Magnetic Contactors and Magnetic Starters

Exceed your expectations
Mitsubishi’s Magnetic Contactors and Magnetic Starters, continuously pushing the boundaries.

Eco Changes is the Mitsubishi Electric Group’s environmental statement, and expresses the Group’s stance on environmental management. Through a wide range of businesses, we are helping contribute to the realization of a sustainable society.

To ensure proper use of the products listed in this catalog, please be sure to read the instruction manual prior to use.

Mitsubishi Electric Corporation Nagoya Works is a factory certified for ISO14001 (standards for environmental management systems) and ISO9001 (standards for quality assurance management systems).

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www.MitsubishiElectric.com
Mitsubishi Electric began making Magnetic Contactors and Magnetic Starters in 1933 with the first EC Series products. Since then consecutive new products and series have been highly appreciated by our customers. Our commitment to our customers remains to continuously develop our products to exceed their expectations.

Mitsubishi's Magnetic Contactors and Magnetic Starters continue to push the boundaries.

MS-T Series is released.

The Motor Circuit Breaker was released.

The 80th anniversary


MS-A Series was released.

MS Series was released.

EM Series was released.

EC Series was released.

EK Series was released.

ES Series was released.

MS-K Series was released.

MS-N Series was released.

US-H Series was released.

US-N Series was released.

SD-Q Series was released.

US-K Series was released.

SD-Q Series was released.

MS-K Series

MS-N Series

The ground breaking “CAN terminal” proved to be an epoch making step in the design of Magnetic Contactors.

Lower power consumption was achieved through the use of AC operating, DC excited electromagnets.

Sales of Magnetic Starters exceeded 100 million units.

Double ratings of AC3 grade (Green) and AC4 grade (Red) were adopted allowing the unit to be downsized.

In cooperation with Westinghouse Electric Corporation, the clapper type EK Magnetic Contactor was developed.

Mitsubishi Electric introduced its own design of horizontal movement Magnetic Contactor with the EM series.

EK Series

EM Series

Meet your needs

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Application to Thermal Overload Relays

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Order Procedure

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Warranty and Safety

Information of Our FA-related Products

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Operating Characteristic Curve

Magnetic Starters

Magnetic Contactors

Thermal Overload Relays

Contactor Relays

Optional Units
Desire to down-size the switchboard

Desire to reduce the types and stock of switchboard parts

Desire to prevent accidents such as electric shock

Do these requirements sound familiar?

The new MS-T Series can help you solve these issues.
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.

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**New integrated terminal covers**

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.

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**Reduce your coil inventory by up to 50%**

The new ST series has new wide range operating coils which mean 50% fewer variations are required to span the 24-550V voltage range compared to the previous SN series. This means a smaller stock burden for those users who hold main stock or spare parts.

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**A tough product for tough environments - as standard**

Tropicalization treatment, anti-corrosion treatment and low temperature-response capabilities are now standard in the S-T type Magnetic Contactor range, so our customers do not need to worry about which version they are ordering. (Note MSO-T and TH-T Magnetic Starters and thermal overloads have anti-corrosive treatment only)

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**Low power consumption**

High efficiency electrical steel core and coil reduces power consumption by up to 69%
Safety & Quality

No touch safety
The integrated terminal covers offer various benefits not to mention added protection against electric shock through secure finger protection. This is available not only on Magnetic Contactors but also Thermal Overload Relays, Contactor Relays and Auxiliary Contact Units.

MS-T Series complies with DIN EN 50274/VDE 0660 Teil 514 for “Finger safe (prevention of finger contact)”

A light touch
The MS-T Series’ auxiliary contacts can operate with load as light as 20V 3mA making it suitable for direct control/operation from a PLC output.

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

Easy branch circuit wiring with Motor Circuit Breaker and optional connection conductor unit
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
Your confidence: Certified
Many customers are engaged in business which can mean them exporting to countries around the world and therefore having to comply with those local standards. The MS-T Series is certified to the highest international levels while work is ongoing to gain other country and shipping standards to help put your “mind at rest”.

<table>
<thead>
<tr>
<th>Standards</th>
<th>Applicable standard</th>
<th>International</th>
<th>Japan</th>
<th>European countries</th>
<th>China</th>
<th>U.S. &amp; Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEC</td>
<td>JIS</td>
<td>EN EC directive</td>
<td>Certificate authority</td>
<td>GB</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Higher SCCR value achieved by using with Motor Circuit Breaker
When the MMP-T Series and the MS-T Series are used together, the higher SCCR (UL short-circuit current rating) value, can be achieved. That will be a great support for your business in North America.

* Refer to page 28 for the SCCR values for the Magnetic Contactor and Thermal Overload Relays.
* For details on the SCCR value when used in combination with the Motor Circuit Breaker, refer to the Motor Circuit Breaker catalog.
### List of Produced Models

#### Magnetic Starters/Magnetic Contactors (Base version)

<table>
<thead>
<tr>
<th>Frame</th>
<th>Model Name</th>
<th>Speed</th>
<th>Current</th>
<th>Voltage</th>
<th>Rated capacity [kW]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MS-□</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MS-□□</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MS-□□□</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

#### Magnetic Contactors

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Speed</th>
<th>Current</th>
<th>Voltage</th>
<th>Rated capacity [kW]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MS-□</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MS-□□</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MS-□□□</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

### Magnetic Starters/Magnetic Contactors (Reversing)

<table>
<thead>
<tr>
<th>Frame</th>
<th>Model Name</th>
<th>Speed</th>
<th>Current</th>
<th>Voltage</th>
<th>Rated capacity [kW]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MS-□</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MS-□□</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MS-□□□</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

#### Magnetic Contactors

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Speed</th>
<th>Current</th>
<th>Voltage</th>
<th>Rated capacity [kW]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MS-□</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MS-□□</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MS-□□□</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

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**Note:**
- The tables provide a summary of produced models and their specifications.

**Solve Together**

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**MS-T Series Introduction**

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**Category AC-3**

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**SA type is a surge absorber-installed type. Alternate current operation coils of N50 to N800 types with surge absorber.**
### Magnetic Starters/Magnetic Contactors (Reversing)

<table>
<thead>
<tr>
<th>Frame</th>
<th>T10</th>
<th>T12</th>
<th>T20</th>
<th>T25</th>
<th>T32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model name</td>
<td>Magnetic Contactors (Without Thermal Overload Relays, Open type)</td>
<td>Magnetic Contactors (Reversing)</td>
<td>Magnetic Contactors (Non-Reversing)</td>
<td>Combined Thermal Overload Relays</td>
<td>Magnetic Contactors (Reversing)</td>
</tr>
<tr>
<td>Voltage range</td>
<td>200-240VAC</td>
<td>380-440VAC</td>
<td>500VAC</td>
<td>200-240VAC</td>
<td>380-440VAC</td>
</tr>
<tr>
<td>Overload current/power</td>
<td>Category AC-3</td>
<td>Category AC-4</td>
<td>Category AC-4</td>
<td>Category AC-4</td>
<td>Category AC-4</td>
</tr>
<tr>
<td>Current rating</td>
<td>2.2/11</td>
<td>2.7/6</td>
<td>2.2/6</td>
<td>4/5</td>
<td>5.5/9</td>
</tr>
<tr>
<td></td>
<td>6/5</td>
<td>7.5/17</td>
<td>5.5/13</td>
<td>11/17</td>
<td>7.5/17</td>
</tr>
</tbody>
</table>

### List of Produced Models

#### Thermal Overload Relays

| Heater designation | T16 | T20 | T18 | T17 | N12 | N18 | N20 | N20A | N60 | N66 | N70 | N80 | N90 | N100 | N110 | N120 | N125 | N130 | N140 | N150 | N175 | N200 | N225 | N250 | N280 | N325 | N350 | N400 | N450 | N500 | N600 |
|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| M3 rating | TH1 | TH2 | TH3 | TH4 | TH5 | TH6 | TH7 | TH8 | TH9 | TH10 | TH11 | TH12 | TH13 | TH14 | TH15 | TH16 | TH17 | TH18 | TH19 | TH20 | TH21 | TH22 | TH23 | TH24 | TH25 | TH26 | TH27 | TH28 | TH29 | TH30 |
| M2 rating | TH20 | TH25 | TH30 | TH35 | TH40 | TH45 | TH50 | TH55 | TH60 | TH65 | TH70 | TH75 | TH80 | TH85 | TH90 | TH95 | TH100 | TH105 | TH110 | TH115 | TH120 | TH125 | TH130 | TH135 | TH140 | TH145 | TH150 | TH155 | TH160 | TH165 | TH170 |
| M1 rating | TH30 | TH35 | TH40 | TH45 | TH50 | TH55 | TH60 | TH65 | TH70 | TH75 | TH80 | TH85 | TH90 | TH95 | TH100 | TH105 | TH110 | TH115 | TH120 | TH125 | TH130 | TH135 | TH140 | TH145 | TH150 | TH155 | TH160 | TH165 | TH170 | TH175 | TH180 | TH185 |

#### Contactor Relays

<table>
<thead>
<tr>
<th>Frame</th>
<th>T8</th>
<th>T10</th>
<th>T12</th>
<th>N4</th>
<th>N5T</th>
<th>N9</th>
<th>N6</th>
<th>N8</th>
<th>N1M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Models</td>
<td>S3b</td>
<td>S4b</td>
<td>S5b</td>
<td>S6b</td>
<td>S7b</td>
<td>S8b</td>
<td>S9b</td>
<td>S10b</td>
<td>S11b</td>
</tr>
<tr>
<td>Series number</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

### Magnetic Starters/Magnetic Contactors

<table>
<thead>
<tr>
<th>Frame</th>
<th>T10</th>
<th>T12</th>
<th>T20</th>
<th>T25</th>
<th>T32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model name</td>
<td>Magnetic Contactors (With/without Thermal Overload Relays, Open type)</td>
<td>Magnetic Contactors (Reversing)</td>
<td>Magnetic Contactors (Non-Reversing)</td>
<td>Combined Thermal Overload Relays</td>
<td>Magnetic Contactors (Reversing)</td>
</tr>
<tr>
<td>Voltage range</td>
<td>200-240VAC</td>
<td>380-440VAC</td>
<td>500VAC</td>
<td>200-240VAC</td>
<td>380-440VAC</td>
</tr>
<tr>
<td>Overload current/power</td>
<td>Category AC-3</td>
<td>Category AC-4</td>
<td>Category AC-4</td>
<td>Category AC-4</td>
<td>Category AC-4</td>
</tr>
<tr>
<td>Current rating</td>
<td>2.2/11</td>
<td>2.7/6</td>
<td>2.2/6</td>
<td>4/5</td>
<td>5.5/9</td>
</tr>
<tr>
<td></td>
<td>6/5</td>
<td>7.5/17</td>
<td>5.5/13</td>
<td>11/17</td>
<td>7.5/17</td>
</tr>
</tbody>
</table>

Note 1: The content within ( ) of rated capacity and rated operational current is applied to the Magnetic Starter.

Note 2: The content within [ ] of Conventional free air thermal current Ith [A] is applied to the Magnetic Starter.

Note 3: +2b of T10 and T12 auxiliary contact arrangements in Reversing type represents b contact built in the UT-ML11 interlock unit.

Note 4: For auxiliary contact arrangement, please refer to the Electrical durability curve on Page 13.

Note 5: For auxiliary contact arrangement, please refer to the Electrical durability curve on Page 13.

Note 6: Operational coil input and coil consumption are average values in cases of applying 220V60Hz to AC200V coil.
### Magnetic Starters/Magnetic Contactors

**Specification List Table**

<table>
<thead>
<tr>
<th>Magnetic Contactors</th>
<th>T10</th>
<th>T12</th>
<th>T20</th>
<th>T21</th>
<th>T25</th>
<th>T32</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Magnetic Contactors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>50-240V</td>
<td>50-240V</td>
<td>50-240V</td>
<td>50-240V</td>
<td>50-240V</td>
<td>50-240V</td>
</tr>
<tr>
<td><strong>Frame</strong></td>
<td>T10</td>
<td>T12</td>
<td>T20</td>
<td>T21</td>
<td>T25</td>
<td>T32</td>
</tr>
<tr>
<td></td>
<td>50-240V</td>
<td>50-240V</td>
<td>50-240V</td>
<td>50-240V</td>
<td>50-240V</td>
<td>50-240V</td>
</tr>
</tbody>
</table>

#### Making and Breaking capacities

**Making capacity**
- 220 to 240VAC
- 380 to 440VAC

**Breaking capacity**
- 220 to 240VAC
- 380 to 440VAC

#### Coordination with short-circuit protective devices

**Type 1**
- Short-circuit protective device rating: 5A
- Main circuit: 40A
- Auxiliary circuit: 10A

#### Electrical Durability Curve

**Main circuit voltage** 220 to 240VAC

**Main circuit voltage** 380 to 440VAC

#### Coil Ratings

**Coil types and ratings**

<table>
<thead>
<tr>
<th>Coils</th>
<th>Rated voltage (V)</th>
<th>Making on the equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC24V</td>
<td>24</td>
<td>48-50</td>
</tr>
<tr>
<td>AC48V</td>
<td>50-100</td>
<td>200-240</td>
</tr>
<tr>
<td>AC100V</td>
<td>260-300</td>
<td>380-440</td>
</tr>
<tr>
<td>AC480V</td>
<td>400-550</td>
<td></td>
</tr>
</tbody>
</table>

**Rated voltage and frequency**

**For S-T10 to T32 types**

<table>
<thead>
<tr>
<th>Coils</th>
<th>Rated voltage (V)</th>
<th>Making on the equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC24V</td>
<td>24</td>
<td>48-50</td>
</tr>
<tr>
<td>AC48V</td>
<td>50-100</td>
<td>200-240</td>
</tr>
<tr>
<td>AC100V</td>
<td>260-300</td>
<td>380-440</td>
</tr>
<tr>
<td>AC450V</td>
<td>400-550</td>
<td></td>
</tr>
</tbody>
</table>

**For S-T10SA to T32SA types**

<table>
<thead>
<tr>
<th>Coils</th>
<th>Rated voltage (V)</th>
<th>Making on the equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC24V</td>
<td>24</td>
<td>48-50</td>
</tr>
<tr>
<td>AC48V</td>
<td>50-100</td>
<td>200-240</td>
</tr>
<tr>
<td>AC100V</td>
<td>260-300</td>
<td>380-440</td>
</tr>
<tr>
<td>AC450V</td>
<td>400-550</td>
<td></td>
</tr>
</tbody>
</table>
Selection and Application

Application to Thermal Overload Relays

This reliability is applied when the product is in use under a clean atmosphere in the standard specification environment (Refer to page 44).

Note 1: The contact reliability indicates the failure rate $E_{60}$ (the number of failures/the number of opening and closing operations, per contact) at $60\%$ reliability standard.

Note 2: The ambient temperature compensator is mounted on all types.

Contact reliability is applied when the product is in use under a clean atmosphere in the standard specification environment (Refer to page 44).

Note 1: The contact reliability indicates the failure rate $E_{60}$ (the number of failures/the number of opening and closing operations, per contact) at $60\%$ reliability standard.

The minimum working voltage and current of the main and auxiliary contacts of the S-T type Magnetic Contactors and the contact voltage of main and auxiliary contacts vary depending on the allowable failure rate. Apply the following diagrams.

For SD-T12 to T32 types Contactor Relays vary depending on the allowable failure rate. Apply the following diagrams.

For SD-T12 to T32SA types

Note: $E_{60}$ is the number of failures during $10^6$ operations. The failure rate is calculated taking into account the failure rate $E_{60}$.

Note 2: The ambient temperature compensator is mounted on all types.

| Model list |

<table>
<thead>
<tr>
<th>Frame</th>
<th>T18</th>
<th>T25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model name</td>
<td>With 2-elements Magnetic Contactors</td>
<td>TH-T18</td>
</tr>
<tr>
<td>with 3-elements Magnetic Contactors</td>
<td>TH-T180P</td>
<td>TH-T250P</td>
</tr>
<tr>
<td>Isolated dimensions (mm)</td>
<td>45×55×76.5</td>
<td>63×51×79</td>
</tr>
<tr>
<td>Product weight</td>
<td>For Magnetic Contactors</td>
<td>0.11</td>
</tr>
<tr>
<td>For Independent mounting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applicable standard</td>
<td>IEC60947-4-1,EN60947-4-1, JIS C8201-4-1,GB14048.4</td>
<td></td>
</tr>
</tbody>
</table>

Use condition

- Ambient temperature: $-10\text{ to }+40\%$ (Standard: $27\%$; maximum temperature on the board: $50\%$)
- Rated insulation voltage: $500V$
- Rated working voltage: $500V$
- Pollution degree: Y
- Heater designation (adjustable range of stabilized current) [A]
  - (Rated operational voltage: $550V$ maximum)
  - $0.12 (0.1\text{ to }0.16) - 2.1 (1.7\text{ to }2.5) - 0.24 (0.2\text{ to }0.33) - 2.5 (2\text{ to }3) - 0.35 (0.28\text{ to }0.4) - 3 (2.7\text{ to }4.4) - 0.5 (0.4\text{ to }0.6) - 4 (3.5\text{ to }4.5) - 0.7 (0.55\text{ to }0.85) - 6 (5.2\text{ to }6.5) - 0.9 (0.7\text{ to }1.1) - 7 (6.2\text{ to }7.6) - 1.3 (1\text{ to }1.6) - 9 (7.6\text{ to }8.5) - 1.7 (1.4\text{ to }2) - 12 (10.2\text{ to }11) - 22 (18\text{ to }22) |

Power consumption (Operated at minimum maximum stabilization [W])

- $0.70 - 1.18 - 1.5 - 3.0 |

Terminal screw size

- M3.5 |

Compatible with terminal... Electric wire size [mm²]

- 1.6 - 0.75 to 2.5 - 6.6 (5.2 to 8) - 5 (4 to 6) - 3.6 (2.8 to 4.4) - 2.5 (2 to 3) - 1.7 (1.4 to 2) - 1.25 - 1.6 to 2.6, 1.25 to 6 |

Contact arrangement

- $1a1b - 2 - 3 - 4 |

Conventional trip at thermal overload circuit [A]

- Category A
  - 24VDC | 225 (120) | 220 (120) |
  - 240VDC | 195 (105) | 195 (105) |
  - 500VDC | 390 (207) | 390 (207) |
  - 110VDC | 0.39 (0.2) | 0.39 (0.2) |
  - 220VDC | 0.15 (0.1) | 0.15 (0.1) |

Minimum applicable load level

- $40V$ | $200V$ |

Terminals size

- M3.5 |

Compatible with terminal... Electric wire size [mm²]

- 1.6 - 0.75 to 2.5 - 6.6 (5.2 to 8) - 5 (4 to 6) - 3.6 (2.8 to 4.4) - 2.5 (2 to 3) - 1.7 (1.4 to 2) - 1.25 - 1.6 to 2.6, 1.25 to 6 |

Operating characteristic curve description page

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Operating characteristic curve description page

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Vibration resistance (vibration resistance malfunction performance)

- 10 to 55 Hz, 19.6 m/s²

Read method

- Manual/Automatic switchable

Operation indication (lever indication)

- Manual/Automatic switchable

Manual trip check

- Manual/Automatic switchable
Application to Thermal Overload Relays

The Thermal Overload Relays are adjusted at the time of assembly. Do not disassemble it.

Precautions for Use

Disassembly
The Thermal Overload Relays are adjusted at the time of assembly. Do not disassemble it.

Ambient temperature compensation

The TH-T type Thermal Overload Relays are adjusted with the Magnetic Starters in the standard box (the MS type) relative to the ambient temperature of 20°C (the temperature on the control board of the MS type Magnetic Starters is 35°C). The ambient temperature compensator is mounted on the TH-T type Thermal Overload Relays. Therefore, the ambient temperature less effects the operational characteristic change. The minimum operating current change according to the ambient temperature change relative to the ambient temperature of 20°C (the temperature on the control board of 35°C) generally depends on the characteristics in the diagrams 1 and 2. The Thermal Overload Relay’s compensation factor is the ratio of the current of the minimum operating current when the ambient temperature decreases for the same ambient temperature increase. This means that after the installation site is significantly different from 20°C, the ambient temperature compensated current of the Thermal Overload Relay needs to be corrected as shown in diagrams 1 and 2. In addition, note that the compensation factor has characteristic to be the minimum scale of the compensation factor to the ambient temperature.

Connecting electric wire size and operating current

The TH-T type adjusts the minimum operating current with the standard electric wire size shown in the following table. If the electric wire is thicker or thinner than this standard electric wire size, the operating current becomes high or low, respectively. Therefore, correct the stabilized current (divide it by the change rate of the minimum operating current) to use a size different from the standard connecting electric wire size.

<table>
<thead>
<tr>
<th>Model name</th>
<th>Wire diameter [mm²]</th>
<th>Standard electric wire size [mm²]</th>
<th>Connecting electric wire size [%]</th>
<th>Change rate of minimum operating current [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>TH-T18KP</td>
<td>0.12 to 51</td>
<td>2</td>
<td>1.25</td>
<td>98</td>
</tr>
<tr>
<td>TH-T25KP</td>
<td>0.24 to 11</td>
<td>3.5</td>
<td>2.5</td>
<td>103</td>
</tr>
<tr>
<td>TH-T25FKP</td>
<td>10.22</td>
<td></td>
<td>0</td>
<td>104</td>
</tr>
</tbody>
</table>

Note 1: The ambient temperature applied to the MS type indicates the outside temperature of the box.

Connecting electric wire size [mm²] and maximum operating current [A]

<table>
<thead>
<tr>
<th>Model name</th>
<th>Wire diameter [mm²]</th>
<th>Standard electric wire size [mm²]</th>
<th>Maximum operating current [A]</th>
</tr>
</thead>
<tbody>
<tr>
<td>TH-T18KP</td>
<td>0.12 to 51</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td>TH-T25KP</td>
<td>0.24 to 11</td>
<td>3.5</td>
<td>22</td>
</tr>
<tr>
<td>TH-T25FKP</td>
<td>10.22</td>
<td></td>
<td>22</td>
</tr>
</tbody>
</table>

Compensation factor: Percentage of the minimum operating current at 20°C (the temperature on the control board of 35°C) generally depends on the characteristics in the diagrams 1 and 2 and the value of the load current of the motor divided by the rated current of the motor. The TH-T type Thermal Overload Relay, TH-T25 at the ambient temperature of 20°C (the temperature on the control board of 35°C) is 8% at the maximum scale according to diagram 2. If the motor rated current is 15A, the compensation 15.0A x 1.08 = 16.2A.

Note 1: The ambient temperature applied to the MS type indicates the outside temperature of the box.

Connecting electric wire size [mm²] and maximum operating current [A]

<table>
<thead>
<tr>
<th>Model name</th>
<th>Wire diameter [mm²]</th>
<th>Standard electric wire size [mm²]</th>
<th>Maximum operating current [A]</th>
</tr>
</thead>
<tbody>
<tr>
<td>TH-T18KP</td>
<td>0.12 to 51</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td>TH-T25KP</td>
<td>0.24 to 11</td>
<td>3.5</td>
<td>22</td>
</tr>
<tr>
<td>TH-T25FKP</td>
<td>10.22</td>
<td></td>
<td>22</td>
</tr>
</tbody>
</table>

Compensation factor: Percentage of the minimum operating current at 20°C (the temperature on the control board of 35°C) generally depends on the characteristics in the diagrams 1 and 2 and the value of the load current of the motor divided by the rated current of the motor. The TH-T type Thermal Overload Relay, TH-T25 at the ambient temperature of 20°C (the temperature on the control board of 35°C) is 8% at the maximum scale according to diagram 2. If the motor rated current is 15A, the compensation 15.0A x 1.08 = 16.2A.

Note 1: The ambient temperature applied to the MS type indicates the outside temperature of the box.

Connecting electric wire size [mm²] and maximum operating current [A]

<table>
<thead>
<tr>
<th>Model name</th>
<th>Wire diameter [mm²]</th>
<th>Standard electric wire size [mm²]</th>
<th>Maximum operating current [A]</th>
</tr>
</thead>
<tbody>
<tr>
<td>TH-T18KP</td>
<td>0.12 to 51</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td>TH-T25KP</td>
<td>0.24 to 11</td>
<td>3.5</td>
<td>22</td>
</tr>
<tr>
<td>TH-T25FKP</td>
<td>10.22</td>
<td></td>
<td>22</td>
</tr>
</tbody>
</table>
### Magnetic Starters

#### MS-T series (non-Reversing) : Enclosed

<table>
<thead>
<tr>
<th>Model name</th>
<th>Non-Reversing</th>
<th>Reversing</th>
<th>Non-Reversing</th>
<th>Reversing</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS-T10</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>MS-T12</td>
<td>2.5</td>
<td>3.5</td>
<td>4.5</td>
<td>5.5</td>
</tr>
<tr>
<td>MS-T21</td>
<td>4</td>
<td>5.5</td>
<td>7.5</td>
<td>9.5</td>
</tr>
</tbody>
</table>

#### MS-2xT series (Reversing) : Enclosed

<table>
<thead>
<tr>
<th>Model name</th>
<th>Non-Reversing</th>
<th>Reversing</th>
<th>Non-Reversing</th>
<th>Reversing</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSO-2xT10</td>
<td>1.7</td>
<td>2.1</td>
<td>2.6</td>
<td>3.6</td>
</tr>
<tr>
<td>MSO-T10</td>
<td>1.7</td>
<td>2.1</td>
<td>2.6</td>
<td>3.6</td>
</tr>
<tr>
<td>MSO-T12</td>
<td>1.7</td>
<td>2.1</td>
<td>2.6</td>
<td>3.6</td>
</tr>
</tbody>
</table>

#### MSO-T series (non-Reversing) : Open type

<table>
<thead>
<tr>
<th>Model name</th>
<th>Non-Reversing</th>
<th>Reversing</th>
<th>Non-Reversing</th>
<th>Reversing</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSO-T10</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>MSO-T12</td>
<td>2.5</td>
<td>3.5</td>
<td>4.5</td>
<td>5.5</td>
</tr>
<tr>
<td>MSO-T21</td>
<td>4</td>
<td>5.5</td>
<td>7.5</td>
<td>9.5</td>
</tr>
</tbody>
</table>

#### MSO-2xT series (Reversing) : Open type

<table>
<thead>
<tr>
<th>Model name</th>
<th>Non-Reversing</th>
<th>Reversing</th>
<th>Non-Reversing</th>
<th>Reversing</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSO-2xT10</td>
<td>1.7</td>
<td>2.1</td>
<td>2.6</td>
<td>3.6</td>
</tr>
<tr>
<td>MSO-T10</td>
<td>1.7</td>
<td>2.1</td>
<td>2.6</td>
<td>3.6</td>
</tr>
<tr>
<td>MSO-T12</td>
<td>1.7</td>
<td>2.1</td>
<td>2.6</td>
<td>3.6</td>
</tr>
</tbody>
</table>

### Magnetic Contactors

#### S-series (non-Reversing)

<table>
<thead>
<tr>
<th>Model name</th>
<th>Non-Reversing</th>
<th>Reversing</th>
<th>Non-Reversing</th>
<th>Reversing</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-T10</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>S-Gh-T12</td>
<td>2.5</td>
<td>3.5</td>
<td>4.5</td>
<td>5.5</td>
</tr>
<tr>
<td>S-Gh-T20</td>
<td>4</td>
<td>5.5</td>
<td>7.5</td>
<td>9.5</td>
</tr>
</tbody>
</table>

#### S-2xT series (Reversing)

<table>
<thead>
<tr>
<th>Model name</th>
<th>Non-Reversing</th>
<th>Reversing</th>
<th>Non-Reversing</th>
<th>Reversing</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-2xT10</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>S-Gh-T12</td>
<td>2.5</td>
<td>3.5</td>
<td>4.5</td>
<td>5.5</td>
</tr>
<tr>
<td>S-Gh-T20</td>
<td>4</td>
<td>5.5</td>
<td>7.5</td>
<td>9.5</td>
</tr>
</tbody>
</table>

### Thermal Overload Relays configuring the Magnetic Starters

| Thermal Overload Relays models and heater types that configure Magnetic Starters
<table>
<thead>
<tr>
<th>Model name</th>
<th>Non-Reversing</th>
<th>Reversing</th>
<th>Non-Reversing</th>
<th>Reversing</th>
</tr>
</thead>
<tbody>
<tr>
<td>T10, T12</td>
<td>380 to 440VAC</td>
<td>220 to 240VAC</td>
<td>380 to 440VAC</td>
<td>220 to 240VAC</td>
</tr>
</tbody>
</table>

#### Auxiliary contact

- Non-Reversing: 1a, 1a1b × 2 + 2b, 2a1b × 2 + 2b
- Reversing: 1a1b, 1a1b × 2 + 2b, 2a1b × 2 + 2b

#### Auxiliary contact arrangement

- Non-Reversing: Standard, Special
- Reversing: Standard, Special

#### Operation coil rating

- Non-Reversing: 1a, 1a1b × 2 + 2b, 2a1b × 2 + 2b
- Reversing: 1a1b, 1a1b × 2 + 2b, 2a1b × 2 + 2b

#### Auxiliary contact mounting type

- Non-Reversing: Front clip-on auxiliary contact block mounting type, Side clip-on auxiliary contact block mounting type
- Reversing: Front clip-on auxiliary contact block mounting type, Side clip-on auxiliary contact block mounting type

#### Surge absorber mounting type

- Non-Reversing: Surge absorber mounting type
- Reversing: Surge absorber mounting type
Thermal Overload Relays

Heater types of TH type Thermal Overload Relays

<table>
<thead>
<tr>
<th>Model name</th>
<th>TH-T18</th>
<th>TH-T25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>M50D-T10 -T20</td>
<td>M50D-T21 -T25</td>
</tr>
<tr>
<td>Standard heater rating (designation) (A)</td>
<td>0.12, 0.17, 0.24, 0.35, 0.5, 0.7, 0.8, 1.3, 1.7, 2.1, 2.5, 3.6, 5, 6, 9, 11, 15</td>
<td>0.24, 0.35, 0.5, 0.7, 0.8, 1.3, 1.7, 2.1, 2.5, 3.6, 5, 6, 9, 11, 15, 22</td>
</tr>
<tr>
<td>Contact arrangement</td>
<td>1a1b, 1a1b</td>
<td>1a1b</td>
</tr>
<tr>
<td>A</td>
<td>55</td>
<td>51</td>
</tr>
<tr>
<td>B</td>
<td>45</td>
<td>63</td>
</tr>
<tr>
<td>C</td>
<td>76.5</td>
<td>79</td>
</tr>
</tbody>
</table>

Contactor Relays

Specification List

<table>
<thead>
<tr>
<th>Model name</th>
<th>SR-T5</th>
<th>SRD-T5</th>
<th>SR-T9</th>
<th>SRD-T9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of poles</td>
<td>5</td>
<td>9</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Contact arrangement</td>
<td>5x5</td>
<td>7x7</td>
<td>5x5</td>
<td>7x7</td>
</tr>
<tr>
<td>Rated insulation voltage (V)</td>
<td>690</td>
<td>690</td>
<td>690</td>
<td>690</td>
</tr>
<tr>
<td>Applicable standard</td>
<td>IEC60947-5-1, EN60947-5-1, JIS C8201-5-1, GBR14046.5</td>
<td>IEC60947-5-1, EN60947-5-1, JIS C8201-5-1, GBR14046.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated impulse withstand voltage (kV)</td>
<td>7</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated frequency (Hz)</td>
<td>50/60</td>
<td>50/60</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Performance Characteristic

- AC rated operational current (A)
- DC rated operational current (A)
- Contact rating (Note 1) Optional unit (Note 2)

<table>
<thead>
<tr>
<th>Category</th>
<th>AC-15 (Coil load)</th>
<th>DC-12 (Large circuit load)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC rated operational current (A)</td>
<td>120VAC</td>
<td>240VDC</td>
</tr>
<tr>
<td>DC rated operational current (A)</td>
<td>440VAC</td>
<td>110VDC</td>
</tr>
<tr>
<td>Contact rating (Note 1) Optional unit (Note 2)</td>
<td>0.6(2)</td>
<td>0.3(0.8)</td>
</tr>
<tr>
<td>Surge absorber unit</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Additional auxiliary contact block</td>
<td>○</td>
<td>x</td>
</tr>
<tr>
<td>Category AC-12 (Resistive load)</td>
<td>240VDC</td>
<td>110VDC</td>
</tr>
<tr>
<td>Category DC-12 (Resistive load)</td>
<td>240VDC</td>
<td>110VDC</td>
</tr>
<tr>
<td>Minimum applicable load level (VA)</td>
<td>20V 3mA</td>
<td>1,000</td>
</tr>
<tr>
<td>Mechanical durability [ten thousand times]</td>
<td>1,000</td>
<td>50</td>
</tr>
<tr>
<td>Electrical durability [ten thousand times]</td>
<td>1,000</td>
<td>50</td>
</tr>
<tr>
<td>Switching frequency [time/hour]</td>
<td>500</td>
<td>50</td>
</tr>
<tr>
<td>Coil consumption (Note 3) [VA]</td>
<td>0.45</td>
<td>0.45</td>
</tr>
<tr>
<td>Sealed [VA]</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Power consumption (Note 3) [VA]</td>
<td>2.2</td>
<td>2.2</td>
</tr>
</tbody>
</table>

Note 1: The value in brackets indicates the current when switching the load with two poles installed in series.
Note 2: In the optional unit field, ○ and X indicate mountable and non-mountable, respectively.
Note 3: Coil consumption are average values in case of applying 220V60Hz to AC200V coil.
## Contactor Relays

### Contact arrangement/Contact placement

<table>
<thead>
<tr>
<th>Model name</th>
<th>SR-T5</th>
<th>SR-D T5</th>
<th>SR-T9</th>
<th>SR-D T9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact arrangement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5a</td>
<td>4a1b</td>
<td>7a2b</td>
<td>5a4b</td>
<td></td>
</tr>
<tr>
<td>3a2b</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact placement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5a</td>
<td>4a1b</td>
<td>7a2b</td>
<td>5a4b</td>
<td></td>
</tr>
<tr>
<td>3a2b</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Combination with additional auxiliary contact block**

The SR-T series contactor type Contactor Relay is usable in combination with the following additional auxiliary contact blocks.

<table>
<thead>
<tr>
<th>Contactor Relay</th>
<th>Auxiliary contact block</th>
<th>Front clip-on</th>
<th>Side clip-on</th>
</tr>
</thead>
<tbody>
<tr>
<td>UT-AX4</td>
<td>4a1b</td>
<td>9a</td>
<td>8a1b</td>
</tr>
<tr>
<td>UT-AX2</td>
<td>7a2b</td>
<td>6a1b</td>
<td>5a2b</td>
</tr>
<tr>
<td>UT-AX11</td>
<td>4a1b</td>
<td>5a4b</td>
<td>3a2b</td>
</tr>
</tbody>
</table>

### Notes

1. The auxiliary contact blocks cannot be mounted on SR(D)-T9.
2. The Contactor Relay is not usable with front clip-on and side clip-on blocks mounted at the same time.
3. The contact arrangements in are standard combinations.

---

## Optional Units

### Model list (for MS-T series)

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Optional Units</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contactor Relay</td>
<td>UT-AX4</td>
<td>UT-AX2</td>
</tr>
<tr>
<td>SR-D T5</td>
<td>UT-AX11</td>
<td>UT-AX1</td>
</tr>
<tr>
<td>SR-T9</td>
<td>UT-SA21</td>
<td>UT-SA22</td>
</tr>
<tr>
<td>SR-D T9</td>
<td>UT-SA23</td>
<td>UT-SA25</td>
</tr>
</tbody>
</table>

### Notes

- Combination with additional auxiliary contact block.
- The Contactor Relay is usable in combination with the following additional auxiliary contact blocks.
- The auxiliary contact blocks cannot be mounted on SR(D)-T9.
- The Contactor Relay is not usable with front clip-on and side clip-on blocks mounted at the same time.
- The contact arrangements in are standard combinations.
**Optional Units**

**UT-AX** auxiliary contact block

<table>
<thead>
<tr>
<th>Model name</th>
<th>UT-AX4</th>
<th>UT-AX2</th>
<th>UT-AX11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting method</td>
<td>Front clip-on</td>
<td>Front clip-on</td>
<td>2</td>
</tr>
<tr>
<td>Number of poles</td>
<td>4a</td>
<td>2a</td>
<td>2</td>
</tr>
<tr>
<td>Contact arrangement</td>
<td>3/4b</td>
<td>1/4b</td>
<td>1/4b</td>
</tr>
<tr>
<td>Applicable model</td>
<td>Magnetic Contact</td>
<td>AC special type</td>
<td>S-T10, T12, T20, T21, T26, T32</td>
</tr>
<tr>
<td></td>
<td>Contact Relay</td>
<td>AC special type</td>
<td>S-DT10, T20, T21, T32</td>
</tr>
<tr>
<td>Rated insulation voltage [V]</td>
<td>690</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated impulse withstand voltage [kV]</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated frequency [Hz]</td>
<td>50/60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pollution degree</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**UT-SA** Operation Coil Surge Absorber Unit

### Types and application

<table>
<thead>
<tr>
<th>Surge absorber element</th>
<th>Model</th>
<th>Internal element specifications</th>
<th>Applicable voltage range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varistor</td>
<td>UT-SA1</td>
<td>AC24V Varistor voltage120V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>UT-SA2</td>
<td>AC48V Varistor voltage240V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>UT-SA3</td>
<td>AC200V Varistor voltage480V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>UT-SA4</td>
<td>AC400V Varistor voltage960V</td>
<td></td>
</tr>
<tr>
<td>Varistor + OR</td>
<td>UT-SA5</td>
<td>AC48V Varistor voltage120V 0.1μF,470V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>UT-SA6</td>
<td>AC200V Varistor voltage120V 0.1μF,470V</td>
<td></td>
</tr>
</tbody>
</table>

#### Application and selection

<table>
<thead>
<tr>
<th>Model</th>
<th>Magnetic Contact</th>
<th>Applicable model</th>
<th>Contactor Relay</th>
</tr>
</thead>
<tbody>
<tr>
<td>UT-SA2</td>
<td>S-T10, T12, T20, T21, T26, T32</td>
<td>SA-T5,T9</td>
<td></td>
</tr>
<tr>
<td>UT-SA3</td>
<td>S-DT10, T20, T21, T32</td>
<td>SR(S)-T5,T9</td>
<td></td>
</tr>
</tbody>
</table>

#### Precautions for application

1. Connect the terminals of surge absorber unit in parallel with the operation coil of the Magnetic Contactor or Contactor Relay.
2. When used in combination with the surge absorber, the open time of the Magnetic Contactor or Contactor Relay may be 1.5 to 3 times longer.
3. The surge absorber is designed to suppress the surge from the Magnetic Contactor. The warranty does not cover external surges. Extreme external surges may damage the product.
● UT-ML □ Mechanical Interlock Unit

Application

<table>
<thead>
<tr>
<th>Model</th>
<th>Applicable Magnetic Contactor model</th>
</tr>
</thead>
<tbody>
<tr>
<td>UT-ML11</td>
<td>S-T10, T12, T20</td>
</tr>
<tr>
<td>UT-ML20</td>
<td>S-T12, T20</td>
</tr>
<tr>
<td>UN-ML21</td>
<td>S-T21, T25, T32, SD-T21, T32</td>
</tr>
</tbody>
</table>

Note: Use UN-ML21 of the M5-8 Series as the mechanical interlock unit for S-T31 to T32.

Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>UT-ML11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated insulation voltage</td>
<td>600V</td>
</tr>
<tr>
<td>Rated impulse withstand voltage</td>
<td>6kV</td>
</tr>
<tr>
<td>Rated frequency</td>
<td>50-60Hz</td>
</tr>
<tr>
<td>Pollution degree</td>
<td>3</td>
</tr>
<tr>
<td>Terminal screw size/type</td>
<td>M3.5 cross slot screw with pressure plate</td>
</tr>
<tr>
<td>Applicable electric wire (mm²)</td>
<td>φ1.6 - 0.75 to 2.5</td>
</tr>
<tr>
<td>Applicable crimp lug size</td>
<td>1.25-3.5 to 2-3.5</td>
</tr>
<tr>
<td>Terminal screw tightening torque (Nm)</td>
<td>0.9 to 1.6</td>
</tr>
</tbody>
</table>

Mounting

Hole drilling dimension

(Drilling of holes is not required when mounting the IEC 35mm rail mountable model is mounted to the IEC 35mm rail for reversing.)

MEMO
**UT-SDⅢ主回路接続キット**

<table>
<thead>
<tr>
<th>種類</th>
<th>適用する 負荷特性 のフレーム</th>
<th>可用形</th>
<th>適用形</th>
</tr>
</thead>
<tbody>
<tr>
<td>T10</td>
<td>UT-SD10, UT-SG10</td>
<td>d</td>
<td>d</td>
</tr>
<tr>
<td>T12, T20</td>
<td>UT-SD20, UT-SG20</td>
<td>d</td>
<td>d</td>
</tr>
<tr>
<td>T21, T25</td>
<td>UT-SD25, UT-SG25</td>
<td>d</td>
<td>d</td>
</tr>
</tbody>
</table>

備考

- 6本/セットになっています。
- 使用時には、電源側、負荷側両方用のものを取り付けてください。
- 3本/セットになっています。
- 電源側端子にも取付けることができます。

**UT-SA33Ⅲ主回路セーラー受器ユニット**

<table>
<thead>
<tr>
<th>種類</th>
<th>形名</th>
<th>取付方法</th>
<th>内部接続</th>
<th>定格電圧・周波数</th>
<th>適用機種</th>
</tr>
</thead>
<tbody>
<tr>
<td>UT-SA3320</td>
<td>ヘッダーON</td>
<td>(3.3μF+600μF)×3</td>
<td>AC24V 50/60Hz</td>
<td>S-T10, T12, T20 (BC)</td>
<td></td>
</tr>
<tr>
<td>UT-SA3332</td>
<td></td>
<td></td>
<td></td>
<td>S-T12, T21, T32 (BC)</td>
<td></td>
</tr>
</tbody>
</table>

**仕様**

- 電子用電圧: 240V
- 電子用周波数: 50/60Hz
- 安全デバイス角度(ヘッダー) | 800V | 1000万円

使用上の注意

1. インバータ回路使用時は、4.1に従って接続してください。
2. 3以上の接続部品の少ない接続には使用しないでください。

**接続例**

- 三相回路
- 単相回路

**UT/UN-SY□ 操作コイル用DC/ACインタフェースユニット**

<table>
<thead>
<tr>
<th>形名</th>
<th>出力方式</th>
<th>コニック取付方法</th>
<th>適用する電磁接続器、電磁盤電路の形名</th>
</tr>
</thead>
<tbody>
<tr>
<td>UT-SY21 (BC)</td>
<td>電磁線出力</td>
<td>トロリオン</td>
<td>S-T10-T32</td>
</tr>
<tr>
<td>UT-SY22 (BC)</td>
<td>接点出力</td>
<td>リレー出力</td>
<td>S-T10-T32</td>
</tr>
<tr>
<td>UN-SY11 (BC)</td>
<td>電磁線出力</td>
<td>リレー出力</td>
<td>S-T10-T32</td>
</tr>
<tr>
<td>UN-SY12 (BC)</td>
<td>接点出力</td>
<td>端子取付</td>
<td>S-N10-N400</td>
</tr>
</tbody>
</table>

注: 操作コイルは、コク電気ま230V用のS-N10-N200の形名です。

**仕様**

- 形名: UT-SY21, UT-SY22, UN-SY11, UN-SY12
- DC電圧: 24V
- 電磁線電圧変換电压: 50/50Hz
- ドライプ出力: 10mA
- 電磁線電圧: 10V
- 接点出力: 10mA
- 助作電流: 500mA
- 電磁線電圧: 500mA
- 接点出力: 500mA
- 超音波: 1MHz

接続例（接続図）

- UT-SY21 (BC)
- UN-SY11

注: UN-SY12 סKX09型を除く全形名は後発のもので予想4000円となります。
We support your overseas business.

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Model name</th>
<th>Application standard</th>
<th>Safety certification standard</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>International</td>
<td>Japan</td>
</tr>
<tr>
<td>IEC</td>
<td>JIS</td>
<td>EN</td>
<td>CE marking</td>
</tr>
</tbody>
</table>

Note: ① Compliant or supported with standard parts. ② Certified with standard parts.

UL Approval for U.S.A. and Canada  UL60947-4-1A (CSA C22.2 No. 60947-1) / UL508 (CSA C22.2 No. 14)

Magnetic Contactor

<table>
<thead>
<tr>
<th>Type</th>
<th>Main Contact</th>
<th>Maximum Continuous Horsepower Rating [HP]</th>
<th>Maximum Current Rating [A]</th>
<th>Auxiliary Contact (Rating Code)</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-2XMT10</td>
<td>1/2</td>
<td>1</td>
<td>5-1/2</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>S-2XMT20</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>S-2XMT30</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>S-2XMT40</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>10</td>
<td>7-1/2</td>
</tr>
</tbody>
</table>

Thermal Overload Relays

<table>
<thead>
<tr>
<th>Type</th>
<th>Heater Designation</th>
<th>FLA Adjustable Range [A]</th>
<th>Magnetic Contactor to be coupled</th>
<th>Connecting Bar for coupling</th>
<th>Top Class</th>
<th>Auxiliary Contact (Rating Code)</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>TH-T18KP</td>
<td>0.12 A</td>
<td>0.1 - 0.32</td>
<td>S-2XMT10, S-2XMT20, S-2XMT30</td>
<td>Unnecessary</td>
<td>10</td>
<td>D600</td>
<td></td>
</tr>
<tr>
<td>TH-T25KP</td>
<td>0.2 A</td>
<td>0.3 - 0.82</td>
<td>S-2XMT20, S-2XMT30, S-2XMT40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Contact Relay and Auxiliary Contact Block

<table>
<thead>
<tr>
<th>Type</th>
<th>Auxiliary Contact (Rating Code)</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR-T5</td>
<td>A600 and Q300</td>
<td></td>
</tr>
<tr>
<td>SR-T9</td>
<td>A600 and Q300</td>
<td></td>
</tr>
<tr>
<td>UT-A00</td>
<td>UT-A04</td>
<td></td>
</tr>
<tr>
<td>UT-A011</td>
<td>UT-A04</td>
<td></td>
</tr>
</tbody>
</table>

Surge Absorber Unit for Operating Coil

<table>
<thead>
<tr>
<th>Type</th>
<th>Rating, [V]</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTSA4</td>
<td>24 - 48V</td>
<td>100-420V</td>
</tr>
<tr>
<td>UTSA5</td>
<td>100-240V</td>
<td>240-480V</td>
</tr>
<tr>
<td>UTSA4</td>
<td>100-240V</td>
<td>240-480V</td>
</tr>
<tr>
<td>UTSA5</td>
<td>100-240V</td>
<td>240-480V</td>
</tr>
</tbody>
</table>
### Available Short Circuit Current Rating (SCCR) and Short Circuit Protection Device (S.C.P.D.)

<table>
<thead>
<tr>
<th>Model</th>
<th>S-C.P.D.</th>
<th>Available Short Circuit Current</th>
<th>S-C.S.C.</th>
<th>Available Short Circuit Current</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time, Class RA</td>
<td>Max. Circuit Voltage 000V</td>
<td>Contactor Breaker Circuit</td>
<td>Max. Circuit Voltage 000V</td>
</tr>
<tr>
<td>S-Dy(T10/S-Dy(T10)</td>
<td>10A</td>
<td>10A / 10A / 10A / 10A</td>
<td>10A / 10A / 10A / 10A</td>
<td>10A / 10A / 10A / 10A</td>
</tr>
<tr>
<td>S-Dy(T20)</td>
<td>20A</td>
<td>20A / 20A / 20A / 20A</td>
<td>20A / 20A / 20A / 20A</td>
<td>20A / 20A / 20A / 20A</td>
</tr>
<tr>
<td>S-Dy(T12)</td>
<td>12A</td>
<td>12A / 12A / 12A / 12A</td>
<td>12A / 12A / 12A / 12A</td>
<td>12A / 12A / 12A / 12A</td>
</tr>
<tr>
<td>S-(2×)T10</td>
<td>10A</td>
<td>10A / 10A / 10A / 10A</td>
<td>10A / 10A / 10A / 10A</td>
<td>10A / 10A / 10A / 10A</td>
</tr>
<tr>
<td>S-(2×)T20</td>
<td>20A</td>
<td>20A / 20A / 20A / 20A</td>
<td>20A / 20A / 20A / 20A</td>
<td>20A / 20A / 20A / 20A</td>
</tr>
<tr>
<td>S-(2×)T12</td>
<td>12A</td>
<td>12A / 12A / 12A / 12A</td>
<td>12A / 12A / 12A / 12A</td>
<td>12A / 12A / 12A / 12A</td>
</tr>
</tbody>
</table>

*1. Main circuit wires must be connected to contactor using applicable lugs shown in above table.

### Applicable wire size, lug size and tightening torque

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw size</td>
<td>Min. – Max.</td>
<td>Min. – Max.</td>
<td>Min. – Max.</td>
<td>Min. – Max.</td>
<td>Min. – Max.</td>
<td>Min. – Max.</td>
<td>Min. – Max.</td>
<td>Min. – Max.</td>
<td>Min. – Max.</td>
</tr>
<tr>
<td>Wire strip length</td>
<td>9mm</td>
<td>9mm</td>
<td>9mm</td>
<td>9mm</td>
<td>9mm</td>
<td>9mm</td>
<td>9mm</td>
<td>9mm</td>
<td>9mm</td>
</tr>
<tr>
<td>Wire size (0°C/30°C) (copper only) (Sol/Str.)</td>
<td>14 – 12 AWG</td>
<td>14 AWG</td>
<td>14 AWG</td>
<td>14 – 12 AWG</td>
<td>14 AWG</td>
<td>14 AWG</td>
<td>14 AWG</td>
<td>14 AWG</td>
<td>14 AWG</td>
</tr>
<tr>
<td>Torque</td>
<td>1.25-3.5</td>
<td>2.5-5.5</td>
<td>2.5-5.5</td>
<td>2.5-5.5</td>
<td>2.5-5.5</td>
<td>2.5-5.5</td>
<td>2.5-5.5</td>
<td>2.5-5.5</td>
<td>2.5-5.5</td>
</tr>
</tbody>
</table>

**Note:** Special lugs are recommended.

### Instruction for UL / CSA

1. Two conductors of the same size can be connected.
2. Main circuit wires must be connected to contactor using applicable lugs shown in above table.
3. Overload relay must be replaced if burnout of current element occurs.
4. A 2-wire control is used to read the automatic reset overload relay of a motor controller; the motor connected to the circuit may start automatically when the relay is in the automatic reset position.
**Enclosed Magnetic Starters**

- **Type Codes**
- **Solve Together**
- **Magnetic Contactors**
- **Open type Magnetic Starters**
- **Thermal Overload Relays**
- **Contactor Relays**
- **Optional Units**
- **Enclosed Magnetic Starters**
- **Magnetic Contactors**
- **Open type Magnetic Starters**
- **Thermal Overload Relays**
- **Contactor Relays**
- **Optional Units**

**Type Codes**

*For the information on type codes for orders, check the note in Order Procedure.*

Enclosed Magnetic Starters

- **Basic type**
- **Non-Reversing/Reversing**
  - No code
  - Non-Reversing
  - Reversing
- **Frame size**
  - T10, T12, T13

Open type Magnetic Starters

- **Basic type**
- **Non-Reversing/Reversing**
  - No code
  - Non-Reversing
  - Reversing
- **Frame size**
  - T10-T25

Magnetic Contactors

- **Basic type**
- **Non-Reversing/Reversing**
  - No code
  - Reversing
- **Frame size**
  - T10-T32

Thermal Overload Relays

- **Basic type**
- **Non-Reversing/Reversing**
  - No code
  - Reversing
- **Frame size**
  - T18, T25

Contactor Relays

- **Basic type**
- **Non-Reversing/Reversing**
  - No code
  - Reversing
- **Frame size**
  - T5, T9

Optional Units

- **Unit type**
- **Non-Reversing/Reversing**
  - No code
  - Reversing
- **Application**
  - 1 to 2-digit number

---

*For the information on type codes for orders, check the note in Order Procedure.*
## Order Procedure

### Enclosed Magnetic Starters

<table>
<thead>
<tr>
<th>Model name</th>
<th>Motor capacity</th>
<th>Main circuit voltage</th>
<th>Operation coil designation or operation circuit voltage</th>
<th>Auxiliary contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS-T21</td>
<td>3.7kW</td>
<td>200V</td>
<td>AC200V</td>
<td>1B</td>
</tr>
<tr>
<td>MS-T10</td>
<td>2.2kW</td>
<td>200V</td>
<td>AC200V</td>
<td>1A</td>
</tr>
</tbody>
</table>

Refer to page 12,32.

### Standard (AC operated) Magnetic Starters

<table>
<thead>
<tr>
<th>Model name</th>
<th>Heater designation (setting current)</th>
<th>Operation coil designation or operation circuit voltage</th>
<th>Auxiliary contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSO-T21</td>
<td>3.7kW</td>
<td>AC200V</td>
<td>1B</td>
</tr>
<tr>
<td>MSO-T10</td>
<td>2.2kW</td>
<td>AC200V</td>
<td>1A</td>
</tr>
</tbody>
</table>

Refer to page 12,32.

### Standard (AC operated) Magnetic Contactors

<table>
<thead>
<tr>
<th>Model name</th>
<th>Operation coil designation or operation circuit voltage</th>
<th>Auxiliary contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-T20</td>
<td>AC200V</td>
<td>2A</td>
</tr>
<tr>
<td>S-T10</td>
<td>AC100V/50Hz</td>
<td>2A</td>
</tr>
</tbody>
</table>

Refer to page 12,32.

### Contactor Relays

<table>
<thead>
<tr>
<th>Model name</th>
<th>Operation coil designation</th>
<th>Contact arrangement</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR-T5</td>
<td>AC200V</td>
<td>3A2B</td>
</tr>
<tr>
<td>SRL-T5</td>
<td>AC100V/50Hz</td>
<td>4A1B</td>
</tr>
</tbody>
</table>

Refer to page 21.

### Thermal Overload Relays

<table>
<thead>
<tr>
<th>Model name</th>
<th>Heater designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>TH-T18KP</td>
<td>15A</td>
</tr>
</tbody>
</table>

Refer to page 15 and designate the heater nominal.

### Optional Units

#### UT-AX auxiliary contact block

<table>
<thead>
<tr>
<th>Model name</th>
<th>Contact arrangement</th>
</tr>
</thead>
<tbody>
<tr>
<td>UT-AX4</td>
<td>2A2B</td>
</tr>
</tbody>
</table>

Refer to page 24.

#### UT-SA Operation Coil Surge Absorber Unit

<table>
<thead>
<tr>
<th>Model name</th>
<th>Voltage nominal</th>
</tr>
</thead>
<tbody>
<tr>
<td>UT-SA21</td>
<td>AC400V</td>
</tr>
<tr>
<td>UT-SA22</td>
<td>AC200V</td>
</tr>
<tr>
<td>UT-SA25</td>
<td>AC48V</td>
</tr>
</tbody>
</table>

Refer to page 25.

#### UT-ML Mechanical Interlock Unit

<table>
<thead>
<tr>
<th>Model name</th>
<th>UT-ML11</th>
</tr>
</thead>
</table>

Refer to page 26.

#### UT-SY□ (B) 形接触器コイル用DC Interface Modules

<table>
<thead>
<tr>
<th>Model name</th>
<th>UT-SY□</th>
</tr>
</thead>
<tbody>
<tr>
<td>UT-SY21</td>
<td>UT-SY21BC</td>
</tr>
</tbody>
</table>

Refer to page 21.

#### UT-HZ18 (B), UN-RM20 形サーマルリレー用Separate mounting adaptor

<table>
<thead>
<tr>
<th>Model name</th>
<th>UT-HZ18</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN-RM20</td>
<td>UT-RM20</td>
</tr>
</tbody>
</table>

Refer to page 21.

**Note:**
- For orders, specify products as shown below. Insert a space where `˛` is present.
- If adding multiple two-character codes (such as SA, BC, and KP) after a frame size (T10 or others) of type name, specify them in alphabetical order of the first letters. (Example: MSO-T18BKPSA)
- (If they are not in alphabetical order, the type code is automatically changed.)

**For orders, specify products as shown below. Insert a space where `˛` is present.**

- If adding multiple two-character codes (such as SA, BC, and KP) after a frame size (T10 or others) of type name, specify them in alphabetical order of the first letters. (Example: MSO-T18BKPSA)
- (If they are not in alphabetical order, the type code is automatically changed.)
Outline Drawing, Contact Arrangement

Magnetic Starters (enclosed)

- **MS-T10(KP) type Magnetic Starters (enclosed)**
  - Block diagram and contact arrangement
  - Hook slot
  - Installation holes for 3-M4 screws
  - Grounding terminal

- **MS-T12(KP) type Magnetic Starters (enclosed)**
  - Block diagram and contact arrangement
  - Hook slot
  - Installation holes for 3-M4 screws
  - Grounding terminal

- **MS-O-T21(KP) type Magnetic Starters (enclosed)**
  - Block diagram and contact arrangement
  - Hook slot
  - Installation holes for 3-M4 screws
  - Grounding terminal

- **MS-O-T22(KP) type Magnetic Starters (enclosed)**
  - Block diagram and contact arrangement
  - Hook slot
  - Installation holes for 3-M4 screws
  - Grounding terminal

- **Reversible type Magnetic Starters (enclosed)**
  - **MS-O-T21(KP)**
  - Block diagram and contact arrangement
  - Hook slot
  - Installation holes for 3-M4 screws

- **MS-O-T25(KP)**
  - Block diagram and contact arrangement
  - Hook slot
  - Installation holes for 3-M4 screws

Magnetic Starters

- **MS-O-T10KP**
  - Installation holes for 2-M6 screws

- **MS-O-T12KP**
  - Installation holes for 2-M6 screws

- **MS-O-T20KP**
  - Installation holes for 2-M6 screws
Outline Drawing, Contact Arrangement

Magnetic Contactors

**S-T10**

**S-T12**
**S-T20**

**S-T21**
**S-T25**

**S-T32**

Contact arrangement

**S-2×T10**
**S-2×T12**
**S-2×T20**

**S-2×T21**
**S-2×T25**

**S-2×T32**
Outline Drawing, Contact Arrangement

SD-T21(BC)

Outline Drawing, Contact Arrangement

SD-2xT21(BC)

Outline Drawing, Contact Arrangement

MSOD-T21(BC)

Outline Drawing, Contact Arrangement

MSOD-2xT21(BC)
Optional Units

- **UT-AX2(BC)**
  - M3.5 screws (Self-lifting)
  - Magnetic Contactor
  - Contact Arrangement
  - Example of mounting on left side of unit

- **UT-AX4(BC)**
  - M3.5 screws (Self-lifting)
  - Magnetic Contactor
  - Contact Arrangement
  - Example of mounting on right side of unit

- **UT-AX11(BC)**
  - M3.5 screws (Self-lifting)
  - Magnetic Contactor
  - Contact Arrangement
  - Example of mounting

Note 1: Specifications with both UT-AX2 and UT-AX4 mounted simultaneously are not possible.

Note 2: Mount on one side or both sides of the Magnetic Contactors and Contactors Relays shown on the right.

Note: The contact arrangement 2a is shown in the figure above.

Note: The contact arrangement 4a is shown in the figure above.

Outline Drawing, Contact Arrangement

Outline Drawing

Solve Together
**Precautions for Handling**

**About Handling**

**Note**

**Warranty and Safety**

---

**About Handling**

**Precautions for Use**

1. Be sure to periodically check the Magnetic Starters and apply safety measures on the performance sequences of important matters. (The Magnetic Starters contacts may suffer from destructive continuity, welding, and burning.)

2. 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 (IEC60947-4-1, "Low-voltage switchgear and controller etc."). Actual use condition is different from this test condition, the user must evaluate the condition (by using an actual device).

**Use condition**

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

1. Ambient temperature
   - Even when the device is used in accordance with normal usage, deterioration of the insulation will progress.
   - In particular, as the ambient temperature increases, the insulation life is shortened. In general, it is said that every time the ambient temperature increases 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 increases and life may be shortened dramatically.

2. Vibration/Impact
   - Although vibration of 19.6m/s² and impact of 49m/s² do not cause contact malfunction, even when the vibration and impact are below these values but are applied continuously, fatigue failure may cause some trouble. In particular, please note that the resonance of an installed board may exert a large vibration on the product.

**Usage environment**

1. Ambient temperature
   - 

2. Maximum temperature of the inside of the control board
   - 

3. Ambient temperature
   - 

4. Height above sea level
   - 2000 m or less

5. Vibration
   - 10 to 55 Hz, 19.6m/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.

8. Stroge temperature/Relative humidity
   - -40°C to 65°C 45% to 85% RH
   - However, dew condensation and freezing should be avoided.

**Mounting**

1. Direct mounting
   - The device should be mounted in a dry location low in dust and vibration.

2. The normal mounting direction is depicted 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. Excessive force applied to the control board cannot be avoided. Be sure to install the device by 10 degrees in a counter clockwise direction from the normal mounting direction as shown in Fig. 3 when mounting it.

5. If the device is mounted in a horizontal orientation, its characteristic is nearly unchanged but mechanical durability may be deteriorated. Horizontal mounting of reversing type is not allowed.

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.

8. Storage temperature/Relative humidity : -30°C to 65°C 45% to 85% RH
   - However, dew condensation and freezing should be avoided.

**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 described in ( ) is applied when additionally mounting auxiliary contacts.

**Mounting of IEC 35mm wide rail**

(1) T10 to T32 types and SR-T type are standard devices allowed to be mounted on an IEC 35mm wide rail.

(2) 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 Specifications
  - Rail Width: 35mm, Rail Height: 7.5mm
  - Rail Width: 35mm, Rail Height: 15mm

- Maximum pitch of rail mounting screw (1mm)
  - 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.

**Mounting screw pitch**

- Rail Width: 35mm, Rail Height: 7.5mm
- Rail Width: 35mm, Rail Height: 15mm

**Switchgear and controller** etc.). If actual use condition is different from this test condition, the user must evaluate the condition (by using an actual device).

---

**Note**

1. The value of this arc space is a value of IEC and JIS Standards-based closed circuit shut-off capacity test.

2. Although the B dimension of T10 to T32 avoids closely attached mounting, when considering to apply current to the device or when mounting conduct high frequency and high utilization on the same rail, the device life may be shortened in terms of temperature increase and impact, so please keep the space between the device over the minimum value shown in the above table as much as possible when mounting them.

3. E dimension is 3mm when mounting UT-45D or UT-45I with controllers.
**Warranty and Safety**

**About Handling**

- **Note**: Applicable electric wire size and tightening torque and terminal dimension of terminal screw

- **Warning**: The union may cause overheating or in. Be sure to properly keep the tightening torque and periodically re-tighten the screw.

- **Note**: Tightening the screws on the rated voltage will damage the terminal screw even in 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 right table. Insufficient tightening of the terminal screw may cause overheating or cause the electric wire to drop off. Excessive tightening may damage the tightening screws. Adhesion of rust, paint, thermal oil, etc. to electric wire connection or contact may cause heat generation due to defective contact, so this is very dangerous.

The main circuit terminals of T10 to T32 and TH-T18/T25 types are allowed to be connected via any of 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-up terminals, which facilitate wiring.

- **Note**: Refer to the right figure to set the switching time allowance.

- **Note**: Please use a swaging tool which is recommended by JST.

- **Note**: Operational circuits are coil terminals of Magnetic Contactors and control circuit terminals of Thermal Overload Relays.

- **Note**: Please use a crimping tool which is recommended by JST.

**Connection**

- **Note**: Applicable electric wire size and tightening torque and terminal dimension of terminal screw

This may cause overheating or in. Be sure to properly keep the tightening torque and periodically re-tighten the screw.

However, please note that tightening the screws on the rated voltage will damage the terminal screw even in 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 right table. Insufficient tightening of the terminal screw may cause overheating or cause the electric wire to drop off. Excessive tightening may damage the tightening screws. Adhesion of rust, paint, thermal oil, etc. to electric wire connection or contact may cause heat generation due to defective contact, so this is very dangerous.

The main circuit terminals of T10 to T32 and TH-T18/T25 types are allowed to be connected via any of 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-up terminals, which facilitate wiring.

- **Note**: Note 7: Please use a swaging tool which is recommended by JST.

- **Note**: Note 6: Operational circuits are coil terminals of Magnetic Contactors and control circuit terminals of Thermal Overload Relays.

- **Note**: Please use a crimping tool which is recommended by JST.

**Operating circuit**

- **Warning**: Applying a low voltage that does not operate the Magnetic Contactors to the operating circuit may cause overvoltage to the coil, which may cause the coil to be burned in a short time.

When applying such parts to a Reversing type circuit exceeding 500V, please use an insulating tube-attached crimp lug. 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 operating coil and the aging variation of the molding component. M5O and S-T without a box are standard products available even at the inside temperature of 55°C.

**Application to special environment**

- **Note**: Please note that the operating characteristics of the Magnetic Contactor and Thermal Overload Relay may vary with the ambient temperature.

**High temperature**

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 operating coil and the aging variation of the molding component. M5O and S-T without a box are standard products available even at the inside temperature of 55°C.

**Low temperature**

Although 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 contact incorporated in a switchboard, the S-T type Magnetic Contactors is applicable as a standard product. Also, M5O-T type Magnetic Starters and TH-T type Thermal Overload Relays of low temperature specification are not manufactured.

Applicable temperature range of low-temperature-based products: -40 to 5°C (Operating temperature) -60 to 65°C (Storage temperature)

**Corrosive gas**

S-T type Magnetic Contactors is of corrosion resistance-increased specification as a standard product. Corrosive gases that exist in an environment with an 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, resulted in increased temperature.

Additionally, if the environment contains some corrosive gas but is under dry condition, 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 (M5O-T: YS, TH-T: YS) of the specification with increased corrosion resistance to such corrosive gases are also manufactured.

**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. Therefore, it is recommended to put a moisture absorbent (Silica gel) in an amount of 3kg or more per m³, so as to lower the humidity.
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 be applied to 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.
   - Failures caused by inappropriate conditions, environment, handling, and uses other than those specified in catalogs, instruction manuals or specifications.
   - Failures caused by inappropriate installation.
   - Failures caused by the design of customer’s equipment or software.
   - Failures caused by the customer tampering with our products such as reworks without our authorization.
   - Failures caused by the customer falling to correctly maintain or replace components such as spare parts, as specified by documents such as instruction manuals.
   - Failures caused by uses of the product other than those specified in catalogs.
   - Failures caused by force majeure such as fire and abnormal voltage accidents, and natural disasters such as earthquake, wind and flood.
   - Failures caused by reasons that were unforeseeable by 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.

**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 situation regardless of our foreseeability, secondary losses, accident compensation, damages on anything other than our products, compensation to jobs including replacement work, readjustment of field machinery equipment, startup test run, etc. performed by customers, and damages caused by any reasons for which we are not held responsible, shall be outside the scope of our compensation.

**Exemption from warranty related to opportunity or secondary losses.**

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.

2. When using a product listed in this catalog, you are required to accept that your use should not lead to any serious accident if by any chance the product develops any failures or errors, and, in the event any failure or error occurs, backup or fail-safe functions are in place outside the device by the system.

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 the applications requiring special quality assurance systems, such as serious public uses as atomic power plants and other power plants owned by power companies, railway applications and government and public office applications.

4. 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.

**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 control 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 customers to renew the products every 10 years as a rule, provided that the products are used in accordance with the number of open/close operations specified by this catalog or the instruction manual.

We also recommend to renew devices other than the Magnetic Starters and Magnetic Contactors described in this catalog every 10 years as a rule.

**Notes for adopting the product**

Before purchasing and using our products, please confirm the following product warranty. Please note that the failure mentioned here shall not include such items as scratches and discoloration which do not affect performance.

**Notes for security related issues**

1. Before performing the installation, wiring, 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.

2. With the MS-T Series, the parts such as the contact and coil cannot be replaced so do not modify or disassemble the product. Failure to observe this can lead to failure.

3. 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 equipment damage.

4. 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 of 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 product parts. It also represents a risk of failure due to result of failure or malfunctions.

- Do not use the product when it has received damage during transportation, installation, or wiring. This can cause fire or malfunction.

- 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 the product 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 intrinsic 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 overheating 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 overheated 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 waving of contacts, clattering 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 complete connection described in this catalog only shows the one to be run as 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 recovers to the product or disassemble the product. These may cause failures.

- When you dispose of the products, treat them as industrial waste products.
[Related Products]

Low-voltage switch | Mitsubishi Motor Circuit Breaker MMP-T Series

Introducing a Motor Circuit Breaker from Mitsubishi Electric!

- Design smaller panels by using the Motor Circuit Breaker, various options and MS-T Series Magnetic Contactor.
- Prevent secondary damage with Motor Circuit Breaker and Magnetic Contactor combination.
- Streamlined wiring terminal BC specifications (option) contribute to improving your productivity.
- Support your overseas business with compliance to various International Standards as well as the UL Types E/F combination.

Product specifications:
- Rated current: 0.16 A to 32 A (15 types)
- Applicable (compliant) standards:
  - Staked product compliant with various International Standards including IEC, JIS, CCC, TUV and UL (optional)
- Wiring type: Bare wire, red terminal, Y crimp and round crimp supported
- Improvement of safety:
  - Wire and safety are separate with connection conductors and well insulated wiring terminal (8 specifications option)
- Optional parts:
  - Auxiliary Manual Contact Unit, Bus-Cable Fixer Unit, Line Terminals Top, Connector Contact Unit, etc. available
- DIN rail mounting:
  - Standard product mountable on rail
- Finger protection support:
  - Standard product compliant with IP20 from front side of terminals
- Application in North America:
  - Type E/F combination certification acquired. Compatible up to maximum SCCR value 50 kA.

Low Voltage Circuit Breaker | Mitsubishi WS-V Series Molded Case Circuit Breakers, Earth Leakage Circuit Breakers

Technologies based on long year experience realize more improved performance.

- The new electronic circuit breakers can display various measurement items.
- Improvement of breaking performance with new breaking technology “Expanded ISTAC”.
- Compliance with global standard for panel and machine export.
- Commoditization of internal accessories for shorter delivery time and stock reduction.

Product specifications:
- Frame: 32-200A Frame
- Applicable standard:
  - Applicable to IEC, GB, UL, CSA, JIS and etc.
- Expansion of UL listed product line:
  - New line-up of 480VAC Type with high breaking performance for SCCR requirement
- Communication of internal accessories:
  - Reduction of internal accessory types from 3 to 1
- Communication for AC and DC circuit:
  - Common use of 32-400A frame in both AC and DC circuit
- Contact safe for easy to use:
  - Thermal adjustable and electronic circuit breakers are same size as 200A fixed type
- Measuring Display unit (MRD) breakers:
  - Measure and transmit energy data to realize energy management.

Three-Phase Motor | High Performance Energy-Saving Motor | Super Line Premium Series | SF-PR

High Efficiency & Compatible. New Launch of Super Line Premium Series SF-PR Model

- Compared to general-purpose motor SF-JR model, general loss is reduced by 3% on average, and it is compatible with highly efficient premium IE3.
- Easy replacement is achieved as mounting dimension (frame number) is compatible with general-purpose motor SF-JR model.
- This series can accommodate different power sources of Japan and the U.S. Three rings in Japan match the Top Frame standards, while it is compatible in the U.S.
- Can be driven by inverters as standard. Advanced magnetic flux vector control by our FR-A800 achieves steady drive up to 1.5kVA.

Product Specifications:
- Number of poles: 2-pole, 4-pole, 6-pole
- Voltage frequency: 200/230/220V 50/60/50Hz, 220V 50Hz, 400-440V 440V 50/60Hz, 550-690V 50/60Hz
- Enclosure:
  - Totally enclosed fan cooled type (indoor, outside installation)
- Protection system:
  - IP44
- Electrically (safety):
  - Motor with 2-poles over 1kW is dedicated for a direct connection.
- Motor power:
  - Motors with 4-poles and 6-poles are for both direct and crossed belt connections.
- Rotation direction:
  - Counter-clockwise (CCW) direction viewed from the edge of axes.
- Compatible standard:
  - JEC-3137-2000 (DCflux is compatible with IEC 6034-30.)

PLC | MELSEC-Q Series Universal Model

Introducing the high-speed QCPU (QnUGVCPU) for faster processing of large data volumes.

- Realize high-speed, high-accuracy machine control with various iQ Platform compatible controllers and multiple CPUs.
- Easily connect to GOTs and Programming tools using built-in Ethernet port.
- 255 models from 10 k step small capacity to 1000 k step large capacity, are available.
- Seamless communication and flexible integration at any network level.

Product Specifications:
- Program capacity:
  - 10k steps for 100k steps
- Memory capacity:
  - 256 points for 4096 points/8192 points
- Basic instruction processing speed (2 instruction):
  - 120msec to 1.9s
- External connection interface:
  - USB (all models equipped, Ethernet: RS-232, memory card, extended SRAM cassette
- Function module:
  - 1D analog, high-speed counter, positioning, simple motion, temperature input, temperature control, network module
- Module expansion style:
  - Building block type
- Network:

HMI | Graphic Operation Terminal GOT2000 Series GT27 Model

To the top of HMIs with further user-friendly, satisfactory standard features.

- Comfortable screen operation even if high-load processing (e.g. logging, device data transfer) is running. (Monitoring performance is twice faster than GT16)
- Actual usable space without using a 3D card is expanded to 128MB for more flexible screen design.
- Multi-touch features, two-point press, and scroll operations for more user-friendliness.
- Outline font and PNG images for clear, beautiful screen display.

Product Specifications:
- Screen size:
  - 12.1V, 10.4V, 8.4V (15” coming soon)
- Resolution:
  - 1600 x 1280 (XGA coming soon)
- Interface:
  - 32-step adjustment
- Touch panel type:
  - Analog resistive film
- Built-in interface:
  - RS-232, RS-422/485, Ethernet, USB, SD card
- Applicable software:
  - GT Works3
- Input power supply voltage:
  - 100 to 240VAC (+10%, -15%), 24VDC (+20%, −20%)

Inverter | FR-A800 Series

High-functionality, high-performance inverter

- Realize even higher responsiveness during real sensor-less vector control or vector control, and achieve faster operating frequencies.
- The latest automatic tuning function supports various induction motors and also sensor-less PM motors.
- The standard model is compatible with EU Safety Standards ITO (Pul.SL). Add options to support higher level safety standards.
- A variety of useful functions provide USB memory support and customization with a PLC function.

Product Specifications:
- Inverter capacity:
  - 200V class 0.4kW to 200kW, 400V class 0.8kW to 500kW
- Control method:
  - High-precision PWM control (Selected from 1V/f, advanced flux vector, real sensor-less vector or PM sensor-less vector control, vector control (when using options))
- Output frequency range:
  - 0.2 to 599Hz (when using V/f control or advanced flux vector control).
- Maximum torque running range:
  - 100% to 100% (continuous) 75% to 100% (continuous) 400V 2.4kW to 50% (continuous)
- Maximum torque running range:
  - 100% to 100% (continuous) 75% to 100% (continuous) 400V 2.4kW to 50% (continuous)
- Torque control:
  - 100% to 100% (continuous) 75% (continuous) 50% (continuous)
**Related Products**

**AC Servo | Mitsubishi General-Purpose AC Servo MELSERVO-J4 Series**

- Industry-leading level of high performance servo
  - Industry-leading level of basic performance: Speed frequency response (2.9kHz), 4,000,000 (4,194,304/rev) encoder
  - Advanced one-touch tuning function achieves the one-touch adjustment of advanced vibration suppression control II, etc.
  - Equipped with large capacity drive recorder and machine diagnosis function for easy maintenance.
  - 2-axis and 3-axis servo amplifiers are available for energy-conservative, space-saving, and low-cost machines.

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**EDM | Wire EDM MV1200R**

- Next-generation innovations of our best-selling Performance Machine.
  - Total running cost reduced up to 42%, which is accounted for 90% by filter, ion exchange resin and power consumption.
  - Improved productivity by an innovative automatic wire threading.
  - Faster machining is realized with improved power-supply performance.
  - (Rz3. 5 μm/Ra0. 45 μm with 3 outs!) (Rz2. 0 μm/Ra0. 28 μm with 4 outs)

<table>
<thead>
<tr>
<th>Product Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model:</td>
</tr>
<tr>
<td>Machining travel (X-Y-Z) (mm):</td>
</tr>
<tr>
<td>Machining travel <a href="mm">x-y-z</a>:</td>
</tr>
<tr>
<td>Max. taper angle:</td>
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<tr>
<td>Max. workpiece dimensions (mm):</td>
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<tr>
<td>Wire diameter (mm):</td>
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<tr>
<td>Electric fluid:</td>
</tr>
<tr>
<td>Footprint (W-L-D) (mm):</td>
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</tbody>
</table>

For: 0.3-0.5.08 OD guides and 1.0-1.5.06 jet nozzle are standard equipment.

**Robot | MELFA F Series**

- High speed, high precision and high reliability industrial robot
  - Compact body and slim arm design, allowing operating area to be expanded and load capacity increased.
  - The fastest in its class using high performance motors and unique driver control technology.
  - Improved flexibility for robot layout design considerations.
  - Optimal motor control tuning set automatically based on operating position, posture, and load conditions.

<table>
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<tr>
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<tbody>
<tr>
<td>Degrees of freedom:</td>
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<tr>
<td>Installation:</td>
</tr>
<tr>
<td>Maximum load capacity:</td>
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<tr>
<td>Maximum reach radius:</td>
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</tbody>
</table>