

FACTORY AUTOMATION

**Mitsubishi Electric Magnetic Starters
MS-T/N Series**

MS-T/N
SERIES



Mitsubishi Electric Magnetic Starters





Mitsubishi Electric Corporation

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⚠ 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.

			
<small>(Note) Mark that indicates certification of the China Compulsory Certificate.</small>	<small>(Note) Mark that indicates EC Directives compliance. CE Mark labeled products can also be used in Europe.</small>	<small>(Note) Mark that indicates German Rheinland Inspection Association certified products.</small>	<small>(Note) Mark that indicates UL certified products to UL and CSA Standards.</small>

Mitsubishi Electric Corporation Nagoya Works holds environmental management system ISO14001 and quality system ISO9001 certification.

			
<small>EC 98 J 2017</small>	<small>0051</small>	<small>1828</small>	<small>008</small>

This publication has been issued in July 2018. In addition, as the contents of this publication may change without prior notice, please contact us in advance when adopting products.

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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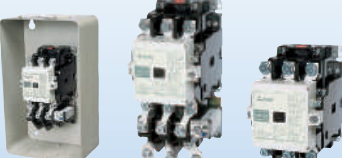



12. Motor Circuit Breaker MMP-T32

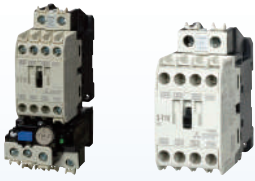

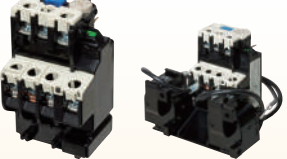


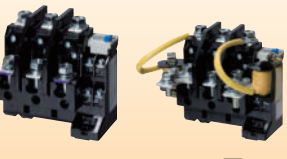
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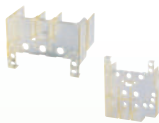








Line-up A Wide Variation that Suits User Needs








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
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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
 <p>MSO/S-T□DL</p>	 <p>MSO-T□SR</p>	 <p>MSO-T□FSKP</p>	 <p>MS-T□PM</p>
 <p>MSO/S-N□DL</p>	 <p>MSO-N□SR</p>	 <p>MSO-N□FS</p>	-
<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.
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Contactor Relays				Optional Units
DC Operated Type	Mechanically Latched Type	Delay Open Type	With Wiring Streamlining Terminal	Failure Detection Units (Contact Welding Detection)
 <p>SRD-T</p>	 <p>SRL-T SRLD-T</p>	 <p>SR-T□DL</p>	 <p>SR/SRD-T□BC</p>	-
-	-	-	-	 <p>UN-FD</p>
<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	 <p>Surge Absorber Units UT-SA</p>  <p>Auxiliary Contact Units UT-AX</p>  <p>Mechanical Interlock Units UT-ML</p>  <p>DC/AC Interface Units for Control Coils UT-SY</p>  <p>Independent Mounting Units UT-HZ</p>  <p>Reset Release for Thermal Overload Relays UT-RR</p>	 <p>Live Part Protection Cover Units UN-CV/UN-CZ</p>  <p>Terminal Protection Cover Units UN-CW</p>  <p>Surge Absorber Units UN-SA</p>  <p>Auxiliary Contact Units UN-AX</p>  <p>Auxiliary Contact Units With Contact for Low-level Signals UN-LL22</p>  <p>DC/AC Interface Units for Control Coils UN-SY</p>  <p>Fluorescent Display Lamps UN-TL for Thermal Overload Relays</p>  <p>Mechanical Interlock Units UN-ML</p>  <p>Reset Release for Thermal Overload Relays UN-RR</p>	
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 		
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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	 <p>SH-V</p>	 <p>US-N</p>  <p>US-H</p>	 <p>Drive Units with Outputs UA-SH</p>  <p>Drive Units UA-DR1</p>  <p>Power Control Units UA-PC</p>	 <p>ET-N</p>
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.
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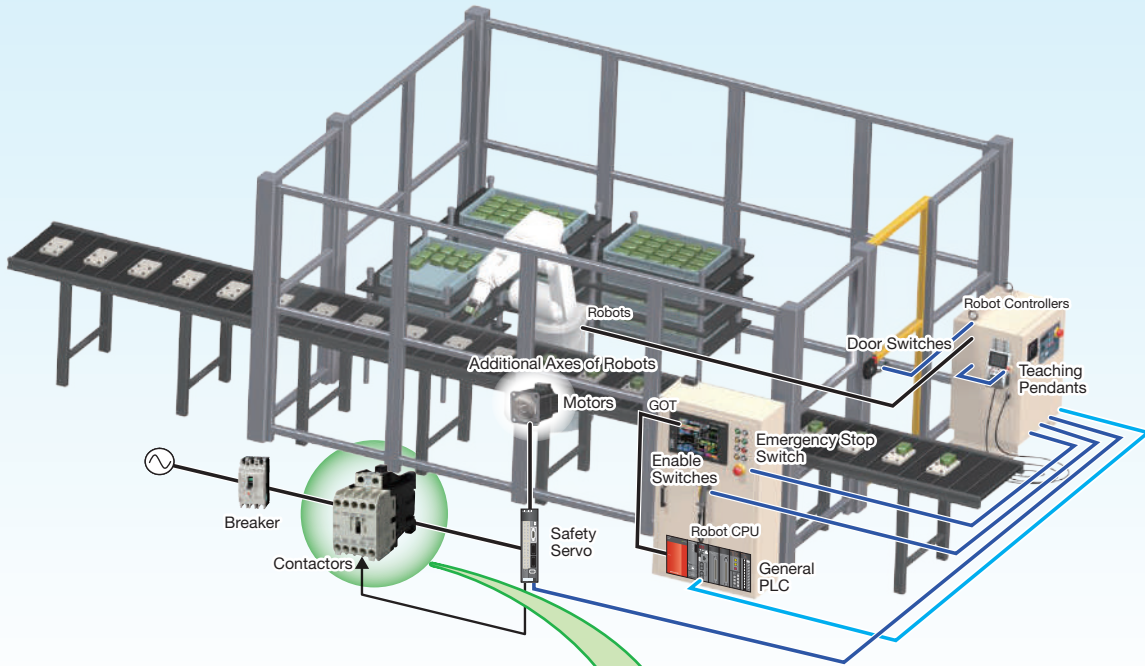
Magnetic Starters/Contactors/Relays According to Application			
DC Interface Contactors	NC Main Contact Contactors	DC Contactors	Safety Contactors
 <p>MSOD-Q</p>  <p>SD-Q</p>  <p>SD-QR (Reversible)</p>	 <p>B(D)-T</p>  <p>B(D)-N</p>	 <p>DU(D)-N</p>	 <p>S(D)-T</p>  <p>SD-Q</p>  <p>S(D)-N</p>
<ul style="list-style-type: 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 Short-circuits 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)
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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



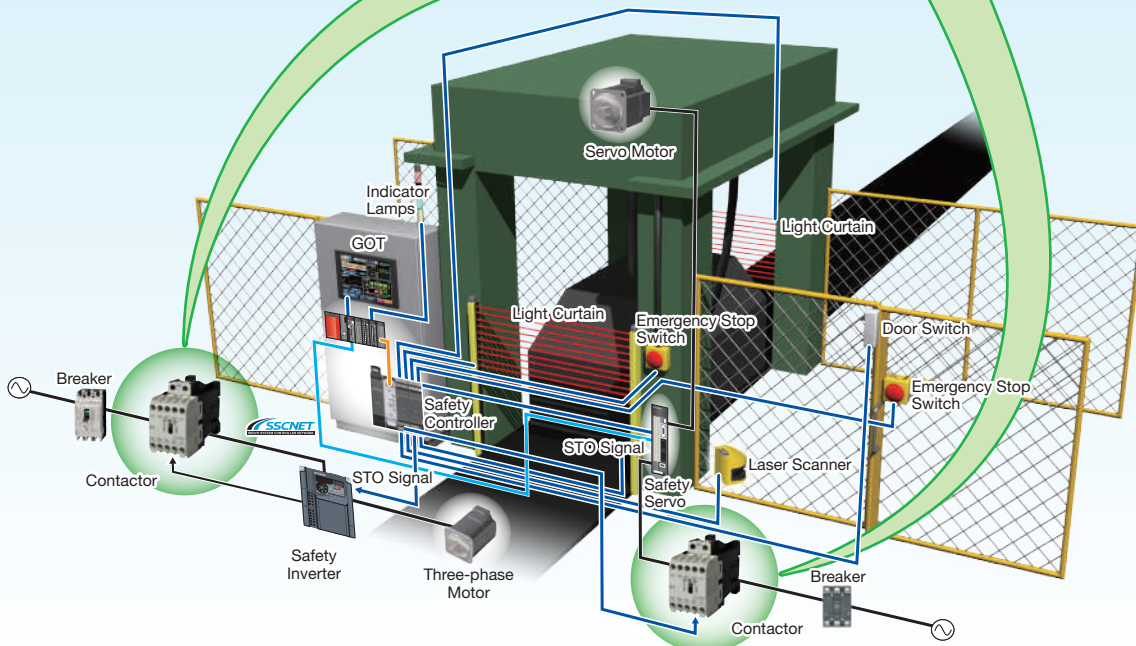
Mirror Contacts
(With Safety
Separation Function)

Press Machining Solutions

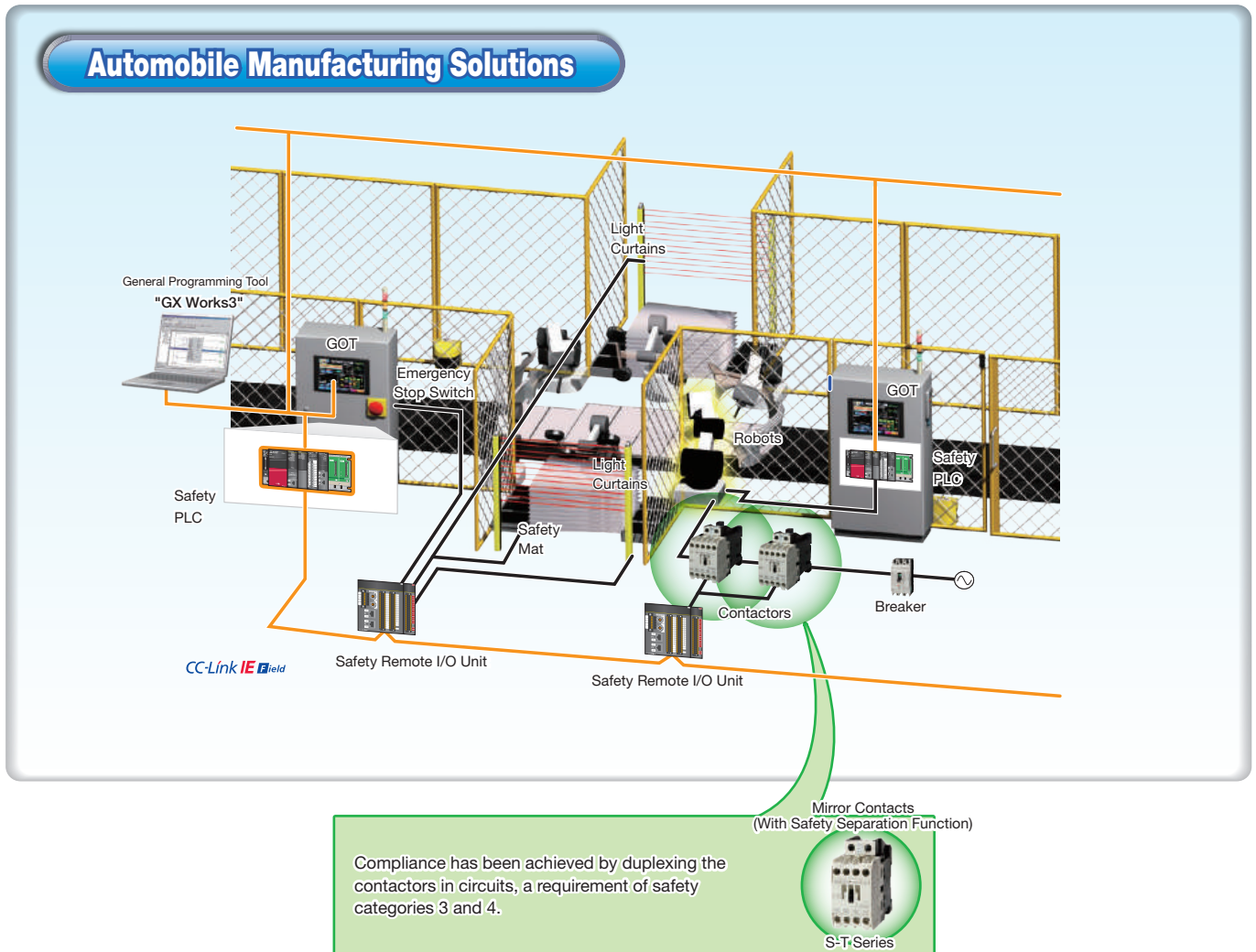
It is best to employ S-T series/S-N series/SD-Q series models with mirror contacts (safety separation function) in safety inverter/servo circuits for the shutting down of power in the event of an abnormality. With this application, compliance with safety categories 3 and 4 is achieved.



S-T Series



familiar to customers, starting with the

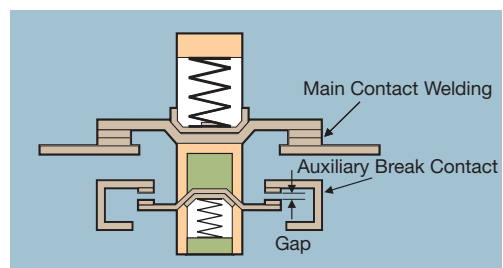


Mitsubishi Electric can provide an assortment of controllers and drivers that serve as accessory devices for magnetic starters and that are necessary for system structures, as well as other safety solutions related to these products.

■ 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 270 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
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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!!

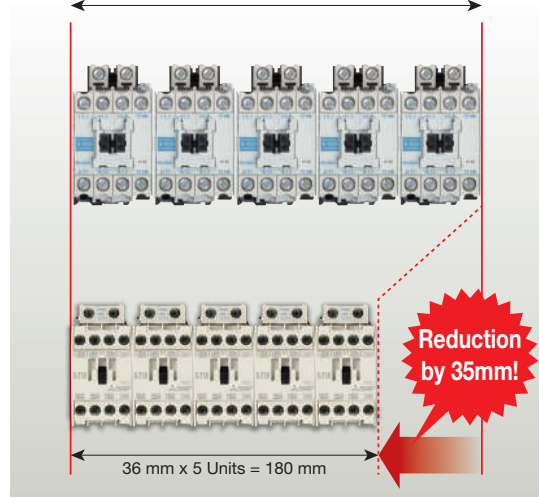
There is a saying that "every bit helps" and now with the industries smallest* general purpose Magnetic Contactor in its class, customers are able to more easily down-size their boards than ever before.

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

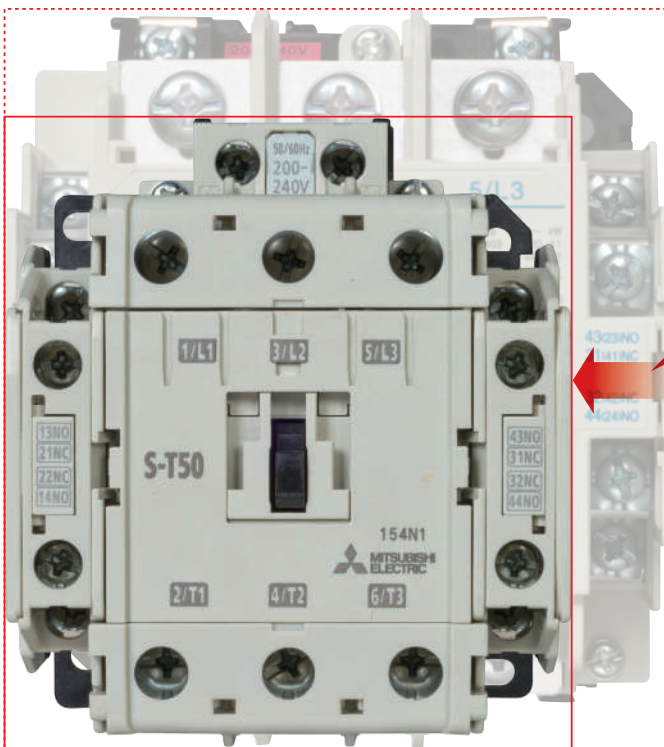


S-T10 (Actual Size)

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



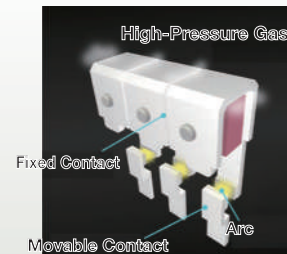
(For mounting details, refer to "Mounting" on page 64)



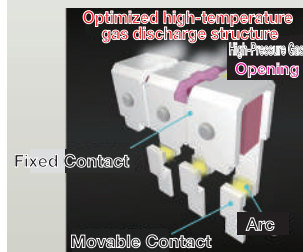
S-T50 (Actual Size)

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

Frame Size		35 A	50 A		65 A		80 A	100 A
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		13 A		18 A	20 A	32 A
Traditional MS-N Series	Front View			None		None
		SD-N11	SD-N12		SD-N21	
New slimline MS-T Series	Front View					
		SD-T12	SD-T20	SD-T21	SD-T32	

Frame Size		35 A	50 A	65 A	80 A	100 A
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

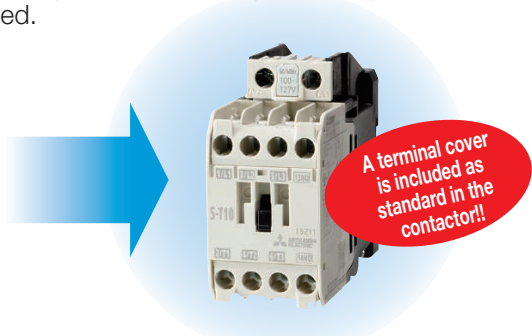
Standardization

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.

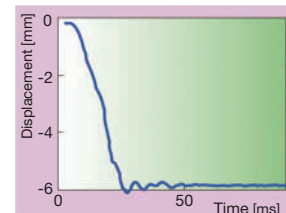
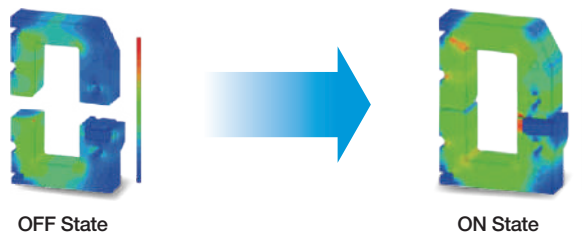
Coil designation	Rated Voltage [V]	
	50 Hz	60 Hz
AC24V	24	24
AC48V	48 to 50	48 to 50
AC100V	100	100 to 110
AC120V	110 to 120	115 to 120
AC127V	125 to 127	127
AC200V	200	200 to 220
AC220V	208 to 220	220
AC230V	220 to 240	230 to 240
AC260V	240 to 260	260 to 280
AC380V	346 to 380	380
AC400V	380 to 415	400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

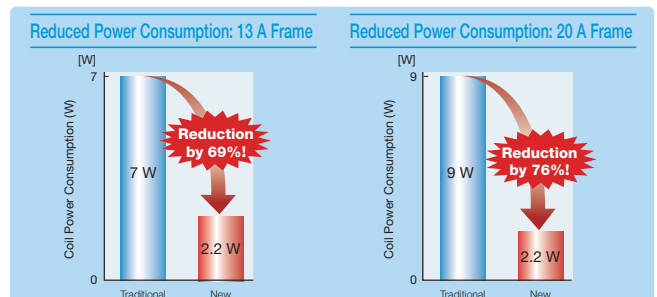
Capable of direct drive with transistor output of PLC, etc

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)	7 W	2.2 W	69%
20 A Frame (Coil: DC12/24V)	9 W	2.2 W	76%
32 A Frame (Coil: DC12/24V)	—	2.2 W	—

*DC48V to 220V: 3.3 W.



Safety & Quality

Safety & Quality

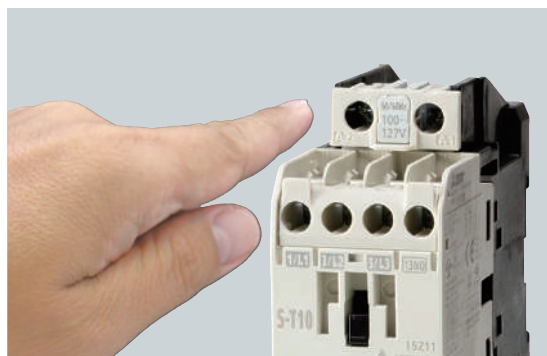
Terminal Covers with Finger Protection Function

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 into 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

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.

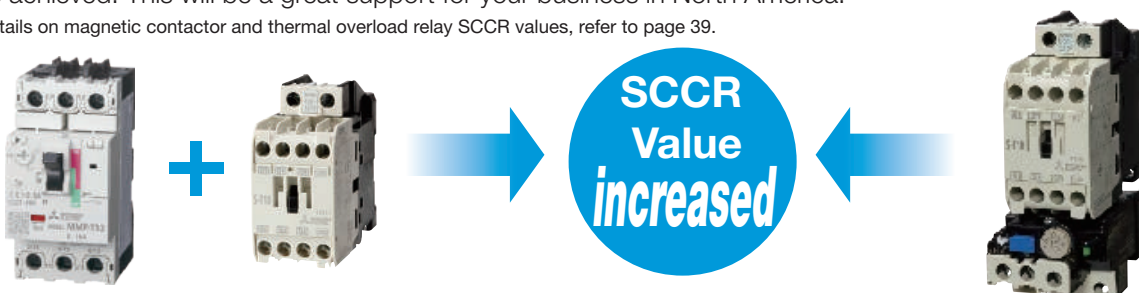
Standards	Applicable standard				Safety Certification Standard
	International	Japan	European countries		China
	IEC *	JIS	EN	Certifying Body	GB
EC Directive			TÜV Rheinland		
					UL us

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.

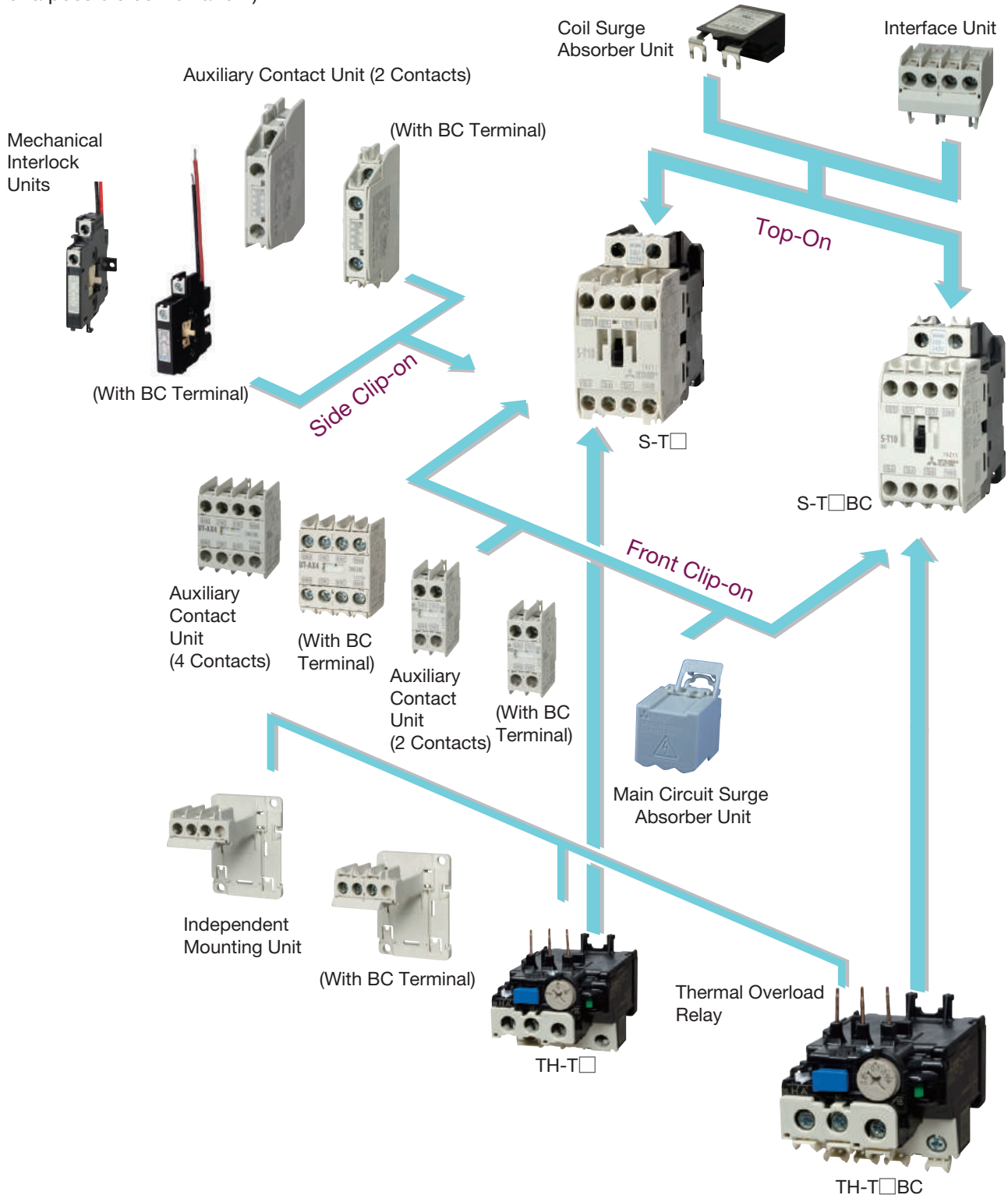
When the MMP-T Series and the S-T Series are used together, a higher SCCR (UL short-circuit current rating) value can be achieved. This will be a great support for your business in North America.

* For details on magnetic contactor and thermal overload relay SCCR values, refer to page 39.



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.)

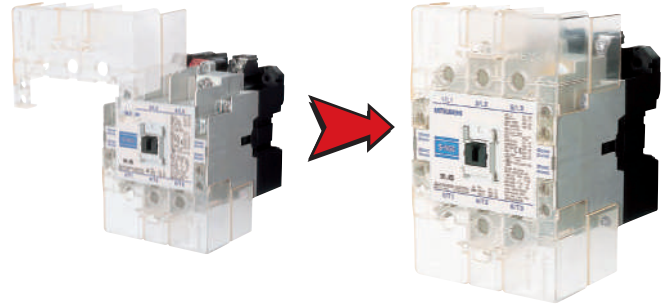


MS-N Series Magnetic Contactors

125 to 800 A Frame

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

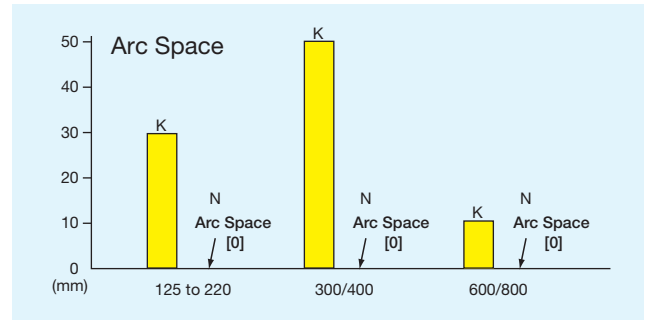
- Attention has been paid to safety in order to provide live part protection covers that offer finger protection and that are easy to handle.
- Various types are offered including those for magnetic contactors, magnetic starters, reversible magnetic contactors, and reversible magnetic starters, etc.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



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

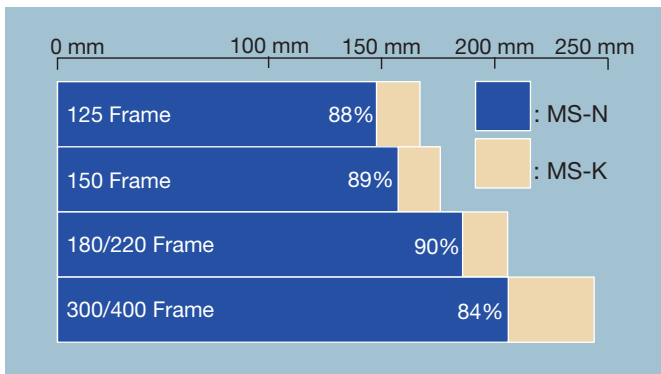
- Safety and a long product life have been guaranteed by combining the current capacities of each magnetic contactor to form an ideal arc-suppression structure that effectively interrupts current. Also, by employing HGC arc-suppression (*), an arc space of "0" can be achieved, resulting in further improvements 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.

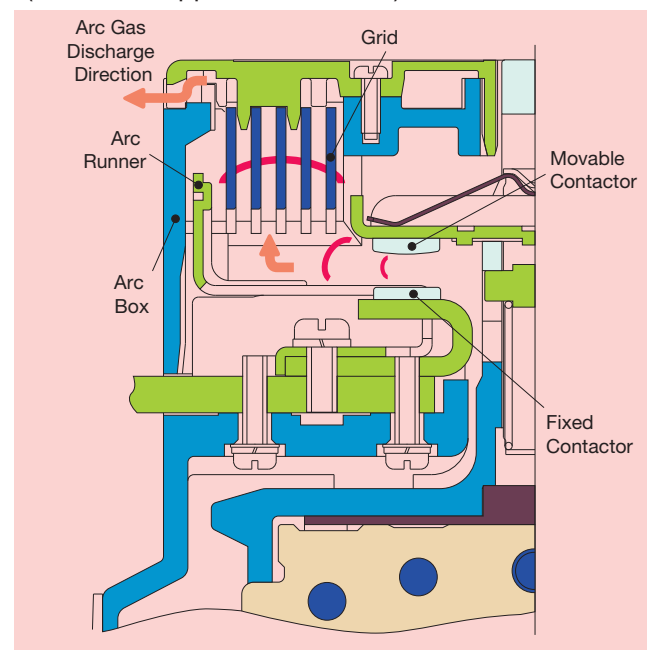


Realizing Space Saving

- 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)



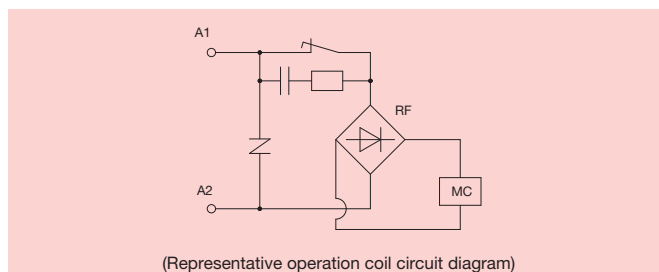
A Brightened Board Interior

- 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.

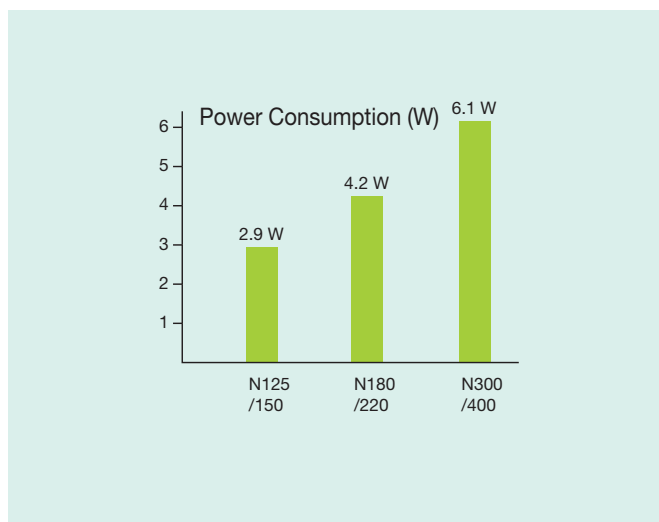


Designation	Rating
AC100V	100 to 127 V 50/60 Hz
AC200V	200 to 240 V 50/60 Hz
AC300V	260 to 350 V 50/60 Hz
AC400V	380 to 440 V 50/60 Hz
AC500V	460 to 550 V 50/60 Hz

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 Name	Rated Voltage (V)	Rated Capacity (kW)	Rated Current (A)	Type
SD-Q11	AC200 V	2.5 kW	1a(1b)	Non-Reversible Type
SD-QR11	AC200 V	2.5 kW	1b x 2	Reversible Type
SD-Q12	AC200 V	2.5 kW	1a1b(2a)	Non-Reversible Type
SD-QR12	AC200 V	2.5 kW	1a1b x 2	Reversible Type

Model Name	Rated Capacity (kW) AC-3		Free Air Thermal Current (A)	Electrical Durability (x 10000)
	200 to 240 V	380 to 440 V		
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.






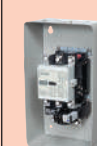

























MS-T/N Series Specification List

AC Operated	AC220 to 240V Note 1) (Three-Phase Cage Motor Standard Duty) [kW/A] (Note 2)	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 TH-T65KP				
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											
Applied Products	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 100 for details about mechanically latched types, or page 109 for delay open types.
- Note 6. Because there are products that cannot be mounted, please refer to combination details on page 180 when applying optional products.

Magnetic Starters, Magnetic Contactors, Thermal Overload Relays

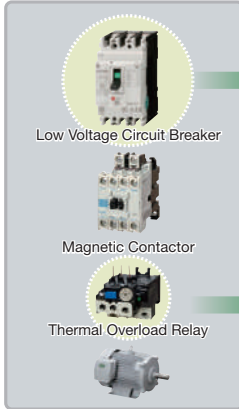
22/85 [19/80]	30/105 [22/100]	37/125 [30/125]	45/150 [37/150]	55/180 [45/180]	75/250 [55/220]	90/300 [75/300]	125/400 [110/400]	190/630 [160/630]	220/800 [200/800]
45/85 [37/80]	55/105 [45/93]	60/120 [60/120]	75/150 [75/150]	90/180 [90/180]	132/250 [110/220]	160/300 [150/300]	220/400 [200/400]	330/630 [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-N120KP 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

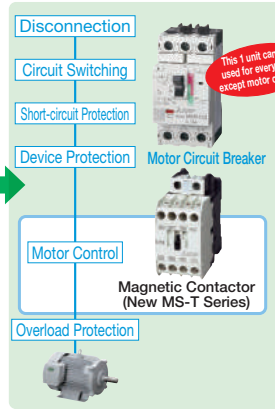
What is a motor circuit breaker?

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

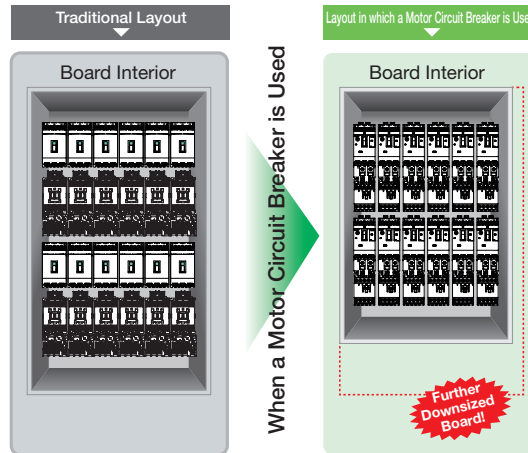


When a motor circuit is composed of a motor circuit breaker and magnetic contactor



Featuring a Space-saving Design that Results in Downsized Panels

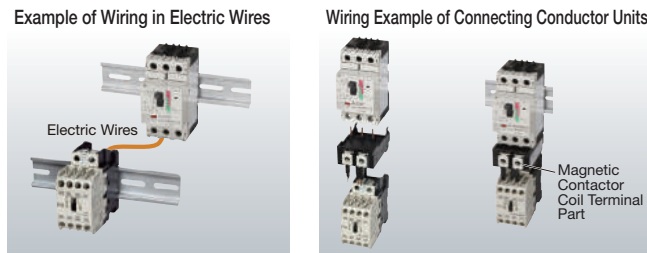
Example of Space Saving Application



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

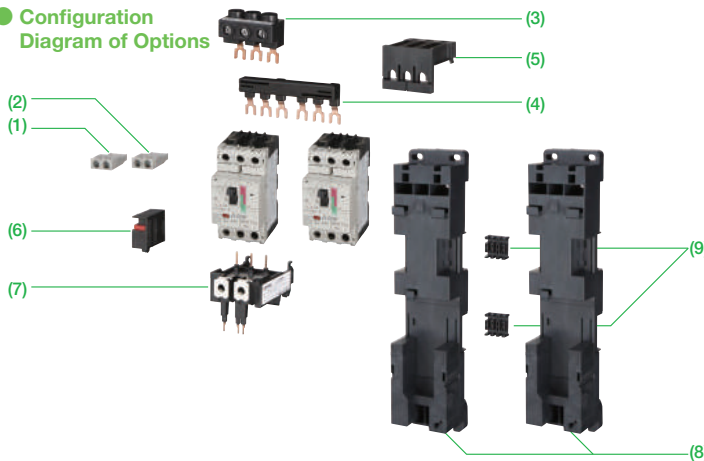


Usage Example With UT-MQ12

Ease-of-Use

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

Configuration Diagram of Options



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.	
			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.	
			1b		
			UT-MALL (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)	Joining Block Unit		UT-RT10	A block that connects the 2 mounting base units mechanically.	
			UT-RT20		
			UT-RT32		

*For combination model names, please refer to the outline drawings on page 355.



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	Combined Thermal Overload Relays	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	
				TH-T18KP			TH-T25KP		—	TH-T25 / T50KP	TH-T25 / T50KP	
Rated Insulation Voltage		[V]	690									
Rated Impulse Withstand Voltage		[kV]	6									
Rated Frequency		[Hz]	50/60									
Pollution Degree			3									
Main contact rating	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] [5.5/26]	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	7.5/35		
		AC380 to 440V	2.2/6	4/9	5.5/13		7.5/17	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 10)				1a x 2 + 2b	1a1b x 2 + 2b		2a2b x 2		2a2b x 2	2a2b x 2	2a2b x 2	
Special accessory			Non-Reversing	1b	2a		—	—	—	—		
			Reversing (Note 4, Note 6)	1a x 2 + 2b	2a x 2 + 2b		—	—	—	—		
Max. number of additional options (Note 10)		Non-Reversing	1 for UT-AX2/4, 2 for UT-AX11									
		Reversing (Note 8, Note 10)	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		
		AC240V	3	3	3	3	3	3	3	3		
		DC24V	3									
Rated Operational Current (Category DC-13 : Direct current coil load)		DC110V	0.6									
	Conventional Free Air Thermal Current I _{th} [A]	10	10	10	10	10	10	10	10			
Mechanical Durability		[x 10000]	1000									
Electrical Durability (Note 5) [Ten thousand times]	Category AC-3	200 (Note 5, 6)										
	Category AC-4	3 (Note 5)										
	Category AC-1	50										
Switching Frequency [Times/Hour]	Category AC-3	1800							1200			
	Category AC-4	300										
	Category AC-1	1200										
Coil consumption (Note7) [VA]	Sealed	7			7		4.5	10				
	Inrush	45			75		55	110				
Power Consumption (Note 7) [W]			2.2		2.4	2.4	1.8	3.8	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	76 x 165 x 97.5			—		104 x 176 x 110		—		135 x 231 x 126
		Reversing	—			—		220 x 192 x 115		—		300 x 247 x 130
IEC 35mm rail mounting			Possible (excluding Enclosed Magnetic Starters)									
Installable Optional Unit Model Names (Note 12)	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-ML11 (Note 13)				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 is 2,000,000 times for T10 to T65 (1,000,000 times for the T20 380V, T80 and T100). Refer to the electric durability curve for the life performance.
- Note 2. The value between parentheses for the rated operating current is for the magnetic contactor (without thermal overload relay), while the value between parentheses for the motor capacity applies to an enclosed type magnetic starter.
- 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 parentheses. 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 100 for details about mechanically latched types, or page 109 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	—	—
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	—	—
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)
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										
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					50	
3 (Note 5)										
50										
1200										
300										
1200										
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-AX600
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. Operational coil input and coil consumption are average values in case of applying 220V60Hz to AC200V coil.
 Note 9. The +2b on the auxiliary contact arrangement of reversible T10 to T20 types indicates the break contact of the integrated UT-ML11 interlock unit. There is no need to specify when ordering.
 Note 10. The body and auxiliary contact unit can be additionally installed by the customer as a separate arrangement. Enclosed type auxiliary contact units and mechanically latched front clip-on auxiliary contacts cannot be additionally installed. Refer to page 182 for details about auxiliary contact units.
 Note 11. 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 12. Because there are products that cannot be mounted, please refer to combination details on page 180 when applying optional products.
 Note 13. The DC operated type is combined with UT-ML20.

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	220 V	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]	440 V	4	5.5	7.5	11	15	15	18.5	22	30	45	55	60	75	90	132	160	220	330	440			
Auxiliary Contact (Note 6)	Standard	1a	1a1b	1a1b	← 2a2b →		← 2a2b →																
	Special	1b	2a (Note 8)	2a (Note 8)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Model Name																							
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	-	○	-	○	-	-	○	○	○	○	○	-	○	-	○	○	○	○	-	-		
	MSOD-□DL	-	-	-	○	-	-	○	○	○	○	○	-	○	-	○	○	○	○	-	-		
Mechanically Latched Type	MSOL-□	-	-	-	○	-	-	○	○	○	○	○	○	○	-	○	○	○	○	-	-		
	MSOLD-□	-	-	-	○	-	-	○	○	○	○	○	○	○	-	○	○	○	○	-	-		
With Terminal Cover	MSO-□CW	-	-	-	-	-	-	-	-	○	○	○	○	○	○	○	○	○	○	-	-		
	MSOD-□CW	-	-	-	-	-	-	-	-	○	○	○	○	○	○	○	○	○	○	-	-		
Magnetic Contactors	Standard Specifications	S-□	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
		SD-□	-	○	○	○	-	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Surge Absorber Mounted Type	S-□SA (Note 3)	○	○	○	○	○	○	○	○	-	-	-	-	-	-	-	-	-	-	-	-	
		SD-□SA	-	○	○	○	-	○	○	○	-	-	-	-	-	-	-	-	-	-	-	-	
	Anticorrosion Treatment	S-□YS	-	-	-	-	-	-	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
		SD-□YS	-	-	-	-	-	-	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	Open Time Quick Motion Type	S-□QM	-	-	-	-	-	-	-	-	○	○	○	○	○	○	○	○	○	○	-	-	
		SD-□QM	-	-	-	-	-	-	-	-	○	○	○	○	○	○	○	○	○	○	-	-	
	Wiring Streamlining Terminal	S-□BC	○	○	○	○	○	○	○	○	-	-	-	-	-	-	-	-	-	-	-	-	
		SD-□BC	-	○	○	○	-	○	○	○	-	-	-	-	-	-	-	-	-	-	-	-	
With Terminal Cover	S-□CW	-	-	-	-	-	-	-	-	○	○	○	○	○	○	○	○	○	○	-	-		
	SD-□CW	-	-	-	-	-	-	-	-	○	○	○	○	○	○	○	○	○	○	-	-		
Delay Open Type	S-□DL	-	○	-	○	-	-	○	○	○	○	○	-	○	-	○	○	○	○	-	-		
	SD-□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	220 V	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			
	440 V	4	5.5	7.5	11	15	15	18.5	22	30	45	55	60	75	90	132	160	220	330	440			
Auxiliary Contact (Note 4 to Note 6)	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																							
Magnetic Starters	Enclosed Type	Standard Specifications	MS-□	-	-	-	○	-	-	○	○	○	○	○	○	○	○	○	○	○	-	-	
		3-Element (2E) Thermal	MS-□KP	-	-	-	○	-	-	○	○	○	○	○	○	○	○	○	○	○	○	-	-
	Open Type	Standard Specifications	MSOD-□	-	○	○	○	-	-	○	○	○	○	○	○	○	-	○	○	○	○	-	-
		3-Element (2E) Thermal	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	-	○	○	○	-	-	○	○	○	○	○	-	-	-	-	-	-	-	-	-	-
	Surge Absorber Mounted Type	MSO-□SA	○	○	○	○	○	-	-	○	○	○	○	-	-	-	-	-	-	-	-	-	-
		MSOD-□SA	-	○	○	○	-	-	○	○	○	○	○	-	-	-	-	-	-	-	-	-	-
	Wiring Streamlining Terminal	MSO-□BC	○	○	○	○	○	-	-	○	○	-	-	-	-	-	-	-	-	-	-	-	-
		MSOD-□BC	-	○	○	○	-	-	○	○	-	-	-	-	-	-	-	-	-	-	-	-	-
	With Terminal Cover	MSO-□CW	-	-	-	-	-	-	-	-	○	○(Note 7)	-	-	-	-	-	-	-	-	-	-	-
		MSOD-□CW	-	-	-	-	-	-	-	-	○	○(Note 7)	-	-	-	-	-	-	-	-	-	-	-
	Anticorrosion Treatment	MSO-□YS	○	○	○	○	○	-	-	○	○	○	○	○	○	○	○	○	○	○	○	-	-
		MSOD-□YS	-	○	○	○	-	-	○	○	○	○	○	○	○	○	-	○	○	○	○	-	-
Mechanically Latched Type	MSOL-□	-	-	-	○	-	-	○	○	○	○	○	○	○	-	○	○	○	○	○	-	-	
	MSOLD-□	-	-	-	○	-	-	○	○	○	○	○	○	○	-	○	○	○	○	○	-	-	
Magnetic Contactors	Open Type	Standard Specifications	S-□	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
		SD-□	-	○	○	○	-	○	○	○	○	○	○	○	○	-	○	○	○	○	○	○	○
	Surge Absorber Mounted Type	S-□SA (Note 3)	○	○	○	○	○	○	○	○	-	-	-	-	-	-	-	-	-	-	-	-	-
		SD-□SA	-	○	○	○	-	○	○	○	-	-	-	-	-	-	-	-	-	-	-	-	-
	Anticorrosion Treatment	S-□YS	-	-	-	-	-	-	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
		S-□BC	○	○	○	○	○	○	○	○	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wiring Streamlining Terminal	SD-□BC	-	○	○	○	-	○	○	○	-	-	-	-	-	-	-	-	-	-	-	-	-
		S-□CW	-	-	-	-	-	-	-	-	○	○	-	-	-	-	-	-	-	-	-	-	-
	With Terminal Cover	SD-□CW	-	-	-	-	-	-	-	-	○	○	-	-	-	-	-	-	-	-	-	-	-
		SL-□	-	-	-	○	-	-	○	○	○	○	○	○	○	-	○	○	○	○	○	○	○
	Mechanically Latched Type	SLD-□	-	-	-	○	-	-	○	○	○	○	○	○	○	-	○	○	○	○	○	○	○
		S-□FN	-	-	-	○	-	-	○	○	-	○	○	-	○	-	-	-	-	○	-	-	-
	Class 2 Heat Resistance	S-□SD	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
		SD-□SD	-	○	○	○	-	○	○	○	○	○	○	○	○	-	○	○	○	○	○	○	○
	With Reversing Connecting Conductor (Both Power and Load Sides)	S-□SG	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
		SD-□SG	-	○	○	○	-	○	○	○	○	○	○	○	○	-	○	○	○	○	○	○	○
With Power Side 3-Pole In-Phase Crossover Conductor	S-□SX	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	SD-□SX	-	○	○	○	-	○	○	○	○	○	○	○	○	-	○	○	○	○	○	○	○	
With Load Side 3-Pole In-Phase Crossover Conductor	S-□SF	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	SD-□SF	-	○	○	○	-	○	○	○	○	○	○	○	○	-	○	○	○	○	○	○	○	

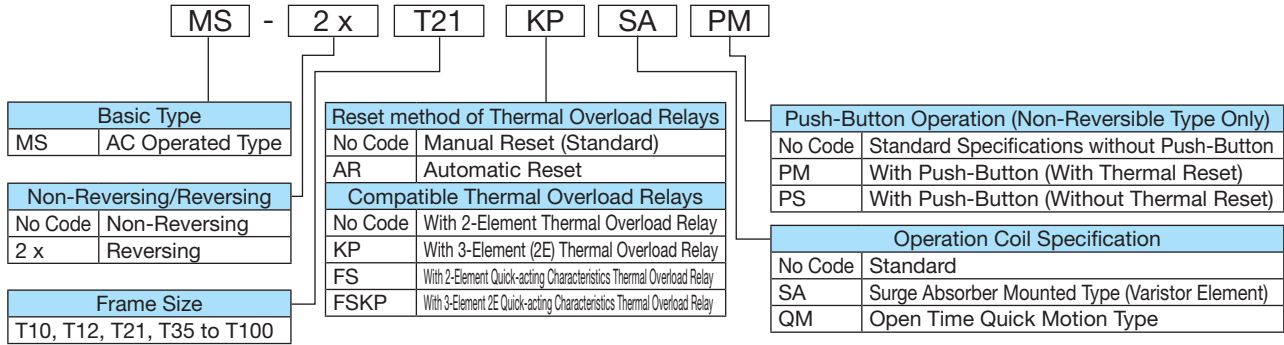
- Note 1. ○ : Permanently in stock, depending on operation coil voltage and heater designation. ○ : Made to order.
- : Outside production range
- Note 2. The value between parentheses for the class AC-3 rated capacity applies to an enclosed magnetic starter.
- Note 3. T65 to N800 types have an AC control 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-ML11 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 100 for details about mechanically latched types, or page 109 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

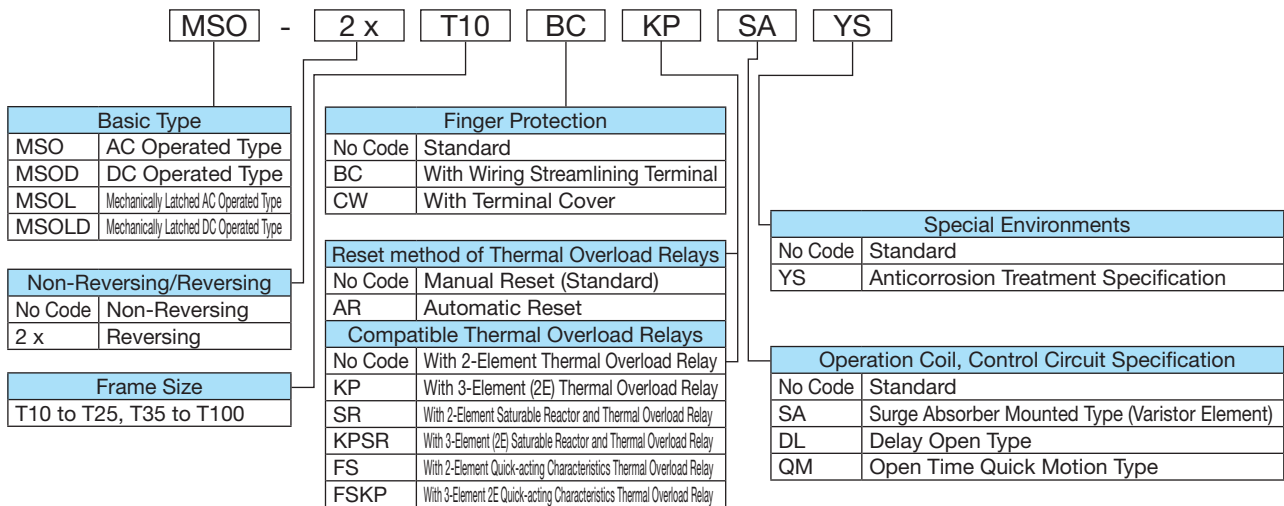
2.3.1 MS-T Magnetic Starters

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.

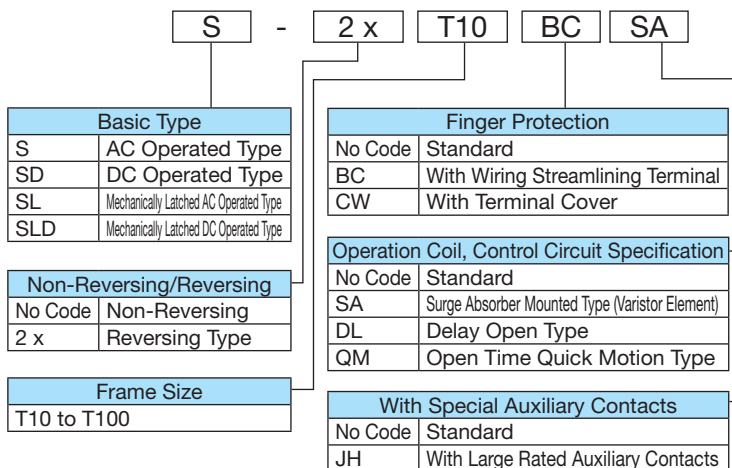
● Enclosed Magnetic Starters



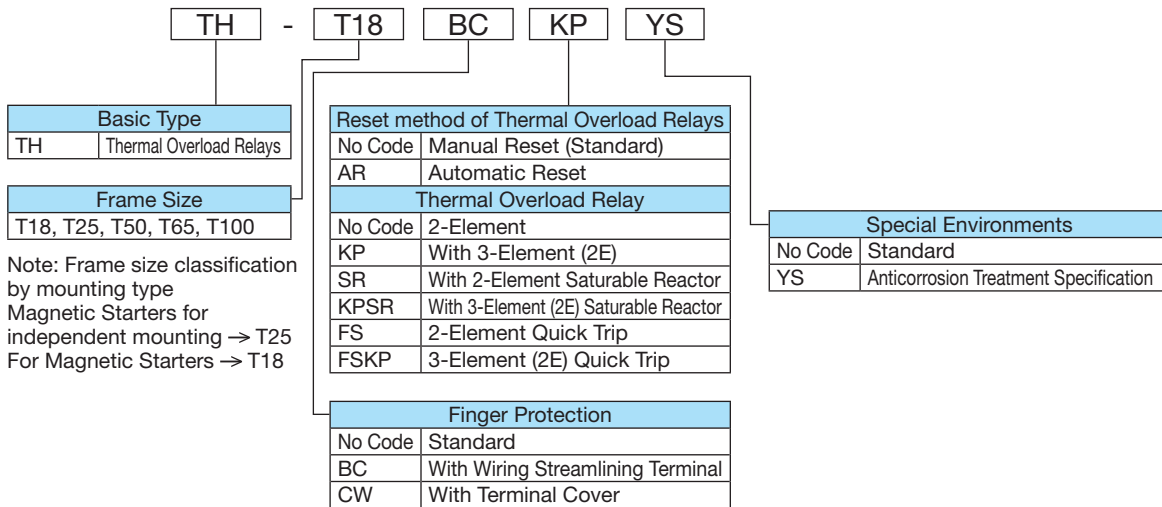
● Open Type Magnetic Starters



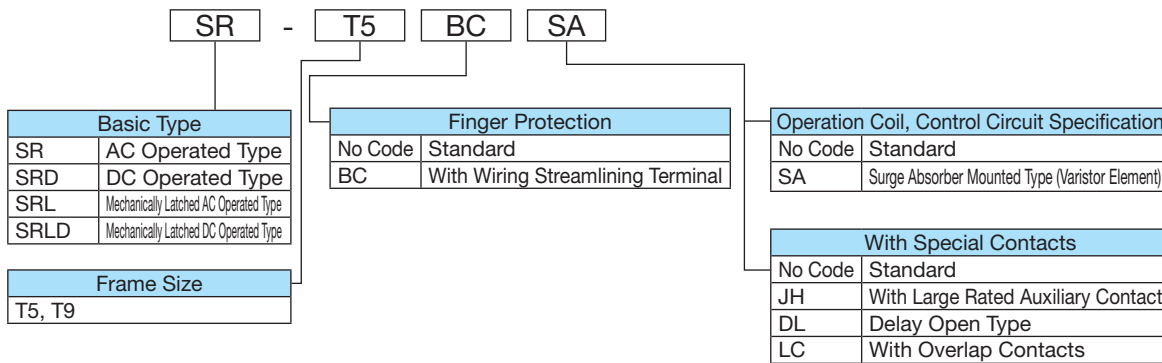
2.3.2 S-T Magnetic Contactors



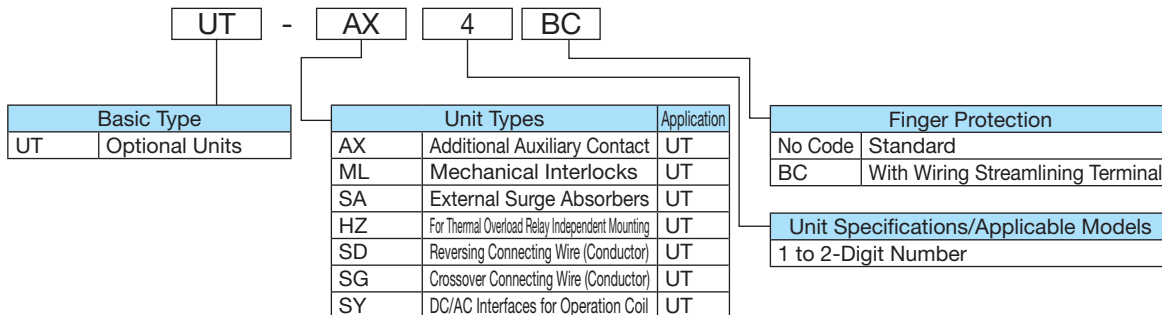
2.3.3 TH-T Thermal Overload Relays



2.3.4 SR-T Contactor Relays



2.3.5 UT Optional Units

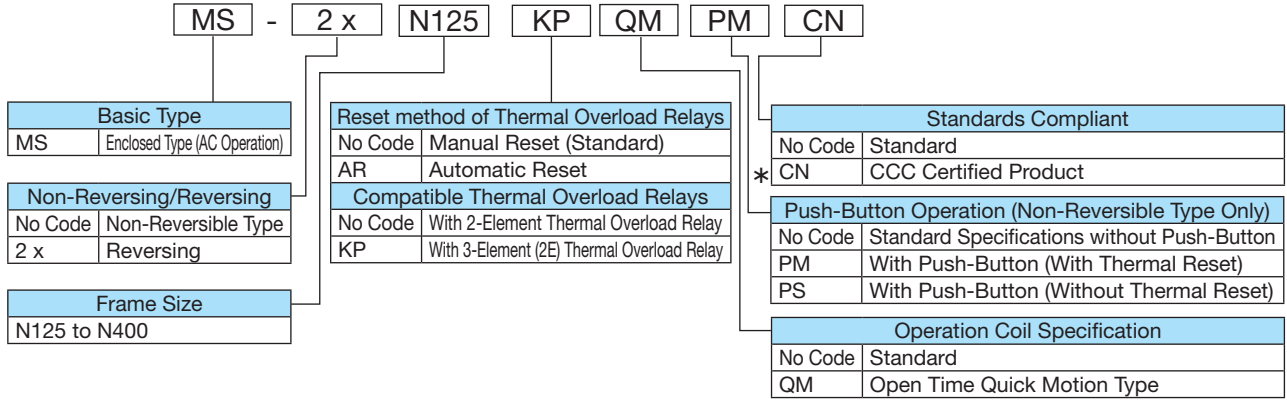


2.3.6 MS-N Magnetic Starters

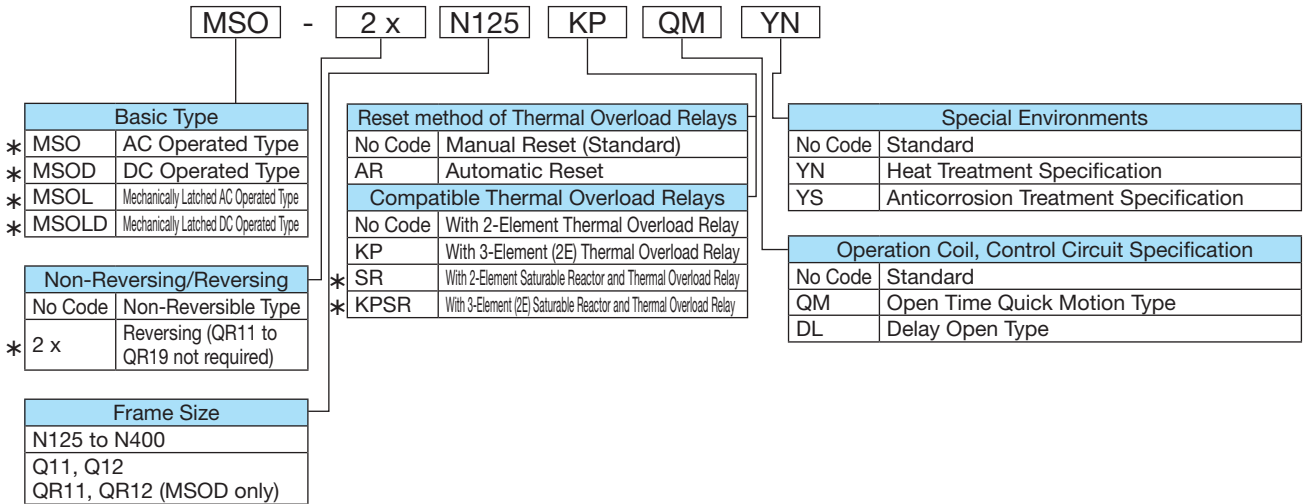
Note 1. Refer to the Product Model List (page 28) or the individual listed page for details about product manufacturing specifications and target models. Furthermore, some types may be unable to be manufactured depending on the combination of symbols.

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

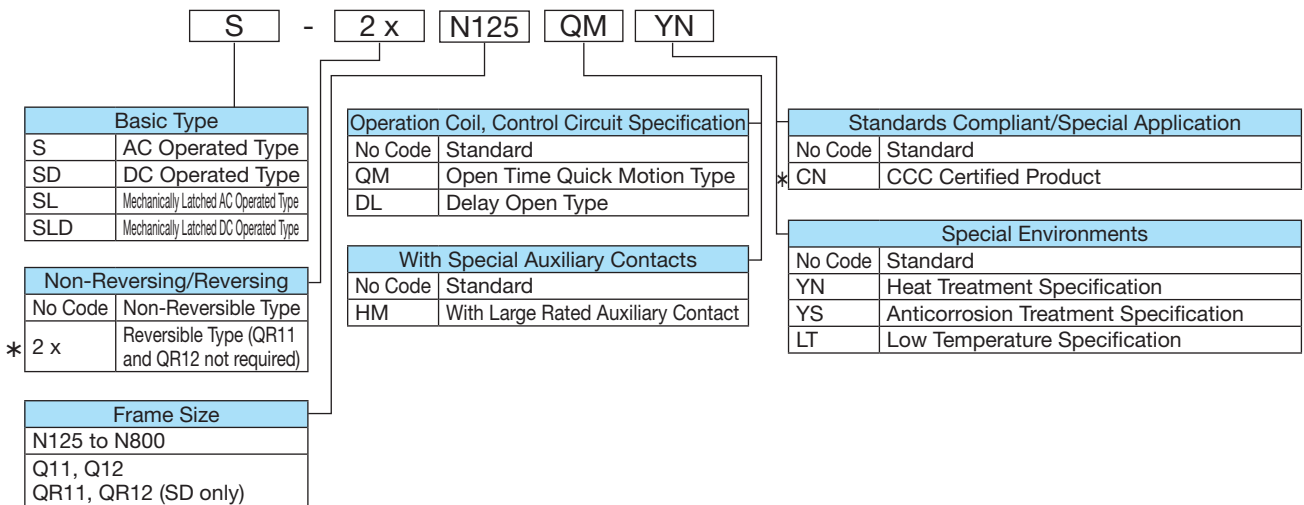
● Enclosed Magnetic Starters



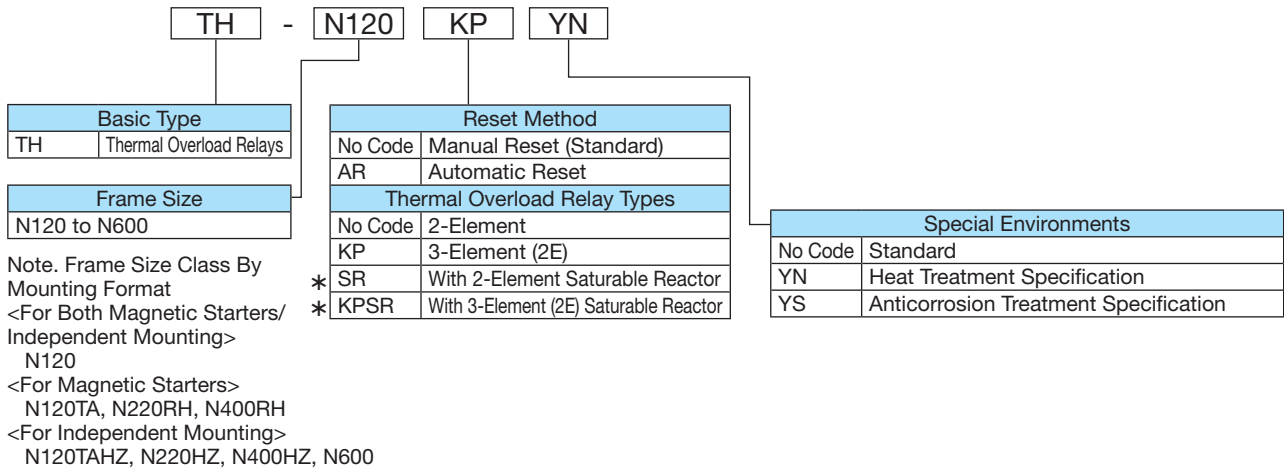
● Open Type Magnetic Starters



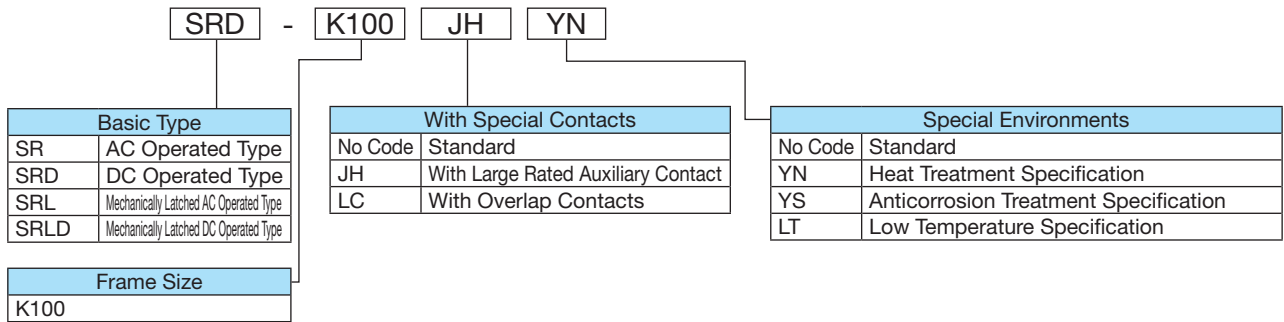
2.3.7 S-N Magnetic Contactors



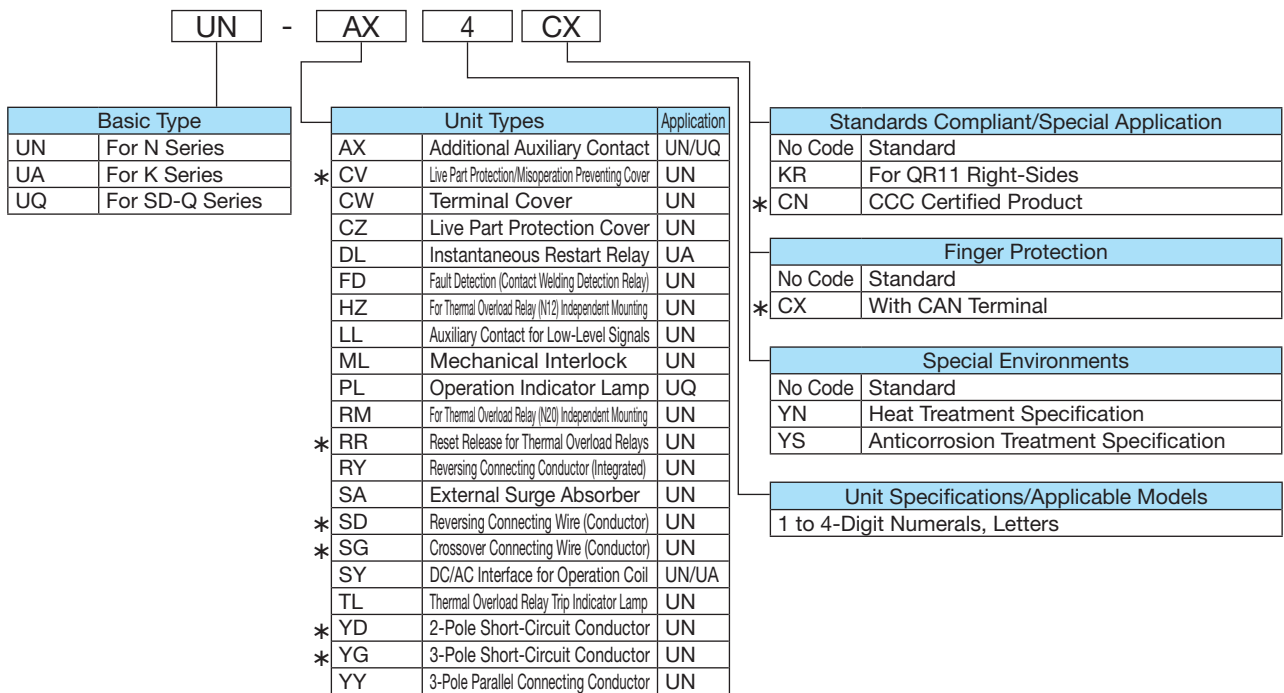
2.3.8 TH-N Thermal Overload Relays






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 66)
	(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 66)
	(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				Single-Phase Motor Application Capacity (Category AC-3)		Inching Duty		Three-Phase Resistive Load (Category AC-1)		
	Three-Phase Squirrel-cage Motor (Category AC-3)				Three-Phase Squirrel-cage Motor (Category AC-4)		Three-Phase Resistive Load (Category AC-1)				
	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) Ith [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						
	T10	T12	T32	T20	T21 to T80	T100 N125	N150 to N800	2xT10	2xT12 2xT20	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	1a x 2 + 2b	1a1b x 2 + 2b	2a2b x 2	2a2b x 2	2a2b x 2	3a3b x 2	4a4b x 2
Special	1b	2a (Note 8)	—	2a (Note 8)	—	—	—	1b x 2 + 2b	2a x 2 + 2b	—	—	—	—	—
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	5a1b x 2 + 2b 4a2b x 2 + 2b 3a3b x 2 + 2b	—	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-ML11 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 1b x 2 + 2b: 2B

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 185 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 100 for details about mechanically latched types, or page 109 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)				
	AC120 V	AC240 V	AC440 V	AC500 V	DC24 V	DC48 V	DC110 V	DC220 V	AC120 V	AC240 V	AC440 V	AC500 V	DC24 V	DC48 V	DC110 V	DC220 V	
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 20 V, 3 mA.

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 main and auxiliary contacts 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

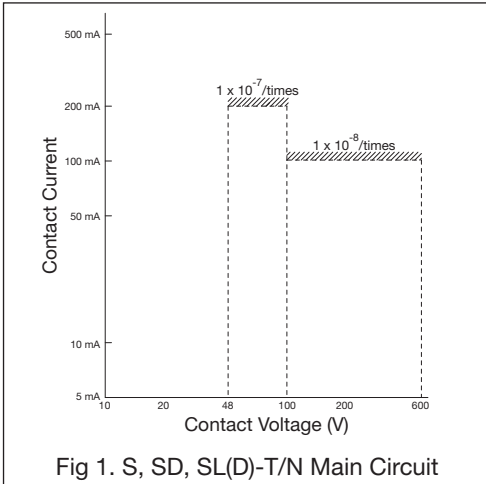


Fig. 1. S, SD, SL(D)-T/N Main Circuit

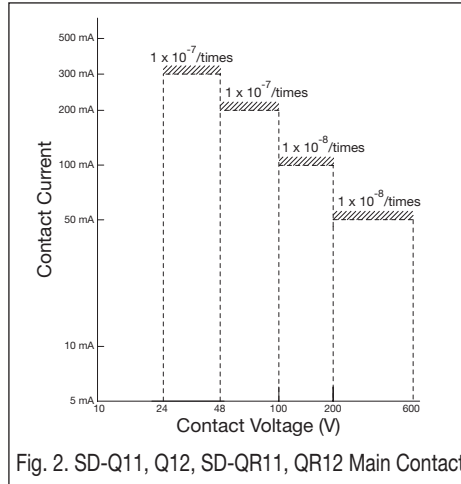


Fig. 2. SD-Q11, Q12, SD-QR11, QR12 Main Contact

Note 1: The contact reliability indicates the failure rate $\lambda 60$ (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 64).

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.

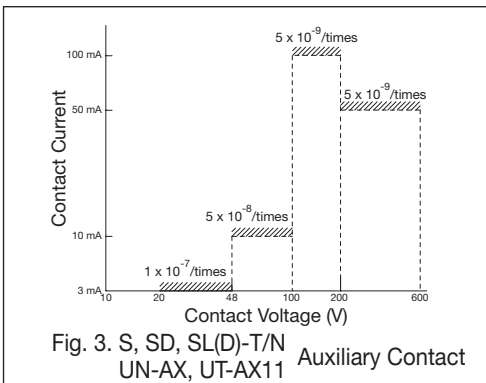


Fig. 3. S, SD, SL(D)-T/N UN-AX, UT-AX11 Auxiliary Contact

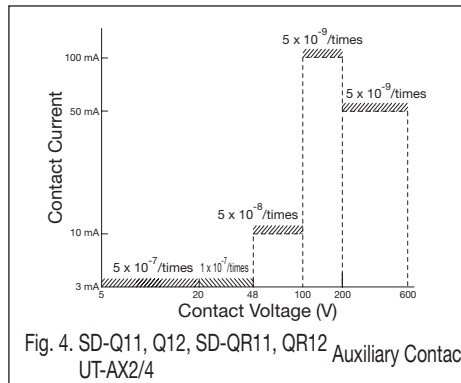


Fig. 4. SD-Q11, Q12, SD-QR11, QR12 UT-AX2/4 Auxiliary Contact

● Contactor Relays

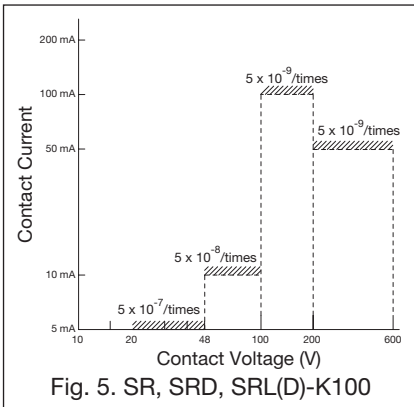


Fig. 5. SR, SRD, SRL(D)-K100

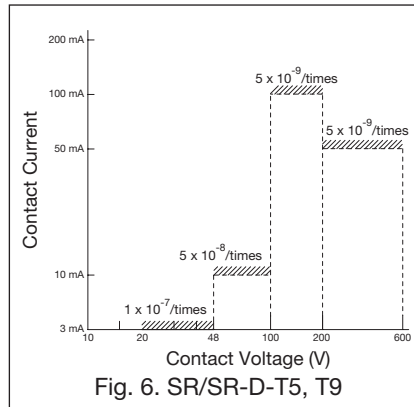


Fig. 6. SR/SR-D-T5, T9

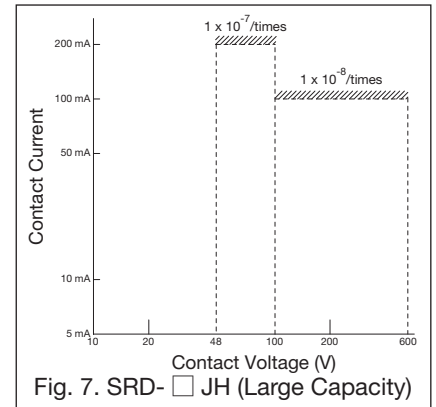


Fig. 7. SRD- JH (Large Capacity)

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 and SRT-NN/NF Types

Coil Designation	Rated Voltage [V]		Coil Indication
	50 Hz	60 Hz	
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 and SRT-NNSA/NFSA Types

Coil Designation	Rated Voltage [V]		Coil Indication	Varistor Voltage [V]
	50 Hz	60 Hz		
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

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
	50 Hz/60 Hz		
AC24V (Note 1)	24		Rated Voltage/ Frequency
AC48V (Note 1)	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
	50 Hz/60 Hz		
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 248

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 156

B-T/N□: Page 238

DU-N□: Page 242

SH-V□: Page 248

● 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 158

SD-Q□: Page 232

BD-T/N□: Page 238

DUD-N□: Page 242

SHD-V□: Page 248

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 160 SHL(D)-V□: Page 248

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	Current	Power Factor	Current	Power Factor	
AC-1	1.5Ie	0.8	1.5Ie	0.8	Non-Inductive Or Low-Inductance Loads, Resistive Heaters
AC-2	4Ie	0.65	4Ie	0.65	Wound Motor Starting, Running, Stopping
AC-3	10Ie	(Note 3)	8Ie	(Note 3)	Cage Induction Motor Starting, Running, Stopping
AC-4	12Ie	(Note 3)	10Ie	(Note 3)	Cage Induction Motor Starting, Inching, Plugging
AC-5a	3Ie	0.45	3Ie	0.45	Switching Discharge Lamp Control Equipment
AC-5b	1.5Ie	(Note 4)	1.5Ie	(Note 4)	Switching Incandescent Lamps
AC-6a	(Note 5)		(Note 5)		Switching Transformers
AC-6b	(Note 6)		(Note 6)		Switching Capacitor Banks
AC-8a	6Ie	(Note 3)	6Ie	(Note 3)	Control of Closed-Type Refrigerant Compressor Motors with Manual Return Overload Tripping Devices
AC-8b	6Ie	(Note 3)	6Ie	(Note 3)	Control of Closed-Type Refrigerant Compressor Motors with Automatic Return Overload Tripping Devices

- Note 1. Ie: Rated operating current. Note 2. Tested at a voltage 1.05 times greater than rated voltage.
Note 3. Ie ≤ 100 A: 0.45, Ie > 100 A: 0.35. Note 4. Carried out with an incandescent load.
Note 5. Class AC-6a Ie is 0.45 times that of class AC-3 Ie when switching a transformer with a peak inrush current less than 30 times greater than the rated current.
Note 6. Class AC-6b Ie 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.

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

ik > 205 x Class AC-3 Ie

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

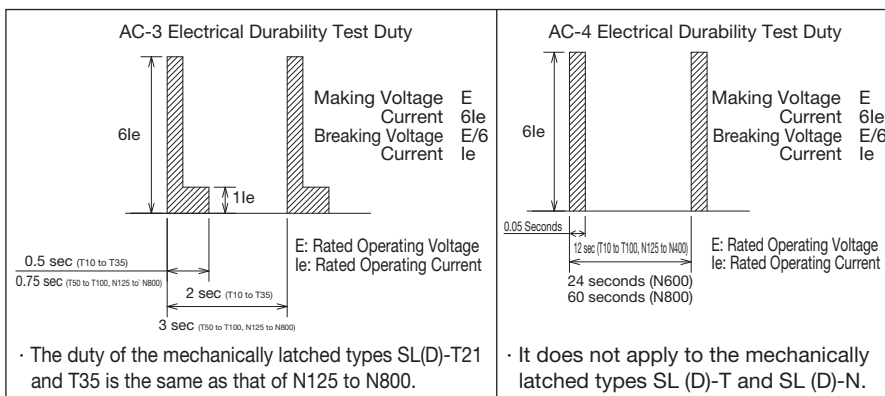
Frame	Rated Operating Voltage [V]	Rated Operating Current [A]	Making and Breaking Capacities [A]		AC Operated Types (S-□)			DC Operated Types (SD-□)			Mechanically Latched Types (SL(D)-□)		
					Switching Frequency [Times/Hour] category AC-3	Switching Durability [x 10000]		Switching Frequency [Times/Hour] category AC-3	Switching Durability [x 10000]		Switching Frequency [Times/Hour] category AC-3	Switching Durability [x 10000]	
			Making	Breaking		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	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	50
	440	32	400	320									
T50	220	50	550	440	1200	1000	200	1200	1000	200	1200	25	25
	440	48	500	400									
T65	220	65	650	520	1200	500	200	1200	500	200	1200	25	25
	440	65	650	520									
T80	220	80	850	680	1200	500	100	1200	500	100	1200	25	25
	440	80	850	680									
T100	220	100	1050	840	1200	500	100	1200	500	100	1200	25	25
	440	93	1050	840									
N125	220	125	1250	1000	1200	500	100	1200	500	100	1200	25	25
	440	120	1200	960									
N150	220	150	1500	1200	1200	500	100	1200	500	100	1200	25	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	25
	440	220	2500	2000									
N300	220	300	3000	2400	1200	500	100	1200	500	100	1200	25	25
	440	300	3000	2400									
N400	220	400	4000	3200	1200	500	50	1200	500	50	1200	25	25
	440	400	4000	3200									
N600	220	630	6300	5040	1200	500	50	1200	500	50	1200	10	10
	440	630	6300	5040									
N800	220	800	8000	6400	1200	500	50	1200	500	50	1200	10	10
	440	800	8000	6400									

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 156, 160
 B(D)-T/N□: Page 237
 SH, SHD, SHL(D)-V□: Page 247

SD-Q□: Page 231
 DU(D)-N□: Page 242

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 131 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

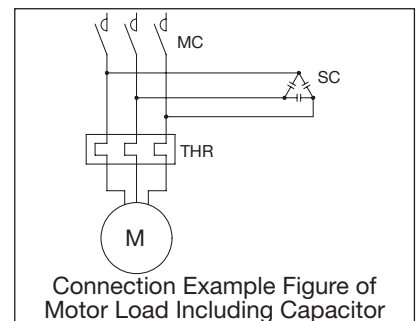
It indicates the heater designation of the thermal overload relay for the single-phase motor and frame of the applicable magnetic starter.

Motor Capacity [kW]	100 to 110 V					200 to 240 V								
	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	T25	T35	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 131 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).

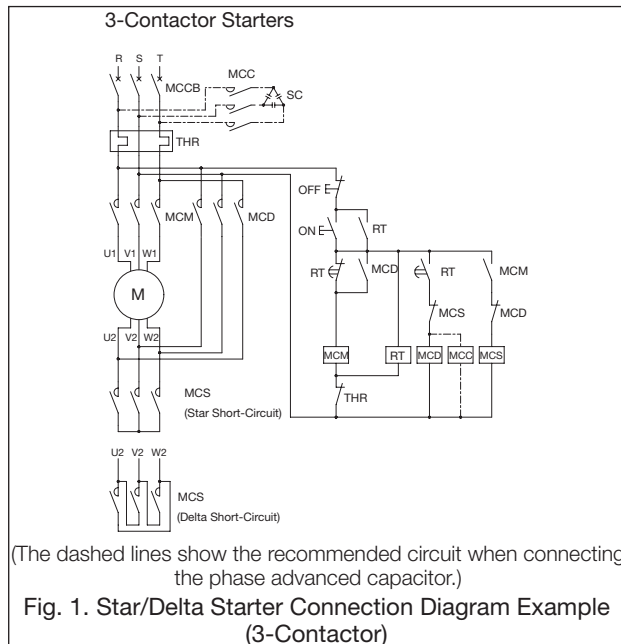
Electrical interlocks are required to be installed between star (MCS or MCS1) and delta (MCD) magnetic contactors. 3-contactor types are the most generally used and do not apply voltage to the motor windings when stopped, suppressing damage to the insulation due to leakage currents. 2-contactor types 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 dashed lines show the recommended circuit when connecting the phase advanced capacitor.)

Fig. 1. Star/Delta Starter Connection Diagram Example (3-Contactor)

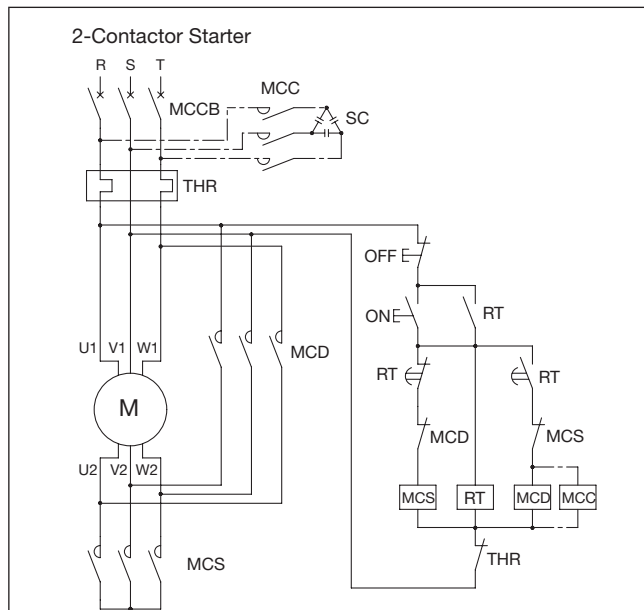
⚠ The motor and equipment may be damaged if it is unable to switch from reduced voltage starting to full voltage running and continues in the reduced voltage starting state.

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	$E_m/\sqrt{3}$	Im	Im	$E_m/\sqrt{3}$
Star/Delta	2Im	0.5T	2Im	$E_m/\sqrt{3}$	Im	$Im/\sqrt{3}$	Em

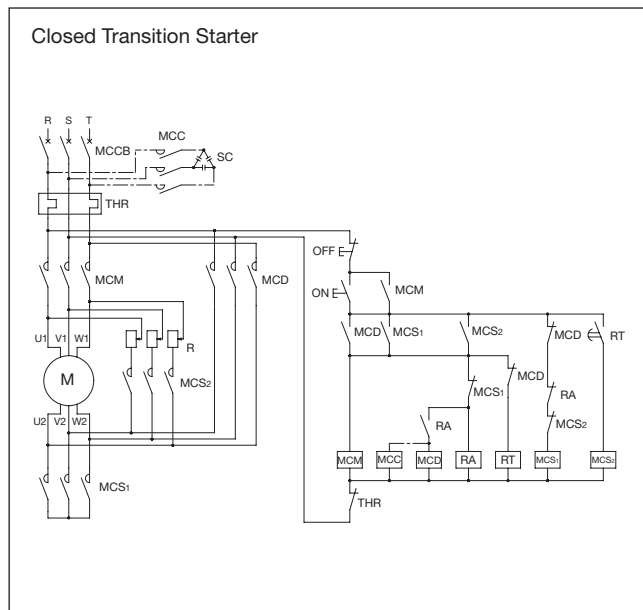
Note 1. Im: Full-load current in delta configuration, Em: Line-to-line voltage, T: Rated torque

Note 2: Estimated torque value.



(The dashed lines show the recommended circuit when connecting the phase advanced capacitor.)

Fig. 2. Star/Delta Starter Connection Diagram Example (2-Contactor) (3-contactor types are recommended for applications with a lot of downtime)



(The dashed lines show the recommended circuit when connecting the phase advanced capacitor.)

Fig. 3. Closed Transition Type Star/Delta Starter Connection Diagram Example

● 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)	
Rated Voltage [V]	Rated Capacity [kW]	Rated Current [A] <small>Note 1</small>		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.

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 Ie, 1.05 Ee, $\cos \phi$ 0.8	1.5 Ie, 1.05 Ee, $\cos \phi$ 0.8	Ie, Ee, $\cos \phi$ 0.95	Ie, Ee, $\cos \phi$ 0.95
	JEM	AC1	1.5 Ie, 1.1 Ee, $\cos \phi$ 0.95	1.5 Ie, 1.1 Ee, $\cos \phi$ 0.95	Ie, Ee, $\cos \phi$ 0.95	Ie, Ee, $\cos \phi$ 0.95
Switching DC Resistive Loads	JIS	DC-1	1.5 Ie, 1.05 Ee, L/R 1(ms)	1.5 Ie, 1.05 Ee, L/R 1(ms)	Ie, Ee, L/R 1(ms)	Ie, Ee, L/R 1(ms)
	JEM	DC1	1.1 Ie, 1.1 Ee, L/R 1(ms)	1.1 Ie, 1.1 Ee, L/R 1(ms)	Ie, Ee, L/R 1(ms)	Ie, Ee, L/R 1(ms)

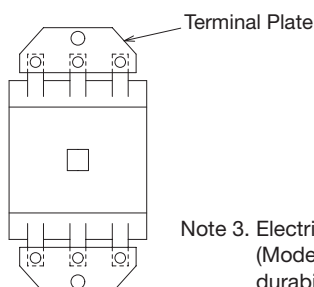
Note 1. Ie: rated operating current, Ee: rated voltage, $\cos \phi$: power factor, L/R: time constant.

Applying Resistive Loads to Magnetic Contactors

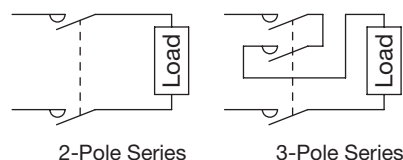
The table below shows the ratings for when applying resistive loads to MS-T/N series magnetic contactors.

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			
	100 to 240 V	400 to 440 V	Three-Phase		Single-Phase			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	100 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.

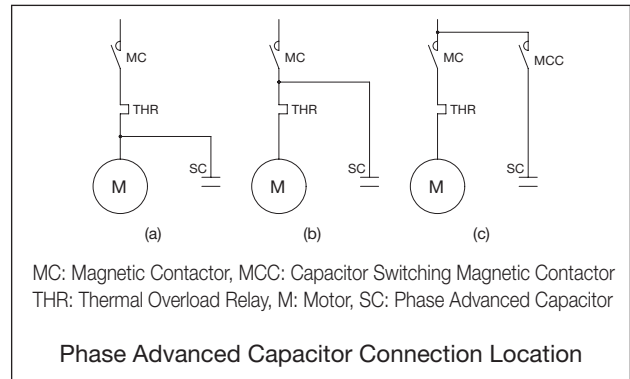
Note 2. The peak wave amplitude of the inrush current when close-circuited is within 20 times the capacitor's rated current (actual value) and the electrical durability is approximately 200,000 operations.

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					Output Units					Output Units							
		Contact Output	Transistor Output		I/O Combination Units		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	RY41N2P RY42N2P	RY41PT1P RY42PT1P	RY40NT5P RY40PT5P	RH42C4NY2P	LY10R2	LY41NT1P LY42NT1P LY41PT1P LY42PT1P	L102CPU L26CPU-BT L02SCPU L02SCPU-P L06CPU L16CPU-P L26CPU L26CPU-P L26CPU-PBT	LY40T5P 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	AC100 V AC200 V	Using UN-SY□/ UT-SY□ DC24 V					
AC Operated	AC100V AC200V	SR-T5, T9	○ 1 mil. ○ 1.5 mil.	○					○ 1 mil. ○ 1.5 mil.	○		○ ○	○ ○	○ 1 mil. ○ 2 mil.	○ ○	○			
		S-T10, T12, T20	○ 1 mil. ○ 1.5 mil.	○					○ 1 mil. ○ 1.5 mil.	○		○ ○	○ ○	○ 1 mil. ○ 2 mil.	○ ○	○			
		S-T21, T25	○ 1 mil. ○ 1.5 mil.	○					○ 1 mil. ○ 1.5 mil.	○		○ ○	○ ○	○ 1 mil. ○ 2 mil.	○ ○	○			
		S-T32	○ 1.5 mil. ○ 2 mil.	○					○ 1.5 mil. ○ 2 mil.	○		○ ○	○ ○	○ 1.5 mil. ○ 2 mil.	○ ○	○			
		S-T35/T50	○ 0.5 mil. ○ 1 mil.	○					○ 0.5 mil. ○ 1 mil.	○		○ ○	○ ○	○ 0.5 mil. ○ 1 mil.	○ ○	○			
		S-T65/T80	○ 0.5 mil. ○ 1 mil.	○					○ 0.5 mil. ○ 1 mil.	○		○ x	○ ○	○ 0.5 mil. ○ 1 mil.	○ x	○			
		S-T100	○ 0.5 mil. ○ 0.5 mil.	○					○ 0.5 mil. ○ 0.5 mil.	○		○ x	○ ○	○ 0.5 mil. ○ 0.5 mil.	○ x	○			
		S-N125, N150	○ 0.5 mil. ○ 0.5 mil.	○					○ 0.5 mil. ○ 0.5 mil.	○		○ x	○ ○	○ 0.5 mil. ○ 0.5 mil.	○ x	○			
		S-N180/N220	○ 0.3 mil. ○ 0.4 mil.	○					○ 0.3 mil. ○ 0.4 mil.	○		○ x	○ ○	○ 0.3 mil. ○ 0.4 mil.	○ x	○			
		S-N300/N400	○ 0.2 mil. ○ 0.3 mil.	○					○ 0.2 mil. ○ 0.3 mil.	○		○ x	○ ○	○ 0.2 mil. ○ 0.4 mil.	○ x	○			
S-N600/N800	x ○ 0.2 mil.	x					x ○ 0.2 mil.	x		x x	x x	x ○ 0.2 mil.	x x	x					
DC Operated	DC24V DC24V DC110V	SD-Q□, QR□	○ 1 mil.	○					○ 1 mil.	○ ○		○	○ 1 mil. ○ 1 mil.	○ ○ ○ ○					
		SRD-T5, T9	○ 0.3 mil. ○ 0.3 mil.	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ 0.3 mil. ○ 0.3 mil.	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ DC24 V	○ 0.3 mil. ○ 0.3 mil.	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V
		SD-T12/T20	○ 0.3 mil. ○ 0.3 mil.	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ 0.3 mil. ○ 0.3 mil.	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ DC24 V	○ 0.3 mil. ○ 0.3 mil.	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V
		SD-T21/T32	○ 0.3 mil. ○ 0.3 mil.	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ 0.3 mil. ○ 0.3 mil.	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ DC24 V	○ 0.3 mil. ○ 0.3 mil.	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V	○ DC24 V ○ DC24 V
		SD-T35/T50	x x x x	○ DC24 V	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	○ DC24 V	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	○ DC24 V
		SD-T65/T80	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	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	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	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	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	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	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	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	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	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	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	x x x x	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	/		Closing Tripping	/							
		SRL-T5	○ 0.5 mil. ○ 0.5 mil.	/					○ 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.	/		○ ○	○ 0.5 mil. ○ 0.5 mil.	○ ○	/				
		SL-T35/T50	○ 0.5 mil. ○ 0.5 mil.	/					○ 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.	/		○ ○	○ 0.25 mil. ○ 0.25 mil.	○ ○	/				
		SL-T100	○ 0.25 mil. ○ 0.25 mil.	/					○ 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.	/		○ ○	○ 0.25 mil. ○ 0.25 mil.	○ ○	/				
		SL-N220	○ 0.25 mil. ○ 0.25 mil.	/					○ 0.25 mil. ○ 0.25 mil.	/		○ ○	○ 0.25 mil. ○ 0.25 mil.	○ ○	/				
		SL-N300/N400	○ 0.25 mil. x	/					○ 0.25 mil. x	/		○ x	○ 0.25 mil. x	○ x	/				
		SL-N600/N800	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.

MELSEC-Q Series		MELSEC-FX Series				CC-Link IE				CC-Link								
I/O Combination Units		Output Units				Output Units				Output Units								
Transistor Output		Contact Output	Transistor Output		Contact Output		Transistor Output		Contact Output		Triaic Output		Transistor Output					
QX42P QX41Y41P	QX48Y57	FX3S-□MR FX3U-□MR(A) FX3V-□E(Y)(R-ES)(S)UL FX3V-16EYR-F-DS FX-16EYR-ES-TB/UL FX3S-□MR(A) FX3U-□MR FX3-□E(Y)R	FX3S-□MT FX3V-□E(Y)T-ESS/UL FX-16EYR-ES-TB/UL FX3S-□MT(A) FX3U-□MT(A)	FX3S-32MT FX3V-□E(Y)T-DSS FX3U-□MT FX3S-□MT FX3U-□MT FX3-□ET FX3-C-□E(Y)T	NZ2GF2S2-16R NZ2GF2B2-16R	NZ2GFCE3-16T NZ2GFCE3-16TE NZ2GFOM1-16T NZ2GFOM1-16TE NZ2GF2S1-16T NZ2GF2S1-16TE NZ2GF2B1N1-16T NZ2GF2B1N1-16TE NZ2GF2B1-32T NZ2GF2B1-32TE	NZ2EX2B1-16T NZ2EX2B1-16TE NZ2EX2S1-16T NZ2EX2S1-16TE	AJ65SBBT2N-□R AJ65DBTB1-32R	AJ65BTB2-16R	No Varistor		AJ65SBBT□□□ AJ65SBBT□□□T AJ65SBBT□□□TE AJ65BTB□□□ AJ65BTB□□□T AJ65BTB□□□TE AJ65BTB□□□T AJ65BTB□□□TE AJ65BTB□□□T AJ65BTB□□□TE	AJ65SBBT□□□TE AJ65BT□□□TE AJ65BT□□□TE AJ65BT□□□TE AJ65BT□□□TE AJ65BT□□□TE AJ65BT□□□TE AJ65BT□□□TE AJ65BT□□□TE AJ65BT□□□TE	AJ65BT□□□TE AJ65BT□□□TE AJ65BT□□□TE AJ65BT□□□TE AJ65BT□□□TE AJ65BT□□□TE AJ65BT□□□TE AJ65BT□□□TE AJ65BT□□□TE AJ65BT□□□TE	AJ65BT□□□TE AJ65BT□□□TE AJ65BT□□□TE AJ65BT□□□TE AJ65BT□□□TE AJ65BT□□□TE AJ65BT□□□TE AJ65BT□□□TE AJ65BT□□□TE AJ65BT□□□TE			
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		AC100 V AC200 V	AC100 V AC200 V	AC100 V AC200 V	AC100 V AC200 V	AC100 V AC200 V	Using UN-SY□□/UT-SY□ DC24 V					
○	○	○ 3 mil.	○	○	○ 1 mil. ○ 1.5 mil.	○	○	○ 2 mil. ○ 2 mil.	○ 2 mil. ○ 2 mil.	○ 2 mil. ○ 2 mil.	○ 2 mil. ○ 2 mil.	○	○	○	○	○	T5/9	
○	○	○ 3 mil.	○	○	○ 1 mil. ○ 1.5 mil.	○	○	○ 2 mil. ○ 2 mil.	○ 2 mil. ○ 2 mil.	○ 2 mil. ○ 2 mil.	○ 2 mil. ○ 2 mil.	○	○	○	○	○	T10/12/20	
○	○	○ 3 mil.	○	○	○ 1 mil. ○ 1.5 mil.	○	○	○ 2 mil. ○ 2 mil.	○ 2 mil. ○ 2 mil.	○ 2 mil. ○ 2 mil.	○ 2 mil. ○ 2 mil.	○	○	○	○	○	T21/25	
○	○	○ 3 mil.	○	○	○ 1.5 mil. ○ 2 mil.	○	○	○ 2 mil. ○ 2 mil.	○ 2 mil. ○ 2 mil.	○ 2 mil. ○ 2 mil.	○ 2 mil. ○ 2 mil.	○	○	○	○	○	T32	
○	○	○ 3 mil.	○	○	○ 0.5 mil. ○ 1 mil.	○	○	○ 2 mil. ○ 2 mil.	○ 2 mil. ○ 2 mil.	○ 2 mil. ○ 2 mil.	○ 2 mil. ○ 2 mil.	○	○	○	○	○	T35/50	
○	○	○ 3 mil.	○	○	○ 0.5 mil. ○ 1 mil.	○	○	○ 1.5 mil. ○ 2 mil.	○ 2 mil. ○ 2 mil.	○ 1.5 mil. ○ 2 mil.	○ 2 mil. ○ 2 mil.	○	x	○	○	○	T65/80	
○	○	○ 3 mil.	○	○	○ 0.5 mil. ○ 0.5 mil.	○	○	○ 1 mil. ○ 1.5 mil.	○ 1 mil. ○ 1.5 mil.	○ 1 mil. ○ 1.5 mil.	○ 1.5 mil. ○ 2 mil.	○	x	○	○	○	T100	
○	○	○ 1 mil.	○	○	○ 0.5 mil. ○ 0.5 mil.	○	○	○ 1 mil. ○ 1.5 mil.	○ 1 mil. ○ 1.5 mil.	○ 1 mil. ○ 1.5 mil.	○ 1.5 mil. ○ 2 mil.	○	x	○	○	○	N125/150	
○	○	○ 0.2 mil.	○	○	○ 0.3 mil. ○ 0.4 mil.	○	○	○ 0.5 mil. ○ 1 mil.	○ 1 mil. ○ 0.5 mil.	○ 1 mil. ○ 1 mil.	○ 1 mil. ○ 1 mil.	○	x	○	○	○	N180/220	
○	○	○ 0.2 mil.	○	○	○ 0.2 mil. ○ 0.3 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.	○	x	○	○	○	N300/400	
x	x	x	x	x	x ○ 0.2 mil.	x	x	x ○ 0.4 mil.	x	x	x	x	x	x	x	x	x	N600/800
○	○	○ 1 mil.	○	○	○ 1 mil.	○	○	○ 2 mil.	○ 2 mil.			○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	Q/QR		
		DC24 V DC110 V			DC24 V DC110 V			○ DC24 V	○ DC110 V	○ DC24 V	○ DC110 V							
○ DC24 V	○ DC24 V	○ 0.15 mil. x	○ DC24 V	○ DC24 V	○ 0.3 mil. ○ 0.3 mil.	○ DC24 V	○ DC24 V	○ 0.4 mil. ○ 0.8 mil.	○ 0.4 mil. ○ 0.4 mil.	○ 0.8 mil. ○ 0.8 mil.	○ 0.8 mil. ○ 0.8 mil.	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	T5/9		
○ DC24 V	○ DC24 V	○ 0.15 mil. x	○ DC24 V	○ DC24 V	○ 0.3 mil. ○ 0.3 mil.	○ DC24 V	○ DC24 V	○ 0.4 mil. ○ 0.8 mil.	○ 0.4 mil. ○ 0.4 mil.	○ 0.8 mil. ○ 0.8 mil.	○ 0.8 mil. ○ 0.8 mil.	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	T12/20		
○ DC24 V	○ DC24 V	○ 0.1 mil. x	○ DC24 V	○ DC24 V	○ 0.3 mil. ○ 0.3 mil.	○ DC24 V	○ DC24 V	○ 0.4 mil. ○ 0.8 mil.	○ 0.4 mil. ○ 0.4 mil.	○ 0.8 mil. ○ 0.8 mil.	○ 0.8 mil. ○ 0.8 mil.	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	T21/32		
x	○ DC24 V	○ 0.1 mil. x	○ DC24 V	x	x x	○ DC24 V	○ DC24 V	○ 0.1 mil. ○ 0.3 mil.	○ 0.1 mil. ○ 0.3 mil.	○ 0.3 mil. ○ 0.3 mil.	○ 0.3 mil. ○ 0.3 mil.	○ DC24 V	x	○ DC24 V	○ DC24 V	T35/50		
x	x	x x	x x	x x	x x	x x	x x	x x	x x	x x	x x	x	x	x	x	x	T65/80	
x	x	x x	x x	x x	x x	x x	x x	x x	x x	x x	x x	x	x	x	x	x	T100	
x	x	x x	x x	x x	x x	x x	x x	x x	x x	x x	x x	x	x	x	x	x	N125/150	
x	x	x x	x x	x x	x x	x x	x x	x x	x x	x x	x x	x	x	x	x	x	N220	
x	x	x x	x x	x x	x x	x x	x x	x x	x x	x x	x x	x	x	x	x	x	N300/400	
x	x	x x	x x	x x	x x	x x	x x	x x	x x	x x	x x	x	x	x	x	x	N600/800	
		Closing Tripping			Closing Tripping			Closing Tripping	Closing Tripping	Closing Tripping	Closing Tripping	Closing Tripping					T5	
		○ 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.	○	○				T21	
		○ 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.	○	○				T35/150	
		○ 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.	○	○				T65/80	
		○ 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.	○	○				T100	
		○ 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.	○	○				N125/150	
		○ 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.	○	○				N220	
		○ 0.25 mil. x			○ 0.25 mil. x			○ 0.25 mil. x	○ 0.25 mil. x	○ 0.25 mil. x	○ 0.25 mil. x	○	x				N300/400	
		x x			x x			x x	x x	x x	x x	x	○				N600/800	

● 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	AJ65SBTB2-16DR	AJ65SBTB32-8DT	AJ65SBTB1-32DT2	AJ65SBTB1-16DT	AJ65SBTB1-32DT1	AJ65BTE32-2DT	AJ65SBTCF1-32DT	AJ65FBTA2-16DTE	QSOJ65BTS2-4T	QSOJ65BTR2-12DT	CL1Y4-T1B2	CL1Y4-T1C2	CL1XV4-DT1B2	CL1XV16-DTP1C5V		
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.	○	○	○	○	○	○	○	○	○	○	○	○	T5/9
	S-T10, T12, T20		○ 2 mil.	○ 2 mil.	○ 2 mil.	○ 2 mil.	○	○	○	○	○	○	○	○	○	○	○	○	T10/12/20
	S-T21, T25		○ 2 mil.	○ 2 mil.	○ 2 mil.	○ 2 mil.	○	○	○	○	○	○	○	○	○	○	○	○	T21/25
	S-T32		○ 2 mil.	○ 2 mil.	○ 2 mil.	○ 2 mil.	○	○	○	○	○	○	○	○	○	○	○	○	T32
	S-T35/T50		○ 2 mil.	○ 2 mil.	○ 2 mil.	○ 2 mil.	○	○	○	○	○	○	○	○	○	○	○	○	T35/50
	S-T65/T80		○ 1.5 mil.	○ 2 mil.	○ 1.5 mil.	○ 2 mil.	○	○	○	○	○	○	○	○	○	○	○	○	T65/80
	S-T100		○ 1 mil.	○ 1.5 mil.	○ 1 mil.	○ 1.5 mil.	○	○	○	○	○	○	○	○	○	○	○	○	T100
	S-N125, N150		○ 1 mil.	○ 1.5 mil.	○ 1 mil.	○ 1.5 mil.	○	○	○	○	○	○	○	○	○	○	○	○	N125/150
	S-N180/N220		○ 0.5 mil.	○ 1 mil.	○ 0.5 mil.	○ 1 mil.	○	○	○	○	○	○	○	○	○	○	○	○	N180/220
	S-N300/N400		○ 0.5 mil.	○ 0.5 mil.	○ 0.5 mil.	○ 0.5 mil.	○	○	○	○	○	○	○	○	○	○	○	○	N300/400
S-N600/N800		x	○ 0.4 mil.	x	○ 0.4 mil.	x	x	x	x	x	x	x	x	x	x	x	x	N600/800	
DC Operated	SD-Q□, QR□	DC24V	○ 2 mil.	○ 2 mil.	○ DC24 V								○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	Q/QR
			DC24 V	DC110V	DC24 V	DC110V													
	SRD-T5, T9		○ 0.4 mil.	○ 0.8 mil.	○ 0.4 mil.	○ 0.8 mil.	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	T5/9
	SD-T12/T20		○ 0.4 mil.	○ 0.8 mil.	○ 0.4 mil.	○ 0.8 mil.	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	T12/20
	SD-T21/T32		○ 0.4 mil.	○ 0.8 mil.	○ 0.4 mil.	○ 0.8 mil.	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	○ DC24 V	T21/32
	SD-T35/T50		○ 0.1 mil.	○ 0.3 mil.	○ 0.1 mil.	○ 0.3 mil.	○ DC24 V	○ DC24 V	x	x	○ DC24 V	○ DC24 V	x	x	x	x	x	T35/50	
	SD-T65/T80		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	T65/80
	SD-T100		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	T100
	SD-N125, N150		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	N125/150
	SD-N220		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	N220
	SD-N300/N400		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	N300/400
SD-N600/N800		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	N600/800	
Mechanically Latched Type			Closing	Tripping	Closing	Tripping	/												
	SRL-T5		○ 0.5 mil.	○ 0.5 mil.	○ 0.5 mil.	○ 0.5 mil.											T5		
	SL-T21		○ 0.5 mil.	○ 0.5 mil.	○ 0.5 mil.	○ 0.5 mil.											T21		
	SL-T35/T50	AC100V	○ 0.5 mil.	○ 0.5 mil.	○ 0.5 mil.	○ 0.5 mil.											T35/T50		
	SL-T65/T80	AC200V	○ 0.25 mil.	○ 0.25 mil.	○ 0.25 mil.	○ 0.25 mil.											T65/T80		
	SL-T100		○ 0.25 mil.	○ 0.25 mil.	○ 0.25 mil.	○ 0.25 mil.											T100		
	SL-N125, N150		○ 0.25 mil.	○ 0.25 mil.	○ 0.25 mil.	○ 0.25 mil.											N125/150		
	SL-N220		○ 0.25 mil.	○ 0.25 mil.	○ 0.25 mil.	○ 0.25 mil.											N220		
SL-N300/N400		○ 0.25 mil.	x	○ 0.25 mil.	x	N300/400													
SL-N600/N800		x	x	x	x	N600/800													

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)		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	0.4	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	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 x 100	2 x 100	
250	FR-A840-250K (06100)	—	S-N600	—	2 x 100	2 x 100	
280	FR-A840-280K (06830)	—	S-N600	—	2 x 125	2 x 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		
			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
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 x 100	2 x 100	
250	FR-F840-250K (05470)	—	S-N600	—	2 x 100	2 x 100	
280	FR-F840-280K (06100)	—	S-N600	—	2 x 125	2 x 125	
315	FR-F840-315K (06830)	—	S-N600	—	2 x 150	2 x 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		
			No	Yes	No	Yes	
400 V	315	FR-CC2-H315K	—	S-N600	—	2 x 150	—
	355	FR-CC2-H355K	—	S-N600	—	2 x 200	—
	400	FR-CC2-H400K	—	S-N800	—	2 x 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		
			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	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	11	FR-D720-11K	S-T35	S-T35	14	14	14
	15	FR-D720-15K	S-T50	S-T50	22	22	22
	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 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/B(1)/A(1)	S-T10	2 (AWG 14)	1.25 to 2 (AWG 16 to 14)	2 (AWG 14) ^(Note 1)	AWG 18 to 14 ^(Note 4)
MR-J4-20GF/B/A	S-T10				
MR-J4-20B1/A1	S-T10				
MR-J4-40GF/B/A	S-T10				
MR-J4-40B1/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				
MR-J4-350GF/B/A	S-T21				
MR-J4-500GF/B/A ^(Note 2)	S-T35	5.5 (AWG 10)			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)		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)
MR-J4-22KGF/B/A ^(Note 2)	S-T100	38 (AWG 2)	2 (AWG 14) ^(Note 1)		38 (AWG 2)
MR-J4-60GF4/B4/A4	S-T10	2 (AWG 14)			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)	8 (AWG 8)	
				5.5 (AWG 10), 8 (AWG 8), 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-JE-C/MR-JE-B/MR-JE-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 this catalog.

Servo Amplifier Model Name	No-Fuse Breakers <small>(Note 4, 5)</small>	Magnetic Contactors <small>(Note 2,5)</small>	Wire Size [mm ²] <small>(Note 4)</small>		
			L1, L2, L3, \ominus	P+, C	U, V, W, \ominus
MR-JE-10C/B/A	30 A Frame 5 A (30 A Frame 5 A)	S-T10	2 (AWG 14)	2 (AWG 14) <small>(Note 1)</small>	AWG 18 - 14 <small>(Note 3)</small>
MR-JE-20C/B/A	30 A Frame 5 A (30 A Frame 5 A)	S-T10			
MR-JE-40C/B/A	30 A Frame 10 A (30 A Frame 5 A)	S-T10			
MR-JE-70C/B/A	30 A Frame 15 A (30 A Frame 10 A)	S-T10			
MR-JE-100C/B/A (Three-Phase Power Input)	30 A Frame 15 A (30 A Frame 10 A)	S-T10			
MR-JE-100C/B/A (Single-Phase Power Input)	30 A Frame 15 A (30 A Frame 15 A)	S-T10			
MR-JE-200C/B/A (Three-Phase Power Input)	30 A Frame 20 A (30 A Frame 20 A)	S-T21	3.5 (AWG 12)		AWG 16 - 10 <small>(Note 3)</small>
MR-JE-200C/B/A (Single-Phase Power Input)	30 A Frame 20 A (30 A Frame 20 A)	S-T21			
MR-JE-300C/B/A	30 A Frame 30 A (30 A Frame 30 A)	S-T21			

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

Note 2. Use a magnetic contactor with an operation delay time of 80 ms or less (the time from current application to the control coil until the contact closes).

Note 3. The wire size indicates the applicable wire for the servo amplifier connector.

Note 4. When complying with IEC/EN/UL/CSA standards, refer to "MELSERVO-JE Instructions and Cautions for Safe Use of AC Servos" as enclosed with the servo amplifier.

Note 5. Install one no-fuse breaker and one magnetic contactor for each servo amplifier.

2.18.3 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 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)		

2.18.4 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 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

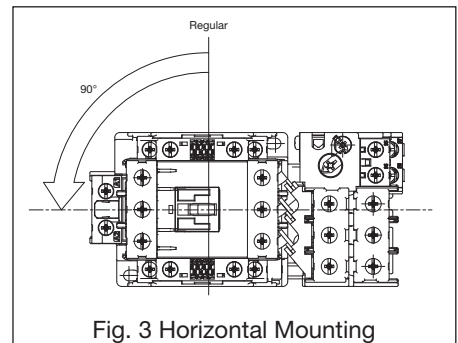
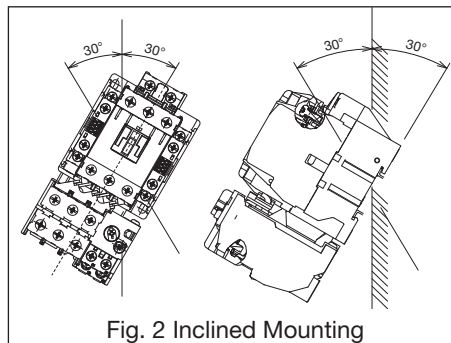
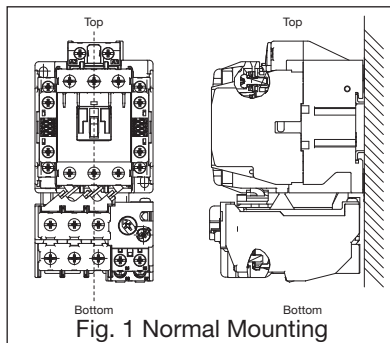
- (1) Ambient Temperature : -10°C to 40°C
(Applied to the outside of the control board environment) Average daily atmospheric temperature: 35°C (Max.), Average yearly atmospheric temperature: 25°C (Max.)
- (2) Maximum temperature : 55°C However, the ambient temperature of boxed MS type is 40°C (Average 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/s² or less
- (6) Impact : 49 m/s² 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.

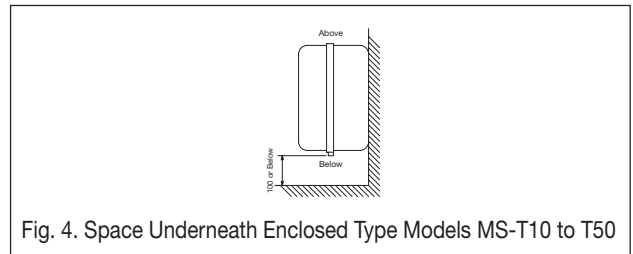
● Direct Mounting

- (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.

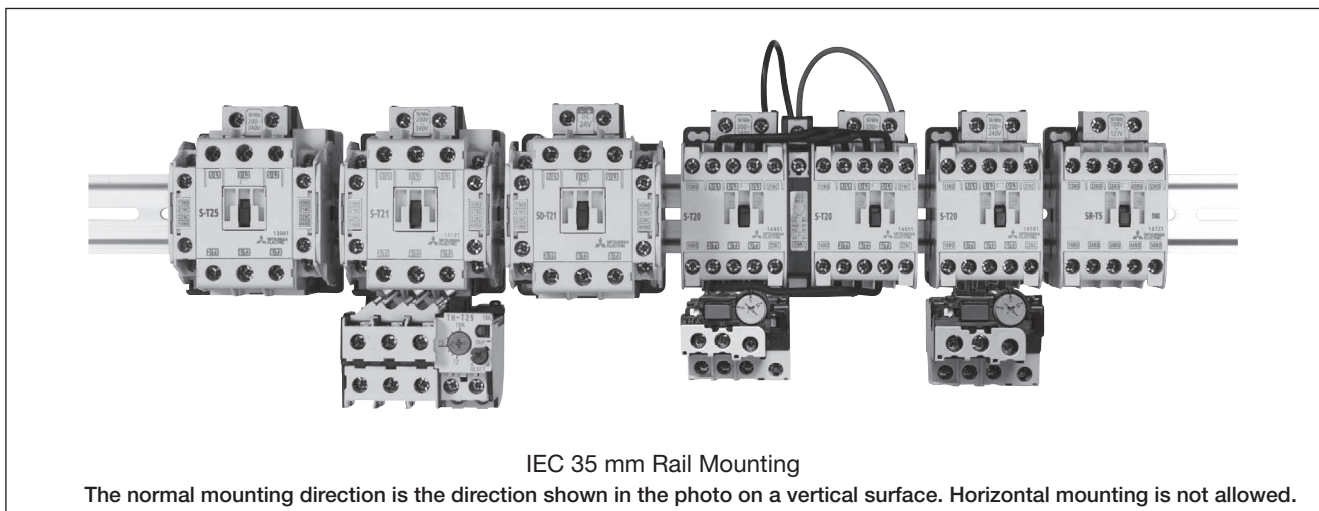


● Tightening torque of mounting screw (Common to all models)

- (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.

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				

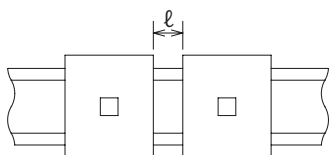
(2) Minimum Clearance ℓ (mm) of Product when Rail Mounted

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	T25	TH-T18 + UT-HZ18	SR(D)-T/K	T65
	T12	T32	TH-T25 + UN-RM20	SRL(D)-T/K	T80
Minimum Clearance ℓ	5		5	5	10
Close Mounting*	OK		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.

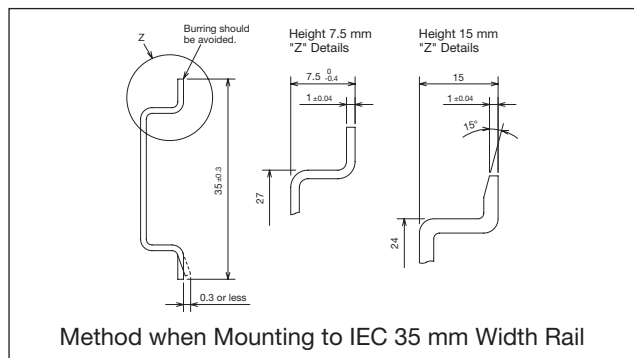
Also, because the characteristics of thermal overload relays are also somewhat influenced by the space between device and heater, please keep the space between the devices over the minimum value shown in the above table as much as possible when mounting them.



(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



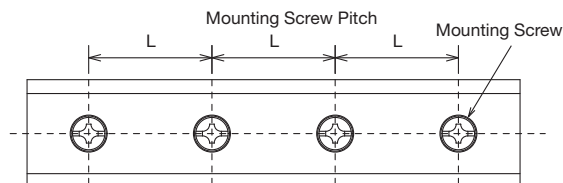
(4) Maximum Pitch of Rail Mounting Screw L (mm)

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.

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

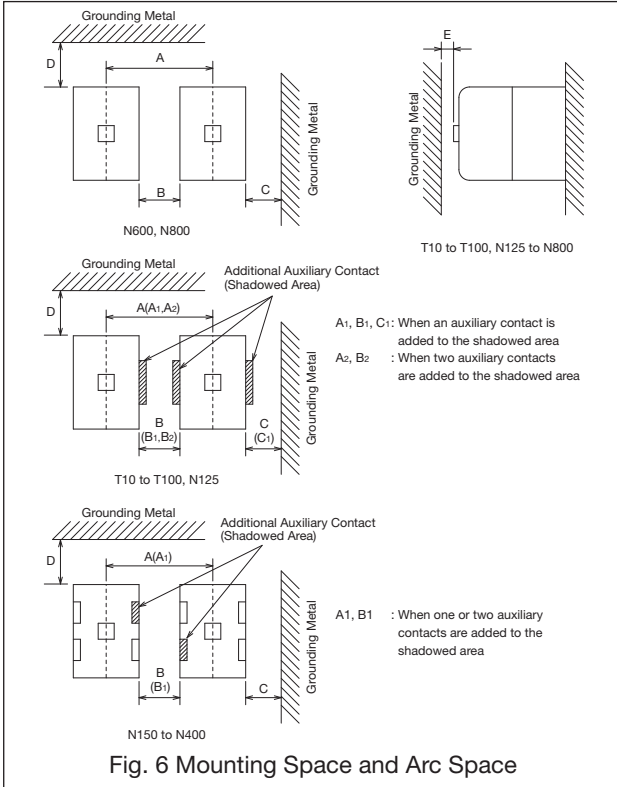
Note 1. It is also recommended that a minimum pitch be selected when installing multiple devices on the same rail.

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

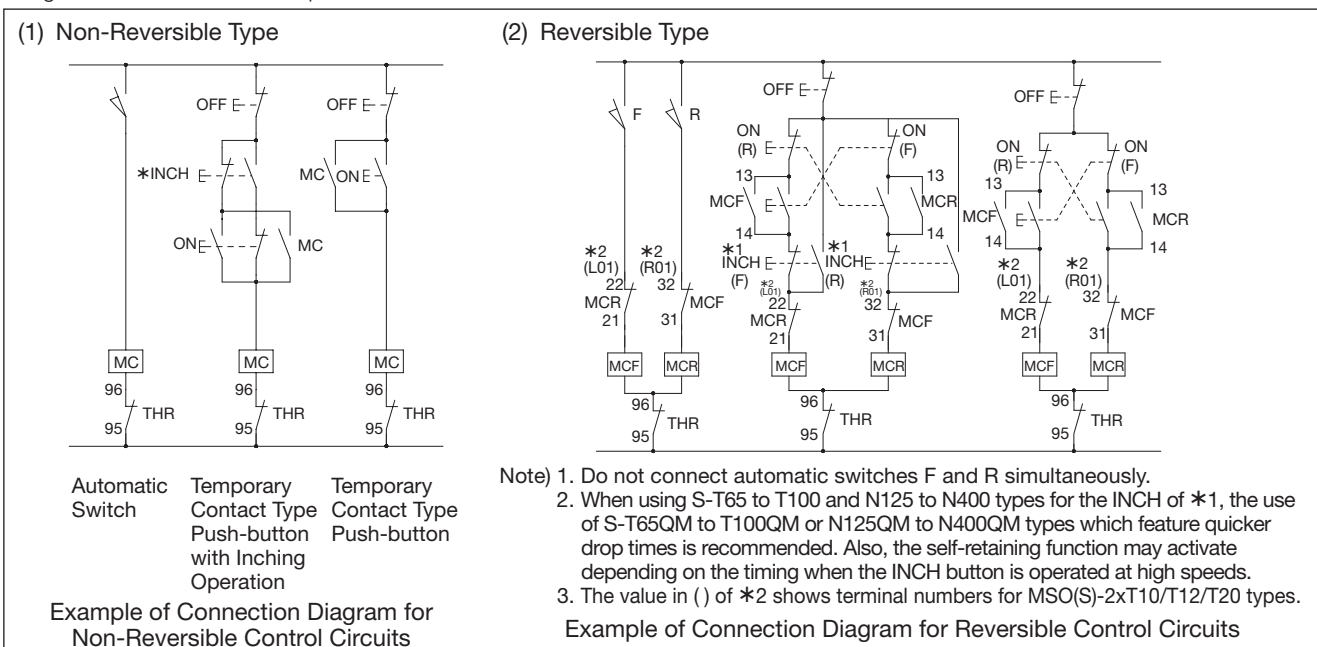
Frame	B	C
T65 to 100, N125	*34	*32
N150 to N400	64	47

* 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)	5 (Note 3) (B ₁ = 17, B ₂ = 29)	10 (C ₁ = 22)	15	0	5 (Note 5)
T12	49					
T20	(A ₁ = 61, A ₂ = 73)					
T21	68					
T25	(A ₁ = 80, A ₂ = 92)					
T32	48(A ₁ = 60, A ₂ = 72)	25	10 (C ₁ = 23.5)	25	0	3
T35	80					
T50	(A ₁ = 93.5, A ₂ = 107)					
T65	98					
T80	(A ₁ = 111.5, A ₂ = 125)	10 (C ₁ = 23.5)	10 (C ₁ = 23.5)	25	0	5 (Note 5)
T100	110 (A ₁ = 124, A ₂ = 138)					
T5	49 (A ₁ = 61, A ₂ = 73)	5 (Note 3) (B ₁ = 17, B ₂ = 29)	10 (C ₁ = 22)	15	0	3
T9	49					
N125	112 (A ₁ = 126, A ₂ = 140)	12 (B ₁ = 20)	16 (C ₁ = 30)	25	0	10
N150	132 (A ₁ = 140)					
N180	150 (A ₁ = 160)	12 (B ₁ = 22)	16	50	0	10
N220						
N300	175 (A ₁ = 185)	12 (B ₁ = 22)	16	90	0	10
N400						
N600	305	15	20	90	0	10
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 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 wire size [ømm, mm ²]	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		Main circuit	Operating circuit		Main circuit (Note 2)	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	1.25 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)		1.25-6 to 22-6 38-S6 (Note 10) 60-S6 (Note 10)	1.25-4 to 2-4 5.5-S4
S-T100	15 x 7.5 x 11.5		M4x10		(2 to 38)	1.25-6 to 60-6	4	—	—	0.94 to 1.51 (1.17)			
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	Hex Bolt	M4x10	—	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	1.6	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	ø1.6 0.75 to 2.5	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 12	—	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	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	1.25 to 2	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) TH-N120TAHZ	20 x 10 x 15	M8x20			—		38-8 to 100-8		11.5	6.28 to 10.29 (7.84)			
TH-N220RH (Load Side) TH-N220HZ TH-N220TAHZ	25 x 12.5 x 20	M10x25	Hex Bolt	M4x10	—	22-10 to 150-10	14.5	11.8 to 19.1 (14.7)					
TH-N400RH (Load Side) TH-N400HZ	30 x 15 x 22.5	M12x30			—	22-12 to 200-12	17.5	19.6 to 31.3 (24.5)					
TH-N600	—	—			—	—	—	2.5	—				

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 67, 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-T35 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.

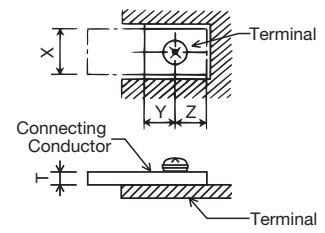
Note 7. When using the IEC60529 finger-safe specification for MSO/S-T10(BC) - T50(BC), T65CW, T80CW, and SR-T5/T9(BC), be sure to insulate the crimping part of the crimp lug. However, please insulate 5.5-S3 by a method other than insulated crimp terminal.

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

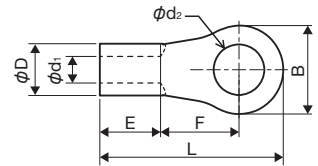
Note 9. When wiring two crimp lugs for T10 to T20BC and TH-T18BC, use crimp lugs with an F dimension of 6 mm or more.

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.

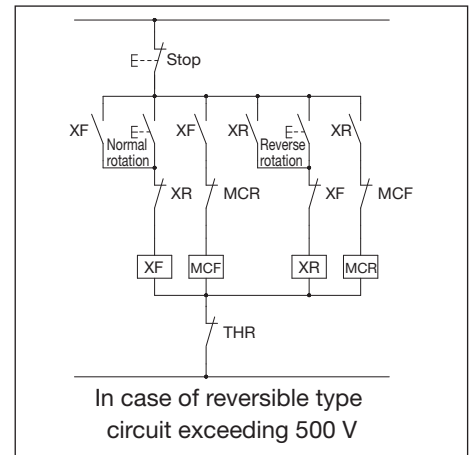


Crimp Lug Dimensions



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.



In case of reversible type circuit exceeding 500 V

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 64.**

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

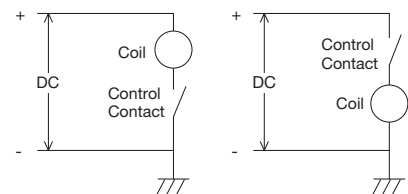


Fig. A

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 101

● 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.

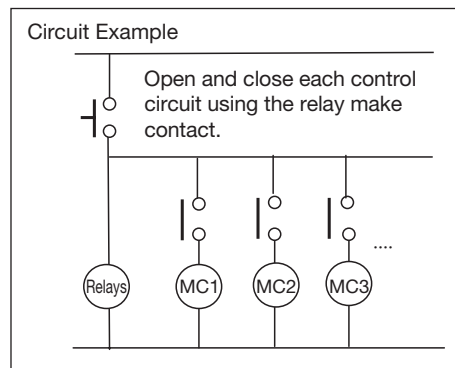
● Using with Square Wave Power Supply

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

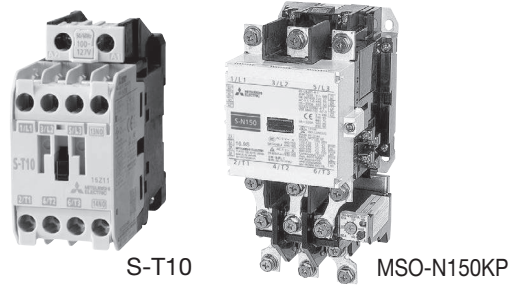
4.1	Standard (AC Operated) Magnetic Starters/Magnetic Contactors MS/MSO/S-□	72
4.2	Reversible Magnetic Starters/Magnetic Contactors MS/MSO/S-2x□	73
4.3	DC Operated Magnetic Starters/Magnetic Contactors MSOD/SD-□	89
4.4	Mechanically Latched Magnetic Starters/Magnetic Contactors MSOL(D)/SL(D)-□	100
4.5	Delay Open Magnetic Starters/Magnetic Contactors MSO/S-□DL	109
4.6	Magnetic Starters with Saturable Reactors and Thermal Overload Relays MSO-□(KP)SR	112
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4 MS-T/N Series Magnetic Starters/Magnetic Contactors

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 254 for details.)



● Ratings/Specifications (Standard Applicability)

Magnetic Contactors	Magnetic Starters (Note 12)	Rated Capacity [kW]				Rated Operating Current [A]						Conventional Free-Air Thermal Current	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)			lth [A]	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-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)		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	1a1b(2a)		TH-T18(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[60][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			TH-T50(BC)KP	29 to 42	
S-T100	MSO-T100KP	30[22]	55[45]	55[45]	55	105[100]	105[93]	85[75]	65	150	150	150	2a2b	UN-AX2, 4 x 1 or UN-AX11 x 2	TH-T65KP	15 to 54	
S-N125	MSO-N125KP	37[30]	60[60]	60[60]	60	125[125]	120[120]	90[90]	70	150	150	150		TH-T100KP (Note 4)	67		
S-N150	MSO-N150KP	45[37]	75[75]	90[90]	90	150[150]	150[150]	140[140]	100	200	200	200		TH-T65KP	15 to 54		
S-N180	MSO-N180KP	55[45]	90[90]	110[110]	110	180[180]	180[180]	180[180]	120	260	260	260		TH-T100KP	67, 82		
S-N220	MSO-N220KP	75[55]	132[110]	132[132]	132	250[220]	250[220]	200[200]	150	260	260	260		TH-N120KP (TA)	42 to 105		
S-N300	MSO-N300KP	90[75]	160[150]	160[160]	200	300[300]	300[300]	250[250]	220	350	350	350		TH-N120KP	42 to 105		
S-N400	MSO-N400KP	125[110]	220[200]	225[200]	250	400[400]	400[400]	350[350]	300	450	450	450		TH-N220KPRH	82 to 150		
S-N600	—	190[160]	330[300]	330[300]	330	630[630]	630[630]	500[500]	420	660	660	660		TH-N400KPRH	82 to 150		
S-N800	—	220[200]	440[400]	500[400]	500	800[800]	800[800]	720[720]	630	800	800	800		TH-N600KP (Note 5)	105 to 250		
														UN-AX150 x 2	TH-N600KP	250 to 500	
													UN-AX600 x 1	TH-N600KP (Note 5)	250 to 660		

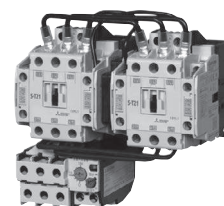
- Note 1. The value in parentheses for the rated operating current is applicable in the case of magnetic contactors.
- Note 2. Enclosed type magnetic starters are of MS-□ type. T20, T25, T32 and N600, N800 types are outside production range. It should be noted that auxiliary contact units cannot be additionally installed to enclosed types. MS-T□DP is for single-phase motors. Refer to page 255 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 69 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 75	—
	· How to Order	Page 122	—
	· Combining with Optional Units	Page 182	—

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

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.



MSO-2xT21KP

● Ratings/Specifications (Standard Applicability)

Magnetic Contactors	Magnetic Starters (Note 12)	Rated Capacity [kW]				Rated Operating Current [A]				Conventional Free-Air Thermal Current	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-2 x T10(BC)	MSO-2 x 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 x 2 + 2b (1b x 2 + 2b)	UT-AX2, 4(BC) x 2 or UT-AX11(BC) x 2	TH-T18(BC)KP	0.12 to 9
S-2 x T12(BC)	MSO-2 x 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 x 2 + 2b (2a x 2 + 2b)		TH-T18(BC)KP	0.12 to 11
S-2 x T20(BC)	MSO-2 x 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	1a1b x 2 + 2b (2a x 2 + 2b)		TH-T25(BC)KP	0.12 to 15
S-2 x T21(BC)	MSO-2 x 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 x 2	UN-AX2, 4 x 2 or UN-AX11 x 2	TH-T25(BC)KP	0.24 to 22
S-2 x T25(BC)	MSO-2 x 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			TH-T25(BC)KP	0.24 to 22
S-2 x T32(BC)	—	7.5[7.5]	15[15]	15[11]	11	32[32]	32[32]	24[20]	12	32	32	32			—	—
S-2 x T35(BC)	MSO-2 x T35(BC)KP	11[7.5]	18.5[15]	18.5[15]	15	40[35]	40[32]	32[26]	17	60	60	60	UN-AX2, 4(BC) x 2 or UT-AX11(BC) x 2	TH-T25(BC)KP	0.24 to 22	
S-2 x T50(BC)	MSO-2 x 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-2 x T65(CW)	MSO-2 x T65(CW)KP	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	
S-2 x T80(CW)	MSO-2 x T80(CW)KP (Note 11)	22[19]	45[37]	45[45]	45	85[80]	85[80]	75[75]	52	120	120	120	UN-AX80 x 2	TH-T65KP	15 to 54	
S-2 x T100	MSO-2 x T100KP	30[22]	55[45]	55[45]	55	105[100]	105[93]	85[75]	65	150	150	150		TH-T100KP	67	
S-2 x N125	MSO-2 x N125KP	37[30]	60[60]	60[60]	60	125[125]	120[120]	90[90]	70	150	150	150	3a3b x 2	—	TH-T65KP	15 to 54
S-2 x N150	MSO-2 x N150KP	45[37]	75[75]	90[90]	90	150[150]	150[150]	140[140]	100	200	200	200			TH-T100KP	67, 82
S-2 x N180	MSO-2 x N180KP	55[45]	90[90]	110[110]	110	180[180]	180[180]	180[180]	120	260	260	260			TH-N120KP (TA)	42 to 105
S-2 x N220	MSO-2 x N220KP	75[55]	132[110]	132[132]	132	250[220]	250[220]	200[200]	150	260	260	260	TH-N220KPRH	—	TH-N120KP	42 to 125
S-2 x N300	MSO-2 x N300KP	90[75]	160[150]	160[160]	200	300[300]	300[300]	250[250]	220	350	350	350			TH-N220KPRH	82 to 180
S-2 x N400	MSO-2 x N400KP	125[110]	220[200]	225[200]	250	400[400]	400[400]	350[350]	300	450	450	450	TH-N400KPRH	—	TH-N300KP	105 to 250
S-2 x N600	—	190[160]	330[300]	330[300]	330	630[630]	630[630]	500[500]	420	660	660	660			TH-N400KPRH	105 to 330
S-2 x N800	—	220[200]	440[400]	500[400]	500	800[800]	800[800]	720[720]	630	800	800	800	4a4b x 2	—	TH-N600KP (Note 5)	250 to 500

- 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-ML11 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> For 1b x 2 + 2b: 2B
- 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.

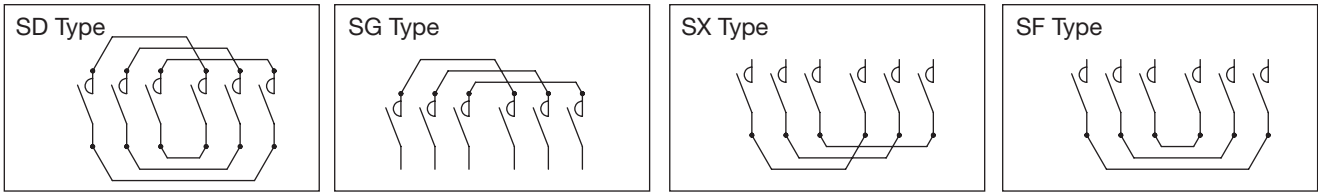
● Connecting Conductor Included

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 204 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.

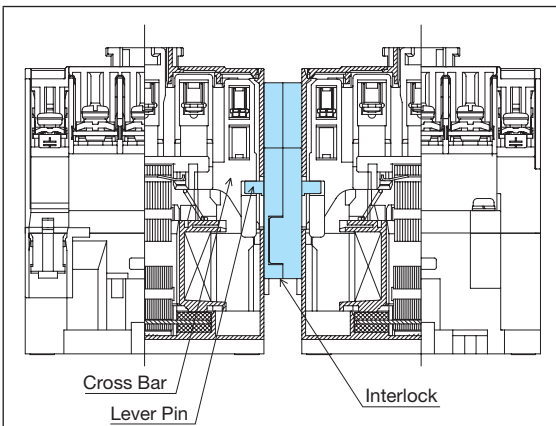


Fig. 1. Structural and Operational Diagram (T10 to T80)

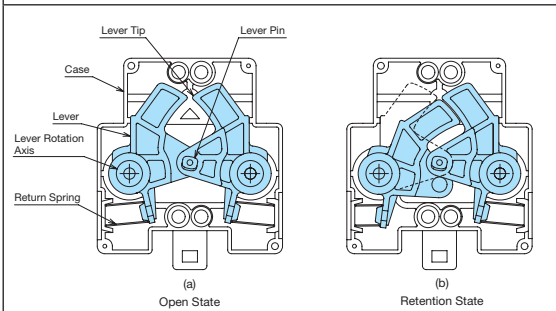
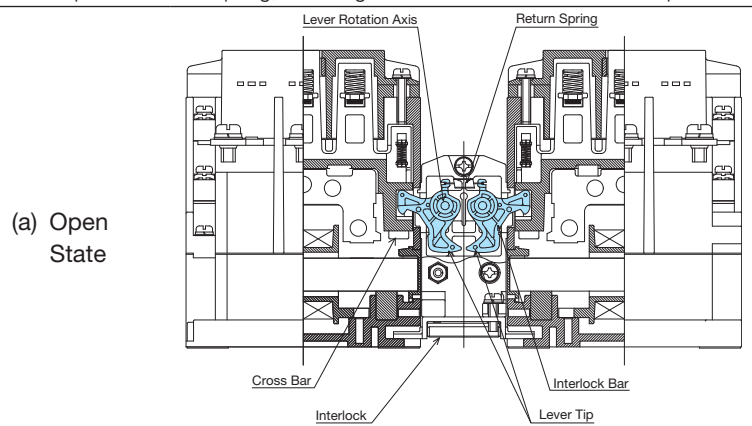
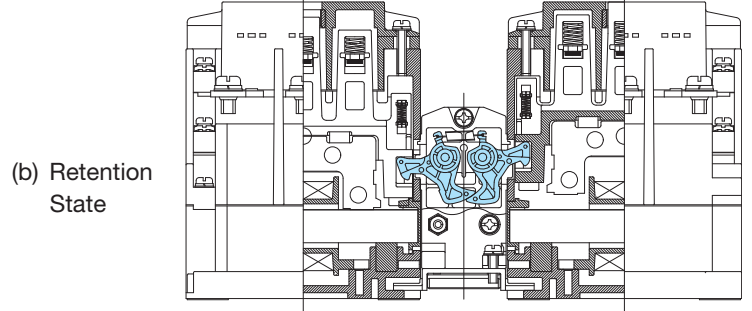


Fig. 2. Interlock Internal Structure (T10 to T80)



(a) Open State



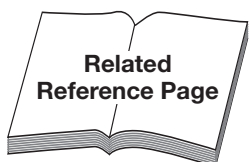
(b) Retention State

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.

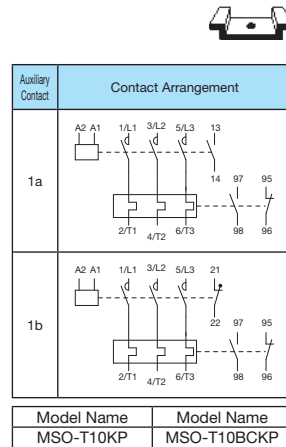
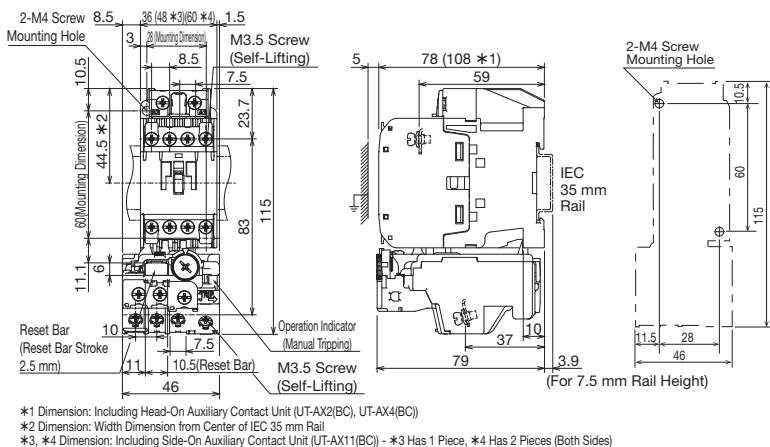
Item	Reference Page	Remarks
• Auxiliary Contact Rating	Page 39	—
• Operation Coil	Page 41	—
• Properties	Page 43	—
• Performance	Page 44	—
• Outline Drawings/Contact Arrangements	Page 75	—
• How to Order	Page 122	—
• Combining with Optional Units	Page 182	—



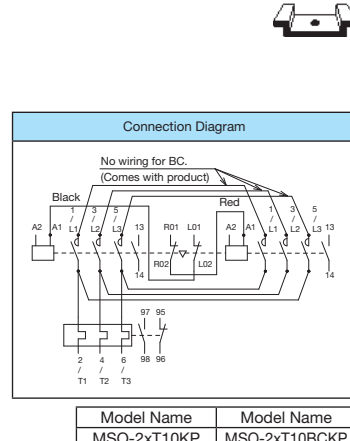
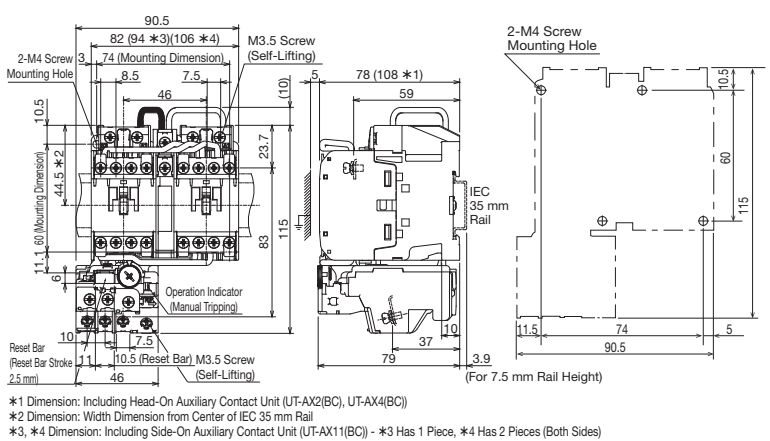
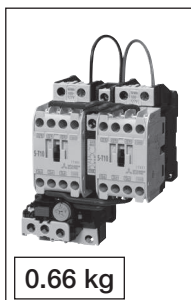
● Outline Drawings/Contact Arrangements (AC Operated Magnetic Starters/Magnetic Contactors)

■ T10

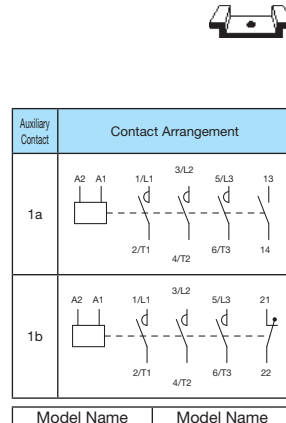
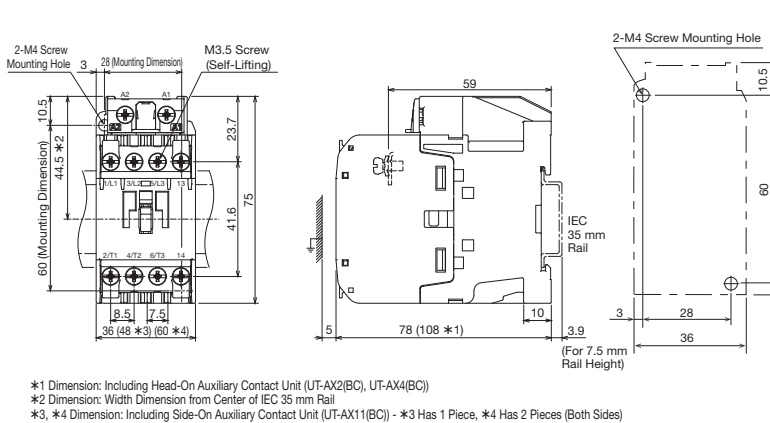
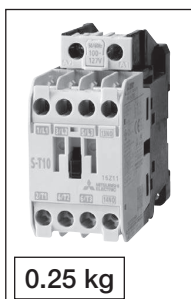
Non-Reversing
MSO-T10(BC)KP



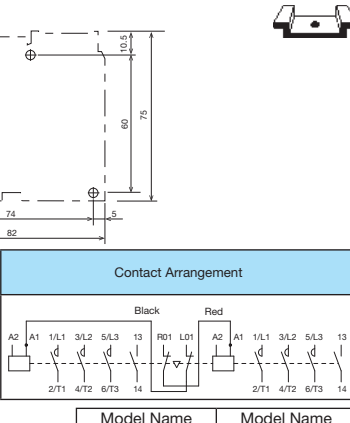
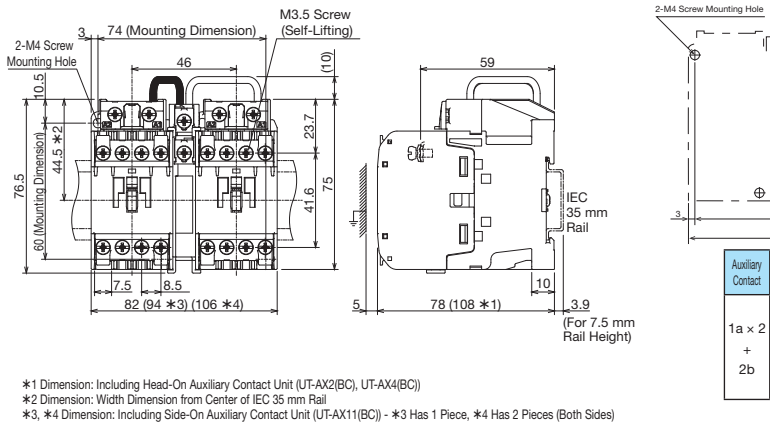
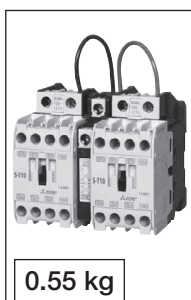
Reversing
MSO-2 x T10(BC)KP



Non-Reversing
S-T10(BC)



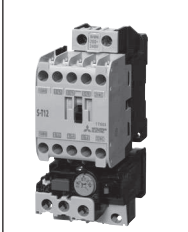
Reversing
S-2 x T10(BC)



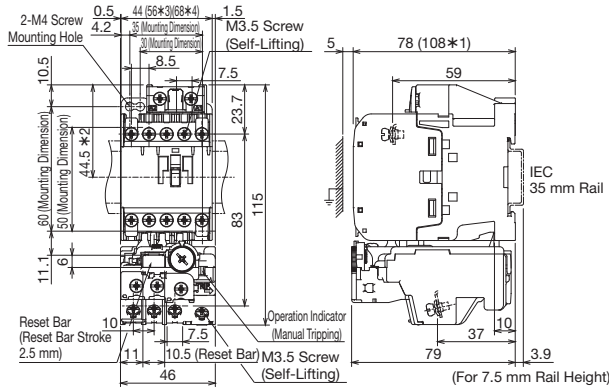
T12/T20

Non-Reversing

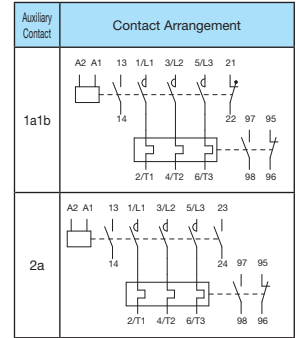
MSO-T12(BC)KP
MSO-T20(BC)KP



0.38 kg



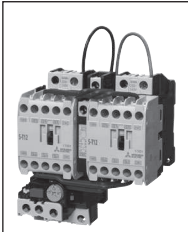
*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
*2 Dimension: Width Dimension from Center of IEC 35 mm Rail
*3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)



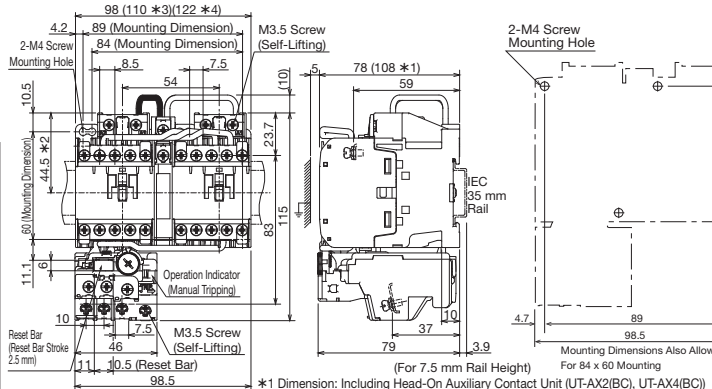
Model Name	Model Name
MSO-T12KP	MSO-T12BCKP
MSO-T20KP	MSO-T20BCKP

Reversing

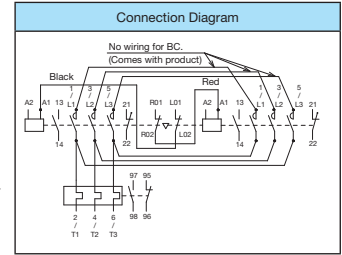
MSO-2xT12(BC)KP
MSO-2xT20(BC)KP



0.7 kg



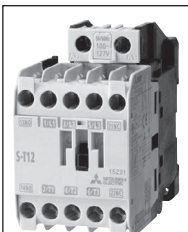
*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
*2 Dimension: Width Dimension from Center of IEC 35 mm Rail
*3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)



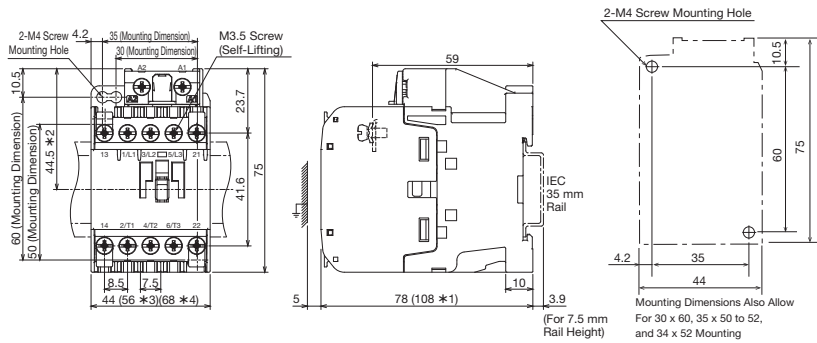
Model Name	Model Name
MSO-2xT12KP	MSO-2xT12BCKP
MSO-2xT20KP	MSO-2xT20BCKP

Non-Reversing

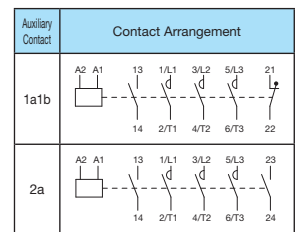
S-T12(BC)
S-T20(BC)



0.27 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)



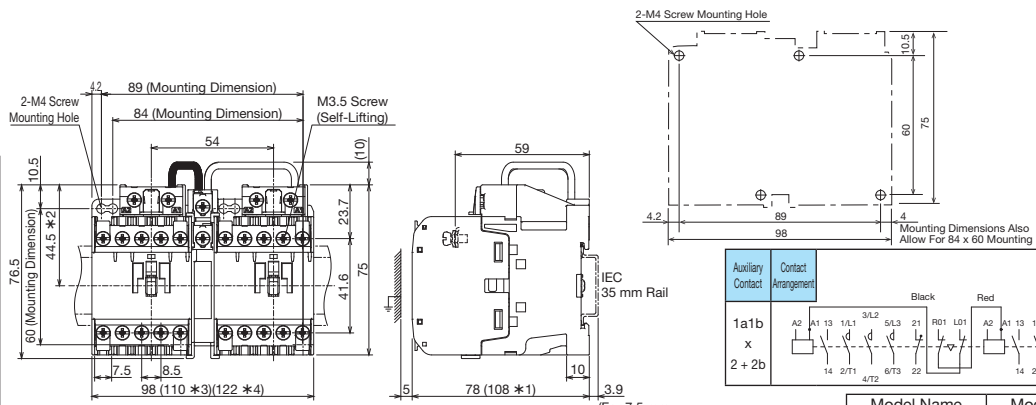
Model Name	Model Name
S-T12	S-T12BC
S-T20	S-T20BC

Reversing

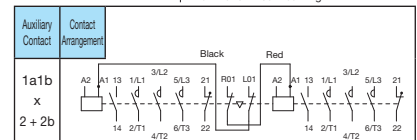
S-2xT12(BC)
S-2xT20(BC)



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)

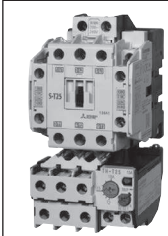


Model Name	Model Name
S-2xT12	S-2xT12BC
S-2xT20	S-2xT20BC

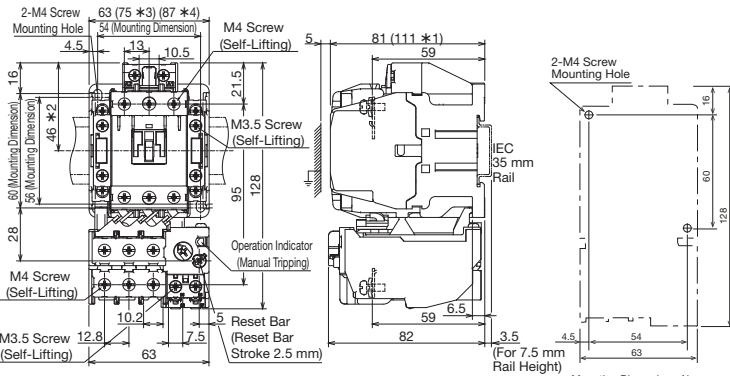
T21/T25

Non-Reversing

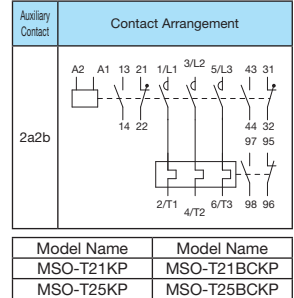
**MSO-T21(BC)KP
MSO-T25(BC)KP**



0.58 kg

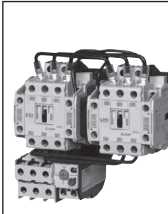


*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
*2 Dimension: Width Dimension from Center of IEC 35 mm Rail
*3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)

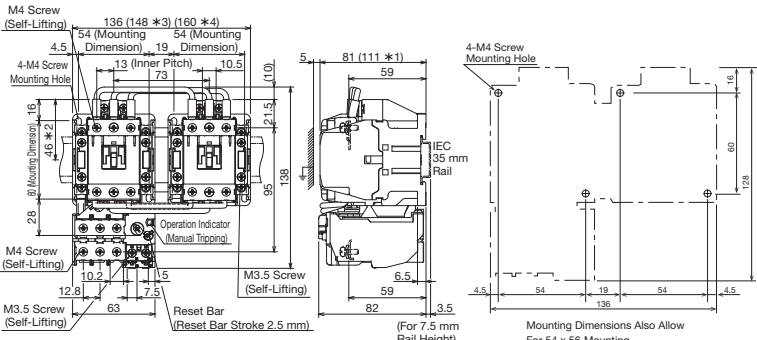


Reversing

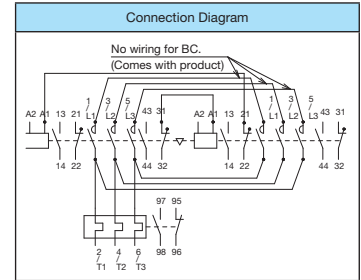
**MSO-2xT21(BC)KP
MSO-2xT25(BC)KP**



1.03 kg



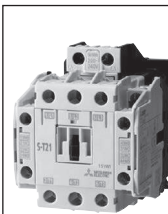
*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
*2 Dimension: Width Dimension from Center of IEC 35 mm Rail
*3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)



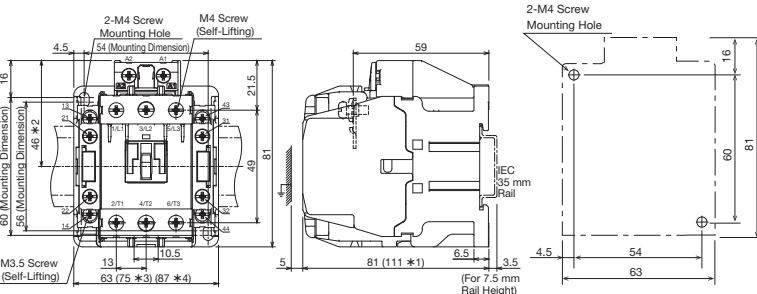
Model Name	Model Name
MSO-2xT21KP	MSO-2xT21BCKP
MSO-2xT25KP	MSO-2xT25BCKP

Non-Reversing

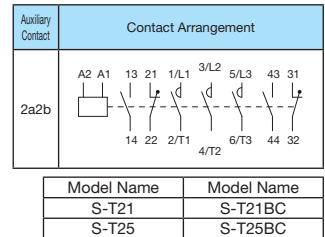
**S-T21(BC)
S-T25(BC)**



0.41 kg

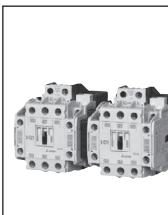


*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
*2 Dimension: Width Dimension from Center of IEC 35 mm Rail
*3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)

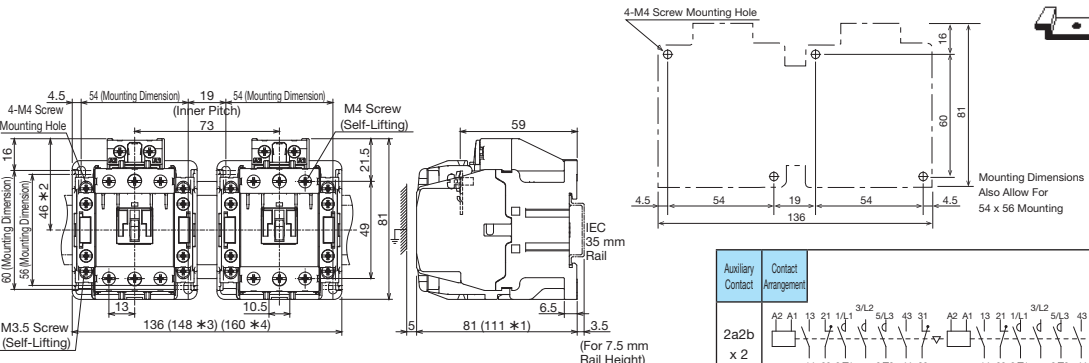


Reversing

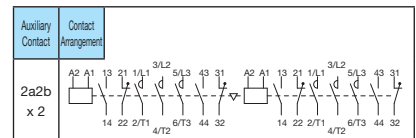
**S-2xT21(BC)
S-2xT25(BC)**



0.86 kg



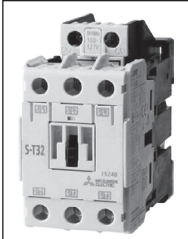
*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
*2 Dimension: Width Dimension from Center of IEC 35 mm Rail
*3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)



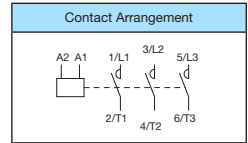
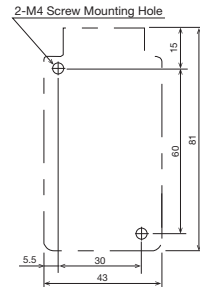
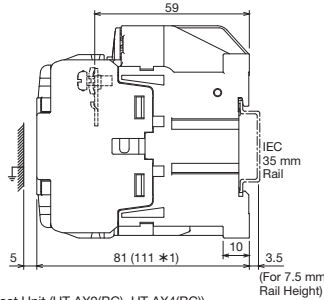
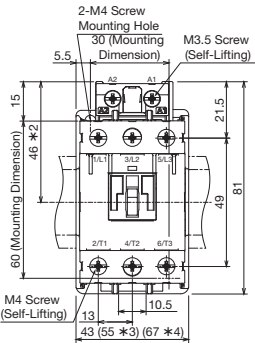
T32

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
- *3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)

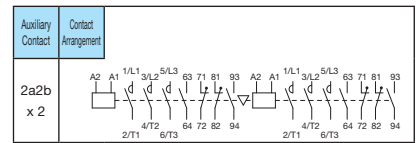
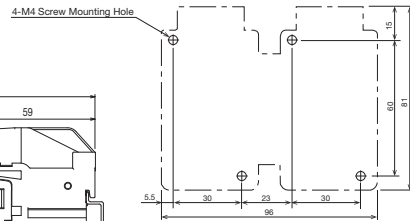
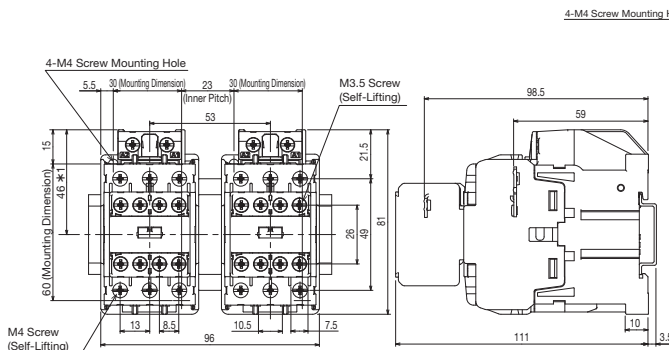
Model Name	S-T32
	S-T32BC

Reversing

S-2 x T32(BC)



0.76 kg



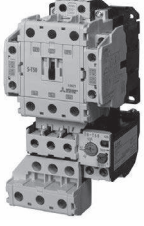
- *1 Dimension: Width Dimension from Center of IEC 35 mm Rail

Model Name	S-2xT32
	S-2xT32BC

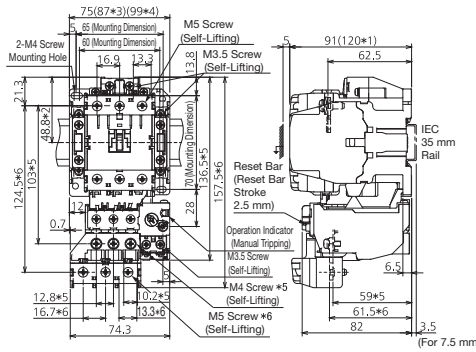
T35/T50

Non-Reversing

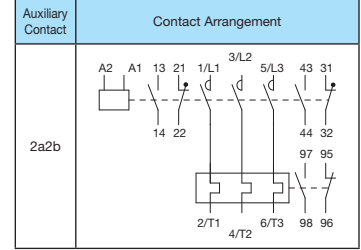
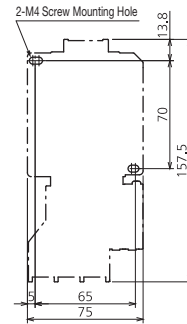
MSO-T35(BC)KP
MSO-T50(BC)KP



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

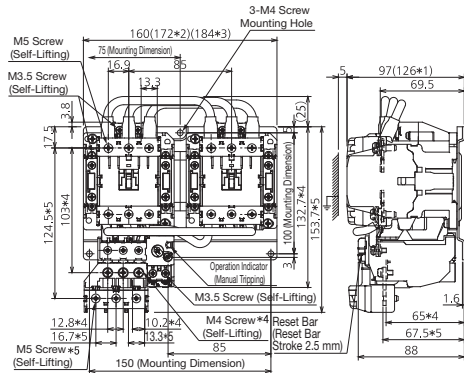


Model Name	Model Name
MSO-T35KP	MSO-T35BCKP
MSO-T50KP	MSO-T50BCKP

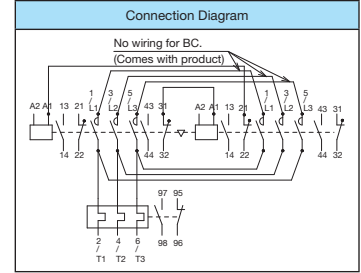
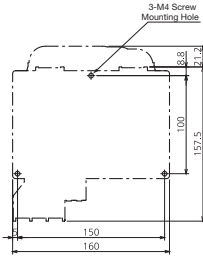
Reversing

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

1.54 kg



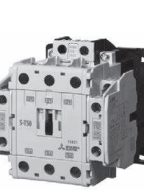
- *1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
- *2, *3 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC))
- *2 Has 1 Piece, *3 Has 2 Pieces (Both Sides)
- *4 Dimension: Heater Designations 22A or Less. *5 Dimension: Heater Designations 29A or More



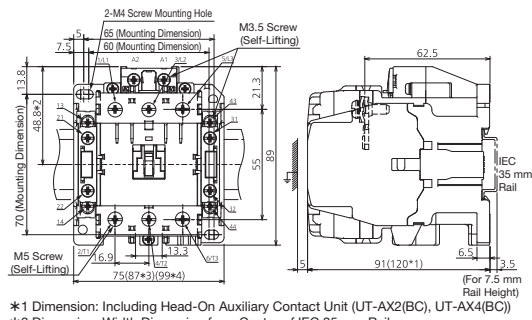
Model Name	Model Name
MSO-2xT35KP	MSO-2xT35BCKP
MSO-2xT50KP	MSO-2xT50BCKP

Non-Reversing

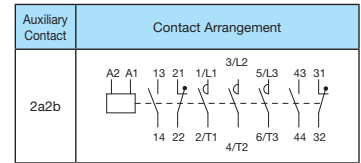
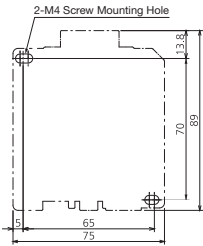
S-T35(BC)
S-T50(BC)



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)

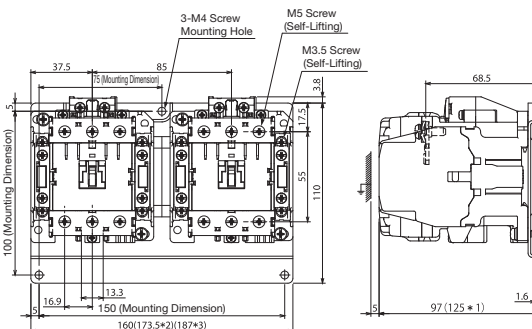


Model Name	Model Name
S-T35	S-T35BC
S-T50	S-T50BC

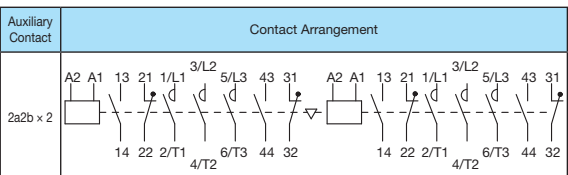
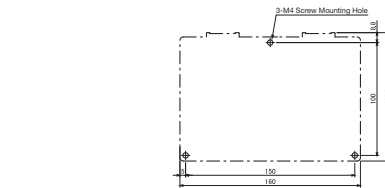
Reversing

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)

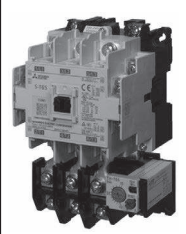


Model Name	Model Name
S-2xT35	S-2xT35BC
S-2xT50	S-2xT50BC

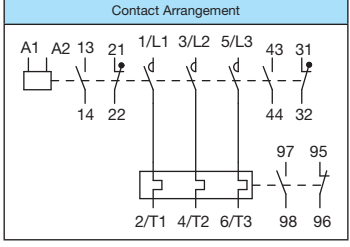
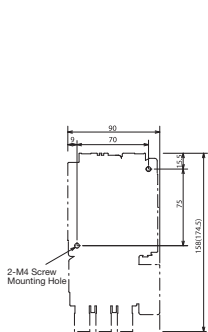
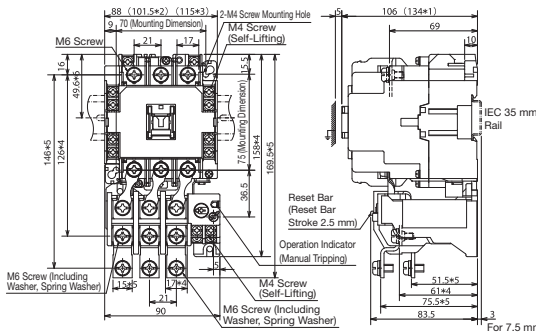
T65/T80

Non-Reversing

MSO-T65(CW)KP
MSO-T80(CW)KP



1.1 kg

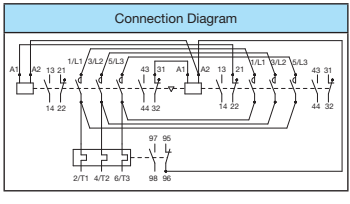
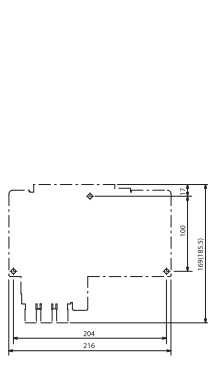
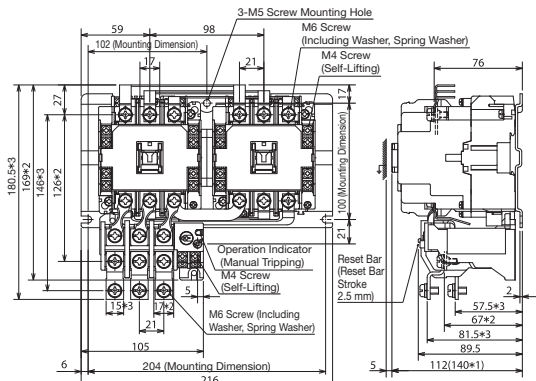


- *1 Dimension: Including Head-On Auxiliary Contact Unit (UN-AX2, UN-AX4)
- *2, *3 Dimension: Including Side-On Auxiliary Contact Unit (UN-AX11)
 - *2 Has 1 Piece, *3 Has 2 Pieces (Both Sides)
- *4 Dimension: Dimension at Heater Designation of 54A or Less
- *5 Dimension: Dimension at Heater Designation of 67A (MSO-T80CW 67 A is not manufactured)
- *6 Dimension: Width Dimension from Center of IEC 35 mm Rail

Model Name
MSO-T65KP
MSO-T80KP

Reversing

MSO-2xT65(CW)KP
MSO-2xT80(CW)KP



- *1 Dimension: Including Head-On Auxiliary Contact Unit (UN-AX2, UN-AX4)
- *2 Dimension: Dimension at Heater Designation of 54A or Less
- *3 Dimension: Dimension at Heater Designation of 67A (MSO-2xT80CW 67A is not manufactured)

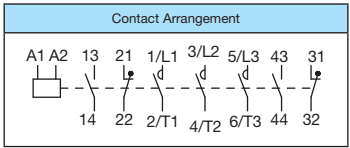
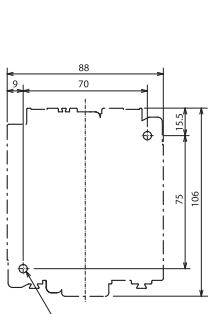
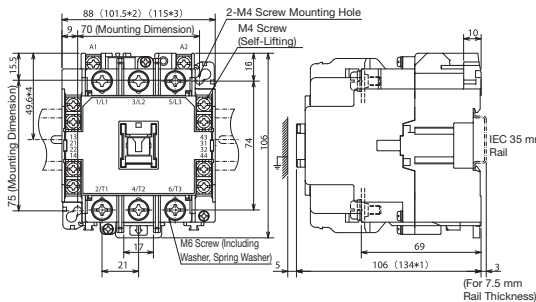
Model Name
MSO-2xT65KP
MSO-2xT80KP

Non-Reversing

S-T65(CW)
S-T80(CW)



0.75 kg

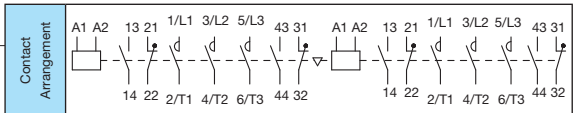
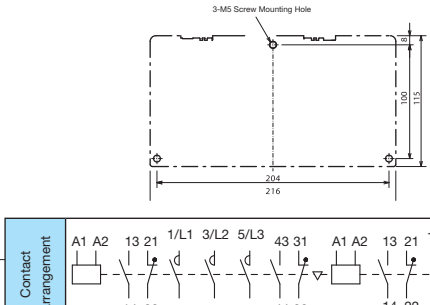
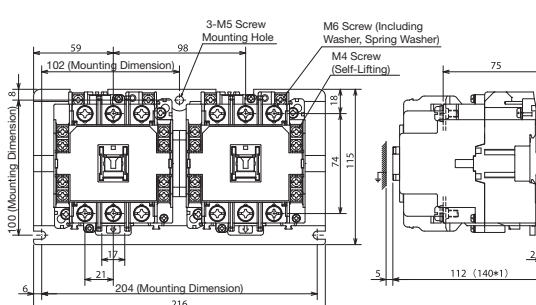


- *1 Dimension: Including Head-On Auxiliary Contact Unit (UN-AX2, UN-AX4)
- *2, *3 Dimension: Including Side-On Auxiliary Contact Unit (UN-AX11)
 - *2 Has 1 Piece, *3 Has 2 Pieces (Both Sides)
- *4 Dimension: Width Dimension from Center of IEC 35 mm Rail

Model Name
S-T65
S-T80

Reversing

S-2xT65(CW)
S-2xT80(CW)



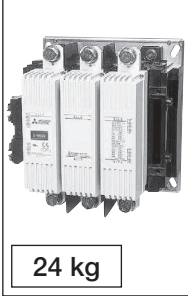
- *1 Dimension: Including Head-On Auxiliary Contact Unit (UN-AX2, UN-AX4)

Model Name
S-2xT65
S-2xT80

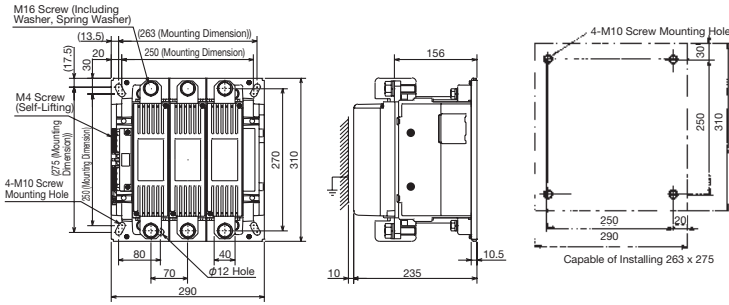
N600/N800

Non-Reversing

S-N600
S-N800



24 kg



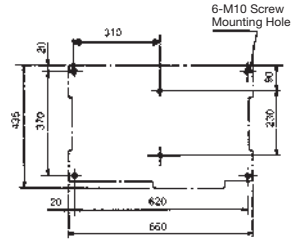
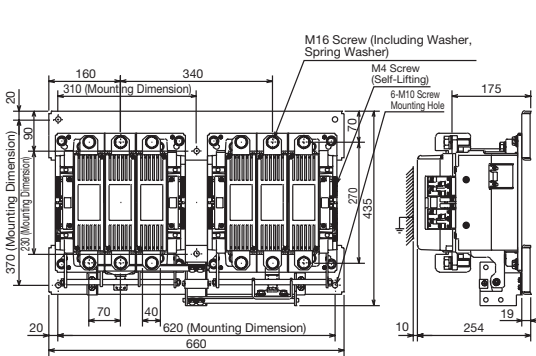
Contact Arrangement	
A1	13 21 43 31 (13) (31) (23) (41) 1/L1 3/L2 5/L3
A2	14 22 44 32 (14) (32) (24) (42) 2/T1 4/T2 6/T3

Model Name
S-N600
S-N800

Reversing

S-2xN600
S-2xN800

54 kg



Contact Arrangement	
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
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

Model Name
S-2xN600
S-2xN800

● Non-Reversing Magnetic Starter (Enclosed)

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

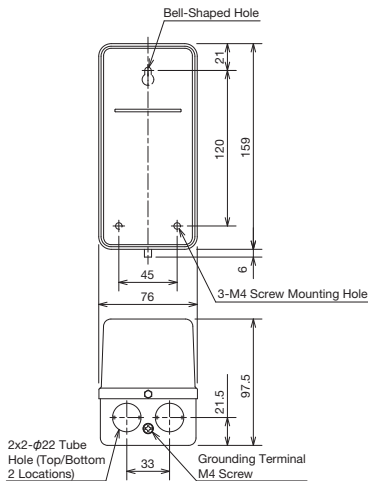


Fig 4. MS-T10KP (0.74 kg)
MS-T12KP (0.76 kg)

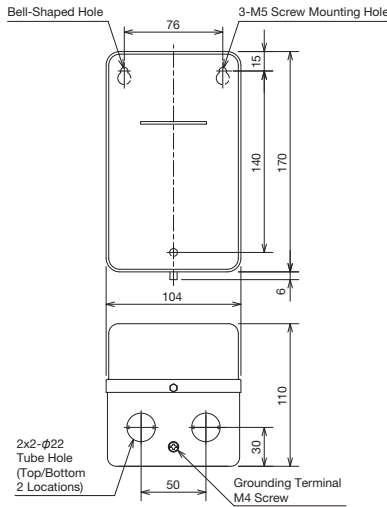


Fig 5. MS-T21KP (1.12 kg)

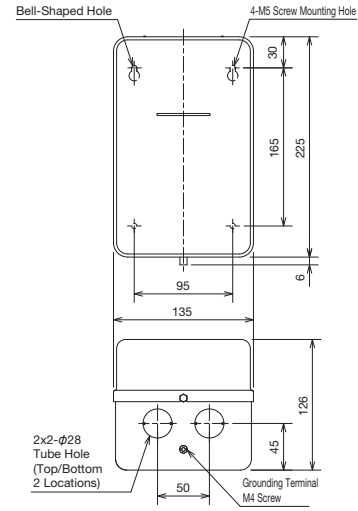


Fig 6. MS-T35KP/T50KP (1.9 kg)

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.

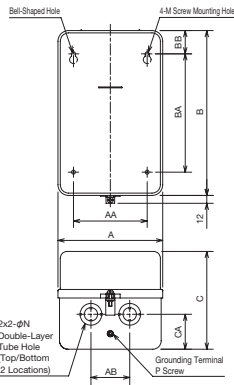


Fig. 7. MS-T65KP to T100KP
MS-N125KP to N220KP

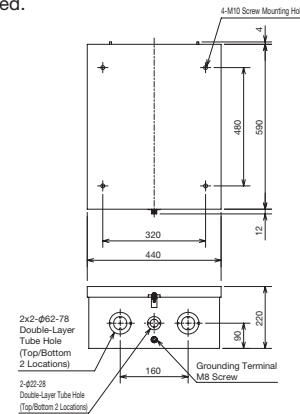
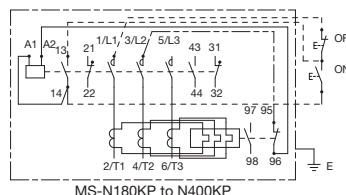
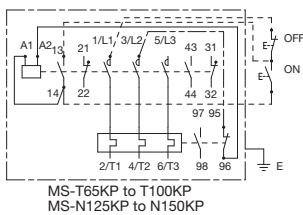
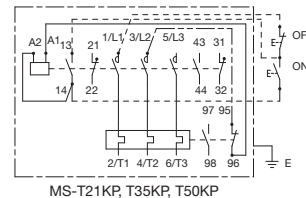
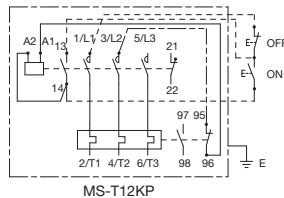
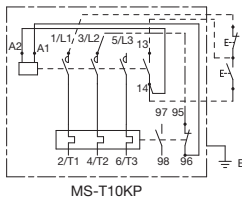


Fig. 8. MS-N300KP/N400KP (27.5 kg/28 kg)

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	12.8/16.2/16.2



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	

4

MS-T/N Series Magnetic Starters/Magnetic Contactors

● Reversing Magnetic Starters (Enclosed Type)

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

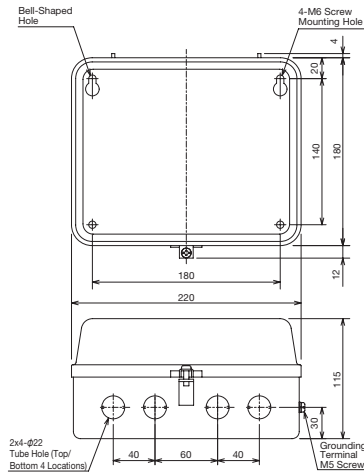


Fig. 9. MS-2xT21KP (2.0 kg)

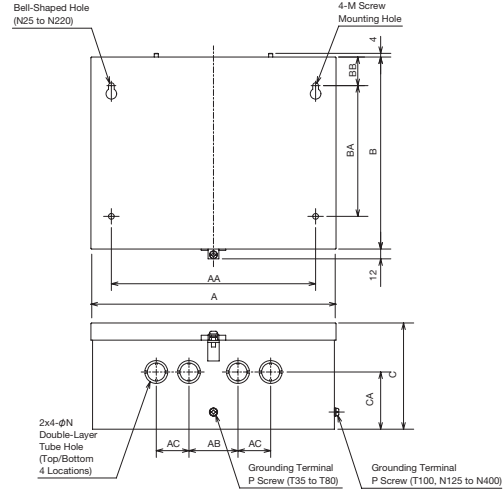
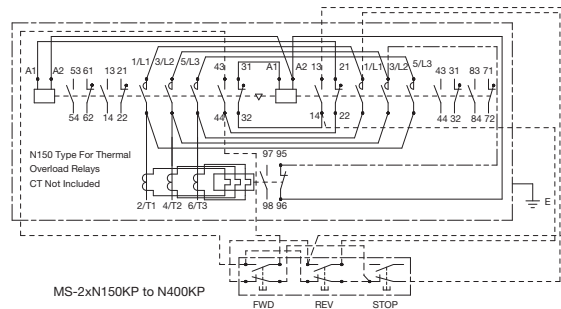
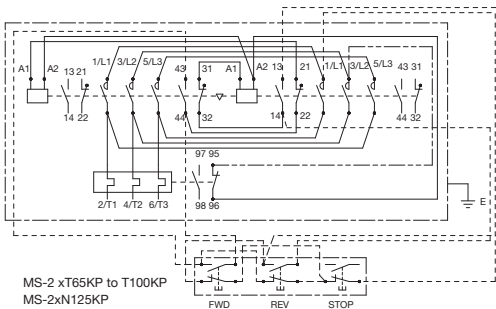
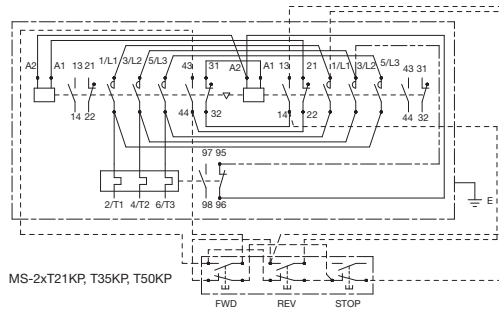


Fig. 10. MS-2xT35KP to T100KP, MS-2xN125KP to N400KP

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



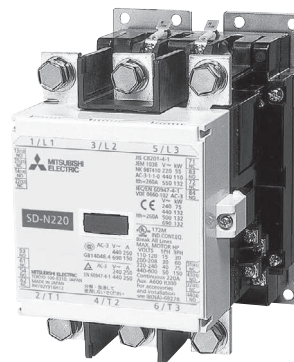
Note 1) The figure above shows the same power supply for both the main circuit and control circuit.
 The solid lines show completed wiring while the broken lines and double-dashed lines are still in need of wiring. (For the double-dashed lines, use the power supply attached to the unit)
 Note 2) If the 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 [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)	—	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			—	TH-T25(BC)KP	0.12 to 15	
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	2a2b	—	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	—	UT-AX2, 4(BC) x 1 or UT-AX11(BC) 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	—	TH-T25(BC)KP	0.24 to 22		
SD-T50(BC)	MSOD-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	
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			—	TH-T25(BC)KP	0.24 to 22	
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			UN-AX2, 4 x 1 or UN-AX11 x 2	TH-T50(BC)KP	29 to 42	
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			—	TH-T100KP	67, 82	
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-T65KP	15 to 54		
SD-N180	MSOD-N180KP	55[45]	90[90]	110[110]	110	180[180]	180[180]	180[180]	120	260	260	260			—	TH-T100KP	67, 82	
SD-N220	MSOD-N220KP	75[55]	132[110]	132[132]	132	250[220]	250[220]	200[200]	150	260	260	260			—	TH-N120KP	42 to 105	
SD-N300	MSOD-N300KP	90[75]	160[150]	160[160]	200	300[300]	300[300]	250[250]	220	350	350	350			—	TH-N120KP (TA)	42 to 125	
SD-N400	MSOD-N400KP	125[110]	220[200]	225[200]	250	400[400]	400[400]	350[350]	300	450	450	450			—	TH-N220KPRH	82 to 150	
SD-N600	—	190[160]	330[300]	330[300]	330	630[630]	630[630]	500[500]	420	660	660	660			—	TH-N400KPRH	105 to 250	
SD-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 4)	105 to 330	
																	TH-N600KP	250 to 500
																	(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.

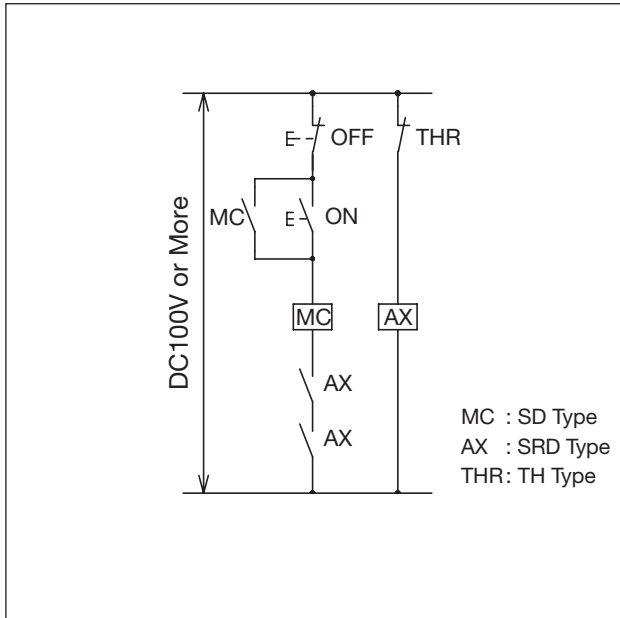
Note 8. Contact us or the dealer if you intend to use it at rating 120 A or higher in Class AC-1.

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)

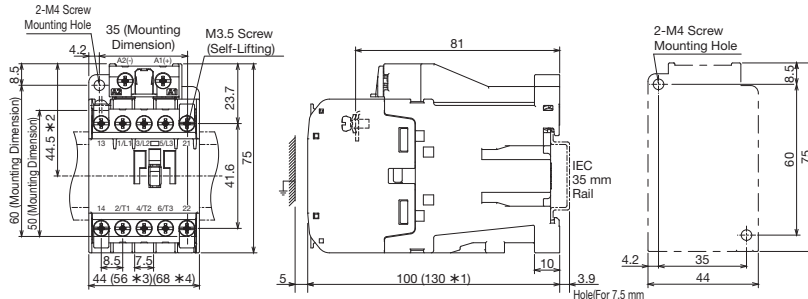
Circuit Example 1	Effect of Changing Circuit
	<ul style="list-style-type: none"> · It is necessary to restrict the polarity of the control circuit power supply. · The open time of MC2 increases.
<p>Circuit Example 2</p>	<ul style="list-style-type: none"> · It is necessary to restrict the polarity of the control circuit power supply. · The open time of MC2 increases.
<p>Circuit Example 3</p>	<ul style="list-style-type: none"> · The time until MC2 is activated increases.

	Item	Reference Page	Remarks
	· Auxiliary Contact Rating	Page 39	—
	· Operation Coil	Page 42	—
	· Properties	Page 43	—
	· Performance	Page 44	—
	· Outline Drawings/Contact Arrangements	Page 91	—
	· How to Order	Page 122	—
	· Combining with Optional Units	Page 182	—

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

Non-Reversing

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

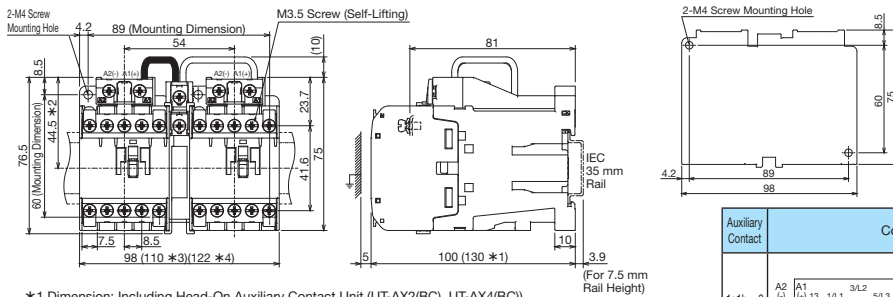
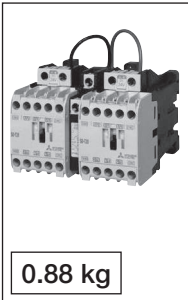


*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
 *2 Dimension: Width Dimension from Center of IEC 35 mm Rail
 *3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC))
 - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)

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

Reversing

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

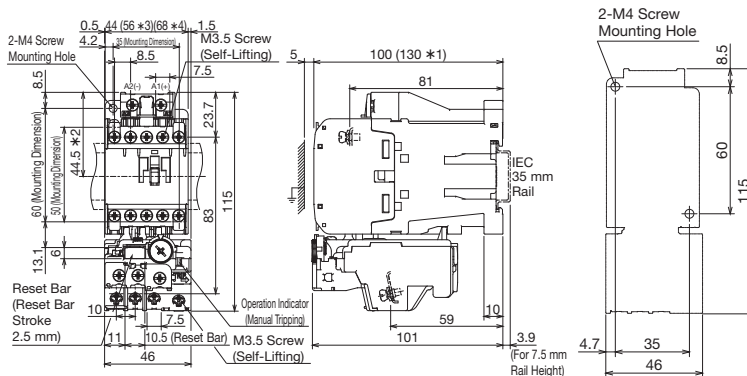
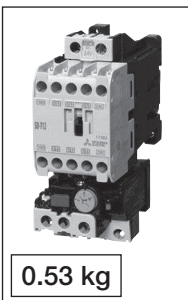


*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
 *2 Dimension: Width Dimension from Center of IEC 35 mm Rail
 *3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC))
 - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)

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>SD-2xT12</td> <td>SD-2xT12BC</td> </tr> <tr> <td>SD-2xT20</td> <td>SD-2xT20BC</td> </tr> </tbody> </table>		Model Name	Model Name	SD-2xT12	SD-2xT12BC	SD-2xT20	SD-2xT20BC
Model Name	Model Name						
SD-2xT12	SD-2xT12BC						
SD-2xT20	SD-2xT20BC						

Non-Reversing

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

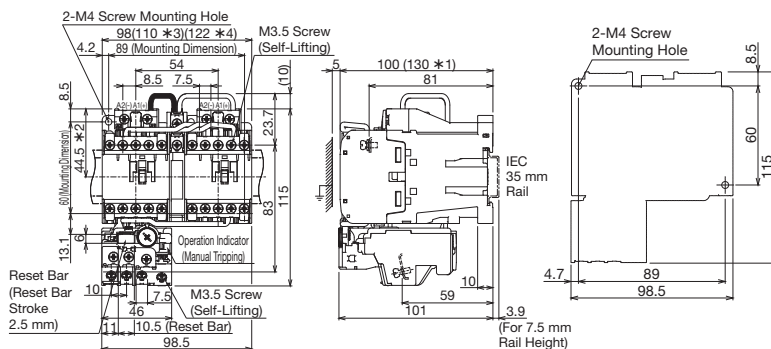
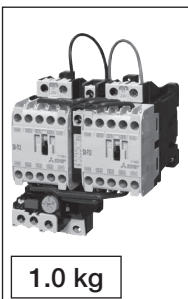


*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
 *2 Dimension: Width Dimension from Center of IEC 35 mm Rail
 *3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC))
 - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)

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

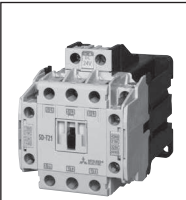
Connection Diagram							
<table border="1"> <thead> <tr> <th>Model Name</th> <th>Model Name</th> </tr> </thead> <tbody> <tr> <td>MSOD-2xT12KP</td> <td>MSOD-2xT12BCKP</td> </tr> <tr> <td>MSOD-2xT20KP</td> <td>MSOD-2xT20BCKP</td> </tr> </tbody> </table>		Model Name	Model Name	MSOD-2xT12KP	MSOD-2xT12BCKP	MSOD-2xT20KP	MSOD-2xT20BCKP
Model Name	Model Name						
MSOD-2xT12KP	MSOD-2xT12BCKP						
MSOD-2xT20KP	MSOD-2xT20BCKP						

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

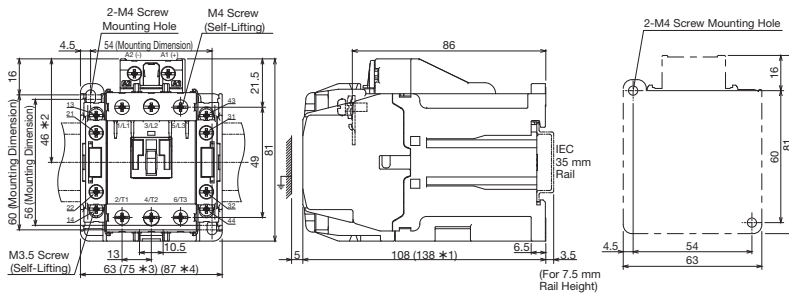
T21

Non-Reversing

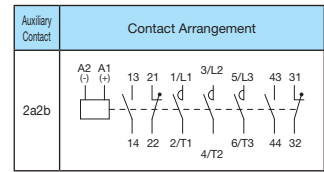
SD-T21(BC)



0.59 kg



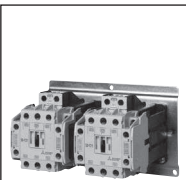
- *1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
- *2 Dimension: Width Dimension from Center of IEC 35 mm Rail
- *3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)



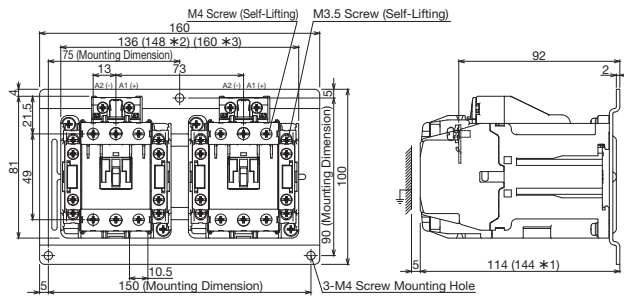
Model Name
SD-T21
SD-T21BC

Reversing

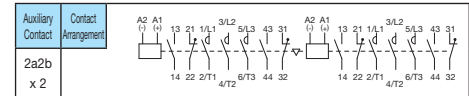
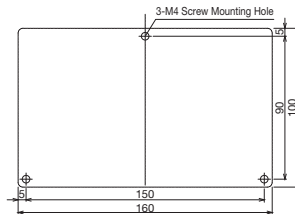
SD-2 x T21(BC)



1.44 kg



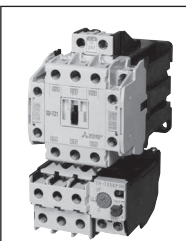
- *1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
- *2, *3 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *2 Has 1 Piece, *3 Has 2 Pieces (Both Sides)



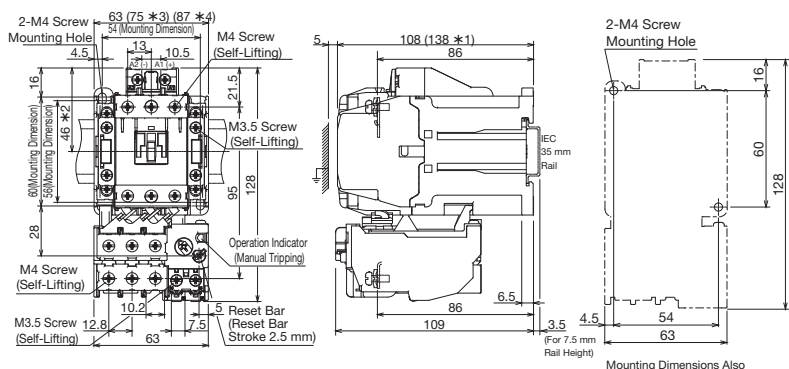
Model Name
SD-2xT21
SD-2xT21BC

Non-Reversing

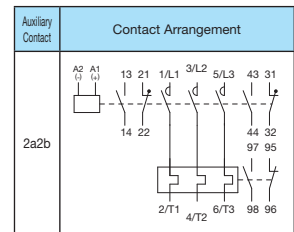
MSOD-T21(BC)KP



0.77 kg



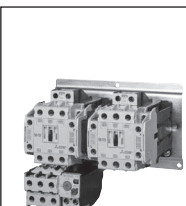
- *1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
- *2 Dimension: Width Dimension from Center of IEC 35 mm Rail
- *3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)



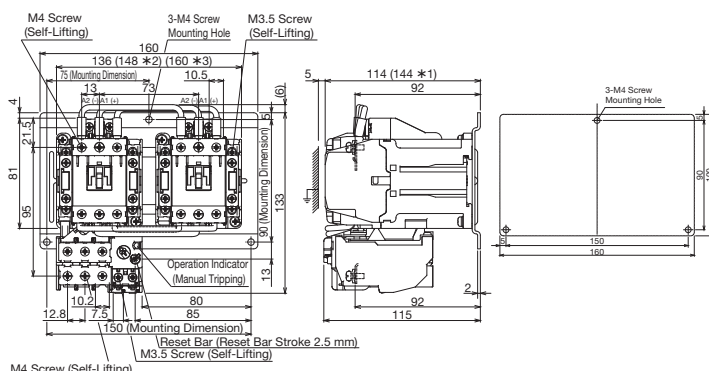
Model Name
MSOD-T21KP
MSOD-T21BCKP

Reversing

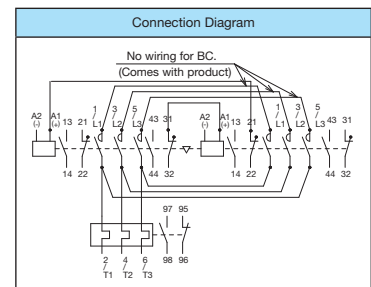
MSOD-2 x T21(BC)KP



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)

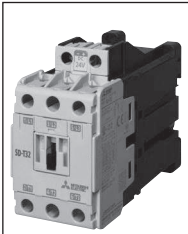


Model Name
MSOD-2xT21KP
MSOD-2xT21BCKP

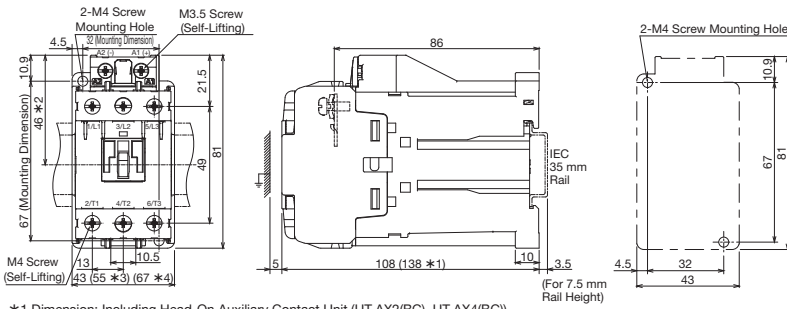
T32

Non-Reversing

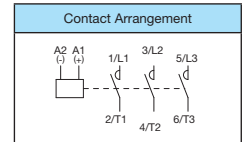
SD-T32(BC)



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)



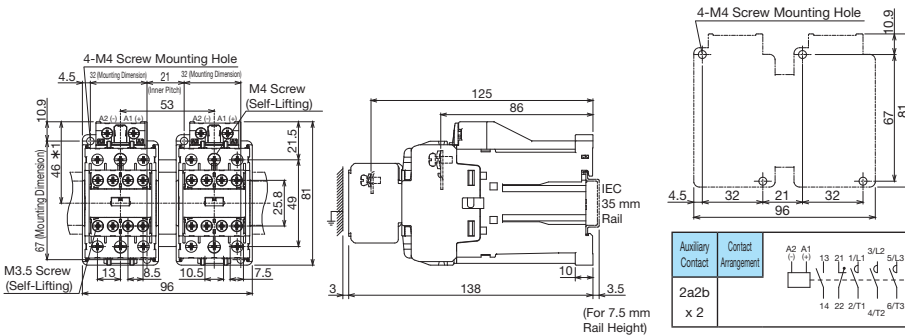
Model Name
SD-T32
SD-T32BC

Reversing

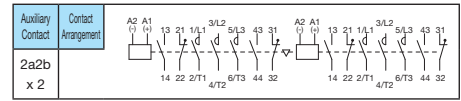
SD-2 x T32(BC)



1.22 kg



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



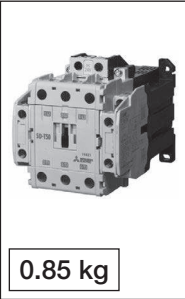
Model Name
SD-2xT32
SD-2xT32BC

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

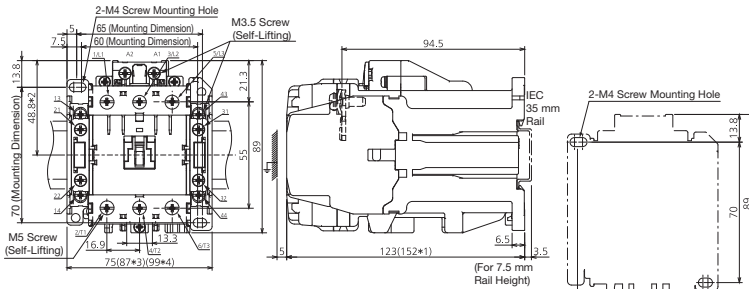
T35/T50

Non-Reversing

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



0.85 kg



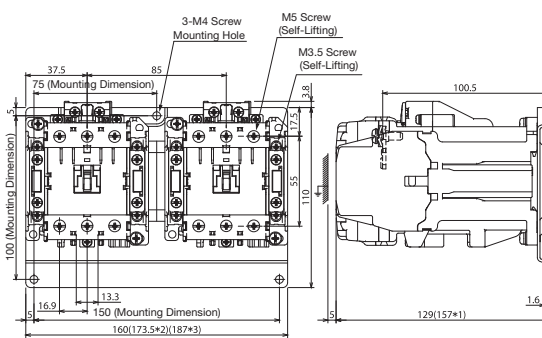
- *1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
- *2 Dimension: Width Dimension from Center of IEC 35 mm Rail
- *3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC))
- *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)

Auxiliary Contact	Contact Arrangement
2a2b	

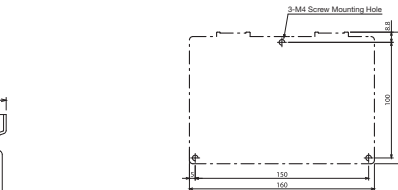
Model Name	Model Name
SD-T35	SD-T35BC
SD-T50	SD-T50BC

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)



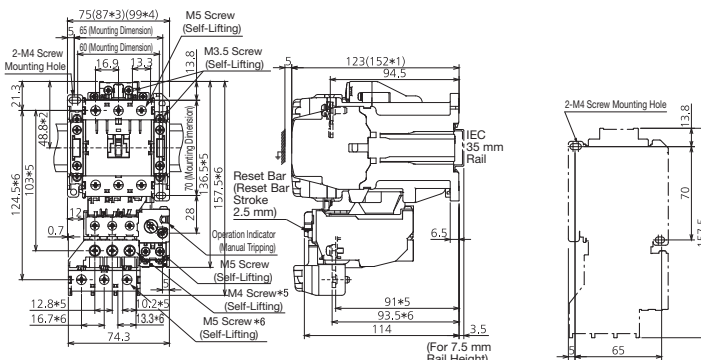
Auxiliary Contact	Contact Arrangement
2a2b x 2	

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

1.96 kg

Non-Reversing

MSOD-T35(BC)KP
MSOD-T50(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)
- *5 Dimension: Heater Designations 22A or Less, *6 Dimension: Heater Designations 29A or More

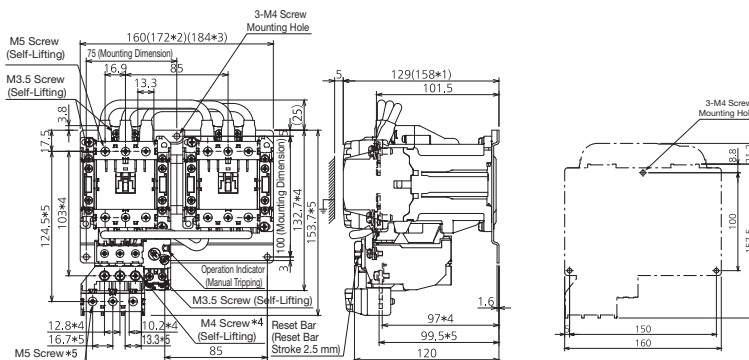
Auxiliary Contact	Contact Arrangement
2a2b	

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

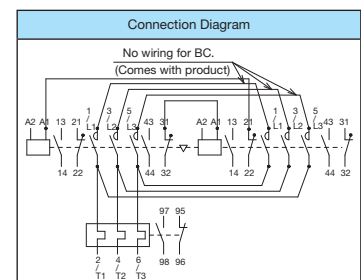
1.09 kg

Reversing

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



- *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



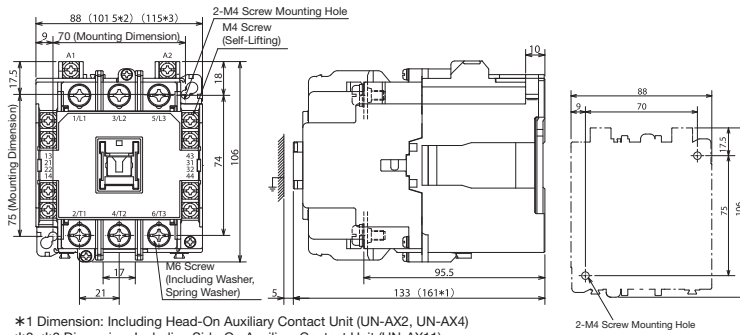
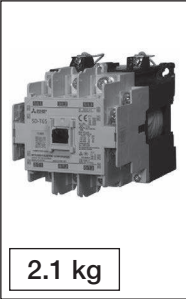
Model Name	Model Name
MSOD-2xT35KP	MSOD-2xT35BCKP
MSOD-2xT50KP	MSOD-2xT50BCKP

2.2 kg

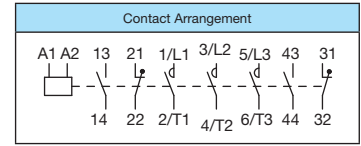
T65/T80

Non-Reversing

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



*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)

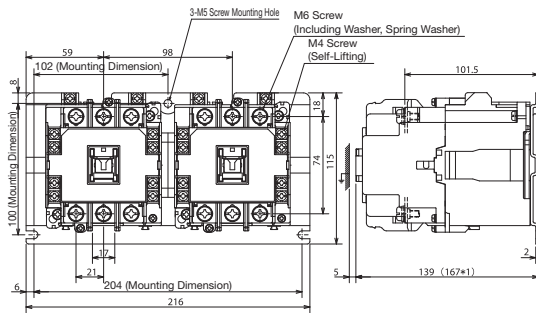


Model Name
SD-T65
SD-T80

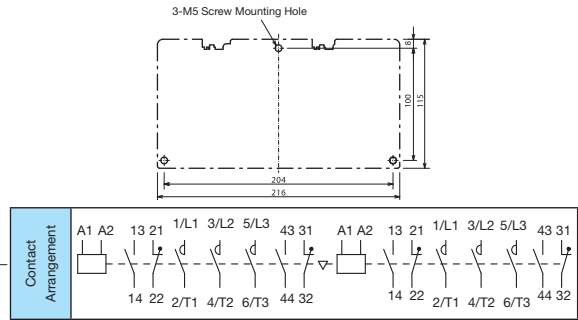
Reversing

SD-2xT65(CW)
SD-2xT80(CW)

4.6 kg



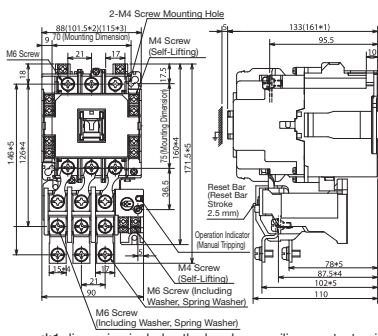
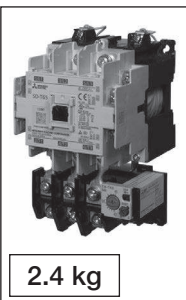
*1 Dimension: Including Head-On Auxiliary Contact Unit (UN-AX2, UN-AX4)



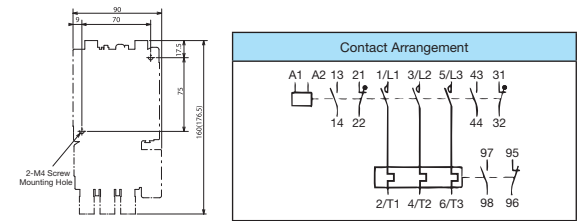
Model Name
SD-2xT65
SD-2xT80

Non-Reversing

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



*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)

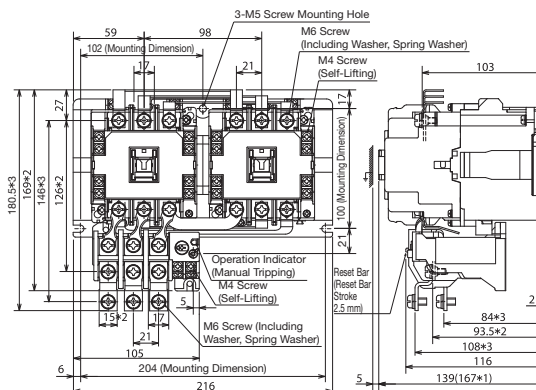


Model Name
MSOD-T65KP
MSOD-T80KP

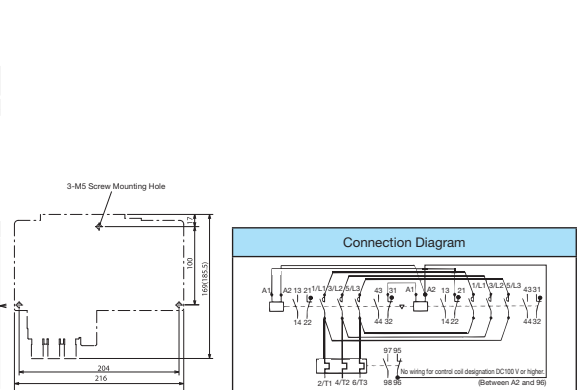
Reversing

MSOD-2xT65(CW)KP
MSOD-2xT80(CW)KP

4.9 kg



*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)

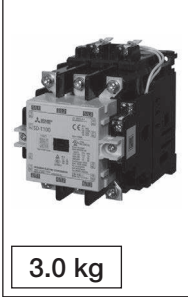


Model Name
MSOD-2xT65KP
MSOD-2xT80KP

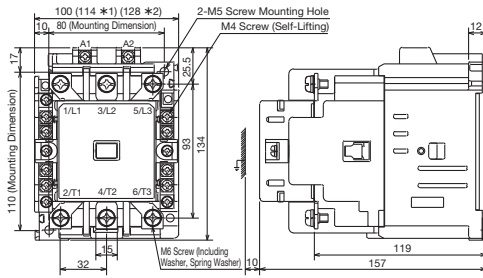
T100

Non-Reversing

SD-T100

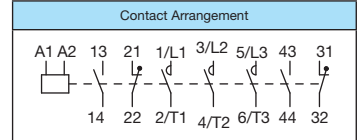
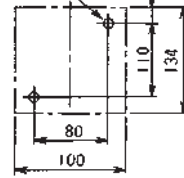


3.0 kg



*1, *2 Dimension: Including Side-On Auxiliary Contact Unit (UN-AX80)
*1 Has 1 Piece, *2 Has 2 Pieces (Both Sides)

2-M5 Screw Mounting Hole

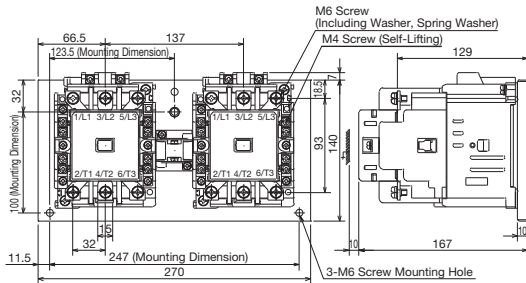


Model Name
SD-T100

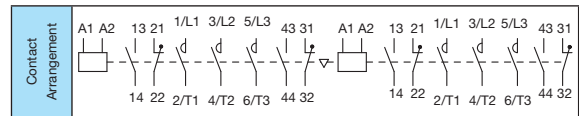
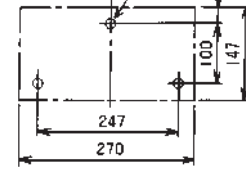
Reversing

SD-2xT100

6.9 kg



3-M6 Screw Mounting Hole

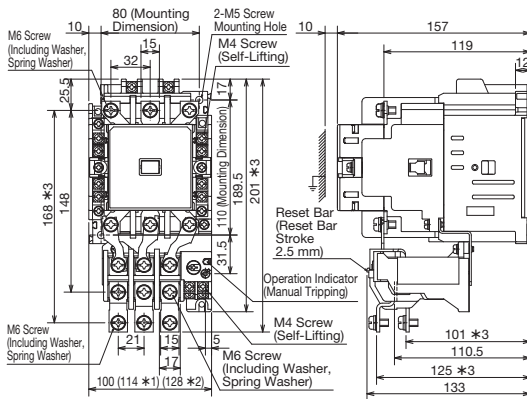


Model Name
SD-2xT100

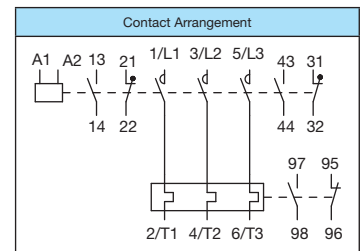
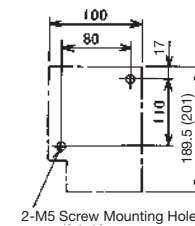
Non-Reversing

MSOD-T100KP

3.5 kg



*1, *2 dimensions indicate when using a side-on auxiliary contact unit (UN-AX80)
- *1 indicates 1 piece, *2 indicates 2 pieces (both sides).
*3 is for the heater designation of 67A or 82A.

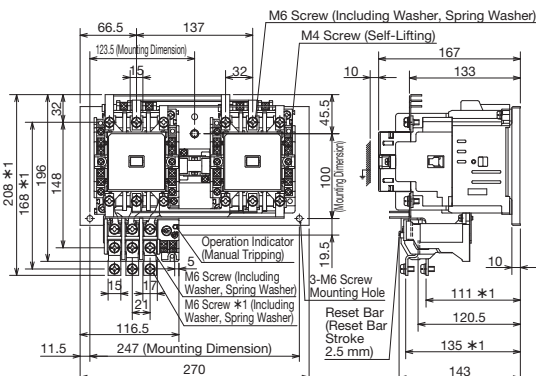


Model Name
MSOD-T100KP

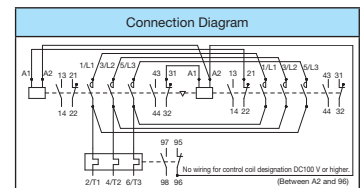
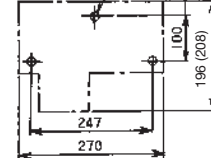
Reversing

MSOD-2xT100KP

7.2 kg



3-M6 Screw Mounting Hole



Model Name
MSOD-2xT100KP

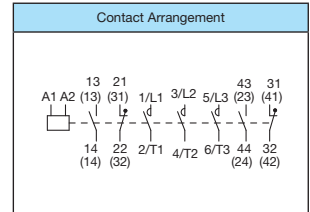
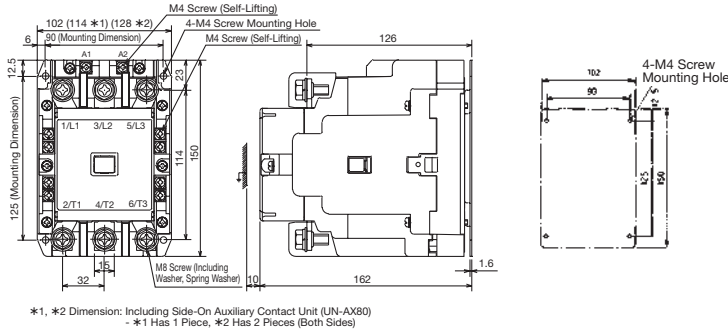
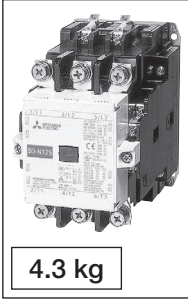
*1 is for the heater designation of 67A or 82A.

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

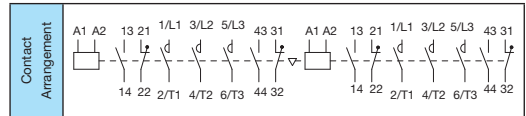
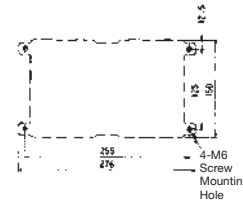
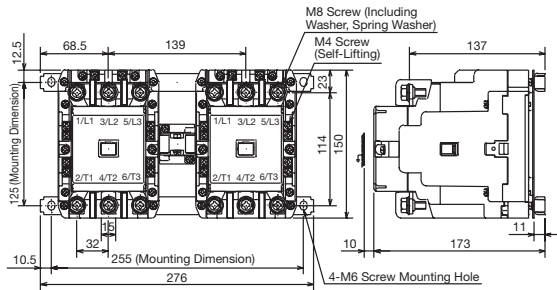
SD-N125



Model Name	SD-N125
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Reversing

SD-2xN125

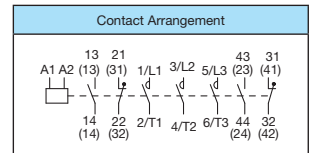
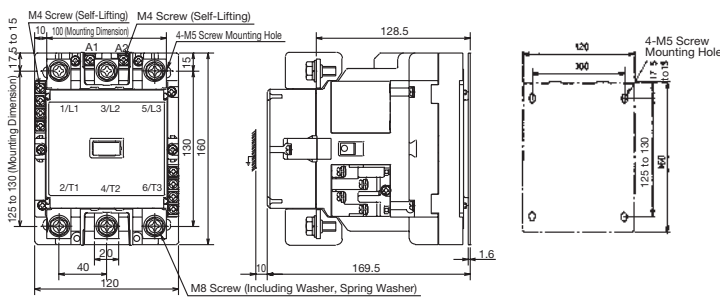
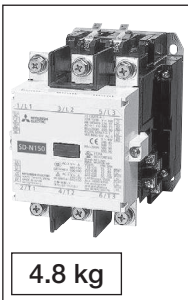


Model Name	SD-2xN125
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N150

Non-Reversing

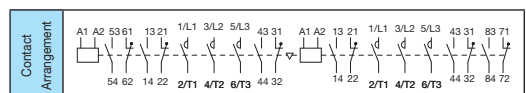
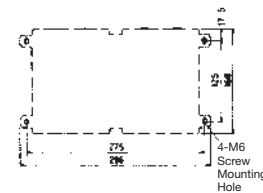
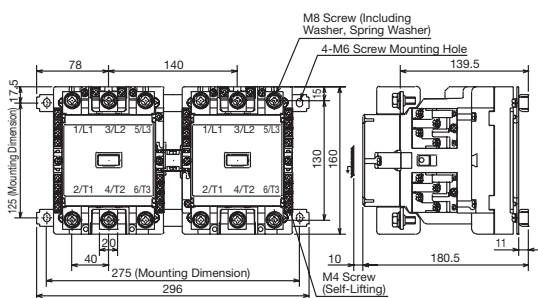
SD-N150



Model Name	SD-N150	Model Number	SN2971
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Reversing

SD-2xN150



Model Name	SD-2xN150
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10 kg

4

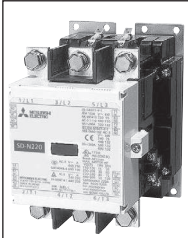
MS-T/N Series Magnetic Starters/Magnetic Contactors

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).

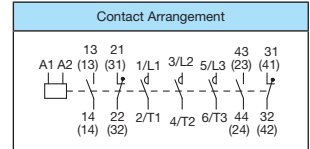
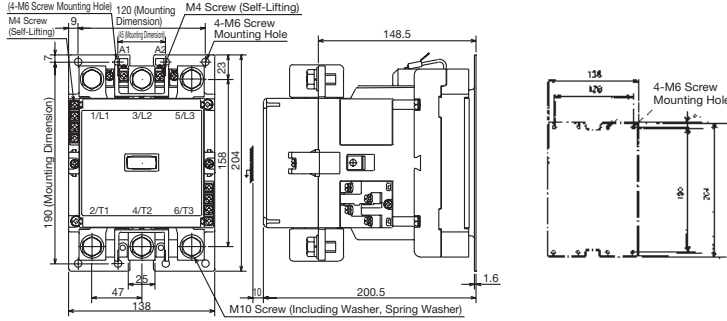
N220

Non-Reversing

SD-N220



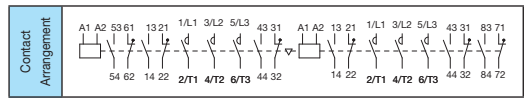
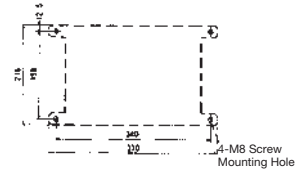
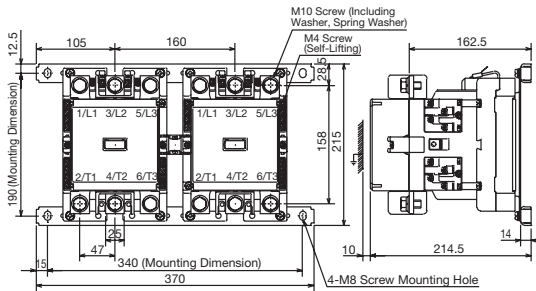
7.5 kg



Model Name	Model Number
SD-N220	SN2981

Reversing

SD-2xN220



Model Name
SD-2xN220

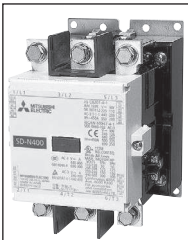
17 kg

N300/N400

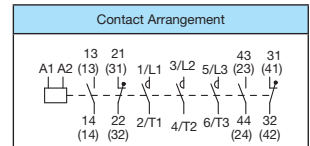
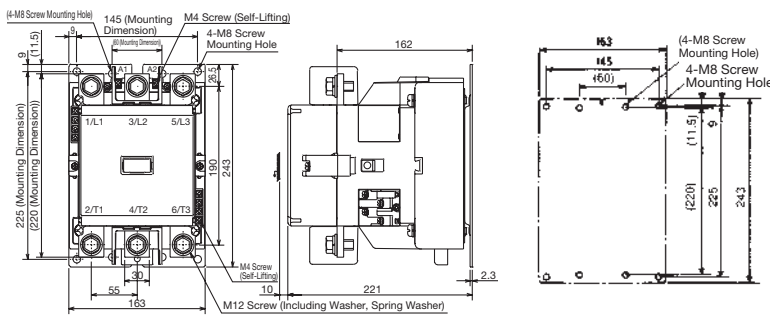
Non-Reversing

SD-N300

SD-N400



13 kg
13.5 kg

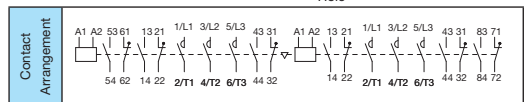
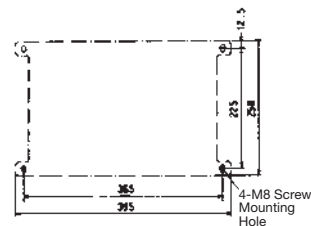
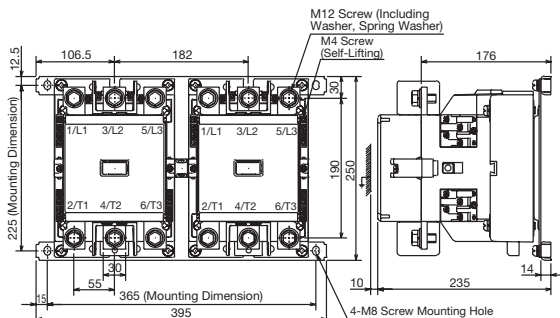


Model Name	Model Number
SD-N300	SN2991
SD-N400	SN3001

Reversing

SD-2xN300

SD-2xN400



Model Name
SD-2xN300
SD-2xN400

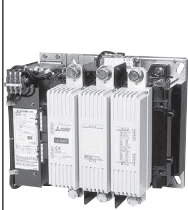
28 kg
29 kg

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).

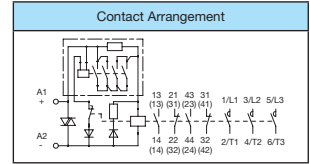
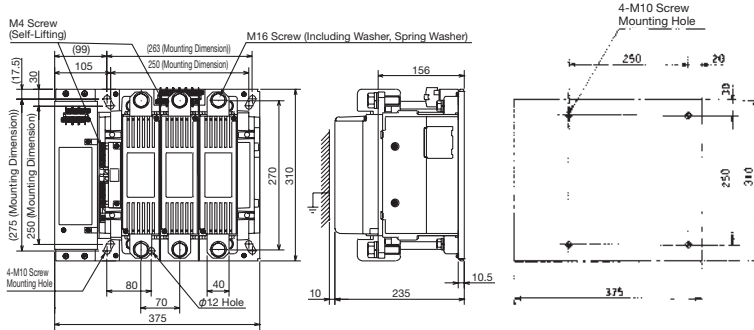
N600/N800

Non-Reversing

SD-N600
SD-N800



29 kg



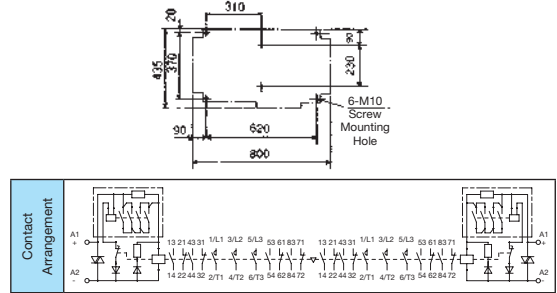
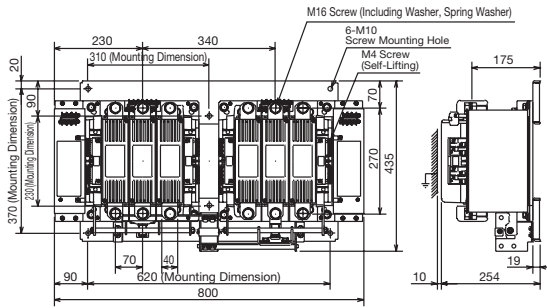
Model Name
SD-N600
SD-N800

Reversing

SD-2xN600
SD-2xN800



64 kg

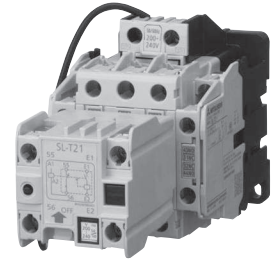


Model Name
SD-2xN600
SD-2xN800

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]				Resistive Load (Category AC-1)		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)		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 × 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 × 2)	1a1b (1a1b × 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 [48]	38 [38]	26	80	80	80				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			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			UN-AX11x2	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			UN-AX80x2 (UN-AX80x2)	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			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			UN-AX150x2 (-)	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			TH-N400KPRH	105 to 250	
SL-N600	—	190 [160]	330 [300]	330 [300]	330	630 [630]	630 [630]	500 [500]	420	660	660	660			UN-AX600x1 (-)	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 × T□, SL(D)-2 × N□ or MSOL(D)-2 × T□, MSOL(D)-2 × 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.

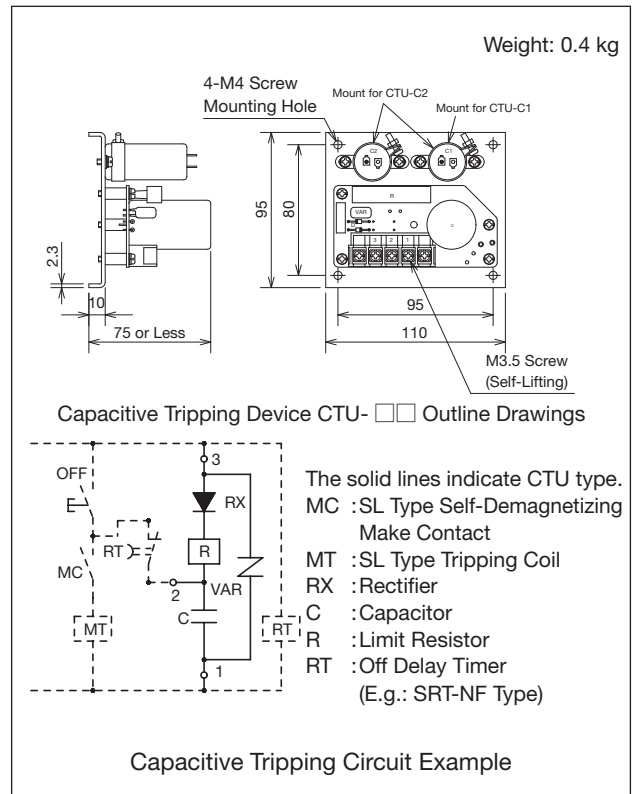
● Operating Transformer Capacity, Capacitive Tripping

Frame	Operating Transformer Capacity (For AC Operation) (VA)	Minimum Capacitance For Capacitive Tripping (For AC200 V) (μ F)	Capacitive Tripping Device Model Name	
			Note 1	Note 2
			AC100 V	AC200 V
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	CTU-C1	CTU-C2
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.

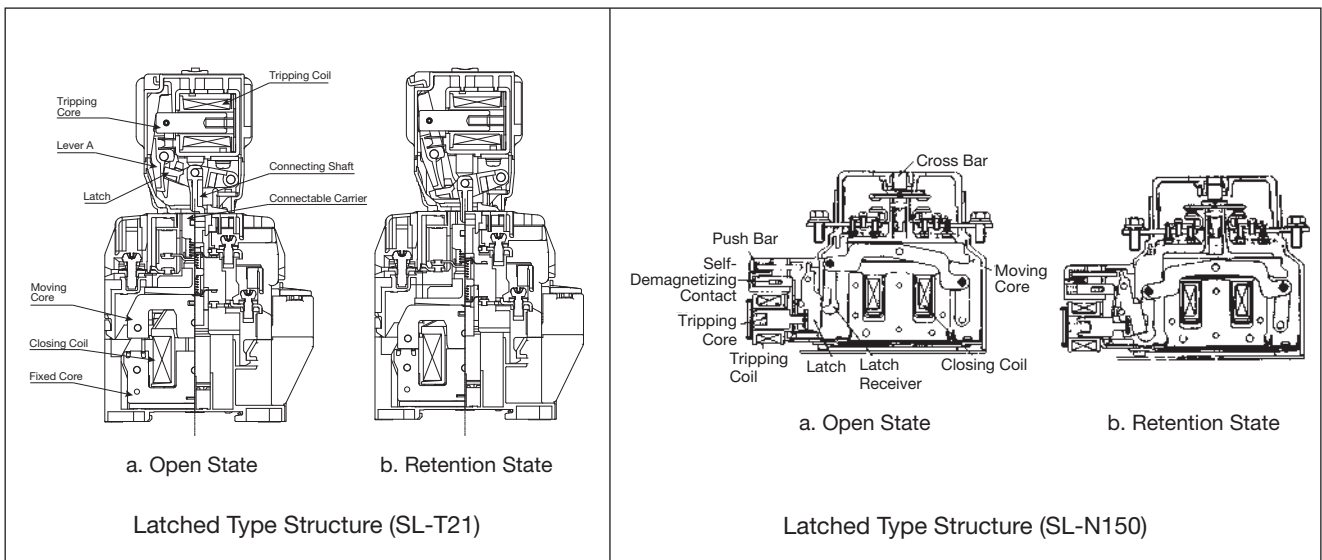
- Charging for at least 10 seconds at the rated voltage allows for tripping up to 30 seconds after a power failure.
- Tripping Coil Rated Voltage/Frequency
For AC100 V: 100 to 110 V, 50/60 Hz
For AC200 V: 200 to 220 V, 50/60 Hz
- Uses an electrolytic capacitor, so the capacity should be checked periodically.



● 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

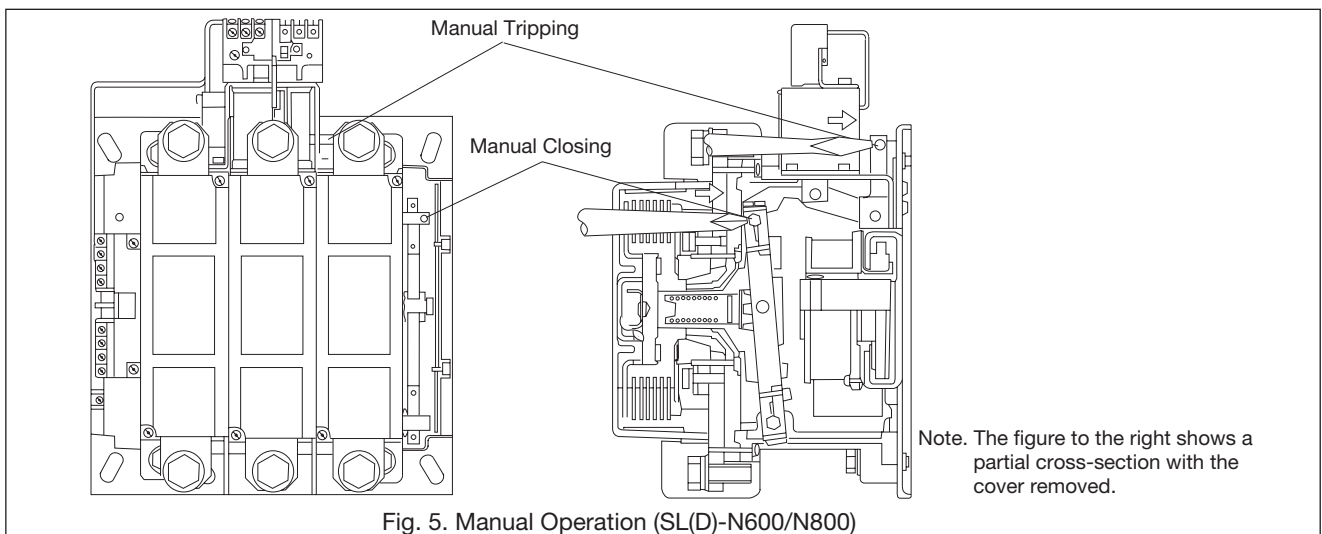
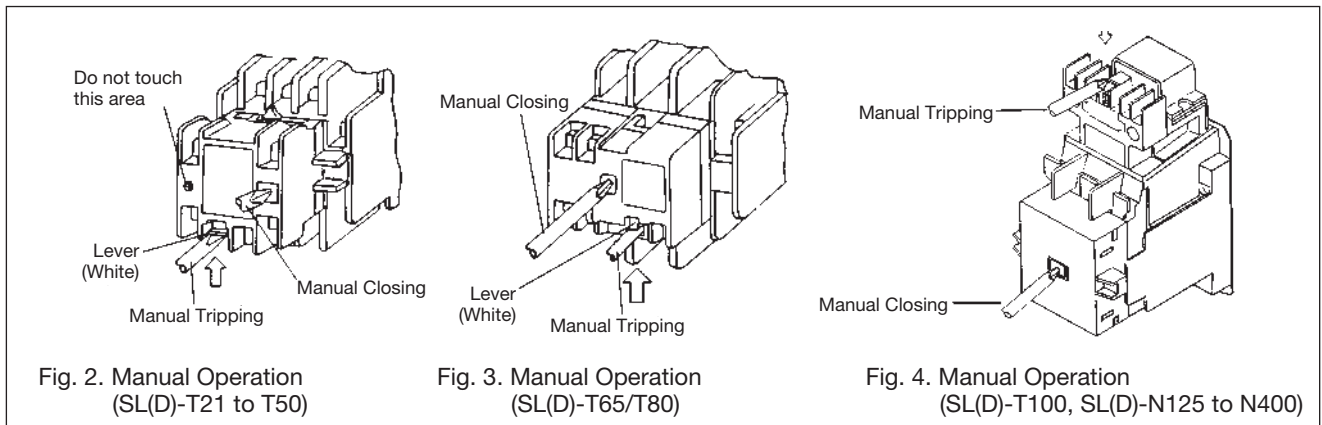
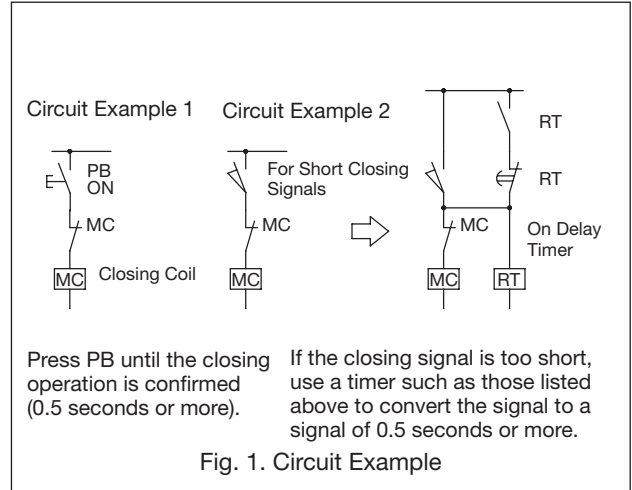
- (1) Energizing the tripping coil attracts the movable core, freeing lever A or the latch receiver from the latch.
- (2) When the latch is released the movable core returns to its original position and the main contact is opened.

● **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

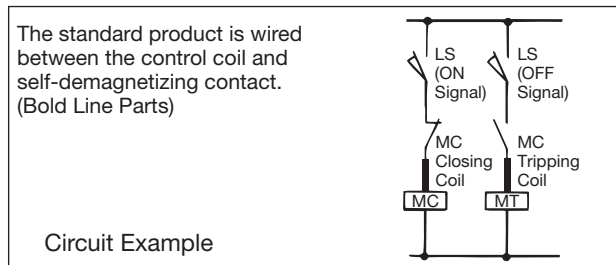
Configure your system such that the closing switch and tripping switch command signals never overlap (simultaneous contact).

● 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.

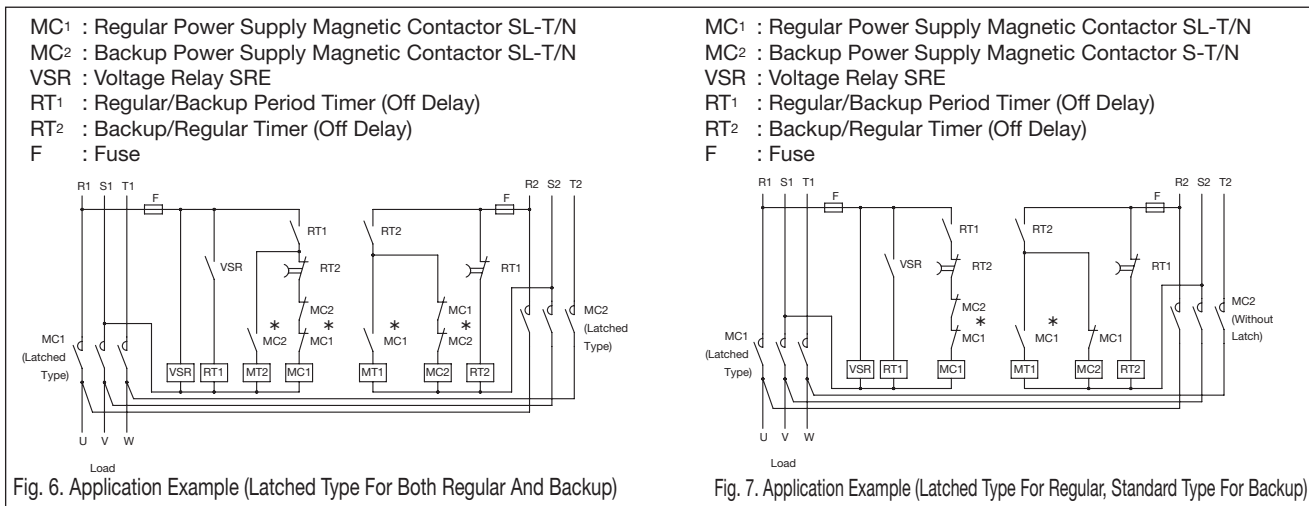


● Disassembly

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

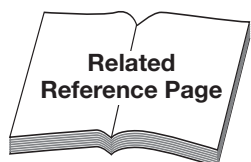
● Application Example

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 104	—
• How to Order	Page 122	—
• Combining with Optional Units	Page 182	—

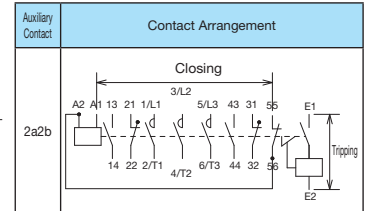
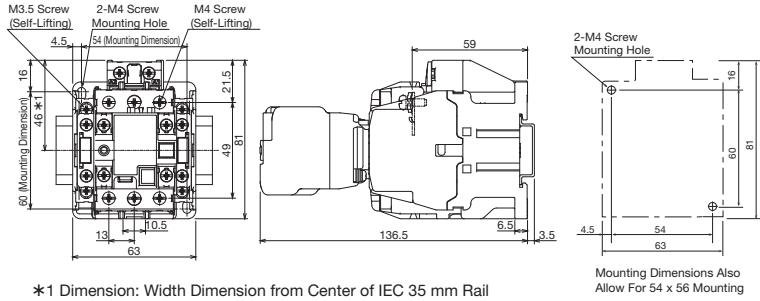
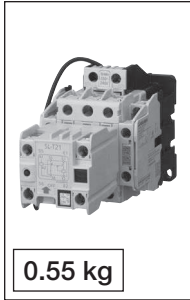


● Outline Drawings/Contact Arrangements (Mechanically Latched Magnetic Starters/Magnetic Contactors)

T21

Non-Reversing

SL(D)-T21(BC)

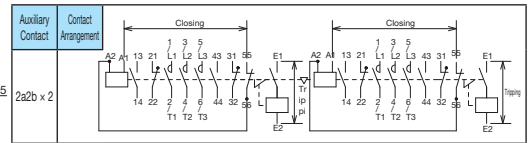
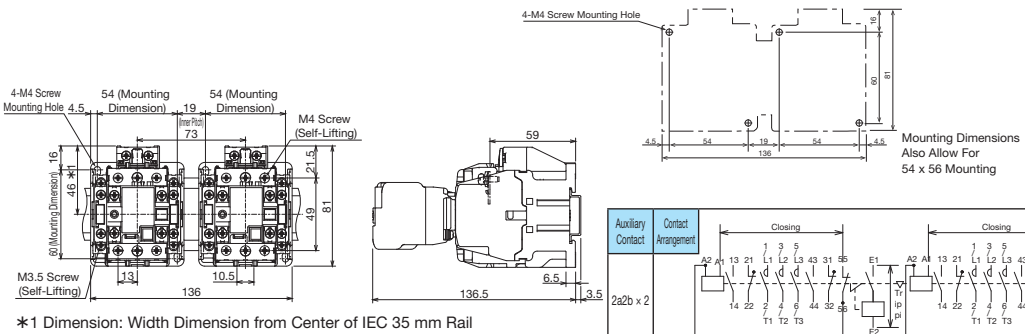


Model Name	Model Name
SL-T21	SL-T21BC
SLD-T21	SLD-T21BC

Reversing

SL(D)-2xT21(BC)

1.15 kg

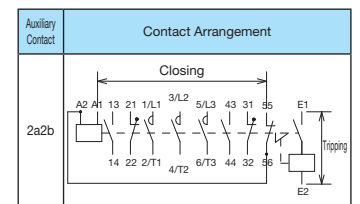
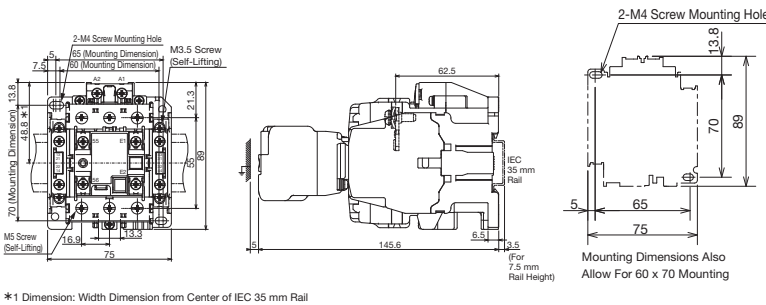
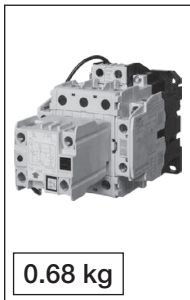


Model Name	Model Name
SL-2xT21	SL-2xT21BC
SLD-2xT21	SLD-2xT21BC

T35/T50

Non-Reversing

SL(D)-T35 SL(D)-T50

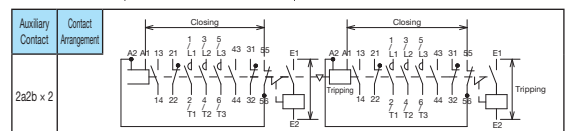
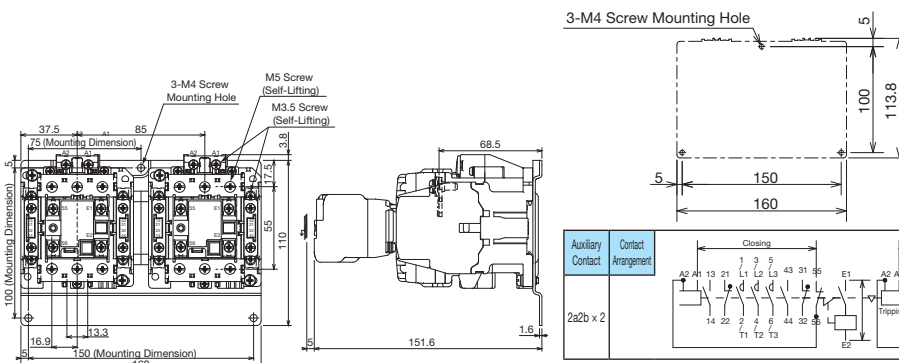


Model Name	Model Name
SL-T35	SLD-T35
SL-T50	SLD-T50

Reversing

SL(D)-2xT35 SL(D)-2xT50

1.9 kg



Model Name	Model Name
SL-2xT35	SLD-2xT35
SL-2xT50	SLD-2xT50

4

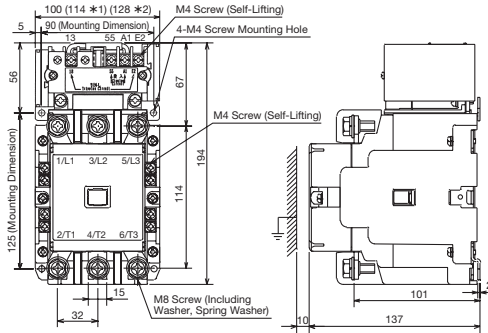
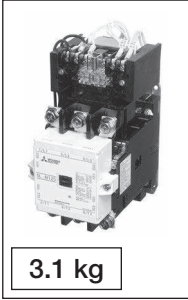
MS-T/N Series Magnetic Starters/Magnetic Contactors

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).

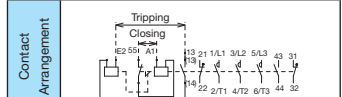
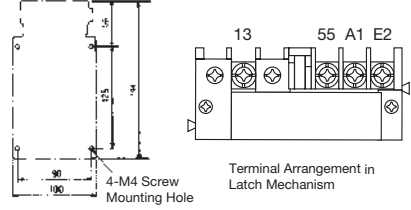
N125

Non-Reversing

SL(D)-N125



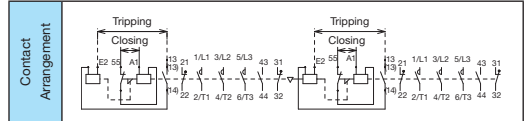
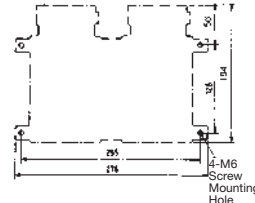
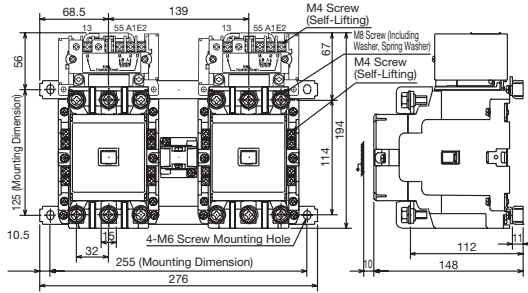
*1, *2 Dimension: Including Side-On Auxiliary Contact Unit (UN-AX30)
 *1 Has 1 Piece, *2 Has 2 Pieces (Both Sides)



Model Name	Model Number	Model Name	Model Number
SL-N125	SLN05 □□	SLD-N125	SLN3541

Reversing

SL(D)-2xN125



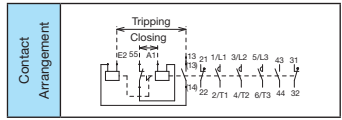
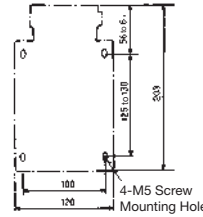
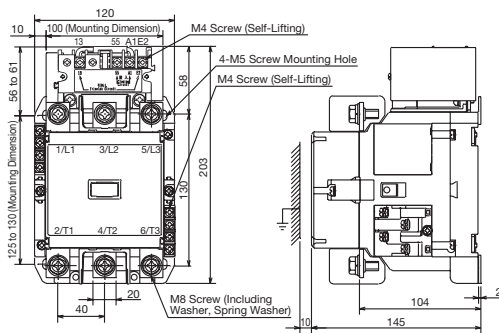
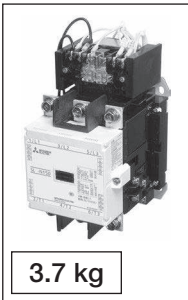
Model Name	Model Name
SL-2xN125	SLD-2xN125

7.0 kg

N150

Non-Reversing

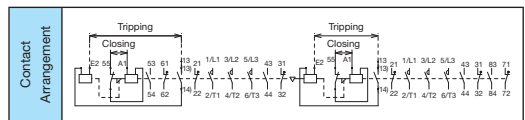
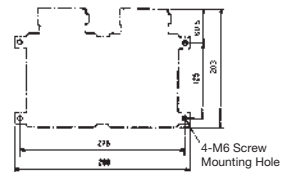
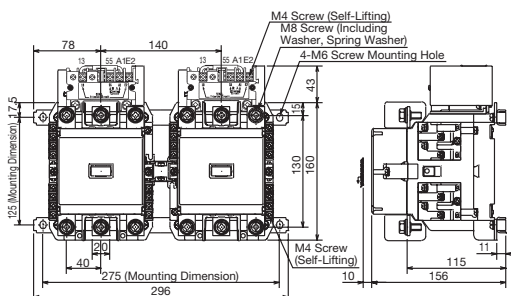
SL(D)-N150



Model Name	Model Number
SL-N150	SLN06 □□
SLD-N150	SLN355

Reversing

SL(D)-2xN150



Model Name	Model Number
SL-2xN150	SLN1 □□□
SLD-2xN150	

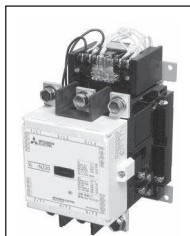
8.0 kg

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).

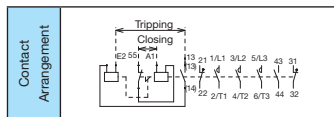
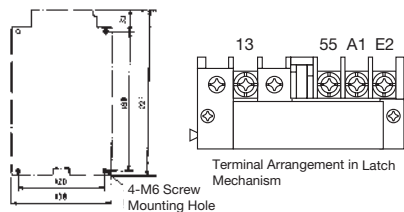
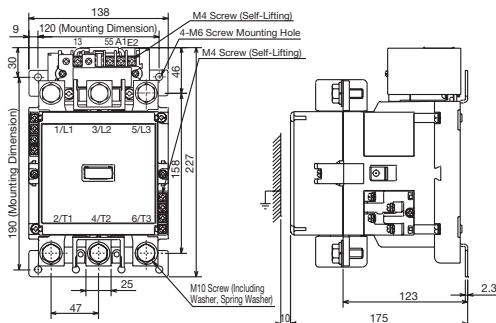
N220

Non-Reversing

SL(D)-N220



6.0 kg

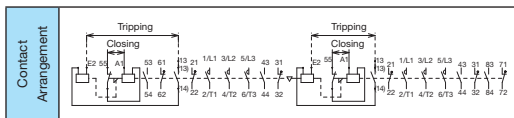
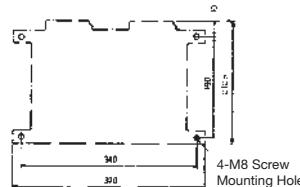
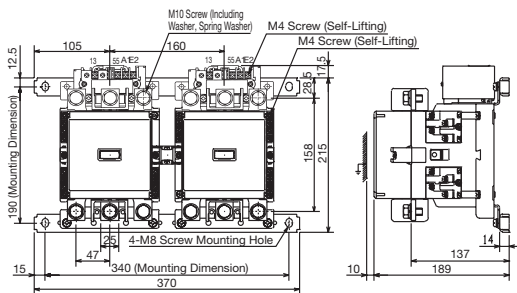


Model Name	Model Number
SL-N220	SLN06 □ □
SLD-N220	SLN3561

4

Reversing

SL(D)-2xN220



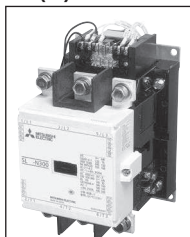
Model Name	Model Number
SL-2xN220	SLN19 □ □
SLD-2xN220	SLN3571

14 kg

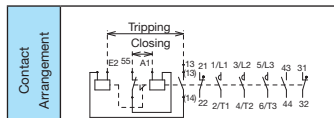
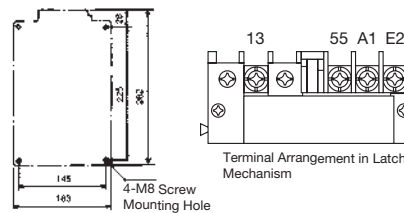
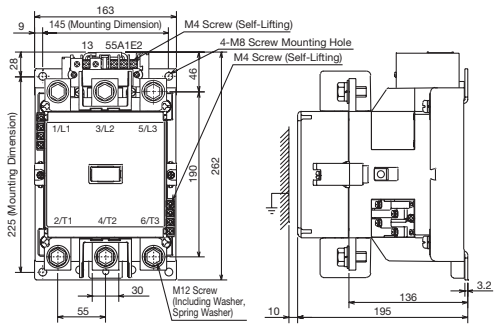
N300/N400

Non-Reversing

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



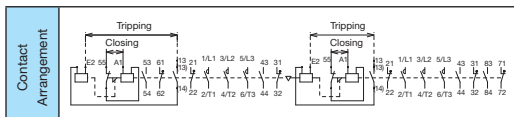
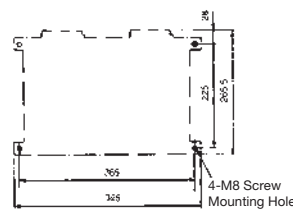
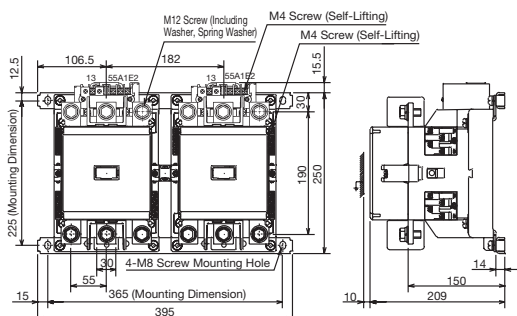
9.5 kg
10 kg



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)-2xN400**



Model Name	Model Number	Model Name
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).

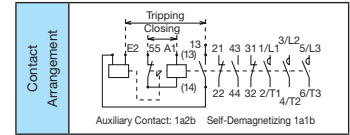
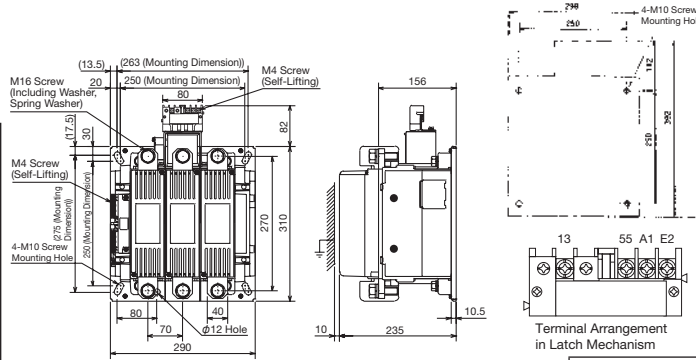
N600/N800

Non-Reversing

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



27 kg

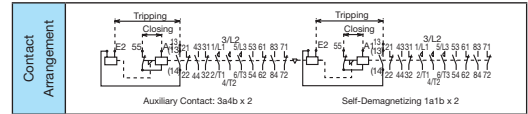
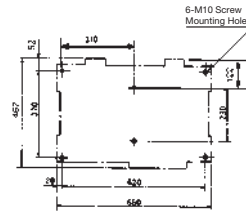
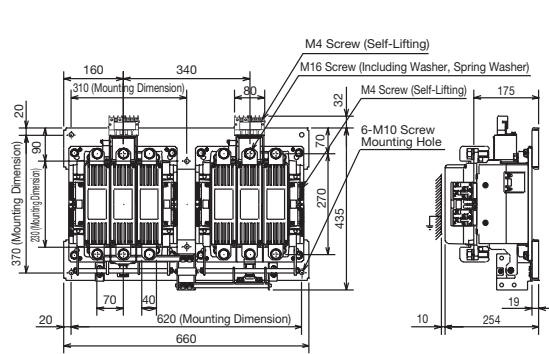


Model Name	Model Number	Model Name	Model Number
SL-N600	SNL0681	SLD-N600	
SL-N800		SLD-N800	

Reversing

SL(D)-2xN600
SL(D)-2xN800

60 kg

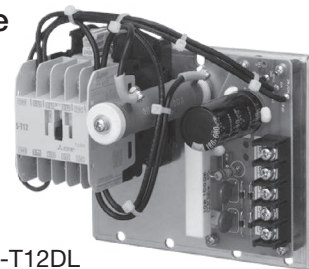


Model Name	Model Name
SL-2xN600	SLD-2xN600
SL-2xN800	SLD-2xN800

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 [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	—		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	— Note 3	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 to 42
S-T65DL	MSO-T65DLKP	18.5 [15]	30 [30]	37 [30]	30	65 [65]	65 [65]	60 [45]	38	100	100	100			TH-T65KP	15 to 54
S-T80DL	MSO-T80DLKP	22 [19]	45 [37]	45 [45]	45	85 [80]	85 [80]	75 [75]	52	120	120	120			TH-T65KP (Note 7)	67
S-T100DL	MSO-T100DLKP	30 [22]	55 [45]	55 [45]	55	105 [100]	105 [93]	85 [75]	65	150	150	150	1a1b	UN-AX150x1 Note 3	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-T100KP	67, 82
S-N220DL	MSO-N220DLKP	75 [55]	132 [110]	132 [132]	132	250 [220]	250 [220]	200 [200]	150	260	260	260			TH-N120KP(TA)	42 to 125
S-N300DL	MSO-N300DLKP	90 [75]	160 [150]	160 [160]	200	300 [300]	300 [300]	250 [250]	220	350	350	350			TH-N220KPRH	82 to 180
S-N400DL	MSO-N400DLKP	125 [110]	220 [200]	225 [200]	250	400 [400]	400 [400]	350 [350]	300	450	450	450	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 334.

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		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			7 to 100						200		
T35DL	113	24			7 to 100						500		
T50DL	113	24			10 to 100						800		
T65DL	55	26			30 to 100						1000		
T80DL	55	26			AC200V						1500		
T100DL	66	27			8 Times Class AC-3 Rated Operating Current						2000		
N150DL	76	55			500						3000		
N220DL	100	66			50						4000		
N300DL	140	85			50						5000		
N400DL	140	85	50		6000								

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

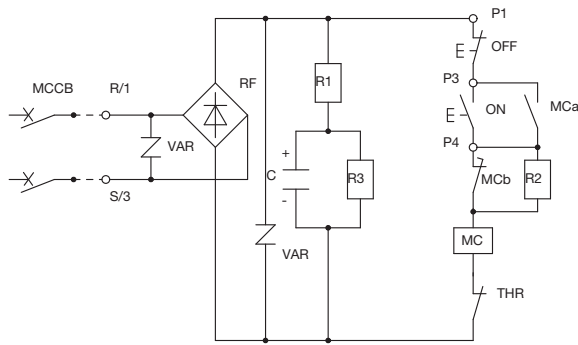
Note 2. The input is the average when applying 220 V at 60 Hz. Values for AC100V coils are approximately the same.

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.

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

Connecting

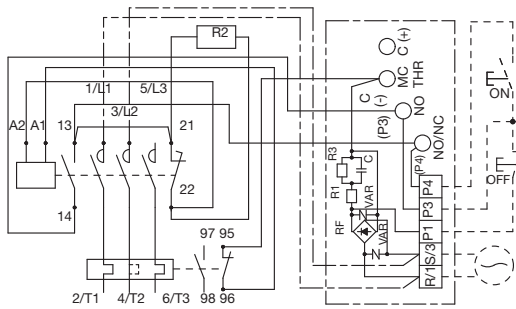


Deployment Connection Diagram

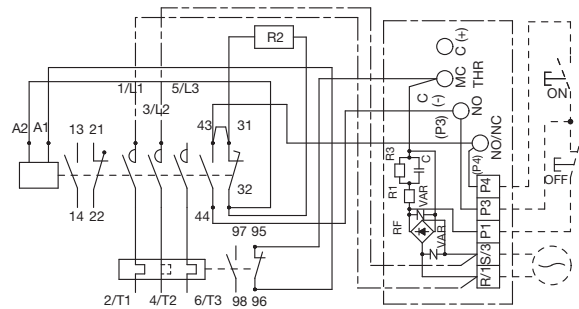
Note 1. The figure to the left is for MSO-□DL.

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.

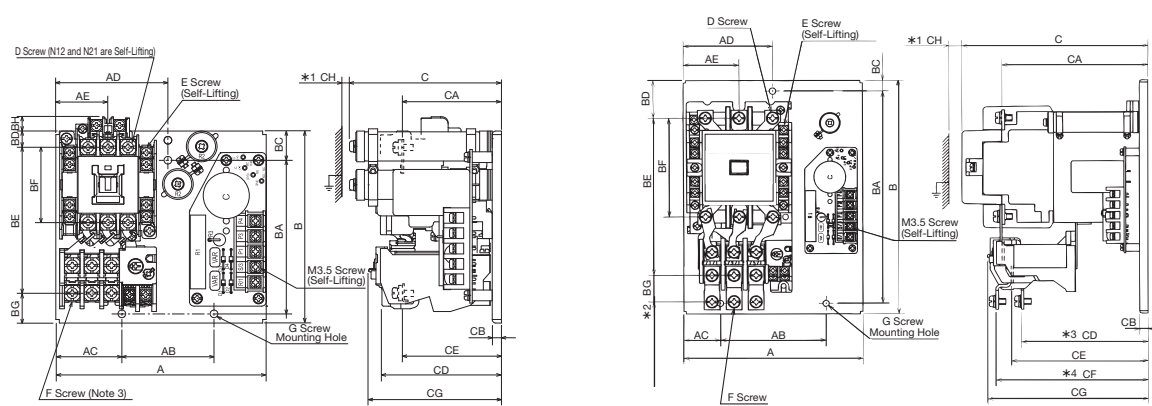
When Power Supply Voltage Drops and Momentary Power Failures Occur

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



◆ 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).

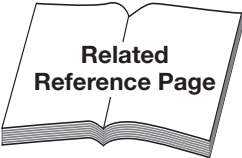
Variable Dimensions Table

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
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

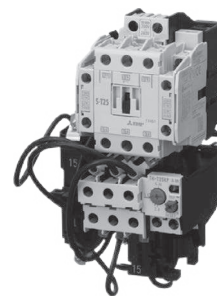
- Note 1. *1: "CH" is the arc space.
 Note 2. Below indicates the case when using TH-T50/T100 and TH-N□TA thermal overload relays.
 *2: "BG" has extended terminal pitch, "F Screw" has a terminal screw on the load side
 *3: "CD" has load side 4/T2 terminal height
 *4: "CF" has load side 2/T1, 6/T3 terminal 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 SR (with delay trip thermal overload REL) are not manufactured.

	Item	Reference Page	Remarks
	· Auxiliary Contact Rating	Page 39	—
	· How to Order	Page 125	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 182	—

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)								
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	Standard (Special)	Additional Unit Model Names x Pieces	Model Name	Heater Designation Range [A]	
												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)		—	TH-T18SR	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
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			TH-T50PSR	TH-T50SR	29 to 42
MSO-T80KPSR	MSO-T80SR	22[19]	45[37]	45[45]	45	85[80]	85[80]	75[75]	52	2a2b	UN-AX2, 4 x 1 or UN-AX11 x 2	TH-T65PSR	TH-T65SR	15 to 54
MSO-T100KPSR	MSO-T100SR	30[22]	55[45]	55[45]	55	105[100]	105[93]	85[75]	65			TH-T100PSR	TH-T100SR	67
MSO-N125KPSR	MSO-N125SR	37[30]	60[60]	60[60]	60	125[125]	120[120]	90[90]	70			TH-T65PSR	TH-T65SR	15 to 54
MSO-N150KPSR	MSO-N150SR	45[37]	75[75]	90[90]	90	150[150]	150[150]	140[140]	100			TH-T100PSR	TH-T100SR	67, 82
MSO-N180KPSR	MSO-N180SR	55[45]	90[90]	110[110]	110	180[180]	180[180]	180[180]	120			TH-N120 (TA)KPSR	TH-N120 (TA)SR	42 to 105
MSO-N220KPSR	MSO-N220SR	75[55]	132[110]	132[132]	132	250[220]	250[220]	200[200]	150			TH-N220 RHKPSR	TH-N220 RHSR	82 to 150
MSO-N300KPSR	MSO-N300SR	90[75]	160[150]	160[160]	200	300[300]	300[300]	250[250]	220			TH-N400 RHKPSR	TH-N400 RHSR	82 to 180
MSO-N400KPSR	MSO-N400SR	125[110]	220[200]	225[200]	250	400[400]	400[400]	350[350]	300			TH-N400 RHKPSR	TH-N400 RHSR	105 to 250
														105 to 330

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.

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 (UN-CV, 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 128, 138 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 128, 138 for information about thermal overload relays.
	· How to Order	Page 125	—
	· Combining with Optional Units	Page 182	—

● 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

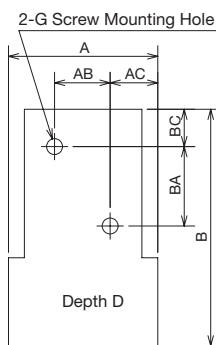


Fig. a. MSO-T10 to T50(KP)SR Types

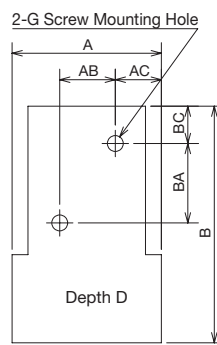


Fig. b. MSO-T65 to T100(KP)SR Types

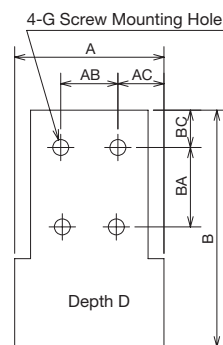


Fig. c. MSO-N125 to N400(KP)SR Type

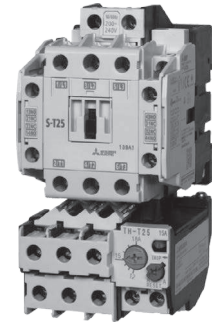
Frame	No. Thermal Elements	A	AB	AC	B	BA	BC	D	G	Weight [kg]	Reference Diagram (Above Figure)
T10SR	2	94	28	30.5	150	60	10.5	79	M4	0.54	Fig. a
T12/T20SR		94	35	30.3	150	60	10.5	79	M4	0.56	
T21/T25SR		97.5	54	4.5	162.5	60	16	82	M4	0.78	
T35/T50SR		97.5	65	5	170.5	70	13.8	91	M4	0.99	
T65/T80SR		140	70	26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

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

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.



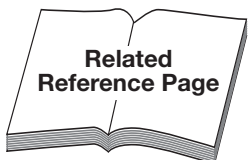
MSO-T25FSKP

● 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)	UT-AX2, 4(BC) x 1 or UT-AX11(BC) x 2	TH-T18FSKP	—	2.1 to 9
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-T25FSKP	TH-T25FS	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-T25FSKP	TH-T25FS	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	2a2b		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-T50FSKP	TH-T50FS	2.1 to 22
MSO-T50FSKP	MSO-T50FS	15[11]	22[22]	25[22]	22	55[50][50]	50[48]	38[38]	26			TH-T25FSKP	TH-T25FS	29
MSO-T65FSKP	MSO-T65FS	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-T65FSKP	TH-T65FS	42, 54
MSO-T80FSKP	MSO-T80FS	22[19]	45[37]	45[45]	45	85[80]	85[80]	75[75]	52			(Note 5)	(Note 5)	67
MSO-T100FSKP	MSO-T100FS	30[22]	55[45]	55[45]	55	105[100]	105[93]	85[75]	65	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 128, 139 for information about thermal overload relays.
· Performance	Page 44	Same as MSO/S-□ types. Refer to pages 128, 139 for information about thermal overload relays.
· Outline Drawings/Contact Arrangements	Page 75	Same as MSO-□ type.
· How to Order	Page 123	—
· Combining with Optional Units	Page 182	—



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
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)	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	2a2b	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
										TH-T25KP	0.24 to 22
MS-T50KPPM	15[11]	22[22]	25[22]	22	55[50][50]	50[48]	38[38]	26		TH-T50KP	29 to 42
										TH-T65KP	15 to 54
MS-T65KPPM	18.5[15]	30[30]	37[30]	30	65[65]	65[65]	60[45]	38		(Note 7)	67
MS-T80KPPM	22[19]	45[37]	45[45]	45	85[80]	85[80]	75[75]	52		TH-T65KP	15 to 54
MS-T100KPPM	30[22]	55[45]	55[45]	55	105[100]	105[93]	85[75]	65		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).

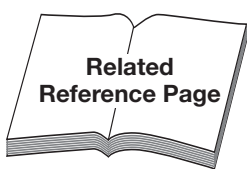
Note 4. MS-T21PM types with 200 to 220 V ratings are 3.7 kW, in accordance with the Electrical Appliance and Material Safety Law.

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 255 article 10.2 for details about production scope and applicable capacities.

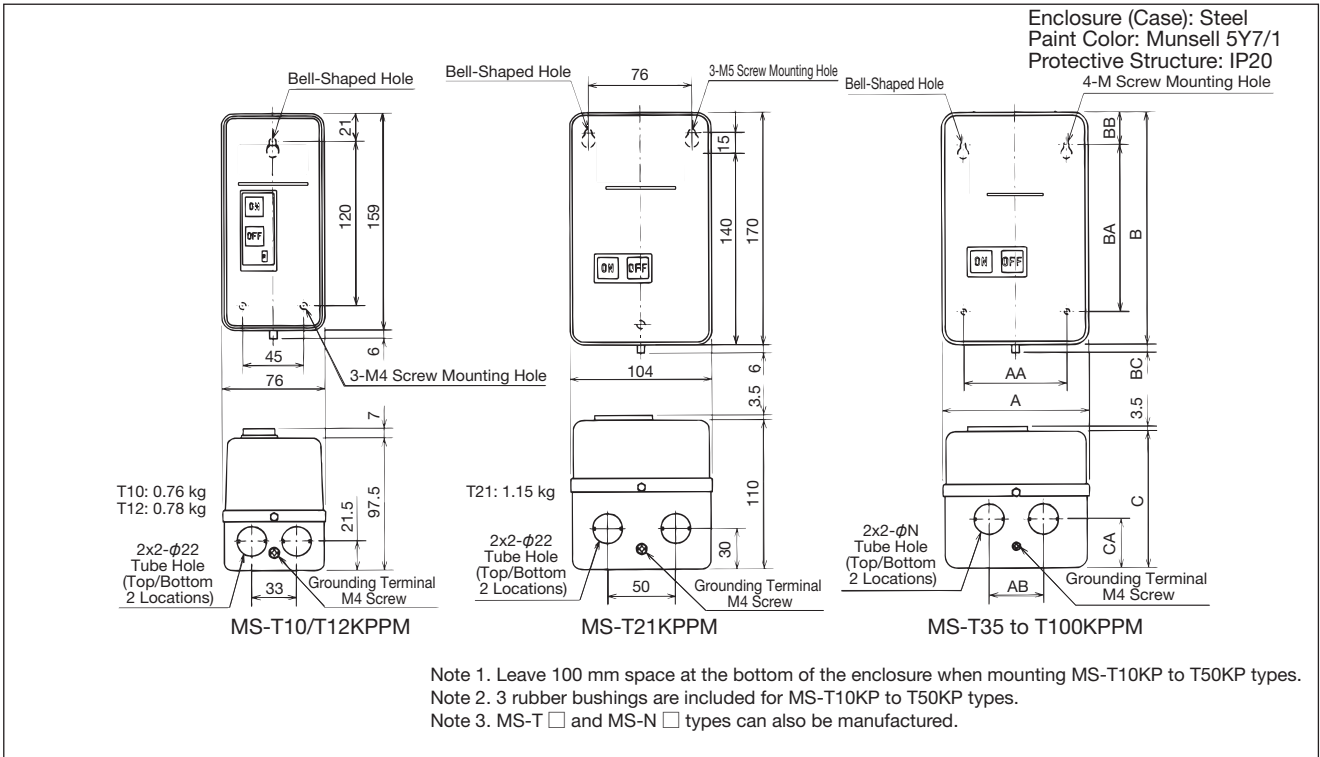
Note 7. Heater designation 67A uses a thermal overload relay dedicated for enclosed types.

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 128, 137 for information about thermal overload relays.
	· Performance	Page 44	Same As Above
	· How to Order	Page 123	—

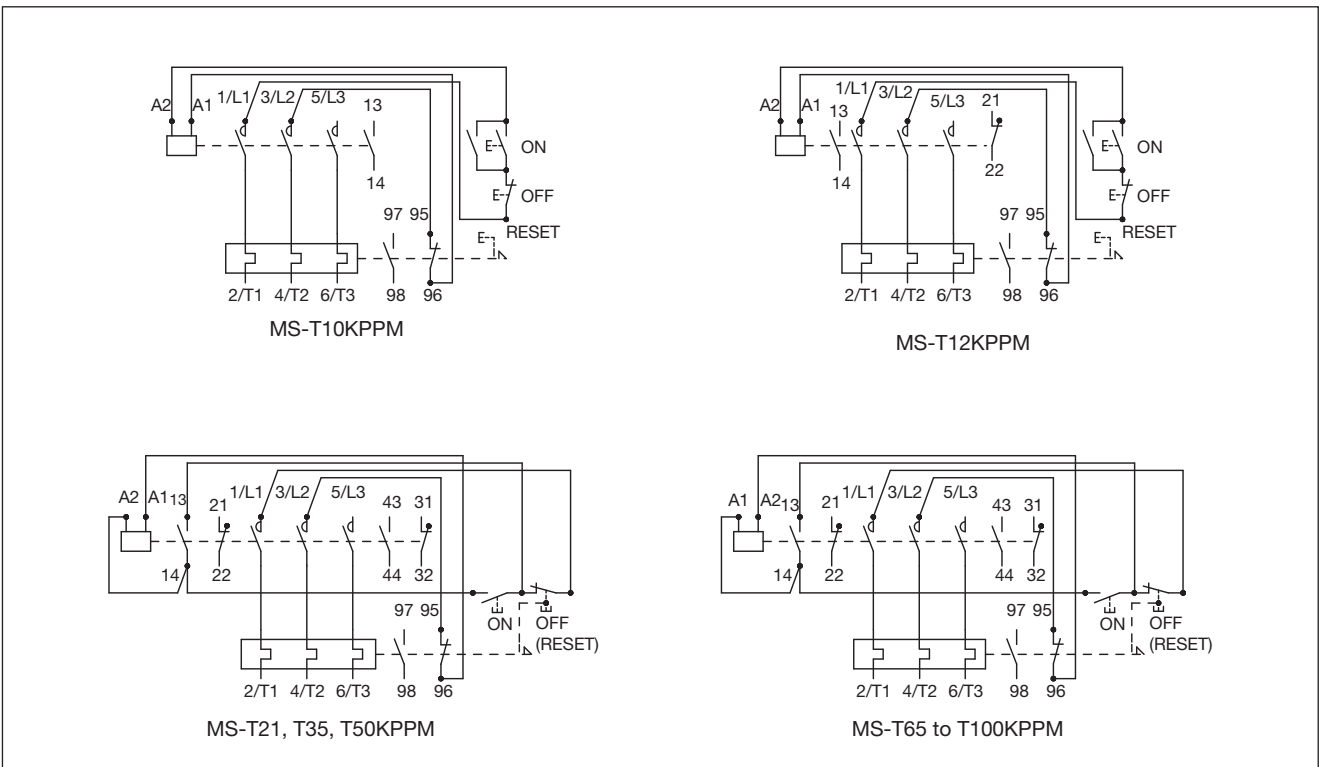
4 MS-T/N Series Magnetic Starters/Magnetic Contactors

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.

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

● 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.

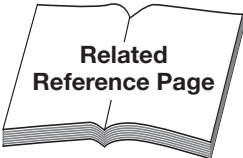
● Precautions When Using Crimp Lugs

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 128, 137 for information about thermal overload relays.
	· Performance	Page 44	Same As Above
	· Outline Drawings/Contact Arrangements	Page 75	Same as MSO/S-□ types.
	· How to Order	Page 123	—
	· Combining with Optional Units	Page 182	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)



S-T32

S-N48

● Ratings/Specifications (Standard Applicability)

Magnetic Contactors		Rated Capacity [kW]				Rated Operating Current [A]				Conventional Free Air Thermal Current I _{th} [A]	Additional Auxiliary Contact Unit Model Name x Pieces (Note 2)	Terminal Screw Size (Standard Tightening Torque N·m (Parentheses Show Standard Value))		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						
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	32	UT-AX2, 4 x 1 UT-AX11 x 2	M4 1.18 - 1.86 (1.47)	M3.5 0.94 - 1.51 (1.17)	1.25-4 to 5.5-4	1.25-3.5 to 2-3.5
S-N38(CX) S-N48(CX)	S-2 x N38(CX) S-2 x N48(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

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		500	100	
S-N38	110	13	4.3	80	120 to 145	90 to 115	10 to 20	5 to 14	500		1200 Times/Hour	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.

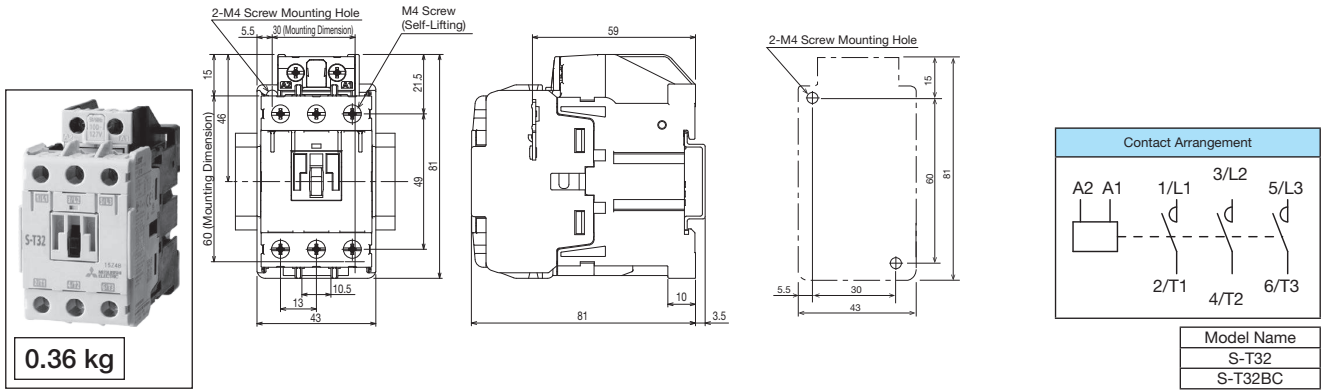
Note 6. The electrical durability at the making current capacity lasts 100,000 operations.

	Item	Reference Page	Remarks
	· Operation Coil	Page 41	—
	· How to Order	Pages 123, 125	—
	· Combining with Optional Units	Page 182	—

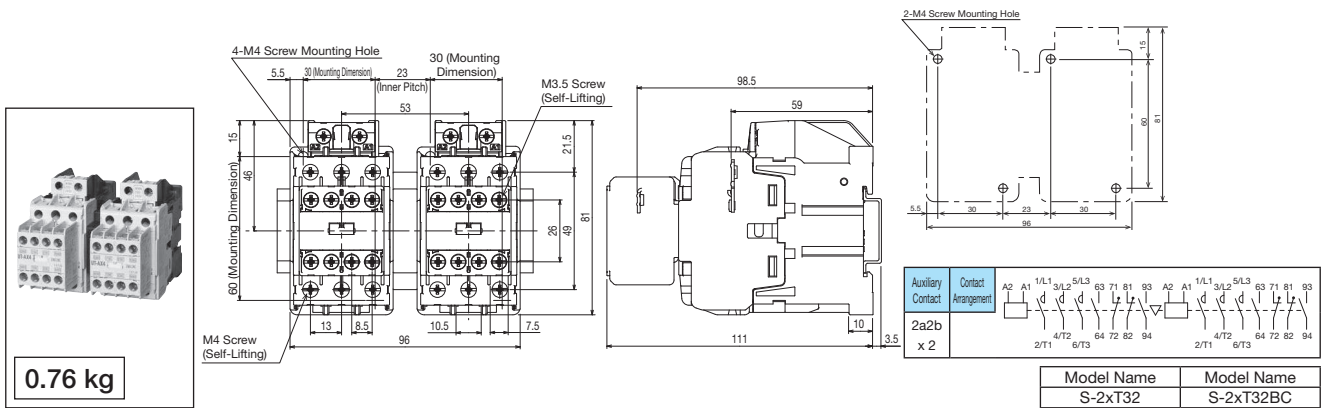
4 MS-T/N Series Magnetic Starters/Magnetic Contactors

Outline Drawings/Contact Arrangements

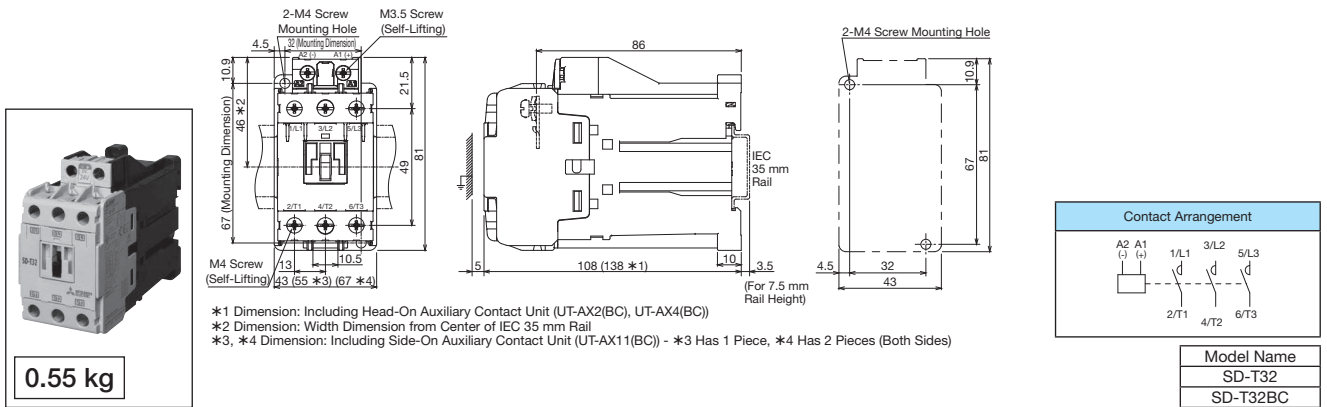
S-T32(BC)



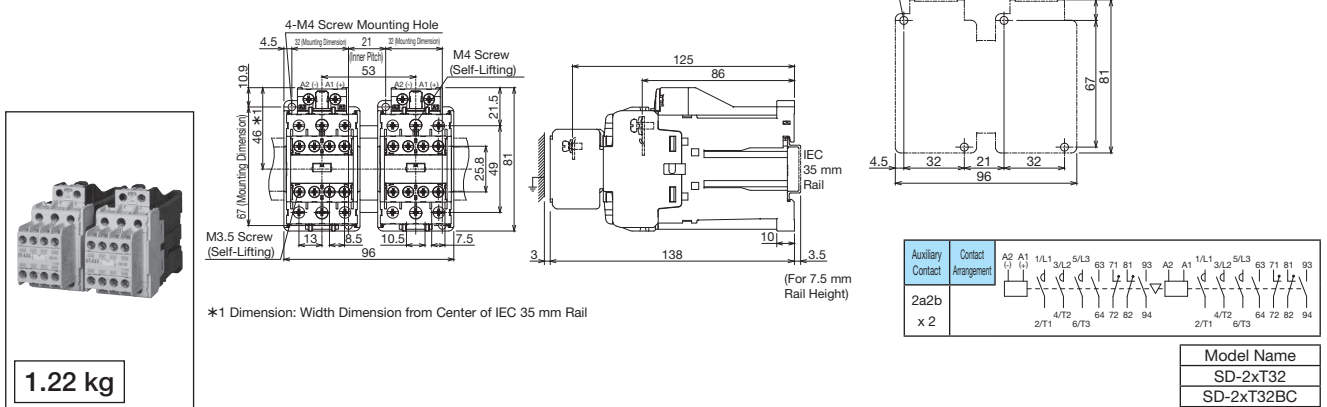
S-2 x T32(BC)



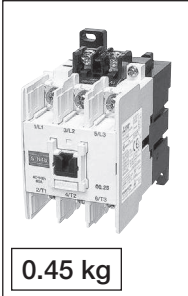
SD-T32(BC)



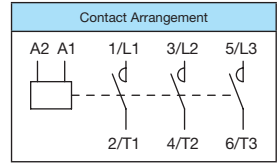
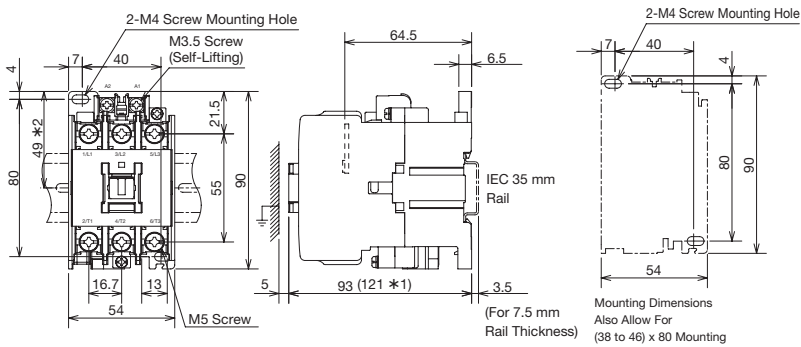
SD-2 x T32(BC)



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



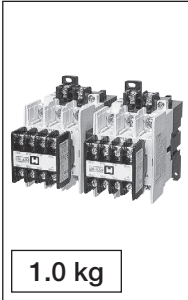
0.45 kg



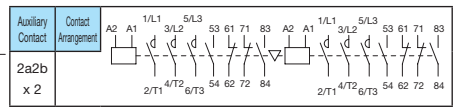
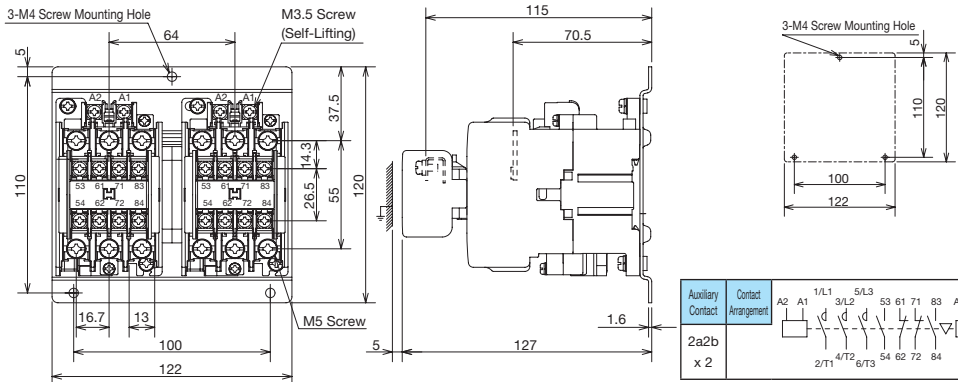
*1 Dimension: Including Head-On Auxiliary Contact Unit (UN-AX2(CX), UN-AX4(CX))
*2 Dimension: Width Dimension from Center of IEC 35 mm Rail.
Not Applicable With Side-On Auxiliary Contact Unit (UN-AX11(CX))

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

S-2 x N38(CX)
S-2 x N48(CX)



1.0 kg



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

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