Motor circuit breakers

Motor circuit breakers Debut!

Safety Warning
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).

Eco Changes in the Mitsubishi Electric Group are a significant statement, and expresses the Group’s initiatives undertaken in the following areas:

- Promoting the conservation of resources, realizing a harmonious society through the development of new technologies and products.
- Contributing to the environment and society in a sustainable manner.

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE: TOKYO 105-8055, 2-1, MARUNOUCHI 1-Chome, CHIYODA-KU, TOKYO 100-8011, JAPAN
www.mitsubishielectric.com/III

Motor circuit breakers
Bring a breath of fresh air into a Motor Control Circuit!

With Mitsubishi Electric’s range of smart Motor circuit breakers!

MMP-T series

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<tr>
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</tbody>
</table>
Do these requirements sound familiar?

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

Desire to down-size the machine control panels

Desire to increase wiring efficiency

Desire to meet global demands

Down-sizing
Wiring reduction
Smart wiring
Safety & Quality
Safety & Quality
Worldwide coverage
Global standard
What is a Motor circuit breaker?

A Motor circuit breaker is a device integrating Low voltage circuit breakers and Thermal Overload Relays functions. This device is capable of protecting the motor branch circuits from overload, phase-loss, and short-circuit alone. It enables even more secure wiring and motor protection.

What is the role of a Motor circuit breaker in a motor circuit?

The motor circuit requires various roles, including disconnection, circuit on/off switching, short-circuit protection, device protection, motor control, and overload protection. A motor circuit consisting of a Low voltage circuit breakers, Magnetic Contactor, and Thermal Overload Relays is typically adopted, and each of the devices has its own independent role. On the other hand, in a motor circuit consisting of a Motor circuit breaker and an Magnetic Contactor, only motor control is provided by the Magnetic Contactor and other functions are provided by the Motor circuit breaker.

Motor circuit breaker

(A method using Motor circuit breaker)

Conventional method

Motor circuit breaker

(Motor circuit breaker: Released at the same time, New MS-T Series)

<table>
<thead>
<tr>
<th>Basic type</th>
<th>RPM-T32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated current (A)</td>
<td>0.16 to 32 (15 types)</td>
</tr>
<tr>
<td>Rated short-circuit breaking capacity (kA)</td>
<td></td>
</tr>
<tr>
<td>240V</td>
<td>190</td>
</tr>
<tr>
<td>415V</td>
<td>50</td>
</tr>
<tr>
<td>Outside dimension (mm) W x H x D</td>
<td>45 x 96 x 76</td>
</tr>
</tbody>
</table>
Why is a Motor circuit breaker required at this time?

When exporting products to foreign countries including the U.S.A. and European countries, not only the device component but also the motor circuit are required to comply with the standards of the respective countries including UL and EN standards. The electric wires and devices that make up the motor control circuit (Low Voltage Circuit Breakers, Fuse, Magnetic Contactor, Thermal Overload Relays) must be protected under a short-circuit condition. In addition, we need to select each device considering their functions and characteristics. Thus, we have encountered difficulties in realizing the reliable circuit protection at times. The device to reduce such burden is our “Motor circuit breaker”. Undertaking multiple protection roles stated above, the Motor circuit breaker can not only protect electric wires and load devices from short-circuit accident but also simplify motor circuit combination. In addition, in North America, a control panel shall be marked with SCCR (short-circuit current rating), but even high SCCR that cannot be covered by the combination of Low voltage circuit breakers and Magnetic motor starters can be covered by the use of a Motor circuit breaker. Having these advantages tends to increase demand for “Motor circuit breakers”.

In case of application in North America

General motor circuits have many devices to be combined and are complicated.

When using a Motor circuit breaker, then...

Combination of Motor circuit breaker and option enables wiring reduction and space saving. This allows us to respond to the needs of down-sizing the control panel, which increases the demand for Motor circuit breakers. (For details about wiring reduction & space saving, please refer to the next section.)

Conventional method

- Short-circuit protection device for power supply circuit
- Motor control device
- Motor overload protection device

- Branch circuit protection device
- Branch circuit protector
- Motor circuit breaker
- Specific options

A method in which a Motor circuit breaker is used

Connection diagram

The control panel is even more down-sized!

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- Motor circuit breaker
- Specific options

A method in which a Motor circuit breaker is used

Connection diagram

The control panel is even more down-sized!
Advantages of Adopting This Device

Wiring reduction
smart wiring

Wiring streamlining terminal

- Using a wiring streamlining terminal facilitates the wiring!

Electric wire-used wiring example

Conductor-joint-unit-used wiring example

Both common electric wire-used wiring and unit-used wiring are available! Using the unit facilitates combination with respective devices. In addition, the terminal connected to control terminal of magnetic contactor arranged at the front also facilitates the wiring, thus contributing to improvement of production.

Safety & Quality

Safe and reliable MMP-T32

- As with the combination of Low voltage circuit breakers, Magnetic Contactor, and Thermal Overload Relays, the combination of Motor circuit breaker and Magnetic Contactor can prevent secondary disasters.

Global standard

Worldwide coverage

Acquisition of main international standards can support customers' overseas business.

- Certification to various major international standards

Not only major international standards such as IEC, JIS, UL, CE, and CCC but also other national standards are certified. This will help our customers expand their business in foreign countries. This will help our customers expand their business in foreign countries.

- UL60947-4-1A Type E/F is also covered.

Compliance of the device to UL's Type EF combination can surely respond to export to the U.S.A. For details, please refer to Page 22.
#### Key points

- **MMP-T32**
  - Wiring-supporting BC terminal (Option)
  - Integrated finger protection provides convenient safety
  - A round solderless terminal is applicable.
  - The compact breaker design also allows Auxiliary contact unit (AX) and alarm contact unit (AL).
  - Breaker type operating handle with off-lock hole.
  - Optional short-circuit indicator unit can be added speeding up fault diagnosis.

- **MMP-T32BC**
  - 45mm

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#### Specification List

<table>
<thead>
<tr>
<th>Frame A</th>
<th>MMP-T32</th>
<th>MMP-T32BC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type name</td>
<td>JIS C8201-2-1 Ann.1, JIS B041-4-1, EN60947-2, EN60947-4-1, IEC60947-2, IEC60947-4-1, GB14048.2</td>
<td></td>
</tr>
<tr>
<td>Number of poles</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Handle shape</td>
<td>Tumbler handle</td>
<td></td>
</tr>
<tr>
<td>Rated current (Ie) [A]</td>
<td>0.1 to 32</td>
<td></td>
</tr>
<tr>
<td>Rated operational voltage Ue [V]</td>
<td>200 to 690</td>
<td></td>
</tr>
<tr>
<td>Rated frequency [Hz]</td>
<td>50/60</td>
<td></td>
</tr>
<tr>
<td>Rated impulse withstand voltage Uimp [kV]</td>
<td>600</td>
<td></td>
</tr>
</tbody>
</table>

| Type name | JIC C8201-2-1 Ann.1, JIS C8201-4-1, EN60947-2, EN60947-4-1, IEC60947-2, IEC60947-4-1, GB14048.2 |
| Rated short-circuit breaking capacity [kA] | 6 |

- **JIS C8201-2-1 Ann.1**
  - UL-compliant rated working current is described on a different page.

#### How to Order

**At time of your order, please specify your desired products as shown below.**

(A space should be inserted in the -marked position.)

<table>
<thead>
<tr>
<th>Model</th>
<th>Heater nominal</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMP-T32</td>
<td>32A</td>
</tr>
<tr>
<td>MMP-T32BC</td>
<td></td>
</tr>
</tbody>
</table>

**How to Order the Options**

- **Auxiliary contact unit**
  - Type name: UT-MAX
  - Contact arrangement: 1a
- **Alarm contact unit**
  - Type name: UT-MAL
  - Contact arrangement: 1a
- **Short-circuit indicator unit**
  - Type name: UT-TU

---

#### Applicable Standards

- **International Standards**
  - IEC60947-2, 60947-4-1
  - UL60947-4-1, CSA C22.2 No.60947-4-1
  - TUV approval CE CCC

- **Domestic Standards in Japan**
  - JIS C8201-2-1 Ann.1, 8201-4-1
  - Electric Applicable Safety Law

- **Wiring-supporting BC terminal (Option)**
  - A round solderless terminal is applicable.

- **Adjustment dial settable to full load current**
  - Optional short-circuit indicator unit can be added speeding up fault diagnosis.

- **Test trip function**
  - Breaker type operating handle with off-lock hole.
Specifications

Usage Environment

1. Ambient temperature: -10°C to 40°C (Applied to the outside of the control panel)
2. Maximum temperature of the inside of the control panel: 55°C (Yearly average temperature of the inside of the control panel should be 40°C or less)
3. Ambient temperature: 45% to 85%RH (for subtle load)
4. Height above sea level: 2000m or less
5. Vibration: 10 to 55Hz, 19.6m/s² or less
6. Impact: 49m/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/Relative humidity: -30°C to 65°C / 45% to 85%RH (for subtle load)

* As for handling, temperature adjustment, and closely-attached installation, please read the Instruction Manual.

Operating Characteristic Curve

List of Options

<table>
<thead>
<tr>
<th>Number</th>
<th>Product name</th>
<th>Model</th>
<th>Specification</th>
<th>Description</th>
<th>Applied model</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>Auxiliary contact unit</td>
<td>UT-MAX</td>
<td>1a</td>
<td>Contact of the unit operates in conjunction with ON/OFF operation of MMP-T32.</td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>Alarm contact unit</td>
<td>UT-MAXLL</td>
<td>1a</td>
<td>Contact of the unit operates in conjunction with the trip operation of MMP-T32.</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>3-phase feed-in terminal</td>
<td>UT-EP9</td>
<td>1a</td>
<td>A unit to connect the large electric wire to MMP-T32.</td>
<td>MMP-T32</td>
</tr>
<tr>
<td>④</td>
<td>Bus bar</td>
<td>UT-2B4</td>
<td>1a</td>
<td>A unit to supply power to two or three MMP-T32.</td>
<td></td>
</tr>
<tr>
<td>⑤</td>
<td>Line side terminal adapter kit</td>
<td>UT-C13</td>
<td>1a</td>
<td>A power supply-side terminal cover to respond to UL60947-4-1A, Type E/F. This kit consists of terminal adapter, terminal cover and 3 screws.</td>
<td></td>
</tr>
<tr>
<td>⑥</td>
<td>Short-circuit indicator unit</td>
<td>UT-TU</td>
<td>1a</td>
<td>A unit to detect short-circuit. This unit is required for application to UL60947-4-1A Type EF.</td>
<td></td>
</tr>
<tr>
<td>⑦</td>
<td>Connection conductor unit</td>
<td>UT-MT20</td>
<td>1a</td>
<td>A unit to connect the MMP-T32 and Magnetic Contactor electrically and mechanically.</td>
<td></td>
</tr>
<tr>
<td>⑧</td>
<td>Mounting base unit</td>
<td>UT-BT20</td>
<td>1a</td>
<td>A plate to install the combination starter with MMP-T32 and Magnetic Contactor combined. Rail mounting and screw mounting are available.</td>
<td></td>
</tr>
<tr>
<td>⑨</td>
<td>Jointing block unit</td>
<td>UT-BT32</td>
<td>1a</td>
<td>A set of the blocks for mechanically connecting two mounting base units.</td>
<td></td>
</tr>
</tbody>
</table>

Option combination Diagram
**Outline Drawing**

**MMP-T32 + UT-MAX(LL)/UT-MAL(LL)**

(Unit: mm)

* The diagram above shows two UT-MAX(LL) and/or UT-MAL(LL) in mounted condition. The outline dimensions of UT-MAX(LL) and UT-MAL(LL) are the same.

**MMP-T32×2 + UT-EP3 + UT-□□**

(Unit: mm)

**MMP-T32×3 + UT-3B4/UT-3B5**

(Unit: mm)
Outline Drawing

**MMP-T32 + UT-CV3 + UT-TU**

(Unit: mm)

- UT-CV3
- MMP-T32
- UT-TU

**MMP-T32 + UT-MT+ + UT-BT+ + S-T+**

(Unit: mm)

- UT-BT
- MMP-T32
- S-T

**MMP-T32 + UT-MT+ + UT-BT+ + S-2×T+ + UT-RT+**

(Unit: mm)

- UT-RT
- MMP-T32
- Top Hat Rail (35mm)

**Combination Magnetic Contactors**

- Top Hat Rail (35mm)
- UT-CV3
- UT-TU
- UT-BT
- UT-RT

**Top Hat Rail Installation Dimension**

- Dimension A B C
- UT-BT20 163 106 116
- UT-BT32 167 104 120
- UT-RT10 91 46 116
- UT-RT20 99 54 116
- UT-RT32 98 53 120

**Installation holes for 3-M4 screw**

- M4×20 screw

**9 (The height of rail is 15mm)**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>UT-BT20</td>
<td>163</td>
<td>106</td>
<td>116</td>
</tr>
<tr>
<td>UT-BT32</td>
<td>167</td>
<td>104</td>
<td>120</td>
</tr>
<tr>
<td>UT-RT10</td>
<td>91</td>
<td>46</td>
<td>116</td>
</tr>
<tr>
<td>UT-RT20</td>
<td>99</td>
<td>54</td>
<td>116</td>
</tr>
<tr>
<td>UT-RT32</td>
<td>98</td>
<td>53</td>
<td>120</td>
</tr>
</tbody>
</table>

**UT-CV3**

**UT-TU**

**UT-BT**

**UT-RT**

**Top Hat Rail**

**M4×20 screw**

**S-T**

**9 (The height of rail is 15mm)**
On basic configuration circuit of NEC (National Electric Code) and application to Motor circuit breaker

The Clause 430 of NEC (National Electric Code) regulates the basic configuration of an electric motor protection circuit to be as shown in the following figure. UL standards define several motor circuit configurations, and among them you find Type E and Type F using a Motor circuit breaker. A Mitsubishi Motor circuit breaker can be used for path disconnecting, motor control and protection from overload as a single unit, but can also be used as Type E in combination with specific options, and as Type F in combination with Magnetic Contactors. By using a Motor circuit breaker to conform to the motor circuit configuration defined by UL, you can reduce the number of applicable devices against NEC basic circuit configuration, and further enhance the value of SCCR.

In addition, using the line side terminal adapter kit and short-circuit indicator unit enables the Type E circuit configuration and also enables branch circuit protection in addition to the protection functions of short-circuit, overload, and overcurrent.

UL Standard and SCCR

UL60497-4-1A and Type F

Type E/F Selection List

Motor circuit breaker | Setting range | I0H (A) | I0L (A) | I0E (A) | I0M (A) | No horse power settings | No horse power settings | 400-480V | 480-575V | Combination units | SCCR (kA) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<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>MMP-T32</td>
<td>120-180</td>
<td>0.16</td>
<td>0.16</td>
<td>0.4</td>
<td>0.6</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>UT-4/CVC</td>
<td>UT-TU</td>
</tr>
<tr>
<td></td>
<td>220-280</td>
<td>0.25</td>
<td>0.25</td>
<td>0.4</td>
<td>0.6</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>UT-4/CVC</td>
<td>UT-TU</td>
</tr>
<tr>
<td></td>
<td>380-520</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.6</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>UT-4/CVC</td>
<td>UT-TU</td>
</tr>
<tr>
<td></td>
<td>220-280</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.6</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
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<td>UT-TU</td>
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<tr>
<td></td>
<td>380-520</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.6</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>UT-4/CVC</td>
<td>UT-TU</td>
</tr>
</tbody>
</table>

Type E/F Selection List

Motor circuit breaker | Setting range | I0H (A) | I0L (A) | I0E (A) | I0M (A) | No horse power settings | No horse power settings | 400-480V | 480-575V | Combination units | SCCR (kA) |
<table>
<thead>
<tr>
<th></th>
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<td>0.4</td>
<td>0.6</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>UT-4/CVC</td>
<td>UT-TU</td>
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<tr>
<td></td>
<td>220-280</td>
<td>0.25</td>
<td>0.25</td>
<td>0.4</td>
<td>0.6</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>UT-4/CVC</td>
<td>UT-TU</td>
</tr>
<tr>
<td></td>
<td>380-520</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.6</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>UT-4/CVC</td>
<td>UT-TU</td>
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<tr>
<td></td>
<td>220-280</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.6</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>UT-4/CVC</td>
<td>UT-TU</td>
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<tr>
<td></td>
<td>380-520</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.6</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>UT-4/CVC</td>
<td>UT-TU</td>
</tr>
</tbody>
</table>
About Warranty

Before purchasing and using our products, please confirm the following product 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 or use conditions specifically impact the life 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 rewires without our authorization.
   ⑤ Failures caused by uses of the product other than ordinarily intended.
   ⑥ Failures caused by force majeure such as fire and abnormal voltage accidents, and natural disasters such as earthquakes, wind and flood.
   ⑦ 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.

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 our service company with charge. In this case, a service fee shall be charged to the customer in accordance with our price list.

Recommendation for renewal due to life
Our Motor circuit breakers with contacts and mechanical parts have certain wear life in line with the number of open/close operations, while our mold components, coil wires, electronic parts and grease have aging degradation life influenced by the use environment and use conditions.
Regarding the use of our Motor circuit breakers, we recommend customers to renew the products every 15 years as a rule, provided that the products are used in line with the number of opening/closure operations specified by this catalog or the instruction manual under the standard use conditions of Molded Case Circuit Breakers and Earth-Leakage Circuit Breakers as mentioned by the "Survey on Recommended Renewal Timing for Low Voltage Devices" issued by Japan Electrical Manufacturers' Association (JEMA).

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 other jobs, and damages caused by any reasons for which we are not held responsible, shall be outside the scope of our compensation.

Applicable areas of our 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 the external view or specifications that should not affect the model selection change without prior announcement.
(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.
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 security machines, please contact our representatives and discuss any necessary agreement or specifications.

Supply period of spare goods after production stop
(1) For our Motor circuit breakers, no repairs or supply of spare parts are provided by us.
(2) For the discontinuation of production, we will announce in such media as "Sales and Service" paper created by us.
**Related Products**

<table>
<thead>
<tr>
<th>AC Servomotor</th>
<th>Mitsubishi General Purpose AC Servomotor MELSERVO J4 Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-performance servomotor of industry-leading level</td>
<td></td>
</tr>
<tr>
<td>- Industry-leading level of basic performance: Speed frequency response (2.5kHz), 4M pulse (4,194,304p/rev) encoder</td>
<td></td>
</tr>
<tr>
<td>- Advanced one-touch tuning function allows one-touch adjustment of advanced vibration suppression control III</td>
<td></td>
</tr>
<tr>
<td>- Large capacity drive recorder and machine diagnosis function are implemented. It has achieved reduction of maintenance load.</td>
<td></td>
</tr>
<tr>
<td>- The lineup of servo-amplifiers with two-axis/three-axis in a body. This has achieved energy saving, space saving, wiring-reduction and cost saving.</td>
<td></td>
</tr>
</tbody>
</table>

**Production Specifications**

- **Power unit specifications**: Single-phase/3-phase AC300V
- **Instruction interface**: SD/SDH, pulse train, analog
- **Control mode**: Position control, speed control, torque control
- **Speed frequency response**: 2.5kHz
- **Tuning functions**: Advanced one-touch tuning, advanced vibration suppression control III, robust filter, etc.
- **Safety functions**: STD, 001, 020, 051, 061, 081, 091 to be supported by the combination with a motion controller

<table>
<thead>
<tr>
<th>CNC</th>
<th>Mitsubishi Numeric Controller M70V Series</th>
</tr>
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<tbody>
<tr>
<td>A global standard model pursuing speed and precision</td>
<td></td>
</tr>
<tr>
<td>- With the control by instruction unit being 0.1μm and internal interpolation unit being 1mm, high precision and smooth mechanical work have been achieved.</td>
<td></td>
</tr>
<tr>
<td>- Operation and display that do not let one feel the layer structure of the screen, as well as easy program control using standard implementation of Ethernet IP have been realized.</td>
<td></td>
</tr>
<tr>
<td>- A compact unit integrating a display and controller being integrated has contributed to miniaturization of the control panel.</td>
<td></td>
</tr>
<tr>
<td>- The lineup of Type A suited for combined lathe and Type B suited for tapping center</td>
<td></td>
</tr>
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</table>

**Production Specifications**

- **Horizontal center distance of two-axis (mm)**: Type A: 115mm, Type B: 95mm
- **Maximum number of pulses**: Type A: 2 pulses, Type B: 1 pulse
- **Maximum interpolation unit**: 0.05μm
- **Minimum control**: 1mm
- **Revolving servomotor capacity range**: Type A: Max 0.15kW, Max 0.25kW, Type B: Max 0.25kW (1.25kHz)
- **Maximum PLC program memory capacity**: Type A: 32,000 bytes, Type B: 32,000 bytes
- **Function blocks (for machining center)**: G01/G02/G03 (traditional high-speed interpolation taper/深切/深割), G41/G42/G43 (tool compensation), etc.
- **Function blocks (for teaching)**: 3D teaching, 3D teaching (with teaching mode), interpolation teaching, interpolation teaching, interpolation teaching, etc.

**Robot | Industrial Robot MELFA F Series RV-4F**

- **High-speed, high-precision, high-function 4kg transportable vertical-multijoint robot** |
- **Using the unique driving technology, higher-speed motion has been realized.** |
- **Hand wiring and internal piping have contributed to enhanced tooling performance.** |
- **Expansion of the rotational axis motion range has enabled full utilization of the installation space.** |
- **Adoption of flap-shaped arm has realized an operational area suited to a compact area.**

**Production Specifications**

- **Degree of freedom of motion**: 4
- **Structure**: Vertical multijoint type
- **Installation posture**: From standing, hanging from the ceiling, hanging on the wall (paths some restrictions on the relative range at F7)
- **Weight capacity**: 4kg
- **Maximum reach diameter**: 515mm
- **Cycle time (empty weight)**: 0.36sec. (11sec)
- **Position repetition accuracy**: ±0.05mm
- **Positional specifications**: IP4X (Classification: ISO class 3, oil mist specification: IP67)

**Magnetic Starter | MS-T Series**

- **3-phase motor** |
- **High Performance Energy Saving Motor, Super Line Eco Series SF-4R** |
- **High grade motor, pursuing energy saving** |
- **By design and manufacturing technology pursuing ultimate low loss, industry-leading high efficiency and energy saving have been realized.** |
- **The advanced flux vector control by our inverter enables 100% constant torque continuous operation of 1:10.** |
- **The bearing grease life has been prolonged (by a factor of 2.5 compared to our conventional products). Allowing maintenance-free operation for a long time.** |
- **Achieved low-noise operation (5 to 6dB reduction compared to our conventional products).** |
- **The use of identical dimensions by the standard motor (with some exceptions) allows easy switching.**

<table>
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<tr>
<td><strong>Number of poles</strong>: Two-pole, four-pole, six-pole</td>
</tr>
<tr>
<td><strong>Voltage, frequency</strong>: 200/200/200 50/60/60Hz to 480/480/480 50/60/60Hz</td>
</tr>
<tr>
<td><strong>Gear ratio</strong>: 1:10 (1000:100)</td>
</tr>
<tr>
<td><strong>Protection mechanism</strong>: IP54</td>
</tr>
<tr>
<td><strong>Motion energy transmission method</strong>: Two-pole motors of 4kW or higher and three-phase motors up to 10kW are driven by an endless belt</td>
</tr>
<tr>
<td><strong>Rotation direction</strong>: Counterclockwise direction as viewed from the axial end (CCW)</td>
</tr>
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</table>

**Low voltage breaker | Mitsubishi No-fuse Breaker, Earth Leakage Breaker WS-V Series**

- **The optimum breaker proposal by double specifications, for mechanical equipment uses and for receiving/distributing equipment uses** |
- **A general purpose Magnetic Contactor of 10A frames has achieved the smallest size in the industry with a width of 36mm.** |
- **Adoption of new breaker technology Expanded ISTEAK enables excellent performance of one-rank higher.** |
- **With conformance to various overseas standards, the product supports the global export of power boards and machines.** |
- **By realizing the common use of internal accessory devices, it contributes to shorter delivery time and reduction in number of inventory items.**

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<tr>
<td><strong>Frame</strong>: 3A - 20A frame</td>
</tr>
<tr>
<td><strong>Supplied conforming standards</strong>: Support for (compliance to) various standards such as UL, IEC, GB, UL, and CSA</td>
</tr>
<tr>
<td><strong>Supplemental functions of UL registration</strong>: Support for SCOR requirements by expansion of AC480V and high breaker capacity products.</td>
</tr>
<tr>
<td><strong>Common use of internal accessory devices</strong>: The conventional three types of internal accessory devices for each frame have now been unified to one common type.</td>
</tr>
<tr>
<td><strong>Mounting to DIN rail</strong>: The AC480V for small breaker 32A-630A frame have been unified (except for NFUS-C15F).</td>
</tr>
<tr>
<td><strong>Support for finger protection</strong>: Supports IP20 from the direction to the terminal part from side as standard for all models of small size F Style types 2A - 125A frame.</td>
</tr>
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**MOTOR CIRCUIT BREAKERS**

- **Exceed your expectations.** |
- **10A frame model is over 16% smaller with a width of just 36mm!!** |
- **New integrated terminal covers.** |
- **Reduce your coil inventory by up to 50%.** |
- **Be certified to the highest international levels while work is ongoing to gain other country.** |

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<td><strong>Frame</strong>: 10A to 32A</td>
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<tr>
<td><strong>Applicable standards</strong>: Certificates to various standards including IEC, JIS, CE, UL, TUV, CCC</td>
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<tr>
<td><strong>Terminal cover</strong>: Standard terminal cover improves safety, simplified wiring, and reduced inventory, etc.</td>
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<tr>
<td><strong>Improved wiring</strong>: Wiring and operability are improved with streamlining wing terminal RIC specifications.</td>
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<td><strong>Option units</strong>: Distant line unit includes Auxiliary Contact Unit, Operation Coil Surge Absorber Unit, Mechanical Interlock Unit</td>
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