^{Note 3} | 14 kW | 16 kW |
| 13.8 kW | 17.3 kW [15.5 kW] ^{Note 3} | 24.2 kW | 27.7 kW |
| 16 kW | 20 kW [18 kW] ^{Note 3} | — | — |
| 27.7 kW | 34.6 kW [31.1 kW] ^{Note 3} | — | — |
| 5.5 kW (26 A) | 5.5 kW (26 A) | 11 kW (48 A) | 11 kW (48 A) |
| 11 kW (26 A) | 11 kW (26 A) | — | — |
| 300 mA | | | |
| Batch Control | | | |
| AC100 to 480 V 50/60 Hz | | AC100 to 240 V 50/60 Hz | |
| 85 to 110% of Rated Operating Voltage | | | |
| AC500 V | | AC250 V | |
| 1.5 V/Phase | | | |
| 30 mA or Less (AC480 V 60 Hz) | | 30 mA or Less (AC240 V 60 Hz) | |
| 1800 A | | | |
| 13500 | | | |
| Zero Voltage Trigger System | | | |
| 260 A | | 480 A | |
| DC12 to 24 V (10% or Less Voltage Ripple) | | | |
| 85 to 110% of Rated Operating Voltage | | | |
| DC26.4 V | | | |
| 5 mA (DC12 to 24 V) | | 20 mA (DC12 to 24 V) | |
| 2.4 to 4.8 kΩ | | 0.6 to 1.2 kΩ | |
| DC9 V or Less | | | |
| DC3 V or More | | | |
| Max. 1 ms + 1/2 Cycle | | | |
| LED Indicator (Lights When Operating Voltage Applied) | | | |
| — | | AC200 to 240 V 50/60 Hz | |
| — | | Break Contact | |
| — | | DC5 to 24 V/AC100 to 240 V 0.1 A | |
| 2.5 kV | | 2 kV | |
| 100 MΩ | | | |
| 6 kV | | 4 kV | |
| -10 to 60°C (Use at Reduced Current When 40°C or More) | | | |
| 45% to 85% RH | | | |
| 2,000 m or below | | | |
| 10 to 55 Hz 19.6 m/s ² | | | |
| 98 m/s ² | | | |

11 Related Equipment

Circuits

Figures 1 to 4 show the block circuit diagrams for US-N(H)□ types.



Note 1. The main circuit and control circuit are isolated via a photocoupler.

Note 2. US-N(H)□ types adopt a zero voltage trigger system.

Note 3. US-N20/N30/N40/N50(TE) types do not have A3 and A4 terminals.

Note 4. A cooling fan and fan fault detector are integrated into US-N(H)70/N(H)80NS(TE) types.

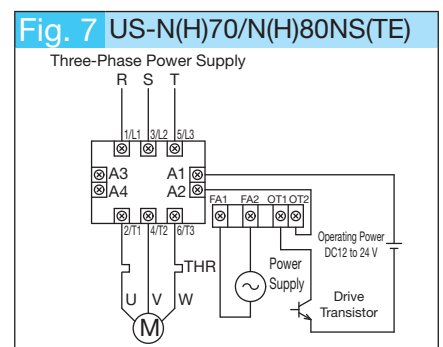
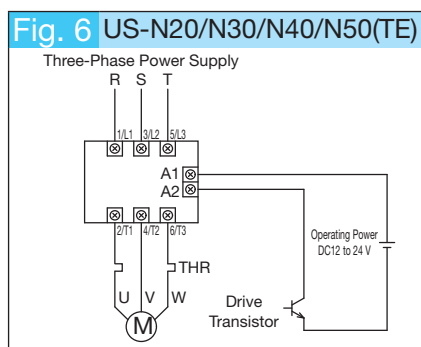
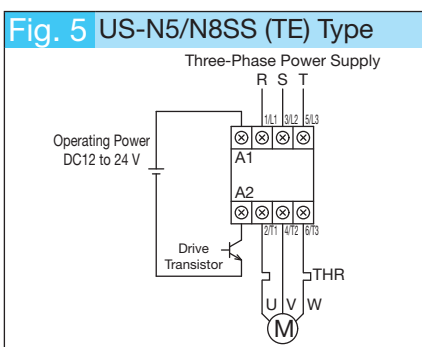
Note 5. Control circuit wiring (FA1, FA2, OT1 and OT2 terminals) must be used for models with an integrated cooling fan and fan fault detector. (Refer to the Connections section)

Refer to "Application Precautions" for information regarding handling of cooling fans.

Connecting

Figures 5 to 7 show sample circuit connections for US-N(H) □ types.

Use a low signal contact if using a contact in place of a transistor as the drive signal for US-N(H) □ /K(H) □ types.



Note. Refer to page 267 for information regarding CE Mark compliance.

Note. Refer to page 267 for information regarding CE Mark compliance.

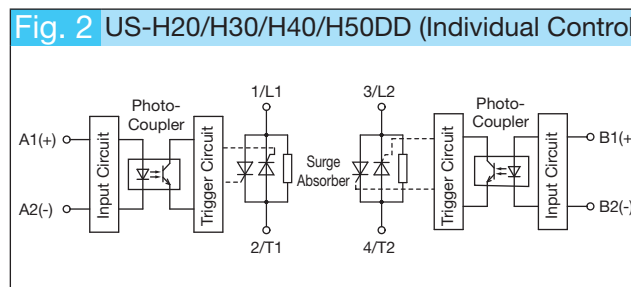
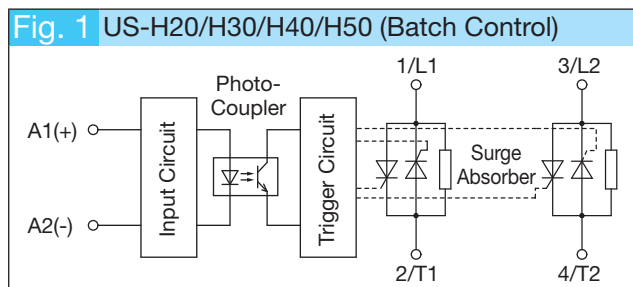
11.2.2 US-H□ Solid State Contactors

● Ratings/Specifications

| Appearance | | | | | | | | | | |
|----------------------------------|--|---|----------|--------|------------|--------------------|------------|----------|----------|------|
| | | | | | | | | | | |
| Model Name | Standard | US-H20 | US-H30 | US-H40 | US-H50 | US-H20DD | US-H30DD | US-H40DD | US-H50DD | |
| | IEC 35 mm Rail Mounting | US-H20RM | US-H30RM | — | — | US-H20DDRM | US-H30DDRM | — | — | |
| Width Reduced Product | US-H20UF | US-H30UF | — | — | US-H20DDUF | US-H30DDUF | — | — | — | |
| Rating | Rated Operating Current (-10 to 40°C) (Note 1) | JEM (Category AC-1) | 20A | 30A | 40A | 50A | 20A | 30A | 40A | 50A |
| | | IEC (Category AC-5) | 20A | 30A | 40A | 50A | 20A | 30A | 40A | 50A |
| | Applicable Heater Capacity (-10 to 40°C) | 1 φ 200 V | 4kW | 6kW | 8kW | 10kW | 4kW | 6kW | 8kW | 10kW |
| | | 3 φ 200 V | 6.9kW | 10.3kW | 13.8kW | 17.3kW | — | — | — | — |
| | | 1 φ 400 V | 8kW | 12kW | 16kW | 20kW | 8kW | 12kW | 16kW | 20kW |
| 3 φ 400 V | | 13.8kW | 20.7kW | 27.7kW | 34.6kW | — | — | — | — | |
| Minimum Load Current | 0.3 A | | | | | | | | | |
| Main Circuit Specifications | Main Circuit Control Method | Batch Control | | | | Individual Control | | | | |
| | Rated Operating Voltage | AC24 to 480 V 50/60 Hz | | | | | | | | |
| | Operating Voltage Range | 85 to 110% of Rated Operating Voltage | | | | | | | | |
| | Rated Insulation Voltage | AC500 V | | | | | | | | |
| | Making Voltage Drop | 1.8 V (At Rated Continuity Current) | | | | | | | | |
| | Open Circuit Leakage Current | Max. 30 mA (AC480 V 60 Hz) | | | | | | | | |
| | Surge ON Current (60 Hz, 1 Half-Wave Cycle Peak Value) | 330 A | 800 A | 1000 A | 1300 A | 330 A | 800 A | 1000 A | 1300 A | |
| | Tolerance I ² t (A ² s) | 450 | 2600 | 4100 | 7000 | 450 | 2600 | 4100 | 7000 | |
| | Trigger System | Zero Voltage Trigger System | | | | | | | | |
| | Making and Breaking Capacities | 28 A | 42 A | 56 A | 70 A | 28 A | 42 A | 56 A | 70 A | |
| Operating Circuit Specifications | Rated Operating Voltage | DC12 to 24 V (10% or Less Voltage Ripple) | | | | | | | | |
| | Operating Voltage Fluctuation Range | 85 to 110% of Rated Operating Voltage | | | | | | | | |
| | Control Circuit Maximum Applied Voltage | DC26.4 V | | | | | | | | |
| | Control Circuit Input Current | 10 mA or Less (DC12 to 24 V) | | | | | | | | |
| | Input Impedance | 1.2 to 2.4 kΩ | | | | | | | | |
| | Operating Voltage | DC9 V or Less | | | | | | | | |
| | Open Voltage | DC3 V or More | | | | | | | | |
| | Response Time | Max. (1 ms + 1/2 Cycle) | | | | | | | | |
| | Operation Indicator | LED Indicator (Lights When Operating Voltage Applied) | | | | | | | | |
| | Withstand Voltage | 2.5 kV | | | | | | | | |
| Common Specifications | Insulation Resistance | 100 MΩ | | | | | | | | |
| | Rated Impulse Withstand Voltage | 6 kV | | | | | | | | |
| | Operating Ambient Temperature | -10 to 60°C (Use at Reduced Current If 40°C or More) | | | | | | | | |
| | Relative Humidity | 45% to 85% RH | | | | | | | | |
| | Altitude | 2,000 m or below | | | | | | | | |
| | Vibration-Resistant | 10 to 55 Hz 19.6 m/s ² | | | | | | | | |
| | Shock-Resistant | 98 m/s ² | | | | | | | | |

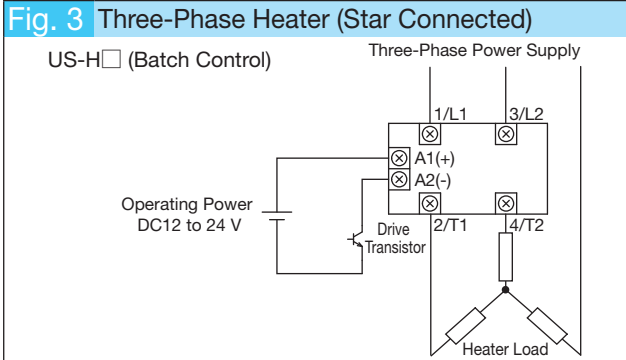
Note 1. If the ambient temperature is 40°C or more, use the rated operated current multiplied by the reduced rate shown in figure 1 on page 304.
 Note 2. US-H□HZ types without cooling fins can also be manufactured. Refer to the Applications column on page 299 for information regarding US-H□HZ type application.
 Note 3. US-H□ types are solid state contactors for heater loads. Do not use with motor loads, as they are not applicable.

● Circuit

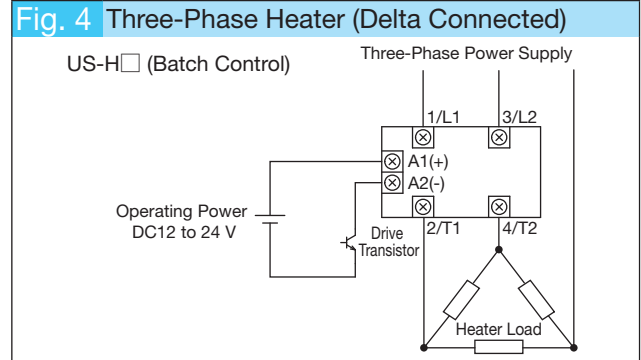


11 Related Equipment

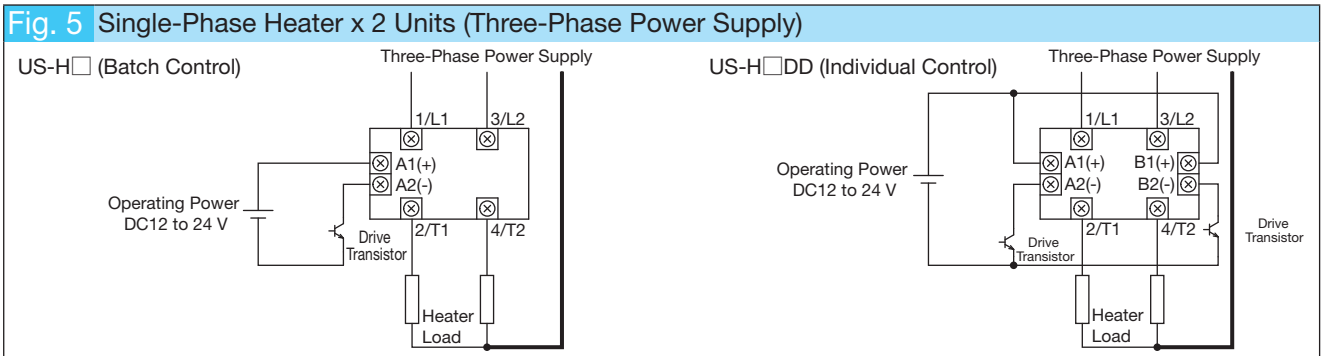
Connecting



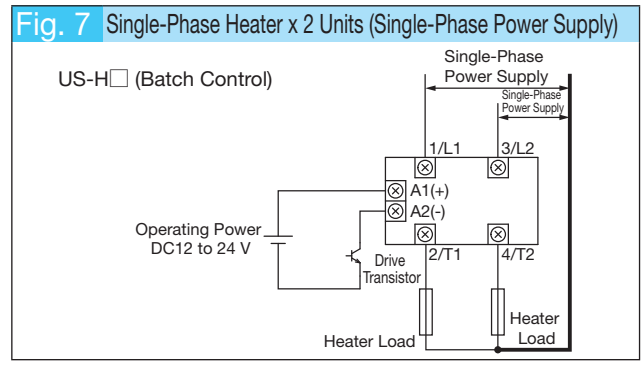
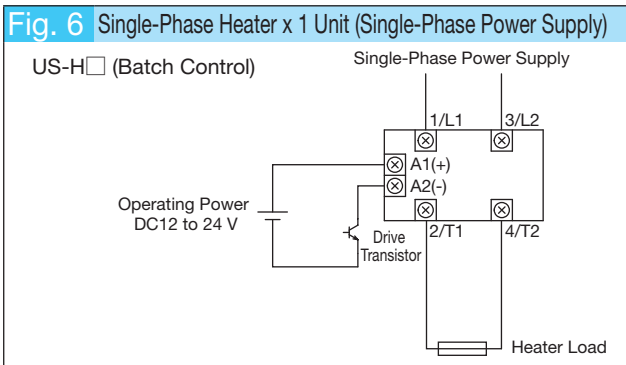
Note 1. Connect the load directly to the power supply for single-phase operation.
 Note 2. The rated current of US-H types should be selected to match the heater current.



Note 1. Connect the load directly to the power supply for single-phase operation.
 Note 2. Heater current is $\sqrt{3}$ times for US-H types, so the rated current of US-H types should be selected accordingly.



Note 1. The solid line — indicates $\sqrt{3}$ times the heater current, so the current capacity of the power wiring should be selected accordingly to withstand the current.
 Note 2. 2 heaters can be independently controlled when using US-H DD (individual control) types.



Note 1. The solid line — indicates double the heater current, so the current capacity of the power wiring should be selected accordingly to withstand the current.
 Note 2. 2 heaters can be independently controlled when using US-H DD (individual control) types.

● US-H □ HZ (Without Cooling Fins) Application

US-H □ (DD)HZ solid state contactors are US-H □ (DD) types without the cooling fins, allowing for combination with cooling fins that give your desired performance and cooling fins to suit the load conditions.

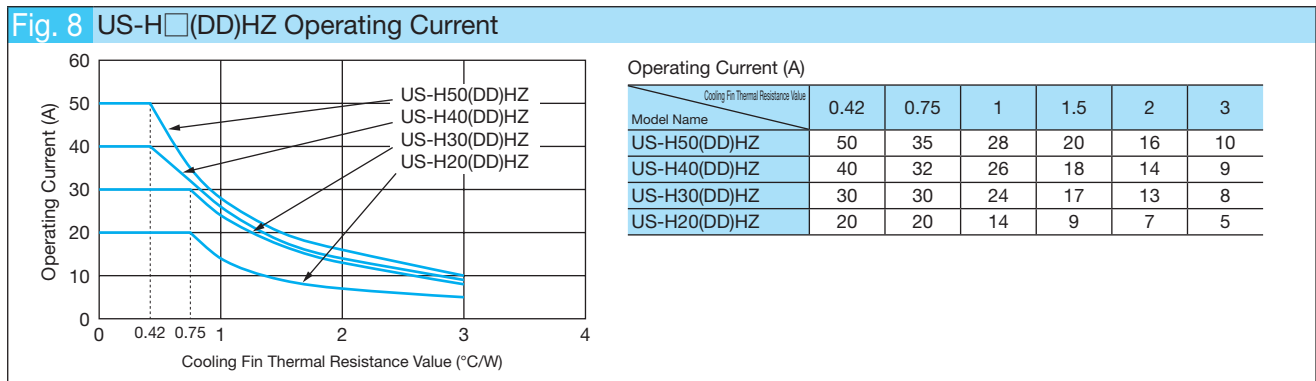
(1) Rating

The operating current when combining with fins with the same thermal resistance value as US-H □ (DD) types or when directly mounted to control panels (iron plate) is indicated in the table below.

Operating Current Based on Mounting Conditions

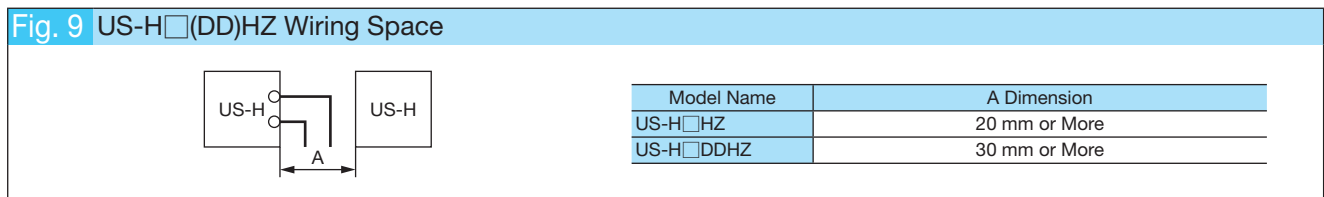
| Model Name | For Fins With Thermal Resistance Equivalent to US-H□(DD) (Cooling Fin Thermal Resistance Value: 0.42°C/W) | For Direct Mounting to Control Board Mounting Panels (Iron Plate) (Thermal Resistance Value: 3°C/W) |
|--------------|---|---|
| US-H20(DD)HZ | 20 A | 5 A |
| US-H30(DD)HZ | 30 A | 8 A |
| US-H40(DD)HZ | 40 A | 9 A |
| US-H50(DD)HZ | 50 A | 10 A |

Note. Calculate the operating current for thermal resistances differing from the table above using the operating currents for cooling fin thermal resistance values in Figure 8.



(2) Mounting

1. The surface to which US-H□(DD)HZ types are mounted (cooling fins or control panel) should have flatness within 50 μm.
2. When mounting to cooling fins or control panel, apply a 0.1 mm thick coating of thermal compound with good heat-transfer properties to the rear surface of US-H□(DD)HZ types.
Thermal Compound (E.g.) G-747 (Shin-Etsu Silicone)
3. Use 2 M4 screws with a tightening torque of 1.2 to 2.05 N·m when mounting to cooling fins or control panels.
4. The US-H□(DD)HZ type connects to the control circuit terminal from the side, so some space to the sides is required for wiring. Secure the amount of wiring space indicated by dimension A in Figure 9.



11 Related Equipment

11.3 Application to Each Load

11.3.1 US-N Solid State Contactors

● Heater Load

The table below shows the AC rated operating current applicable with heater loads (JEM1441 (class AC-1), IEC60947-4-3 (Class AC-51)).

| Model Name | Rated Operating Current (A) | | Applicable Heater Capacity (kW) | | | | |
|--------------------|-----------------------------|----------------------|---------------------------------|------|------|-------------|------|
| | JEM (Category AC-1) | IEC (Category AC-51) | Single-Phase | | | Three-Phase | |
| | | | 100V | 200V | 400V | 200V | 400V |
| US-N5SS(TE) | 5 | 5 | 0.5 | 1 | — | 1.7 | — |
| US-N8SS(TE) | 8 | 8 | 0.8 | 1.6 | — | 2.7 | — |
| US-N20(TE)(CX)(RM) | 20 | 20 | 2 | 4 | 8 | 6.9 | 13.8 |
| US-N30(TE)(CX) | 30 | 30 | 3 | 6 | 12 | 10.3 | 20.7 |
| US-N40(TE)(CX) | 40 | 40 | 4 | 8 | 16 | 13.8 | 27.7 |
| US-N50(CX) | 50 | 50 | 5 | 10 | 20 | 17.3 | 34.6 |
| US-N50TE(CX) | 50 | 45 | 4.5 | 9 | 18 | 15.5 | 31.1 |
| US-N70NS(TE) | 70 | 70 | 7 | 14 | — | 24.2 | — |
| US-N80NS(TE) | 80 | 80 | 8 | 16 | — | 27.7 | — |
| US-NH70NS(TE) | 70 | 65 | — | 14 | 28 | 24.2 | 48.5 |
| US-NH80NS(TE) | 80 | 75 | — | 16 | 32 | 27.7 | 55.4 |

Note 1. Rating applicable for -10 to 40°C ambient temperature. If the temperature is 40°C or more, use the rated operated current multiplied by the reduced rate shown in Figure 1 on page 304.

Note 2. Calculate the applicable heater capacity using the equations below.

For single-phase: power supply voltage x load current

For three-phase: $\sqrt{3}$ x power supply voltage x load current (3 x power supply voltage x load current for delta connections)

Note 3. An energizing inrush current flows for heater loads when US-N is connected on the primary side of the transformer. Take this inrush current into account when making a selection. (Refer to technical documents)

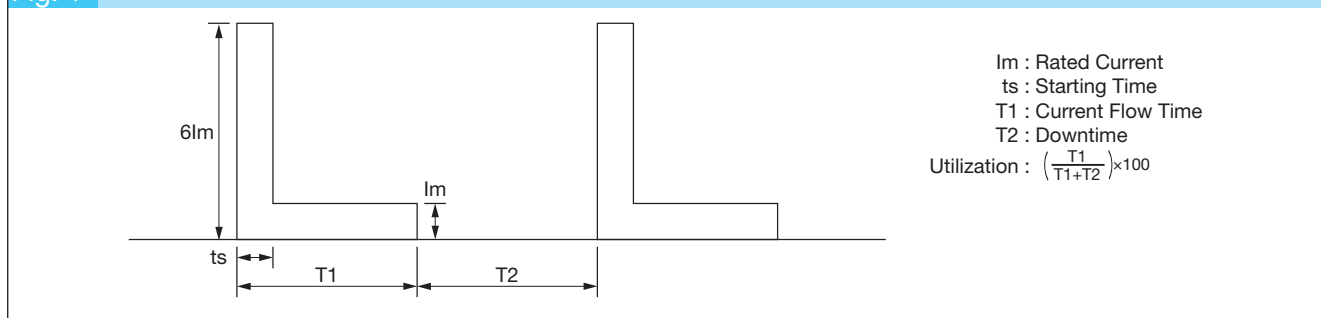
● Motor Load

For applications with direct start motor loads, an applicable solid state contactor frame size should be determined based on motor starting current, starting time, switching frequency and utilization. Accordingly, it is necessary to clarify the application conditions for practical use and select a frame size that will support them.

Figure 1 and page 301 show examples for selecting a US-N solid state contactor based on the operating conditions.

Refer to page 306 for selection of solid state contactors with no-fuse breakers, thermal overload relays and quick-trip fuse protection functions.

Fig. 1 Current Pattern for Motor Direct Start



(1) 200 V Main Circuit Motor

- Selection Criteria A (Switching Frequency: 1200 Times/Hour, Utilization: 25%, Starting Current: 6 Times Full-Load Current, Ambient Temperature 40°C)

| Motor Capacity (3 φ 200 V) | Starting Time | | | | | | |
|----------------------------|---|--------------------------------|---|-------------------------------------|---|--------------------------------|-------|
| | 0.1 s | 0.2 s | 0.3 s | 0.4 s | 0.5 s | 0.6 s | 0.7 s |
| 0.4 kW (3.2 A) | US-N5 <input type="checkbox"/> | | | | | US-N8 <input type="checkbox"/> | |
| 0.75 kW (4.8 A) | US-N5 <input type="checkbox"/> | US-N8 <input type="checkbox"/> | US-N20 <input type="checkbox"/> | | | | |
| 1.5 kW (8.0 A) | US-N20 <input type="checkbox"/> | | | | | | |
| 2.2 kW (11.1 A) | US-N20 <input type="checkbox"/> | | | US-N30 <input type="checkbox"/> | | | |
| 3.7 kW (17.4 A) | US-N30 <input type="checkbox"/> | | | US-N40/N50 <input type="checkbox"/> | US-N70 <input type="checkbox"/> /N80 <input type="checkbox"/> | | |
| 5.5 kW (26.0 A) | US-N40/N50 <input type="checkbox"/> | | US-N70 <input type="checkbox"/> /N80 <input type="checkbox"/> | | | | |
| 7.5 kW (34.0 A) | US-N70 <input type="checkbox"/> /N80 <input type="checkbox"/> | | | | | | |
| 11 kW (48.0 A) | US-N70 <input type="checkbox"/> /N80 <input type="checkbox"/> | | | | | | |

- Selection Criteria B (Switching Frequency: 600 Times/Hour, Utilization: 40%, Starting Current: 6 Times Full-Load Current, Ambient Temperature 40°C)

| Motor Capacity (3 φ 200 V) | Starting Time | | | | | | |
|----------------------------|---|--------------------------------|---|-------------------------------------|---|--------------------------------|-------|
| | 0.1 s | 0.2 s | 0.3 s | 0.4 s | 0.5 s | 0.6 s | 0.7 s |
| 0.4 kW (3.2 A) | US-N5 <input type="checkbox"/> | | | | | US-N8 <input type="checkbox"/> | |
| 0.75 kW (4.8 A) | US-N5 <input type="checkbox"/> | US-N8 <input type="checkbox"/> | US-N20 <input type="checkbox"/> | | | | |
| 1.5 kW (8.0 A) | US-N20 <input type="checkbox"/> | | | | | | |
| 2.2 kW (11.1 A) | US-N20 <input type="checkbox"/> | | | US-N30 <input type="checkbox"/> | | | |
| 3.7 kW (17.4 A) | US-N30 <input type="checkbox"/> | | | US-N40/N50 <input type="checkbox"/> | US-N70 <input type="checkbox"/> /N80 <input type="checkbox"/> | | |
| 5.5 kW (26.0 A) | US-N40/N50 <input type="checkbox"/> | | US-N70 <input type="checkbox"/> /N80 <input type="checkbox"/> | | | | |
| 7.5 kW (34.0 A) | US-N70 <input type="checkbox"/> /N80 <input type="checkbox"/> | | | | | | |
| 11 kW (48.0 A) | US-N70 <input type="checkbox"/> /N80 <input type="checkbox"/> | | | | | | |

- Selection Criteria C (Switching Frequency: 150 Times/Hour, Utilization: 60%, Starting Current: 6 Times Full-Load Current, Ambient Temperature 40°C)

| Motor Capacity (3 φ 200 V) | Starting Time | | | | | | |
|----------------------------|---|--------------------------------|---|-------------------------------------|-------|-------|-------|
| | 0.1 s | 0.2 s | 0.3 s | 0.4 s | 0.5 s | 0.6 s | 0.7 s |
| 0.4 kW (3.2 A) | US-N5 <input type="checkbox"/> | | | | | | |
| 0.75 kW (4.8 A) | US-N5 <input type="checkbox"/> | US-N8 <input type="checkbox"/> | US-N20 <input type="checkbox"/> | | | | |
| 1.5 kW (8.0 A) | US-N20 <input type="checkbox"/> | | | | | | |
| 2.2 kW (11.1 A) | US-N20 <input type="checkbox"/> | | | US-N30 <input type="checkbox"/> | | | |
| 3.7 kW (17.4 A) | US-N30 <input type="checkbox"/> | | | US-N40/N50 <input type="checkbox"/> | | | |
| 5.5 kW (26.0 A) | US-N40/N50 <input type="checkbox"/> | | US-N70 <input type="checkbox"/> /N80 <input type="checkbox"/> | | | | |
| 7.5 kW (34.0 A) | US-N70 <input type="checkbox"/> /N80 <input type="checkbox"/> | | | | | | |
| 11 kW (48.0 A) | US-N70 <input type="checkbox"/> /N80 <input type="checkbox"/> | | | | | | |

(2) 400 V Main Circuit Motor

- Selection Criteria A (Switching Frequency: 1200 Times/Hour, Utilization: 25%, Starting Current: 6 Times Full-Load Current, Ambient Temperature 40°C)

| Motor Capacity (3 φ 400 V) | Starting Time | | | | | | |
|----------------------------|---|-------|---|---|-------|---------------------------------|-------|
| | 0.1 s | 0.2 s | 0.3 s | 0.4 s | 0.5 s | 0.6 s | 0.7 s |
| 3.7 kW (8.7 A) | US-N20 <input type="checkbox"/> | | | | | US-N30 <input type="checkbox"/> | |
| 5.5 kW (13.0 A) | US-N30 <input type="checkbox"/> | | | | | | |
| 7.5 kW (17.4 A) | US-N30 <input type="checkbox"/> | | US-N40/N50 <input type="checkbox"/> | US-NH70 <input type="checkbox"/> /NH80 <input type="checkbox"/> | | | |
| 11 kW (26.0 A) | US-N40/N50 <input type="checkbox"/> | | US-NH70 <input type="checkbox"/> /NH80 <input type="checkbox"/> | | | | |
| 15 kW (34.0 A) | US-NH70 <input type="checkbox"/> /NH80 <input type="checkbox"/> | | | | | | |
| 22 kW (48.0 A) | US-NH70 <input type="checkbox"/> /NH80 <input type="checkbox"/> | | | | | | |

11 Related Equipment

- Selection Criteria B (Switching Frequency: 600 Times/Hour, Utilization: 40%, Starting Current: 6 Times Full-Load Current, Ambient Temperature 40°C)

| Motor Capacity (3 φ 400 V) | Starting Time | | | | | | |
|----------------------------|----------------|-------|----------------|-------------|-------|----------------|-------|
| | 0.1 s | 0.2 s | 0.3 s | 0.4 s | 0.5 s | 0.6 s | 0.7 s |
| 3.7 kW (8.7 A) | US-N20□ | | | | | | |
| 7.5 kW (17.4 A) | US-N30□ | | | US-N40/N50□ | | US-NH70□/NH80□ | |
| 11 kW (26.0 A) | US-N40/N50□ | | US-NH70□/NH80□ | | | | |
| 15 kW (34.0 A) | US-NH70□/NH80□ | | | | | | |
| 22 kW (48.0 A) | US-NH70□/NH80□ | | | | | | |

- Selection Criteria C (Switching Frequency: 150 Times/Hour, Utilization: 60%, Starting Current: 6 Times Full-Load Current, Ambient Temperature 40°C)

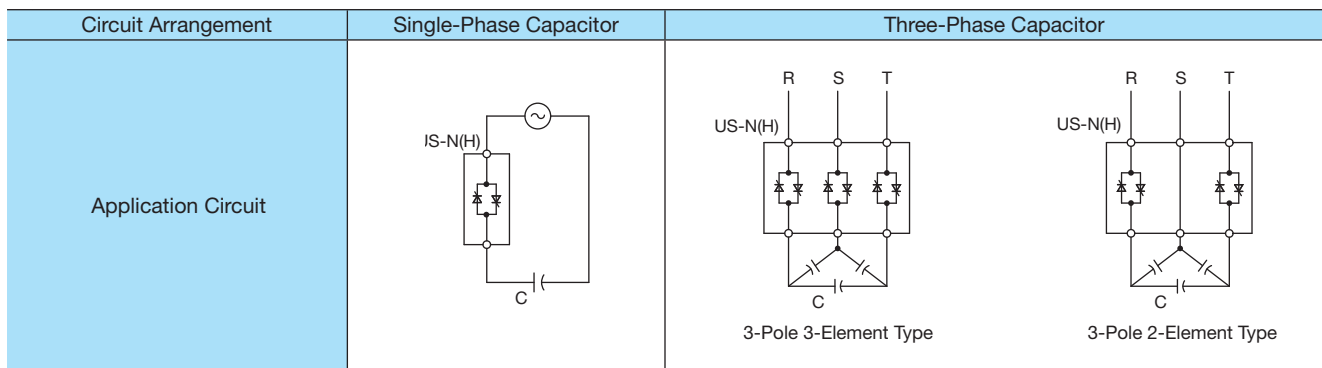
| Motor Capacity (3 φ 400 V) | Starting Time | | | | | | |
|----------------------------|----------------|-------|----------------|-------|-------|-------------|-------|
| | 0.1 s | 0.2 s | 0.3 s | 0.4 s | 0.5 s | 0.6 s | 0.7 s |
| 3.7 kW (8.7 A) | US-N20□ | | | | | | |
| 7.5 kW (17.4 A) | US-N30□ | | | | | US-N40/N50□ | |
| 11 kW (26.0 A) | US-N40/N50□ | | US-NH70□/NH80□ | | | | |
| 15 kW (34.0 A) | US-NH70□/NH80□ | | | | | | |
| 22 kW (48.0 A) | US-NH70□/NH80□ | | | | | | |

● Capacitive Load

US-N solid state contactors close using a zero voltage trigger system. As such, these can suppress an inrush current when closing capacitive loads of approximately 2 to 10 times the rated current, making them suitable for frequently switched phase advanced capacitors. When using a phase advanced capacitor the voltage and current waveforms may become distorted. As these distortions increase the noise of transformers and motors, a series reactor with 6% the capacitive reactance is generally inserted to help suppress distortions to the voltage and current due to the 5th harmonic. This series reactor not only helps to restore the waveform but also helps to suppress the inrush current. We recommend their use in all capacitive circuits. The maximum inrush current with a 6% series reactor in place is approximately 5 times the rated current. When the capacitor is open-circuited, the effect of residual charge in the capacitor means a voltage 2 times greater than the power supply is applied to the main circuit element. The rated voltage of the US-N unit to be used hence must be 2 times the intended circuit voltage.

Use a AC400 V main circuit voltage US-N □ unit for AC200 V capacitive load applications.

Fig. 2 Capacitor Load Application Circuit



- Capacitor Load Application Capacity (AC200 V)

| Model Name | Single-Phase Capacitor | Three-Phase Capacitor |
|--|------------------------|-----------------------|
| US-N20□ | 3 kVA | 5 kVA |
| US-N30□ | 4.6 kVA | 8 kVA |
| US-N40□ | 6 kVA | 10 kVA |
| US-N50□ | 7.6 kVA | 13 kVA |
| US-NH70NS(TE)/US-NH80NS(TE) (1 to 3 Units) | 10 kVA | 18 kVA |

11.3.2 US-H□ Solid State Contactors

● Heater Load

The table below shows the AC rated operating current applicable with heater loads (JEM1441 (class AC-1), IEC60947-4-3 (Class AC-51)).

| Model Name | Rated Operating Current (A) | | Applicable Heater Capacity (kW) | | | | |
|-------------------|-----------------------------|----------------------|---------------------------------|------|------|-------------|------|
| | | | Single-Phase | | | Three-Phase | |
| | JEM (Category AC-1) | IEC (Category AC-51) | 100V | 200V | 400V | 200V | 400V |
| US-H20 (RM)(UF) | 20 | 20 | 2 | 4 | 8 | 6.9 | 13.8 |
| US-H30 (RM)(UF) | 30 | 30 | 3 | 6 | 12 | 10.3 | 20.7 |
| US-H40 | 40 | 40 | 4 | 8 | 16 | 13.8 | 27.7 |
| US-H50 | 50 | 50 | 5 | 10 | 20 | 17.3 | 34.6 |
| US-H20DD (RM)(UF) | 20 | 20 | 2 | 4 | 8 | — | — |
| US-H30DD (RM)(UF) | 30 | 30 | 3 | 6 | 12 | — | — |
| US-H40DD | 40 | 40 | 4 | 8 | 16 | — | — |
| US-H50DD | 50 | 50 | 5 | 10 | 20 | — | — |

Note 1. Rating applicable for -10 to 40°C ambient temperature. If the temperature is 40°C or more, use the rated operated current multiplied by the reduced rate shown in Figure 1 on page 304.

Note 2. Calculate the applicable heater capacity using the equations below.

For single-phase: Power supply voltage x load current

For three-phase: $\sqrt{3}$ x power supply voltage x load current (3 x power supply voltage x load current for delta connections)

11 Related Equipment

11.4 Application Precautions

● Working Environment

- (1) Operating Ambient Temperature: -10°C to 60°C
However, if the temperature is 40°C to 60°C then use the rated operating current multiplied by the reduced rate shown in Figure 1. (No freezing, no condensation)
- (2) Storage Temperature : -30°C to 65°C
- (3) Relative Humidity : 45% to 85% RH
- (4) Vibration : 10 to 55 Hz 19.6 m/s² or Less
- (5) Shock : 98 m/s² or Less
- (6) Environment : Use only in well-ventilated areas free of dust, gas and organic solvents.

● Mounting

- (1) US-N and US-H type main circuit and cooling fins are electrically isolated so there is no need to insulate when mounting. Mount in the mounting orientation shown in Figure 2. Remember to take ventilation within the panel into consideration.
Do not place in contact with cables etc. as the temperature of the cooling fins is approximately 100°C when the rated operating current is being continuously applied.
- (2) If using US-N or US-H units on column panels or arranging with other equipment, take care to secure at least the amount of space indicated in Figure 3. If mounting US-N or US-H units vertically, then space all US-N or US-H units at least 300 mm apart.

● Main Circuit Voltage Application Range

The main circuit voltage can be operated within the range indicated in the above-right table.
DC power supplies are not supported.

● Operating Voltage and Wiring Used

The DC operating voltage for US-N or US-H drive units is required to be DC12 to 24 V with 10% or less voltage ripple. (Fig. 4)

Avoid combining the control input and power lines of US-N or US-H units.

Use a twisted-pair cable for the control circuit and limit the length to 10 m or less.

● Open Circuit Leakage Current

- (1) 15 to 50 mA of leakage current will flow when US-N or US-H units are open-circuited (OFF), depending on the model. These leakage currents may cause electric shocks on the load side, so a no-fuse breaker or magnetic contactor should be connected on the power-side, as per Figure 5, to ensure the load is open-circuited.
- (2) The leakage current may prevent light load motors from stopping when US-N is switched off. In such cases, connect a resistor in parallel with the load such that the load current is 10 or more times greater than the leakage current. (Fig. 6)
- (3) If there is no load present with US-N or US-H units, the main circuit will not switch on and operation cannot be verified. However, the operation indicator lamp will illuminate when voltage is applied and a voltage close to the power supply voltage is applied to the load side of US-N or US-H units. (Due to US-N or US-H leakage currents) Connect a sample load such as a resistor (so that 1 A or so flows) to check the operation of US-N or US-H units.

● Main Circuit Voltage Application Range

| Series | US-N | US-H |
|----------------------|------------------|------------|
| Main Circuit Voltage | | |
| AC24 to 480 V | — | H20 to H50 |
| AC100 to 480 V | N20 to N50 | — |
| AC100 to 240 V | N5, N8, N70, N80 | — |
| AC200 to 480 V | NH70, NH80 | — |

Note. This table indicates the applicable model names. — is not applicable

Fig. 1 Rated Operating Current Reduction Rate

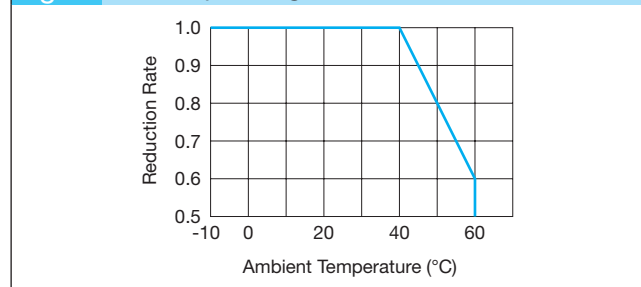


Fig. 2 Mounting Orientation

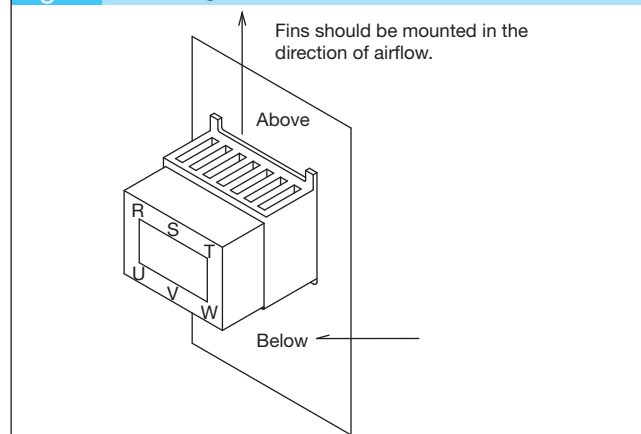


Fig. 3 Space Occupied in Mounted State

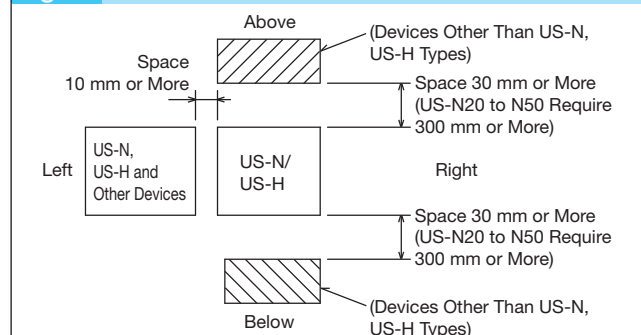
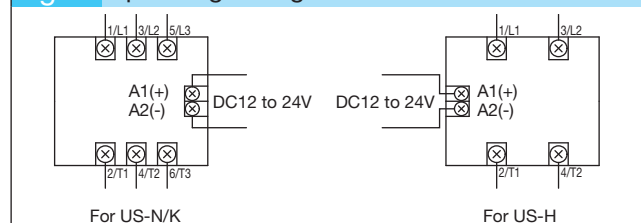


Fig. 4 Operating Voltage



● Cooling Fan Circuit Connections

US-N(H)70NS(TE) and US-N(H)80NS(TE) units have an integrated cooling fan and fan fault detector. Take care to ensure these are wired to the control circuit.

(1) Cooling Fan Operating Power Terminal (FA1, FA2)

Connect the cooling fan operating power supply to the primary-side main circuit of the US-N unit as per Figure 7. If the main circuit is AC400 V, then reduce the voltage to AC200 V using a control transformer. Avoid connecting to the secondary side of the US-N unit, as the lifespan of the cooling fan will be reduced if frequently started or stopped.

(2) Cooling Fan

The lifespan of the cooling fan bearing is approximately 10,000 to 35,000 hours and should be replaced as required according to the running conditions. Replacement is also required if abnormal noise or vibrations are generated. (Replacement cooling fan units are available.)

(3) Fan Fault Detector Terminals (OT1, OT2)

Fan fault detectors operate when there is a fault with the cooling fins (faulty cooling fan etc.) by open-circuiting the normally closed fan fault detector contact. Connect to the control circuit in series to switch OFF the US-N unit when a fault is detected. The fan fault detector automatically resets (closes the contact) when the temperature has dropped. If retention of the detection signal is required, then attach an external retention circuit.

● Applicable Wire Size and Terminal Screw Tightening Torque

⚠ There is a risk of overheating or fire. Be sure to maintain the tightening torque and periodically re-tighten the screw. Electric wires should be properly connected according to the electric wiring diagram. Tightening the terminal screw should be properly conducted within the tightening torque shown in the tables (1) and (2). Insufficient tightening of the terminal screw may cause overheating or cause the electric wire to fall off. Excessive tightening torque may damage the terminal screw.

● AC Operated Optional Unit Control Via Solid State Relays

When controlling the switching of AC operated optional units (UA-DR □, UA-SH □, UA-RE, UN-FD □) with a solid state relay or triac output, use a solid state relay or triac output with an integrated varistor. US-N type optional UA-SH □ unit auxiliary outputs have an integrated varistor and can be controlled by the optional units listed above.

● Non-Applicable Connections

US-N or US-H types are 1-pole to 3-pole compatible and can switch single-phase and three-phase loads. The special configurations shown below cannot be used.

(1) Parallel Connections (Refer to Figure 8)

Poles of the US-N or US-H unit main circuit cannot be connected in parallel in order to increase current capacity.

(Explanation) The ON power supply to the thyristor of each pole has some variance which causes continuity current to concentrate at the pole with lower voltage, damaging the thyristor.

(2) Series Connections (Refer to Figure 9)

Poles of the US-N or US-H unit main circuit cannot be connected in series in order to increase the rated voltage.

(Explanation) The operating voltage and operating time of each pole has some variance which causes timing mismatches, applying excessive voltage to certain poles, resulting in damage.

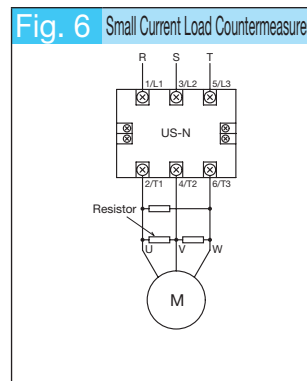
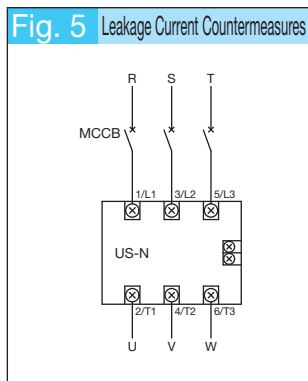
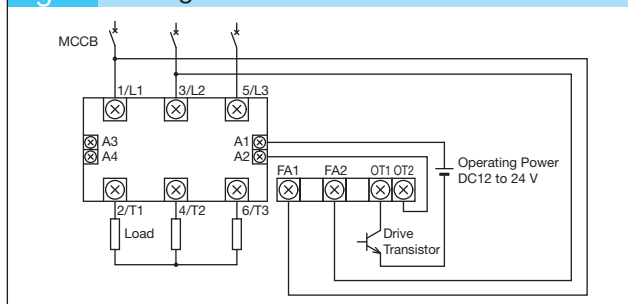


Fig. 7 Cooling Fan Control Circuit



(1) Applicable Wire Size and Terminal Screw Tightening Torque (Main Circuit)

| Model Name | Terminal Screw Size | Applicable Wire Size | Applicable Crimp Lug Size | Terminal Screw Tightening Torque |
|--|---------------------|---|---------------------------|---|
| US-N5SS (TE) US-N8SS (TE) | M3.5 | φ 1.6mm 1.25 to 2mm ² | 1.25-3.5 to 2-3.5 | 0.94 to 1.51 N·m (Standard 1.17 N·m) |
| US-N20 (TE) to N50 (TE) | M5 | — (Note 1) (2 to 14mm ²) | 1.25-5 to 14-5 | 2.06 to 3.33 N·m (Standard 2.54 N·m) |
| US-N (H) 70NS (TE) US-N (H) 80NS (TE) | M6 | — | 1.25-6 to 22-6 38-S6 | 3.53 to 5.78 N·m (Standard 4.41 N·m) |
| US-H20 (DD) to H50 (DD) | M5 | — | 1.25-5 to 14-5 | 2.06 to 3.33N·m (Standard 2.54N·m) |
| US-H20/H30 (DD)UF | | | | |

Note 1. The value in parentheses is applicable for US-N□(TE)CX only.

(2) Applicable Wire Size and Terminal Screw Tightening Torque (Control Circuit)

| Model Name | Terminal Screw Size | Applicable Wire Size | Applicable Crimp Lug Size | Terminal Screw Tightening Torque |
|-------------------------------|---------------------|---------------------------------------|---------------------------|---|
| US-N/H Series All Models | M3.5 | φ 1.6 mm 1.25 to 2 mm ² | 1.25-3.5 to 2-3.5 | 0.94 to 1.51 N·m (Standard 1.17 N·m) |
| UA, UN-□ All Option Models | M3.5 | φ 1.6 mm 1.25 to 2 mm ² | 1.25-3.5 to 2-3.5 | 0.94 to 1.51 N·m (Standard 1.17 N·m) |

Fig. 8 Parallel Connected

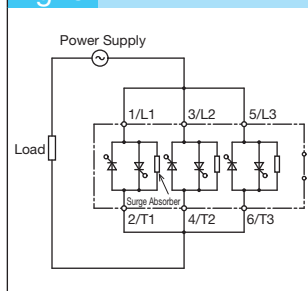
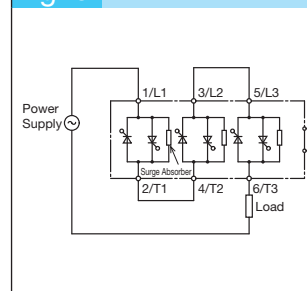


Fig. 9 Series Connected



(3) Inverter Secondary Connections

Use on the secondary-side of the inverter is not possible as a large leakage current flows when switched off due to harmonics, potentially causing the surge absorber to burn out.

11 Related Equipment

● Failure Mode

US-N or US-H units may fail if subjected to incorrect handling or operating conditions. Current usually flows continuously while in the main circuit element failure mode of US-N or US-H units. Fault detection units (UN-FD) are available as optional units to detect when US-N or US-H units fail while the main circuit element is in continuity mode. This unit should be combined for use with a no-fuse breaker with voltage tripping device or magnetic contactor.

● Short-circuit Protection

US-N or US-H units have little over-current withstanding capacity (surge ON current) and regions that cannot be protected by no-fuse breakers so must be protected with quick-trip fuses or thyristor protectors.

(1) Quick-Trip Fuses

Quick-trip fuses are economical when divided among heater loads and motor loads with starting currents. The table below shows quick-trip fuse selection criteria.

● Quick-Trip Fuse Selection Criteria

| Selection Criteria | Content | Equation |
|---|---|--|
| (1) Fuse Rated Current | Limiting of Load Current to Prevent Fuse Temperature Rise and Erroneous Fusing | $(\text{Fuse Rated Current}) \times 0.8 \geq (\text{Load Current})$ |
| (2) Fusing Properties of Fuse | Limiting of Overcurrent to Prevent Fuse Deterioration and Fusion by Repeated Overcurrent (Ex: Motor Start-Up Current) | $(\text{Fusing Current of Fuse}) \times 0.6 > (\text{Load Start-Up Current})$ |
| (3) Relationship of the Total Breaking I^2t of the Fuse and Allowable I^2t of the Element | Protection of the Element with Respect to Short Circuit of a Half Cycle or Less | $(\text{Total Breaking } I^2t \text{ of Fuse}) < (\text{Allowable } I^2t \text{ of Element})$ |
| (4) Relationship of the Fusing Characteristics of the Fuse and State Current of the Element | Protection of the Element during Large Current Flow | The intersection of the fusing characteristics of the fuse and state current characteristics of the element is to be 50 ms or more |

For Heater Loads: Select (1), (3), (4)

For Motor Loads: Select (2), (3), (4)

(2) Thyristor Protector

Applicable during the limited area of short-circuit current during an accident when protecting US-N and US-H types with a thyristor protector.

US-N or US-H have rated surge ON current properties and allowable I^2t values to withstand over-current situations. Protection against the rated surge ON consists of a balance of thyristor protector operating characteristics and allowable I^2t and is limited to the protectable region applicable when short-circuited (shorted time region) with restricted thyristor protector current (continuous I^2t).

Fig. 10 Short-Circuit Protection Via Quick-Trip Fuse

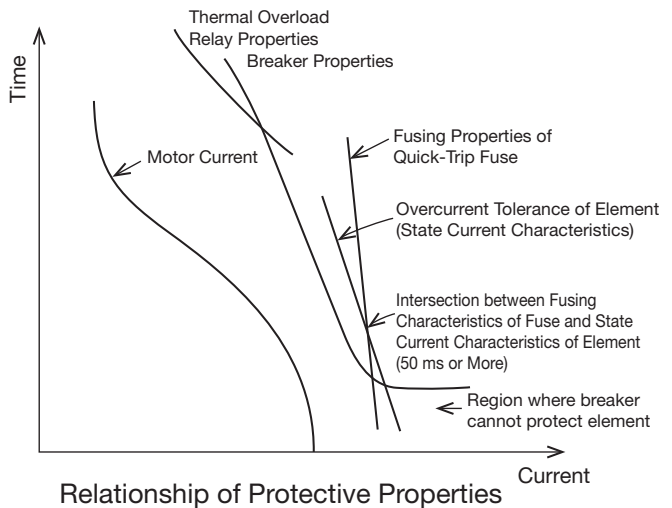
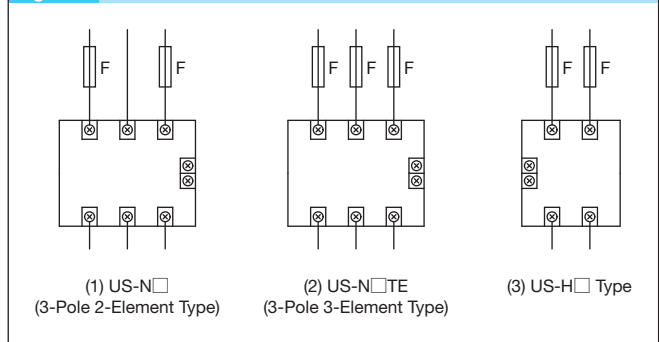
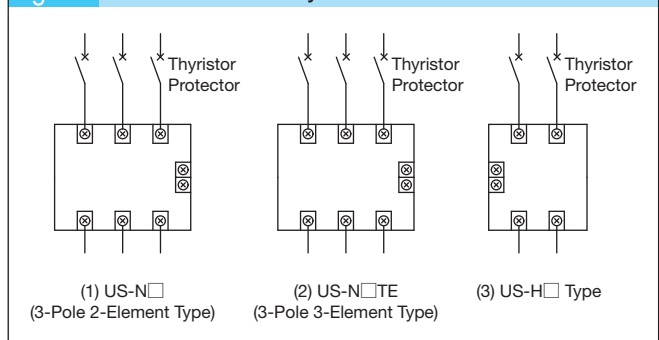


Fig. 11 Protection Via Thyristor Protector



● Heater Load

For nichrome, iron, chrome and aluminum type general heaters or far-infrared heaters without inrush current, 3x the thyristor protector types listed in the table below are ideal.

If the operating circuit short-circuit current exceeds the value listed in the table below, use a no-fuse breaker and quick-trip fuse with the US-N or US-H unit.

● US-N, US-H Series Combination Chart

| | Model Name | Tolerance I ² t (A ² s) | Main Circuit Voltage | Thyristor Protector Rated Current | | | | | | |
|--|---|---|----------------------|--|------|------|------|------|------|------|
| | | | | 10 A | 15 A | 20 A | 25 A | 30 A | 40 A | 50 A |
| | | | | Thyristor Protector (SP-50K 1P/2P/3P □ 3x) Short-Circuit Protection Current (kA) | | | | | | |
| Solid State Contactors for General Loads | US-N20 □ | 2600 | Single-Phase AC110 V | 8 | 5 | 3 | 2 | — | — | — |
| | | | 3-Phase AC220 V | 4 | 3 | 2.2 | 1.6 | — | — | — |
| | | | 3-Phase AC440 V | 1.7 | 1.5 | 1.2 | 1 | — | — | — |
| | US-N30 □ | 7000 | Single-Phase AC110 V | 10 | 10 | 8.5 | 6 | 4.3 | 3.2 | — |
| | | | 3-Phase AC220 V | 5 | 5 | 5 | 3.9 | 2.8 | 2.1 | — |
| | | | 3-Phase AC440 V | 2.5 | 2.5 | 2.5 | 2.1 | 1.3 | — | — |
| | US-N40 □ US-N50 □ | 13500 | Single-Phase AC110 V | 10 | 10 | 10 | 10 | 8.6 | 6 | 4.4 |
| | | | 3-Phase AC220 V | 5 | 5 | 5 | 5 | 5 | 3.5 | 2.9 |
| | US-N70NS(TE) US-N80NS(TE) | 13500 | Single-Phase AC110 V | 10 | 10 | 10 | 10 | 8.6 | 6 | 4.4 |
| | | | 3-Phase AC220 V | 5 | 5 | 5 | 5 | 5 | 3.5 | 2.9 |
| | US-NH70NS(TE) US-NH80NS(TE) | 13500 | 3-Phase AC440 V | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.1 | 1.9 |
| | Solid State Contactors for Heater Loads | US-H20 □ | 450 | Single-Phase AC110 V | 0.6 | 0.5 | 0.4 | — | — | — |
| 3-Phase AC220 V | | | | 0.55 | 0.42 | 0.39 | 0.3 | — | — | — |
| 3-Phase AC440 V | | | | 0.38 | 0.34 | 0.3 | — | — | — | — |
| US-H30 □ | | 2600 | Single-Phase AC110 V | 8 | 5 | 3 | 2 | 1.7 | 1.2 | 1 |
| | | | 3-Phase AC220 V | 4 | 3 | 2.2 | 1.6 | 1.3 | 0.9 | 0.8 |
| | | | 3-Phase AC440 V | 1.7 | 1.5 | 1.2 | 1 | 0.85 | 0.75 | 0.67 |
| US-H40 □ | | 4100 | Single-Phase AC110 V | 10 | 8.2 | 5 | 3.5 | 2.7 | 2 | 1.6 |
| | | | 3-Phase AC220 V | 5 | 5 | 3.3 | 2.4 | 1.7 | 1.4 | 1.2 |
| | | | 3-Phase AC440 V | 2.5 | 2.1 | 1.8 | 1.5 | 1.3 | 1 | 0.9 |
| US-H50 □ | | 7000 | Single-Phase AC110 V | 10 | 10 | 8.5 | 6 | 4.3 | 3.2 | 2.5 |
| | | | 3-Phase AC220 V | 5 | 5 | 5 | 3.9 | 2.8 | 2.1 | 1.7 |
| | | | 3-Phase AC440 V | 2.5 | 2.5 | 2.5 | 2.1 | 1.8 | 1.5 | 1.3 |

● Motor Load

Thyristor protectors are not applicable. Use a no-fuse breaker and quick-trip fuse with the US-N unit.

11 Related Equipment

● Device Selection

Selection of the solid state contactor, thermal overload relay and no-fuse breaker for each motor capacity and also the selection of element protection for US-N □ units is explained below.

However, US-N □ units with no-fuse breakers may not be able to offer short-circuit protection over all regions and may need to be combined with a short-circuit protecting quick-trip fuse, as described on page 306.

(1) Thermal Overload Relay and No-Fuse Breaker Selection

The applicable solid state contactor frames for motor loads can be selected from page 301, while the thermal overload relay and no-fuse breaker selection should be made from the contents below.

The solid state contactors listed below are selected based on the following ratings as per pages 301 and 302: switching frequency: 600 times/hour, utilization: 40%, starting current: 6 times full-load current, starting time: 0.2 s or less, ambient temperature 40°C.

● At AC200 V Rating

| Motor Capacity | Solid State Contactors | Thermal Overload Relays | No-Fuse Breakers |
|----------------|------------------------------|-------------------------|------------------|
| 0.4 kW | US-N5SS(TE) | TH-T25 2.1 A | NF32-SV 5 A |
| 0.75 kW | US-N5SS(TE) | TH-T25 3.6 A | NF32-SV 10 A |
| 1.5 kW | US-N20(TE) | TH-T25 6.6 A | NF32-SV 15 A |
| 2.2 kW | US-N20(TE) | TH-T25 9 A | NF32-SV 20 A |
| 3.7 kW | US-N30(TE) | TH-T25 15 A | NF32-SV 30 A |
| 5.5 kW | US-N40(TE) US-N50(TE) | TH-T25 22 A | NF63-SV 50 A |
| 7.5 kW | US-N70NS(TE) US-N80NS(TE) | TH-T65 29 A | NF63-SV 60 A |
| 11 kW | US-N70NS(TE) US-N80NS(TE) | TH-T65 42 A | NF125-SV 75 A |

● At AC400 V Rating

| Motor Capacity | Solid State Contactors | Thermal Overload Relays | No-Fuse Breakers |
|----------------|--------------------------------|-------------------------|------------------|
| 3.7 kW | US-N20(TE) | TH-T25 6.6 A | NF32-SV 20 A |
| 5.5 kW | US-N30(TE) | TH-T25 11 A | NF32-SV 30 A |
| 7.5 kW | US-N30(TE) | TH-T25 15 A | NF32-SV 30 A |
| 11 kW | US-N40(TE) US-N50(TE) | TH-T25 22 A | NF63-SV 50 A |
| 15 kW | US-NH70NS(TE) US-NH80NS(TE) | TH-T65 29 A | NF63-SV 60 A |
| 22 kW | US-NH70NS(TE) US-NH80NS(TE) | TH-T65 42 A | NF125-SV 75 A |

(2) Selection When US-N □ Element Protection is Required

There are some cases in which US-N □ elements will not be protected if overloaded (current exceeding 6 times the motor full-load current) when using the combinations in the table above.

Use one of the solid state contactor frames below if US-N □ element protection is required.

● At AC200 V Rating

| Motor Capacity | Solid State Contactors | Thermal Overload Relays | No-Fuse Breakers |
|----------------|------------------------------|-------------------------|------------------|
| 0.4 kW | US-N8SS(TE) | TH-T25 2.1 A | NF32-SV 5 A |
| 0.75 kW | US-N20(TE) | TH-T25 3.6 A | NF32-SV 10 A |
| 1.5 kW | US-N30(TE) | TH-T25 6.6 A | NF32-SV 15 A |
| 2.2 kW | US-N40(TE) US-N50(TE) | TH-T25 9 A | NF32-SV 20 A |
| 3.7 kW | US-N40(TE) US-N50(TE) | TH-T25 15 A | NF32-SV 30 A |
| 5.5 kW | US-N70NS(TE) US-N80NS(TE) | TH-T25 22 A | NF63-SV 50 A |

● At AC400 V Rating

| Motor Capacity | Solid State Contactors | Thermal Overload Relays | No-Fuse Breakers |
|----------------|--------------------------------|-------------------------|------------------|
| 1.5 kW | US-N20(TE) | TH-T25 3.6 A | NF32-SV 10 A |
| 2.2 kW | US-N30(TE) | TH-T25 5 A | NF32-SV 10 A |
| 3.7 kW | US-N30(TE) | TH-T25 6.6 A | NF32-SV 20 A |
| 5.5 kW | US-N40(TE) US-N50(TE) | TH-T25 11 A | NF32-SV 30 A |
| 7.5 kW | US-N40(TE) US-N50(TE) | TH-T25 15 A | NF32-SV 30 A |
| 11 kW | US-NH70NS(TE) US-NH80NS(TE) | TH-T25 22 A | NF63-SV 50 A |

● Differences Between 3-Pole 2-Element and 3-Pole 3-Element Types

US-N(H) □ units are available as 3-pole 2-element and 3-pole 3-element types. The functionality between the two is essentially the same, but as the central pole of 3-pole 2-element (between 3/L2 and 4/T2 terminals) types is internally connected, delta connections cannot be used to increase applicable capacity.

Of the 3-pole 2-element products, US-N30 and N50 types are more compact than their US-N30TE and N50TE 3-pole 3-element counterparts, allowing for greater minimization of occupied space to be achieved.

11.5 Optional Units

○ : Applicable, x: Not Applicable

| Optional Unit Names | Model Name | Applicable Models | | | |
|----------------------------------|------------|-------------------|-----------------------|------------------------|---------------------------------------|
| | | US-N5SS/N8SS(TE) | US-N20(TE) to N50(TE) | US-N(H)70/N(H)80NS(TE) | US-H20 to H50(DD) US-H20/H30(DD)UF |
| Drive Units | UA-DR1 | x | ○ (Note 2) | ○ (Note 2) | x |
| Drive Units with Outputs | UA-SH8 | ○ (Note 1) | x | x | x |
| | UA-SH1 | x | ○ (Note 2) | ○ (Note 2) | x |
| Reversing Unit | UA-RE | ○ | ○ | ○ | x |
| Fault Detection Units | UN-FD | ○ | ○ | ○ (N70/N80(TE)) | ○ |
| | UN-FD4 | x | ○ | ○ (NH70/NH80(TE)) | ○ |
| Power Control Units | UA-PC | ○ | ○ | ○ | ○ |
| Live Part Protection Cover Units | UN-CV501US | x | x | x | ○ |

| Optional Unit Names | Model Name | Applicable Models | | |
|----------------------------------|------------|-------------------|--------|--------|
| | | UA-DR1 | UA-SH1 | UA-SH8 |
| Live Part Protection Cover Units | UA-CVDR1 | ○ | ○ | x |
| | UA-CVSH8 | x | x | ○ |


Note 1. When mounting UA-SH8 units to US-N5SS/N8SS(TE) types, first remove the US-N □ type body cover.
If live part protection is required for UA-SH8 units then a UA-CVSH8 live part protection cover should be mounted.
Refer to page 321 for details regarding the outline drawings when UA-CVSH8 is mounted to a UA-SH8 unit.

Note 2. When mounted to US-N20(TE) to N50(TE), US-N(H)70/N(H)80NS(TE), the outline drawings are increased.
Refer to pages 323 for information about outline drawings.
If live part protection is required for UA-DR1 or SH1 units, a UA-CVDR1 live part protection cover should be mounted.

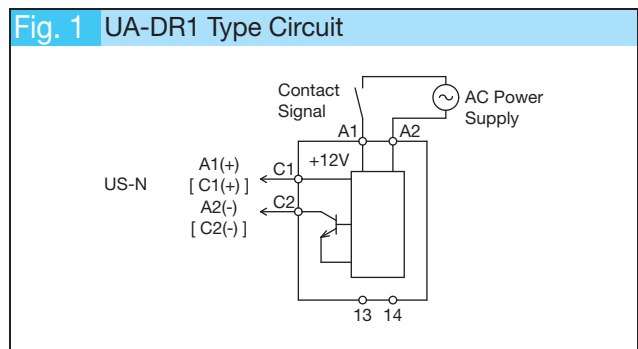
11.5.1 Drive Units (UA-DR1)

US-N units can be driven at AC100 V or AC200 V by using UA-DR1 drive units.

● Rating

| | | |
|-------------------------------------|---|---|
| Appearance |  | |
| Model Name | UA-DR1 AC100V | UA-DR1 AC200V |
| Rated Operating Voltage | AC100 to 120 V 50/60 Hz | AC200 to 240 V 50/60 Hz |
| Input Current | 20mA | |
| Rated Output Voltage/Current | DC12 to 24 V/20 mA | |
| Response Time | OFF→ON | Max. 30 ms + 1/2 Cycle + 1 ms (When Combined With US-N) |
| | ON→OFF | Max. 30 ms + 1/2 Cycle + 1 ms (When Combined With US-N) |
| Allowable Voltage Fluctuation Range | 85 to 110% of Rated Operating Voltage | |
| Operating Temperature/Humidity | -10 to 60°C/45 to 85% RH | |

● Circuit

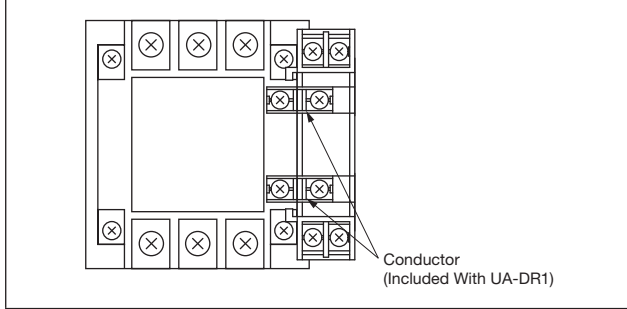


11 Related Equipment

● Mounting

UA-DR1 units should be mounted on the right side of US-N units using the conductor attached to the UA-DR1 unit. Refer to page 323 for information regarding outline drawings as the width and depth may increase for some models.

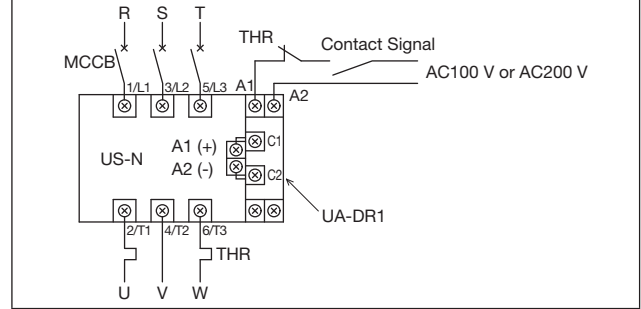
Fig. 2 UA-DR1 Type Mounting Method



● Thermal Overload Relay Connection

Connect as shown in Figure 3 if using a thermal overload relay with circuits combined with UA-DR1 types.

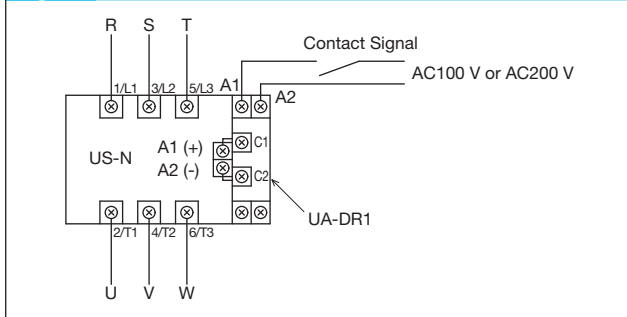
Fig. 3 Thermal Overload Relay Connection



● US-N Connections

Connect as per Figure 4 if using a combination of UA-DR1 unit.



Fig. 4 For US-N20 to N50(TE), N(H)70/N(H)80NS(TE)



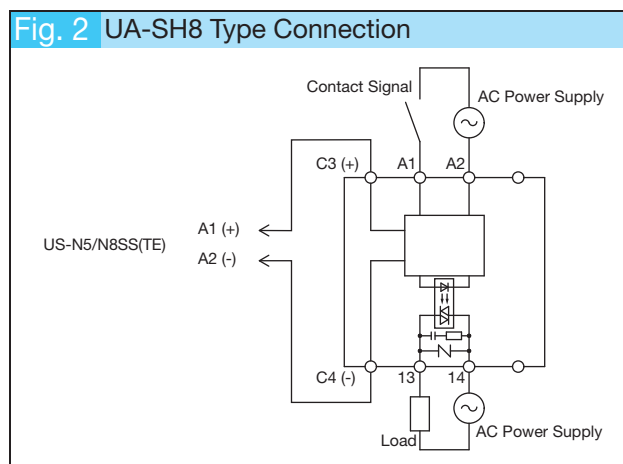
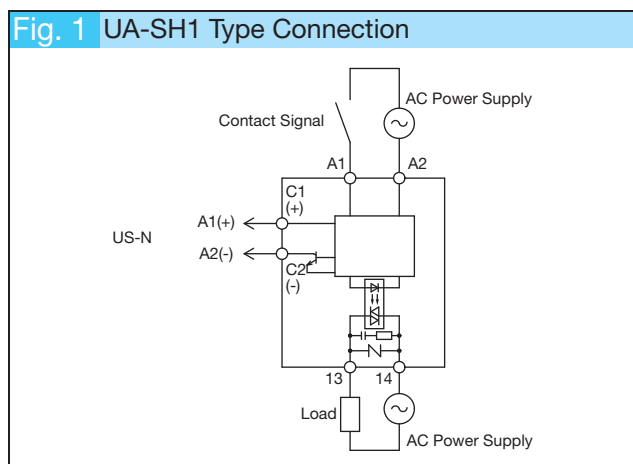
11.5.2 Drive Units with Outputs (UA-SH1, UA-SH8)

US-N units can be driven at AC100 V or AC200 V by using UA-SH1 or UA-SH8 drive units with outputs while simultaneously allowing use of the auxiliary outputs (triac outputs (1 circuit)).

Rating

| | | | | | | |
|-------------------|-------------------------------------|---|---|--|-------------------------|--------------------------------------|
| Appearance | |  |  | | | |
| Model Name | | UA-SH1 AC100V | UA-SH1 AC200V | UA-SH8 AC100V | UA-SH8 AC200V | |
| Driver | Rated Operating Voltage | AC100 to 120 V 50/60 Hz | AC200 to 240 V 50/60 Hz | AC100 to 120 V 50/60 Hz | AC200 to 240 V 50/60 Hz | |
| | Input Current | 20 mA | | 45 mA | | |
| | Rated Output Voltage/Current | DC12 to 24 V/20 mA | | DC24 V/30 mA | | |
| | Response Time | OFF→ON | Max. 50 ms (When Combined With US-N) | Max. 50 ms (When Combined With US-N5/N8SS(TE)) | ON→OFF | Max. 50 ms (When Combined With US-N) |
| Auxiliary Outputs | Rated Load Voltage | AC100 to 240 V 50/60 Hz | | | | |
| | Rated Load Current | 0.5 A (Class AC-15) | | | | |
| | Output Method | Triac Output (1 Circuit/Built-in Surge Absorber) | | | | |
| | Leakage Current | 3 mA or Less | | | | |
| | Making Voltage Drop | 1.5 V or Less | | | | |
| Common | Allowable Voltage Fluctuation Range | 85 to 110% of Rated Voltage | | | | |
| | Operating Temperature/Humidity | -10 to 60°C/45 to 85% RH | | | | |
| | Operation Indicator | — | | Lights When Operating Voltage Applied | | |

Circuits/Connections



Handling

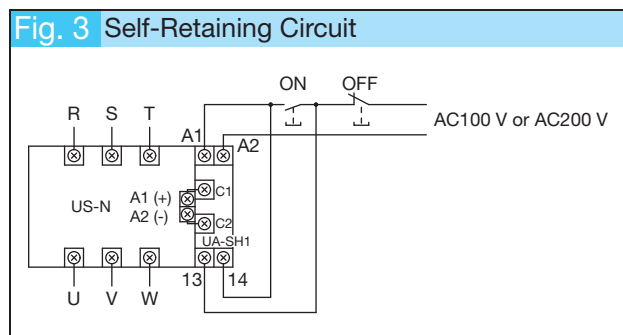
(1) Types/Mounting

Front Clip-on mounted UA-SH8 units can be mounted to US-N5/N8SS(TE) units. Side-mounted UA-SH1 units can be mounted to US-N20/N30/N40/N50(TE) and US-N(H)70/N(H)80NS(TE) units. UA-SH1 units should be mounted to the conductor attached to the right side of US-N units.

(2) Self-Retaining Circuit

Connect as per Figure 3 if mounting a self-retaining circuit.

(3) When mounting UA-SH8 units to US-N5SS/N8SS(TE) types, first remove the US-N type body cover. If live part protection is required, mount a UA-CVSH8 live part protection cover to the UA-SH8 unit.




11 Related Equipment

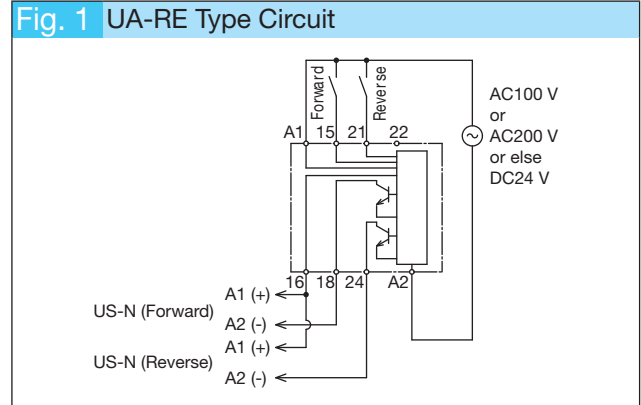
11.5.3 Reversing Units (UA-RE)

An interlock can be achieved between forward US-N units and reverse US-N units through the use of a UA-RE reversing unit, allowing for reversible motor running.

Rating

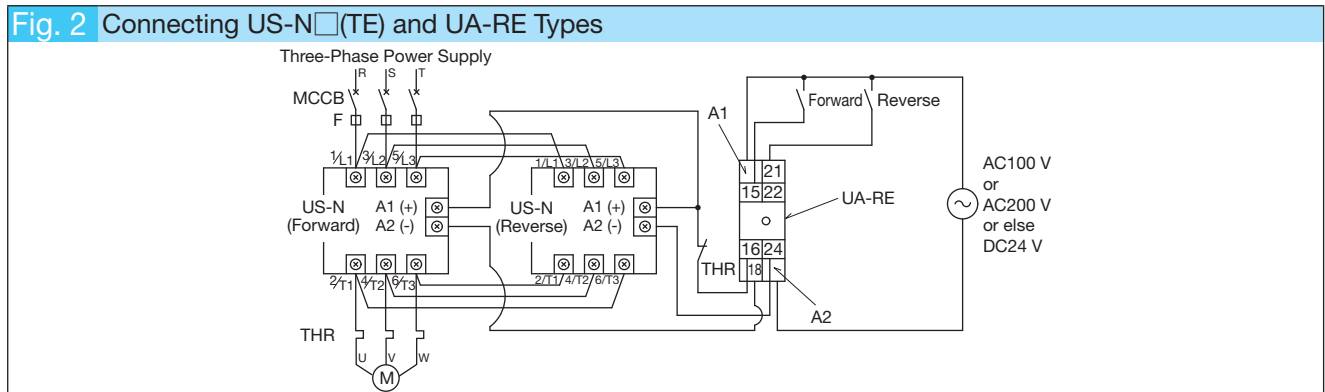
| | | | |
|-------------------------------------|---|---|-------------|
| Appearance |  | | |
| Model Name | UA-RE AC100V | UA-RE AC200V | UA-RE DC24V |
| Rated Operating Voltage | AC100 to 120 V 50/60 Hz | AC200 to 240 V 50/60 Hz | DC24 V |
| Input Current | Control (A1-A2): 35 mA, Signal (A2-15 or 21): 10 mA | | |
| Rated Output Voltage/Current | DC12 V/20 mA | | |
| Interlock Time | Max. 100 ms | | |
| Response Time | OFF → ON | Max. 20 ms + 1/2 Cycle + 1 ms (When Combined With US-N) | |
| | ON → OFF | Max. 20 ms + 1/2 Cycle + 1 ms (When Combined With US-N) | |
| Allowable Voltage Fluctuation Range | 85 to 110% of Rated Operating Voltage | | |
| Operating Temperature/Humidity | -10 to 60°C/45 to 85% RH | | |
| Operation Indicator | Lights During Forward Output (Green LED)/Lights During Reverse Output (Red LED) | | |

Circuit



Note 1. The A1 and A2 input terminals of products with DC24 V operating voltage have no polarity.

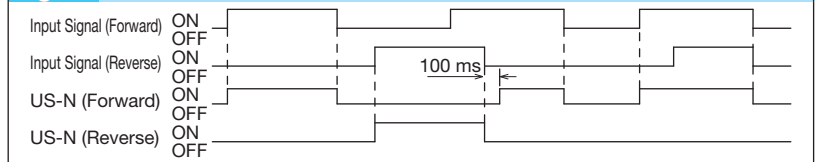
Connecting



Operating Conditions

- (1) Max. 100 ms switching time between forward and reverse modes.
- (2) The input signal that is input first is given priority and the second signal is invalid until the first input signal switches OFF.

Fig. 4 Operating Pattern Diagram




11.5.4 Fault Detection Units (UN-FD, UN-FD4)

Detects failures that occur to the main circuit element of US-N or US-H units when in conduction mode, and can be used to prevent abnormal operation of loads by interrupting the power supply by combining a no-fuse breaker with voltage tripping device or magnetic contactor. Fault detection units are available as UN-FD type for 200 V main circuits or as UN-FD4 type for 400 V main circuits. The table below shows the differences. Refer to the Specifications column of each item for details.

| Model Name | UN-FD | UN-FD4 |
|------------------------------------|--|--|
| Type | UN-FD AC100V, AC200V, DC24V 3 Types | UN-FD4 AC100V, AC200V, DC24V 3 Types |
| Rated Main Circuit Voltage | AC200 to 240 V 50/60 Hz | AC380 to 440 V 50/60 Hz |
| Output Contact Arrangement | 1c | 1a and 1b Types |
| Allowable Detection Retention Time | 1 Second (Minimum Rating) | Continuous Rating |
| Fault Detection Criteria | <ul style="list-style-type: none"> · Detects When 1 or More of 2 Elements Have Continuity Failure For 2-Element Types · Detects When 2 or More of 3 Elements Have Continuity Failure For 3-Element Types or Opening Faults | <ul style="list-style-type: none"> · Detects When 1 or More of 2 Elements Have Continuity Failure For 2-Element Types or When Both Elements Have Opening Faults · Detects When 2 or More of 3 Elements Have Continuity Failure For 3-Element Types or Opening Faults · Fault Detection For When the Control Input Signal is ON and Main Circuit Power Supply is OFF |
| Fault Detection Retention | No Protection Function | Electric Retention via Operating Power Supply |
| Reset | When Main Circuit Power Supply Is Open | When Operating Power Supply is Turned Off |
| Indicator | None | <ul style="list-style-type: none"> · With Fault Detection Indicator Lamp · With Operation Indicator Lamp |

(1) UN-FD Type

● Rating

| | | | |
|-------------------------------------|---|---|-------------|
| Appearance |  | | |
| Model Name | UN-FD AC100V | UN-FD AC200V | UN-FD DC24V |
| Rated Operating Voltage | AC100 to 120 V 50/60 Hz | AC200 to 240 V 50/60 Hz | DC24 V |
| Rated Main Circuit Voltage | AC200 to 240 V 50/60 Hz | | |
| Input Current | 17 mA | | |
| Output | Contact Arrangement | 1c | |
| | Contact Rating | AC240 V 1 A, AC120 V 1.5 A (Class AC-15), DC24 V 1 A (Class DC12) | |
| Minimum Control Input Time | 20 ms | | |
| Detection Time | 0.2 to 0.5 s | | |
| Allowable Detection Retention Time | 1 Second (Minimum Rating) | | |
| Allowable Voltage Fluctuation Range | 85 to 110% of Rated Voltage (Both Control Circuit and Main Circuit) | | |
| Operating Temperature/Humidity | -10 to 60°C/45 to 85% RH | | |
| Combined Protection Function | (1) No-Fuse Breakers with Voltage Tripping Device (2) Magnetic Contactors · Operate the above (1) or (2) within 1 second to shut off power to the main circuit. | | |

Note 1. UN-FD types cannot be used in the following circuits.

- Capacitive Load Circuits · Star-Delta Starting Circuits · Inverter Circuits

Note 2. UN-FD types cannot be used in combination with UA-PC type power control units.

Note 3. CAN terminal types (UN-FDCX) are also manufactured.

● Operating Circuit

- (1) Figures 2 to 5 indicate the main and control circuits when both use the same power supply. Use separate power supplies if the main circuit voltage and control circuit voltage are different.
- (2) When using thermal overload relays with motor loads, connect the break contact of the thermal overload relay in series with the contact signal.
- (3) For single-phase loads, use any 2 of the UN-FD terminals numbered 15, 16 or 18 to connect to the terminals of the load.

● Connecting

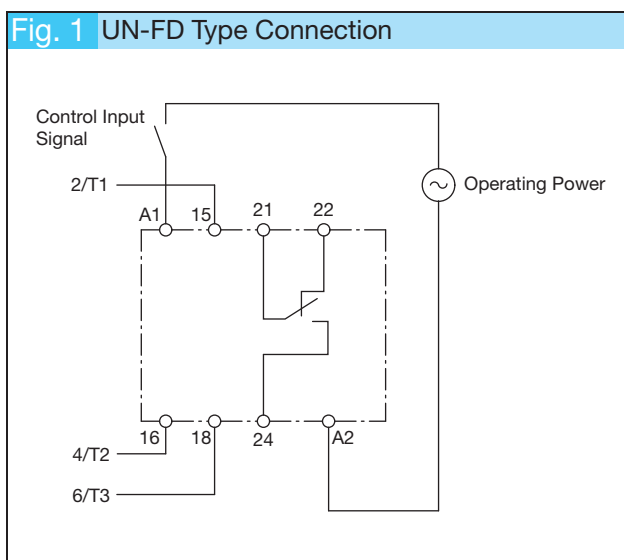


Fig. 2 Connecting UN-FD Types and No-Fuse Breakers (With Drive Unit)

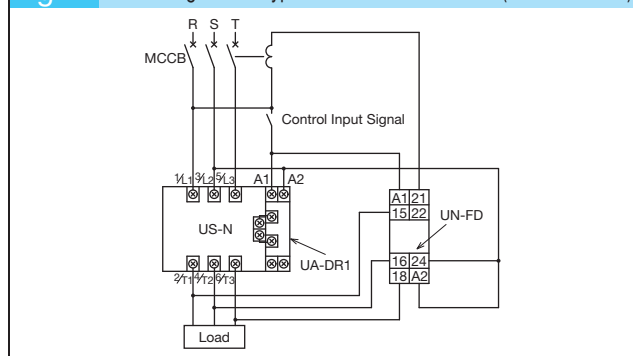
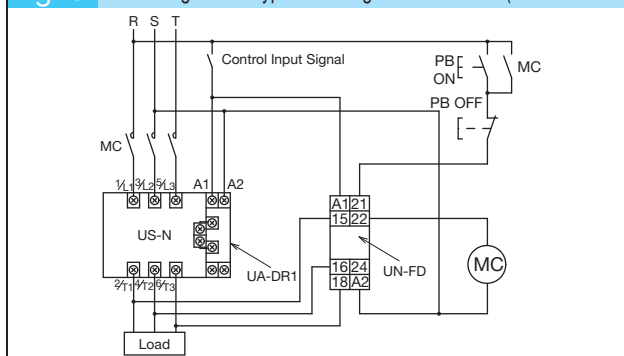


Fig. 3 Connecting UN-FD Types and Magnetic Contactors (With Drive Unit)



11 Related Equipment

Fig. 4 Connecting UN-FD Types and No-Fuse Breakers (Without Drive Unit)

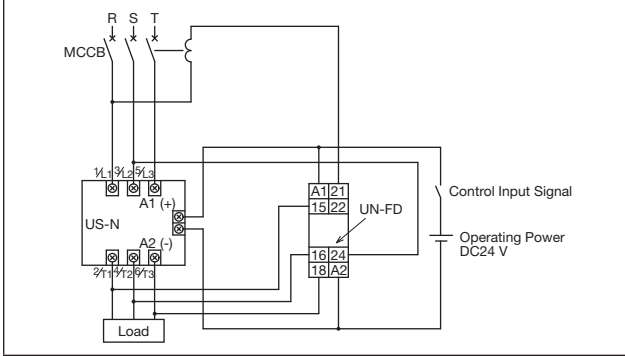
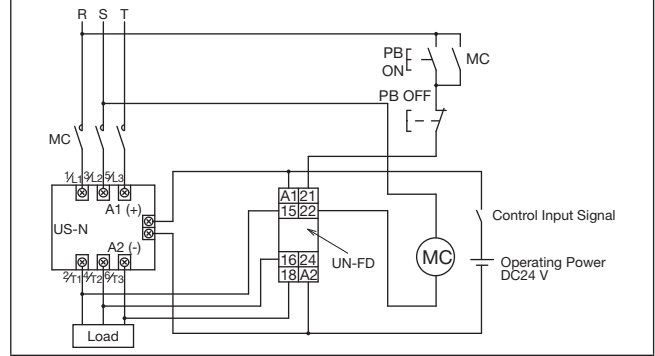


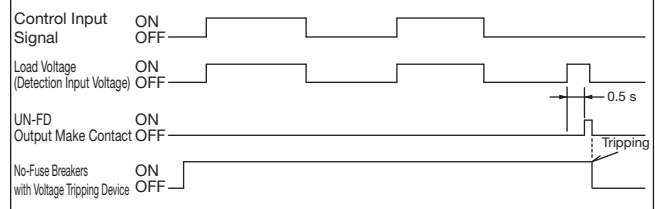
Fig. 5 Connecting UN-FD Types and Magnetic Contactors (Without Drive Unit)



● Operating Conditions

- (1) Normal operation is judged to be when load current flows while the control input signal is being input.
- (2) Fault detection operation is judged to be when load current flows while the control input signal is in the OFF state.
- (3) US-N or US-H units trigger fault detection operation of the UN-FD unit if a main circuit power supply is applied without a load connected. Connect an actual load or a sample load such as a resistor (so that 1 A or so flows) to check the operation of US-N or US-H units. This is in order for the fault detection unit to be able to determine that a fault has occurred in the US-N or US-H unit when a voltage approximately equal to the power supply voltage is applied (due to US-N or US-H leakage current) to the load side while the US-N or US-H unit is in the OFF state. This is not considered abnormal behavior of the fault detection unit.

Fig. 6 Operating Pattern Diagram



● Fault Detection Criteria


- Detects when 1 or more of the 2 elements fail continuity tests for US-N □ (SS)(NS) and US-H solid state contactors.
- Detects when 2 or more of the 3 elements fail continuity tests for US-N □ TE(SS)(NS) solid state contactors.

● Handling

- (1) A no-fuse breaker or magnetic contactor should be configured to open-circuit the main circuit after fault detection. When using a fault detection unit in combination with a no-fuse breaker with voltage tripping device, use the output make contact of the fault detection unit to trip the no-fuse breaker during a fault. When using a fault detection unit (UN-FD) in combination with a magnetic contactor, use a self-retaining circuit to retain the magnetic contactor coil and configure it such that the output break contact of the fault detection unit releases the self-retaining circuit of the magnetic contactor coil, causing the magnetic contactor to form an open-circuit.
- (2) UN-FD units are rated for only short periods of time, so the detection state should not be maintained for more than 1 second. UN-FD units are reset when the main circuit becomes open-circuited.
- (3) The fault detection time of UN-FD units is 0.2 to 0.5 seconds and may malfunction when applied with solid state contactors switching capacitive loads or motors with long residual voltage decay times.
- (4) Input as the forward/reverse signal for UN-FD unit input circuits when using a circuit supporting reversing running.

(2) UN-FD4 Type

● Rating

| | | | | | | |
|-------------------------------------|---|--|--|---------------------|--|---------------------|
| Appearance |  | | | | | |
| Model Name | UN-FD4 AC100V1A | UN-FD4 AC100V1B | UN-FD4 AC200V1A | UN-FD4 AC200V1B | UN-FD4 DC24V1A | UN-FD4 DC24V1B |
| Rated Operating Voltage | AC100 to 120 V 50/60 Hz | | AC200 to 240 V 50/60 Hz | | DC24 V | |
| Rated Main Circuit Voltage | AC380 to 440 V 50/60 Hz | | | | | |
| Input Current | Control (A1 to A2): 17 mA, Signal (24): 10 mA | | | | | |
| Output | Contact Arrangement | 1a | 1b | 1a | 1b | 1a |
| | Contact Rating | AC240 V 1 A, AC120 V 1.5 A (Class AC-15), DC24 V 1 A (Class DC-12) | | | | |
| Minimum Control Input Time | 20 ms | | | | | |
| Detection Time | 0.2 to 0.5 s | | | | | |
| Allowable Detection Retention Time | Continuous Rating | | | | | |
| Allowable Voltage Fluctuation Range | 85 to 110% of Rated Voltage (Both Control Circuit and Main Circuit) | | | | | |
| Operating Temperature/Humidity | -10 to 60°C/45 to 85% RH | | | | | |
| Operation Indicator | Lights With Signal Input (Green LED)/Lights When in Fault State (Red LED) | | | | | |
| Combined Protection Function | No-Fuse Breakers with Voltage Tripping Device | Magnetic Contactors | No-Fuse Breakers with Voltage Tripping Device | Magnetic Contactors | No-Fuse Breakers with Voltage Tripping Device | Magnetic Contactors |
| Fault Detection Retention | Electric Retention via Operating Power Supply | | | | | |
| Fault Detection Reset | Resetting By Turning OFF Operating Power | | | | | |

Note 1. UN-FD4 types cannot be used in the following circuits.

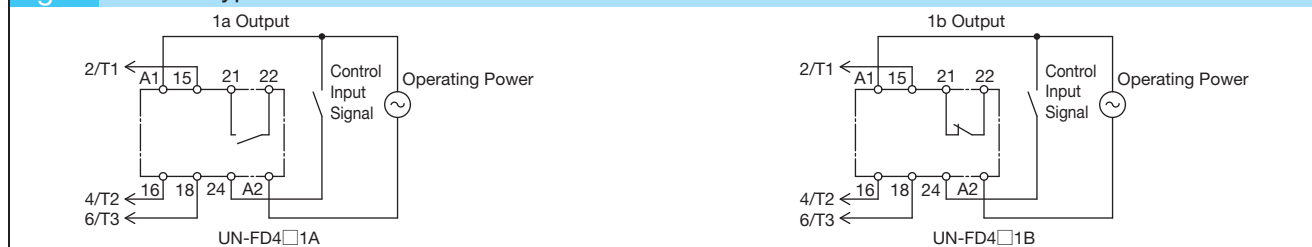
- Capacitive Load Circuits · Star-Delta Starting Circuits · Inverter Circuits

Note 2. UN-FD4 types cannot be used in combination with UA-PC type power control units.

Note 3. CAN terminal types (UN-FD4CX) are also manufactured.

● Connecting

Fig. 7 UN-FD4 Type Connection



● Operating Circuit

- Figures 8 to 11 indicate the main and control circuits when both use the same power supply. Use separate power supplies if the main circuit voltage and control circuit voltage are different.
- When using thermal overload relays with motor loads, connect the break contact of the thermal overload relay in series with the control input signal.
- For single-phase loads, use any 2 of the UN-FD4 terminals numbered 15, 16 or 18 to connect to the terminals of the load.

Fig. 8 Connecting UN-FD4□1A Types and No-Fuse Breakers (With Drive Unit)

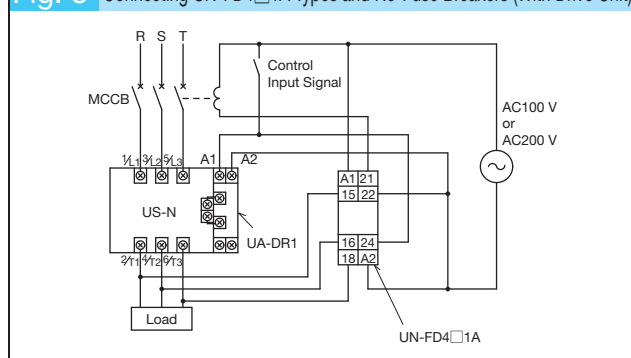
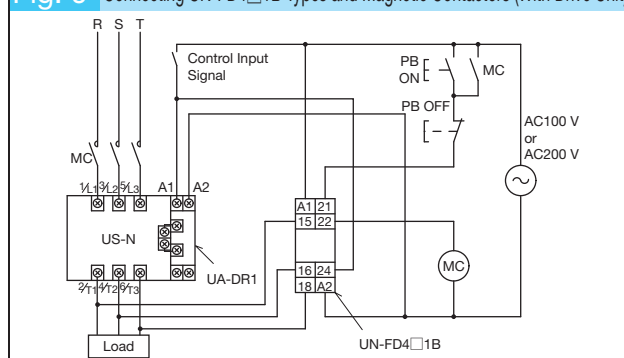


Fig. 9 Connecting UN-FD4□1B Types and Magnetic Contactors (With Drive Unit)



11 Related Equipment

Fig. 10 Connecting UN-FD4□1A Types and No-Fuse Breakers (Without Drive Unit)

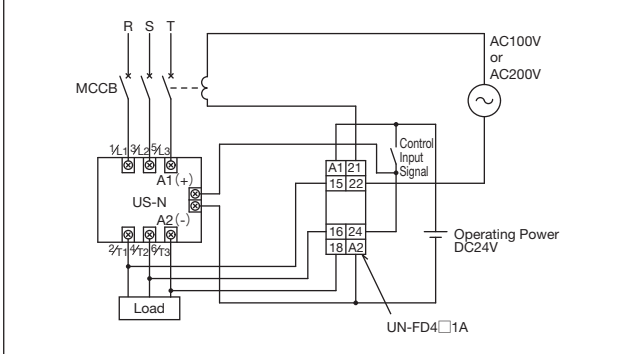
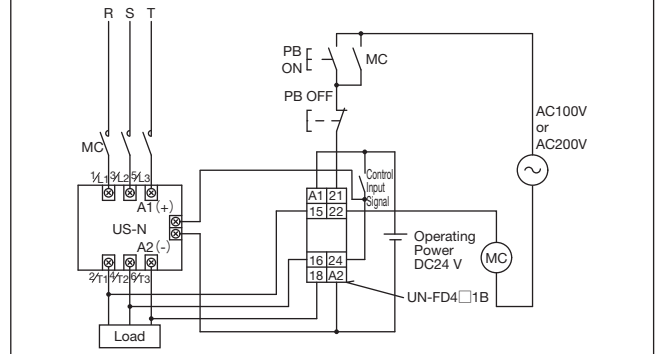


Fig. 11 Connecting UN-FD4□1B Types and Magnetic Contactors (Without Drive Unit)

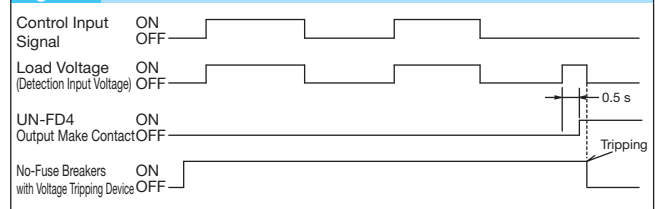


Note. It is also possible to use DC24V circuits alone if using DC operated magnetic contactors (DC24V coils).

● Operating Conditions

- (1) Normal operation is judged to be when load current flows while the control input signal is being input.
- (2) Fault detection operation is judged to be when load current flows while the control input signal is in the OFF state. Detects a fault when the control input signal is ON while the main circuit power supply is OFF.
- (3) US-N or US-H units trigger fault detection operation of the UN-FD4 unit if a main circuit power supply is applied without a load connected. Connect an actual load or a sample load such as a resistor (so that 1 A or so flows) to check the operation of US-N or US-H units. This is in order for the fault detection unit to be able to determine that a fault has occurred in the US-N or US-H unit when a voltage approximately equal to the power supply voltage is applied (due to US-N or US-H leakage current) to the load side while the US-N or US-H unit is in the OFF state. This is not considered abnormal behavior of the fault detection unit.

Fig. 12 Operating Pattern Diagram



● Fault Detection Criteria

- Detects when 1 or more of the 2 elements fail continuity tests or when both elements undergo open-circuit faults for US-N□ and US-H□ solid state contactors.
- Detects when 2 or more of the 3 elements fail continuity tests or open-circuit faults for US-N□ TE solid state contactors.


● Handling

- (1) A no-fuse breaker or magnetic contactor should be configured to open-circuit the main circuit after a fault has been detected.
- (2) UN-FD4 units do not reset until the operating power supply is switched OFF. Switch OFF the operating power supply in order to reset.
- (3) The fault detection time of UN-FD4 units is 0.2 to 0.5 seconds and may malfunction when applied with solid state contactors switching capacitive loads or motors with long residual voltage decay times.
- (4) Input as the forward/reverse signal for UN-FD4 unit input circuits when using a circuit supporting reversing running.

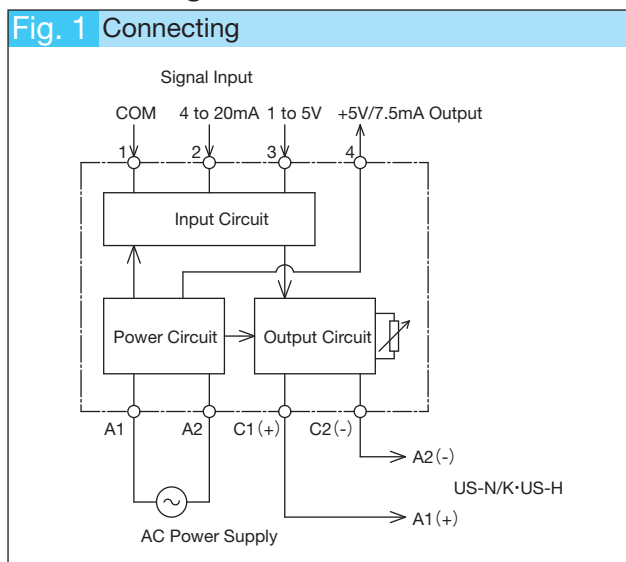
11.5.5 Power Control Unit (UA-PC)

UA-PC power control units can be combined with US-N or US-H solid state contactors to control power using a low-noise minimal-cycle control system that is ideal for controlling the temperature of electric heaters, etc.

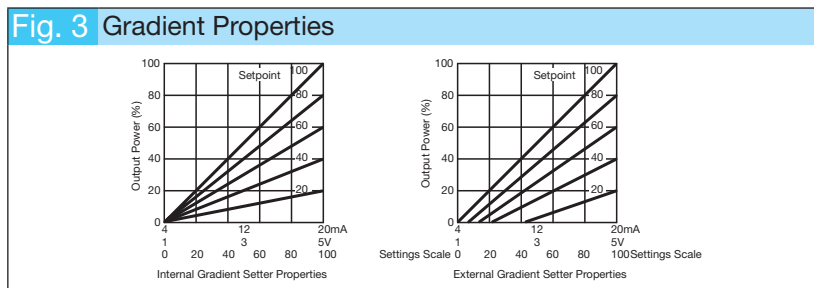
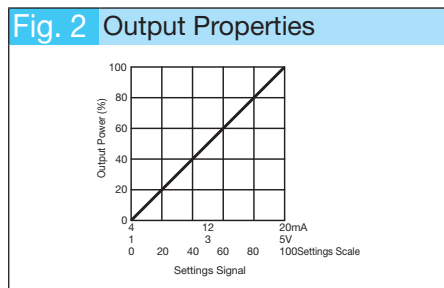
Rating

| | | |
|-------------------------------------|---|---|
| Appearance |  | |
| Model Name | UA-PC AC100V | UA-PC AC200V |
| Rated Operating Voltage | AC100 to 110V 50/60Hz | AC200 to 220V 50/60Hz |
| Input Current | 20mA | |
| Control Method | Cycle Control (Zero Voltage Trigger) | |
| Input Signal | Current Signal : 4 to 20mA (250Ω) Voltage Signal : 1 to 5V (100kΩ) Contact Signal : ON, OFF Symbols Variable Resistance: Manual Setting/Gradient Setting | |
| Rated Output Voltage/Current | DC12V/20mA | |
| Gradient Setting | 0 to 100% (Adjustable Via Setter) | |
| Control Period | 0.2 to 1s (Adjustable Via Setter) | |
| Combining US-N/US-H | Adjustment Range of Output Voltage | 0 to 100% |
| | Applicable Loads | Resistor/Heating Element |
| Operation Indicator | Power Indicator | Lights With Control Circuit Voltage Input (Red LED) |
| | Output Indicator | Lights With US-N Drive Signal Output (Red LED) |
| Allowable Voltage Fluctuation Range | 85 to 110% of Rated Operating Voltage | |
| Operating Temperature/Humidity | -10 to 60°C/45 to 85% RH | |

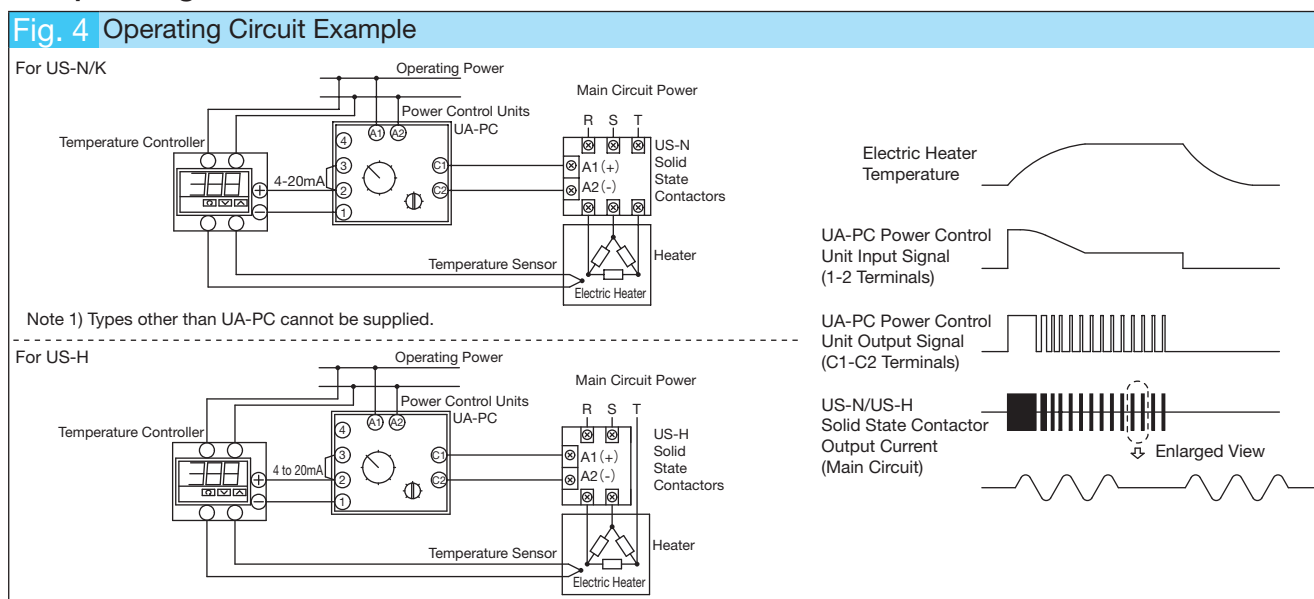
Connecting



Properties



Operating Circuit



11 Related Equipment

Application

(1) No. of US-N Drive Units

The below indicates the number of US-N or US-H drive units for UA-PC units.

| Main Circuit Control Method | 3-Pole Batch Control | |
|-----------------------------|--|--|
| Model Name | US-N5SS (TE)/N8SS (TE) US-N70NS (TE)/N80NS (TE) US-NH70NS (TE)/NH80NS (TE) | US-N20 (TE) to N50 (TE) |
| Connection Circuit | Capable Of Driving Up To 1 Units | Capable Of Driving Up To 4 Units |
| Main Circuit Control Method | 3-Pole Individual Control | |
| Model Name | US-H20 to H50 | US-H20DD to H50DD |
| Connection Circuit | Capable Of Driving Up To 2 Units | Capable Of Driving Up To 1 Unit (2 Circuits) |

(2) Signal Input Circuit Example

(1) to (18) show the possible signal input circuits.

| | |
|---|--|
| (1) Automatic Control (Current Signal) - Internal Gradient Settings | (2) Automatic Control (Current Signal) - External Gradient Settings |
| (3) Automatic Control (Current Signal) - Internal Gradient Settings - Multiple Unit Control | (4) Automatic Control (ON/OFF Signal) - Internal Gradient Settings |
| (5) Automatic Control (ON/OFF Signal) - External Gradient Settings | (6) Automatic Control (ON/OFF Signal) - Internal Gradient Settings - Multiple Unit Control |

| | |
|---|---|
| <p>(7) Automatic Control (Voltage Signal) - Internal Gradient Settings</p> | <p>(8) Automatic Control (Voltage Signal) - External Gradient Settings</p> |
| <p>(9) Automatic Control (Voltage Signal) - Internal Gradient Settings - Multiple Unit Control</p> | <p>(10) Hi/Lo Control (ON/OFF Signal) - Internal Gradient Settings</p> |
| <p>(11) Hi/Lo Control (ON/OFF Signal) - External Gradient Settings</p> | <p>(12) Manual Control - Internal Settings</p> |
| <p>(13) Manual Control - External Main Settings - Internal Gradient Settings</p> | <p>(14) Manual Control - External Main Settings - External Gradient Settings</p> |
| <p>(15) Auto/Manual Control (Current Signal/External Main Settings) - Internal Gradient Settings</p> <p>* Mode Switch For Extremely Low Signals (DC1 V 1 mA or Less)</p> | <p>(16) Auto/Manual Control (Current Signal/External Main Settings) - External Gradient Settings</p> <p>* Mode Switch For Extremely Low Signals (DC1 V 1 mA or Less)</p> |
| <p>(17) Auto/Manual Control (ON/OFF Signal) - External Main Settings - Internal Gradient Settings</p> <p>* Mode Switch For Extremely Low Signals (DC1 V 1 mA or Less)</p> | <p>(18) Auto/Manual Control (ON/OFF Signal) - External Main Settings - External Gradient Settings</p> <p>* Mode Switch For Extremely Low Signals (DC1 V 1 mA or Less)</p> |

11 Related Equipment

(3) Application Example - Rapid Start-Up Load Temperature Circuit via a UA-PC Power Control Unit

This method of temperature control rapidly starts up electric heaters to reach the set temperature in the shortest amount of time. To achieve this, the heat is initially turned on at 100% power for rapid heating, then as the temperature approaches the set temperature the power level is reduced.

The way in which UA-PC units support this kind of temperature control is indicated below.

(1) Usage Method

Short-circuiting terminals 1 and C2 of the UA-PC power control unit being used results in a 100% output signal regardless of control input signal.

Accordingly, the required functionality can be achieved by using a contact to control the current path between terminals 1 and C2.

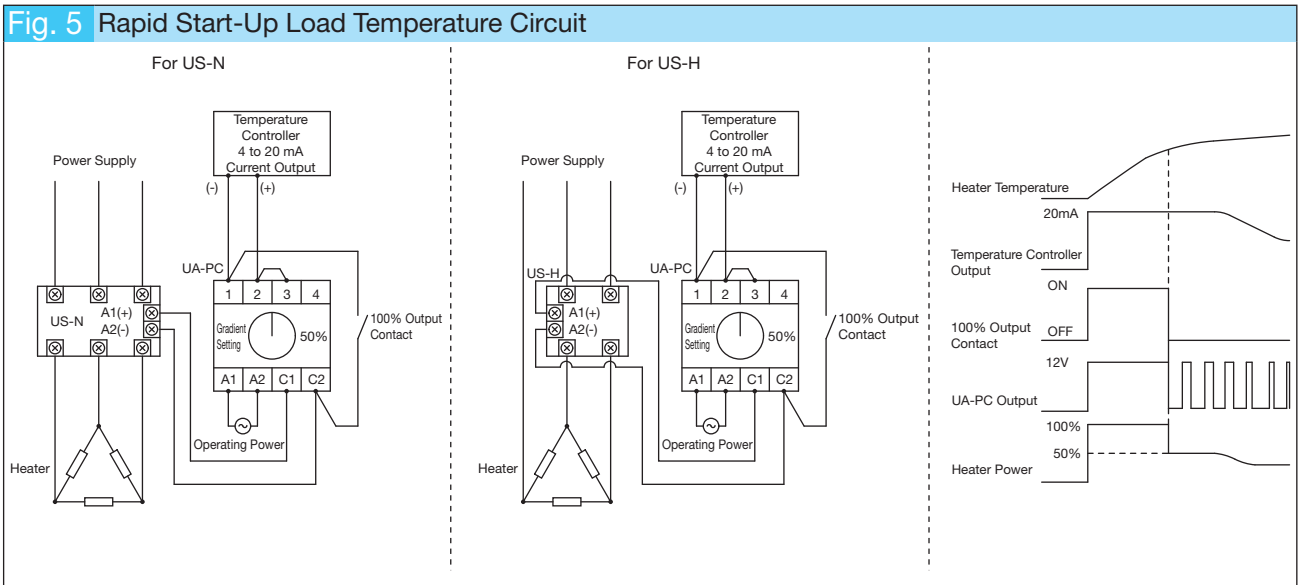
a) Time Control Using Timers

A timer is used to short-circuit terminals 1 and C2 for a fixed period of time only after power has been applied to the electric heater, open-circuiting the contact after the timed period has elapsed.

b) Control Using Thermal Switches or Temperature Controllers with Lower-Limit Alarm Outputs

Thermal switches which activate when the electric heater temperature is a little below the set temperature, or a temperature controller with lower-limit alarm output (open-circuited at low temperatures) are used to control the current path between terminals 1 and C2.

(2) Operating Circuit Example



● Handling

(1) Applicable Loads

UA-PC power control units are intended only for use with resistive loads and cannot be used with inductive loads or for control of transformer primary coils. Select a solid state contactor rated to suit the heater capacity.

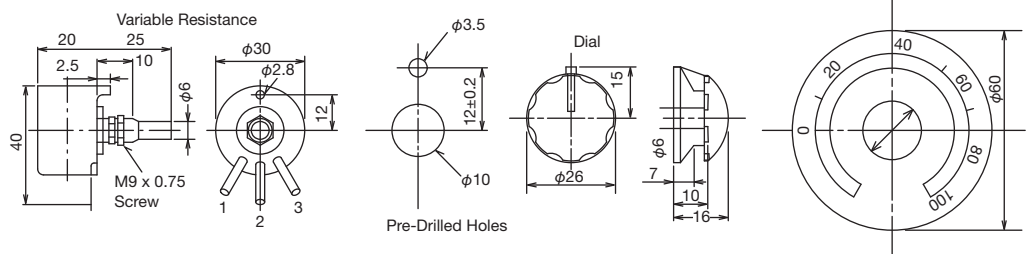
(2) Wiring

- Wiring between the UA-PC unit and temperature controller/setter should be as short as possible (3 m or less) and should be connected such that each of the respective signals match.
- For lengths exceeding 3 m, use a single-core wire or a 2-core shielded wire (10 m or less) and connect the shield to ground.
- Use 10 m or less of twisted-pair cable for wiring the UA-PC output terminals and solid state contactor input terminals together.
- Avoid parallel wiring between the control circuit and main circuit.

(3) Setters

The below types of variable resistors are available for external setting.

| UA-PC | — | VR10 |
|--------|--------------------------------|------|
| Symbol | Resistor/Application | |
| VR10 | 10 k Ω /Gradient Setter | |
| VR1 | 1 k Ω /Main Setter | |



t=0.2

11.5.6 Live Part Protection Cover Units

Covers for preventing inadvertent contact with live parts after wiring in panel mounting.
 The below live part protection cover units are available as optional units or as US-H □ type live part protection covers.

● Production Range/Applicable Models

| Model Name | Applicable Models |
|------------|---|
| UA-CVDR1 | UA-DR1, UA-SH1 |
| UA-CVSH8 | UA-SH8 |
| UN-CV501US | US-H20/H30/H40/H50 (DD), US-H20/H30 (DD) UF |

● Outline Drawings

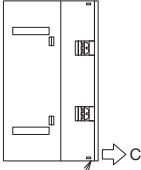
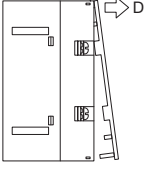
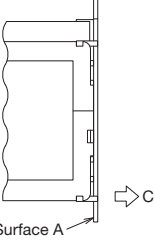
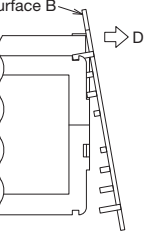
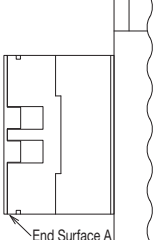
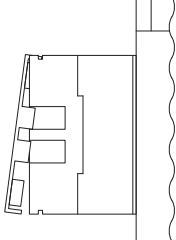
| Model Name | UA-CVDR1 | UA-CVSH8 | UN-CV501US |
|------------------|---|--|---|
| Outline Drawings | <p>The figure above shows a UA-SH1 type unit with live part protection cover mounted.</p> | <p>The figure above shows a UA-SH8 type unit with live part protection cover mounted. (* Symbol: UA-SH8 type outline drawings when US-N5/N8SS(TE) is mounted)</p> | <p>The figure above shows a US-H20HZ type unit with live part protection cover mounted.</p> |

● Mounting Method

| Model Name | Mounting Method |
|------------|--|
| UA-CVDR1 | <ol style="list-style-type: none"> Hook the claws of the cover to the holes of the barrier at the top of the unit. Press along the direction of arrow A to mount the live part protection cover. |
| UA-CVSH8 | <ol style="list-style-type: none"> Hook the claws of the cover to the grooves of the barrier at the top of the unit. Press along the direction of arrow A to mount the live part protection cover. |
| UN-CV501US | <ol style="list-style-type: none"> Hook the claws of the cover to the indents of the barrier at the top of the unit. While pressing in the direction of arrow B, simultaneously press in the direction of arrow A. |

11 Related Equipment

● Removal Method

| Model Name | Removal Method | | |
|------------|---|--|--|
| UA-CVDR1 |  <p>End Surface A</p> |  <p>End Surface B</p> | <ol style="list-style-type: none"> (1) Pull end surface A of the live part protection cover away in the direction of arrow C. (2) Similarly, pull end surface B in the direction of arrow D and detach the live part protection cover. |
| UA-CVSH8 |  <p>End Surface A</p> |  <p>End Surface B</p> | <ol style="list-style-type: none"> (1) Pull end surface A of the live part protection cover away in the direction of arrow C. (2) Similarly, pull end surface B in the direction of arrow D and detach the live part protection cover. |
| UN-CV501US |  <p>End Surface A</p> |  | <ol style="list-style-type: none"> (1) Press end surface A of the live part protection cover in the direction of arrow C. (Press both poles up) (2) Detach the live part protection cover. |

● Minimum Order Unit


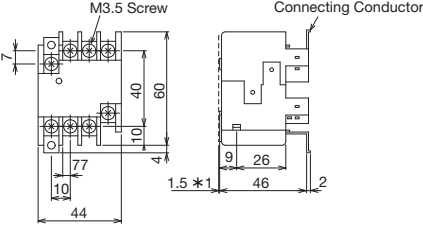

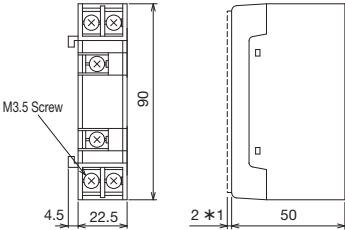

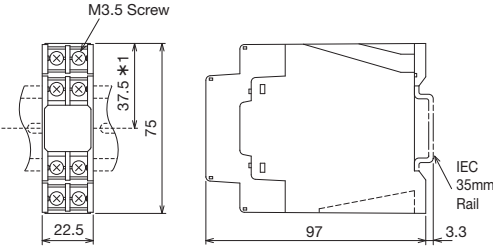
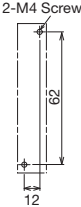

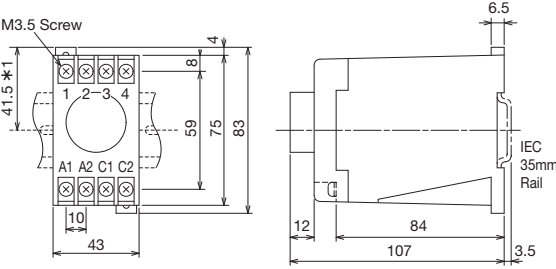
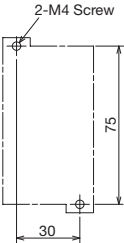
The minimum order quantity for all types is 10 pieces. 10 pieces per bag are shipped. Place orders in multiples of 10 when ordering.

11 Related Equipment

● US-H Solid State Contactors

| Model Name | Appearance | Outline Drawings | Hole Drilling Dimensions | Weight (kg) |
|--|------------|------------------|--------------------------|-------------|
| US-H20 US-H20DD US-H30 US-H30DD | | | | 0.42 |
| US-H40 US-H40DD US-H50 US-H50DD | | | | 0.85 |
| US-H20HZ US-H20DDHZ US-H30HZ US-H30DDHZ US-H40HZ US-H40DDHZ US-H50HZ US-H50DDHZ | | | | 0.13 |
| US-H20RM US-H20DDRM US-H30RM US-H30DDRM | | | | 0.44 |
| US-H20UF US-H20DDUF | | | | 0.52 |
| US-H30UF US-H30DDUF | | | | 0.68 |

● Optional

| Model Name | Appearance | Outline Drawings | Hole Drilling Dimensions | Weight (kg) |
|--------------------------|---|--|--|--|
| UA-SH8 |  |  <p>*1 Dimension: Dimensions including live part protection cover UA-CVSH8.</p> | <p>Can be mounted on US-N5SS(TE) types. (Front Clip-on Type) Connecting conductor is included with the unit.</p> | <p>0.5</p> |
| UA-DR1 UA-SH1 |  |  <p>*1 Dimension: Dimensions including live part protection cover UA-CVDR1.</p> | <p>UA-DR1 and UA-SH1 include connecting conductors for US-N.</p> | <p>0.1</p> |
| UA-RE UN-FD UN-FD4 |  |  <p>*1 Dimension: Dimension from Center of IEC 35 mm Rail.</p> |  | <p>0.1</p> |
| UA-PC |  |  <p>*1 Dimension: Dimension from Center of IEC 35 mm Rail.</p> |  | <p>0.5</p> |

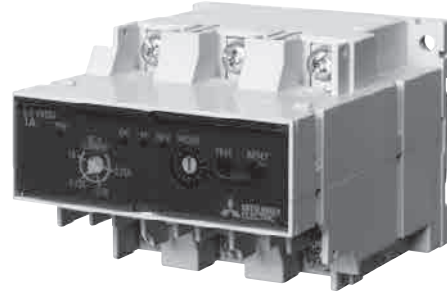
11 Related Equipment

11.7 ET-N□ Electric Motor Protection Relays

Electric motor protection relays that can protect against overloads (including restriction) and open-phases (including unbalanced currents) during AC motor start-up or running, as well as detect reverse-phase states.

Features

- **Optimal Protection to Suit Load Properties**
Protection function and overload operating time can be selected to suit the load via the mode setting switch.
Protection Function: Overload, Open-Phase and Reverse-Phase Combination
Operating Time: Select Among 3/5/7/15/30 Seconds (At Current 600% of Setpoint)
- **Wide Current Settling Range**
Applicable with a current settling range 3 to 4 times the minimum scale.
- **Easy Fault-Finding Via Operation Indicator Lamp**
Indicators: Power/Overload/Open-Phase/Reverse-Phase
- **Indicates Load Equipment Running State**
Indicates the normal running or stopped states of load equipment.
- **Output Contacts 1a1b**
Make contacts and break contacts are completely independent and can be used with circuits at different voltages.
- **Simple Operation**
Has settings/operation displays located on the front surface to make initial settings and maintenance easy.
Settings/operation displays have protective covers to prevent misoperation.
- **Operation Checking**
Checking of overload operation properties is possible.
Can also be operated momentarily with external testing circuits.
- **Self-Diagnosing Functionality**
Equipped with self-diagnosing functionality that triggers a trip when abnormalities are detected.

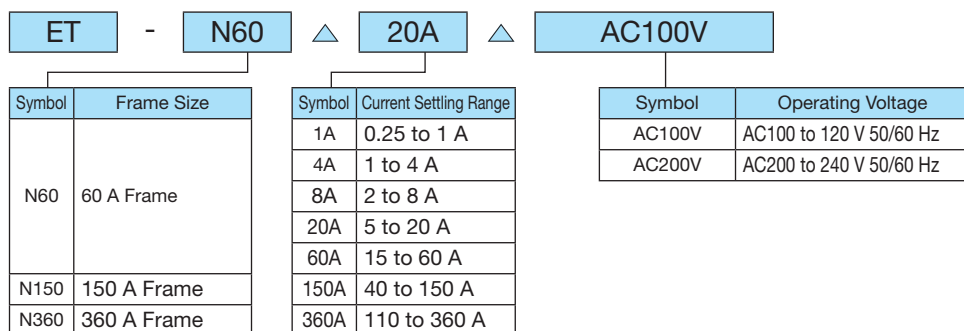


ET-N60

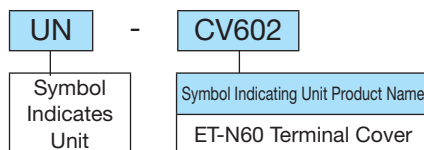
- **Compact**
ET-N60 have a reduced width of 78 mm which is effective for reducing the size of control panels.
- **Simple Wiring**
The main circuit wiring is connected via terminals so there is no need to wind up main circuit power lines.
- **Rail Mounting Standardized**
ET-N60 can be mounted on IEC, DIN and JIS standards compliant 35 mm width rail.

Type Designations

· Electric Motor Protection Relays



· Terminal Cover Units



Rating

| Model Name | Range of Settling Current [A] | Applicable Motor Capacity [kW] | | Model Name | Range of Settling Current [A] | Applicable Motor Capacity [kW] | | | |
|------------|-------------------------------|--------------------------------|--------------|-------------|-------------------------------|--------------------------------|--------------|-----------|-----------|
| | | 200 to 220 V | 400 to 440 V | | | 200 to 220 V | 400 to 440 V | | |
| ET-N60 | 1A | 0.25 to 1 | 0.03 to 0.2 | 0.05 to 0.4 | ET-N60 | 60A | 15 to 60 | 3.7 to 11 | 7.5 to 22 |
| ET-N60 | 4A | 1 to 4 | 0.2 to 0.75 | 0.4 to 1.5 | ET-N150 | 150A | 40 to 150 | 11 to 37 | 22 to 75 |
| ET-N60 | 8A | 2 to 8 | 0.4 to 1.5 | 0.75 to 2.2 | ET-N360 | 360A | 110 to 360 | 30 to 90 | 55 to 150 |
| ET-N60 | 20A | 5 to 20 | 1.5 to 4 | 2.2 to 7.5 | | | | | |

● Properties

| | | | | | | | |
|---|---|--|---------|----------|-----------|------------|-------------|
| Main Circuit Rated Insulation Voltage | 660V 50/60Hz | | | | | | |
| Rated Current | 1A | 4A | 8A | 20A | 60A | 150A | 360A |
| Current Settling Range | 0.25 to 1A | 1 to 4A | 2 to 8A | 5 to 20A | 15 to 60A | 40 to 150A | 110 to 360A |
| Control Circuit Rated Operating Voltage | 100 to 120V or 200 to 240V 50/60Hz | | | | | | |
| Allowable Operating Voltage Fluctuation Range | 85 to 110% of Rated Operating Voltage | | | | | | |
| Control Circuit Input | For AC100 V: 7 VA (With AC100 V Applied)/For AC200 V: 14 VA (With AC200 V Applied) | | | | | | |
| Output Contact | Contact Arrangement | 1a1b | | | | | |
| | Rating | AC240 V 1 A, AC120 V 2 A (Class AC-15) | | | | | |
| | Reset | Manual Reset | | | | | |
| Protection Mode | Overload/Overload + Open-Phase/Overload + Open-Phase + Reverse-Phase | | | | | | |
| Overload | Operating Current | 115±5% | | | | | |
| | Operating Time | 3/5/7/15/30 Seconds (at 600% Current) | | | | | |
| | Operating Method | Heat-Accumulating Operation (Inching/Hot Start Protection) | | | | | |
| Open Phase | Imbalance Sensitivity | 30 to 50% | | | | | |
| | Operating Time | 3±1 s | | | | | |
| Reverse-Phase | Detection Method | Current Detection | | | | | |
| | Operating Time | 0.5 s or Less | | | | | |
| Property Fluctuations As Voltage Fluctuates | Operating Current ±5%, Operating Time ±10% | | | | | | |
| Property Fluctuations As Temperature Fluctuates | Operating Current ±5%, Operating Time ±10% | | | | | | |
| Operation Indicator Lamp | Power/Overload/Open-Phase/Reverse-Phase Individual Tripping Indicators | | | | | | |
| Withstand Voltage | Main Circuit: AC2500 V for 1 Minute, Operation Control Circuit: AC2000 V for 1 Minute | | | | | | |

● Working Environment Criteria

- (1) Ambient Temperature: -10 to 55°C (no condensation, no freezing)
- (2) Relative Humidity: 45 to 85% RH
- (3) Vibration: 10 to 55 Hz 19.6 m/s² or Less
- (4) Shock: 49 m/s² or Less
- (5) Altitude: 2000 m or Below

● Handling

● Control Panel

The protection mode setting switch and current adjusting dial have a control groove to support control operations via compact minus (flathead) screwdrivers.

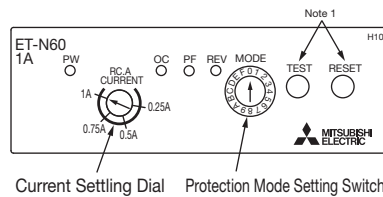


Fig. 1. Control Panel

Note 1. When operating the buttons with the protective cover on, do so with the button front surface part open.

If the buttons are pressed from above the cover without opening it, unnecessary operations may occur.

● Protection Mode Settings

Configure the protection function and operating time via the protection mode settings switch to suit the load characteristics and application before use. The switch is set to position 0 at shipping. However, if the settings switch is stopped between two values unstable operation may result, so take care ensure a clear selection is made. Do not set the switch to the "F" position.

● Protection Mode Setting Switch Settings and Protection Functionality

| Set Position | Protection Function | Operating Time (At 600% I) | Set Position | Protection Function | Operating Time (At 600% I) | Set Position | Protection Function | Operating Time (At 600% I) |
|--------------|--|----------------------------|--------------|---|----------------------------|--------------|--------------------------|----------------------------|
| 0 | Overload, Open-Phase and Reverse-Phase Protection (3E) | 3 s | 5 | Overload and Open-Phase Protection (2E) | 3 s | A | Overload Protection (1E) | 3 s |
| 1 | Overload, Open-Phase and Reverse-Phase Protection (3E) | 5 s | 6 | Overload and Open-Phase Protection (2E) | 5 s | B | Overload Protection (1E) | 5 s |
| 2 | Overload, Open-Phase and Reverse-Phase Protection (3E) | 7 s | 7 | Overload and Open-Phase Protection (2E) | 7 s | C | Overload Protection (1E) | 7 s |
| 3 | Overload, Open-Phase and Reverse-Phase Protection (3E) | 15 s | 8 | Overload and Open-Phase Protection (2E) | 15 s | D | Overload Protection (1E) | 15 s |
| 4 | Overload, Open-Phase and Reverse-Phase Protection (3E) | 30 s | 9 | Overload and Open-Phase Protection (2E) | 30 s | E | Overload Protection (1E) | 30 s |

● Configuring Settling Current

Configure the current adjusting dial to suit the rated current of the load before use. For greater precision configuration, illuminate the "OC" lamp of the ET-N when setting the current.

● Detailed Setting Procedure (Set the current using the following procedure.)

- (1) Turn the current setting dial to the maximum position.
- (2) Apply the operating power supply.
- (3) Allow 115% of the rated motor current to flow through the ET-N main circuit terminal using an actual load or a resistor.
- (4) Set the protection mode setting switch to "A" to "E" if testing single-phase current, connect the main circuit in series with 1/L1 phase, 3/L2 phase and 5/L3 phase, then allow the main circuit current to flow.
- (5) The "OC" indicator lamp should now blink with a 1 second period.
- (6) In this state, slowly reduce the current value using the current setting dial. (Rotate to the left)
- (7) Stop turning the current setting dial when the "OC" indicator lamp blinking changes from a 1 second period to a 0.2 second period to complete configuration.

The overload protection properties are those shown in Figure 2. Configure special load devices by first verifying the overload withstanding capacity of the device.

Do not turn the current adjusting dial past the maximum or minimum values of the rated current range.

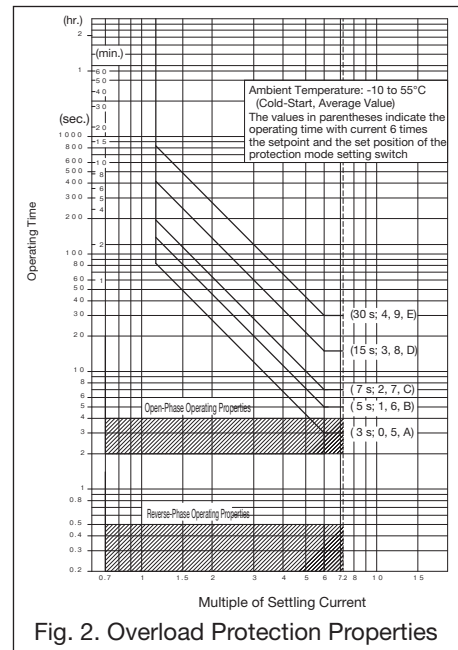


Fig. 2. Overload Protection Properties

11 Related Equipment

● Mounting

The control circuit terminal should be facing downwards to be in the correct orientation when screw mounting or IEC 35 mm rail mounting on vertical surfaces. If mounting horizontally with screws, then rotate the unit 90 degrees in a counterclockwise direction. Close mounting is not possible, as a minimum gap of 10 mm should be established when mounting.

● Indicator Lamp Display Contents

4 indicator lamps are used to indicate the running and tripping status of the load device.

| Indicator Lamp Names | Always Lit | 1 s Blinking | 0.2 s Blinking |
|----------------------|------------------------|-----------------------------------|--|
| PW | Power Indicator | Self-Diagnosing Abnormal Tripping | — |
| OC | Overload Tripping | Load Running (Normal Running) | Testing Overcurrent and Overload Protection (Test 1) |
| PF | Open Phase Tripping | — | — |
| REV | Reverse-Phase Tripping | Test Tripping (Test 2) | — |

● Tests

(1) Overload Protection Testing (Test 1)

Pressing the test button applies a signal with 600% normal current in order to test the overload protection function. The OC indicator lamp will blink with a 0.2 second period. Continue to press the test button and time how long it takes until the OC indicator lamp is continuously lit or the output contact operates in order to test the overload protection function. The operating time should be $\pm 10\%$ of the operating time range (at 600% current) configured with the protection mode settings switch.

(2) Test Tripping (Test 2)

Simultaneously press the test button and reset button to momentarily trip the output relay.

● Reset

Press the reset button to reset the tripped state relay. If tripped via an overload then the relay cannot be immediately reset. (If tripped via an overload then the relay cannot be reset for 5 minutes) Open-phase or reverse-phase trips can be reset. The relay is reset electrically so cannot be reset if the operating power supply is OFF.

● Reverse-Phase Protection

The operating time for reverse-phase protection is 0.5 seconds, so the motor will rotate in the reverse direction for a short period of time even if the phases are reversed. If reversing for even a short period of time cannot be tolerated, then use in combination with a separate reverse-phase protection relay. The current flowing in ET-N main circuit terminals is used to detect phase reversal, so detection is not possible if the order of the phases between ET-N and the load device are changed.

● Non-Applicable Loads

ET-N units have an integrated current transformer that detects main circuit current and provides overcurrent protection, protecting the load device. (Refer to Figure 3). The integrated current transformer is designed to detect 50/60 Hz power, so a reduction in power supply frequency (low inverter operating frequency) may fail to saturate the iron core of the transformer, causing only low signals from the main circuit current to be detected, changing the operating properties of the ET-N unit. ET-N units cannot be used to protect motors for the above reasons when driving with an inverter and so should not be used. They are similarly unusable for DC circuits or for circuits other than 50/60 Hz for the same reasons.

● Connecting

● Terminal Connections

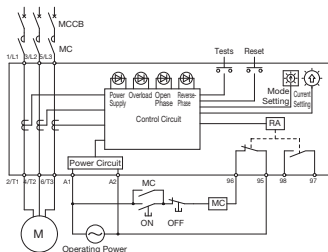


Fig. 3. Terminal and Internal Connections

Magnetic contactors should be mounted separately and terminal connections made with the wires from the table at right.

● Connection Method

(1) Control Circuit Wiring

The protection function does not operate at all if the operating power supply is not applied to the ET-N unit. Configure the circuit such that the operating power supply is normally applied.

(2) Large Capacity Motor or High Voltage Motor Application

Application to high voltage motors or motors exceeding 360 A should be in combination with an external current transformer as per Figure 4.

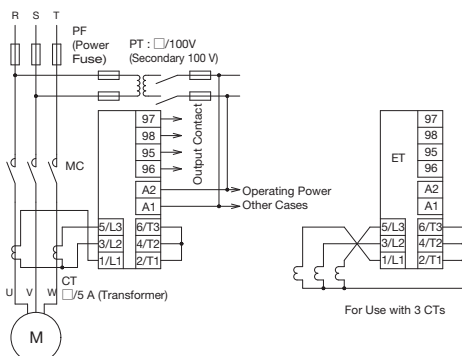


Fig. 4. For Large Capacity Motors/High Voltage Motors

● Applicable Wires

| Model Name | Terminal Screw Size | Main Circuit | | | Control Circuit | | | |
|-----------------------|---------------------|------------------|-----------------------|---|---------------------|---|--------------------------|---|
| | | Applicable Wires | Applicable Crimp Lugs | Tightening Torque N·m (Parentheses show standard value) | Terminal Screw Size | Applicable Wires | Applicable Crimp Lugs | Tightening Torque N·m (Parentheses show standard value) |
| ET-N60 1 A to 60 A | M5 | — | 1.25-5 to 14-5 | 2.06 to 3.33 (2.54) | — | — | — | — |
| ET-N150 150 A | M8 | — | 5.5-8 to 60-8 | 6.28 to 10.29 (7.84) | M3.5 | 1.25 to 2 mm ² ϕ 1.6 mm | 1.25-3.5 to 2-3.5 ϕ | 0.94 to 1.51 (1.17) |
| ET-N360 360 A | M12 | — | 5.5-12 to 200-12 | 19.6 to 31.3 (24.5) | — | — | — | — |

The external current transformer should be used with objects that have large overcurrent time constants in order not to saturate up to 600% rated motor current.

(3) Single-Phase Motor Application

Single-phase loads should be connected with the protection mode setting switch in the overcurrent protection property position (A to E) as per Figure 5.

(4) Phase Advanced Capacitor Connections

Phase advanced capacitors should be connected to the main circuit power supply side of ET-N units as per Figure 6.

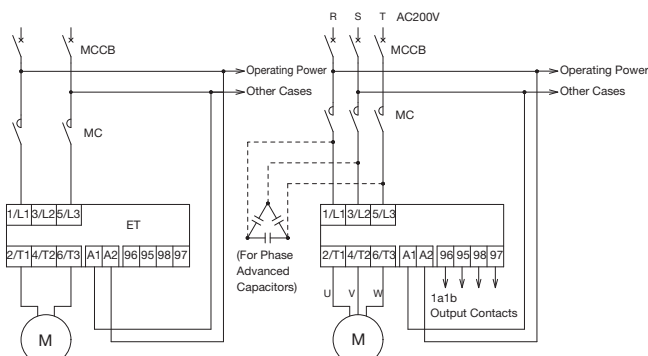
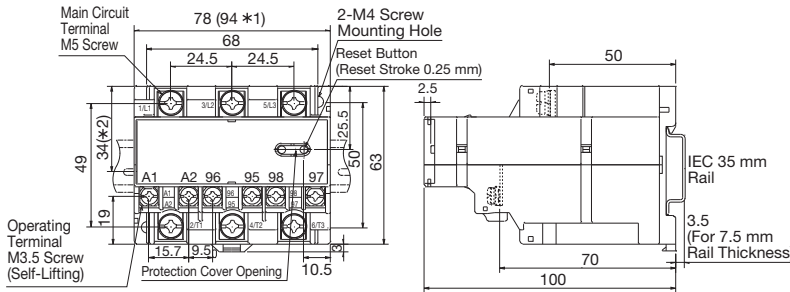
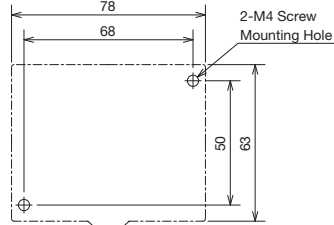
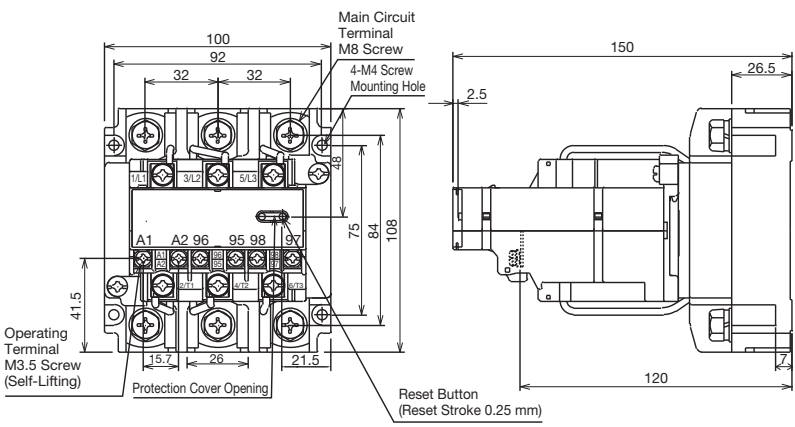
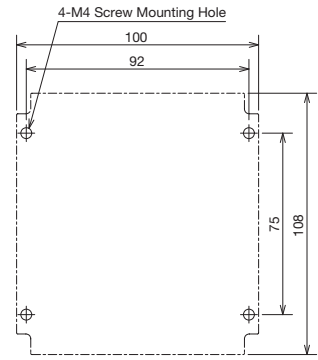
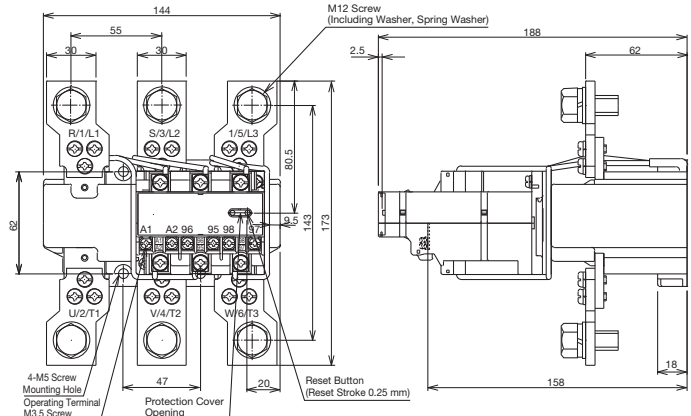
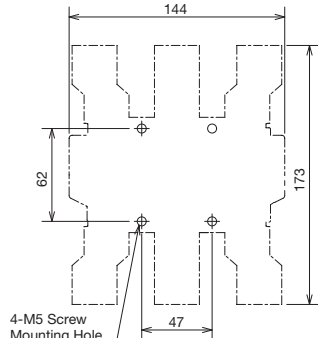


Fig. 5. For Single-Phase Motors

Fig. 6. For Phase Advanced Capacitors

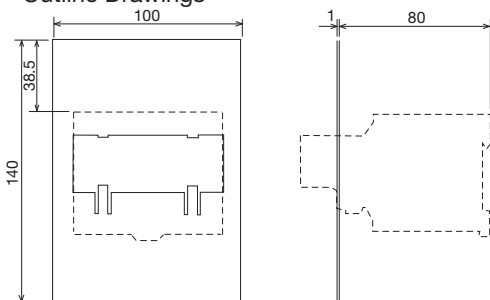
Outline Drawings

 Can be mounted on IEC 35 mm rails.

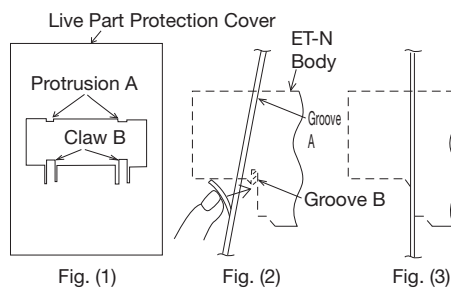
| Model Name | Outline Drawings | Hole Drilling Dimensions |
|---|--|--|
| ET-N60 1A 4A 8A 20A 60A |  <p>*1 Dimension: Including Adapter, *2 Dimension: Dimension from Center of IEC 35 mm Rail</p> |  <p>85 x 50 Mounting Possible With Use Of Adapter</p> |
| 0.3 kg ET-N150 150A |  |  |
| 1.6 kg ET-N360 360A |  |  |

UN-CV602 Live Part Protection Cover Units

· Outline Drawings



· Mounting Method



1. Insert protrusion A of the live part protection cover into groove A of the ET-N upper surface. (Figs. (1) and (2))
2. Press the live part protection cover B claw in the direction of the arrow and insert it into the B groove of the ET-N lower surface. (Figs. (1) and (2))

| Model Name | Minimum Order Unit |
|------------|--------------------|
| UN-CV602 | 5 (5-Pack) |

11 Related Equipment

11.8 SRE Voltage Detection Relays

SRE-AA units can detect both DC and AC overvoltage or undervoltage conditions with high precision, and have a wide configurable range from 0.1 V to 250 V. SRE-K units not only allow detection by simply connecting to a power terminal but can be used to detect drops in power supply voltage, such as a warning when switching to home generated power during a power outage or when battery voltage drops.

Features

● High External Surge Withstand Capability

The integrated surge absorber circuit delivers excellent external surge withstanding capacity.

● Simple Wiring

Adopts self-lifting terminal screws for simple wiring.



● High Precision

The detector uses an IC for high accuracy and high reliability.

● High Input Impedance

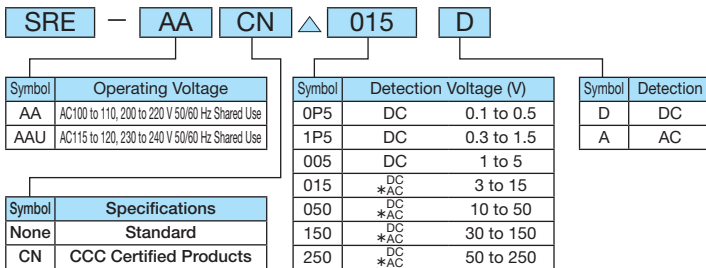
Has a high input impedance so as to not affect other equipment.

● Wide Detection Range

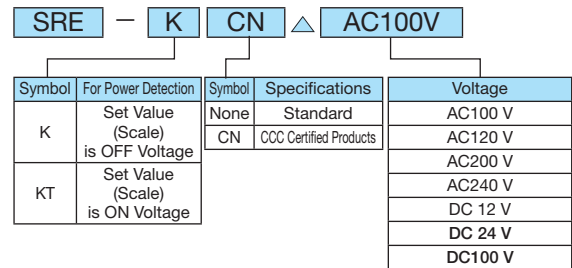
Has a wide 0.1 to 250 V range for DC and 3 to 250 V range for AC. (For Standard Detection)

Type Designations

1. For Standard Detection



2. For Power Detection



Note. AC detection is applicable for those items marked with * above.

Ratings/Specifications

| By Model | Model Name | Detection Voltage Setting Range | Detector Input Max. Voltage (Continuous) | Input Impedance | Output Contact | Operating Voltage | |
|------------------------|-------------------|---------------------------------|--|-----------------|----------------|--|---|
| For Standard Detection | SRE-AA SRE-AAU | 0P5D | DC 0.1 to 0.5 V | ±100 V | 20 KΩ | Contact Arrangement 1c Rated Operating Current Class AC-15 Electrical Durability of 0.5 mil. times Class DC-13 Electrical Durability of 0.25 mil. times DC110 V 0.2 A Rated Continuity Current Ith 3 A | AC100 to 110, 200 to 220 V 50/60 Hz Shared Use or AC115 to 120, 230 to 240 V 50/60 Hz |
| | | 1P5D | DC 0.3 to 1.5 V | ±100 V | 50 KΩ | | |
| | | 005D | DC 1 to 5 V | ±150 V | 100 KΩ | | |
| | | 015D | DC 3 to 15 V | ±150 V | 100 KΩ | | |
| | | 050D | DC 10 to 50 V | ±200 V | 500 KΩ | | |
| | | 150D | DC 30 to 150 V | ±300 V | 800 KΩ | | |
| | | 250D | DC 50 to 250 V | ±300 V | 800 KΩ | | |
| | | 015A | AC 3 to 15 V | AC150 V | 100 KΩ | | |
| | | 050A | AC 10 to 50 V | AC200 V | 500 KΩ | | |
| | | 150A | AC 30 to 150 V | AC300 V | 800 KΩ | | |
| For Power Detection | SRE-K | AC100V | AC 75 to 105 V | AC120 V | Input 1.8 VA | AC100 V 50/60 Hz Shared Use | |
| | | AC120V | AC 90 to 125 V | AC132 V | | AC120 V 50/60 Hz Shared Use | |
| | | AC200V | AC 150 to 210 V | AC240 V | | AC200 V 50/60 Hz Shared Use | |
| | | AC240V | AC 180 to 250 V | AC264 V | | AC240 V 50/60 Hz Shared Use | |
| | | DC12V | DC 9 to 12.5 V | DC 14 V | | DC 12 V | |
| | | DC24V | DC 18 to 25 V | DC 28 V | | DC 24 V | |
| | SRE-KT | DC100V | DC 75 to 105 V | DC120 V | Input 1.7 W | DC100 V | |
| | | AC100V | AC 80 to 115 V | AC120 V | | AC100 V 50/60 Hz Shared Use | |
| | | AC120V | AC 95 to 130 V | AC132 V | | AC120 V 50/60 Hz Shared Use | |
| | | AC200V | AC 160 to 230 V | AC240 V | | AC200 V 50/60 Hz Shared Use | |
| | | AC240V | AC 190 to 260 V | AC264 V | | AC240 V 50/60 Hz Shared Use | |
| | | DC12V | DC 10 to 14 V | DC 14 V | | DC 12 V | |
| | | DC24V | DC 20 to 28 V | DC 28 V | | DC 24 V | |
| | | DC100V | DC 80 to 115 V | DC120 V | | DC100 V | |

Note. SRE-AA(U) DC detectors can be used with single-phase full-wave power supplies.

● Properties

| Item | Use Conditions | Properties | Remarks |
|--------------------------------|--|-----------------------|---------------------------------------|
| Voltage Fluctuation Properties | 85 to 110% of Rated Operating Voltage | ±1.5% | Excluding SRE-K, KT Types |
| Ambient Temperature Properties | -10°C to 55°C | ±2.5% | |
| Repeat Properties | Repeating under Identical Conditions | ±1% | |
| Response Time | 150% of Set Voltage Applied | 100 ms | |
| Withstand Voltage | Between Batch Terminal - Ground Terminal, Input - Output | AC1500 V for 1 Minute | |
| Insulation Resistance | Between Batch Terminal - Ground Terminal, Input - Output | 100 MΩ or More | DC500 V Insulation Tester |
| Power Consumption | Rated Operating Voltage Applied | 2 VA | Same as SRE-K, KT Types |
| Surge Withstand Voltage | Detection Input, Power Input | 3500 V 1 x 40 μs | Excluding DC Operated SRE-K, KT Types |

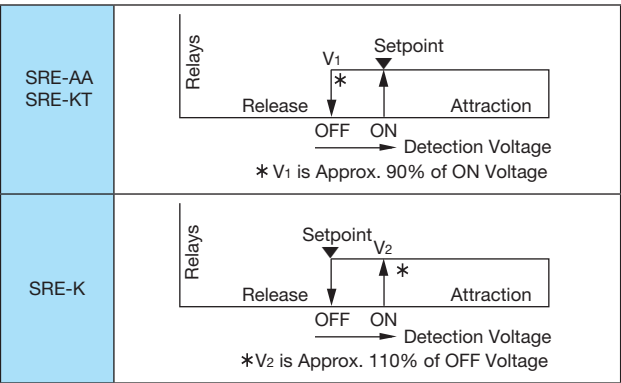
● Working Environment Criteria

- (1) Ambient Temperature : -10 to 55°C (no condensation, no freezing)
- (2) Relative Humidity : 45 to 85% RH
- (3) Vibration : 10 to 55Hz 19.6 m/s² or Less
- (4) Shock : 49 m/s² or Less
- (5) Altitude : 2000 m or Below

● Application

- SRE-AA Type
 - DC Motor Speed Detection
 - DC Motor Field Detection
 - Motor PG Output Detection
 - For Power Supply Voltage Output Protection
 - For Detection Feedback of Each Signal Output
- SRE-K, SRE-KT Types
 - For Emergency Power Supply Switching Detection
 - For Household Generated Power Switching Detection
 - General Power Supply Voltage Drop Detection
 - Battery Voltage Drop Detection

● Operation



● Connection Method

| Model Name | SRE-AA Type | SRE-K, SRE-KT Types |
|-------------------|--|---|
| Connection Method | <p>Detection (-) (+) Common AC200V (-) (-) AC100V</p> | <p>Operation/Detection (-) (+) (-) (-)</p> |

● Outline Drawings

| Model Name | Appearance | Outline Drawings | Hole Drilling Dimensions | Weight [kg] |
|---------------------------|------------|------------------|--------------------------|-------------|
| SRE-AA SRE-K SRE-KT | | | | 0.3 |

11 Related Equipment

11.9 UA-DL2 Instantaneous Stop/Restart Relays

Power supply continuity is very important for industrial plants. Short-term voltage drop or power failures can affect plant machinery and even cause the production line to grind to a halt.

UA-DL2 instantaneous stop/restart relays automatically restart load equipment that has stopped momentarily due to voltage drop or temporary outages, when power returns.

Features

● Simple Mounting/Wiring

Can be connected without the need to modify existing control circuitry. The plug-in structure also simplifies wiring, attachment and removal.

● Compact

The reduced mounting area required allows for more compact panels.



● 100 V and 200 V Shared Operating Voltage

● With Operation Indicator

Lights up when the power is on, turns off when the power is off

● Switchable Allowable Momentary Failure Time

The allowable momentary failure time can be switched between 1 and 2 seconds for optimal configuration to suit the properties of the load equipment.

Ratings/Specifications

| Item | Specifications | |
|---|---|---|
| Control Circuit Allowable Voltage Fluctuation Range | 85 to 110% of Rated Voltage | |
| Operating Temperature/Humidity | -10 to 55°C/45 to 85% RH | |
| Withstand Voltage | AC2000 V for 1 Minute | |
| Insulation Resistance | 100 MΩ or More | |
| Vibration-Resistant/Shock-Resistant | Vibration: 10 to 55 Hz 19.6 m/s ² / Shock: 98 m/s ² | |
| Operating Time | 1 Second/2 Seconds Switchable | |
| Time Accuracy | Setting Error | -20% to +90% (With AC100 V/AC200 V Applied) |
| | Voltage Error | ±35% |
| | Temperature Error | ±25% |
| Minimum Retention Time | 5 s or More | |
| Minimum Off Time | 50 ms | |
| Input | 3 VA | |
| Electrical Durability | 0.5 mil. times | |
| Output Contact | Contact Arrangement | 1a |
| | Contact Capacity | AC220 V 1 A, AC110 V 1.5 A (Class AC-15) |
| Applicable Magnetic Contactor Model Names | S-T10 to T100, S-N125 to N400* | |

Note 1. There is a limit to the size of the coil impedance of the magnetic contactor to be combined with. * Consult with us regarding use in combination with other magnetic contactors.

Connection Diagram (The functionality of the UA-DL2 units is the same for examples 1 and 2; however, the ON and OFF operating switch connections differ.)

Example 1

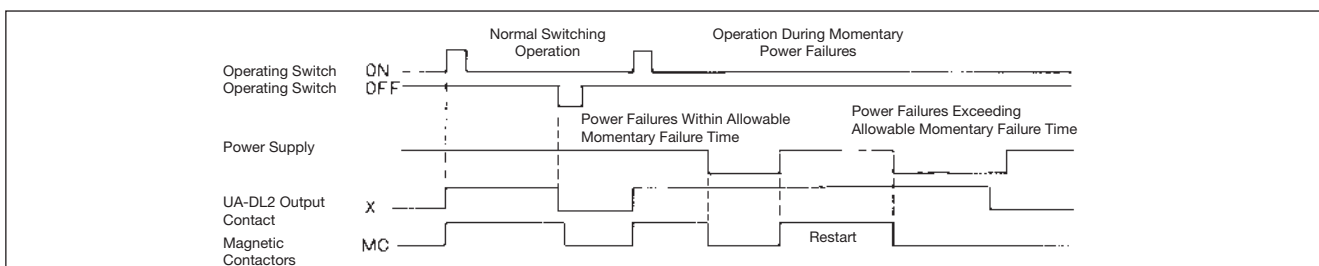
Example 2

Note 1. The below 3 types of voltage specifications are available; however, the correct connection terminal number (2 or 7) that supports the voltage range should be used depending on the operating voltage. (The connection diagram shows connections to terminal 2 for both examples 1 and 2.)

| Connection Terminal Number | AC100/200 V | AC120 V | AC240 V |
|----------------------------|--------------|--------------|--------------|
| 2 | 100 to 110 V | 100 to 110 V | 200 to 220 V |
| 7 | 200 to 220 V | 110 to 120 V | 220 to 240 V |

Note 2. Connecting terminal 4 or terminal 8 may lead to failure, so connections should not be made.

Circuit Operation



● Precautions for Use

- (1) The allowable momentary failure time is set to 2 seconds at shipping. To set to 1 second, firmly rotate the switch in the direction of the arrow until it won't rotate any further.
- (2) Terminal (2) and (7) connections differ depending on the operating circuit voltage. Connect for use in accordance with the circuit voltage used. (Refer to connection diagram note 1.)
- (3) The length of OFF commands sent by external switches (the OFF push button switch in the connection diagram) must be at least 50 ms.
- (4) When using a relay contact in place of a push button switch (OFF), use a contact that won't open if power failures occur. If the push button switch (OFF) opens, the UA-DL2 unit will turn OFF and the magnetic contactor will not restart.
- (5) Uses an electrolytic capacitor so the operation time should be checked periodically.



● Type Designations

(1) Instantaneous Stop/Restart Relays

UA-DL2 ▲ AC100/200V

| Designation | Rated Voltage |
|-------------|--|
| AC100/200V | 100 to 110 V 50/60 Hz 200 to 220 V 50/60 Hz |
| AC120V | 100 to 110 V 50/60 Hz 110 to 120 V 50/60 Hz |
| AC240V | 200 to 220 V 50/60 Hz 220 to 240 V 50/60 Hz |

(2) Socket

PF-08RM Surface Connection Socket (For Panel Mounted Rail Mounting)

PF-08TM Surface Connection Socket (For Panel Mounting)

● Outline Drawings

| Model Name | Outline Drawings | Hole Drilling Dimensions | Weight [kg] |
|---|------------------|---|-------------|
| Instantaneous Stop/Restart Relays UA-DL2 | | | 0.1 |
| Socket PF-08RM | | <p>Up to 2 2-3.5 Sized Crimp Lugs Compliant with Terminal Up to 2 1.25 to 2 mm² Sized Wires Conforming to Terminal</p> | 0.05 |
| Socket PF-08TM | | <p>Up to 2 2-3.5 Sized Crimp Lugs Conforming to Terminal Up to 2 1.25 to 2 mm² Sized Wires Conforming to Terminal</p> | 0.05 |

11 Related Equipment

11.10 How to Order

Follow the steps below when ordering. (Enter a space in ▲.)

1. US-N Solid State Contactors

| |
|------------------------|
| Model Name |
| US-N20TE |
| Specify from page 290. |

2. US-H Solid State Contactors

| |
|-------------------------------------|
| Model Name |
| US-H20 |
| Specify from page 291, 293 and 297. |

3. Optional Units

Drive Units (UA-DR1)

| | |
|------------------------|---|
| Model Name | Rated Operating Voltage |
| UA-DR1 | ▲ AC100V |
| Specify from page 309. | Select the rated operating voltage from page 309. |

Reversing Units (UA-RE)

| | |
|------------------------|---|
| Model Name | Rated Operating Voltage |
| UA-RE | ▲ AC100V |
| Specify from page 312. | Select the rated operating voltage from page 312. |

Fault Detection Units (UN-FD, UN-FD4)

| | | |
|------------------------|---|--|
| Model Name | Rated Operating Voltage | Contact Arrangement |
| UN-FD UN-FD4 | ▲ AC100V ▲ AC200V | ▲ 1A |
| Specify from page 313. | Select the rated operating voltage from page 313. | Specification available for UN-FD4 units only. Select a contact arrangement to be specified from page 315. |

Power Control Units (UA-PC)

| | |
|------------------------|---|
| Model Name | Rated Operating Voltage |
| UA-PC | ▲ AC100V |
| Specify from page 317. | Select the rated operating voltage from page 317. |

Drive Units with Output (UA-SH1, UA-SH8)

| | |
|------------------------|---|
| Model Name | Rated Operating Voltage |
| UA-SH1 UA-SH8 | ▲ AC100V ▲ AC200V |
| Specify from page 311. | Select the rated operating voltage from page 311. |

Variable Resistors for Power Control Units (UA-PC-VR□)

| |
|------------------------|
| Model Name |
| UA-PC-VR10 |
| Specify from page 320. |

Live Part Protection Cover Units (UA-CV□, UN-CV501US)

| |
|------------------------|
| Model Name |
| UA-CVDR1 |
| Specify from page 321. |

4. Electric Motor Protection Relays

ET Type

| | | |
|------------------------|-----------------------------|---|
| Model Name | Setting Current Designation | Rated Operating Voltage |
| ET-N60 | ▲ 20A | ▲ AC100V |
| Specify from page 326. | Select from page 326. | Select an operating voltage designation (symbol) from page 326. |

ET Live Part Protection Cover

| |
|------------------------|
| Model Name |
| UN-CV602 |
| Specify from page 329. |

5. Voltage Relays

SRE-AA□ Type

| | |
|------------------------|---|
| Model Name | Detection Voltage Designation |
| SRE-AA SRE-AAU | ▲ 015D ▲ 150A |
| Specify from page 330. | Select the detection voltage configuration range from page 330. |

SRE-K□ Type

| | |
|------------------------|---|
| Model Name | Operation and Detection Voltage Designation |
| SRE-K SRE-KT | ▲ AC100V ▲ DC100V |
| Specify from page 330. | Select the detection voltage configuration range from page 330. |

6. Instantaneous Stop/Restart Relays

| | |
|------------------------|--|
| Model Name | Rated Operating Voltage Designation |
| UA-DL2 | ▲ AC100V/200V |
| Specify from page 332. | Select an operating voltage designation from page 333. |

7. Socket

| |
|------------------------|
| Model Name |
| PF-08RM |
| Specify from page 333. |



12

Motor Circuit Breakers MMP-T32

| | | |
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12 Motor Circuit Breakers MMP-T32

12.1 Selection and Application

● Features

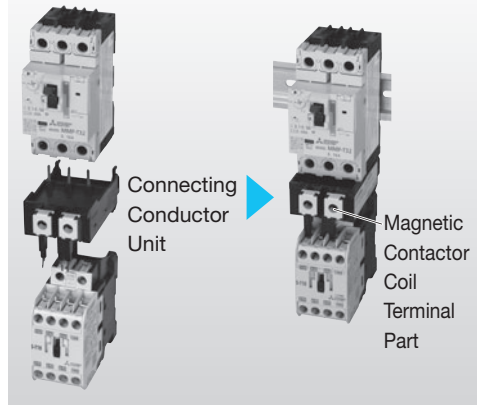
- One unit protects industrial motors
One unit detects overload/open-phase operation and enables cutting off short-circuit accident currents. Compact exterior and rated breaking capacity of 100 kA (200/240 V).
- Improved safety during product maintenance
Standard-equipped DIN and VDE compliant live part protection cover helps improve safety during maintenance.



MMP-T32

- Helps facilitate the miniaturization of control/distribution panels
Optimized internal structure enables reduction of the depth dimension. Using a connecting conductor unit (UT-MT □) will further help facilitate the miniaturization of panels. Auxiliary contact unit, alarm contact unit and short-circuit display unit, a unit that displays red when short-circuited, can be built in with a 45 mm width.

Wiring Example of Connecting Conductor Units



● Type Designations

■ MMP-T Series



| Model Name | Model | Frame | Specifications | Symbol | Specifications |
|------------|------------------------|-------|----------------|--------|-----------------------------------|
| MMP | Motor Circuit Breakers | T32 | 32 A | BC | With Wiring Streamlining Terminal |

| Heater Designation (A) | Current Setting Range (A) |
|------------------------|---------------------------|
| 0.16 | 0.1 to 0.16 |
| 0.25 | 0.16 to 0.25 |
| 0.4 | 0.25 to 0.4 |
| 0.63 | 0.4 to 0.63 |
| 1 | 0.63 to 1 |
| 1.6 | 1 to 1.6 |
| 2.5 | 1.6 to 2.5 |
| 4 | 2.5 to 4 |
| 6.3 | 4 to 6.3 |
| 8 | 5.5 to 8 |
| 10 | 7 to 10 |
| 13 | 9 to 13 |
| 18 | 12 to 18 |
| 25 | 18 to 25 |
| 32 | 24 to 32 |

12.2 Specifications

| Frame Size | | 32 A | | | | | | | | | | | |
|---|------------------------------------|--|-----|-----------|----|-----------|----|--------------|----|-----------|----|-----|--|
| Model Name | | MMP-T32 | | | | | | MMP-T32BC *1 | | | | | |
| Standard | | JIS C8201-2-1 Ann. 1, JIS C8201-4-1, EN60947-2, EN60947-4-1, IEC60947-2, IEC60947-4-1, GB14048.2 | | | | | | | | | | | |
| No. of Poles | | 3 | | | | | | | | | | | |
| Handle Shape | | Tumbler Handle | | | | | | | | | | | |
| Rated Current In [A] | | 0.1 to 32 | | | | | | | | | | | |
| Rated Operating Voltage Ue [V] | | 100 to 690 | | | | | | | | | | | |
| Rated Operating Frequency [Hz] | | 50/60 | | | | | | | | | | | |
| Rated Insulation Voltage Ui [V] | | 690 | | | | | | | | | | | |
| Rated Impulse Withstand Voltage Uimp [kV] | | 6 | | | | | | | | | | | |
| Rated Short Circuit Breaking Capacity [kA] | Rated Operating Current Ie [A]*2 | 200/240 V | | 400/415 V | | 440/460 V | | 500 V | | 600/690 V | | | |
| | Heater Designation | Icu | | Ics | | Icu | | Ics | | Icu | | Ics | |
| | Current Setting Range | | | | | | | | | | | | |
| | 0.16 | 100 | | 100 | | 100 | | 100 | | 100 | | | |
| | 0.25 | 100 | | 100 | | 100 | | 100 | | 100 | | | |
| | 0.4 | 100 | | 100 | | 100 | | 100 | | 100 | | | |
| | 0.63 | 100 | | 100 | | 100 | | 100 | | 100 | | | |
| | 1 | 100 | | 100 | | 100 | | 100 | | 100 | | | |
| | 1.6 | 100 | | 100 | | 100 | | 100 | | 100 | | | |
| | 2.5 | 100 | | 100 | | 100 | | 100 | | 8 | | 6 | |
| | 4 | 100 | | 100 | | 100 | | 100 | | 8 | | 6 | |
| | 6.3 | 100 | | 100 | | 100 | | 100 | | 6 | | 5 | |
| | 8 | 100 | | 100 | | 50 | | 38 | | 42 | | 32 | |
| | 10 | 100 | | 100 | | 50 | | 38 | | 42 | | 32 | |
| 13 | 100 | | 100 | | 50 | | 38 | | 42 | | 32 | | |
| 18 | 100 | | 50 | | 38 | | 35 | | 27 | | 10 | | |
| 25 | 100 | | 50 | | 38 | | 35 | | 27 | | 10 | | |
| 32 | 100 | | 50 | | 38 | | 35 | | 27 | | 10 | | |
| Category of Use | JIS C8201-2-1 Ann.1 IEC 60947-2 | Cat.A | | | | | | | | | | | |
| | JIS C8201-4-1 IEC 60947-4-1 | AC-3 | | | | | | | | | | | |
| Tripping Class (JIS C8201-4-1, IEC 60947-4-1) | | 10 | | | | | | | | | | | |
| Instant Tripping Characteristics | | 13x Max. Ie | | | | | | | | | | | |
| Switching Life | Mechanical [Times] | 0.1 mil. | | | | | | | | | | | |
| | Electrical [Times] (AC-3) | 0.1 mil. | | | | | | | | | | | |
| Open-Phase Protection | | Yes | | | | | | | | | | | |
| Tripping Display | | Yes | | | | | | | | | | | |
| Test Trip Function | | Yes | | | | | | | | | | | |
| Auxiliary Contact Unit | | UT-MAX (1a or 1b) | | | | | | | | | | | |
| Alarm Contact Unit | | UT-MAL (1a or 1b) | | | | | | | | | | | |
| Short-circuit Display Unit | | UT-TU | | | | | | | | | | | |
| Mass [g] | | 330 | | | | | | | | | | | |

*1: MMP-T32BC is equipped with wiring streamlining terminal *2: Rated operating current for UL application is listed on a separate page

12 Motor Circuit Breakers MMP-T32

● Type 1 Coordination (Non-Reversing/Reversing, Direct Start)

Satisfies the requirements for protection coordination Type 1 (Type 1 Coordination) of combination starters specified in IEC 60947-4-1 and JIS C 8201-4-1.

◆ Combining Motor Circuit Breakers and Magnetic Contactors (Type 1 Coordination)

| Motor Circuit Breakers | | | Magnetic Contactors | Rated Conditional Short-Circuit Current I _q [kA] | | | |
|------------------------|--------------------|---------------------------------|---|---|-----------|-----------|-------|
| Model Name | Heater Designation | Rated Current Setting Range [A] | | 200/240 V | 400/415 V | 440/460 V | 500 V |
| MMP-T32 | 0.16 | 0.1 to 0.16 | Refer to the Combination List (Table Below) | 50 | 50 | 50 | 50 |
| | 0.25 | 0.16 to 0.25 | | 50 | 50 | 50 | 50 |
| | 0.4 | 0.25 to 0.4 | | 50 | 50 | 50 | 50 |
| | 0.63 | 0.4 to 0.63 | | 50 | 50 | 50 | 50 |
| | 1 | 0.63 to 1 | | 50 | 50 | 50 | 50 |
| | 1.6 | 0.1 to 1.6 | | 50 | 50 | 50 | 50 |
| | 2.5 | 1.6 to 2.5 | | 50 | 50 | 50 | 50 |
| | 4 | 2.5 to 4 | | 50 | 50 | 50 | 50 |
| | 6.3 | 4 to 6.3 | | 50 | 50 | 50 | 50 |
| | 8 | 5.5 to 8 | | 50 | 50 | 50 | 42 |
| | 10 | 7 to 10 | | 50 | 50 | 50 | 42 |
| | 13 | 9 to 13 | | 50 | 50 | 50 | 42 |
| | 18 | 12 to 18 | | 50 | 50 | 35 | 10 |
| | 25 | 18 to 25 | | 50 | 50 | 35 | 10 |
| 32 | 24 to 32 | 50 | 50 | 35 | 10 | | |

The following table shows the magnetic contactors that can be combined with each rating of the motor circuit breaker.

| Motor Circuit Breakers | | | Magnetic Contactors (Non-Reversing/Reversing) | | | |
|------------------------|--------------------|---------------------------------|---|----------------|----------------|----------------|
| Model Name | Heater Designation | Rated Current Setting Range [A] | Model Name | | | |
| | | | 200/240 V | 400/415 V | 440/460 V | 500 V |
| MMP-T32 | 0.16 | 0.1 to 0.16 | S-(2x)T10(BC) | S-(2x)T10(BC) | S-(2x)T10(BC) | S-(2x)T10(BC) |
| | 0.25 | 0.16 to 0.25 | SD-(2x)T12(BC) | SD-(2x)T12(BC) | SD-(2x)T12(BC) | SD-(2x)T12(BC) |
| | 0.4 | 0.25 to 0.4 | SD-(2x)T20(BC) | SD-(2x)T20(BC) | SD-(2x)T20(BC) | SD-(2x)T20(BC) |
| | 0.63 | 0.4 to 0.63 | SD-(2x)T21(BC) | SD-(2x)T21(BC) | SD-(2x)T21(BC) | SD-(2x)T21(BC) |
| | 1 | 0.63 to 1 | SD-(2x)T25(BC) | SD-(2x)T25(BC) | SD-(2x)T25(BC) | SD-(2x)T25(BC) |
| | 1.6 | 0.1 to 1.6 | SD-(2x)T32(BC) | SD-(2x)T32(BC) | SD-(2x)T32(BC) | SD-(2x)T32(BC) |
| | 2.5 | 1.6 to 2.5 | SD-Q(R)11/12 | SD-Q(R)11/12 | SD-Q(R)11/12 | SD-Q(R)11/12 |
| | 4 | 2.5 to 4 | S-(2x)T10(BC) | S-(2x)T10(BC) | S-(2x)T10(BC) | S-(2x)T10(BC) |
| | 6.3 | 4 to 6.3 | SD-(2x)T12(BC) | SD-(2x)T12(BC) | SD-(2x)T12(BC) | SD-(2x)T12(BC) |
| | 8 | 5.5 to 8 | SD-(2x)T20(BC) | SD-(2x)T20(BC) | SD-(2x)T20(BC) | SD-(2x)T20(BC) |
| | 10 | 7 to 10 | SD-(2x)T21(BC) | SD-(2x)T21(BC) | SD-(2x)T21(BC) | SD-(2x)T21(BC) |
| | 13 | 9 to 13 | SD-(2x)T25(BC) | SD-(2x)T25(BC) | SD-(2x)T25(BC) | SD-(2x)T25(BC) |
| | 18 | 12 to 18 | SD-Q(R)11/12 | SD-Q(R)11/12 | SD-Q(R)11/12 | SD-Q(R)11/12 |
| | 25 | 18 to 25 | S-(2x)T10(BC) | S-(2x)T10(BC) | S-(2x)T10(BC) | S-(2x)T10(BC) |
| 32 | 24 to 32 | SD-(2x)T12(BC) | SD-(2x)T12(BC) | SD-(2x)T12(BC) | SD-(2x)T12(BC) | |

Note 1. When combining S(D)-T21 and S-T25, only wiring with electric wires is possible. (Connecting conductor units cannot be used)

Note 2. The above table is based on the class AC-3 maximum rated operating current of each magnetic contactor. Select with attention to the actual operating conditions.

Note 3. Refer to the following for unit selection when combining a motor circuit breaker and a magnetic contactor.

S-T10(BC) to T20(BC): UT-MT20

S-T32(BC): UT-MT32

SD-T12(BC)/T20(BC): UT-MT20D+UT-BT32D

SD-T32(BC): UT-MT32D+UT-BT32D

S-2xT10(BC): UT-MT20+UT-RT10+UT-BT20 (2 Units)

S-2xT12(BC)/T20(BC): UT-MT20+UT-RT20+UT-BT20 (2 Units)

S-2xT32(BC): UT-MT32+UT-RT32+UT-BT32 (2 Units)

SD-2xT12(BC)/T20(BC): UT-MT20D+UT-RT20+UT-BT32D (2 Units)

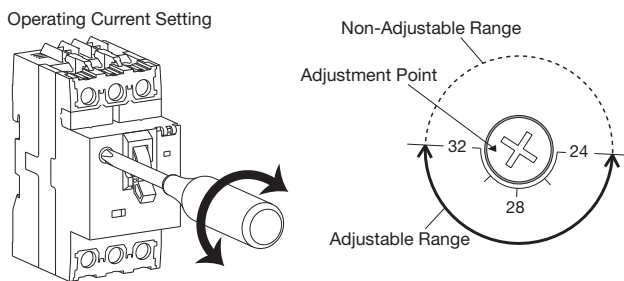
SD-2xT32(BC): UT-MT32D+UT-RT32+UT-BT32D (2 Units)

S-T21(BC)/T25(BC)/SD-T21(BC)/S-2xT21(BC)/SD-2xT21(BC)/T25(BC): Electric Wire Connection

SD-Q11/Q12/QR11/QR12: UT-MQ12

12.3 Working Environment

- (1) Ambient Temperature : -10°C to 40°C
(Applied outside control panel) Daily Average Temperature Maximum 35°C, Yearly Average Temperature Maximum 25°C
- (2) Maximum Temperature Inside Control Panel : 55°C (yearly average temperature inside panel of 40°C or below)
Please note that operation characteristics are affected by the ambient temperature.
- (3) Relative Humidity : 45% to 85% RH (no condensation, no freezing)
- (4) Altitude : 2000 m or Below
- (5) Vibration : 10 to 55 Hz 19.6 m/s² or Less
- (6) Shock : 49 m/s² or Less
- (7) Atmosphere : Low levels of dust, smoke, corrosive gas, moisture or sodium.
When used in a sealed state for a long time, contact failure, etc., can occur.
Do not use the products in an atmosphere containing flammable gas.
- (8) Storage Temperature/Relative Humidity: -30°C to 65°C/45% to 85% RH (no condensation, no freezing) Storage temperature refers to ambient temperature during transportation or storage of product. When starting use of the product, the temperature must be within the working temperature.
- (9) Precautions for Use : Set the position of the adjusting dial in consideration of the panel interior temperature and the mounting conditions.

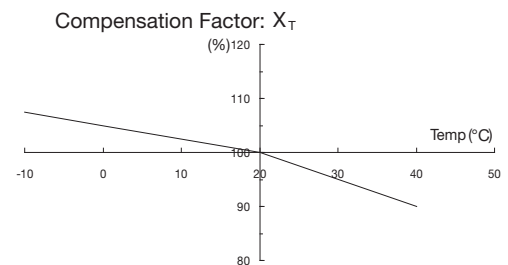


$$I_{SET} = I / X_{SET} \times 100$$

I : Motor Rated Current
 X_{SET} : Determined based on the following Figures 1 and 2

(E.g.) If $I = 2.8$ A, Panel Interior Temperature = 40°C, and close mounted
 $I_{SET} = 2.8 / (90 - 5) \times 100 \approx 3.3$ A
 → Set the adjusting dial to position 3.3 A.

<Fig. 1. Temperature compensation properties>



<Fig. 2. Mounting condition compensation>

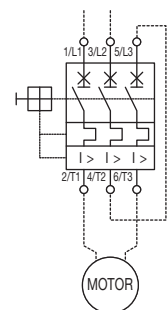
| | |
|--|--|
| | [Non-Close Mounting] $X_{SET} = X_T$ ($L \geq 10$ mm) |
| | [Close Mounting] $X_{SET} = X_T - 5$ |

(10) Connecting

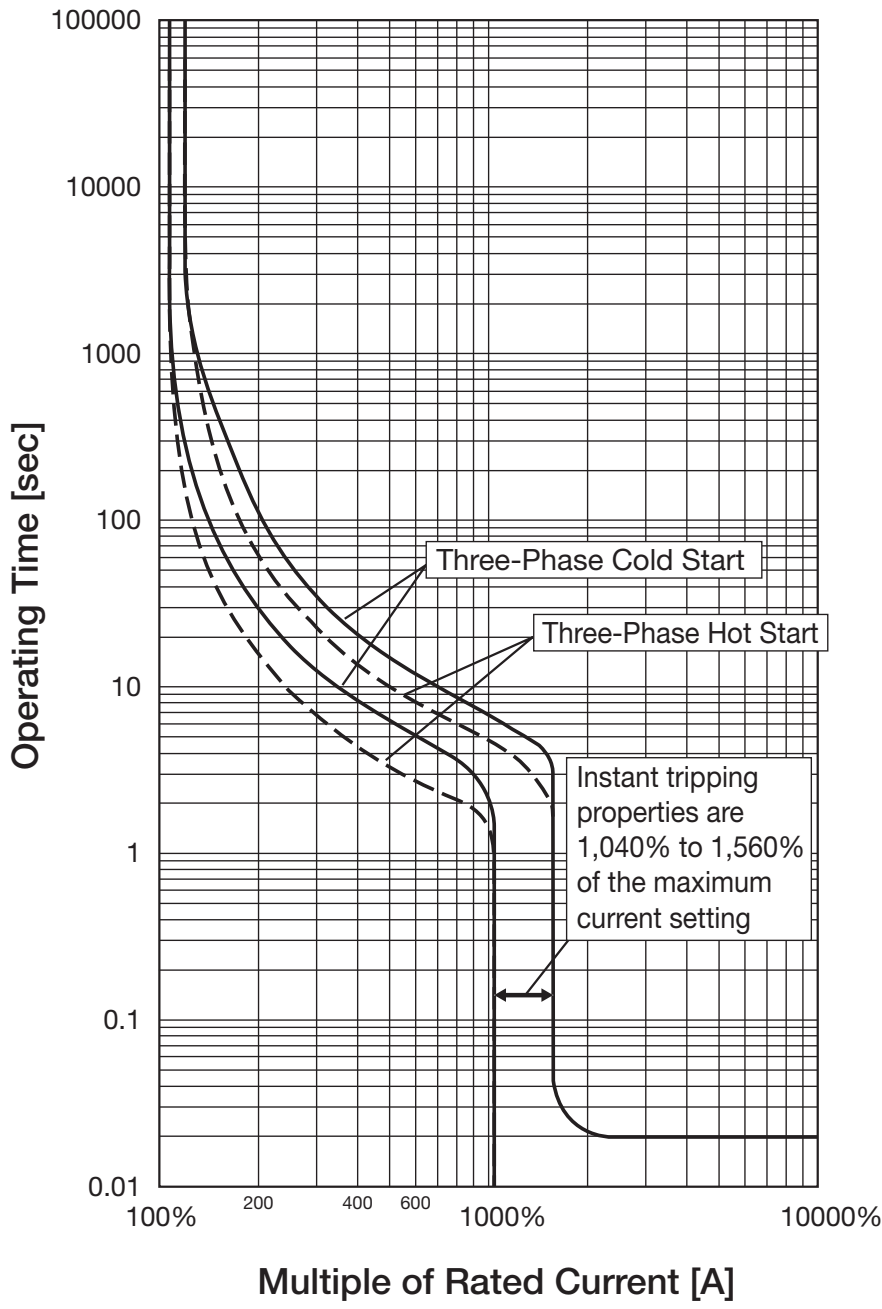
| Model Name | | MMP-T32 | UT-MAX(LL), UT-MAL(LL) |
|---|--|-------------------------------------|----------------------------|
| Terminal Screw Size | | M4 | M3.5 |
| Recommended Length L of Insulation Layer to be Peeled off When Wired with Bare Wire | | 10 mm | 8.5 mm |
| Applicable Wire Size | Single Wire [mm] | ϕ 1.6, ϕ 2.6 | ϕ 1.6 |
| | Stranded Wire [mm ²] | 1 to 6 | 0.5 to 2 |
| | UL Electrical Wire (60/70°C, Copper Only) (Note 4) | #14 to #8 | #16 to #14 |
| Crimp Lug Size | | R1.25-4 to R5.5-4 8-4NS (Note 3) | 0.5-3.7A to 2-S3A (Note 3) |
| Terminal Screw Tightening Torque [N·m] | | 1.4 to 2.0 | 0.9 to 1.1 |

- Note 1. In each terminal, two wires or two crimp lugs may be connected.
- Note 2. For details about handling, temperature compensation, close mounting, etc., refer to the Operating Manual.
- Note 3. J.S.T. Mfg. Co., Ltd. model numbers are shown as typical products.
- Note 4. Only 70°C is applicable for AWG#8.

- (11) Application to Single-Phase Motor: Select the appropriate heater designation upon checking the full-load current for actual use.
Note that the motor circuit breaker has open-phase protection function, so for single-phase motors, connect as shown in the figure at right.



12.4 Operating Characteristic Curve

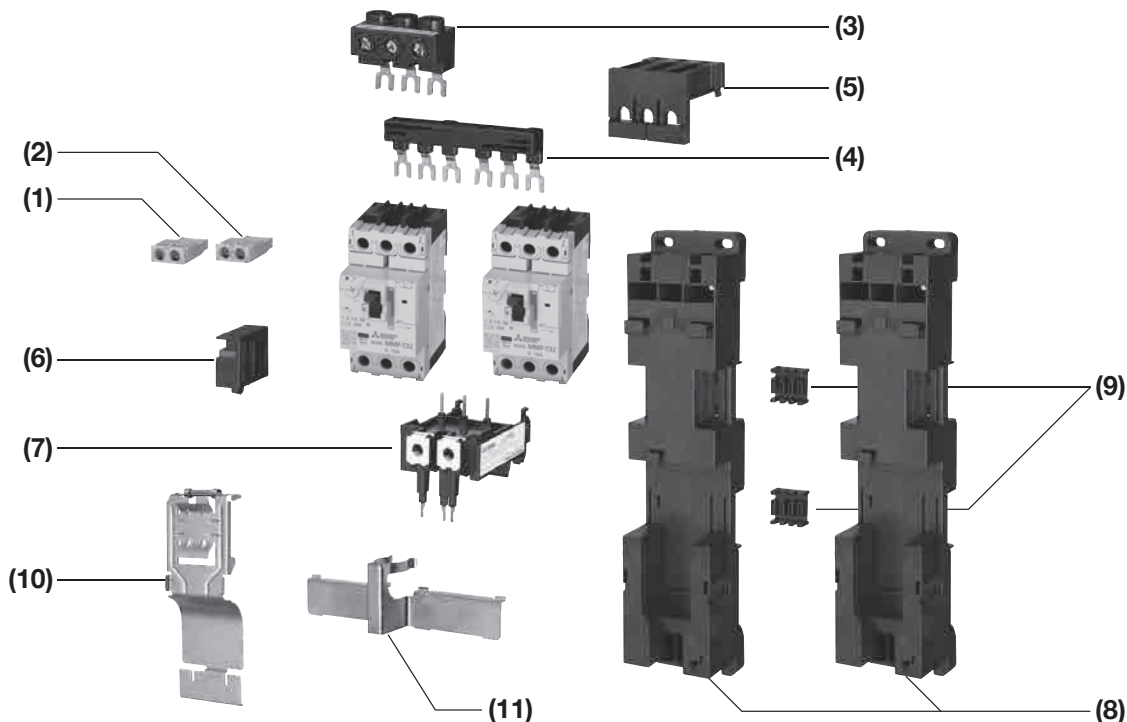


12.5 Optional Units

| Number | Product Name | Model Name | Specifications | Description |
|--------|------------------------------|------------------------------------|-----------------------------|--|
| (1) | Auxiliary Contact (Interior) | UT-MAX | 1a 1b | The contacts of this unit operate in unison with the turning ON/OFF of the main unit. |
| | | UT-MAXLL (For Very Small Loads) | 1a 1b | |
| (2) | Alarm Contact (Interior) | UT-MAL | 1a 1b | The contacts of this unit operate (either short-circuits, overloads, open-phase) in unison with the trip operation of the main unit. |
| | | UT-MALLL (For Very Small Loads) | 1a 1b | |
| (3) | Power Supply Block | UT-EP3 | | This is a terminal block unit that can enable the wiring of bare wires (single core wire/ stranded wire) on the power supply side if the unit is connected in parallel with a bus bar. |
| (4) | Bus Bar | UT-2B4 | 45 mm Clearance Row of 2 | A unit that can supply power (parallel connection) to 2 or 3 units individually without use of electric wire. |
| | | UT-3B4 | 45 mm Clearance Row of 3 | |
| | | UT-2B5 | 57 mm Clearance Row of 2 | |
| | | UT-3B5 | 57 mm Clearance Row of 3 | |
| (5) | Power Side Terminal Cover | UT-CV3 | | Power side terminal cover for UL60947-4-1A, Type E/F. |
| (6) | Short-circuit Display Unit | UT-TU | | A unit that operates and displays in red only when the unit trips due to a short circuit. Necessary for application to UL60947-4-1A, Type E/F. |
| (7) | Connecting Conductor Unit | UT-MT20 | | Unit for electrically and mechanically connecting MMP-T32 and a magnetic contactor. |
| | | UT-MT32 | | |
| | | UT-MQ12 | | |
| | | UT-MT20D | | |
| | | UT-MT32D | | |
| (8) | Mounting Base Unit | UT-BT20 | | Plate for mounting a combination starter by combining MMP-T32 and a magnetic contactor. Can be rail mounted or screw mounted. |
| | | UT-BT32 | | |
| | | UT-BT32D | | |
| (9) | Mounting Base Unit | UT-BT32DMP | | |
| (10) | Joining Block Unit | UT-RT10 | | A block that connects the 2 mounting base units mechanically. |
| | | UT-RT20 | | |
| | | UT-RT32 | | |
| (11) | Joining Block Unit | UT-RT32DMP | | |

Note 1. The interior auxiliary contact and alarm contact unit can be mounted on one or two places on a motor circuit breaker.

● Configuration Diagram of Options



12 Motor Circuit Breakers MMP-T32

Optional Unit Specifications

Operating Optional Units

| Unit Types | Model Name | Contact Arrangement | Operation of MMP-T32 | | | |
|----------------------------|------------|---------------------|----------------------|------------------------|------------------------------|------------|
| | | | O N | Short Circuit Tripping | Overload/Open-Phase Tripping | OFF |
| Auxiliary Contact Unit | UT-MAX(LL) | 1a | ON | OFF | OFF | OFF |
| | | 1b | OFF | ON | ON | ON |
| Alarm Contact Unit | UT-MAL(LL) | 1a | OFF | ON | ON | OFF |
| | | 1b | ON | OFF | OFF | ON |
| Short-circuit Display Unit | UT-TU | — | No Display | Red Display | No Display | No Display |

Specifications of Auxiliary Contact Unit and Alarm Contact Unit

| Model Name | Contact Arrangement | Rated Insulation Voltage | Durability | | Minimum Applicable Load | Rated Operating Current [A] | | | | | |
|------------|---------------------|--------------------------|----------------|--------------|--------------------------|-----------------------------|------|------------------------|------|------|------|
| | | | Mechanical | Electrical | | AC-12 (Resistive Load) | | DC-12 (Resistive Load) | | | |
| | | | | | | 125V | 250V | 30V | 48V | 125V | 250V |
| UT-MAX | 1a, 1b | 250 V | 0.1 mil. times | 10,000 times | 5 V/160 mA 24 V/40 mA | 5 | 3 | — | — | 0.4 | 0.2 |
| UT-MAL | 1a, 1b | | 1,000 times | 1,000 times | | | | | | | |
| UT-MAXLL | 1a, 1b | 125 V | 0.1 mil. times | 10,000 times | 5 V/1 mA 24 V/0.25 mA | 0.1 | — | 0.1 | 0.03 | — | — |
| UT-MALLL | 1a, 1b | | 1,000 times | 1,000 times | | | | | | | |

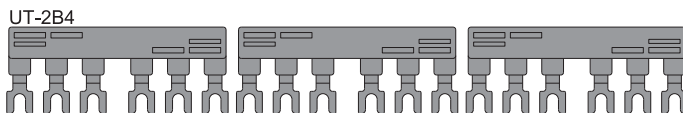
Specifications of Power Supply Block and Bus Bar

| Model Name | Conventional Free Air Thermal Current Ith [A] | Rated Conditional Short-Circuit Current Iq [kA] | Applicable Electrical Wire |
|--------------------|---|---|---|
| UT-EP3 | 63 | 50 | Flexible Stranded Wire: 1 x 6: 25 mm ² Stranded Wire: 1 x 6: 16 mm ² (Cannot be wired with crimp lug) |
| UT-2B4/3B4/2B5/3B5 | | | 1 x R1.25/4: 8-4NS (Cannot be wired with bare wire) |

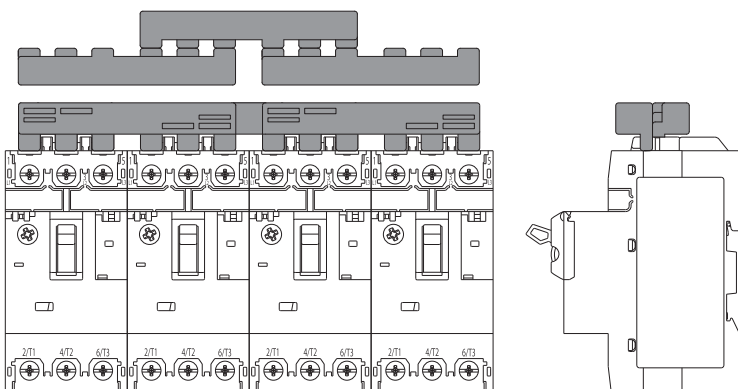
Parallel Connection Using Bus Bar Unit

- When connecting four or more MMP-T32 Motor Circuit Breakers in parallel, connect them alternately reversing multiple UT-□B□ Bus Bar Units.
- Meet the following requirement in limiting the number of units when connecting in parallel.
[Rated Current of Bus Bar Unit (63 A)] > [Sum Value of Settling Current (Parallel Connection)]
- Application Example: For Connecting 4 Units in Parallel (Close Mounting)

Bus Bar Units to be Used



- Connection Example * Determine the arrangement of the bus bar unit according to the feed position.



12.6 Applicable Standard

● Regulatory/Legal Conformity and Compliance

| Standards/Regulations | | Model Name | MMP-T32 | UT-MAX UT-MAL | UT-TU | UT-CV3 | UT-MT20 UT-MT32 UT-MT20D UT-MT32D UT-MQ12 | UT-BT20 UT-BT32 | UT-BT32D UT-BT32DMP | UT-2B4/3B4 UT-2B5/3B5 | UT-EP3 | |
|-------------------------|---|--|---|---|-------------------------|----------------|---|--------------------|------------------------|--------------------------|--------|---|
| | | | | | | | | | | | | |
| Overseas Tripping | International | IEC60947-2 | ○ | — | — | — | — | — | — | ○ | ○ | |
| | | IEC60947-4-1 | ○ | — | — | — | ○ | ○ | ○ | ○ | ○ | |
| | | IEC60947-5-1 | — | ○ | — | — | — | — | — | — | — | |
| | Europe | CE CE | EN60947-2 | ○ | — | — | — | — | — | — | — | — |
| | | | EN60947-4-1 | ○ | — | — | — | — | — | — | — | — |
| | | | EN60947-5-1 | — | ○ | — | — | — | — | — | — | — |
| | | TÜV TUV Rheinland (Certification Number) | EN60947-2 | ○ (R50269663) (R50269678) (R50269688) (R50269690) | — | — | — | — | — | — | — | — |
| | RoHS Directive | | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | |
| | China | CCC CCC (Certification Number) | GB14048.2 | ○ (2012010307533513) | — | | | | | | | |
| | | | GB14048.5 | — | ○ (2012010304563726) | | | | | | | |
| North America Canada | UL/CSA ULus (File Number) | UL60947-4-1 | ○ (Single Unit: E061855) (Combination: E319418) | ○ (E361855) | ○ (E319418) | ○ (E319418) | ○ (E319418) | — | ○ (E319418) | — | — | |
| | | CSA C22.2 No.60947-4-1 | | | | | | | | | | |
| Domestic | Japan | JIS C8201-2-1 Ann.1 | ○ | — | — | — | — | — | — | ○ | ○ | |
| | | JIS C8201-4-1 | ○ | — | — | — | ○ | ○ | ○ | ○ | ○ | |
| | | JIS C8201-5-1 | — | ○ | — | — | — | — | — | — | — | |
| | Electrical Appliances and Materials Safety Act | Non-Specified Electric Appliances | ○ | — | | | | | | | | |

○ : Compliant (or Certified in the Case of Third-Party Authentication); — : Not Applicable or Not Certified

12 Motor Circuit Breakers MMP-T32

12.7 UL Standards and SCCR

● UL Standard Certified Rating (Motor Circuit Breakers)

When UL standards are applied and used, select from the rating table below.

■ Motor Circuit Breakers UL Standard Certified Ratings

[Certified Rating]

◆ Main Circuit Single-Phase

| Motor Circuit Breaker (Current Setting Range) | | Certified Rating | | | | | | | | | | | |
|--|--------------|-----------------------------|-------------------------------------|-----------------------------|-------------------------------------|-----------------------------|-------------------------------------|-----------------------------|-------------------------------------|-----------------------------|-------------------------------------|-----------------------------|-------------------------------------|
| | | 110 to 120V | | 200 V | | 208 V | | 220 to 240V | | 440 to 480V | | 550 to 600V | |
| | | Maximum Rated Capacity [HP] | Maximum Rated Operating Current [A] | Maximum Rated Capacity [HP] | Maximum Rated Operating Current [A] | Maximum Rated Capacity [HP] | Maximum Rated Operating Current [A] | Maximum Rated Capacity [HP] | Maximum Rated Operating Current [A] | Maximum Rated Capacity [HP] | Maximum Rated Operating Current [A] | Maximum Rated Capacity [HP] | Maximum Rated Operating Current [A] |
| MMP-T32 | 0.1 to 0.16 | — | 0.16 | — | 0.16 | — | 0.16 | — | 0.16 | — | 0.16 | — | 0.16 |
| | 0.16 to 0.25 | — | 0.25 | — | 0.25 | — | 0.25 | — | 0.25 | — | 0.25 | — | 0.25 |
| | 0.25 to 0.4 | — | 0.4 | — | 0.4 | — | 0.4 | — | 0.4 | — | 0.4 | — | 0.4 |
| | 0.4 to 0.63 | — | 0.63 | — | 0.63 | — | 0.63 | — | 0.63 | — | 0.63 | — | 0.63 |
| | 0.63 to 1 | — | 1 | — | 1 | — | 1 | — | 1 | — | 1 | — | 1 |
| | 1 to 1.6 | — | 1.6 | — | 1.6 | — | 1.6 | 1/10 | 1.5 | — | 1.6 | — | 1.6 |
| | 1.6 to 2.5 | — | 2.5 | 1/6 | 2.5 | 1/6 | 2.4 | 1/6 | 2.2 | 1/2 | 2.5 | 1/2 | 2 |
| | 2.5 to 4 | 1/8 | 3 | 1/3 | 4 | 1/3 | 4 | 1/3 | 3.6 | 1 | 4 | 1-1/2 | 4 |
| | 4 to 6.3 | 1/4 | 5.8 | 1/2 | 5.6 | 1/2 | 5.4 | 1/2 | 4.9 | 2 | 6 | 2 | 4.8 |
| | 5.5 to 8 | 1/3 | 7.2 | 3/4 | 7.9 | 3/4 | 7.6 | 1 | 8 | 2 | 6 | 3 | 6.8 |
| | 7 to 10 | 1/2 | 9.8 | 1 | 9.2 | 1 | 8.8 | 1-1/2 | 10 | 3 | 8.5 | — | 10 |
| | 9 to 13 | 3/4 | 13 | 1-1/2 | 11.5 | 1-1/2 | 11 | 2 | 12 | 5 | 13 | 5 | 11.2 |
| | 12 to 18 | 1 | 16 | 2 | 13.8 | 2 | 13.2 | 3 | 17 | 5 | 14 | 7-1/2 | 16 |
| 18 to 25 | 2 | 24 | 3 | 19.6 | 3 | 18.7 | — | 25 | 7-1/2 | 21 | 10 | 20 | |
| 24 to 32 | 2 | 24 | 5 | 32 | 5 | 30.8 | 5 | 28 | 10 | 26 | 15 | 27 | |

Note 1. Since “—” has no horsepower setting by standard, select the maximum rated operating current [A].

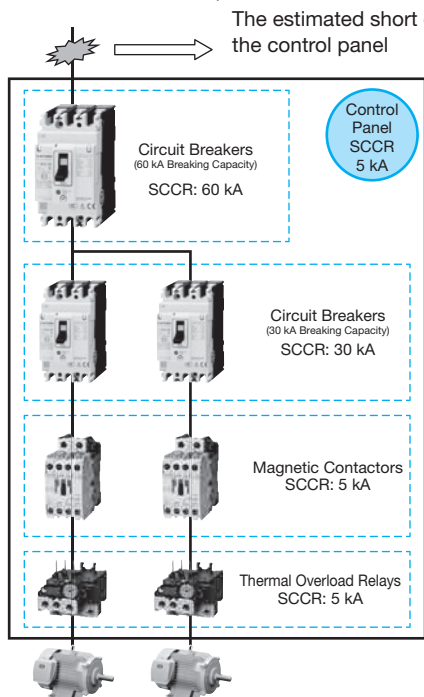
◆ Main Circuit Three-Phase

| Motor Circuit Breaker (Current Setting Range) | | Certified Rating | | | | | | | | | | | |
|--|--------------|-----------------------------|-------------------------------------|-----------------------------|-------------------------------------|-----------------------------|-------------------------------------|-----------------------------|-------------------------------------|-----------------------------|-------------------------------------|-----------------------------|-------------------------------------|
| | | 110 to 120V | | 200 V | | 208 V | | 220 to 240V | | 440 to 480V | | 550 to 600V | |
| | | Maximum Rated Capacity [HP] | Maximum Rated Operating Current [A] | Maximum Rated Capacity [HP] | Maximum Rated Operating Current [A] | Maximum Rated Capacity [HP] | Maximum Rated Operating Current [A] | Maximum Rated Capacity [HP] | Maximum Rated Operating Current [A] | Maximum Rated Capacity [HP] | Maximum Rated Operating Current [A] | Maximum Rated Capacity [HP] | Maximum Rated Operating Current [A] |
| MMP-T32 | 0.1 to 0.16 | — | 0.16 | — | 0.16 | — | 0.16 | — | 0.16 | — | 0.16 | — | 0.16 |
| | 0.16 to 0.25 | — | 0.25 | — | 0.25 | — | 0.25 | — | 0.25 | — | 0.25 | — | 0.25 |
| | 0.25 to 0.4 | — | 0.4 | — | 0.4 | — | 0.4 | — | 0.4 | — | 0.4 | — | 0.4 |
| | 0.4 to 0.63 | — | 0.63 | — | 0.63 | — | 0.63 | — | 0.63 | — | 0.63 | — | 0.63 |
| | 0.63 to 1 | — | 1 | — | 1 | — | 1 | — | 1 | 1/2 | 1 | 1/2 | 0.9 |
| | 1 to 1.6 | — | 1.6 | — | 1.6 | — | 1.6 | — | 1.6 | 3/4 | 1.6 | 3/4 | 1.3 |
| | 1.6 to 2.5 | — | 2.5 | 1/2 | 2.5 | 1/2 | 2.4 | 1/2 | 2.2 | 1 | 2.1 | 1-1/2 | 2.4 |
| | 2.5 to 4 | — | 4 | 3/4 | 3.7 | 3/4 | 3.5 | 1 | 4 | 2 | 3.4 | 3 | 3.9 |
| | 4 to 6.3 | 3/4 | 6.3 | 1-1/2 | 6.3 | 1-1/2 | 6.3 | 1-1/2 | 6 | 3 | 4.8 | 5 | 6.1 |
| | 5.5 to 8 | 1 | 8 | 2 | 7.8 | 2 | 7.5 | 2 | 6.8 | 5 | 7.6 | 5 | 6.1 |
| | 7 to 10 | 1 | 8.4 | — | 10 | — | 10 | 3 | 9.6 | 5 | 7.6 | 7-1/2 | 9 |
| | 9 to 13 | 1-1/2 | 12 | 3 | 11 | 3 | 10.6 | 3 | 9.6 | 7-1/2 | 11 | 10 | 11 |
| | 12 to 18 | 2 | 13.6 | 5 | 17.5 | 5 | 16.7 | 5 | 15.2 | 10 | 14 | 15 | 17 |
| | 18 to 25 | 3 | 19.2 | 7-1/2 | 25.3 | 7-1/2 | 24.2 | 7-1/2 | 22 | 15 | 21 | 20 | 22 |
| | 24 to 32 | 5 | 30.4 | 10 | 32 | 10 | 30.8 | 10 | 28 | 20 | 27 | 30 | 32 |

Note 1. Since “—” has no horsepower setting by standard, select the maximum rated operating current [A].

● What is SCCR (Short-Circuit Current Rating)?

Article 409 of NFPA 70 (National Electric Code: NEC), which is the electrical equipment standard of the United States, requires the SCCR value to be displayed on industrial control panels. SCCR is defined as the value of the short-circuit current that various devices connected to the main circuit can withstand; it is stipulated that the SCCR value of the control panel must be greater than the estimated short circuit current at the location where the control panel is installed. The SCCR value for industrial control panels is determined based on supplement SB of UL 508A.



● Determination of SCCR for Control Panel

Basically, the smallest SCCR value among the power circuit components is regarded as SCCR for the control panel.

In the case of the circuit in the figure at left, the SCCR value for the control panel is 5 kA.

● Determination of SCCR Value for Power Circuit Components

The determination method of SCCR for the power circuit components is in accordance with one of the following.

- (1) The SCCR value displayed on device rating plates, in instruction manuals, etc.
- (2) The estimated SCCR value described in table UL508A, SB4.1.
- (3) The value described in the manufacturer's UL procedure and evaluated using a specific combination.

● To increase the SCCR value of the control panel

When adopting the values from (1) or (2) above, the SCCR value of the magnetic contactors/thermal overload relays is 5 kA and the SCCR of the control panel is limited. However, by applying the SCCR value of (3), it is possible to further increase the SCCR value of the control panel.

● Examples for Combinations of Specific Devices

The following types of specific combinations can achieve a high SCCR.

(1) Combination Motor Controller Type C

Combination of UL489 Breaker and UL60947-4-1 Contactor or Thermal Overload Relay

(2) Combination Motor Controller Type E

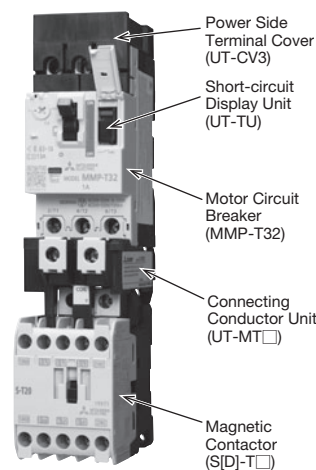
Combination of UL 60947-4-1 Motor Circuit Breaker and Specific Optional Items
 * Specific Optional Items: Power Side Terminal Cover (UT-CV3) and Short-Circuit Display Unit (UT-TU)

(3) Combination Motor Controller Type F

Combination with Combination Motor Controller Type E and UL60947-4-1 Contactor

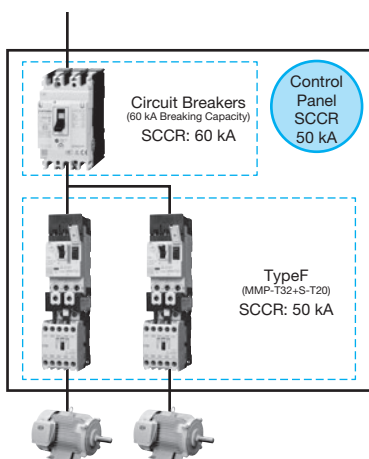
⇒ MMP-T32 has a high SCCR UL certification with Type E/F

Refer to page 348 for Type E/F combination table and SCCR values.



Combination Motor Controller Type F

● Advantages Seen in Type E/F Circuit Example



By using Type E/F it is possible to display a high SCCR value.

The circuit diagram at left shows an example using Type F, with SCCR value of 50 kA.

Also, by adopting Type E/F combination motor controllers, it is possible to reduce the number of components (breakers). In addition, connecting with connecting conductor units can save space and wiring.

● Increasing the SCCR value by other methods (reference)

The SCCR values can also be increased by using the following methods.

* Check UL508A SB for details.

1. Correction for Transformer Capacity and Secondary Side SCCR
2. Correction with Current Limiting Circuit Breaker and Current Limiting Fuse

12 Motor Circuit Breakers MMP-T32

UL Standard Certification (SCCR) [Type E/F Combination Motor Controllers]

Type E/F combination motor controllers can be configured by applying power side terminal covers and short circuit display units to motor circuit breakers. Increasing the SCCR value contributes to panel miniaturization and reduced wiring.

Type E/F Selection Table

(1) Type E Combination

[Certified Rating]

$$\text{Combination Arrangements} = \text{Motor Circuit Breaker MMP-T32} + \text{Power Side Terminal Cover Kit UT-CV3} + \text{Short-circuit Display Unit UT-TU}$$

◆ Main Circuit Three Phase 220 to 240 V

| Type E Combination | | | Certified Rating | | | |
|---|---------------------------|----------------------------|-----------------------------|-------------------------------------|------|------|
| Motor Circuit Breaker (Current Setting Range) | Power Side Terminal Cover | Short-circuit Display Unit | Maximum Rated Capacity [HP] | Maximum Rated Operating Current [A] | SCCR | |
| MMP-T32 | UT-CV3 | UT-TU | — | 0.16 | 240V | 50kA |
| | | | — | 0.25 | | |
| | | | — | 0.4 | | |
| | | | — | 0.63 | | |
| | | | — | 1 | | |
| | | | — | 1.6 | | |
| | | | 1/2 | 2.2 | | |
| | | | 1 | 4 | | |
| | | | 1-1/2 | 6 | | |
| | | | 2 | 6.8 | | |
| | | | 3 | 9.6 | | |
| | | | 3 | 9.6 | | |
| | | | 5 | 15.2 | | |
| | | | 7-1/2 | 22 | | |
| 10 | 28 | 25kA | | | | |

Note 1. Since “—” has no horsepower setting by standard, select the maximum rated operating current [A].

◆ Main Circuit Three Phase 440 to 480 V

| Type E Combination | | | Certified Rating | | | |
|---|---------------------------|----------------------------|-----------------------------|-------------------------------------|-------------|------|
| Motor Circuit Breaker (Current Setting Range) | Power Side Terminal Cover | Short-circuit Display Unit | Maximum Rated Capacity [HP] | Maximum Rated Operating Current [A] | SCCR | |
| MMP-T32 | UT-CV3 | UT-TU | — | 0.16 | 480Y / 277V | 50kA |
| | | | — | 0.25 | | |
| | | | — | 0.4 | | |
| | | | — | 0.63 | | |
| | | | 1/2 | 1 | | |
| | | | 3/4 | 1.6 | | |
| | | | 1 | 2.1 | | |
| | | | 2 | 3.4 | | |
| | | | 3 | 4.8 | | |
| | | | 5 | 7.6 | | |
| | | | 5 | 7.6 | | |
| | | | 7-1/2 | 11 | | |
| | | | 10 | 14 | | |
| | | | 15 | 21 | | |
| 20 | 27 | | | | | |

Note 1. Since “—” has no horsepower setting by standard, select the maximum rated operating current [A].

(2) Type F Combination

[Certified Rating]

$$\text{Combination Arrangements} = \text{Type E Combination (See (1))} + \text{Connecting Conductor Unit UT-MT } \square / \text{UT-MQ12} + \text{Magnetic Contactor S-T } \square / \text{SD-Q } \square$$

◆ Main Circuit Three Phase 220 to 240 V

| Type F Combination | | | | Certified Rating | | | |
|--|----------------------|----------------|---------------------------------|--|-------------------------------------|------|-------------|
| Type E Combination (Current Setting Range) | Magnetic Contactors | | Connecting Conductor Unit | Maximum Rated Capacity [HP] | Maximum Rated Operating Current [A] | SCCR | |
| MMP-T32 + UT-CV3 + UT-TU | S-T10 / SD-Q11 / Q12 | S-T12 / SD-T12 | S-T20 / SD-T20 / S-T32 / SD-T32 | UT-MT20 (For S-T10/T12/T20) | — | 0.16 | 240V / 50kA |
| | | | | UT-MT20D | — | 0.25 | |
| | | | | UT-MT20D + UT-BT32D/BT32DMP (For SD-T12/T20) | — | 0.4 | |
| | | | | UT-MT20D + UT-BT32D/BT32DMP (For SD-T12/T20) | — | 0.63 | |
| | | | | UT-MT20D + UT-BT32D/BT32DMP (For SD-T12/T20) | — | 1 | |
| | | | | UT-MT20D + UT-BT32D/BT32DMP (For SD-T12/T20) | 1/2 | 1.6 | |
| | | | | UT-MT32 (For S-T32) | 1 | 2.1 | |
| | | | | UT-MT32 (For S-T32) | 1-1/2 | 3.4 | |
| | | | | UT-MT32D | 2 | 4.8 | |
| | | | | UT-MT32D | 3 | 7.6 | |
| | | | | UT-MT32D + UT-BT32D/BT32DMP (For SD-T32) | 3 | 7.6 | |
| | | | | UT-MT32D + UT-BT32D/BT32DMP (For SD-T32) | 5 | 11 | |
| | | | | UT-MQ12 (For SD-Q11/Q12) | 7-1/2 | 14 | |
| | | | | UT-MQ12 (For SD-Q11/Q12) | 10 | 21 | |
| UT-MQ12 (For SD-Q11/Q12) | 10 | 27 | | | | | |

Note 1. Since “—” has no horsepower setting by standard, select the maximum rated operating current [A].

◆ Main Circuit Three Phase 440 to 480 V

| Type F Combination | | | | Certified Rating | | | |
|--|----------------------|----------------|---------------------------------|--|-------------------------------------|------|--------------------|
| Type E Combination (Current Setting Range) | Magnetic Contactors | | Connecting Conductor Unit | Maximum Rated Capacity [HP] | Maximum Rated Operating Current [A] | SCCR | |
| MMP-T32 + UT-CV3 + UT-TU | S-T10 / SD-Q11 / Q12 | S-T12 / SD-T12 | S-T20 / SD-T20 / S-T32 / SD-T32 | UT-MT20 (For S-T10/T12/T20) | — | 0.16 | 480Y / 277V / 50kA |
| | | | | UT-MT20D | — | 0.25 | |
| | | | | UT-MT20D | — | 0.4 | |
| | | | | UT-MT20D | — | 0.63 | |
| | | | | UT-MT20D + UT-BT32D/BT32DMP (For SD-T12/T20) | 1/2 | 1 | |
| | | | | UT-MT20D + UT-BT32D/BT32DMP (For SD-T12/T20) | 3/4 | 1.6 | |
| | | | | UT-MT32 (For S-T32) | 1 | 2.1 | |
| | | | | UT-MT32 (For S-T32) | 2 | 3.4 | |
| | | | | UT-MT32D | 3 | 4.8 | |
| | | | | UT-MT32D | 5 | 7.6 | |
| | | | | UT-MT32D + UT-BT32D/BT32DMP (For SD-T32) | 5 | 7.6 | |
| | | | | UT-MT32D + UT-BT32D/BT32DMP (For SD-T32) | 7-1/2 | 11 | |
| | | | | UT-MQ12 (For SD-Q11/Q12) | 10 | 14 | |
| | | | | UT-MQ12 (For SD-Q11/Q12) | 15 | 21 | |
| UT-MQ12 (For SD-Q11/Q12) | 20 | 27 | | | | | |

Note 1. Since “—” has no horsepower setting by standard, select the maximum rated operating current [A].

UL Standard Certification (SCCR) [Combination with Servo Amplifier]

The SCCR is acquired by combining a Combination Motor Controller Type E and a Mitsubishi Electric AC servo amplifier. The applicable combinations and SCCR values are shown in the table below.

| Type E Combination Motor Controller (SCPD) | | Servo Amplifiers | | | Main Circuit Voltage (Vac) | SCCR (kA) |
|--|--------------------|------------------|--------------------|-------------|----------------------------|-----------|
| Model Name | Heater Designation | Model Name | Input Rating (Vac) | Input Phase | | |
| MMP-T32 | 1.6A | MR-J4-10# | 200 to 240 | Three-Phase | 240 | 50 |
| | 2.5A | MR-J4-20# | | | | |
| | 4A | MR-J4-40# | | | | |
| | 6.3A | MR-J4-60# | | | | |
| | 6.3A | MR-J4-70# | | | | |
| | 8A | MR-J4-100# | | | | |
| | 18A | MR-J4-200# | | | | |
| | 25A | MR-J4-350# | | | | |
| | 32A | MR-J4-500# | | | | |
| | 2.5A | MR-J4-60#4 | 380 to 480 | Three-Phase | 480Y277 | 50 |
| | 4A | MR-J4-100#4 | | | | |
| | 8A | MR-J4-200#4 | | | | |
| | 13A | MR-J4-350#4 | | | | |
| | 18A | MR-J4-500#4 | | | | |
| | 25A | MR-J4-700#4 | 200 to 240 | Three-Phase | 240 | 50 |
| | 6.3A | MR-J4W2-22B | | | | |
| | 8A | MR-J4W2-44B | | | | |
| | 13A | MR-J4W2-77B | | | | |
| | 18A | MR-J4W2-1010B | | | | |
| | 8A | MR-J4W3-222B | | | | |
| 13A | MR-J4W3-444B | | | | | |

#: Either A, B, or GF.

12 Motor Circuit Breakers MMP-T32

● UL Standard Certification (SCCR) [Combination with Inverter]

The SCCR is acquired by combining a Combination Motor Controller Type E and a Mitsubishi Electric inverter. The applicable combinations and SCCR values are shown in the table below.

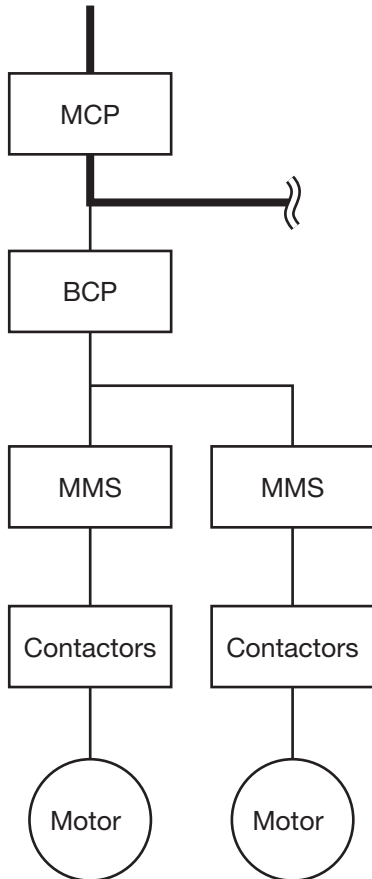
| Type E Combination Motor Controller (SCPD) | | Inverters | | Main Circuit Voltage (Vac) | SCCR (kA) | |
|--|--------------------|---------------------|---------------|----------------------------|-----------|----|
| Model Name | Heater Designation | Model Name | Capacity [kW] | | | |
| MMP-T32 | 1.6A | FR-E720 | 0.1 | 480Y277 | 50 | |
| | 4A | | 0.2 | | | |
| | 6.3A | | 0.4 | | | |
| | 10A | | 0.75 | | | |
| | 13A | | 1.5 | | | |
| | 18A | | 2.2 | | | |
| | 25A | | 3.7 | | | |
| | 4A | FR-E740 | 0.4 | | 50 | |
| | 6.3A | | 0.75 | | | |
| | 8A | | 1.5 | | | |
| | 10A | | 2.2 | | | |
| | 18A | | 3.7 | | | |
| | 25A | 5.5 | 25 | | | |
| | 32A | 7.5 | | | | |
| | 1.6A | FR-D720 | 0.1 | | 480Y277 | 50 |
| | 4A | | 0.2 | | | |
| | 6.3A | FR-D720 (FR-F720PJ) | 0.4 | | | 50 |
| | 8A | | 0.75 | | | |
| | 13A | | 1.5 | | | |
| | 18A | | 2.2 | | | |
| | 25A | | 3.7 | | | |
| | 2.5A | FR-D740 (FR-F740PJ) | 0.4 | | | 50 |
| | 4A | | 0.75 | | | |
| | 6.3A | | 1.5 | | | |
| 10A | 2.2 | | | | | |
| 18A | 3.7 | | | | | |
| 25A | 5.5 | | | | | |
| 32A | 7.5 | | | | | |
| MMP-T32 | 8A | FR-A820 | 0.4 | 480Y277 | | 50 |
| | 13A | | 0.75 | | | |
| | 18A | | 1.5 | | | |
| | 25A | | 2.2 | | | |
| | 32A | | 3.7 | | | |
| | 4A | FR-A840 | 0.4 | | | 50 |
| | 6.3A | | 0.75 | | | |
| | 8A | | 1.5 | | | |
| | 13A | | 2.2 | | | |
| | 18A | | 3.7 | | | |
| | 25A | | 5.5 | | | |
| | 32A | | 7.5 | | | |
| | 8A | FR-F820 | 0.75 | | 50 | |
| | 13A | | 1.5 | | | |
| | 18A | | 2.2 | | | |
| | 25A | | 3.7 | | | |
| | 32A | | 5.5 | | | |
| | 4A | FR-F840 | 0.75 | | 50 | |
| | 6.3A | | 1.5 | | | |
| | 8A | | 2.2 | | | |
| | 13A | | 3.7 | | | |
| | 18A | | 5.5 | | | |
| | 25A | | 7.5 | | | |
| | 32A | | 11 | | | |
| | | | | 25 | | |

● UL Standards and Group Installation

Group installation is a short-circuit protection method that protects multiple motor branch circuits with one short-circuit protection device (low voltage circuit breaker or fuse). The MMP-T32 acquires a high SCCR value UL certification for group installations by combining with a specific low voltage circuit breaker.

● Group Installation Application Example

Group installation circuit example using a motor circuit breaker

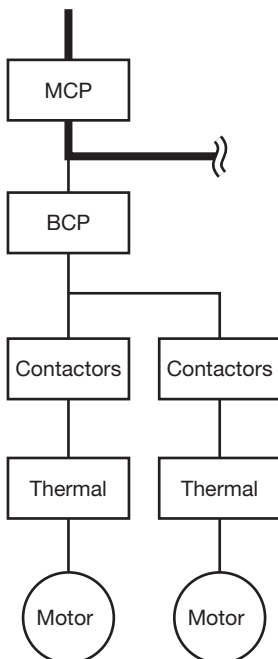


[Definition of Abbreviations]
 MCP: Main Circuit Protection device
 BCP: Branch Circuit Protection device
 MMS: Manual Motor Starter

1. Combining with a breaker with a maximum rated current of 250 A, group installation certification is acquired. ⇒ Group protection is possible for a larger number of motors.
2. It is possible to increase the SCCR value.

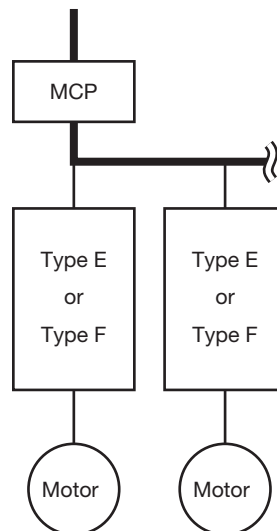
* Refer to page 352 for a list of models with group installation acquired and SCCR values.

When applying general group protection



In the absence of group installation certification, the BCP rating is limited to the value specified by NFPA70 430.52. Relatively few motors can use group protection, and more BCPs are required.

Differences from individual protection using Type E/F



Type E/F is regarded as a device with branch circuit protection functionality, allowing independent protection and enabling BCP reduction.

12 Motor Circuit Breakers MMP-T32

● UL Certification Rating (Group Installation)

The table below shows the UL certification ratings applicable to group installation circuits.

Table 1. Motor Circuit Breaker MMP-T32 Single Unit

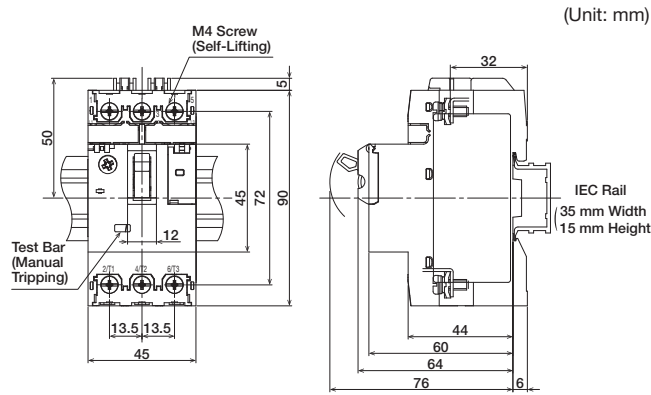
| Motor Circuit Breaker Model Name | Heater Designation | Short-Circuit Current Rating (SCCR) | | | | | | | |
|----------------------------------|--------------------|--|--------------------------|------------------------|--|-------------------------------------|------------------------|-------|------------------------|
| | | Main Circuit Voltage: 240 V Maximum | | | | Main Circuit Voltage: 480 V Maximum | | | |
| | | Low Voltage Circuit Breaker (BCP) Rating | | | Low Voltage Circuit Breaker (BCP) Rating | | | | |
| | | Maximum Rated Current | Minimum Breaking Current | Recommended Model Name | Maximum Rated Current | Minimum Breaking Current | Recommended Model Name | | |
| MMP-T32 | 0.16A | 50 kA | 250 A | 50 kA | NF250-HVU NV250-HVU | 50 kA | 250 A | 50 kA | NF250-HVU NV250-HVU |
| | 0.25A | | | | | | | | |
| | 0.4A | | | | | | | | |
| | 0.63A | | | | | | | | |
| | 1A | | | | | | | | |
| | 1.6A | | | | | | | | |
| | 2.5A | | | | | | | | |
| | 4A | | | | | | | | |
| | 6.3A | | | | | | | | |
| | 8A | | | | | | | | |
| | 10A | | | | | | | | |
| | 13A | | | | | | | | |
| | 18A | | | | | | | | |
| | 25A | 25 kA | 25 kA | 25 kA | 25 kA | 25 kA | 25 kA | 25 kA | 25 kA |
| 32A | | | | | | | | | |

Table 2. Motor Circuit Breaker MMP-T32+S(D)-T □

| Motor Circuit Breaker Model Name | Heater Designation | Short-Circuit Current Rating (SCCR) | | | | | | | | | | | |
|----------------------------------|--------------------|--|-----------------------|-----------------------|-----------------------|--|--------------------------|------------------------|--|--------------------------|------------------------|-------|------------------------|
| | | Combination Connecting Unit/Magnetic Contactor | | | | Main Circuit Voltage: 240 V Maximum | | | Main Circuit Voltage: 480 V Maximum | | | | |
| | | | | | | Low Voltage Circuit Breaker (BCP) Rating | | | Low Voltage Circuit Breaker (BCP) Rating | | | | |
| | | | | | | Maximum Rated Current | Minimum Breaking Current | Recommended Model Name | Maximum Rated Current | Minimum Breaking Current | Recommended Model Name | | |
| MMP-T32 | 0.16A | UT-MT20 / S-T10 | UT-MT20(D) / S(D)-T12 | UT-MT20(D) / S(D)-T20 | UT-MT32(D) / S(D)-T32 | 50 kA | 250 A | 50 kA | NF250-HVU NV250-HVU | 50 kA | 250 A | 50 kA | NF250-HVU NV250-HVU |
| | 0.25A | | | | | | | | | | | | |
| | 0.4A | | | | | | | | | | | | |
| | 0.63A | | | | | | | | | | | | |
| | 1A | | | | | | | | | | | | |
| | 1.6A | | | | | | | | | | | | |
| | 2.5A | | | | | | | | | | | | |
| | 4A | | | | | | | | | | | | |
| | 6.3A | | | | | | | | | | | | |
| | 8A | | | | | | | | | | | | |
| | 10A | | | | | | | | | | | | |
| | 13A | | | | | | | | | | | | |
| | 18A | | | | | | | | | | | | |
| | 25A | — | — | — | — | — | — | — | — | — | — | — | — |
| 32A | | | | | | | | | | | | | |

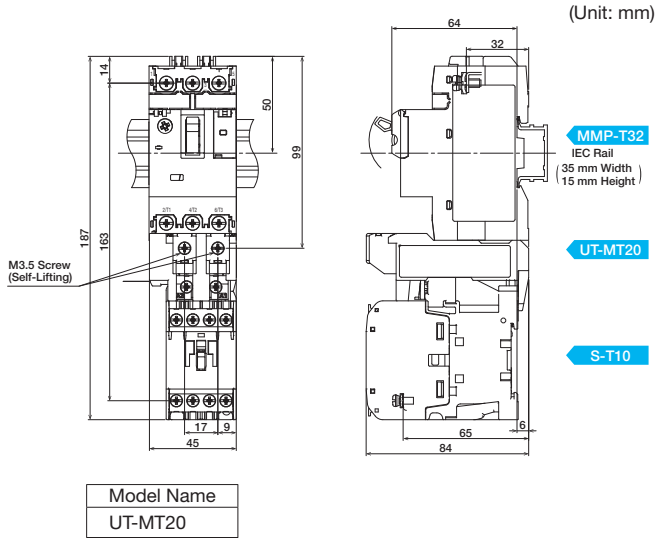
12.8 Outline Drawings

MMP-T32



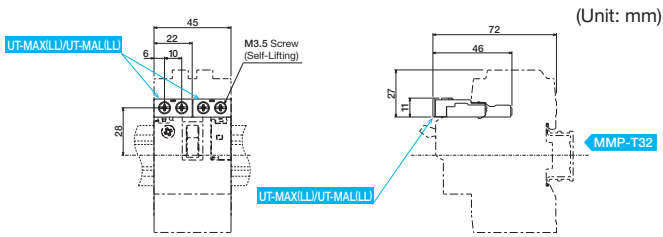
| Model Name | Heater Designation |
|------------|--------------------|
| MMP-T32 | 0.16 to 8 |
| | 10 to 18 |
| | 25 |
| | 32 |

MMP-T32 + UT-MT20 + S-T10



| Model Name |
|------------|
| UT-MT20 |

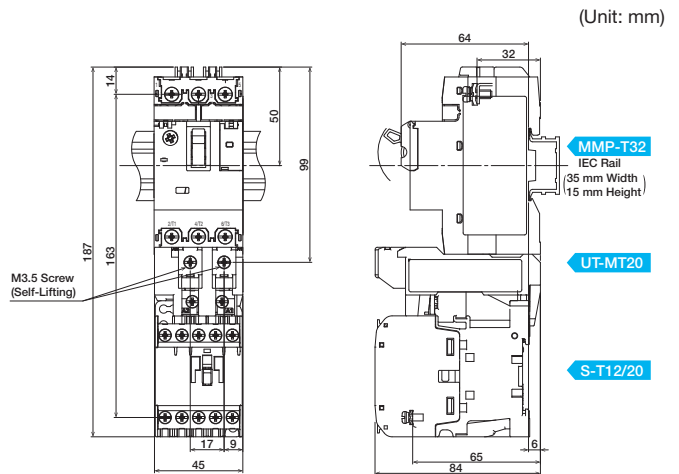
MMP-T32 + UT-MAX(LL)/UT-MAL(LL)



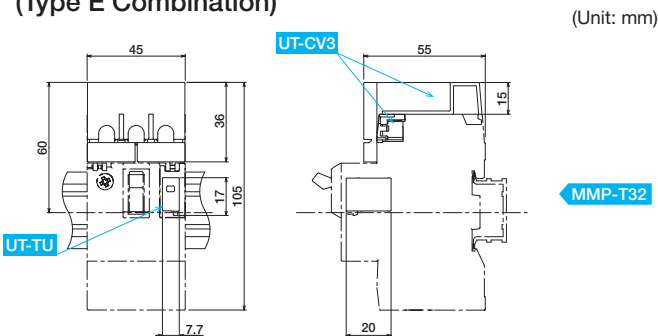
* The above figure shows the state where 2 units [UT-MAX(LL) and/or UT-MAL(LL)] are installed.
Outline drawings of UT-MAX(LL) and UT-MAL(LL) are equivalent.

| Model Name |
|------------|
| UT-MAX |
| UT-MAXLL |
| UT-MAL |
| UT-MALLL |

MMP-T32 + UT-MT20 + S-T12/S-T20

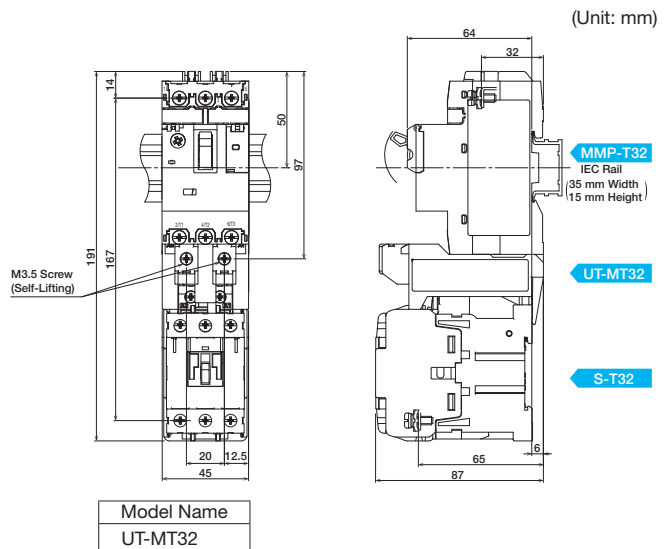


MMP-T32 + UT-CV3 + UT-TU (Type E Combination)



| Model Name |
|------------|
| UT-CV3 |
| UT-TU |

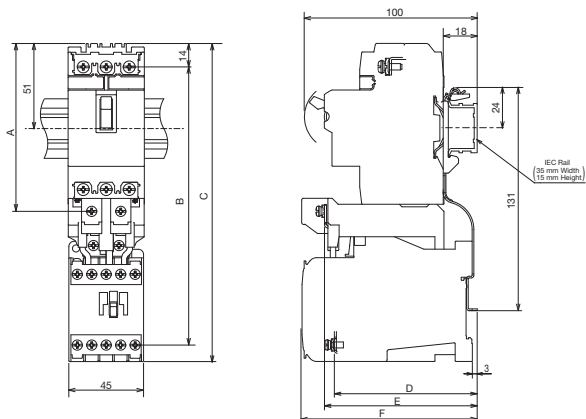
MMP-T32 + UT-MT32 + S-T32



| Model Name |
|------------|
| UT-MT32 |

MMP-T32 + UT-MT□D + SD-2xT□ + UT-BT32DMP

(Unit: mm)

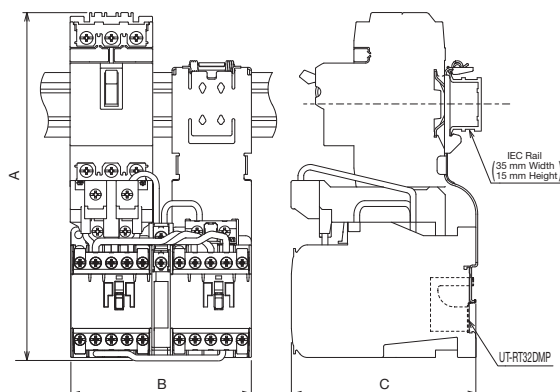


| Variable Dimensions | A | B | C | D | E | F | Combination Contactor | Combination Connecting Conductor Unit |
|---------------------|----|-----|-----|----|----|-----|-----------------------|---------------------------------------|
| UT-BT32DMP | 99 | 164 | 188 | 84 | 90 | 103 | SD-T12/T20 | UT-MT20D |
| | 97 | 167 | 191 | 89 | 96 | 111 | SD-T32 | UT-MT32D |

| |
|------------|
| Model Name |
| UT-BT32DMP |

MMP-T32 + UT-MT□D + SD-2xT□ + UT-BT32DMP + UT-RT32DMP

(Unit: mm)



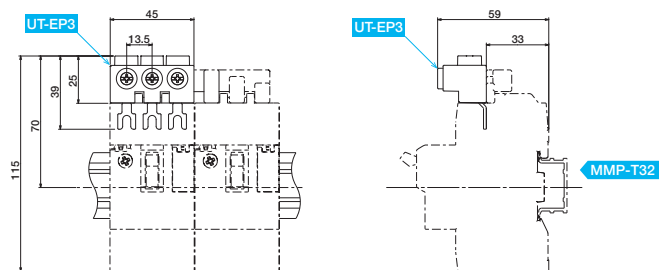
| Variable Dimensions | A | B | C | Combination Contactor | Combination Connecting Conductor Unit | Combination Mounting Base Unit |
|---------------------|-----|----|-----|-----------------------|---------------------------------------|--------------------------------|
| UT-RT32DMP | 190 | 98 | 103 | SD-2xT12/T20 | UT-MT20D | UT-BT32DMP |
| | 191 | 96 | 141 | SD-T32 | UT-MT32D | |

Note. The main circuit conductor kit UT/UN-SD□ is also available as a reversible electric wire. When using UN-SD18CX, switch the reversible wire power side and load side for this kit.

| |
|------------|
| Model Name |
| UT-RT32DMP |

MMP-T32x2 + UT-EP3 + UT-□ B □

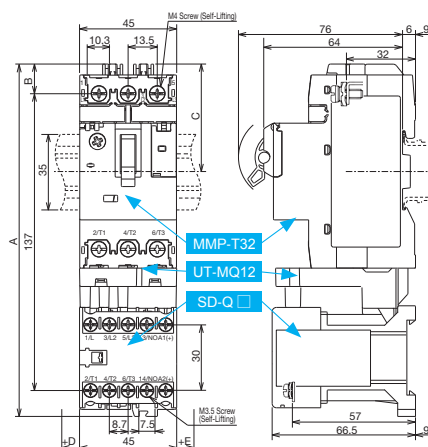
(Unit: mm)



| |
|------------|
| Model Name |
| UT-EP3 |

MMP-T32 + UT-MQ12 + SD-Q□

(Unit: mm)



| Motor Circuit Breakers | Arrangement | Variable Dimension [mm] | | | | | Model Name | |
|------------------------|-------------|---------------------------|---------------------|-----|----|----|------------|------|
| | | Connecting Conductor Unit | Magnetic Contactors | A | B | C | | +D |
| MMP-T32 | UT-MQ12 | SD-Q11 | SD-Q11 | 163 | 14 | 50 | 0 | 0 |
| MMP-T32 | UT-MQ12 | SD-Q12 | SD-Q12 | 163 | 14 | 50 | 9.5 | 0 |
| MMP-T32 | UT-MQ12 | SD-QR11 | SD-QR11 | 166 | 14 | 50 | 0 | 45 |
| MMP-T32 | UT-MQ12 | SD-QR12 | SD-QR12 | 166 | 14 | 50 | 9.5 | 54.5 |

| |
|------------|
| Model Name |
| UT-MQ12 |

12 Motor Circuit Breakers MMP-T32

List of Combination Models

| Motor Circuit Breaker (Type E Optional Unit) | Magnetic Contactors | | Connecting Conductor Unit | Mounting Base Unit | Mounting Method | Joining Block Unit |
|---|---------------------|-------------------|------------------------------|--|------------------------------------|-----------------------|
| MMP-T32 (UT-CV3, UT-TU) | S-T10 | Non- Reversing | UT-MT20 | Configurable without the base unit if screw mounting is not required | IEC Rail (1 pc) | — |
| | S-T12/T20 | | UT-MT20 | | IEC Rail (1 pc) | — |
| | S-T32 | | UT-MT32 | | IEC Rail (1 pc) | — |
| | S-T10 | | UT-MT20 | UT-BT20 | Screw Mounting or IEC Rail (2 pcs) | — |
| | S-T12/T20 | | UT-MT20 | UT-BT20 | Screw Mounting or IEC Rail (2 pcs) | — |
| | S-T32 | | UT-MT32 | UT-BT32 | Screw Mounting or IEC Rail (2 pcs) | — |
| | S-2xT10 | Reversing | UT-MT20 | UT-BT20 (2 Units) | Screw Mounting or IEC Rail (2 pcs) | UT-RT10 |
| | S-2xT12/T20 | | UT-MT20 | UT-BT20 (2 Units) | Screw Mounting or IEC Rail (2 pcs) | UT-RT20 |
| | S-2xT32 | | UT-MT32 | UT-BT20 (2 Units) | Screw Mounting or IEC Rail (2 pcs) | UT-RT32 |
| | SD-Q11/Q12 | Non-Reversing | UT-MQ12 | Not Required | IEC Rail (1 pc) | — |
| | SD-QR11/QR12 | Reversing | UT-MQ12 | (Screw Mounting Not Possible) | IEC Rail (1 pc) | Not Required |
| | SD-T12/T20 | Non- Reversing | UT-MT20D | UT-BT32D | Screw Mounting or IEC Rail (2 pcs) | — |
| | | | | UT-BT32DMP | IEC Rail (1 pc) | — |
| | SD-T32 | | UT-MT32D | UT-BT32D | Screw Mounting or IEC Rail (2 pcs) | — |
| | | | | UT-BT32DMP | IEC Rail (1 pc) | — |
| | SD-2xT12/T20 | Reversing | UT-MT20D | UT-BT32D(2 Units) | Screw Mounting or IEC Rail (2 pcs) | UT-RT20 |
| | | | | UT-BT32DMP(2 Units) | IEC Rail (1 pc) | UT-RT32DMP |
| | SD-2xT32 | | UT-MT32D | UT-BT32D(2 Units) | Screw Mounting or IEC Rail (2 pcs) | UT-RT32 |
| | | | | UT-BT32DMP(2 Units) | IEC Rail (1 pc) | UT-RT32DMP |

12.9 How to Order

How to Order

Follow the steps below when ordering.
(Enter a space in ▲.)

| Model Name | Heater Designation |
|------------|--------------------|
| MMP-T32 | ▲ 32A |
| MMP-T32BC | |

How to Order Options

Follow the steps below when ordering.
(Enter a space in ▲.)

| | Model Name | | Contact Arrangement |
|----------------------------|------------|---|---------------------|
| Auxiliary Contact Unit | UT-MAX | ▲ | 1a |
| | UT-MAX | ▲ | 1b |
| Alarm Contact Unit | UT-MAL | ▲ | 1a |
| | UT-MAL | ▲ | 1b |
| Short-circuit Display Unit | UT-TU | | |

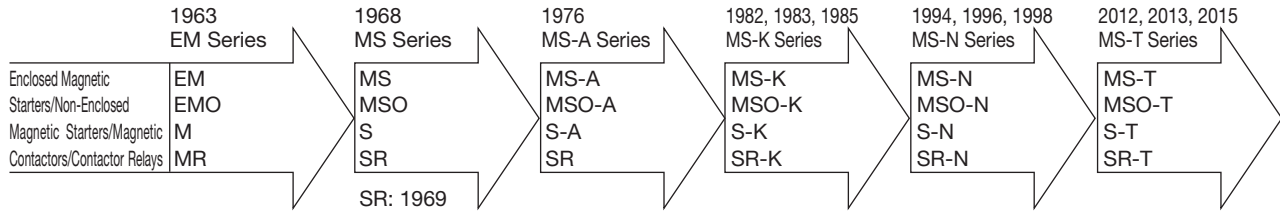
13

Supplementary Information

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13.1 Model Name Changes and Compatibility Between New and Old Products

Our magnetic starters, magnetic contactors and contactor relays undergo model name transition as follows.



The mounting compatibility between the old and current models with equal applied capacity is shown below. Note that the symbols in the compatibility column are as follows, showing the compatibility for the standard mounting dimensions of each series. No coil/contactor compatibility.

- : Compatible
- : Can be made compatible by adding an MSO-T/N Series-dedicated adapter (available as a separate part) *
- : Standard products are not compatible, S/MSO(D)-2xT□XA is compatible
- ◆ : Can be made compatible by directly incorporating MSO-N□XA into MSO-A Series
- △ : Can be made compatible by adding an S-T/N Series-dedicated adapter (available as a separate part) *
- ▲ : Standard products are not compatible, S, SD and SL(D)-N□XA are compatible
- x : Not compatible

* The adapters for S-T12 and SR-T5 can be used only for products where the manufacturing numbers on the front is "14Y **" or "14Z **", or products where the first 2-digit number is equal to or greater than "15" (those that have been manufactured in part of October 2014, and from November on).

1. Magnetic Starters

(1) Mounting Compatibility of MS-A and MS-T/N

| Non-Reversible Type | | |
|---------------------|---------------|-------------------|
| Old Model | Compatibility | Current Model |
| MS-A10(RM) | ○ | MS-T10 |
| MS-A11(RM) | ○ | MS-T12 |
| MS-A12(RM) | x | MS-T12 |
| MS-A20 | ○ | MS-T21 |
| MS-A21 | ○ | MS-T21 |
| MS-A25 | ○ | MS-T35 |
| MS-A35 | ○ | MS-T35 |
| MS-A50 | x | MS-T50 |
| MS-A60 | ○ | MS-T65 |
| MS-A65 | x | MS-T65 |
| MS-A80 | x | MS-T80 |
| MS-A100 | ○ | MS-N125 |
| MS-A120 | ○ | MS-N125 |
| MS-A125 | x (○) | MS-N125 (MS-N150) |
| MS-A150 | ○ | MS-N150 |
| MS-A220 | ○ | MS-N220 |
| MS-A300 | ○ | MS-N300 |
| MS-A401 | ○ | MS-N400 |
| MS-A400 | x | MS-N400 |
| MS-A600 | — | — |

| Reversible Type | | |
|-----------------|---------------|-----------------------|
| Old Model | Compatibility | Current Model |
| MS-AR11 | x | MS-2xT21 |
| MS-2xA20 | ○ | MS-2xT21 |
| MS-2xA21 | ○ | MS-2xT21 |
| MS-2xA25 | x | MS-2xT35 |
| MS-2xA35 | ○ | MS-2xT35 |
| MS-2xA50 | x | MS-2xT50 |
| MS-2xA60 | ○ | MS-2xT65 |
| MS-2xA65 | x | MS-2xT65 |
| MS-2xA80 | x | MS-2xT80 |
| MS-2xA100 | ○ | MS-2xN125 |
| MS-2xA120 | ○ | MS-2xN125 |
| MS-2xA125 | x (○) | MS-2xN125 (MS-2xN150) |
| MS-2xA150 | ○ | MS-2xN150 |
| MS-2xA220 | ○ | MS-2xN220 |
| MS-2xA300 | ○ | MS-2xN300 |
| MS-2xA401 | ○ | MS-2xN400 |
| MS-2xA400 | x | MS-2xN400 |

(2) Mounting Compatibility of MS-K and MS-T/N

| Non-Reversible Type | | |
|---------------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| MS-K10 | ○ | MS-T10 |
| MS-K11 | ○ | MS-T12 |
| MS-K12 | ○ | MS-T12 |
| MS-K20 | ○ | MS-T21 |
| MS-K21 | ○ | MS-T21 |
| MS-K25 | ○ | MS-T35 |
| MS-K35 | ○ | MS-T35 |
| MS-K50 | x | MS-T50 |
| MS-K65 | ○ | MS-T65 |
| MS-K80 | x | MS-T80 |
| MS-K95 | ○ | MS-T100 |
| MS-K100 | ○ | MS-N125 |
| MS-K125 | ○ | MS-N125 |
| MS-K150 | ○ | MS-N150 |
| MS-K180 | ○ | MS-N180 |
| MS-K220 | ○ | MS-N220 |
| MS-K300 | ○ | MS-N300 |
| MS-K400 | ○ | MS-N400 |

| Reversible Type | | |
|-----------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| MS-KR11 | x | MS-2xT21 |
| MS-2xK20 | ○ | MS-2xT21 |
| MS-2xK21 | ○ | MS-2xT21 |
| MS-2xK25 | ○ | MS-2xT35 |
| MS-2xK35 | ○ | MS-2xT35 |
| MS-2xK50 | x | MS-2xT50 |
| MS-2xK65 | ○ | MS-2xT65 |
| MS-2xK80 | x | MS-2xT80 |
| MS-2xK95 | ○ | MS-2xT100 |
| MS-2xK100 | ○ | MS-2xN125 |
| MS-2xK125 | ○ | MS-2xN125 |
| MS-2xK150 | ○ | MS-2xN150 |
| MS-2xK180 | ○ | MS-2xN180 |
| MS-2xK220 | ○ | MS-2xN220 |
| MS-2xK300 | ○ | MS-2xN300 |
| MS-2xK400 | ○ | MS-2xN400 |

(3) Mounting Compatibility of MS-N and MS-T Types

| Non-Reversible Type | | |
|---------------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| MS-N10 | ○ | MS-T10 |
| MS-N11 | ○ | MS-T12 |
| MS-N12 | ○ | MS-T12 |
| MS-N20 | ○ | MS-T21 |
| MS-N21 | ○ | MS-T21 |
| MS-N25 | ○ | MS-T35 |
| MS-N35 | ○ | MS-T35 |
| MS-N50 | x | MS-T50 |
| MS-N65 | ○ | MS-T65 |
| MS-N80 | x | MS-T80 |
| MS-N95 | ○ | MS-T100 |

| Reversible Type | | |
|-----------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| MS-2xN20 | ○ | MS-2xT21 |
| MS-2xN21 | ○ | MS-2xT21 |
| MS-2xN25 | ○ | MS-2xT35 |
| MS-2xN35 | ○ | MS-2xT35 |
| MS-2xN50 | x | MS-2xT50 |
| MS-2xN65 | ○ | MS-2xT65 |
| MS-2xN80 | x | MS-2xT80 |
| MS-2xN95 | ○ | MS-2xT100 |

(4) Mounting Compatibility of MSO-A and MSO-T/N Types

| Non-Reversible Type | | |
|---------------------|---------------|---------------------|
| Old Model | Compatibility | Current Model |
| MSO-A10(RM) | ● | MSO-T10 |
| MSO-A11(RM) | ○ | MSO-T12 |
| MSO-A12(RM) | ● | MSO-T12 |
| MSO-A20 | ● | MSO-T20 |
| MSO-A21 | ○ | MSO-T21 |
| MSO-A25 | x | MSO-T25 |
| MSO-A35 | x | MSO-T35 |
| MSO-A50 | x | MSO-T50 |
| MSO-A60 | x | MSO-T65 |
| MSO-A65 | x | MSO-T65 |
| MSO-A80 | x | MSO-T80 |
| MSO-A100 | ◆ | MSO-N125 |
| MSO-A120 | ◆ | MSO-N125 |
| MSO-A125 | x (◆) | MSO-N125 (MSO-N150) |
| MSO-A150 | ◆ | MSO-N150 |
| MSO-A220 | ◆ | MSO-N220 |
| MSO-A300 | ◆ | MSO-N300 |
| MSO-A401 | ◆ | MSO-N400 |
| MSO-A400 | x | MSO-N400 |
| MSO-A600 | x | S-N600 + TH-N600 |

| Reversible Type | | |
|-----------------|---------------|--------------------|
| Old Model | Compatibility | Current Model |
| MSO-AR11 | x | MSO-2xT10 |
| | x | MSO-2xT12 |
| MSO-2xA20 | x | MSO-2xT20 |
| MSO-2xA21 | x | MSO-2xT21 |
| MSO-2xA25 | x | MSO-2xT25 |
| MSO-2xA35 | x | MSO-2xT35 |
| MSO-2xA50 | x | MSO-2xT50 |
| MSO-2xA60 | x | MSO-2xT65 |
| MSO-2xA65 | x | MSO-2xT65 |
| MSO-2xA80 | x | MSO-2xT80 |
| MSO-2xA100 | x | MSO-2xN125 |
| MSO-2xA120 | x | MSO-2xN125 |
| MSO-2xA125 | x | MSO-2xN125 |
| MSO-2xA150 | x | MSO-2xN150 |
| MSO-2xA220 | x | MSO-2xN220 |
| MSO-2xA300 | x | MSO-2xN300 |
| MSO-2xA401 | x | MSO-2xN400 |
| MSO-2xA400 | x | MSO-2xN400 |
| MSO-2xA600 | x | S-2xN600 + TH-N600 |

(5) Mounting Compatibility of MSO-K and MSO-T/N Types

| Non-Reversible Type | | |
|---------------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| MSO-K10 | ● | MSO-T10 |
| MSO-K11 | ○ | MSO-T12 |
| MSO-K12 | ● | MSO-T12 |
| MSO-K18 | ○ | MSO-T20 |
| MSO-K19 | ● | MSO-T20 |
| MSO-K20 | ● | MSO-T20 |
| MSO-K21 | ○ | MSO-T21 |
| MSO-K25 | x | MSO-T25 |
| MSO-K35 | x | MSO-T35 |
| MSO-K50 | ● | MSO-T50 |
| MSO-K65 | ○ | MSO-T65 |
| MSO-K80 | ● | MSO-T80 |
| MSO-K95 | ○ | MSO-T100 |
| MSO-K100 | ○ | MSO-N125 |
| MSO-K125 | ○ | MSO-N125 |
| MSO-K150 | ○ | MSO-N150 |
| MSO-K180 | ○ | MSO-N180 |
| MSO-K220 | ○ | MSO-N220 |
| MSO-K300 | ○ | MSO-N300 |
| MSO-K400 | ○ | MSO-N400 |

| Reversible Type | | |
|-----------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| MSO-KR11 | x | MSO-2xT10 |
| | x | MSO-2xT12 |
| MSO-2xK18 | x | MSO-2xT20 |
| MSO-2xK19 | x | MSO-2xT20 |
| MSO-2xK20 | x | MSO-2xT20 |
| MSO-2xK21 | x | MSO-2xT21 |
| MSO-2xK25 | x | MSO-2xT25 |
| MSO-2xK35 | ○ | MSO-2xT35 |
| MSO-2xK50 | ■ | MSO-2xT50 |
| MSO-2xK65 | ○ | MSO-2xT65 |
| MSO-2xK80 | ■ | MSO-2xT80 |
| MSO-2xK95 | ○ | MSO-2xT100 |
| MSO-2xK100 | ○ | MSO-2xN125 |
| MSO-2xK125 | ○ | MSO-2xN125 |
| MSO-2xK150 | ○ | MSO-2xN150 |
| MSO-2xK180 | ○ | MSO-2xN180 |
| MSO-2xK220 | ○ | MSO-2xN220 |
| MSO-2xK300 | ○ | MSO-2xN300 |
| MSO-2xK400 | ○ | MSO-2xN400 |

(6) Mounting Compatibility of MSO-N and MSO-T Types

| Non-Reversible Type | | |
|---------------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| MSO-N10 | ● | MSO-T10 |
| MSO-N11 | ○ | MSO-T12 |
| MSO-N12 | ● | MSO-T12 |
| MSO-N18 | ○ | MSO-T20 |
| MSO-N20 | ● | MSO-T20 |
| | ○ | MSO-T21 |
| MSO-N21 | ○ | MSO-T21 |
| MSO-N25 | ● | MSO-T25 |
| MSO-N35 | ○ | MSO-T35 |
| MSO-N50 | ● | MSO-T50 |
| MSO-N65 | ○ | MSO-T65 |
| MSO-N80 | ● | MSO-T80 |
| MSO-N95 | ○ | MSO-T100 |

| Reversible Type | | |
|-----------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| MSO-2×N10 | x | MSO-2×T10 |
| MSO-2×N11 | x | MSO-2×T12 |
| MSO-2×N18 | x | MSO-2×T20 |
| MSO-2×N20 | x | MSO-2×T20 |
| | ○ | MSO-2×T21 |
| MSO-2×N21 | ○ | MSO-2×T21 |
| MSO-2×N25 | x | MSO-2×T25 |
| MSO-2×N35 | ○ | MSO-2×T35 |
| MSO-2×N50 | ■ | MSO-2×T50 |
| MSO-2×N65 | ○ | MSO-2×T65 |
| MSO-2×N80 | ■ | MSO-2×T80 |
| MSO-2×N95 | ○ | MSO-2×T100 |

2. Magnetic Contactors

(1) Mounting Compatibility of S-A and S-T/N Types

| Non-Reversible Type | | |
|---------------------|---------------|----------------|
| Old Model | Compatibility | Current Model |
| S-A10(RM)* | △ | S-T10 |
| S-A11(RM)* | ○ | S-T12 |
| S-A12(RM)* | △ | S-T12 |
| S-A20 | △ | S-T20 |
| S-A21 | ○ | S-T21 |
| S-A25 | x | S-T25 |
| S-A35 | x | S-T35 |
| S-A50 | x | S-T50 |
| S-A60 | △ | S-T65 |
| S-A65 | x | S-T65 |
| S-A80 | x | S-T80 |
| S-A100 | ▲ | S-N125 |
| S-A120 | ▲ | S-N125 |
| S-A125 | x(▲) | S-N125(S-N150) |
| S-A150 | ▲ | S-N150 |
| S-A220 | ▲ | S-N220 |
| S-A300 | ▲ | S-N300 |
| S-A401 | ▲ | S-N400 |
| S-A400 | x | S-N400 |
| S-A600 | ○ | S-N600 |
| S-A800 | ○ | S-N800 |

* (RM) indicates that it can be rail-mounted. S-T10 to T80 are standard products that can be rail-mounted.

| Reversible Type | | |
|-----------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| S-AR11 | x | S-2×T10 |
| | x | S-2×T12 |
| S-2×A20 | x | S-2×T20 |
| S-2×A21 | x | S-2×T21 |
| S-2×A25 | x | S-2×T25 |
| S-2×A35 | x | S-2×T35 |
| S-2×A50 | x | S-2×T50 |
| S-2×A60 | x | S-2×T65 |
| S-2×A65 | x | S-2×T65 |
| S-2×A80 | x | S-2×T80 |
| S-2×A100 | x | S-2×N125 |
| S-2×A120 | x | S-2×N125 |
| S-2×A125 | x | S-2×N125 |
| S-2×A150 | x | S-2×N150 |
| S-2×A220 | x | S-2×N220 |
| S-2×A300 | x | S-2×N300 |
| S-2×A401 | x | S-2×N400 |
| S-2×A400 | x | S-2×N400 |
| S-2×A600 | x | S-2×N600 |
| S-2×A800 | x | S-2×N800 |

(2) Mounting Compatibility of S-K and S-T/N Types

| Non-Reversible Type | | |
|---------------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| S-K10 | △ | S-T10 |
| S-K11 | ○ | S-T12 |
| S-K12 | △ | S-T12 |
| S-K18 | ○ | S-T20 |
| S-K19 | △ | S-T20 |
| S-K20 | △ | S-T20 |
| S-K21 | ○ | S-T21 |
| S-K25 | x | S-T25 |
| S-K28 | x | S-T32 |
| S-K35 | x | S-T35 |
| S-K38 | x | S-T35 |
| S-K48 | x | S-T50 |
| S-K50 | △ | S-T50 |
| S-K65 | ○ | S-T65 |
| S-K80 | △ | S-T80 |
| S-K95 | ○ | S-T100 |
| S-K100 | ○ | S-N125 |
| S-K125 | ○ | S-N125 |
| S-K150 | ○ | S-N150 |
| S-K180 | ○ | S-N180 |
| S-K220 | ○ | S-N220 |
| S-K300 | ○ | S-N300 |
| S-K400 | ○ | S-N400 |
| S-K600 | ○ | S-N600 |
| S-K800 | ○ | S-N800 |

| Reversible Type | | |
|-----------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| S-KR11 | x | S-2×T10 |
| | x | S-2×T12 |
| S-2×K18 | x | S-2×T32 |
| S-2×K19 | x | S-2×T20 |
| S-2×K20 | x | S-2×T20 |
| S-2×K21 | x | S-2×T21 |
| S-2×K25 | x | S-2×T25 |
| S-2×K28 | x | S-2×T32 |
| S-2×K35 | ○ | S-2×T35 |
| S-2×K38 | x | S-2×T35 |
| S-2×K48 | x | S-2×T50 |
| S-2×K50 | ■ | S-2×T50 |
| S-2×K65 | ○ | S-2×T65 |
| S-2×K80 | ■ | S-2×T80 |
| S-2×K95 | ○ | S-2×T100 |
| S-2×K100 | ○ | S-2×N125 |
| S-2×K125 | ○ | S-2×N125 |
| S-2×K150 | ○ | S-2×N150 |
| S-2×K180 | ○ | S-2×N180 |
| S-2×K220 | ○ | S-2×N220 |
| S-2×K300 | ○ | S-2×N300 |
| S-2×K400 | ○ | S-2×N400 |
| S-2×K600 | ○ | S-2×N600 |
| S-2×K800 | ○ | S-2×N800 |

(3) Mounting Compatibility of S-N and S-T Types

| Non-Reversible Type | | |
|---------------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| S-N10 | △ | S-T10 |
| S-N11 | ○ | S-T12 |
| S-N12 | △ | S-T12 |
| S-N18 | ○ | S-T20 |
| S-N20 | △ | S-T20 |
| | ○ | S-T21 |
| S-N21 | ○ | S-T21 |
| S-N25 | △ | S-T25 |
| S-N28 | ○ | S-T32 |
| S-N35 | ○ | S-T35 |
| S-N50 | △ | S-T50 |
| S-N65 | ○ | S-T65 |
| S-N80 | △ | S-T80 |
| S-N95 | ○ | S-T100 |

| Reversible Type | | |
|-----------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| S-2xN10 | x | S-2xT10 |
| S-2xN11 | x | S-2xT12 |
| S-2xN18 | x | S-2xT20 |
| S-2xN20 | x | S-2xT20 |
| | ○ | S-2xT21 |
| S-2xN21 | ○ | S-2xT21 |
| S-2xN25 | x | S-2xT25 |
| S-2xN28 | ○ | S-2xT32 |
| S-2xN35 | ○ | S-2xT35 |
| S-2xN50 | ■ | S-2xT50 |
| S-2xN65 | ○ | S-2xT65 |
| S-2xN80 | ■ | S-2xT80 |
| S-2xN95 | ○ | S-2xT100 |

(4) Mounting Compatibility of SD-A and SD-T/N Types

| Non-Reversible Type | | |
|---------------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| SD-A11 | ○ | SD-T12 |
| SD-A12 | △ | SD-T12 |
| SD-A21 | ○ | SD-T21 |
| SD-A35 | x | SD-T35 |
| SD-A50 | x | SD-T50 |
| SD-A60 | x | SD-T65 |
| SD-A65 | x | SD-T65 |
| SD-A80 | x | SD-T80 |
| SD-A100 | ▲ | SD-N125 |
| SD-A150 | ▲ | SD-N150 |
| SD-A220 | ▲ | SD-N220 |
| SD-A300 | ▲ | SD-N300 |
| SD-A401 | ▲ | SD-N400 |
| SD-A400 | x | SD-N400 |
| SD-A600 | ○ | SD-N600 |

| Reversible Type | | |
|-----------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| SD-2xA21 | x | SD-2xT21 |
| SD-2xA35 | x | SD-2xT35 |
| SD-2xA50 | x | SD-2xT50 |
| SD-2xA60 | x | SD-2xT65 |
| SD-2xA65 | x | SD-2xT65 |
| SD-2xA80 | x | SD-2xT80 |
| SD-2xA100 | x | SD-2xN125 |
| SD-2xA150 | x | SD-2xN150 |
| SD-2xA220 | x | SD-2xN220 |
| SD-2xA300 | x | SD-2xN300 |
| SD-2xA401 | x | SD-2xN400 |
| SD-2xA400 | x | SD-2xN400 |
| SD-2xA600 | x | SD-2xN600 |

(5) Mounting Compatibility of SD-K and SD-T/N Types

| Non-Reversible Type | | |
|---------------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| SD-K11 | ○ | SD-T12 |
| SD-K12 | △ | SD-T12 |
| SD-K21 | ○ | SD-T21 |
| SD-K35 | x | SD-T35 |
| SD-K50 | △ | SD-T50 |
| SD-K65 | ○ | SD-T65 |
| SD-K80 | △ | SD-T80 |
| SD-K95 | ○ | SD-T100 |
| SD-K100 | ○ | SD-N125 |
| SD-K125 | ○ | SD-N125 |
| SD-K150 | ○ | SD-N150 |
| SD-K220 | ○ | SD-N220 |
| SD-K300 | ○ | SD-N300 |
| SD-K400 | ○ | SD-N400 |
| SD-K600 | ○ | SD-N600 |
| SD-K800 | ○ | SD-N800 |

| Reversible Type | | |
|-----------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| SD-2xK21 | x | SD-2xT21 |
| SD-2xK35 | ○ | SD-2xT35 |
| SD-2xK50 | ■ | SD-2xT50 |
| SD-2xK65 | ○ | SD-2xT65 |
| SD-2xK80 | ■ | SD-2xT80 |
| SD-2xK95 | ○ | SD-2xT100 |
| SD-2xK100 | ○ | SD-2xN125 |
| SD-2xK125 | ○ | SD-2xN125 |
| SD-2xK150 | ○ | SD-2xN150 |
| SD-2xK220 | ○ | SD-2xN220 |
| SD-2xK300 | ○ | SD-2xN300 |
| SD-2xK400 | ○ | SD-2xN400 |
| SD-2xK600 | ○ | SD-2xN600 |
| SD-2xK800 | ○ | SD-2xN800 |

(6) Mounting Compatibility of SD-N and SD-T Types

| Non-Reversible Type | | |
|---------------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| SD-N11 | ○ | SD-T12 |
| SD-N12 | △ | SD-T12 |
| SD-N21 | ○ | SD-T21 |
| SD-N35 | ○ | SD-T35 |
| SD-N50 | △ | SD-T50 |
| SD-N65 | ○ | SD-T65 |
| SD-N80 | △ | SD-T80 |
| SD-N95 | ○ | SD-T100 |

| Reversible Type | | |
|-----------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| SD-2xN11 | x | SD-2xT12 |
| SD-2xN21 | ○ | SD-2xT21 |
| SD-2xN35 | ○ | SD-2xT35 |
| SD-2xN50 | ■ | SD-2xT50 |
| SD-2xN65 | ○ | SD-2xT65 |
| SD-2xN80 | ■ | SD-2xT80 |
| SD-2xN95 | ○ | SD-2xT100 |

13 Supplementary Information

(7) Mounting Compatibility of SL(D)-A and SL(D)-T/N Types

| Non-Reversible Type | | |
|---------------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| SL(D)-A21 | ○ | SL(D)-T21 |
| SL(D)-A50 | △ | SL(D)-T50 |
| SL(D)-A60 | △ | SL(D)-T65 |
| SL(D)-A80 | △ | SL(D)-T80 |
| SL(D)-A100 | ▲ | SL(D)-N125 |
| SL(D)-A120 | ▲ | SL(D)-N125 |
| SL(D)-A150 | ▲ | SL(D)-N150 |
| SL(D)-A220 | ▲ | SL(D)-N220 |
| SL(D)-A300 | ▲ | SL(D)-N300 |
| SL(D)-A401 | ▲ | SL(D)-N400 |
| SL(D)-A400 | x | SL(D)-N400 |
| SL(D)-A600 | ○ | SL(D)-N600 |

| Reversible Type | | |
|-----------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| SL(D)-2xA21 | x | SL(D)-2xT21 |
| SL(D)-2xA50 | x | SL(D)-2xT50 |
| SL(D)-2xA60 | x | SL(D)-2xT65 |
| SL(D)-2xA80 | ○ | SL(D)-2xT80 |
| SL(D)-2xA100 | x | SL(D)-2xN125 |
| SL(D)-2xA120 | x | SL(D)-2xN125 |
| SL(D)-2xA150 | x | SL(D)-2xN150 |
| SL(D)-2xA220 | x | SL(D)-2xN220 |
| SL(D)-2xA300 | x | SL(D)-2xN300 |
| SL(D)-2xA401 | x | SL(D)-2xN400 |
| SL(D)-2xA400 | x | SL(D)-2xN400 |
| SL(D)-2xA600 | x | SL(D)-2xN600 |

(8) Mounting Compatibility of SL(D)-K and SL(D)-T/N Types

| Non-Reversible Type | | |
|---------------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| SL(D)-K21 | ○ | SL(D)-T21 |
| SL(D)-K35 | x | SL(D)-T35 |
| SL(D)-K50 | △ | SL(D)-T50 |
| SL(D)-K65 | ○ | SL(D)-T65 |
| SL(D)-K80 | △ | SL(D)-T80 |
| SL(D)-K95 | ○ | SL(D)-T100 |
| SL(D)-K100 | ○ | SL(D)-N125 |
| SL(D)-K125 | ○ | SL(D)-N125 |
| SL(D)-K150 | ○ | SL(D)-N150 |
| SL(D)-K220 | ○ | SL(D)-N220 |
| SL(D)-K300 | ○ | SL(D)-N300 |
| SL(D)-K400 | ○ | SL(D)-N400 |
| SL(D)-K600 | ○ | SL(D)-N600 |
| SL(D)-K800 | ○ | SL(D)-N800 |

| Reversible Type | | |
|-----------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| SL(D)-2xK21 | x | SL(D)-2xT21 |
| SL(D)-2xK35 | ○ | SL(D)-2xT35 |
| SL(D)-2xK50 | x | SL(D)-2xT50 |
| SL(D)-2xK65 | ○ | SL(D)-2xT65 |
| SL(D)-2xK80 | x | SL(D)-2xT80 |
| SL(D)-2xK95 | ○ | SL(D)-2xT100 |
| SL(D)-2xK100 | ○ | SL(D)-2xN125 |
| SL(D)-2xK125 | ○ | SL(D)-2xN125 |
| SL(D)-2xK150 | ○ | SL(D)-2xN150 |
| SL(D)-2xK220 | ○ | SL(D)-2xN220 |
| SL(D)-2xK300 | ○ | SL(D)-2xN300 |
| SL(D)-2xK400 | ○ | SL(D)-2xN400 |
| SL(D)-2xK600 | ○ | SL(D)-2xN600 |
| SL(D)-2xK800 | ○ | SL(D)-2xN800 |

(9) Mounting Compatibility of SL(D)-N and SL(D)-T Types

| Non-Reversible Type | | |
|---------------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| SL(D)-N21 | ○ | SL(D)-T21 |
| SL(D)-N35 | ○ | SL(D)-T35 |
| SL(D)-N50 | △ | SL(D)-T50 |
| SL(D)-N65 | ○ | SL(D)-T65 |
| SL(D)-N80 | △ | SL(D)-T80 |
| SL(D)-N95 | ○ | SL(D)-T100 |

| Reversible Type | | |
|-----------------|---------------|---------------|
| Old Model | Compatibility | Current Model |
| SL(D)-2xN21 | ○ | SL(D)-2xT21 |
| SL(D)-2xN35 | ○ | SL(D)-2xT35 |
| SL(D)-2xN50 | x | SL(D)-2xT50 |
| SL(D)-2xN65 | ○ | SL(D)-2xT65 |
| SL(D)-2xN80 | x | SL(D)-2xT80 |
| SL(D)-2xN95 | ○ | SL(D)-2xT100 |

3. Contactor Relays

(1) Mounting Compatibility of SR(RM) Type and current models (SR-K/SR-T)

| Old Model | Compatibility | Current Model |
|--------------|---------------|---------------|
| SR-40(RM) | ○ | SR-T5 |
| SR-50(RM) | △ | SR-T5 |
| SR-80(RM) | ○ | SR-T9 |
| SR-63,60(RM) | x | SR-T9 |
| SR-100 | ○ | SR-K100 |

(3) Mounting Compatibility of SR-N Type and current models (SR-T)

| Old Model | Compatibility | Current Model |
|-----------|---------------|---------------|
| SR-N4 | ○ | SR-T5 |
| SR-N5 | △ | SR-T5 |
| SR-N8 | ○ | SR-T9 |

(5) Mounting Compatibility of SRD-K Type and current models (SRD-T)

| Old Model | Compatibility | Current Model |
|-----------|---------------|---------------|
| SRD-K4 | ○ | SRD-T5 |
| SRD-K5 | △ | SRD-T5 |
| SRD-K8 | ○ | SRD-T9 |

(7) Mounting Compatibility of SRL(D) Type and current models (SRL(D)-K/SRL(D)-N/SRL-T)

| Old Model | Compatibility | Current Model |
|---------------------------|---------------|------------------------|
| SRL(D)-40(SE) | ○ | SRL(D)-T5 |
| SRL(D)-50(SE) | △ (○) | SRL(D)-T5(SRL(D)-K100) |
| SRL(D)-100(SE)/SRL(D)-101 | ○ | SRL(D)-K100 |

(9) Mounting Compatibility of SRL(D)-N and SRL(D)-T Types

| Old Model | Compatibility | Current Model |
|-----------|---------------|---------------|
| SRL(D)-N4 | ○ | SRL(D)-T5 |

(2) Mounting Compatibility of SR-K Type and current models (SR-K/SR-T)

| Old Model | Compatibility | Current Model |
|-----------|---------------|---------------|
| SR-K4 | ○ | SR-T5 |
| SR-K5 | △ | SR-T5 |
| SR-K8 | ○ | SR-T9 |
| SR-K63,K6 | x | SR-T9 |
| SR-K10 | ○ | SR-K100 |

(4) Mounting Compatibility of SRD Type and current models (SRD-K/SRD-T)

| Old Model | Compatibility | Current Model |
|-----------|---------------|---------------|
| SRD-40 | ○ | SRD-T5 |
| SRD-50 | △ | SRD-T5 |
| SRD-80 | ○ | SRD-T9 |
| SRD-100 | ○ | SRD-K100 |

(6) Mounting Compatibility of SRD-N Type and current models (SRD-T)

| Old Model | Compatibility | Current Model |
|-----------|---------------|---------------|
| SRD-N4 | ○ | SRD-T5 |
| SRD-N5 | △ | SRD-T5 |
| SRD-N8 | ○ | SRD-T9 |

(8) Mounting Compatibility of SRL(D)-K Type and current models (SRL(D)-K/SRL(D)-N/SRL-T)

| Old Model | Compatibility | Current Model |
|------------|---------------|---------------|
| SRL(D)-K4 | ○ | SRL(D)-T5 |
| SRL(D)-K10 | ○ | SRL(D)-K100 |

13.2 Magnetic Starters and Magnetic Contactors New and Old Model Comparison List

● MS-K, MS-N and MS-T Enclosed Magnetic Starters Comparison List (Category AC-3)

| Model Name | | MS-K10 | MS-K11 | MS-K12 | MS-K20 | MS-K21 | MS-K25 | MS-K35 | MS-K50 |
|-------------------------------|---|-----------|-----------|-----------|-----------|----------|-----------|-----------|---------|
| Rated Capacity (kW) AC-3 | 220 to 240 V | 2.5 (2.2) | 3.5 (2.7) | 3.5 (2.7) | 5.5 (4) | 5.5 (4) | 7.5 (5.5) | 11 (7.5) | 15 (11) |
| | 380 to 440 V | 4 (2.7) | 5.5 (4) | 5.5 (4) | 11 (7.5) | 11 (7.5) | 15 (11) | 18.5 (15) | 22 (22) |
| | 500 V | 4 (2.7) | 5.5 (5.5) | 5.5 (5.5) | 11 (7.5) | 11 (7.5) | 15 (11) | 18.5 (15) | 22 (22) |
| Auxiliary Contact Arrangement | | 1a | 1a | 1a1b | 1a1b | 2a2b | 2a2b | 2a2b | 2a2b |
| MS-K Series | Outline Drawings (mm) | | | | | | | | |
| | Weight (kg) | 0.8 | 0.8 | 0.9 | 1.2 | 1.2 | 2.0 | 2.0 | 3.2 |
| | Mounting Compatibility With MS-T Series | ○ | — | ○ | — | ○ | — | ○ | x |
| Model Name | | MS-N10 | MS-N11 | MS-N12 | MS-N20 | MS-N21 | MS-N25 | MS-N35 | MS-N50 |
| Rated Capacity (kW) AC-3 | 220 to 240 V | 2.5 (2.2) | 3.5 (2.7) | 3.5 (2.7) | 4.5 (4) | 5.5 (4) | 7.5 (5.5) | 11 (7.5) | 15 (11) |
| | 380 to 440 V | 4 (2.7) | 5.5 (4) | 5.5 (4) | 7.5 (7.5) | 11 (7.5) | 15 (11) | 18.5 (15) | 22 (22) |
| | 500 V | 4 (2.7) | 5.5 (5.5) | 5.5 (5.5) | 7.5 (7.5) | 11 (7.5) | 15 (11) | 18.5 (15) | 25 (22) |
| Auxiliary Contact Arrangement | | 1a | 1a | 1a1b | 1a1b | 2a2b | 2a2b | 2a2b | 2a2b |
| MS-N Series | Outline Drawings (mm) | | | | | | | | |
| | Weight (kg) | 0.8 | 0.8 | 0.8 | 1.1 | 1.1 | 1.8 | 1.8 | 2.9 |
| | Mounting Compatibility With MS-T Series | ○ | — | ○ | — | ○ | — | ○ | x |
| Model Name | | MS-T10 | — | MS-T12 | — | MS-T21 | — | MS-T35 | MS-T50 |
| Rated Capacity (kW) AC-3 | 220 to 240 V | 2.5 (2.2) | — | 3.5 (2.7) | — | 5.5 (4) | — | 11 (7.5) | 15 (11) |
| | 380 to 440 V | 4 (2.7) | — | 5.5 (4) | — | 11 (7.5) | — | 18.5 (15) | 22 (22) |
| | 500 V | 4 (2.7) | — | 5.5 (5.5) | — | 11 (7.5) | — | 18.5 (15) | 25 (22) |
| Auxiliary Contact Arrangement | | 1a | — | 1a1b | — | 2a2b | — | 2a2b | 2a2b |
| MS-T Series | Outline Drawings (mm) | | | | | | | | |
| | Weight (kg) | 0.74 | — | 0.76 | — | 1.12 | — | 1.9 | 1.9 |

| | MS-K65 | MS-K80 | MS-K95 | MS-K100 | MS-K125 | MS-K150 | MS-K180 | MS-K220 | MS-K300 | MS-K400 |
|--|-----------|------------|------------|------------|---------|------------|------------|------------|------------|------------|
| | 18.5 (15) | 22 (19) | 30 (22) | 30 (25) | 37 (30) | 45 (37) | 55 (45) | 75 (55) | 90 (75) | 125 (110) |
| | 30 (30) | 45 (37) | 55 (45) | 55 (50) | 60 (60) | 75 (75) | 90 (90) | 132 (110) | 100 (150) | 220 (200) |
| | 30 (30) | 45 (45) | 55 (45) | 55 (55) | 60 (60) | 90 (90) | 110 (110) | 132 (132) | 100 (160) | 220 (200) |
| | 2a2b | 2a2b(4a4b) | 2a2b(4a4b) | 2a2b(4a4b) | | 2a2b(4a4b) | 2a2b(4a4b) | 2a2b(4a4b) | 2a2b(4a4b) | 2a2b(4a4b) |
| | | | | | | | | | | |
| | 3.2 | 4.0 | 4.0 | 8 | | 12.8 | 16.2 | 16.2 | 28 | 28 |
| | ○ | x | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | MS-N65 | MS-N80 | MS-N95 | MS-N125 | | MS-N150 | MS-N180 | MS-N220 | MS-N300 | MS-N400 |
| | 16.5 (15) | 22 (19) | 30 (22) | 37 (30) | | 45 (37) | 55 (45) | 75 (55) | 90 (75) | 125 (110) |
| | 30 (30) | 45 (37) | 55 (45) | 60 (60) | | 75 (75) | 90 (90) | 132 (110) | 160 (150) | 220 (200) |
| | 37 (30) | 45 (45) | 55 (45) | 60 (60) | | 90 (90) | 110 (110) | 132 (132) | 160 (160) | 225 (200) |
| | 2a2b | 2a2b(4a4b) | 2a2b(4a4b) | 2a2b(4a4b) | | 2a2b(4a4b) | 2a2b(4a4b) | 2a2b(4a4b) | 2a2b(4a4b) | 2a2b(4a4b) |
| | | | | | | | | | | |
| | 2.9 | 4.0 | 4.0 | 8 | 8 | 12.8 | 16.2 | 16.2 | 27.5 | 28 |
| | ○ | x | ○ | | | | | | | |
| | MS-T65 | MS-T80 | MS-T100 | | | | | | | |
| | 18.5 (15) | 22 (19) | 30 (22) | | | | | | | |
| | 30 (30) | 45 (37) | 55 (45) | | | | | | | |
| | 37 (30) | 45 (45) | 55 (45) | | | | | | | |
| | 2a2b | 2a2b | 2a2b | | | | | | | |
| | | | | | | | | | | |
| | 2.9 | 2.9 | 4.0 | | | | | | | |

Note 1. The mounting compatibility symbols have the following indications.

- : Can be directly replaced as an enclosed type
- x: Not compatible

Note 2. If replacing the starter or contactor only, consult with your dealer or with us.

MSO-K, MSO-N and MSO-T Non-Enclosed Type Magnetic Starter Comparison List (Category AC-3)

| Model Name | | MSO-K10 | MSO-K11 | MSO-K12 | MSO-K18 | MSO-K20 | MSO-K21 | MSO-K25 | MSO-K35 | MSO-K50 |
|-------------------------------|--|-----------|-----------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Rated Capacity (kW) AC-3 | 220 to 240 V | 2.5 (2.2) | 3.5 (2.7) | 3.5 (2.7) | 4.5 (3.7) | 5.5 (4) | 5.5 (4) | 7.5 (5.5) | 11 (7.5) | 15 (11) |
| | 380 to 440 V | 4 (2.7) | 5.5 (4) | 5.5 (4) | 7.5 (5.5) | 11 (7.5) | 11 (7.5) | 15 (11) | 18.5 (15) | 22 (22) |
| | 500 V | 4 (2.7) | 5.5 (5.5) | 5.5 (5.5) | 7.5 (5.5) | 11 (7.5) | 11 (7.5) | 15 (11) | 18.5 (15) | 22 (22) |
| Auxiliary Contact Arrangement | | 1a (3a2b) | 1a (3a2b) | 1a1b | (2a2b) | 1a1b | 2a2b (4a4b) | 2a2b (4a4b) | 2a2b (4a4b) | 2a2b (4a4b) |
| MSO-K Series | Outline Drawings (mm) | | | | | | | | | |
| | Weight (kg) | 0.38 | | 0.42 | 0.45 | 0.7 | 0.7 | 0.9 | 0.9 | 1.4 |
| | Mounting Compatibility With MSO-T Series | ● | — | ● | — | ● | ○ | x | x | ● |
| Model Name | | MSO-N10 | MSO-N11 | MSO-N12 | MSO-N18 | MSO-N20 | MSO-N21 | MSO-N25 | MSO-N35 | MSO-N50 |
| Rated Capacity (kW) AC-3 | 220 to 240 V | 2.5 (2.2) | 3.5 (2.7) | 3.5 (2.7) | 4.5 (3.7) | 5.5 (4) | 5.5 (4) | 7.5 (5.5) | 11 (7.5) | 15 (11) |
| | 380 to 440 V | 4 (2.7) | 5.5 (4) | 5.5 (4) | 7.5 (5.5) | 11 (7.5) | 11 (7.5) | 15 (11) | 18.5 (15) | 22 (22) |
| | 500 V | 4 (2.7) | 5.5 (5.5) | 5.5 (5.5) | 7.5 (5.5) | 11 (7.5) | 11 (7.5) | 15 (11) | 18.5 (15) | 25 (22) |
| Auxiliary Contact Arrangement | | 1a (3a2b) | 1a (3a2b) | 1a1b (3a3b) | (2a2b) | 1a1b (3a3b) | 2a2b (4a4b) | 2a2b (4a4b) | 2a2b (4a4b) | 2a2b (4a4b) |
| MSO-N Series | Outline Drawings (mm) | | | | | | | | | |
| | Weight (kg) | 0.41 | 0.41 | 0.43 | 0.46 | 0.54 | 0.56 | 0.72 | 0.72 | 1.1 |
| | Mounting Compatibility With MSO-T Series | ● | ● | ● | — | ● | ○ | ● | ○ | ● |
| Model Name | | MSO-T10 | — | MSO-T12 | MSO-T20 | MSO-T21 | MSO-T25 | MSO-T35 | MSO-T50 | |
| Rated Capacity (kW) AC-3 | 220 to 240 V | 2.5 (2.2) | — | 3.5 (2.7) | 4.5 (3.7) | 5.5 (4) | 7.5 (5.5) | 11 (7.5) | 15 (11) | |
| | 380 to 440 V | 4 (2.7) | — | 5.5 (4) | 7.5 (7.5) | 11 (7.5) | 15 (11) | 18.5 (15) | 22 (22) | |
| | 500 V | 4 (2.7) | — | 5.5 (5.5) | 7.5 (7.5) | 11 (7.5) | 15 (11) | 18.5 (15) | 25 (22) | |
| Auxiliary Contact Arrangement | | 1a (3a2b) | — | 1a1b (3a3b) | 1a1b (3a3b) | 2a2b (4a4b) | 2a2b (4a4b) | 2a2b (4a4b) | 2a2b (4a4b) | |
| MSO-T Series | Outline Drawings (mm) | | — | | | | | | | |
| | Weight (kg) | 0.36 | — | 0.38 | — | 0.38 | 0.58 | 0.58 | 0.79 | 0.79 |

| MSO-K65 | MSO-K80 | MSO-K95 | MSO-K100 | MSO-K125 | MSO-K150 | MSO-K180 | MSO-K220 | MSO-K300 | MSO-K400 |
|-------------|-------------|-------------|-------------|----------|-------------|-------------|-------------|-------------|-------------|
| 18.5 (15) | 22 (19) | 30 (22) | 30 (25) | 37 (30) | 45 (37) | 55 (45) | 75 (55) | 90 (75) | 125 (110) |
| 30 (30) | 45 (37) | 55 (45) | 55 (50) | 60 (60) | 75 (75) | 90 (90) | 132 (110) | 160 (150) | 220 (200) |
| 30 (30) | 45 (45) | 55 (45) | 55 (55) | 60 (60) | 90 (90) | 110 (110) | 132 (132) | 160 (160) | 220 (200) |
| 2a2b (4a4b) | 2a2b (4a4b) | 2a2b (4a4b) | 2a2b (4a4b) | | 2a2b (4a4b) | 2a2b (4a4b) | 2a2b (4a4b) | 2a2b (4a4b) | 2a2b (4a4b) |
| | | | | | | | | | |
| 1.4 | 2.2 | 2.2 | 3.5 | | 4.6 | 8 | 8 | 12 | 12 |
| ○ | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| MSO-N65 | MSO-N80 | MSO-N95 | MSO-N125 | | MSO-N150 | MSO-N180 | MSO-N220 | MSO-N300 | MSO-N400 |
| 18.5 (15) | 22 (19) | 30 (22) | 37 (30) | | 45 (37) | 55 (45) | 75 (55) | 90 (75) | 125 (110) |
| 30 (30) | 45 (37) | 55 (45) | 60 (60) | | 75 (75) | 90 (90) | 132 (110) | 160 (150) | 220 (200) |
| 37 (30) | 45 (45) | 55 (45) | 60 (60) | | 90 (90) | 110 (110) | 132 (132) | 160 (160) | 225 (200) |
| 2a2b (4a4b) | 2a2b (4a4b) | 2a2b (4a4b) | 2a2b (4a4b) | | 2a2b (4a4b) | 2a2b (4a4b) | 2a2b (4a4b) | 2a2b (4a4b) | 2a2b (4a4b) |
| | | | | | | | | | |
| 1.1 | 2.2 | 2.2 | 3.5 | | 4.6 | 8 | 8 | 11.5 | 12 |
| ○ | ● | ○ | | | | | | | |
| MSO-T65 | MSO-T80 | MSO-T100 | | | | | | | |
| 18.5 (15) | 22 (19) | 30 (22) | | | | | | | |
| 30 (30) | 45 (37) | 55 (45) | | | | | | | |
| 37 (30) | 45 (45) | 55 (45) | | | | | | | |
| 2a2b (4a4b) | 2a2b (4a4b) | 2a2b (4a4b) | | | | | | | |
| | | | | | | | | | |
| 1.1 | 1.1 | 2.2 | | | | | | | |

Note 1. The mounting compatibility symbols have the following indications.

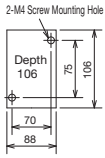
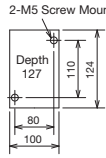
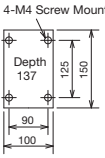
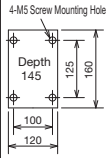
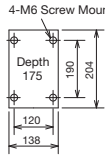
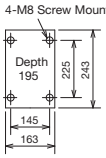
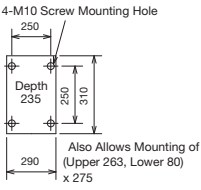
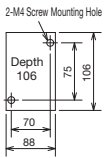
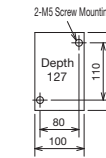
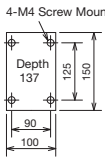
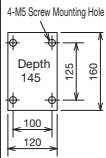
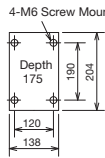
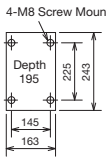
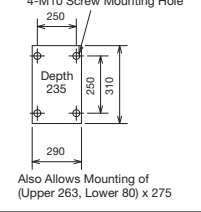
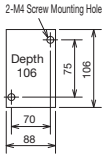
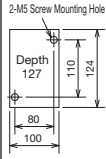
- : Compatible
- : Can be made compatible by adding an MSO-T/N Series-dedicated adapter (available as a separate part)
- ◇ : Can be made compatible by incorporating an MSO-N Series-dedicated adapter (available as a separate part) into the mounting plate of MSO-A Series *
- ◆ : Can be made compatible by directly incorporating MSO-N□XA into MSO-A Series
- x : Not compatible

※ The adapters for S-T12 and SR-T5 can be used only for products where the manufacturing numbers on the front is “14Y **” or “14Z **”, or products where the first 2-digit number is equal to or greater than “15” (some of those manufactured in October 2014, and those manufactured from November on).

Note 2. Although MSO-N600 is not manufactured, a non-enclosed type magnetic starter can be configured by combining a S-N600 magnetic contactor, TH-N600 thermal overload relay, and current transformer.

S-K, S-N and S-T Magnetic Contactors Comparison List (Category AC-3)

| Model Name | | S-K10 | S-K11 | S-K12 | S-K18 | S-K20 | S-K21 | S-K25 | — | S-K35 | S-K50 |
|---|--|-------------------|-------------------|-------------------|-----------------|-------------------|-----------------|-----------------|-----------------|-----------------------|----------------|
| Rated Operating Current (A) AC-3 | 200 to 240 V | 11 (11) | 13 (13) | 13 (13) | 18 (18) | 22 (20) | 22 (20) | 30 (26) | — | 40 (35) | 55 (50) |
| | 380 to 440 V | 9 (7) | 12 (9) | 12 (9) | 16 (13) | 22 (20) | 22 (20) | 30 (24) | — | 40 (32) | 46 (46) |
| | 500 V | 7 (6) | 9 (9) | 9 (9) | 13 (13) | 17 (17) | 17 (17) | 24 (19) | — | 32 (24) | 33 (33) |
| Conventional Free Air Thermal Current (A) | | 20 | 20 | 20 | 25 | 32 | 32 | 50 | — | 60 | 80 |
| Auxiliary Contact Arrangement (Maximum) | | 1a (3a2b) | 1a (3a2b) | 1a1b, 2a | (2a2b) | 1a1b, 2a | 2a2b (4a4b) | 2a2b (4a4b) | — | 2a2b (4a4b) | 2a2b (4a4b) |
| S-K Series | Outline Drawings (mm) | | | | | | | | | | |
| | Terminal Screw (Main) | M3.5 | M3.5 | M3.5 | M4 | M4 | M4 | M5 | — | M5 | M6 |
| | Applicable Crimp Lug (Main) | 1.25-3.5 to 2-3.5 | 1.25-3.5 to 2-3.5 | 1.25-3.5 to 2-3.5 | 1.25-4 to 5.5-4 | 1.25-4 to 5.5-4 | 1.25-4 to 5.5-4 | 1.25-5 to 14-5 | — | 1.25-5 to 14-5 | 1.25-6 to 22-6 |
| | Weight (kg) | 0.28 | 0.28 | 0.32 | 0.32 | 0.5 | 0.65 | 0.76 | — | 0.76 | 1.1 |
| | Mounting Compatibility With S-T Series | ◇ | — | ◇ | — | ◇ | ○ | x | — | x | ◇ |
| Model Name | | S-N10 | S-N11 | S-N12 | S-N18 | S-N20 | S-N21 | S-N25 | — | S-N35 | S-N50 |
| Rated Operating Current (A) AC-3 | 200 to 240 V | 11 (11) | 13 (13) | 13 (13) | 18 (18) | 22 (20) | 22 (20) | 30 (26) | — | 40 (35) | 55 (50) |
| | 380 to 440 V | 9 (7) | 12 (9) | 12 (9) | 16 (13) | 22 (20) | 22 (20) | 30 (25) | — | 40 (32) | 50 (48) |
| | 500 V | 7 (6) | 9 (9) | 9 (9) | 13 (13) | 17 (17) | 17 (17) | 24 (20) | — | 32 (26) | 38 (38) |
| Conventional Free Air Thermal Current (A) | | 20 | 20 | 20 | 25 | 32 | 32 | 50 | — | 60 | 80 |
| Auxiliary Contact Arrangement (Maximum) | | 1a (3a2b) | 1a (3a2b) | 1a1b (3a3b) | (2a2b) | 1a1b (3a3b) | 2a2b (4a4b) | 2a2b (4a4b) | — | 2a2b (4a4b) | 2a2b (4a4b) |
| S-N Series | Outline Drawings (mm) | | | | | | | | | | |
| | Terminal Screw (Main) | M3.5 | M3.5 | M3.5 | M4 | M4 | M4 | M5 | — | M5 | M6 |
| | Applicable Crimp Lug (Main) | 1.25-3.5 to 2-3.5 | 1.25-3.5 to 2-3.5 | 1.25-3.5 to 2-3.5 | 1.25-4 to 5.5-4 | 1.25-4 to 5.5-4 | 1.25-4 to 5.5-4 | 1.25-5 to 14-5 | — | 1.25-5 to 14-5 | 1.25-6 to 22-6 |
| | Weight (kg) | 0.3 | 0.3 | 0.32 | 0.33 | 0.38 | 0.4 | 0.52 | — | 0.52 | 0.75 |
| | Mounting Compatibility With S-T Series | ◇ | — | ◇ | — | ◇ | ○ | ◇ | — | ○ | ◇ |
| Model Name | | S-T10 | — | S-T12 | S-T20 | S-T21 | S-T25 | S-T32 | S-T35 | S-T50 | |
| Rated Operating Current (A) AC-3 | 200 to 240 V | 11 (11) | — | 13 (13) | 18 (18) | 25 (20) | 30 (26) | 32 (32) | 40 (35) | 55 (50) | |
| | 380 to 440 V | 9 (7) | — | 12 (9) | 18 (18) | 23 (20) | 30 (25) | 32 (32) | 40 (32) | 50 (48) | |
| | 500 V | 7 (6) | — | 9 (9) | 17 (17) | 17 (17) | 24 (20) | 24 (20) | 32 (26) | 38 (38) | |
| Conventional Free Air Thermal Current (A) | | 20 | — | 20 | 20 | 32 | 32 | 32 | 60 | 80 | |
| Auxiliary Contact Arrangement (Maximum) | | 1a (3a2b) | — | 1a1b (3a3b) | 1a1b (3a3b) | 2a2b (4a4b) | 2a2b (4a4b) | — (2a2b) | 2a2b (4a4b) | 2a2b (4a4b) | |
| S-T Series | Outline Drawings (mm) | | | | | | | | | | |
| | Terminal Screw (Main) | M3.5 | — | M3.5 | — | M3.5 | M4 | M4 | M4 | M5 | |
| | Applicable Crimp Lug (Main) | 1.25-3.5 to 2-3.5 | — | 1.25-3.5 to 2-3.5 | — | 1.25-3.5 to 2-3.5 | 1.25-4 to 5.5-4 | 1.25-4 to 5.5-4 | 1.25-4 to 5.5-4 | 1.25-5 to 14-5, 22-S5 | |
| | Weight (kg) | 0.25 | — | 0.27 | — | 0.27 | 0.41 | 0.41 | 0.36 | 0.55 | 0.55 |

| S-K65 | S-K80 | S-K95 | S-K100 | S-K125 | S-K150 | S-K180 | S-K220 | S-K300 | S-K400 | S-K600 | S-K800 |
|---|---|---|---|-----------|---|---|-----------------|---|-----------------|---|-----------------|
| 65 (65) | 85 (80) | 105 (93) | 105 (100) | 125 (125) | 150 (150) | 180 (180) | 250 (220) | 300 (300) | 400 (400) | 630 (630) | 800 (800) |
| 62 (62) | 85 (75) | 105 (93) | 105 (100) | 120 (120) | 150 (150) | 180 (180) | 250 (220) | 300 (300) | 400 (400) | 630 (630) | 800 (800) |
| 45 (45) | 75 (75) | 85 (75) | 85 (80) | 90 (90) | 140 (140) | 180 (180) | 200 (200) | 250 (250) | 350 (350) | 500 (500) | 720 (720) |
| 100 | 135 | 150 | 150 | 150 | 200 | 260 | 260 | 350 | 450 | 660 | 800 |
| 2a2b(4a4b) | 2a2b(4a4b) | 2a2b(4a4b) | 2a2b(4a4b) | | 2a2b(4a4b) | 2a2b(4a4b) | 2a2b(4a4b) | 2a2b(4a4b) | 2a2b(4a4b) | 2a2b(4a4b) | 2a2b(4a4b) |
|  |  | |  | |  |  | |  | |  | |
| M6 | M6 | M6 | M8 | | M8 | M10 | M10 | M12 | M12 | M16 | M16 |
| 1.25-6 to 22-6 | 1.25-6 to 60-6 | 1.25-6 to 60-6 | 5.5-8 to 60-8 | | 8-8 to 100-8 | 14-10 to 150-10 | 14-10 to 150-10 | 22-12 to 200-12 | 22-12 to 200-12 | 80-16 to 325-16 | 80-16 to 325-16 |
| 1.1 | 1.8 | 1.8 | 2.7 | | 3.2 | 5.5 | 5.5 | 9.5 | 9.5 | 24 | 24 |
| ○ | ◇ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| S-N65 | S-N80 | S-N95 | S-N125 | | S-N150 | S-N180 | S-N220 | S-N300 | S-N400 | S-N600 | S-N800 |
| 65 (65) | 85 (80) | 105 (100) | 125 (125) | | 150 (150) | 180 (180) | 250 (220) | 300 (300) | 400 (400) | 630 (630) | 800 (800) |
| 65 (65) | 85 (80) | 105 (93) | 120 (120) | | 150 (150) | 180 (180) | 250 (220) | 300 (300) | 400 (400) | 630 (630) | 800 (800) |
| 60 (45) | 75 (75) | 85 (75) | 90 (90) | | 140 (140) | 180 (180) | 200 (200) | 250 (250) | 350 (350) | 500 (500) | 720 (720) |
| 100 | 135 | 150 | 150 | | 200 | 260 | 260 | 350 | 450 | 660 | 800 |
| 2a2b(4a4b) | 2a2b(4a4b) | 2a2b(4a4b) | 2a2b(4a4b) | | 2a2b(4a4b) | 2a2b(4a4b) | 2a2b(4a4b) | 2a2b(4a4b) | 2a2b(4a4b) | 2a2b(4a4b) | 2a2b(4a4b) |
|  |  | |  | |  |  | |  | |  | |
| M6 | M6 | M6 | M8 | | M8 | M10 | M10 | M12 | M12 | M16 | M16 |
| 1.25-6 to 22-6 | 1.25-6 to 60-6 | 1.25-6 to 60-6 | 5.5-8 to 60-8 | | 8-8 to 100-8 | 14-10 to 150-10 | 14-10 to 150-10 | 22-12 to 200-12 | 22-12 to 200-12 | 80-16 to 325-16 | 80-16 to 325-16 |
| 0.75 | 1.7 | 1.7 | 2.7 | | 3.3 | 5.5 | 5.5 | 9.0 | 9.5 | 24 | 24 |
| ○ | ◇ | ○ | | | | | | | | | |
| S-T65 | S-T80 | S-T100 | | | | | | | | | |
| 65 (65) | 85 (80) | 105 (100) | | | | | | | | | |
| 65 (65) | 85 (80) | 105 (93) | | | | | | | | | |
| 60 (45) | 75 (75) | 85 (75) | | | | | | | | | |
| 100 | 120 | 150 | | | | | | | | | |
| 2a2b(4a4b) | 2a2b(4a4b) | 2a2b(4a4b) | | | | | | | | | |
|  | |  | | | | | | | | | |
| M6 | | M6 | | | | | | | | | |
| 1.25-6 to 22-6, 38-S6, 60-S6 | | 1.25-6 to 60-6 | | | | | | | | | |
| 0.75 | | 0.75 | | | | | | | | | |
| | | 1.7 | | | | | | | | | |

Note 1. The mounting compatibility symbols have the following indications.

- : Compatible
- : S-N□XA can be replaced as is
- ◇ : Can be made compatible by adding an S-T/N Series-dedicated adapter (available as a separate part) *
- x : Not compatible

※ The adapters for S-T12 and SR-T5 can be used only for products where the manufacturing numbers on the front is "14Y **" or "14Z **", or products where the first 2-digit number is equal to or greater than "15" (some of those manufactured in October 2014, and those manufactured from November on).

13.3 Compatibility of New and Old Thermal Overload Relays and Magnetic Contactors When Used In Combination

13.3.1 Compatibility of New (MS-T Series) and Old (MS-N Series) When Used In Combination

Whether or not each thermal overload relay and magnetic contactor from the MS-T/MS-N Series can be combined is shown in the table below.

(1) Mounting Compatibility of MS-N Series Magnetic Contactors and MS-T Series Thermal Overload Relays

| Magnetic Contactors | Thermal Overload Relays | Compatibility | Combination Method |
|---------------------|-------------------------|----------------------|---|
| S-N10 | TH-T18(KP) | None | (The mounting portion of the thermal overload relay does not match) |
| S-N11/SD-N11 | TH-T18(KP) | None | (The mounting portion of the thermal overload relay does not match) |
| S-N12/SD-N12 | TH-T18(KP) | None | (The mounting portion of the thermal overload relay does not match) |
| S-N20 | TH-T25(KP) | None | (The mounting portion of the thermal overload relay does not match) |
| S-N21/SD-N21 | TH-T25(KP) | None | (The mounting portion of the thermal overload relay does not match) |
| S-N25 | TH-T25(KP) | None | (The mounting portion of the thermal overload relay does not match) |
| S-N35/SD-N35 | TH-T25(KP)/T50(KP) | None | (The mounting portion of the thermal overload relay does not match) |
| S-N50/SD-N50 | TH-T65(KP) | Yes ^{Note1} | Can be combined using the MSO(D)-N50/N65 connecting conductors and mounting brackets. |
| S-N65/SD-N65 | TH-T65(KP) | Yes | Can be combined using the MSO(D)-N50/N65 connecting conductors and mounting brackets. |
| S-N80 | TH-T65(KP)/T100(KP) | Yes | Can be combined using the MSO-N80/N95 connecting conductors and mounting brackets. |
| SD-N80 | TH-T65(KP)/T100(KP) | Yes | Can be combined using the MSOD-N80/N95 connecting conductors and mounting brackets. |
| S-N95 | TH-T65(KP)/T100(KP) | Yes | Can be combined using the MSO-N80/N95 connecting conductors and mounting brackets. |
| SD-N95 | TH-T65(KP)/T100(KP) | Yes | Can be combined using the MSOD-N80/N95 connecting conductors and mounting brackets. |

Note 1. Cannot be combined with TH-T25(KP)/T50(KP).

(2) Mounting Compatibility of MS-T Series Magnetic Contactors and MS-N Series Thermal Overload Relays

| Magnetic Contactors | Thermal Overload Relays | Compatibility | Combination Method |
|---------------------|-------------------------|----------------------|---|
| S-T10 | TH-N12(KP) | None | (The mounting portion of the thermal overload relay does not match) |
| S-T12/SD-T12 | TH-N12(KP) | None | (The mounting portion of the thermal overload relay does not match) |
| S-T20/SD-T20 | TH-N20(KP) | None | (Different outline drawings) |
| S-T21/SD-T21 | TH-N20(KP) | None | (The mounting portion of the thermal overload relay does not match) |
| S-T25 | TH-N20(TA)(KP) | None | (The mounting portion of the thermal overload relay does not match) |
| S-T35/SD-T35 | TH-N20(TA)(KP) | None | (The mounting portion of the thermal overload relay does not match) |
| S-T50/SD-T50 | TH-N60(KP) | None | (Different outline drawings) |
| S-T65/SD-T65 | TH-N60(KP) | Yes | Can be combined using the MSO(D)-N50/N65 connecting conductors and mounting brackets. |
| S-T80/SD-T80 | TH-N60(TA)(KP) | Yes ^{Note2} | Can be combined using the MSO(D)-N50/N65 connecting conductors and mounting brackets. |
| S-T100 | TH-N60(TA)(KP) | Yes | Can be combined using the MSO-N80/N95 connecting conductors and mounting brackets. |
| SD-T100 | TH-N60(TA)(KP) | Yes | Can be combined using the MSOD-N80/N95 connecting conductors and mounting brackets. |

Note 2. Cannot be combined using the MSO-N80/N95 or MSOD-N80/N95 connecting conductors and mounting brackets.

Note 3. If connecting conductors and mounting brackets are required, optional connecting conductor kits are also available.

- For S(D)-T65/T80 Frame (AC/DC Operation) : BH559N350
- For S-T100 Frame (AC Operation) : BH569N350
- For SD-T100 Frame (DC Operation) : BH569N352

13.3.2 Compatibility of New (MS-N series) and Old (MS-K series) When Used In Combination

Whether or not each thermal overload relay and magnetic contactor from the MS-N/MS-K Series can be combined is shown in the table below.

(1) Mounting Compatibility of MS-K Series Magnetic Contactors and MS-N Series Thermal Overload Relays

| Magnetic Contactors | Thermal Overload Relays | Compatibility | Combination Method |
|-----------------------------|-------------------------|---------------|---|
| S-K125,K150 SD-K125,K150 | TH-N120(TA)(KP) | Yes | Can be combined using the K Series connecting conductors and mounting brackets. (Note 1) |
| S-K180/K220 SD-K220 | TH-N220RH(KP) | Yes | Use the screws that come with the thermal overload relay. |
| S-K300/K400 SD-K300/K400 | TH-N400RH(KP) | Yes | Use the screws that come with the thermal overload relay. |

(2) Mounting Compatibility of MS-N Series Magnetic Contactors and MS-K Series Thermal Overload Relays

| Magnetic Contactors | Thermal Overload Relays | Compatibility | Combination Method |
|-----------------------------|-------------------------|---------------|---|
| S-N125,N150 SD-N125,N150 | TH-K120(TA)(KP) | Yes | Can be combined using the K Series connecting conductors and mounting brackets. (Note 1) |
| S-N180/N220 SD-N220 | TH-K220RH(KP) | Yes | Use the screws fixing the currently attached thermal overload relay. |
| S-N300/N400 SD-N300/N400 | TH-K400RH(KP) | Yes | Use the screws fixing the currently attached thermal overload relay. |

Note 1. If connecting conductors and mounting brackets are required, optional connecting conductor kits are also available.

- For 125 A Frame (AC/DC Operation) : BH579N355
- For 150 A Frame (AC/DC Operation) : BH589N355

13.4 Compatibility of New and Old Optional Units When Used In Combination

13.4.1 Compatibility of New (MS-T Series) and Old (MS-N Series) When Used In Combination

The combinability of MS-T/MS-N Series optional units, magnetic contactors, contactor relays, and thermal overload relays is shown in the following table. For more information on the optional units, refer to page 177.

| Product Name | MS-T Series | | | | MS-N Series | | | | |
|--|-------------------|--|-------------------------------|--|-------------------|----------------------------|------------------|---------------------------|------------|
| | Unit Model Name | Application to MS-N Series | | | Unit Model Name | Application to MS-T Series | | | |
| | | AC Operated | DC Operated | Mechanically Latched Type | | AC Operated | DC Operated | Mechanically Latched Type | |
| Auxiliary Contacts | UT-AX2,AX4 | x | x | x | UN-AX2,AX4 | S-T65, T80 | SD-T65, T80 | x | |
| | UT-AX11 | x | x | x | UN-AX11 | S-T65, T80 | SD-T65, T80 | SL(D)-T65, T80 | |
| Mechanical Interlocks | UT-ML11 | x | x | x | UN-AX80 | S-T100 | SD-T100 | SL(D)-T100 | |
| | UT-ML20 | x | x | x | UN-ML11 | x | x | x | |
| Surge Absorbers for Operation Coils | UT-SA13 | x | SRD-N4,N5,N8 SD-N11 to N35 | SRL(D)-N4 Closing Coil SL(D)-N21 Closing Coil | UN-ML21 | S-T21 to T80 | SD-T21 to T80 | SL(D)-T21 to T80 | |
| | UT-SA21 | SR-N4,N5,N8 S-N10 to N35 S-N38,N48 | | | x | UN-ML80 | S-T100 | SD-T100 | SL(D)-T100 |
| | UT-SA22 | | | | x | UN-SA13 | x | x | x |
| | UT-SA23 | | | | x | UN-SA21 | x | x | x |
| | UT-SA25 | | x | UN-SA22 | x | x | x | | |
| | | | | | UN-SA23 | x | x | x | |
| | | | | | UN-SA25 | x | x | x | |
| | | | | | UN-SA721 | x | SD-T65, T80 | SL(D)-T21 to T80*1 | |
| | | | | | UN-SA712 | x | x | SL(D)-T21 to T50*1 | |
| | | | | | UN-SA722 | x | SD-T65, T80 | SL(D)-T65, T80*1 | |
| | | | | UN-SA713 | x | SD-T65, T80 | SLD-T21 to T80*1 | | |
| Surge Absorbers for Main Circuits | UT-SA3320 | x | x | x | UN-SA723 | x | x | SL-T21 to T80*1 | |
| | UT-SA3332 | x | x | x | UN-SA725 | x | SD-T65, T80 | SL(D)-T21 to T80*1 | |
| DC/AC Interfaces for Operation Coil | | | | | UN-SA3310 | x | x | x | |
| | | | | | UN-SA3320 | x | x | x | |
| | | | | | UN-SA33 | S-T10 to T100 | SD-T12 to T100 | SL(D)-T21 to T100 | |
| | | | | | UN-SY11 | S-T10 to T100 | x | x | |
| | | | | | UN-SY12 | S-T10 to T100 | x | x | |
| | | | | | UN-SY21(CX) | x | x | x | |
| Live Part Protection Covers | UT-CW800 | S-N50,N65 | SD-N50,N65 | x | UN-SY22(CX) | x | x | x | |
| | UT-CW655 | | TH-N60 | | UN-SY31 | S-T65, T80 | x | x | |
| Manual Operation Prevention Covers | UT-CV107 | x | x | x | UN-SY32 | S-T65, T80 | x | x | |
| Main Circuit Conductor Kits (For Reversing) | UT-SD10 | x | x | x | UN-CZ□ | S-T65 to T100 | SD-T65 to T100 | SL(D)-T65 to T100 | |
| | UT-SD20 | x | x | x | UN-CV117 | x | x | x | |
| | | | | | UN-SD10CX | x | x | x | |
| | | | | | UN-SD21CX | x | x | x | |
| | | | | | UN-SD18CX | S-2xT32 | SD-2xT32 | x | |
| Main Circuit Conductor Kits (For Crossover) | UT-SG10 | x | x | x | UN-SD25CX | S-2xT35, T50 | SD-2xT35, T50 | SL(D)-2xT35, T50 | |
| | UT-SG20 | x | x | x | UN-SD50 | S-2xT65, T80 | SD-2xT65, T80 | SL(D)-2xT65, T80 | |
| | | | | | UN-SD80 | S-2xT100 | SD-2xT100 | SL(D)-2xT100 | |
| | | | | | UN-SG10CX | x | x | x | |
| | | | | | UN-SG21CX | x | x | x | |
| Main Circuit Conductor Kits (For 3-Pole Short-Circuit) | | | | | UN-SG18CX | S-2xT32 | SD-2xT32 | x | |
| Main Circuit Conductor Kits (For 2-Pole Short-Circuit) | UT-YD20 | SR-N4,N5,N8 S-N10 to N12 | SRD-N4,N5,N8 SD-N11,N12 | SRL(D)-N4 | UN-SG25CX | S-2xT35, T50 | SD-2xT35, T50 | SL(D)-2xT35, T50 | |
| 3-Pole Array Connection Units | UT-YY20 | x | x | x | UN-SG50 | S-2xT65, T80 | SD-2xT65, T80 | SL(D)-2xT65, T80 | |
| | | | | | UN-SG80 | S-2xT100 | SD-2xT100 | SL(D)-2xT100 | |
| | | | | | UN-YG21 to YG80 | S-T21 to T100 | SD-T21 to T100 | SL(D)-T21 to T100 | |
| Thermal Overload Relay Misoperation Prevention Covers | | | | | UN-YY21 | S-T21 | SD-T21 | SL(D)-T21 | |
| | | | | | UN-YY35 | S-T35, T50 | SD-T35, T50 | SL(D)-T35, T50 | |
| Thermal Overload Relays Reset Releases | UT-RR204 to RR704 | | x | | UN-YY50 | S-T65, T80 | SD-T65, T80 | SL(D)-T65, T80 | |
| | | | | | UN-YY80 | S-T100 | SD-T100 | SL(D)-T100 | |
| Thermal Overload Relays Fluorescent Display Lamps | | | | | UN-CV203 | | TH-T25, T50 | | |
| | | | | | UN-CV603 | | TH-T65, T100 | | |
| Thermal Overload Relays With Independent Mounting | | | | | UN-RR205 to RR705 | | x | | |
| | | | | | UN-RR200 to RR700 | | TH-T25, T50 | | |
| | | | | | UN-RR206 to RR706 | | TH-T65, T100 | | |
| | | | | | UN-TL12 | | TH-T18 | | |
| | | | | | UN-TL20 | | TH-T25, T50 | | |
| | | | | | UN-TL60 | | TH-T65, T100 | | |
| | UT-HZ18 | | x | | UN-HZ12 | | x | | |
| | | | | | UN-RM20 | | TH-T25 | | |

Note 1. x indicates inapplicability.
Note 2. *1 can be applied to the tripping coil.

13.4.2 Compatibility of New (MS-N series) and Old (MS-K series) When Used In Combination

The combinability of MS-N/MS-K Series optional units, magnetic contactors, contactor relays, and thermal overload relays is shown in the following table. For more information on the optional units, refer to page 177.

| Product Name | MS-N Series | | | | MS-K Series | | | |
|--|-------------------|----------------------------|-------------------|---------------------------|-------------------|----------------------------|-------------------|---------------------------|
| | Unit Model Name | Application to MS-K Series | | | Unit Model Name | Application to MS-N Series | | |
| | | AC Operated | DC Operated | Mechanically Latched Type | | AC Operated | DC Operated | Mechanically Latched Type |
| Auxiliary Contacts | UN-AX80 | S-K125 | SD-K125 | SL(D)-K125 | UA-AX80 | S-N125 | SD-N125 | SL(D)-N125 |
| | UN-AX150 | S-K150 to K400 | SD-K150 to K400 | SL(D)-K150 to K400 | UA-AX150 | S-N150 to N400 | SD-N150 to N400 | SL(D)-N150 to N400 |
| | UN-AX600 | S-K600,K800 | SD-K600,K800 | SL(D)-K600,K800 | UA-AX600 | S-N600,N800 | SD-N600,N800 | SL(D)-N600,N800 |
| Mechanical Interlocks | UN-ML80 | S-K125 | SD-K125 | SL(D)-K125 | UA-ML80 | S-N125 | SD-N125 | SL(D)-N125 |
| | UN-ML150 | S-K150 | SD-K150 | SL(D)-K150 | UA-ML150 | S-N150 | SD-N150 | SL(D)-N150 |
| | UN-ML220 | S-K180 to K400 | SD-K220 to K400 | SL(D)-K220 to K400 | UA-ML220 | S-N180 to N400 | SD-N220 to N400 | SL(D)-N220 to N400 |
| Surge Absorbers for Main Circuits | UN-SA33 | S-K125 to K800 | SD-K125 to K800 | SL(D)-K125 to K800 | UA-SA33 | S-N125 to N800 | SD-N125 to N800 | SL(D)-N125 to N800 |
| DC/AC Interfaces for Operation Coil | UN-SY11 | S-K125 to K400 | — | — | UA-SY11 | S-N125 to N400 | — | — |
| | UN-SY12 | S-K125 to K400 | — | — | UA-SY12 | S-N125 to N400 | — | — |
| Main Circuit Conductor Kits (For Reversing) | UN-SD80 to SD600 | S-2xK125 to K800 | SD-2xK125 to K800 | SL(D)-2xK125 to K800 | UA-SD80 to SD600 | S-2xN125 to N800 | SD-2xN125 to N800 | SL(D)-2xN125 to N800 |
| Main Circuit Conductor Kits (For Crossover) | UN-SG80 to SG600 | S-2xK125 to K800 | SD-2xK125 to K800 | SL(D)-2xK125 to K800 | UA-SG80 to SG600 | S-2xN125 to N800 | SD-2xN125 to N800 | SL(D)-2xN125 to N800 |
| Main Circuit Conductor Kits (For 3-Pole Short-Circuit) | UN-YG21 to YG300 | S-K125 to K400 | SD-K125 to K400 | SL(D)-K125 to K400 | UA-YG21 to YG300 | S-N125 to N400 | SD-N125 to N400 | SL(D)-N125 to N400 |
| Main Circuit Conductor Kits (For 2-Pole Short-Circuit) | UN-YD11 to YD300 | S-K125 to K400 | SD-K125 to K400 | SL(D)-K125 to K400 | UA-YD11 to YD300 | S-N125 to N400 | SD-N125 to N400 | SL(D)-N125 to N400 |
| Thermal Overload Relays | UN-CV203 | | x | | UA-CV203 | | TH-N120 to N600 | |
| Misoperation Prevention Covers | UN-CV603 | | TH-K120 to K600 | | | | | |
| Thermal Overload Relays Reset Releases | UN-RR200 to RR700 | | x | | UA-RR200 to RR700 | | TH-N120 to N600 | |
| | UN-RR206 to RR706 | | TH-K120 to K600 | | | | | |
| Thermal Overload Relays | UN-TL20 | | x | | UA-TL20 | | TH-N120 to N600 | |
| Fluorescent Display Lamps | UN-TL60 | | TH-K120 to K600 | | | | | |

Note 1. x indicates inapplicability.

Note 2. *1 can be applied to the tripping coil.

13.5 MS-T Series Changes

The main contents of what has been changed from MS-T Series to MS-N Series are summarized.

For more information regarding mounting compatibility, refer to the following. It is to be noted that components such as contacts and operation coils are for respective series only, and have no compatibility.

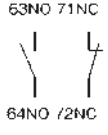
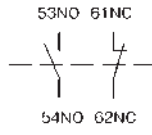
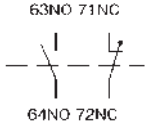
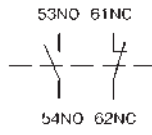
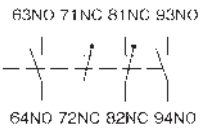
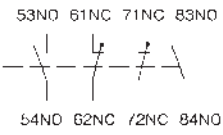
- Magnetic Starters and Magnetic Contactors Page 358 (for contactor relays, T5/T9 is similarly compatible with magnetic contactor T12.)

● Product Marking

(1) Terminal Number

| Item | MS-T Target Model Names (Typical Model) | MS-T Series | MS-N Series | Remarks |
|--|---|--|--|---|
| Auxiliary Terminal Number (Magnetic Contactor) | S-T10,T12,T20, SD-T12,T20 | Make Contacts: 13NO-14NO Break Contacts: 21NC-22NC | Make Contacts: 13NO-14NO Break Contacts: 21NC-22NC | NO (Normally Open): Make Contact NC (Normally Closed): Break Contact |
| | S-T21 to T35, SD-T21 to T35 | Make Contacts: 13NO-14NO 43NO-44NO Break Contacts: 21NC-22NC 31NC-32NC | Make Contacts: 13NO-14NO 43NO-44NO Break Contacts: 21NC-22NC 31NC-32NC | |
| | S-T50 to T100 SD-T50 to T100 | Make Contacts: 13NO-14NO 43NO-44NO Break Contacts: 21NC-22NC 31NC-32NC | Make Contacts: 13 (13) NO-14 (14) NO 43 (23) NO-44 (24) NO Break Contacts: 21 (31) NC-22 (32) NC 31 (41) NC-32 (42) NC | |
| Auxiliary Terminal Number (Contactor Relay) | SR-T5 SRD-T5 | <ul style="list-style-type: none"> · Ones Place of the Number for Make Contacts: 3-4 Break Contacts: 1-2 · Tens Place of the Number Changes to 1 to 5 E.g.: SR-T5 3a2b | <ul style="list-style-type: none"> · Ones Place of the Number for Make Contacts: 3-4 Break Contacts: 1-2 · Tens Place of the Number Changes to 0 to 4 E.g.: SR-N5 3a2b | Complies With the International Standards IEC |
| | | <ul style="list-style-type: none"> · Ones Place of the Number for Make Contacts: 3-4, Break Contacts: 1-2 · Tens Place of the Number Changes to 1 to 9 Example: SR-T9 5a4b | <ul style="list-style-type: none"> · Ones Place of the Number for Make Contacts: 3-4 Break Contacts: 1-2 · Tens Place of the Number Changes to 1 to 8 E.g.: SR-N8 5a3b | |
| Coil Terminal Number | S-T10 to T35 SD-T12 to T35 | A1, A2 (Embossed Characters) | A1, A2 (Simultaneous Printing With Rated Coil Display) | |
| | S-T50 to T100 SD-T50 to T100 | A1, A2 (Embossed Characters) | A1, A2 Embossed Characters) | |

13 Supplementary Information

| Item | | MS-T Target Model Names (Typical Model) | MS-T Series | MS-N Series | Remarks |
|---------------------------------|--|---|---|--|---------|
| Display Content | Auxiliary Terminal Number (Auxiliary Contact Unit) | UT-AX11 | <ul style="list-style-type: none"> Ones Place of the Number for Make Contacts: 3-4 Break Contacts: 1-2 Tens Place of the Number Changes to 6 to 7 E.g.: UT-AX11 1a1b (When mounted on the left side of the body)  | <ul style="list-style-type: none"> Ones Place of the Number for Make Contacts: 3-4 Break Contacts: 1-2 Tens Place of the Number Changes to 5 to 6 E.g.: UN-AX11 1a1b (When mounted on the left side of the body)  | |
| | | UT-AX2 | <ul style="list-style-type: none"> Ones Place of the Number for Make Contacts: 3-4 Break Contacts: 1-2 Tens Place of the Number Changes to 6 to 7 E.g.: UT-AX2 1a1b  | <ul style="list-style-type: none"> Ones Place of the Number for Make Contacts: 3-4 Break Contacts: 1-2 Tens Place of the Number Changes to 5 to 6 E.g.: UN-AX2 1a1b  | |
| | | UT-AX4 | <ul style="list-style-type: none"> Ones Place of the Number for Make Contacts: 3-4 Break Contacts: 1-2 Tens Place of the Number Changes to 6 to 9 E.g.: UT-AX4 2a2b  | <ul style="list-style-type: none"> Ones Place of the Number for Make Contacts: 3-4 Break Contacts: 1-2 Tens Place of the Number Changes to 5 to 8 E.g.: UN-AX4 2a2b  | |
| Display Position | Terminal Number | S-T10 to T20 SD-T12 to T20 SR-T5/T9 SRD-T5/T9 UT-AX2, AX4 | · Laser printed on the product front for both the body and auxiliary contact unit | · For the body (lower part of SR-N8), printed on the product front in blue · For the upper part of SR-N8 (auxiliary contact unit), the terminal number is printed on the paper name plate in blue | |
| | | UT-AX11 | · The terminal number is printed on a paper name plate on the product front | · The terminal number is printed on the paper name plate in blue | |
| | | S-T21 to T35 SD-T21 to T35 | · Laser printed on the front of the product | · Printed on the front of the product in blue | |
| | | S-T50 SD-T50 | · Laser printed on the front of the product | · Printed on the name plate on the product front in blue | |
| S-T65 to T100 SD-T65 to T100 | · Printed on the name plate on the product front in gray | · Printed on the name plate on the product front in blue | | | |

(2) Rating

| Item | MS-T Target Model Names (Typical Model) | MS-T Series | MS-N Series | Remarks |
|---------------------------------|---|--|--|---|
| Display Method | Main Circuit Rating | S-T10 to T35 SD-T12 to T35 SR-T5, T9 SRD-T5, T9 | All laser printed on the side | <ul style="list-style-type: none"> The lth rating (A) is printed on the front bottom left Other ratings are displayed on a name plate on the side |
| | | S-T50 SD-T50 | Laser printed on the side | Printed on the name plate on the front in gray |
| | | S-T-65 to T100 SD-T65 to T100 | Printed on the name plate on the front in gray | Printed on the name plate on the front in gray |
| | Coil Rating | S-T10 to T35 SD-T12 to T35 SR-T5, T9 SRD-T5, T9 | All laser printed (No color-coding) | <ul style="list-style-type: none"> The designation AC100V/200V has all rated ranges color-coded (between the power supply side coil terminals) <ul style="list-style-type: none"> 100 V 50 Hz 100 to 110V 60 Hz 200 V 50 Hz Other ratings have all rated ranges printed on a name plate in white SD and SRD are printed in black on blue |
| | | S-T50 SD-T50 | All laser printed (No color-coding) | <ul style="list-style-type: none"> The designation AC100V/200V is printed in black on color-coded nameplates |
| S-T65 to T100 SD-T65 to T100 | | All printed in black on white nameplates | <ul style="list-style-type: none"> Other ratings are printed in black on white nameplates SD is printed in black on blue | |
| Coil Polarity (+ -) | SD-T12 to T32 SRD-T5, T9 | Laser printed between the coil terminals | (no marking as it has no polarity) | |

(3) Model Names

| Item | MS-T Target Model Names (Typical Model) | MS-T Series | MS-N Series | Remarks |
|----------------|---|---|--|---|
| Display Method | Model Name | S-T10 to T35 SD-T12 to T35 SR-T5, T9 SRD-T5, T9 UT-AX2, AX4 | Laser printed on the product front left | Printed on the front left center of the product in blue |
| | | S-T50 SD-T50 | Laser printed on the product front left | Printed on the name plate on the product front in blue |
| | | S-T65 to T100 SD-T65 to T100 | Printed on the name plate on the product front in gray | Printed on the name plate on the product front in blue |
| | | UT-AX11 | Printed on the paper name plate on the side of the product | Printed on the front center of the product in blue |

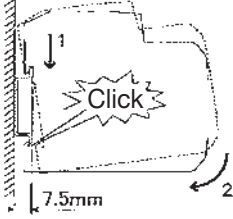
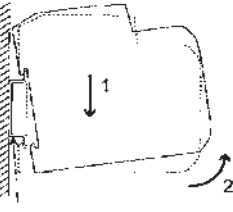
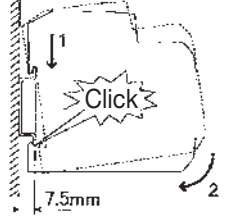
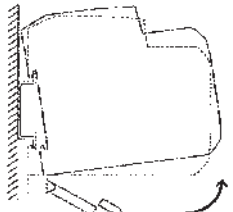
13 Supplementary Information

● Wiring Related

(1) Terminals/Location

| Item | MS-T Target Model Names (Typical Model) | MS-T Series | MS-N Series | Remarks |
|--|--|---|---|---------|
| Contact Mark Display of Auxiliary Terminal (Displayed with engraved marks on contact and terminal, etc.) | S-T10 to T35 SD-T12 to T35 SR-T5, SRD-T5 | Make Contact ▽ Break Contact △ | Make Contact ⊥ Break Contact ≠ | |
| | SR-T9, SRD-T9 | Upper Part (Body Side) Lower Part (Additional Auxiliary Contact Unit Side) | Upper Part (Body Side) Lower Part (Additional Auxiliary Contact Unit Side) | |
| | Make Contact ▽ Break Contact △ | Make Contact ⊥ Break Contact ≠ | Make Contact ▽ Break Contact △ | |

(2) Rail Mounting

| Item | MS-T Target Model Names (Typical Model) | MS-T Series | MS-N Series | Remarks |
|-------------------|---|--|--|---------|
| DIN Rail Mounting | S-T10 to T50 SD-T12 to T50 | <p>·Mounting</p>  <p>·Removing</p>  <p>Screwdriver Not Required</p> | <p>Mounting</p>  <p>·Removing</p>  <p>Screwdriver Operated by Screwdriver</p> | |
| | S-T65 | Same Operation as N Series | Not Available | |
| | S-T80 | | | |

(3) Other

| Item | MS-T Target Model Names (Typical Model) | MS-T Series | MS-N Series | Remarks |
|------------------------------|---|---|--|---------|
| Coil Surge Absorber Function | S-T10SA to T50SA SD-T12SA to T50SA | · Surge Absorber Mounted Type Operation Coil Surge Absorber Unit UT-SA21 (Varistor Element) Mounted on Main Body | · Surge Absorber Integrated Type Operation Coil Surge Absorber (Varistor Element) Integrated in Main Body | |
| | S-T65 to T100 | Integrated Surge Absorber Function Through AC Operated DC Excitation Type Electromagnet · S-T65 to T100 | Integrated Surge Absorber Function Through AC Operated DC Excitation Type Electromagnet · S-N50 to N400 | |

13.6 MS-N Series Changes

The main contents of what has been changed from MS-K Series to MS-N Series are summarized.

For more information regarding mounting compatibility, refer to the following. It is to be noted that components such as contacts and operation coils are for respective series only, and have no compatibility. Refer to page 371 regarding optional units.

- Magnetic Starters/Magnetic Contactors Page 358
- Thermal Overload Relays Page 370

● Product Marking

(1) Terminal Number

| Item | | MS-N Model Names (Typical Model) | MS-N Series | MS-K Series | Remarks |
|------------------|---------------------------|-------------------------------------|---|---|--|
| Display Content | Main Terminal Number | S-N, TH-N All Models | Power Supply Side: 1/L1, 3/L2, 5/L3 Load Side: 2/T1, 4/T2, 6/T3 | Power Supply Side: R/1/L1, S/3/L2, T/5/L3 Load Side: U/2/T1, V/4/T2, W/6/T3 | Change in accordance with JEM1038 and JIS C4531 NO (Normally Open): Make Contact NC (Normally Closed): Break Contact |
| | Auxiliary Terminal Number | | · Ones Place of the Number for Make Contacts: 3-4, Break Contacts: 1-2 | · Ones Place of the Number for Make Contacts: 3-4, Break Contacts: 1-2 | |
| | (Magnetic Contactors) | S-N125 to N800 | Make Contacts: 13 (13) ^{NO} -14 (14) ^{NO} , 43 (23) ^{NO} -44 (24) ^{NO} Break Contacts: 21 (31) ^{NC} -22 (32) ^{NC} , 31 (41) ^{NC} -32 (42) ^{NC} | Make Contacts: 13 (13)-14 (14), 43 (23)-44 (24) Break Contacts: 21 (31)-22 (32), 31 (41)-32 (42) | |
| | Coil Terminal Number | S-N125 to N800 | A1/a, A2/b (Mold Embossed Characters) | A1/a, A2/b (Mold Embossed Characters) | |
| Display Position | Auxiliary Terminal Number | S-N125 | Printed on the name plate on top of the arc box (arc cover) in black | Embossed on the base barrier | |
| | | S-N150 to N400 | | Embossed on the base side | |
| | | S-N600/N800 | | Embossed on the auxiliary contact unit | |

(2) Rating

| Item | | MS-N Model Names (Representative Model) | MS-N Series | MS-K Series | Remarks |
|------------------|---------------------|--|--|---|---------|
| Display Position | Main Circuit Rating | S-N125 to N400 | · The Ith rating (A) is printed on the name plate on the front bottom left · The JIS and JEM ratings are printed on a name plate in the upper right hand corner, IEC rating is on the front right center, UL rating is on the front lower right and EN rating is on the front lower center (EN rating shows the rated operating current (A) and others show the rated capacity (UL is (HP), others are (kW))) | · The JEM rating is printed on the name plate on the front left in green, and the IEC rating on the front right in red [both the rated capacity (kW) and rated operating current (A)] | |
| | | S-N600/N800 | | · The JEM rating is printed on the name plate on the front center in green, and the IEC rating in red [both the rated capacity (kW) and rated operating current (A)] | |

(3) Model Names and Standards

| Item | | MS-N Model Names (Typical Model) | MS-N Series | MS-K Series | Remarks | |
|----------------|--|-------------------------------------|---|---|--|--|
| Display Method | Model Name | S-N125 to N800 | Printed on the left center of the arc cover (arc box) in black | Printed on the name plate on the front upper right of the arc cover (arc box) | | |
| | Compliance and Certification Standards | S-N125 to N400 | JIS C8201-4-1 JEM 1038 NK Certification Number IEC 60947-4-1 DIN VDE 0660 BS EN 60947 cULus, CE and TÜV Marks | Printed on the name plate on the front | JEM 1038 NK Certification Number IEC 947-4-1 DIN VDE 0660 BS EN 60947 UR and CE Marks | Printed on the name plate on the front |
| | | S-N600 | JIS C8201-4-1 JEM 1038 NK Certification Number IEC 60947-4-1 DIN VDE 0660 BS EN cURus and CE Marks | Printed on the name plate on the front | JEM 1038 NK Certification Number IEC 947-4-1 DIN VDE 0660 BS EN 60947-4-1 UR and CE Marks | Printed on the name plate on the front |
| | | S-N800 | JIS C8201-4-1 JEM 1038 NK Certification Number IEC 60947-4-1 DIN VDE 0660 BS EN CE Mark | Printed on the name plate on the front | JEM 1038 NK Certification Number IEC 947-4-1 VDE 0660 BS EN 60947-4-1 CE Mark | Printed on the name plate on the front |

13 Supplementary Information

● Changes in Outline Drawings and Structure

(1) Mounting

| Item | MS-N Model Names (Representative Model) | MS-N Series | MS-K Series | Remarks |
|---|--|--|---|---------|
| Arc Space | N125 to N220 | 10 mm | 30 mm | |
| | N300/N400 | 10 mm | 50 mm | |
| | N600/N800 | 10 mm | 10 mm | |
| Mounting Compatibility With MS-A Series | MSO/S- N125 to N400 | Can be made compatible with MSO/ S-N□XA | Can be made compatible by changing the direction of the mounting plate | |
| | S-N600/N800 | Compatible | Compatible | |

(2) Other

| Item | MS-N Model Names (Representative Model) | MS-N Series | MS-K Series | Remarks |
|--|--|---|---|---------|
| Built-in Operation Coil Surge Absorbing Function | MSOL(D)/SL(D) -N125 to N220 | Built-in Surge Absorbing Function (Closing/Tripping) (Excluding AC/DC24 V and 48 V) | No Surge Absorbing Function (Closing/Tripping) | |
| | MSOL(D)/SL(D) -N300, N400 | | Surge Absorbing Function Built-in Only for Closing | |
| | SL(D)-N600, N800 | Built-in Surge Absorbing Function (Closing/Tripping) (Excluding AC/DC24 V and 48 V) | Built-in Surge Absorbing Function (Closing/Tripping) | |

13.7 Mounting Dimensions When Using Mounting-Compatible Adapter for MS-T Series Magnetic Contactors and Contactor Relays

Although the MS-T Series is not compatible with the MS-N Series and some other models, it can be made compatible with the use of our MS-T Series additional mounting-compatible adapter.

| AC Operated | | Model Name | S-T10 | S-T12, SR-T5 (*3) | S-T20 | S-T25 | S-T50 | S-T80 |
|-------------------------------|--------------|------------|--------------------|--|--|--------------------|--------------------|---------------------|
| Outline Drawing (*1) | | | | | | | | |
| Mounting Pitch Width x Height | Body | | 28 x 60 | 35 x 60 30 x 60 34 x 52 35 x 50 to 52 | 35 x 60 30 x 60 34 x 52 35 x 50 to 52 | 54 x 56 54 x 60 | 65 x 70 60 x 70 | 70 x 75 |
| | Adapter (*2) | | 35 x 50 34 x 52 | 40 x 50 | 54 x 60 54 x 56 | 65 x 70 60 x 70 | 70 x 75 | 80 x 110 86 x 90 |
| DC Operated | | Model Name | — | SD-T12, SRD-T5 | SD-T20 | — | SD-T50 | SD-T80 |
| Outline Drawing (*1) | | | — | | | — | | |
| Mounting Pitch Width x Height | Body | | — | 35 x 60 34 x 52 35 x 50 to 52 | 35 x 60 34 x 52 35 x 50 to 52 | — | 65 x 70 60 x 70 | 70 x 75 |
| | Adapter (*2) | | — | 40 x 50 | 54 x 60 54 x 56 | — | 70 x 75 | 80 x 110 86 x 90 |

*1. The dimensions shown in the figure are the mounting pitch when using the mounting-compatible adapter.

*2. There are no changes in the depth dimensions when using the mounting-compatible adapter.

*3. Mounting-compatible adapters can be used only with S-T12 and SR-T5 types where the manufacturing numbers on the front of the product is "14Y**" or "14Z**", or where the first 2 digits are equal to or greater than "15" (some of those manufactured in October 2014, and those manufactured from November on).

*4. Please use mounting screws with metal washers.

13.8 Model Names of Discontinued Former Models and Replacements

| Old Model Name | Model Name | Alternative Model Name | Compatibility | | Remarks |
|----------------|--------------------------------------|------------------------|---------------|----------|---|
| | | | Mounting | Rating | |
| AT-□ | DC Delayed Relay | SRTD-N□ | x | At Right | Confirm the actual operating voltage and current. |
| AX-□ | DC Relay | SRD-T□ | x | At Right | Confirm the actual operating voltage and current. |
| AM-□ | Time Limit Relay | SRT-N□ | x | ○ | Model Name End 1: OFF Delay, 2: ON Delay |
| B-□ | NC Main Contact Contactor | B-T/N□ | At Right | ○ | Only B-A20 and B-N20 have compatibility. |
| BD-□ | NC Main Contact Contactor | BD-T/N□ | At Right | ○ | Only BD-A20 and BD-N20 have compatibility. |
| C-831 | Commercial Magnetic Contactor | S-T□ | x | ○ | |
| DM-□ | Time Limit Relay | SRTD-N□ | x | ○ | Model Name End 1: OFF Delay, 2: ON Delay |
| DU-□ | Magnetic Contactor For DC | DU-N□ | At Right | ○ | Only DU-K180, K260 and DU-N180, N260 have compatibility. |
| DUD-□ | Magnetic Contactor For DC | DUD-N□ | At Right | ○ | Only DUD-K180, K260 and DUD-N180, N260 have compatibility. |
| EKO-□ | Magnetic Starter | MSO-T/N□ | x | At Right | Make a selection upon confirming the actual operating voltage and current. |
| ESO-15 | Magnetic Starter | MSO-T21 | x | At Right | Make a selection upon confirming the actual operating voltage and current. |
| EMO-□ | Magnetic Starter | MSO-T/N□ | x | At Right | Since the thermal overload relay displays TC (trip current), select a heater designation close to 1/1.15 the set current. |
| MR-□ | Contactor Relay | SR-T/K□ | ○ | ○ | |
| MRD-□ | Contactor Relay | SRD-T/K□ | At Right | At Right | Partly compatible. |
| MRL-□ | Mechanically Latched Contactor Relay | SRL-T/K□ | ○ | ○ | |
| MRDL-□ | Mechanically Latched Contactor Relay | SRLD-T/K□ | ○ | ○ | |
| ML-□ | Mechanically Latched Contactor | SL-T/N□ | At Right | ○ | Partly compatible. |
| MSO-□ | Magnetic Starter | MSO-T/N□ | At Right | At Right | Partly compatible. Make a selection upon confirming the actual operating voltage and current. |
| N-□ | Magnetic Contactor | S-T/N□ | x | At Right | Make a selection upon confirming the actual operating voltage and current. |
| ND-□ | Magnetic Contactor | SD-T/N□ | x | At Right | Make a selection upon confirming the actual operating voltage and current. |
| NS-15 | Magnetic Contactor | S-T21 | x | ○ | |
| RP-□P | Control Relay | Omron MK□P-2 | ○ | ○ | SR(D)-T is functionally usable. |
| RP-□SP | Control Relay With Twin Contact | Omron MK□ZP-2 | ○ | ○ | SR(D)-T is functionally usable. |
| S-□ | Magnetic Contactor | S-T/N□ | At Right | At Right | Partly compatible. Make a selection upon confirming the actual operating voltage and current. |
| SD-□ | Magnetic Contactor | SD-T/N□ | At Right | At Right | Partly compatible. Make a selection upon confirming the actual operating voltage and current. |
| SM-□ | Pneumatic Timer | SRT-N□ | x | ○ | Model Name End 1: OFF Delay, 2: ON Delay |
| SMD-□ | Pneumatic Timer | SRTD-N□ | x | ○ | Model Name End 1: OFF Delay, 2: ON Delay |
| TR-□ | Thermal Overload Relay | TH-T/N□ | x | At Right | Since TR displays TC (trip current), select the TH-T/N heater designation close to 1/1.15 the designation of TR. |
| DRS-□ | Solid State Timer | Omron H3CR-□ | x | At Right | Make a selection upon confirming the actual operating voltage and current. |
| SRS-□ | Solid State Timer | Omron H3CR-□ | x | At Right | Make a selection upon confirming the actual operating voltage and current. |

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| | | Resistive Load | · Three-Phase Resistance · DC Resistance | 37, 49 38, 49 | |
| | | Lighting Load | · Fluorescent Lamps, Mercury Lamps and Incandescent Lamps | 50 | |
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Mitsubishi Electric Magnetic Starters



Precautions Regarding Safety

- For correct and safe use, read the "Instruction Manual" beforehand.
- For safety, make sure that only technicians qualified for electric work or wiring perform connection of the product.
- When a product described in this catalog is to be used in a facility where a failure can lead to injury to the human body or serious damage to earnings, make sure to install safety mechanisms.
- Upon adoption for use, read the "Notes on Product Use" on page 10, beforehand.



(Note) Mark that indicates certification of the China Compulsory Certificate.



(Note) Mark that indicates EC Directives compliance. CE Mark labeled products can also be used in Europe.



TUV Rheinland
(Note) Mark that indicates German Rheinland Inspection Association certified products.



(Note) Mark that indicates UL certified products to UL and CSA Standards.

Mitsubishi Electric Corporation Nagoya Works holds environmental management system ISO14001 and quality system ISO9001 certification.



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