# Specifications

## Energy Measuring Unit

### Basic Unit

| Item | | | Specification | | |
|---|---|---|---|---|---|
| Model | | | Energy Measuring Standard Model EMU4-BM1-MB | Energy Measuring High Performance Model EMU4-HM1-MB | Insulation Monitor Model EMU4-LG1-MB |
| Phase wire system | | | Single-phase 2-wire/single-phase 3-wire, 3-phase 3-wire common | Single-phase 2-wire/single-phase 3-wire, 3-phase 3-wire/ three-phase 4-wire common | Single-phase 2-wire/single-phase 3-wire, 3-phase 3-wire/ three-phase 4-wire common |
| Instrument ratings | Voltage circuit | Single-phase 2-wire/ 3-phase 3-wire | 110V, 220VAC common (*1) | 110V, 220V, 440VAC common (*2) | 110V, 220V, 440VAC common (*2) |
| | | Single-phase 3-wire | 110VAC (between wires 1 and 2, and wires 2 and 3), 220VAC (between wires 1 and 3) | 110VAC (between wires 1 and 2, and wires 2 and 3), 220VAC (between wires 1 and 3) 220VAC (between wires 1 and 2, and wires 2 and 3), 440VAC (between wires 1 and 3) | 110VAC (between wires 1 and 2, and wires 2 and 3), 220VAC (between wires 1 and 3) 220VAC (between wires 1 and 2, and wires 2 and 3), 440VAC (between wires 1 and 3) |
| | | 3-phase 4-wire | – | Minimum: 63.5V/110VAC, Maximum: 277V/480VAC (*3) | |
| | Current circuit | | 50A, 100A, 250A, 400A, 600A (Dedicated split-type current sensor is used. All values indicate primary current values of current sensor.) 5A (Dedicated 5A current sensor is used. Current transformer (CT) is used in two-step configuration together with the 5A current sensor in order to allow a maximum primary current value setting of 30,000A) (*4) | | 1A (Mitsubishi ZCT is used. Primary current value of ZCT is indicated.) |
| | Frequency | | 50/60Hz (automatic frequency selection) | | |
| Auxiliary power rating | | | 100V – 240VAC (+10%, -15%) 50/60Hz | | |
| No. of measurement circuits | | | 1circuit | 1circuit | 1circuit |
| Consumption VA | | Voltage circuit | For each phase: 0.1VA (110VAC), 0.2VA (220VAC) | For each phase: 0.1VA (110VAC), 0.2VA (220VAC), 0.4VA (440VAC) | For each phase: 0.1VA (110VAC), 0.2VA (220VAC), 0.4VA (440VAC) |
| | | Current circuit | For each phase: 0.1VA (current sensor primary side) | | |
| | | Auxiliary power circuit (*10) | 110VAC:2.0VA AC220V:3.0VA | | |
| Measurement items | | | Current, demanded current, voltage, power, demanded power, reactive power, power factor, frequency, electric energy (regenerative, consumption), reactive electric energy (*7), current imbalance rate, voltage imbalance rate, operating time | | – |
| | | | – | Apparent power, periodic electric energy, harmonic current, harmonic voltage, pulse count value, pulse conversion value, electric energy conversion value | Leakage current, demanded leakage current, resistance leakage current (*8), demanded resistance leakage current (*8), resistance leakage current difference conversion value (*8) |
| Main unit tolerances (*5) | | | Current, voltage, power, reactive power, apparent power, frequency: ±1.0% (relative to rated input) Power factor: ±3.0% Electric energy: ±2.0%(in 5 to 100% range of rated values; power factor = 1) Reactive electric energy: ±2.5% (in 10 to 100% range of rated values; power factor = 0) | Current, voltage, power, reactive power, apparent power, frequency: ±1.0% (relative to rated input) Power factor: ±3.0% Electric energy: ±2.0%(in 5 to 100% range of rated values; power factor = 1) Reactive electric energy: ±2.5% (in 10 to 100% range of rated values; power factor = 0) Harmonic current, harmonic voltage: ±2.5% | Low sensitivity mode Leakage current Io, resistive leakage current Ior: ±2.5% (relative to 10 to 100% of rating) Leakage current Io, resistive leakage current Ior: ±2.5mA (relative to 10% of rating or lower) High sensitivity mode Leakage current Io, resistive leakage current Ior: ±2.5mA |
| Data update cycle | | | 100msec | | Leakage current: 2sec, resistive leakage current: 2sec |
| External input specification | Input signal format | | – | Non-voltage a contact, 1 input (Select function from below) | – |
| | Function | | – | Contact/pulse input | – |
| | | Contact input | – | Monitoring of contact and measurement of electric energy during operation (when contact is ON) | – |
| | | Pulse input | – | Counting of input pulse (count: 0 to 999,999) | – |
| | Rated input voltage/current | | – | 5VDC, 7mA | – |
| External output specification | Output signal format | | – | Non-voltage a contact, 1 output (Select function from below) | |
| | Function | | – | Alarm/pulse output | Alarm |
| | | Alarm output | – | Contact output of alarm generating status Select monitoring target from below. Monitoring of current demand upper limit, monitoring of current demand lower limit Monitoring of N-phase current demand upper limit Monitoring of line voltage upper limit Monitoring of line voltage lower limit Monitoring of phase voltage upper limit Monitoring of phase voltage lower limit Monitoring of power demand upper limit, monitoring of power demand lower limit Monitoring of power factor upper limit, monitoring of power factor lower limit Monitoring of pulse conversion value upper limit Monitoring of current imbalance rate upper limit Monitoring of voltage imbalance rate upper limit | Contact output of alarm generating status Select monitoring target from below Leakage current first stage alarm Leakage current second stage alarm Resistance leakage current first stage alarm Resistance leakage current second stage alarm Limit alarm of number of first stage alarm occurrences of leakage current Limit alarm of number of second stage alarm occurrences of leakage current Limit alarm of number of first stage alarm occurrences of resistance leakage current Limit alarm of number of second stage alarm occurrences of resistance leakage current |
| | | Plus output | – | Pulse output of electric energy Select pulse unit from below. 0.001/0.01/0.1/1/10/100/1000/10000/100000(kWh/pulse) (*6) | – |
| | Rated switching voltage/current | | – | 35VDC 75mA, 24VAC 75mA (Power factor = 1) | |
| Power interruption backup | Recorded item | | Setting values, electric energy (consumption, regenerative), reactive electric energy, periodic electric energy, operating time, pulse count value, pulse conversion value, electric energy conversion value, maximum value, minimum value (Stored in the nonvolatile memory) | | •Setting values •Number of alarm occurrences •Maximum value (Stored in the nonvolatile memory) |
| Compatible standard | | | EMC: EN-61326-1:2013, Safety: EN-61010-1:2010 | | |
| Operating environment | Operating temperature range | | -5°Cto +55°C (ave. daily temp. of 35°C or lower) | | |
| | Operating humidity range | | 30% to 85%RH (no condensation) | | |
| | Storage temperature range | | -10°C to +60°C (ave. daily temp. of 35°C or lower) | | |
| | Altitude | | 2,000 m or lower | | |
| Commercial-frequency withstand voltage | | | Between all terminals (excluding communication circuit and frame GND terminal) and external casing: 2,000VAC for 1min Between all current/voltage inputs and all auxiliary power terminals: 2,000VAC for 1min | | |
| | | | Between all current/voltage inputs, auxiliary power terminals and all contact/pulse inputs, pulse/alarm outputs, communication terminals: 2,000VAC for 1min | | |
| Insulation resistance | | | At the same locations as above: 10 MΩ or more (500VDC) | | |
| Compatible wire | Auxiliary power/voltage input terminal | | AWG26-14 (single wire/stranded wires) (Single wire: $\phi$0.41 to $\phi$1.62mm, Stranded wires: 0.13 to 2.0mm$^2$) | | |
| | Current input | | Single wire: AWG24-17, Stranded wires: AWG20-26 (*9) (Single wire: $\phi$0.5 to $\phi$1.2mm, Stranded wires: 0.5 to 1.3mm$^2$) | | |
| | Input/output terminal | | – | AWG26-16 (single wire/stranded wires) (Single wire: $\phi$0.41 to $\phi$1.29mm, Stranded wires: 0.13 to 1.3mm$^2$) | |
| Weight | | | 0.2kg | | |
| External dimensions (unit: mm) | | | 37.5 (W) x 90 (H) x 94 (D) mm (excluding protruding parts) | | |

* 1: 110V and 220V can be connected directly. Externally mounted voltage transformer (VT) for instrument is needed for voltages greater than those (primary voltage can be set to up to 11,000V, and secondary voltage can be set between 1 and 220V). For details, see the instruction manual.
* 2: 110V, 220V and 440V can be connected directly. Externally mounted voltage transformer (VT) for instrument is needed for voltages greater than those (primary voltage can be set to up to 6,600V, and secondary voltage can be set between 1 and 220V). For details, see the instruction manual.
* 3: 63.5V/110V – 277V/480V can be connected directly. An externally mounted voltage transformer (VT) for instrument is needed for voltages greater than those (primary voltage can be set to up to 6,600V, and secondary voltage can be set between 1 and 220V). For details, see the instruction manual.
* 4: The settable primary current when using the 5A current sensor is as follows: 5A, 6A, 7.5A, 8A, 10A, 12A, 15A, 20A, 25A, 30A, 40A, 50A, 60A, 75A, 80A, 100A, 120A, 150A, 200A, 250A, 300A, 400A, 500A, 600A, 750A, 800A, 1000A, 1200A, 1500A, 1600A, 2000A, 2500A, 3000A, 4000A, 5000A, 6000A, 7500A, 8000A, 10000A, 12000A, 20000A, 25000A, 30000A(CT primary side can be set freely up to 30,000A. However, CT secondary side is fixed at 5A.)
* 5: Refer to the specifications of options (split-type current sensor, 5A current sensor) on page 939 for the current sensor error rates.
* 6: Refer to the instruction manual for the detail on the setting of pulse unit.
* 7: Measurements are conducted based on a setting other than 2-circuit measurement mode with single-phase 2-wire setting.
* 8: It measures only in the case of Single-phase 2-wire, Single-phase 3-wire, 3-phase 3-wire.
* 9: Recommended bar terminal: Nichihu TGV TC-1.25-11T.
*10: Connected with optional units, it increases AC110V:4.5VA, AC220V:5.0VA. Connected with display units, it increases AC110V:1.5VA, AC220V:2.0VA.

## Extension Unit

| Item | | | Specification | |
|---|---|---|---|---|
| Model | | | Energy Measuring Extension Unit for Different voltage system EMU4-VA2 | Energy Measuring Extension Unit for Same Voltage System EMU4-A2 |
| Phase wire system | | | Single-phase 2-wire/single-phase 3-wire, 3-phase 3-wire/ 3-phase 4-wire common | (Same as the unit connected on the left side) |
| Instrument ratings | Voltage circuit | Single-phase 2-wire/ 3-phase 3-wire | 110V, 220V, 440VAC common (*2) | |
| | | Single-phase 3-wire | 110VAC (between wires 1 and 2, and wires 2 and 3), 220VAC (between wires 1 and 3) 220VAC (between wires 1 and 2, and wires 2 and 3), 440VAC (between wires 1 and 3) | |
| | | 3-phase 4-wire | Minimum: 63.5V/110VAC, Max.: 277V/480VAC (*3) | |
| | Current circuit | | 50A, 100A, 250A, 400A, 600A<br>(Dedicated split-type current sensor is used. All values indicate primary current values of current sensor.)<br>5A<br>(Dedicated 5A current sensor is used. Current transformer (CT) is used in two-step configuration together with the 5A current sensor in order to allow a maximum primary current value setting of 30,000A) (*4) | |
| | Frequency | | 50/60Hz (automatic frequency selection) | |
| Auxiliary power rating | | | (Same as basic unit) | |
| No. of measurement circuits | | | 2circuits | 2circuits |
| Consumption VA | | Voltage circuit | For each phase: 0.1VA (110VAC), 0.2VA (220VAC), 0.4VA (440VAC) | – |
| | | Current circuit | For each phase: 0.1VA (current sensor primary side) | |
| | | Auxiliary power circuit (*10) | AC110V:1.0VA AC220VA:1.5VA | |
| Measurement items | | | Current, demanded current, voltage, power, demanded power, reactive power, power factor, frequency, electric energy (regenerative, consumption), reactive electric energy (*7), current imbalance rate, voltage imbalance rate, operating time | |
| | | | Apparent power, harmonic current, harmonic voltage, electric energy conversion value | |
| Main unit tolerances (*5) | | | Current, voltage, power, reactive power, apparent power, frequency: ±1.0% (relative to rated input)<br>Power factor: ±3.0%<br>Electric energy: ±2.0%(in 5 to 100% range of rated values; power factor = 1)<br>Reactive electric energy: ±2.5% (in 10 to 100% range of rated values; power factor = 0)<br>Harmonic current, harmonic voltage: ±2.5% | |
| Data update cycle | | | 100msec | |
| External input specification | Input signal format | | – | – |
| | Function | | – | – |
| | | Contact input | – | – |
| | | Pulse input | – | – |
| | Rated input voltage/current | | – | – |
| External output specification | Output signal format | | Non-voltage a contact, 1 output (Select function from below) | |
| | Function | | Alarm/pulse output | |
| | | Alarm output | Contact output of alarm generating status<br>Select monitoring target from below.<br>Monitoring of current demand upper limit, monitoring of current demand lower limit<br>Monitoring of N-phase current demand upper limit<br>Monitoring of line voltage upper limit<br>Monitoring of line voltage lower limit<br>Monitoring of phase voltage upper limit<br>Monitoring of phase voltage lower limit<br>Monitoring of power demand upper limit, monitoring of power demand lower limit<br>Monitoring of power factor upper limit, monitoring of power factor lower limit<br>Monitoring of current imbalance rate upper limit<br>Monitoring of voltage imbalance rate upper limit | |
| | | Plus output | Pulse output of electric energy<br>Select pulse unit from below.<br>0.001/0.01/0.1/1/10/100/1000/10000/100000(kWh/pulse) (*6) | |
| | Rated switching voltage/current | | 35VDC 75mA, 24VAC 75mA (Power factor = 1) | |
| Power interruption backup | Recorded item | | Setting values, electric energy (consumption, regenerative), reactive electric energy, periodic electric energy, operating time, pulse count value, pulse conversion value, electric energy conversion value, maximum value, minimum value (Stored in the nonvolatile memory) | |
| Compatible standard | | | EMC: EN-61326-1:2013, Safety: EN-61010-1:2010 | |
| Operating environment | Operating temperature range | | -5°Cto +55°C (ave. daily temp. of 35°C or lower) | |
| | Operating humidity range | | 30% to 85%RH (no condensation) | |
| | Storage temperature range | | -10°C to +60°C (ave. daily temp. of 35°C or lower) | |
| | Altitude | | 2,000 m or lower | |
| Commercial-frequency withstand voltage | | | Between all terminals (excluding communication circuit and frame GND terminal) and external casing: 2,000VAC for 1min | |
| | | | Between all current/voltage inputs and all auxiliary power terminals: 2,000VAC for 1min | |
| | | | Between all current/voltage inputs, auxiliary power terminals and all contact/pulse inputs, pulse/alarm outputs, communication terminals: 2,000VAC for 1min | |
| Insulation resistance | | | At the same locations as above: 10 MΩ or more (500VDC) | |
| Compatible wire | Auxiliary power/voltage input terminal | | AWG26-14 (single wire/stranded wires)<br>(Single wire: $\phi$0.41 to $\phi$1.62mm, Stranded wires: 0.13 to 2.0mm$^2$) | – |
| | Current input | | Single wire: AWG24-17, Stranded wires: AWG20-26 (*9)<br>(Single wire: $\phi$0.5 to $\phi$1.2mm, Stranded wires: 0.5 to 1.3mm$^2$) | |
| | Input/output terminal | | AWG26-16 (single wire/stranded wires)<br>(Single wire: $\phi$0.41 to $\phi$1.29mm, Stranded wires: 0.13 to 1.3mm$^2$) | |
| Weight | | | 0.2kg | |
| External dimensions (unit: mm) | | | 37.5 (W) x 90 (H) x 94 (D) mm (excluding protruding parts) | |

*1: 110V and 220V can be connected directly. Externally mounted voltage transformer (VT) for instrument is needed for voltages greater than those (primary voltage can be set to up to 11,000V, and secondary voltage can be set between 1 and 220V). For details, see the instruction manual.
*2: 110V, 220V and 440V can be connected directly. Externally mounted voltage transformer (VT) for instrument is needed for voltages greater than those (primary voltage can be set to up to 6,600V, and secondary voltage can be set between 1 and 220V). For details, see the instruction manual.
*3: 63.5V/110V – 277V/480V can be connected directly. An externally mounted voltage transformer (VT) for instrument is needed for voltages greater than those (primary voltage can be set to up to 6,600V, and secondary voltage can be set between 1 and 220V). For details, see the instruction manual.
*4: The settable primary current when using the 5A current sensor is as follows:
5A, 6A, 7.5A, 8A, 10A, 12A, 15A, 20A, 25A, 30A, 40A, 50A, 60A, 75A, 80A, 100A, 120A, 150A, 200A, 250A, 300A, 400A, 500A, 600A, 750A, 800A, 1000A, 1200A, 1500A, 1600A, 2000A, 2500A, 3000A, 4000A, 5000A, 6000A, 7500A, 8000A, 10000A, 12000A, 20000A, 25000A, 30000A(CT primary side can be set freely up to 30,000A. However, CT secondary side is fixed at 5A.)
*5: Refer to the specifications of options (split-type current sensor, 5A current sensor) on page 939 for the current sensor error rates.
*6: Refer to the instruction manual for the detail on the setting of pulse unit.
*7: Measurements are conducted based on a setting other than 2-circuit measurement mode with single-phase 2-wire setting.
*8: It measures only in the case of Single-phase 2-wire, Single-phase 3-wire, 3-phase 3-wire.
*9: Recommended bar terminal: Nichifu TGV TC-1.25-11T.

## Split-type Zero-phase Current Transformer

| Item | Specification | | | | |
|---|---|---|---|---|---|
| Model | CZ-22S | CZ-30S | CZ-55S | CZ-77S | CZ-112S |
| Hole diameter (mm) | 22 | 30 | 55 | 77 | 112 |
| Allowable current (A) | 50 | 100 | 300 | 600 | 1.000 |
| Weight (kg) | 0.5 | 0.6 | 1.8 | 2.8 | 2.8 |
| Rated short-time current | 50kA (peak-to-peak value: 100kA) | | | | |

## Through-type Zero-phase Current Transformer

| Item | Specification | | | | | |
|---|---|---|---|---|---|---|
| Model | ZT15B | ZT30B | ZT40B | ZT60B | ZT80B | ZT100B |
| Hole diameter (mm) | 15 | 30 | 40 | 60 | 80 | 100 |
| Allowable current | Refer to the following table, "Zero-phase Current transformer (ZCT) inside Diameter, Maximum Through-wire Diameter and Allowable Current." | | | | | |
| Weight (kg) | 0.2 | 0.4 | 0.6 | 2.0 | 2.6 | 3.3 |
| Rated short-time current | 50kA (peak-to-peak value: 100kA) | | | | | |

## Zero-phase Current Transformer with Primary Conductor

| Item | Specification | | |
|---|---|---|---|
| Model | ZTA600A | ZTA1200A | ZTA2000A |
| Allowable current (A) | 600 | 1200 | 2000 |
| Weight (kg) | 6.5 | 11 | 27 |
| Rated burden | 3 | | |
| Number of polarities | AC600V | | |
| Rated short-time current | 100kA (peak value) | | |

## Zero-phase Current transformer (ZCT) inside Diameter, Maximum Through-wire Diameter and Allowable Current

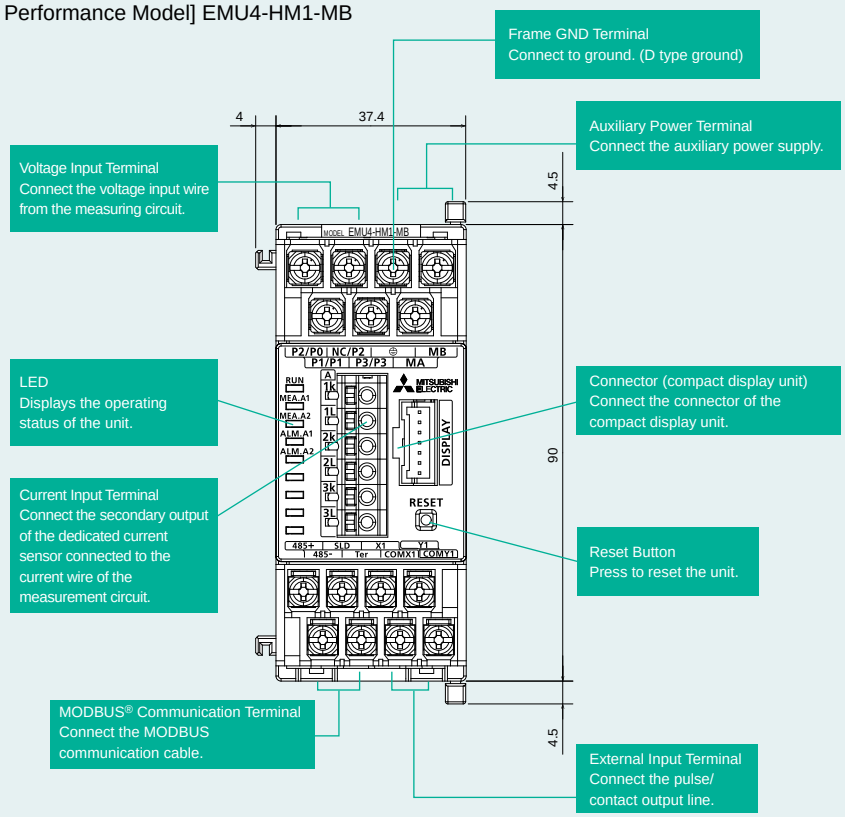
| Wiring | | | Maximum through-wire diameter (mm²) (Allowable current (A) of wire) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Split type | | | | | Through type | | | | | |
| Phase wire | No. of wires | Wire type | CZ-22S | CZ-30S | CZ-55S | CZ-77S | CZ-112S | ZT15B | ZT30B | ZT40B | ZT60B | ZT80B | ZT100B |
| Single-phase 2-wire | 2 | 600V polyvinyl-insulated wire (IV) | 22 (115) | 60 (217) | 250 (556) | 500 (842) | – | 14 (88) | 60 (217) | 150 (395) | 325 (650) | 600 (992) | 800 (1185) |
| | | 600V cross-linked polyethylene-insulated wire Single-core wire (CV wire) | 22 (130) | 38 (190) | 200 (545) | 500 (920) | 1000 (1465) | 2 (33) | 38 (190) | 60 (260) | 250 (655) | 400 (870) | 600 (1140) |
| Single-phase 3-wire 3-phase 3-wire | 3 | 600V polyvinyl-insulated wire (IV) | 22 (115) | 38 (162) | 200 (496) | 500 (842) | – | 8 (61) | 38 (162) | 100 (298) | 250 (556) | 500 (842) | 725 (1095) |
| | | 600V cross-linked polyethylene-insulated wire Single-core wire (CV wire) | 14 (100) | 22 (135) | 150 (455) | 325 (760) | 800 (1285) | 2 (33) | 22 (135) | 60 (260) | 200 (560) | 325 (760) | 600 (1140) |

*1: Note that the wire thickness may vary slightly depending on the manufacturer.
*2: The IV wire applies to cases where insulators are used.
*3: The IV wire applies to cases where insulation in a covered conduit in air.
(Cables of 600mm² or more have various structures. The values are shown for reference. )

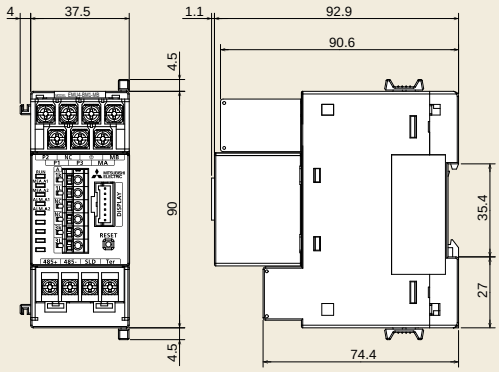
# External View

Units (mm)

●[Energy Measuring High Performance Model] EMU4-HM1-MB

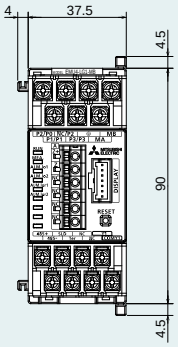



●[Energy Measuring Standard Model] EMU4-HM1-MB

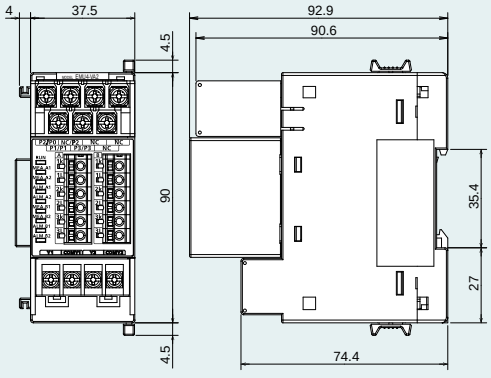



* This side view also applies to other basic unit models (EMU4-BM1-MB, EMU4-HM1-MB, EMU4-LG1-MB).

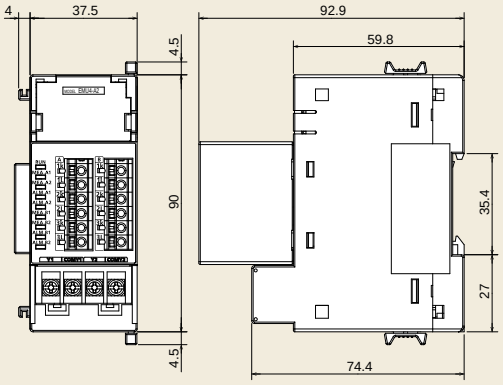
●[Insulation Monitor Model] EMU4-LG1-MB




●[Energy Measuring Extension Unit for Different Voltage System] EMU4-VA2




●[Energy Measuring Extension Unit for Same Voltage System] EMU4-A2



MEMO

# System Configuration Example

## Energy Management System

## Energy-saving Data Collection Server

EcoWebServerⅢ

Support factory, building and school energy-saving activities.
Build visualized environments and manage energy effectively.
Support to energy conditions at all times and quickly resolve energy loss problems.
Finaly reduce energy loss, increase productivity and cut production costs.

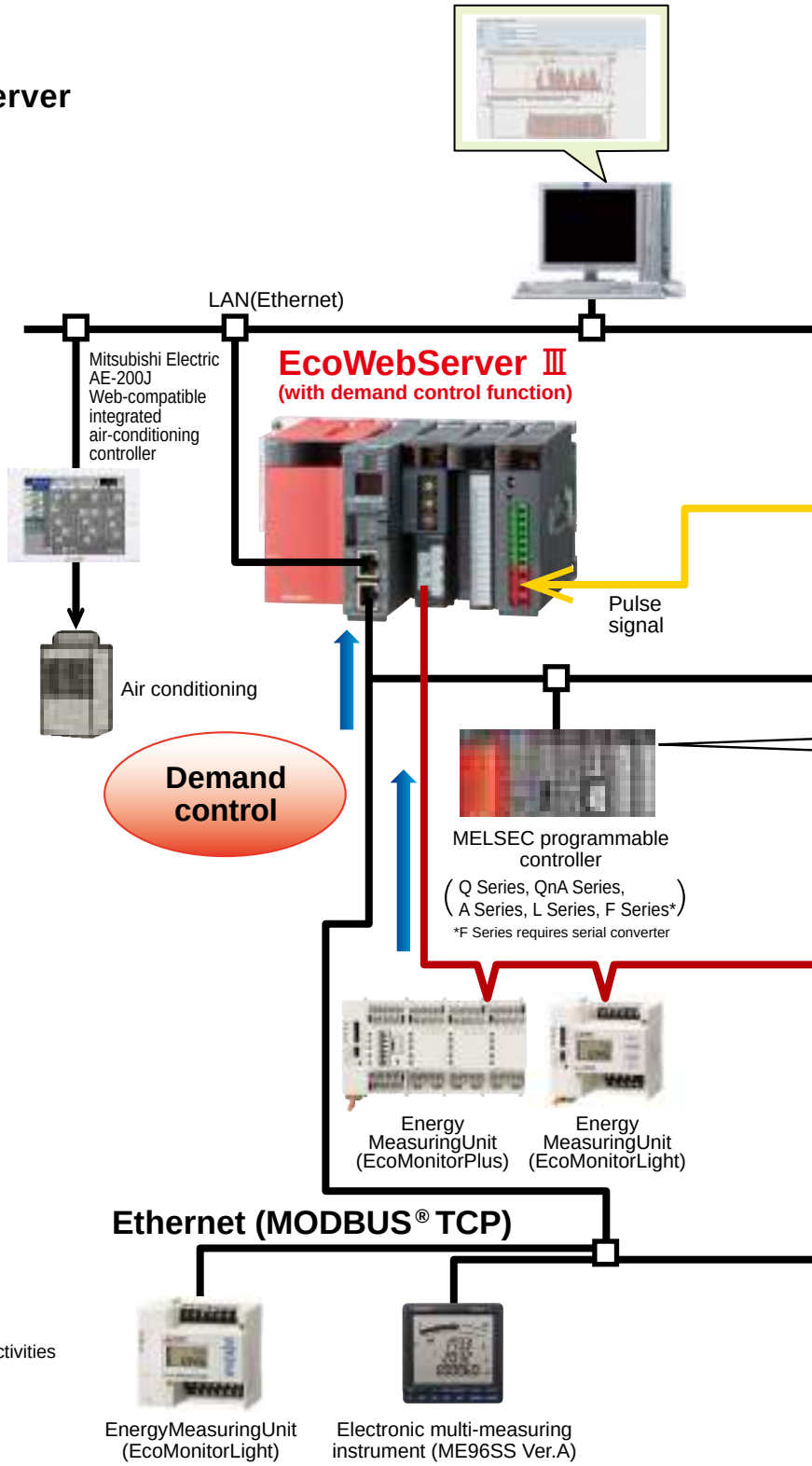
## Energy-saving method

**Plan** Comparatively high specific consumption (waste of energy, negative influence on productivity)
Ex) △kWh of electricity per day can be saved with improvement.

**Do**
- Facilities start-up too fast
- After investigation and deciding appropriate start-up time, implement countermeasure

**Check** Compare data before and after implementing countermeasure (△kWh reduced per day)

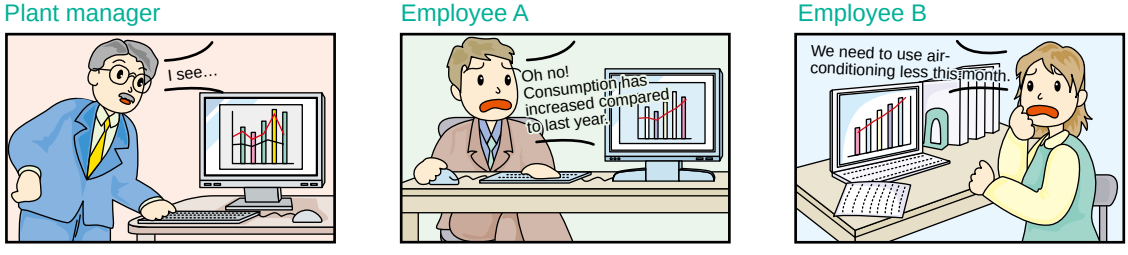
**Action** Implement similar countermeasures for other facilities




## Support energy-saving activities using "Visible Management"

1. Monitor/Manage energy by department
2. Specific consumption-based management of energy-saving activities
3. Monthly/Annual target-based management
4. Monitor equipment operating status
5. Manage/Record energy data

Entire factory



E-mail notification
(abnormal upper/lower limits, operating status, target value over specific consumption, over planned energy value, error information)

Transfers files in CSV format
(zoom (1 or 5 min), daily, monthly, annual, facility (daily), specific consumption, demand (daily, monthly, annual), demand alarm, control, operation history, system log file)

Acquire time information
Adjust EcoWebServer Ⅲ clock



FTP server
(File server)

SMTP server
(Mail server)

SNTP server
(Time server)

Receving point

**Demand measurement**

Electronic multi-measuring instrument (ME96SS Ver.A)

Data collection inside inner register

Measurement data written to inner register

**Ethernet (MELSEC communication protocol)**

Collects production data

Up to 32 units

QE81WH QE82LG

MELSEC-Q Series
Energy measuring module / Insulation monitoring module

MITSUBISHI GOT

Check demand information and alarm records onsite

Network monitoring lamp

**Specific consumption management**

Collects energy data

***CC-Link***

MDU breaker

Electronic multi-measuring instrument (ME96SS Ver.A)

Analog input
Temperature input
Contact output
(Enables remote control of load at locations far from EcoWebServer Ⅲ)

Air circuit breaker (AE-SW Series)

**Target-based management**

MODBUS® TCP ⇔ MODBUS® RTU Protocol converter

**RS-485 (MODBUS® RTU)**

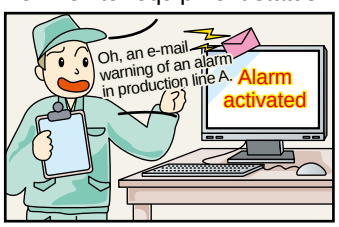
Electronic multi-measuring instrument (ME96SS Ver.A)

EnergyMeasuringUnit (EcoMonitorLight)

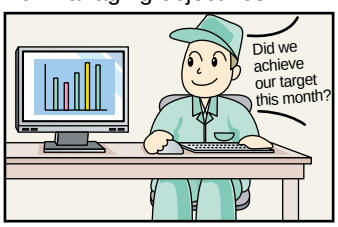
EnergyMeasuringUnit (EcoMonitorPlus)

## Production line

For monitor equipment status




For managing objectives




For improvement activities

# Importance of Visualizing Energy

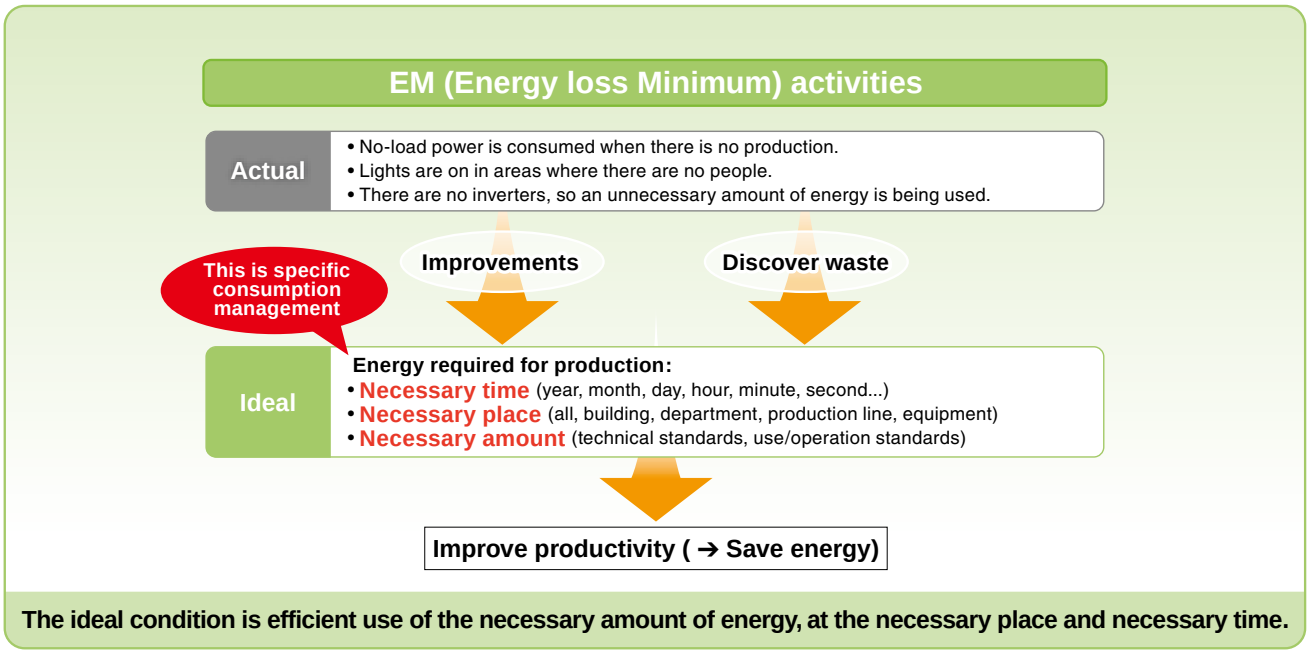
## Essentials Issues for Saving Energy

### ●Target Value Management

Managing objectives is a very important issue when practicing energy savings.
"Target value management" is the process of transforming actual conditions into ideal conditions, and thereby requires understanding the actual situation and how much "unseen" waste there is. For this reason, target value management involves performing detailed management of operations, moving from months to days and lines to equipment, and evolving from "seeing" waste to "understanding" it.
Additionally, when using target value management, it is necessary to construct and put into practice an organization that values "people who set objectives (manage)," "people who find things" and "people capable of thinking of improvements and implementing them."


### ●Specific consumption management

In lines where there is a large difference in production volume, it is difficult to save energy and improve productivity using energy management alone.
By understanding specific consumption —energy consumed per product— waste in energy and production processes can be clarified, and it becomes easier to implement countermeasures.
Rather than simply not using energy, it's important to use energy efficiently when, where and how much needed.



# Importance of Demand Monitoring

## Energy Saving by visualizing demand

●What is “Demand”....?

Demand is average electric power at a specified period. This period for demand differs for each country and the way of management method.

Electric fee is basically determined based on the highest demand in one year(→contract demand).

The highter the contract demand is, the more expensive the electric basic charge is.

There are two types of basic demand management method as below.

**(1) Fixed block demand management method**

The demand period consists of only an interval.

**(2) Rolling block demand management method**

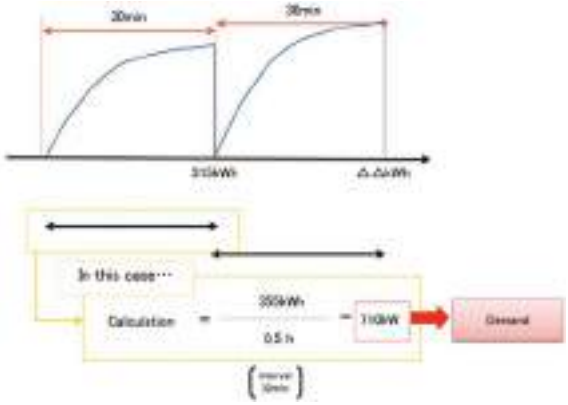
The demand period consists of interval and sub interval.

Interval is the period for caluclation of average electric.

Sub interval is the period for updata the calculation.

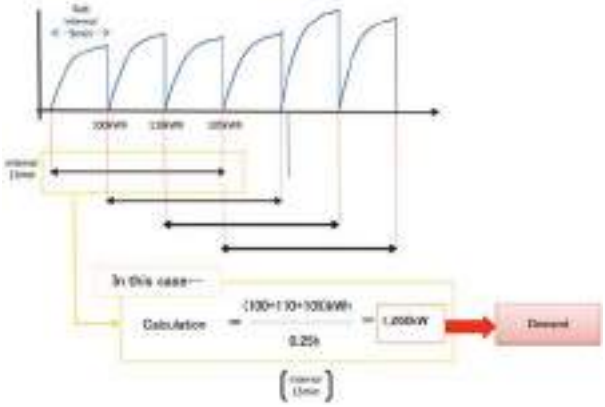
### Fixed block demand management

Ex) Interval:30min



### Rolling block demand management method

Ex) Interval:15min, Sub interval 5min



**EcoWebServerⅢ with demand monitoring function comply with the Fixed block demand management method. Interval can be selected from 15min or 30min.**

**Subtotal Volume**

- Demand (power demand) is computed and calculated by taking pulses from the multi-measuring meter (transaction meter) for power demand.

**Estimation**

- The value at the end of the 30-minute time limit is estimated from the measured demand (power demand).

**Warning**

- Based on the results of the estimation, an alarm is output and a notification sent when the objective demand has been exceeded.
- The alarm notification can be a buzzer, display lamp, etc., which is sent through the contact output.

**Load interruption**

- Load interruption may be necessary depending on power use.
- A control output signal can be used to automatically interrupt the load.

**Reduce demand**

||

**Reduce basic free**

**Realize visualization of energy and demand management with one EcoWebServer Ⅲ.**

# Lineup

## Energy-saving Data Collection Server EcoWebServer Ⅲ

| | |
|---|---|
| Product name | Energy-saving Data Collection Server |
| Model no. | MES3-255C-EN |
| Communication | CC-Link, MODBUS® (TCP, RTU*) |

| | |
|---|---|
| Product name | Energy-saving Data Collection Server (with demand control function) |
| Model no. | MES3-255C-DM-EN |
| Communication | CC-Link, MODBUS® (TCP, RTU*) |

*MODBUS® TCP ⇔ RTU converter is required for MODBUS® RTU communication.
**MODBUS® TCP ⇔ RTU converter (SI-485 MB) is produced by LINEEYE CO.,LTD.**

### Network Specifications (CC-Link)

CC-Link communications section

| Item | Specifications |
|---|---|
| Transmission speed | 156kbps / 625kbps / 2.5Mbps / 5Mbps / 10Mbps |
| Maximum total cable length (maximum transmission distance) | Transmission speed: 156kbps — Cable length between stations: 20cm or more — Maximum total cable length: 1200m<br>625kbps — 900m<br>2.5Mbps — 400m<br>5Mbps — 160m<br>10Mbps — 100m |
| Maximum number of connected units | 64 units However, conditions on the right must be met<br>1. Total number of stations<br>a+b×2+c×3+d×4≦64<br>a: 1 station occupied, b: 2 stations occupied,<br>c: 3 stations occupied, d: 4 stations occupied<br>2. Number of units connected<br>16× (A+D) +54×B+88×C≦2304<br>A: Number of remote I/O stations …64 max<br>B: Number of remote device stations …42 max<br>C: Number of local stations, intelligent device stations …26 max<br>D: Number of reserve stations *<br>* Unregistered station numbers from station 1 to the maximum number of stations are counted as reserve stations. |
| Communication method | Broadcast polling method |
| Synchronization method | Frame synchronization method |
| Encoding method | NRZI method |
| Transmission route format | Bus (RS-485) |
| Transmission format | HDLC compatible |
| Error control method | CRC ($x^{16}+x^{12}+x^{15}$) |
| Connecting cable | CC-Link Ver1.10-compatible dedicated cable |

# Function Comparison/System Environment

## Functions

| Product Name | | | MES3-255C-EN | MES3-255C-DM-EN |
|---|---|---|---|---|
| Demand function | | | — | ○ |
| Connection device | CC-Link terminal device | | Number of remote I/O stations≦64,<br>Number of remote device stations≦42,<br>Number of local stations≦26 | |
| | MODBUS® terminal device | | Number of MODBUS® TCP terminals≦255<br>Number of MODBUS® RTU terminals≦31 for each gateway<br>Number of total MODBUS® terminals≦255 | |
| | MITSUBISHI PLC, GOT | | MC protocol connection (LAN CH2 used)<br>* device read/write<br>CC-Link unit (local) connection<br>* device read | |
| Number of measuring points | Measuring points | | 255 points | |
| | | Number of operation measuring points | 32 points (includes 255 measuring points) | |
| | Virtual measuring points | | 128 points | |
| | Specific consumption measuring points | | 64 points | |
| | Connection point output | | 32 points | |
| | Demand monitoring | Receiving demand | — | 2 points (fixed) whole day, timeframe 1-10 |
| | | Receiving electric energy | — | 2 points (fixed) whole day, timeframe 1-10 |
| Data saving function<br>* CSV format | Zoom (every 1min) data | | 62-day amount | |
| | Zoom (every 5min) data | | 14-day amount | |
| | Daily data (on the hour or every 30min) | | 186-day amount | |
| | Monthly data (specified time (00min) once a day) | | 60-month amount | |
| | Yearly data (specified time (00min) once a month) | | 5-year amount | |
| | Virtual measuring point data (daily) | | 186-day amount | |
| | Virtual measuring point data (monthly) | | 60-month amount | |
| | Virtual measuring point data (yearly) | | 5-year amount | |
| | Specific consumption measuring point data (daily) | | 186-day amount | |
| | Specific consumption measuring point data (monthly) | | 60-month amount | |
| | Specific consumption measuring point data (yearly) | | 5-year amount | |
| | Equipment data (daily) | | 186-day amount | |
| | Operating history data | | 64KB×4 files | |
| | System log | | 256KB×8 files | |
| | Demand data (daily) | | — | 186-day amount |
| | Demand data (monthly(daily maximum)) | | — | 60-month amount |
| | Demand data (yearly(monthly maximum)) | | — | 5-year amount |
| | Demand alarm/Control log | | — | 128KB×62 files |
| Display function | Real-time | Demand monitor | — | • Displays current time limit demand load curve<br>• Displays graph of same day demand results |
| | | Current value monitor | The current value of the specified measuring points are displayed in the units registered for groups and display lists<br>Displays differential display mode function/differential values for specified measuring points (time differential: amount used from previous hour to present time, daily differential/monthly differential: amount used from previous summary time to present) | |
| | | Connection point output monitor | Displays connecting point output status | |
| | Graph display | Demand trend graph | — | Displays demand trend graph |
| | | Measuring point comparison graph | Displays comparison of multiple measuring point data for specified display intervals/time displayed | |
| | | Daily comparison graph | Displays comparison of specified measuring points for desired date | |
| | | Specific consumption graph | Displays graph after dividing energy volume by number produced | |
| | | Equipment graph | Displays graph of equipment efficiency, number of defects and equipment energy volume | |
| | Data file | | Download measuring point data, virtual measuring point data, specific consumption data, equipment data, operating history data, system log, demand data *, alarms/control log * (*only for products with demand monitoring functions) | |
| | Equipment values list | | Displays measuring points, connection point output and content of email notifications set for EcoServerⅢ | |
| Monitoring functions | Email notification function | | Transmits main unit error notifications, periodic notifications, upper/lower limit notifications, operating status notifications, specific consumption objective value notifications, energy plan value notifications and demand notifications * to the specified SMTP Server (*only for products with demand monitoring functions) | |
| | Connection point output | | Outputs connection points for EcoWebServerⅢ connection point output module or combined CC-Link input/output module | |

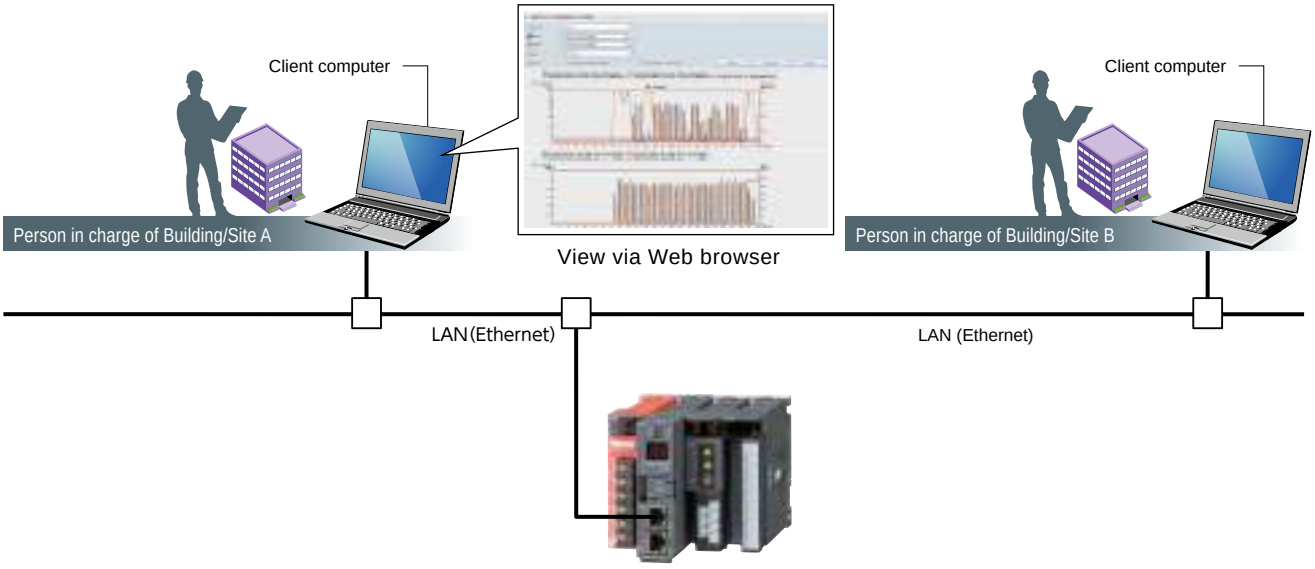
## Recommended system environment

| Item | Specification |
|---|---|
| OS (basic software) | Microsoft Windows Vista® Business (32bit) SP2, Microsoft Windows 7 Professional (32bit, 64bit) SP1<br>Microsoft Windows 8.1 Pro (32bit, 64bit), Microsoft Windows 10 Pro (32bit, 64bit) |
| CPU | Pentium® 1GHz processor or faster, or compatible microprocessor (DOS/V-compatible device) |
| Memory | 1GB or more |
| Hard-disk | If data accumulated by EcoWebServerⅢ is saved to a computer, that storage capacity is required. |
| CD drive | 1 group or more (required for installing setup software) |
| Display resolution | 1280×1024 pixels or more |
| Display colors | 65536 colors or more |
| Input device | Mouse and keyboard |
| External interface | 10BASE-T / 100BASE-TX |
| Web browser | Internet Explorer® 7, 8 (32bit), 9 (32bit), 10 (32bit), 11 (32bit) |
| Java plug-in | Oracle Jave™ 8 JRE 8 (32bit), Oracle Java™ 7 JRE 7 (32bit), Oracle Java™ 6 JRE 6 (32bit) |

## Features

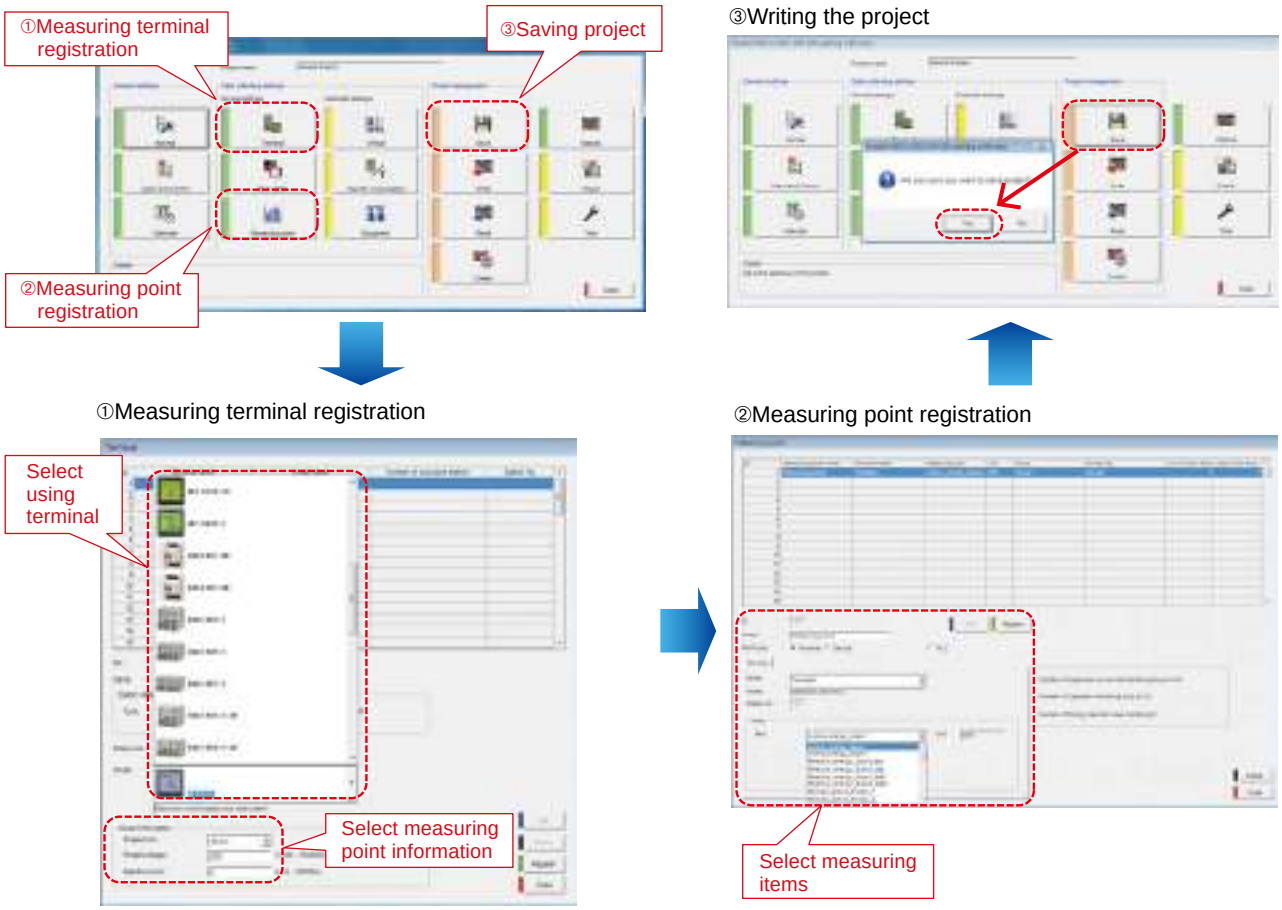
### Measured data can be displayed on a Web browser with graphs without any programing.

Using the HTTP Server function, the collected data is transmitted via Ethernet across the Internet/Intranet so that all employees can confirm and understand amount of energy used in real-time.




### Easy setting by using dedicated setting software.

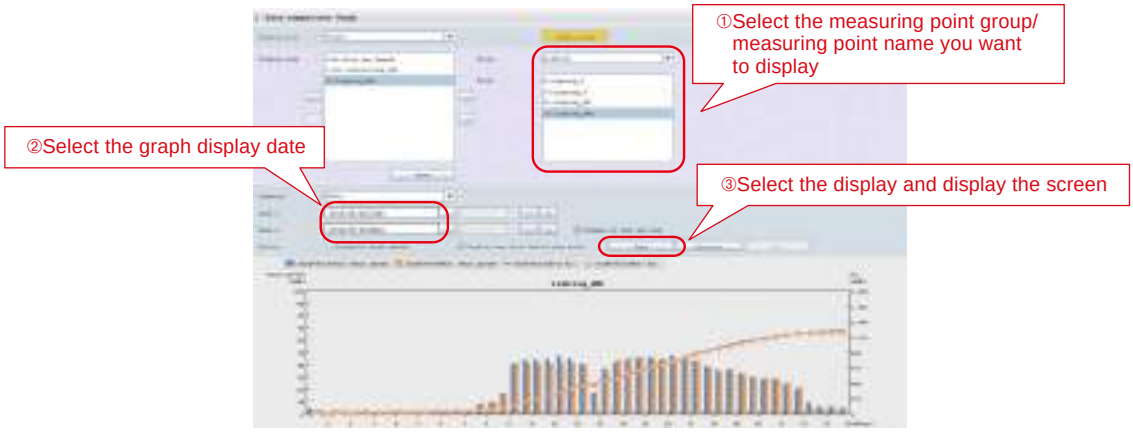
The minimum required registering configuration on the measuring is
“①Measuring terminal registration” → “②Measuring point registration” → “③Writing the project” only.



## Add new comparison screens according to the scenario. Strong support provided for analyzing activities.

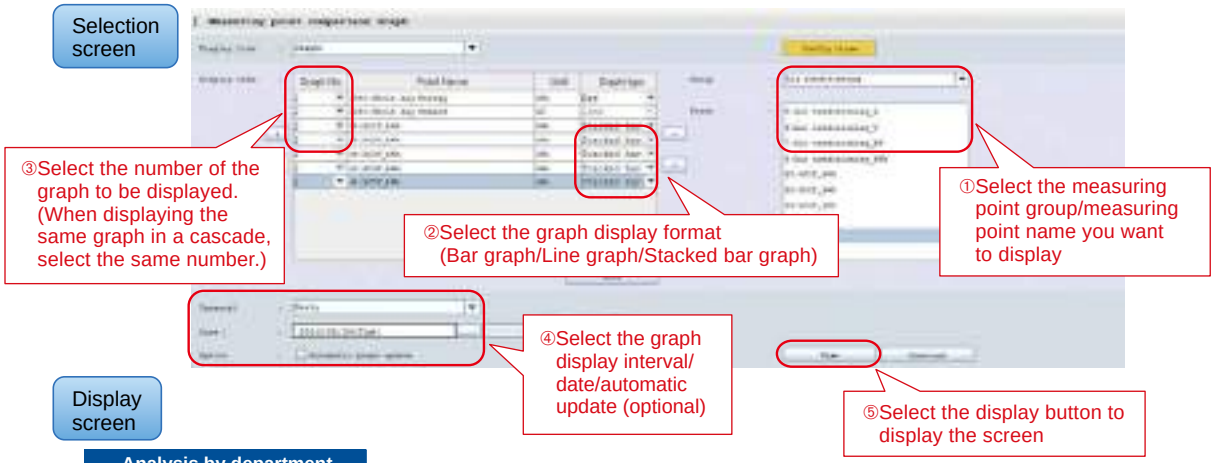
### 1 Date comparison graph

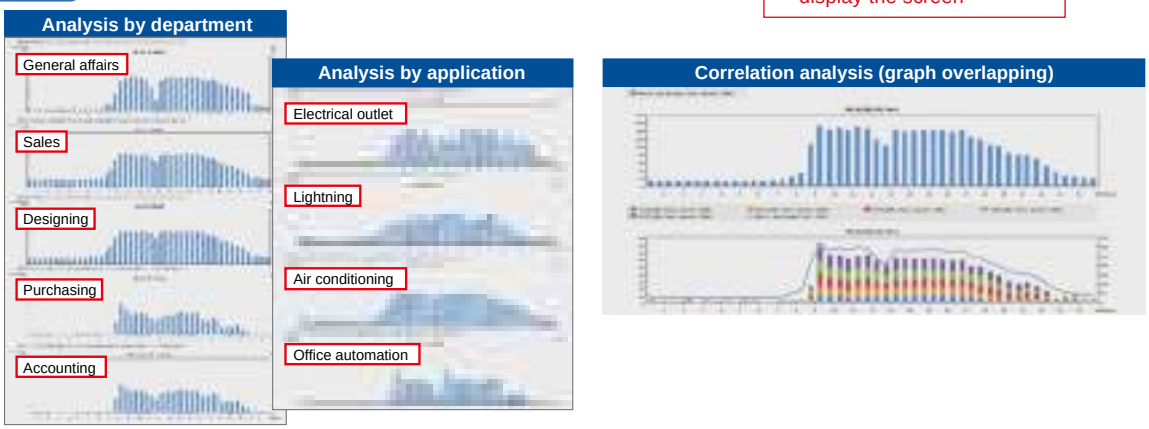
●The display procedure is select “①Measuring point group/name → ②Graph display date” and select “③Display” only.
●A comparison of the specified date and items can be displayed.




### 2 Measuring point comparison graph

●The display procedure is to select “①Measuring point group/name → ②Graph display format → ③Graph No. → ④Graph display intervals etc.” and select “⑤Display” only.
●It’s possible to select graphs and display various graphs in the format of your choice. It’s also possible to display the same graph, making it easy to understand graph correlations.

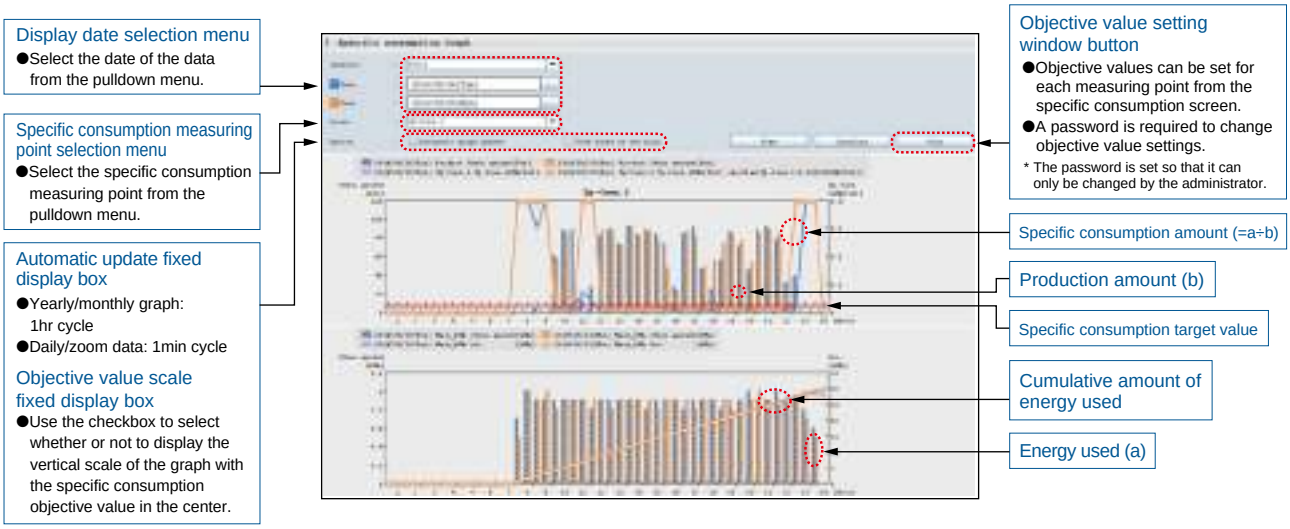


## Easily understand productivity by confirming the specific consumption graph

●By integrating the production volumes from the measuring terminal and PLC, the specific consumption graph can be easily displayed and points related to the drop in specific consumption can be easily understood.

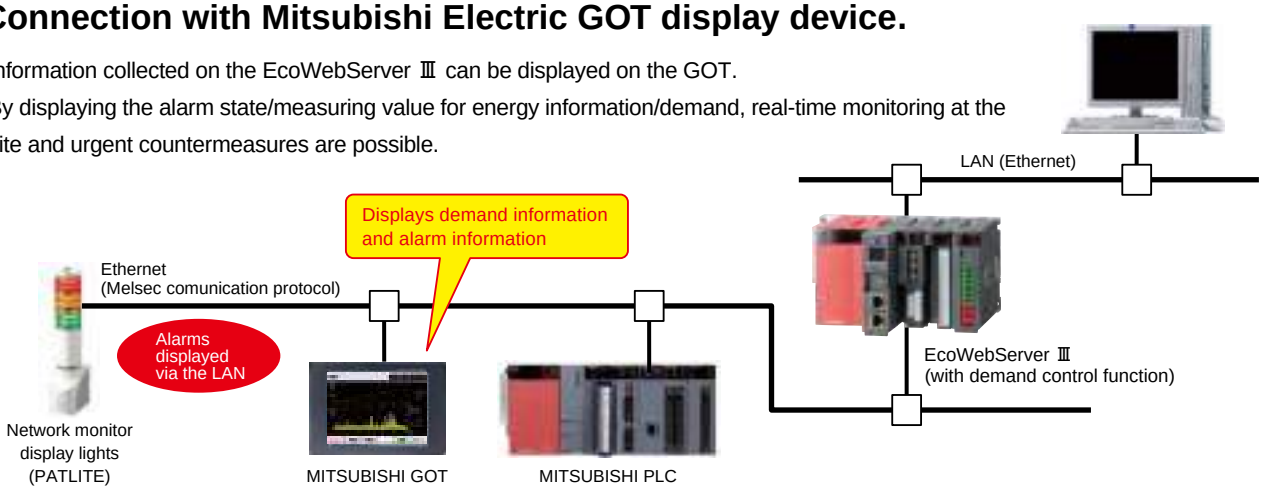
●Additionally, by comparing two specific consumption graphs at the same line, it is possible to confirm the benefits at the time the countermeasure was implemented.




## Connection with Mitsubishi Electric GOT display device.

●Information collected on the EcoWebServer Ⅲ can be displayed on the GOT.

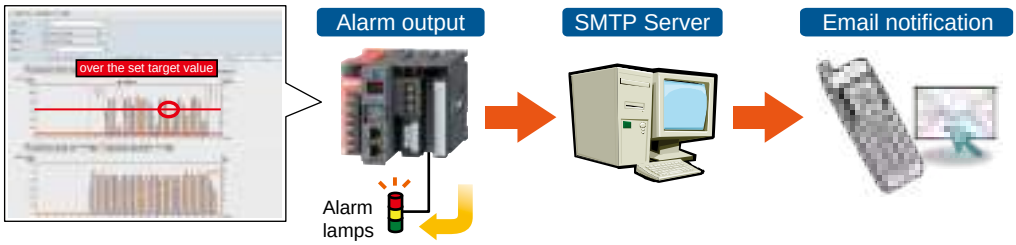
●By displaying the alarm state/measuring value for energy information/demand, real-time monitoring at the site and urgent countermeasures are possible.




## Alarm output/email notification through a variety of monitoring functions.

●Objective values (upper/lower) and error information can be transmitted through email notifications/alarm output, and changes in status can be recognized immediately. The result of the careful target value management and monitoring the status monitoring ensure that problems occurring at the site are not overlooked.

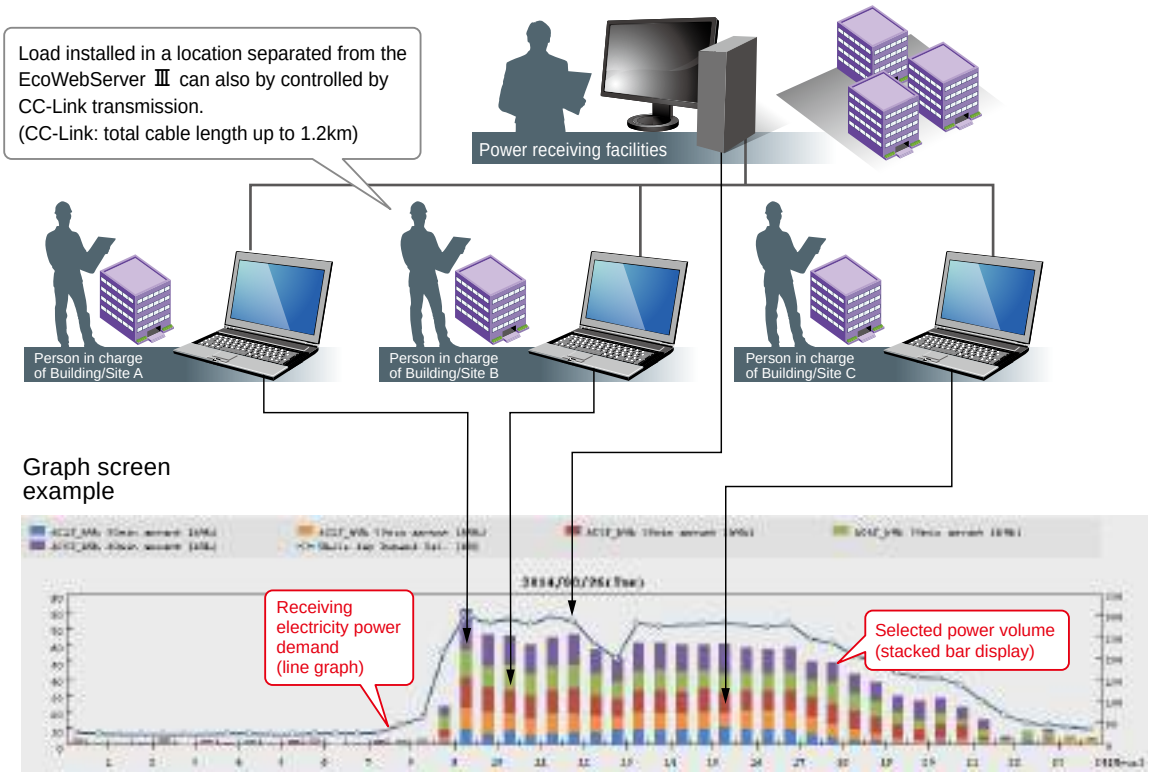
<Items monitored>
- Energy plan value
- Specific consumption objective value
- Upper/lower irregularity
- Change in operating state
- Error information
- Demand alarm



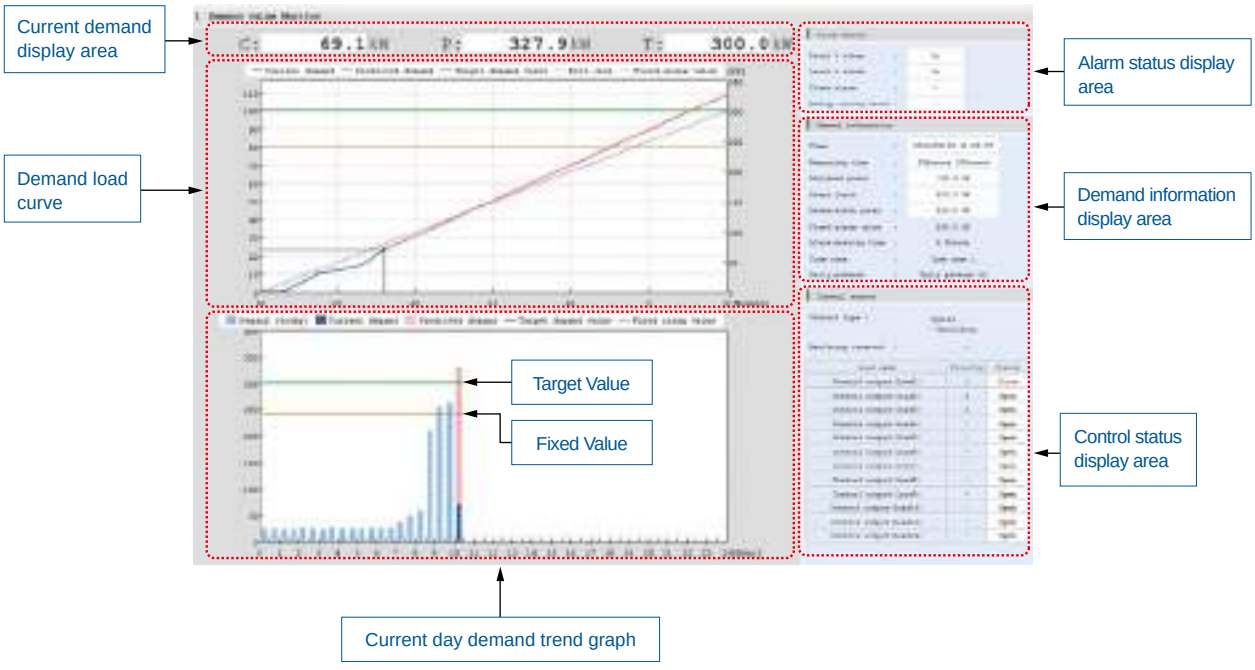
## Simultaneously visualize demand trends and energy consumption per building/load

Compatible model: MES3-255C-DM-EN only

●As the breakdown of power demand (load balance) can be easily understood from the power demand trends and stacked bar graphs for each regional substation and operating equipment can be reviewed, and operations can be planned and proposed based on the analysis results, which enable peak shift/peak cut.



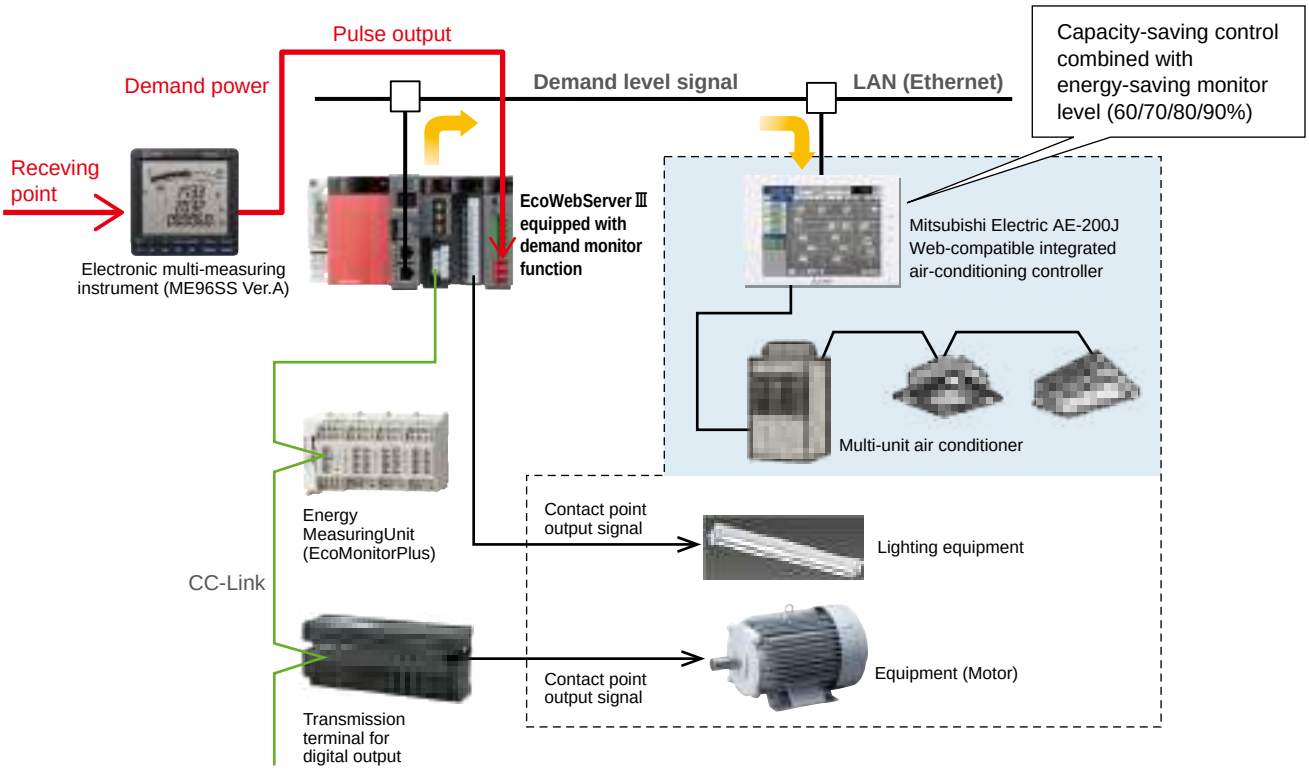

●Demand monitor screen



## Energy-saving air conditioning operation realized by interconnecting with integrated air-conditioning controller.

Compatible model: MES3-255C-DM-EN only

●Demand control possible by interconnecting with Mitsubishi Electric Web-compatible integrated controller—AE-200J, G-150AD, etc.
Additionally, automatic control of load possible through contact point output via main unit of EcoWebServer Ⅲ and CC-Link.

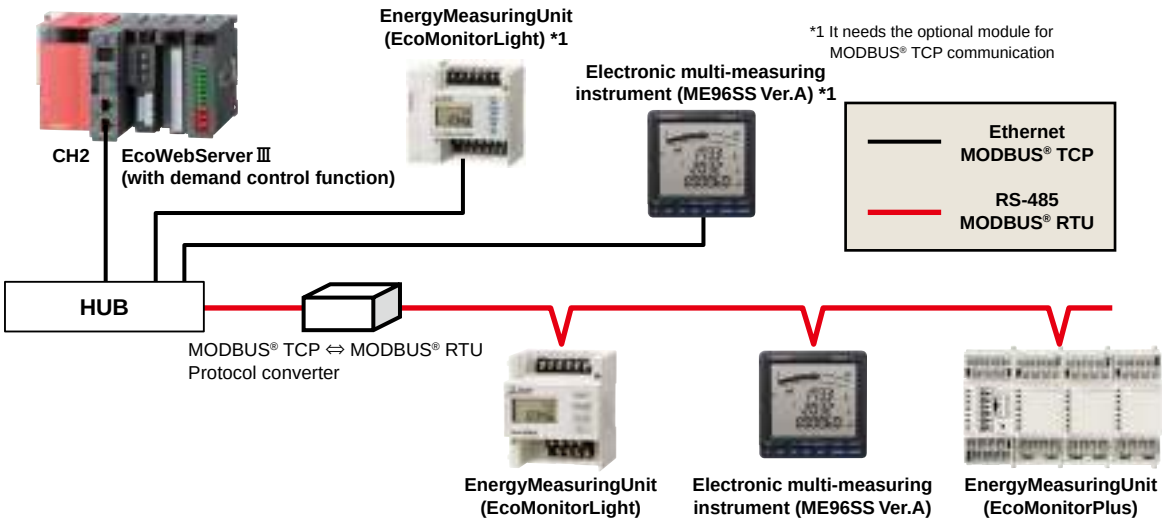



## It can be connected at MODBUS® RTU/TCP communication

●Using the LAN interface (CH2) of EcoWebServer Ⅲ, **realize MODBUS® TCP communication.**
(As with the case of MC protocol communication)

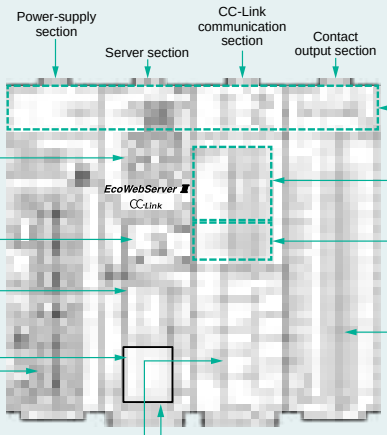
●Using the LAN CH2 of EcoWebServer Ⅲ, via MODBUS® TCP ⇔ MODBUS® RTU converter,
realize **MODBUS® RTU communication.**

✻MODBUS® TCP ⇔ RTU converter is required for MODBUS® RTU communication.
**MODBUS® TCP ⇔ RTU converter (SI-485 MB) is produced by LINEEYE CO.,LTD.**



# Main Unit Specifications

## MES3-255C-EN front




**7-segment LED display**
Displays an error code when an error is detected. In addition, in IP address display mode, the preset IP address is displayed at start-up.

**USB interface**
Not used.

**LAN interface CH1**
Use connected to a computer network.

**LAN interface CH2**
Use when connected to a programmable controller network, MITSUBISHI GOT, MODBUS® communication.

**Power-supply terminal block**
Connect power supply. (Note 1)

**CC-Link terminal block**
Connect CC-Link communication cable.

**LED display**
Display each status.

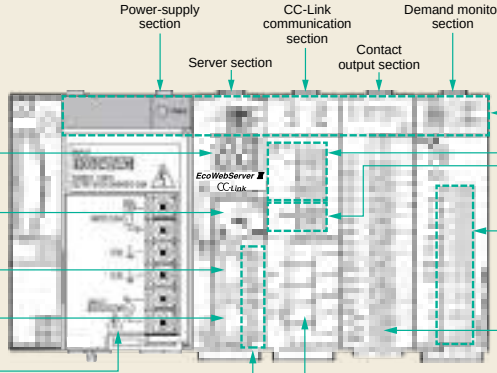
**CC-Link station number setting switch**
Set CC-Link station number.

**CC-Link transmission speed setting switch**
Set CC-Link transmission speed.

**Contact output terminal block**
Closed when conditions monitoring function conditions are met.
Connect external equipment such as buzzers and lamps.

**LED display**
Display each status.

## MES3-255C-DM-EN front




**7-segment LED display**
Displays an error code when an error is detected. In addition, in IP address display mode, the preset IP address is displayed at start-up.

**USB interface**
Not used.

**LAN interface CH1**
Use connected to a computer network.

**LAN interface CH2**
Use when connected to a programmable controller network, MITSUBISHI GOT, MODBUS® communication.

**Power-supply panel**
When you open the panel, you will see the power-supply connection terminal. (Note 1)

**LED display**
Display each status.

**LED display**
Display each status.

**CC-Link station number setting switch**
Set CC-Link station number.

**CC-Link transmission speed setting switch**
Set CC-Link transmission speed.

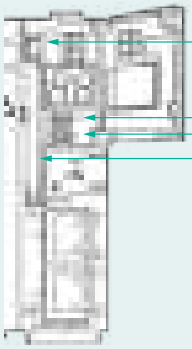
**Demand monitor section connection terminal**
Connect cable to pulse input, alarm output and control output for demand monitoring. (Note 2)

**Contact output terminal block**
Closed when conditions monitoring function conditions are met.
Connect external equipment such as buzzers and lamps.

**CC-Link terminal block**
Connect CC-Link communication cable.

## Front surface (cover of Server section opened)/bottom surface (CC-Link transmission device)

●Front surface (cover of Server section opened)



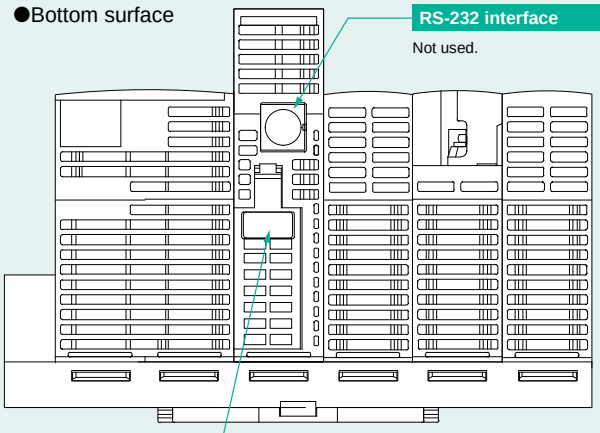
**CompactFlash™ memory card EJECT button**
Push the button and remove the CompactFlash™ memory card.

**MODE/STOP/RUN switch**
Normally, used in RUN state.

**RESET/SELECT switch**
Used when resetting the main unit.

**CompactFlash™ memory card**
Stores programs for collecting and displaying data. Data collected is also saved to it. (Note 3)

●Bottom surface



**RS-232 interface**
Not used.

**Battery storage compartment**
Store the battery.
Remove the cover and connect the connector. (Note 4)

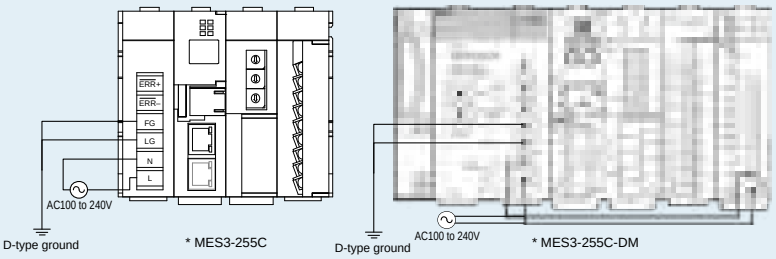
(Note 1) Connect to AC100-240V(+10%, -15%) 50/60Hz(±5%). Do not connect to a power supply other than that specified as this may cause an accident.
(Note 2) A separate power supply is required for the demand monitor section when using. When using the main device, AC100-240V(+10%, -15%) 50/60Hz power is required for the demand monitor connector terminals V1, V2. It is possible to connect power from the power-supply module.
(Note 3)
- CompactFlash™ memory cards are used in a constantly attached state. If they are removed while the power is on or the memory card is being accessed, this product will malfunction.
- When removing the card from the memory card slot, be sure to place the RESET/SELECT switch in the SELECT position and remove it only after turning off the power supply and the CF CARD LED has turned off.
- Do not use the CompactFlash™ memory card with any other product. This could corrupt the internal data.
- Do not insert a CompactFlash™ memory card other than the one included in the package in this device. If a different card is inserted, the system will not operate correctly.

(Note 4) Be sure to exchange the battery within three minutes after turning off the power. If more than three minutes passes after the battery is removed, the final one hour of data may be lost or the clock may initialize. (Data or configuration settings from more than one hour before will not be initialized). If the clock initializes, please set again after backing up the data.
Refer to the operating manual (hardware edition) for the battery replacement procedure.

# Connection Diagram

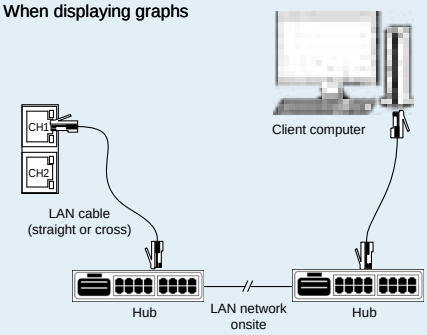
## Model: MES3-255C-EN, MES3-255C-DM-EN

●Power-supply section

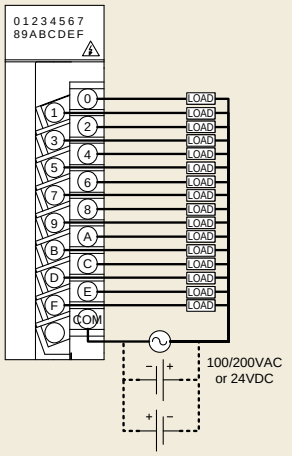



●Server communications section (LAN interface)

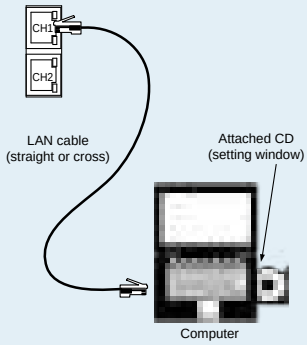
When displaying graphs



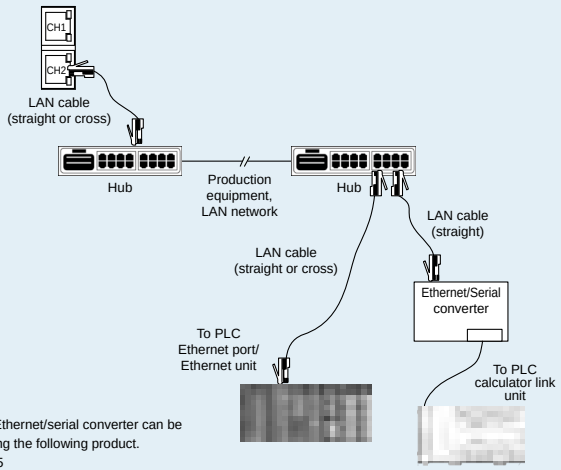

●Connecting point output section




When setting (CH1)

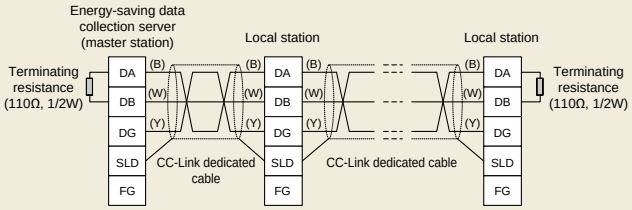



When connecting the PLC (CH2)



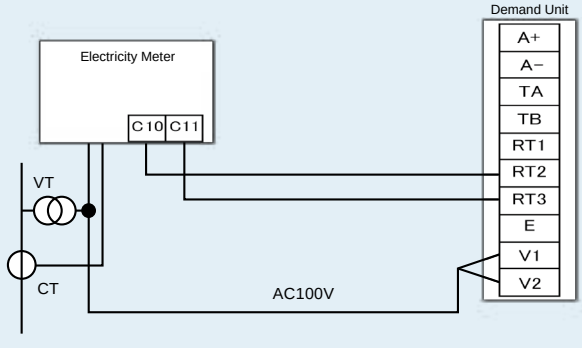

Operation of Ethernet/serial converter can be confirmed using the following product.
Line Eye SI-65

●CC-Link communication section




## Demand monitor section

Where the transaction meter of the multi-measuring power demand meter is 10,000pulse/kWh

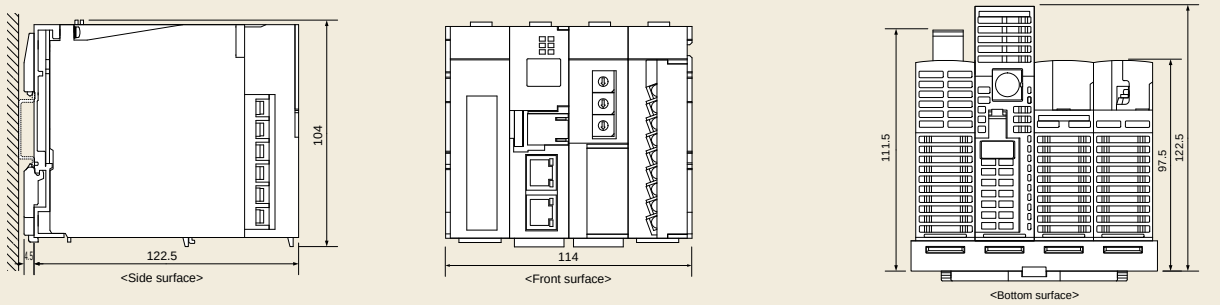


# External Diagram/Bundled Products List

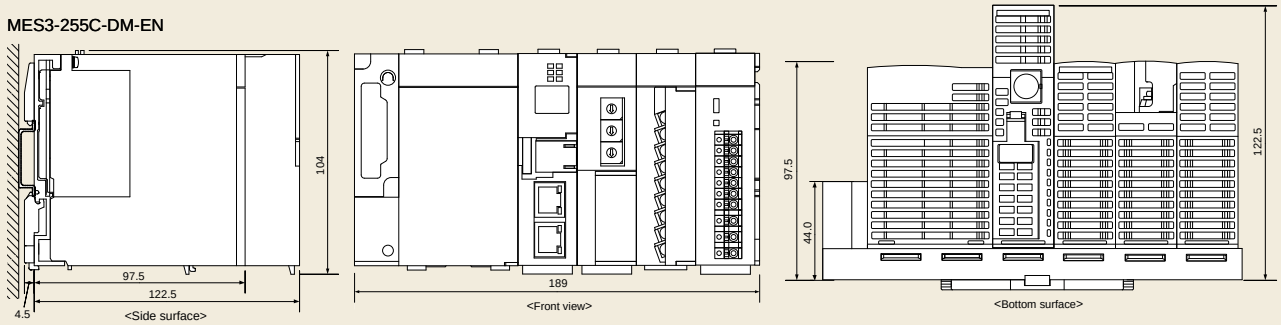
●External dimensions

Unit : mm

MES3-255C-EN



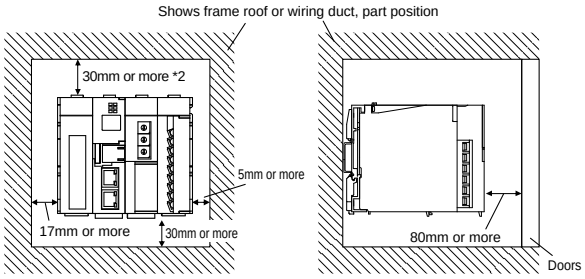

MES3-255C-DM-EN




●Peripheral installation conditions

MES3-255C-EN

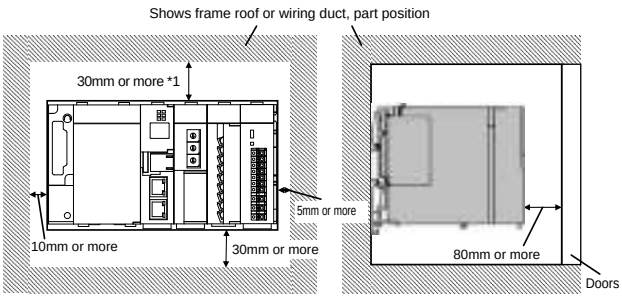
**Peripheral installation conditions** *1




*1 These are the conditions when considering radiation. At the same time, please secure enough space to replace the battery in the lower layer of the main unit.
*2 When height of the wiring duct is 50mm or less. Others are 40mm or more.

MES3-255C-DM-EN

**Peripheral installation conditions**




*1 When height of the wiring duct is 50mm or less. Others are 40mm or more.

## Bundled Products List

| Product Name | CC-Link communication product | |
|---|---|---|
| | MES3-255C-EN | MES3-255C-DM-EN |
| Energy-saving Data Collection Server (main unit) | 1 | |
| CompactFlash™ memory card (software) | 1 | |
| Setup software (CD-R)/operating manual collection | 1 | |
| Battery (installed in lower surface of main unit battery section) *1 | 1 | |
| Frame attachment screw | 4 (M4 × 12) | 4 (M4 × 14) |
| CC-Link terminal resistance (black: 110Ω/2W) (white: 130Ω1/2W) | Black: 2 White: 2 | |
| IEC rail attachment adapter | Small 2 Large 2 | |
| IEC rail attachment screw (M5 × 10) | 2 | |
| IEC rail attachment corner washer | 2 | |
| IEC rail attachment stop metal clamp | 2 | |
| Operating manual hardware edition | 1 | |

*1 To purchase a replacement battery (model name: Q6BAT), inquire at the dealership where you purchased the main product.

# Support Terminal

## MES3-255C-EN, MES3-255C-DM-EN (CC-Link)

| Product Name | Icon/type name | | Station type | Number of occupying stations |
|---|---|---|---|---|
| EnergyMeasuringUnit (1P2W, 1P3W, 3P3W) | EMU4-BD1-MB | | Remote device station | 1 station occupied |
| EnergyMeasuringUnit (1P2W, 1P3W, 3P3W, 3P4W) | EMU4-HD1-MB | | Remote device station | 1 station occupied |
| EnergyMeasuringUnit (1P2W, 1P3W, 3P3W, 3P4W) | EMU4-FD1-MB | | Remote device station | 1 station occupied |
| Energy measuring standard model *1 | EMU4-BM1-MB | | Remote device station | 1 station occupied |
| Energy measuring high performance model *1 | EMU4-HM1-MB | | Remote device station | 1 station occupied |
| Insulation Monitoring model *1 | EMU4-LG1-MB | | Remote device station | 1 station occupied |
| Energy measuring extension model for same voltage system *2 | EMU4-A2 | | Remote device station | *3 |
| Energy measuring extension model for different voltage system *2 | EMU4-VA2 | | Remote device station | *3 |
| Energy measuring extension model for analog input *2 | EMU4-AX4 | | Remote device station | *3 |
| Energy measuring extension model for pulse/digital input *2 | EMU4-PX4 | | Remote device station | *3 |
| EnergyMeasuringUnit (Power reception and distribution monitoring (standard product 3 circuits)) | EMU2-RD3-C | | Remote device station | 1 station occupied |
| EnergyMeasuringUnit (Power reception and distribution monitoring (standard product 5 circuits)) | EMU2-RD5-C | | Remote device station | 1 station occupied |
| EnergyMeasuringUnit (Power reception and distribution monitoring (standard product 7 circuits)) | EMU2-RD7-C | | Remote device station | 1 station occupied |
| EnergyMeasuringUnit (Power reception and distribution monitoring (3P4W 2 circuits)) | EMU2-RD2-C-4W | | Remote device station | 1 station occupied |
| EnergyMeasuringUnit (Power reception and distribution monitoring (3P4W 4 circuits)) | EMU2-RD4-C-4W | | Remote device station | 1 station occupied |
| EnergyMeasuringUnit | EMU3-DP1-C | | Remote device station | 1 station occupied |
| MDU breaker (WS-V) | MDU(WS-V) | NF250-SEV/HEV with MDU | Remote device station | 1 station occupied |
| MDU breaker (WS) | MDU(WS) | NF400-SEP/HEP with MDU<br>NF600-SEP/HEP with MDU<br>NF800-SEP/HEP with MDU | Remote device station | 1 station occupied |
| Low-voltage air circuit breaker (AE-SW with CC-Link interface unit) | AE-SW(BIF-CC) | | Remote device station | 1 station occupied |
| Electronic multi-measuring instrument | ME96SSHA-MB | | Remote device station | 1 station occupied |
| Electronic multi-measuring instrument | ME96SSRA-MB | | Remote device station | 1 station occupied |
| Electronic multi-measuring instrument | ME96SSH-MB | | Remote device station | 1 station occupied |
| Electronic multi-measuring instrument | ME96SSR-MB | | Remote device station | 1 station occupied |
| Electronic multi-measuring instrument | ME96NSR | | Remote device station | 1 station occupied |
| Electronic multi-measuring instrument with transmission function | ME110SSR-C(H) | | Remote device station | 1 station occupied |
| Electronic multi-measuring instrument with transmission function | ME110NSR-C | | Remote device station | 1 station occupied |
| Thermocouple temperature input unit | AJ65BT-68TD | | Remote device station | 4 station occupied |
| Platinum resistance temperature sensor Pt 100 temperature input unit | AJ65BT-64RD3 | | Remote device station | 4 station occupied |
| Analog-digital conversion unit | AJ65BT-64AD | | Remote device station | 2 station occupied |
| Terminal block type 24 VDC input unit (8 points) | AJ65SBTB1-8D | | Remote I/O station | 1 station occupied |
| Terminal block type 24 VDC input unit (16 points) | AJ65SBTB1-16D | | Remote I/O station | 1 station occupied |
| Terminal block type 24 VDC input unit (32 points) | AJ65SBTB1-32D | | Remote I/O station | 1 station occupied |
| Terminal block type DC input transistor output combined unit (Input 8 points, Output 8 points) | AJ65SBTB1-16DT | | Remote I/O station | 1 station occupied |
| Terminal block type DC input transistor output combined unit (Input 16 points, Output 16 points) | AJ65SBTB1-32DT | | Remote I/O station | 1 station occupied |
| CC-Link master/local unit (Local station) | QJ61BT11N | | Intelligent device station | 1 station occupied |
| CC-Link master/local unit (Local station) | LCPU/LJ61BT11 | | Intelligent device station | 1 station occupied |

*1 EMU4-BM1-MB, EMU4-HM1-MB, EMU4-LG1-MB are main units of EcoMonitorPlus.
*2 EMU4-A2, EMU4-VA2, EMU4-AX4, EMU4-PX4 are extension units of EcoMonitorPlus.
*3 Conbination of main unit and extension unit occupied 1 station.

## MES3-255C-EN, MES3-255C-DM-EN (MODBUS®)

| Product Name | Icon/type name |
|---|---|
| Electronic multi-measuring instrument | ME96SSHA-MB |
| Electronic multi-measuring instrument | ME96SSRA-MB |
| Electronic multi-measuring instrument | ME96SSEA-MB |
| Electronic multi-measuring instrument | ME96SSH-MB |
| Electronic multi-measuring instrument | ME96SSR-MB |
| Electronic multi-measuring instrument | ME96SSE-MB |
| EnergyMeasuringUnit (1P2W, 1P3W, 3P3W) | EMU4-BD1-MB |
| EnergyMeasuringUnit (1P2W, 1P3W, 3P3W, 3P4W) | EMU4-HD1-MB |
| EnergyMeasuringUnit (1P2W, 1P3W, 3P3W, 3P4W) | EMU4-FD1-MB |
| Energy measuring standard model *1 | EMU4-BM1-MB |
| Energy measuring high performance model *1 | EMU4-HM1-MB |
| Insulation Monitoring model *1 | EMU4-LG1-MB |
| Energy measuring extension model for same voltage system *2 | EMU4-A2 |
| Energy measuring extension model for different voltage system *2 | EMU4-VA2 |
| Energy measuring extension model for analog input *2 | EMU4-AX4 |
| Energy measuring extension model for pulse/digital input *2 | EMU4-PX4 |

*1 EMU4-BM1-MB, EMU4-HM1-MB, EMU4-LG1-MB are main units of EcoMonitorPlus.
*2 EMU4-A2, EMU4-VA2, EMU4-AX4, EMU4-PX4 are extension units of EcoMonitorPlus.

# Related Products

## EcoMeasureⅢ daily/monthly report specific consumption analysis software

This software supports the specific consumption analysis graph and ledger preparation of daily reports, monthly reports and annual reports from CSV files collected and output by the Mitsubishi Electric EcoWebServerⅢ Energy-saving Data Collection Server.
* The supporting product version, EcoWebServerⅢ with demand monitoring function, for EcoMeasureⅢ, will be released soon.

### Features

**(1) Easily create daily, monthly and annual reports.**

- Ledger prepared ledger is saved as an Excel file in user-designated place.

**(2) Easily perform specific consumption management as the index of energy-saving activities.**

- Possible to manually input production volume and perform specific consumption management of energy information from EcoWebServerⅢ and E-Energy.
- Possible to prepare each specific consumption graph (zoom, daily, weekly and monthly).

**(3) Easily collect data.**

- CSV files stored in EcoWebServerⅢ and E-Energy can be downloaded with simple operations.

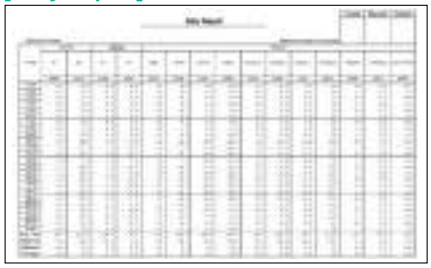
### Product Appearance


### Specifications

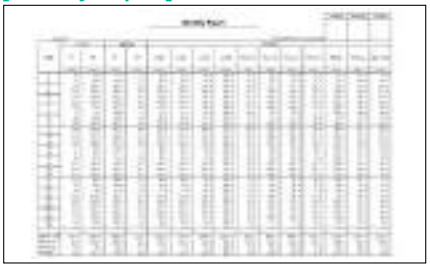
| Item | | Specifications | |
|---|---|---|---|
| Model name | | MES3-SW1-DR-FR | |
| Language | | English, Chinese *1 | |
| Connection devices | Number of units | 8 units maximum (combination of following target devices) | |
| | Target devices | EcoWebServerⅢ | |
| Number of virtual measurement points | | Maximum 95 points (Total of 95 points including virtual measurement points for calculating measurement management points and virtual measurement points for input.)<br>* Four arithmetic operations of up to 64 measurement management points (including constants) can be registered in the virtual measurement points for calculation. | |
| Number of virtual measurement point groups | | Maximum five groups *Addition/Subtraction calculations for up to 32 virtual measurement points can be registered in the virtual measurement point groups. | |
| Ledger creation function | Ledger creation | Daily report creation, monthly report creation, annual report creation | |
| | Maximum number of items | The daily, monthly and annual reports can have up to 2,250 output items. | |
| | Calculation items | Analog (including specific consumption) | Maximum, minimum, average |
| | | Pulse | Total, maximum, minimum, average |
| | | Demand | Maximum |
| Specific consumption management function | Specific consumption display | Daily specific consumption, weekly specific consumption, monthly specific consumption and zoom specific consumption *2 | |
| | Number of specific consumption | Maximum 100 points | |
| | Specific consumption target value | Can set by each specific consumption | |
| | Graph display | Specific consumption, target value, production volume, power used (kWh), accumulated power volume (kWh)<br>* The specific consumption/target value/production volume units can be set freely. | |
| | | Auto-scale function | |
| | List display | Daily/weekly/ monthly specific consumption | Power volume (kWh), production volume, specific consumption, accumulated power volume (kWh), accumulated production amount, specific consumption target value |
| | | Zoom specific consumption | Power volume (kWh), production volume, specific consumption, power use/hour |
| | Automatic updating | Daily/weekly/ zoom specific consumption | Contents of display newly updated at designated time once per hour each hour |
| | | Monthly specific consumption | Contents of display newly updated at designated time once per day each day |
| Operation environment | OS (basic software) | Microsoft Windows Vista® (32bit) (SP2) Home Basic / Home Premium / Business / Enterprise / Ultimate<br>Microsoft Windows Server 2003(32bit) (SP2) Standard<br>Microsoft Windows 7(32bit/64bit)(SP1) Professional<br>Microsoft Windows 8.1 Pro（32bit/64bit）<br>Microsoft Windows 10 Pro（32bit/64bit） | |
| | Required software | Microsoft Excel 2003(SP3) / 2007(SP3) / 2010(32bit/64bit)(SP1) | |
| | CPU | If using Windows XP : Pentium processor of 400MHz or higher or a compatible microprocessor (DOS/V- compatible)<br>If using Windows Vista® or Windows 7 : As recommended for the operating system | |
| | Memory *3 | As recommended for the operating system | |
| | Hard-disk *3 | Software: Approx. 100MB or more | Data: 8GB or more *4 |
| | CD-ROM drive | 1 drive (for installing software) | |
| | LAN | 10/100/1000BASE-T ×1 | |
| | USB connector (Type A) | 1 connector (for connecting hardware key) | |
| | Display resolution | 800×600 pixels or more | |
| | Display color | 256 colors or more | |
| Number of licenses ( number of computers installed in ) | | • 1 license per 1 client<br>• Hardware key attached (USB) (1 unit) | |

*1 It needs to start in the Chinese version of Microsoft operating system (OS).
*2 If virtual measurement points for input or measurement points for E-Energy are included, no zoom specific consumption is displayed.
*3 Note that the required memory and available hard-disk space may vary depending on the system environment.
*4 Shows the capacity required when used with maximum eight subsystems connected.

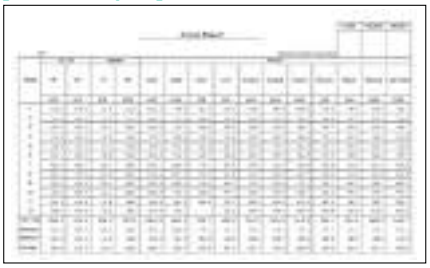
**[Daily Report]**



**[Monthly Report]**



**[Annual Report]**



We would like to improve the productivity and quality without changing the existing equipment.

We cannot afford large cost required for new equipment or modifying the existing equipment.

We would like to save energy, and be environmentally friendly.

We do not have enough workers engaged in examination for improvements and migration.

We would like to acquire and analyze data quickly.

We would like to preventive maintenance.

# Equipment System Migration in 3 Steps

**Mitsubishi Electric will propose a variety of products and functions based on various keywords to eliminate concerns of customers.**

## Step 1 [Stable operation] [Extension of equipment service life] [Preventive maintenance]

- Selecting the proper latest model
- Downsizing and space saving
- Replacing existing products manufactured by other companies with Mitsubishi products
- Improving the maintainability
- Utilizing the software assets and resources
- Improving the operability
- Step-by-step migration
- Preventive maintenance realized by migration

## Step 2 [Productivity improvement]

- High-speed, high-accuracy control
- Smart wiring
- High-speed, large-capacity communication
- Networking

### Control equipment

Not only various functions, high speed, large capacity and extensive networking but also top class reliability are proved by long-term actual achievements.

**Mitsubishi PLCs**

MELSEC iQ-R series

MELSEC Q series

MELSEC L series

**Mitsubishi micro PLCs**

MELSEC iQ-F series

MELSEC-F

**Mitsubishi graphic operation terminals**

GOT2000 Graphic Operation Terminal

### Drive equipment

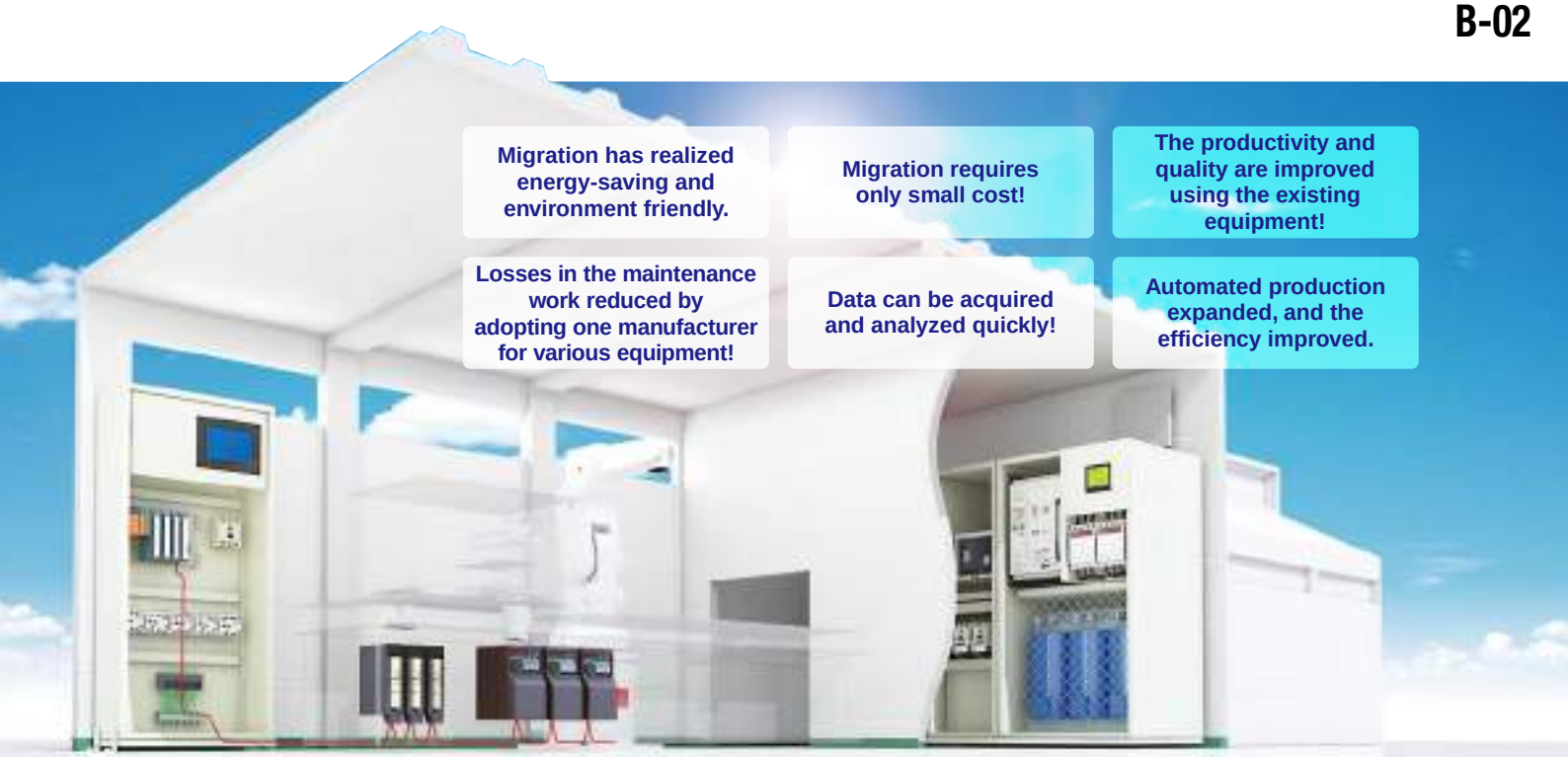
**Mitsubishi inverters**

FREQROL

**Mitsubishi AC servos**

MELSERVO

SSCNET III/H SERVO SYSTEM CONTROLLER NETWORK



Migration has realized energy-saving and environment friendly.

Migration requires only small cost!

The productivity and quality are improved using the existing equipment!

Losses in the maintenance work reduced by adopting one manufacturer for various equipment!

Data can be acquired and analyzed quickly!

Automated production expanded, and the efficiency improved.

## Preventive maintenance and product life

Preventive maintenance of equipment and devices is required to use FA equipment for a long time.

There are two concepts of preventive maintenance.

**Daily maintenance and inspection** (Visual inspection)
- Indicator lamps (in the equipment main body, devices and units)
- Equipment mounting status
- Cable connection status

**Periodic maintenance and inspection** (Visual inspection)
- Maintenance of electrical equipment
- Ambient environment
- Checking stored programs

### Product life

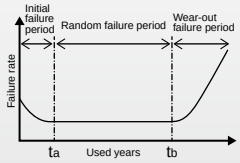
Service life 10 years

Overhaul maintenance 5 years

- Mitsubishi Electric recommends 10 years as the service life of FA equipment.

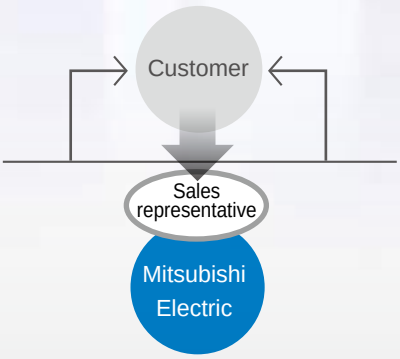
**Replacing a unit whose service life is expired**

Even if a unit is operating normally, the failure rate is high because each part is worn out and damages (related to the power ON time, surge, etc.) are accumulated.




- Mitsubishi Electric recommends overhaul maintenance of FA equipment in 5 years since the start of operation.
- Maintenance of units (to prevent short-circuit by removing dust and adhering substances)
- Replacement of parts requiring periodic replacement (such as fuses, batteries and memory cards)
- Overhaul of units incorporating parts having limited service life*

*Aluminum electrolytic capacitors, fuses, relays, etc.




Mitsubishi Electric will support migration of equipment for the customer in cooperation with the sales representative.

## [Quality improvement] [Promotion of energy saving]

- Standardizing the maintenance tool
- Utilizing the GOT
- Quick recovery from machine alarms
- Supporting and implementing energy saving

Mitsubishi Electric's motor control technology is advancing everyday. Mitsubishi drive equipment contribute to the realization of not only high functions and high performance but also energy saving.

**Mitsubishi industrial robots**

MELFA

Step 3

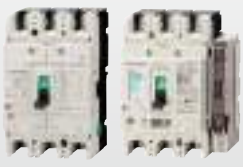
## [Visualization] [Automation] [Safety and security measures]

- Acquiring, judging and analyzing data
- Image recognition inspection
- Automating inspections and judgments
- Safety control equipment
- Automation and labor saving by robots
- Duplicating the CPU
- Constructing the MES (manufacturing execution system)

### Distribution control equipment

Mitsubishi Electric supports stable supply of electric power with its wide variety of products in the distribution control field, and proposes aggressive energy saving achieved by migration.

**Mitsubishi low-voltage distribution control equipment**



WS-V

SS Super-S Series

MS-T series

# Mitsubishi PLCs

## How is the current status of the existing PLC?

**Mitsubishi PLCs**

MELSEC-A (large type) Discontinued September 2008

MELSEC-A (small type) Discontinued September 2014

A/QnA (large type), A2C, AnS (small type), AOJ2(H)

### [Concerns about the existing equipment]

The equipment is working fine, but is getting old.

We would like to upgrade but the performance has reached the limit.

Components from different brands are installed in the equipment which is making maintenance troublesome.

### [Concerns for migrating]

Need to keep the equipment running.

Don't know to which product to migrate to.

Can't read out the existing programs.

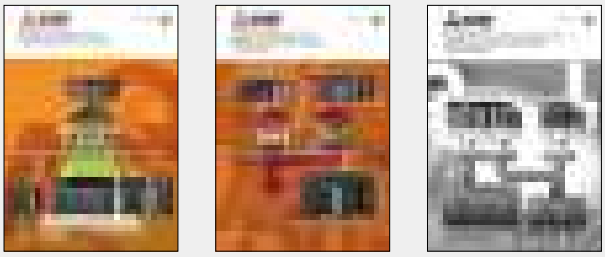
**Mitsubishi Electric can eliminate these concerns!**

## Mitsubishi Electric offers various tools for replacement with latest models.

### Mitsubishi Electric

**A to Q migration catalogs and case examples**

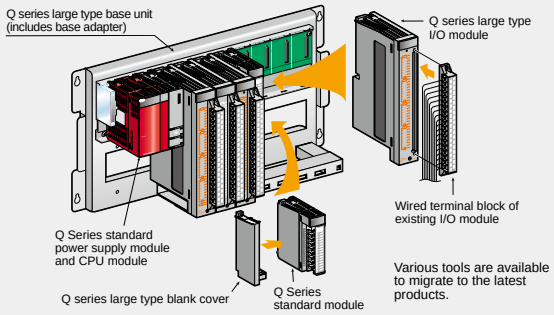
- MELSEC-A Series (large type) Transition Guide
- MELSEC A Series (small type) Transition Guide
- MELSEC-A Series Transition Examples



For example

**A to Q hardware replacement!**

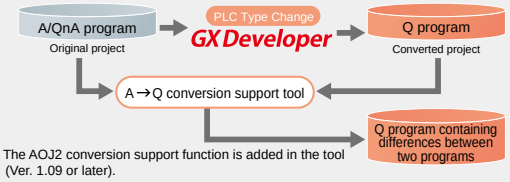
The hardware can be replaced without changing the size and location.




For example

**A to Q program replacement!**

Existing programs can be automatically converrted into Q programs using "PLC Type Change" in GX Developer (also included with GX Works2).
By converting both an existing program and a converted program into "Q program containing differences between two programs" using the A to Q conversion support tool (which can be downloaded free of charge), the correction efficiency is considerably improved.




* The AOJ2 conversion support function is added in the tool (Ver. 1.09 or later).

# Migrate to the latest Mitsubishi PLCs!!

Mitsubishi supports migration with various tools and accumulated know-how.

Mitsubishi PLCs

MELSEC iQ-R series

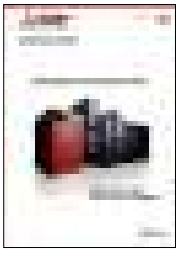
►P.10

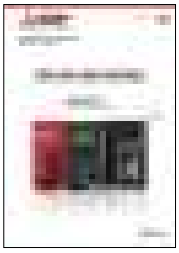
MELSEC Q series

►P.88

MELSEC L series

►P.118



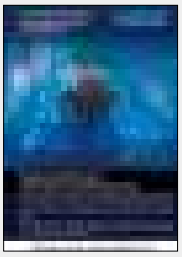


## Partner manufacturers

### A to Q migration tool catalogs

●Migration tool catalogs

Mitsubishi Electric Engineering Co., Ltd.



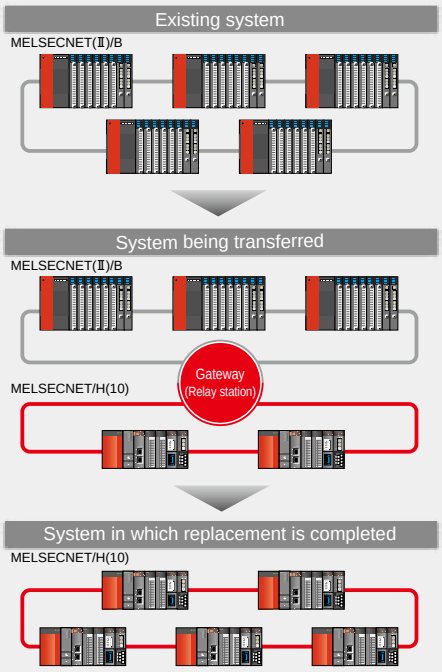
Mitsubishi Electric System & Service Co., Ltd.

Tools to easily migrate from A series to Q series available.

For example

Network replacement!

Mitsubishi data link system “MELSECNET” can be replaced in various methods.




## [Benefits of migration]

- 3 year warranty!
- Easy connection with multiple communication ports!
- High speed and large capacity CPU!
- Improve efficiency with various convenient instructions!
- Abundant lineup enables selection of product suitable for the required specifications.
- The control panel can be downsized.
- Enhanced program security function!

# Mitsubishi Micro PLCs

## How is the current status of the existing PLC?

Mitsubishi micro PLCs

FX1S/FX1N/FX1NC To be discontinued December 2015

FX2N/FX2NC Discontinued September 2012

F1, F1J, F2, FX1, FX2, FX2C, FX0, FX0S, FX0N, FX1S, FX1N, FX1NC, FX2N, FX2NC

### [Concerns about the existing equipment]

- The equipment is working fine, but is getting old.
- We would like to upgrade but the performance has reached the limit.
- Components from different brands are installed in the equipment which is making maintenance troublesome.

### [Concerns for migrating]

- Need to keep the equipment running.
- Don't know to which product to migrate to.
- Can't read out the existing programs.

**Mitsubishi Electric can eliminate these concerns!**

## Mitsubishi Electric offers various tools for replacement with latest models.

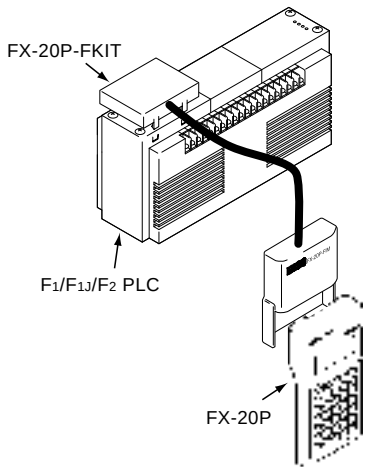
### Migration catalog

●FX Migration Guide

For example

F (F1, F1J, F2) series replacement!

The combination "FX-20P + FX-20P-FKIT" is available.




The F (F1, F1J, F2) series can be replaced by the FX series while reading out existing programs using the combination "FX-20P + FX-20P-FKIT".
After existing programs are transferred to the FX series, they can be corrected and debugged using GX Works2.

FX-20P Discontinued December 2012

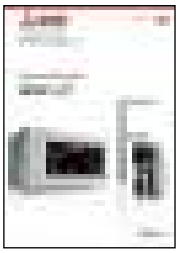
* Contact your local dealer.

# Migrate to the latest Mitsubishi PLCs!!

Micro PLCs are downsized compared to legacy models, and can fit into the existing space. Programs can be replaced with FX-20P-FKIT for F series or with GX Works2 for FX series.

Mitsubishi micro PLCs

**MELSEC iQ-F series**



►P.48

Mitsubishi micro PLCs

**MELSEC-F FX3 series**

►P.134

## [Benefits of migration]

- 3 year warranty!
- Easy connection with multiple communication ports!
- Expansion boards enable expansion at low cost!
- Convenient built-in functions enable system configuration at low cost!
- Abundant lineup enables selection of product suitable for the required specifications.
- Improve efficiency with various convenient instructions!
- Enhanced program security function!
- High-function and compact extension modules are available!

●Migration Guide from FX2N/FX2NC to FX3

●Migration Guide from FX1N/FX1NC to FX3

For example

Legacy FX series replacement!

Legacy FX series program can be transferred to the latest product by using PC type change function of GX Works2.

Programming software

**GX Works2**

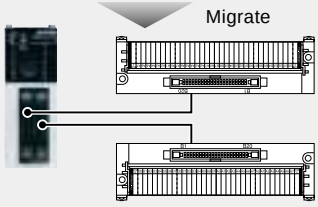

For example

Replacing wiring!

Legacy MELSEC-F product

In case the product size is large and the wiring is short

Migrate



Input terminal block

Output terminal block

Large size legacy product can be replaced easily with connector type FX series PLC and terminal block product of partner vendors.
(Connector type requires 24 V DC power supply)

# Mitsubishi graphic operation terminals

## How is the current status of the existing GOT?

Mitsubishi graphic operation terminals

GOT-A900 series

GOT-A900 Discontinued March 2009

GOT-F900 series

GOT-F900 Discontinued March 2011

### [Concerns about the existing equipment]

- The product is getting old and is not well maintained.
- Screen datas are not backed up.
- Components from different brands are installed in the equipment which is making maintenance troublesome.

### [Concerns for migrating]

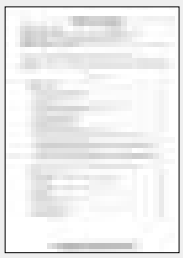
- Do we have to drill holes to replace?
- Can the screen data be replaced?
- Can we replace other brand HMI with GOT1000 or GOT2000 series products?

**Mitsubishi Electric can eliminate these concerns!**

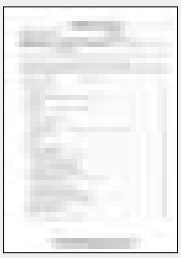
## Mitsubishi Electric offers various tools for replacement with latest models.

### Migration documents

- Technical Bulletin for replacement of GOT-A900 with GOT1000



- Technical Bulletin for replacement of GOT-1000 with GOT2000



For example

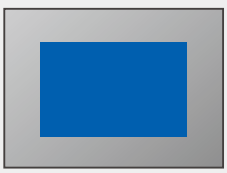
### Migration tool

Optional attachment is available for replacing GOT-900 to GOT1000 series with different screen size.

For example

Replacing of a Mitsubishi legacy product or other brand HMI!

Screen data created in the GOT-A800 series SW3NIW-A8GOTP



Screen data created in the GP-PRO/PB-III series manufactured by Digital Electronics Corporation

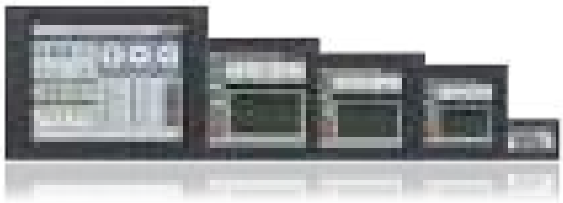
# Migrate to the latest Mitsubishi Graphic Operation Terminals!!

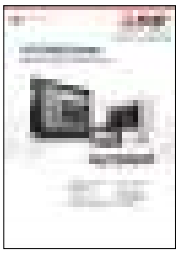
GOT series has same panel-cut dimensions when the screen size is the same. Screen data can easily be replaced using GT Works3. GOT with the latest functions can reduce loads on the PLC, and can back up data.

Mitsubishi Graphic Operation Terminals

**GOT2000**

**Graphic Operation Terminal**





►P.566

Documents for migrating GOT-F900 series

●GOT-F900 Migration Guide ●Replacement Guide

For example **GT Works3 +plus**

comes with the following software to convert screen data from GOT-900 series to GOT1000, GOT2000 series.

**GT Designer2 classic**

**GT Designer3**

## [Benefits of migration]

- **3 year warranty!**
- **Front side USB port enables easy maintenance***

* Excluding some models

- **Can be connected to various networks!**
- **Easy connection with multiple communication ports!**
- **Decentralize control to GOT to assure stable operation!**
- **Improves visibility with brilliant color LCD!**
- **Abundant lineup enables selection of product suitable for the required specifications.**
- **Logging function to improve quality!**

GT Works3 comes with GT Converter2 to convert screen data of legacy models and other brand HMI to GOT1000/GOT2000 series.

Screen design software

**GT Works3**
**GT Works3 +plus**
**GT Convertor2**

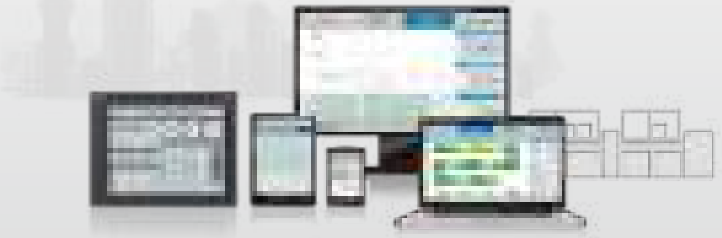
Mitsubishi Graphic Operation Terminals

**GOT2000 series**
**GOT1000 series**

**GOT Mobile**

Monitor your worksite anytime, anywhere.

**Check the equipment status using a web browser.**



# Mitsubishi inverters

## How is the current status of the existing inverter?

Mitsubishi inverters

A700 A500 F500

E500 S500

### [Concerns about the existing equipment]

Replacement of service life limited components may be needed soon.

Need to manage and control many units.

Need to improve energy efficiency.

### [Concerns for migrating]

Are there compatible products to the existing obsolete products?

How can we replace the parameters?

We are using coil type motor, eddy current joint type motor (AS), direct current (DC) motor, and have difficulty in daily and preventive maintenances.

**Mitsubishi Electric can eliminate these concerns!**

## Mitsubishi Electric offers various tools for replacement with latest models.

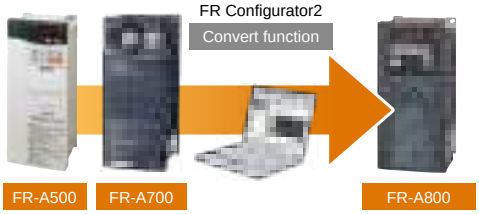
### Migration documents

- Inverter migration proposal

For example

### Convenient compatibility

- Parameters can be converted easily using the convert function of “FR Configurator2” (optional) parameter setting software.



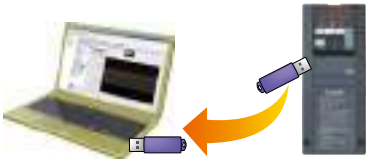

* Supports conversion from A500 to A800.

- The mounting compatibility with conventional models is secured.
- Mitsubishi Electric offers the (optional) mounting compatibility attachment though the compatibility may be different in some models.


### Advantages of migration to the 800 series

- In the FR-A800 and F800 series, the trace function can store the operation status (such as the output frequency) just before activation of the protection function in the RAM built in the inverter. The stored data (trace data) can be copied to the USB memory. Troubleshooting can be performed easily even in distant places when the trace data is captured by the software (FR Configurator2) set up in the inverter.

The trace data stored in the built-in RAM is erased when the power is turned OFF or the inverter is reset.



# Migrate to the latest Mitsubishi inverters!!

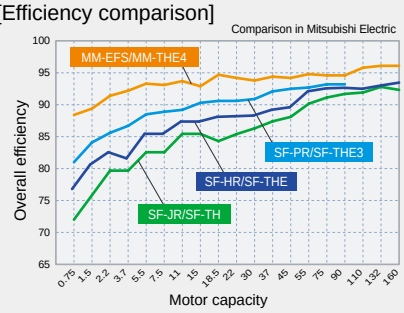
Abundant tools and documents to support migration are available.
Parameters can be converted easily using FR Configurator2.
Mitsubishi inverters with the latest functions considerably improves energy saving and ease of maintenance!

## Energy saving

Replace with high-efficiency IPM motor (MM-EFS series)

- The FREQROL-F800 series is compatible with the IPM motor.
- Replacement is easy due to frame number being the same as that of the standard three-phase motor.

[Efficiency comparison]




- IPM motor with permanent magnet is more efficient than the high-performance energy-saving motors.
- Efficiency level meets “IE4 (super premium efficiency)” of international standard IEC 60034-30. (As of March 2013)

## Improved ease of maintenance

Latest series use long service-life components and most advanced life diagnosis which improves ease of maintenance.

- Approximate life of limited service life components

| Part name | Approximate service life | Service life specified by JEMA |
|---|---|---|
| Cooling fan | 10 years | 2 to 3 years |
| Capacitor for smoothing main circuit | 10 years | 5 years |
| Smoothing capacitor on PC Board | 10 years | 5 years |

- Deterioration degree of main circuit capacitors, control circuit capacitors and rush current suppression circuits can be monitored.
- Self-diagnosis function sounds alarm for components having limited service life to prevent failures.

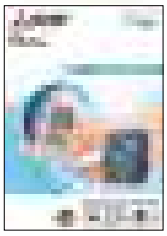
**It is economical to use Mitsubishi inverters for drive when Mitsubishi PLCs are used for control.
CC-Link and RS-485 communication enable precise control of multiple inverters.**

FREQROL




A800 ►P.438 F800 ►P.490 E700 ►P.522 D700 ►P.556



## [Benefits of migration]

- Improved ease of maintenance with long service life components.
- Easy control with abundant network connections!
- Life diagnosis function notifies remaining service life of components!
- “Close contact” installation design saves installation space (E700 and D700).
- Easy operation with M dial
- Easy wiring (A800, F800 E700SC and D700).
- Abundant lineup enables selection of product suitable for the required specifications!
- Parameters can be copied using the USB memory (A800 and F800).
- The magnet motor is also available (A800 and F800).
- Easy replacement of cooling fan

# Mitsubishi industrial robots

## How is the current status of the existing robot?

Mitsubishi industrial robots

P series
EN series

M series
A series

E series
S series

### [Concerns about the existing equipment]

Want to improve productivity of the equipment.

Maintenance is hard due to increased failures.

Want to visualize all standalone robots.

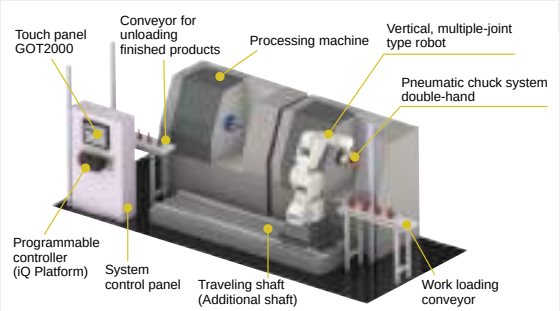
**Mitsubishi Electric can eliminate these concerns!**

## It contributes to productivity, the improvement in reliability, and total cost reduction.

For example

### Loading/Unloading of parts to a processing machine

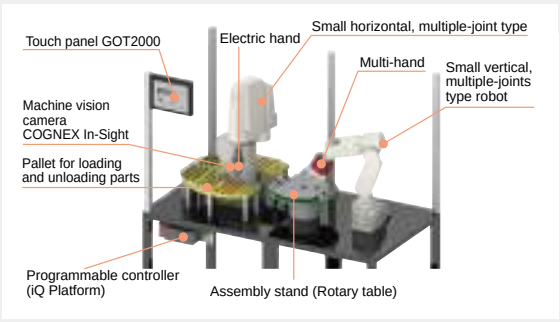
(A lathe, a machining center, a press machine, and a make-up machine, etc.)




For example

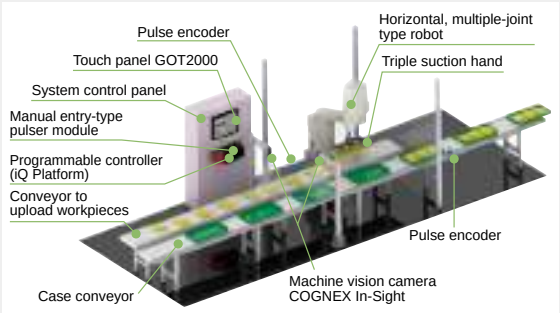
### Assembly of electric components

(switch)




For example

### Conveyor alignment for packed food products



# Migrate to the latest Mitsubishi robots!!


### Points for the employment of robots

A vertical, multiple-joint type robot realizes high-speed loading and unloading of parts to a processing machine. (Oil mist proof) Additional traveling shaft improves the operating rate of a robot and efficiently utilizes the facility.

#### Advantages

- Improvement of environmental resistance
- Smooth hand-over of products with various processing machines
- Higher operating rate of robot
- Shorter cycle time

### Points for the employment of robots

High-speed parts kitting with a horizontal, multiple-joint type robot, fine assembly with a vertical, multiple-joint type robot, and the ability to handle a variety of workpieces with a high-functioning hand (a multi-hand and an electric hand)

#### Advantages

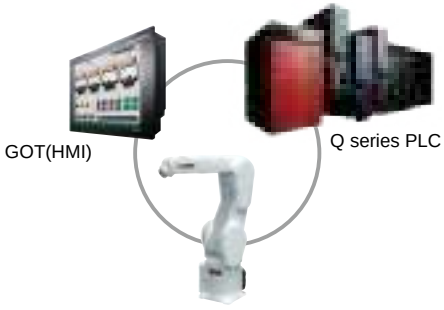
- High-speed kitting
- Capable of handling a wide variety of workpieces using only a small space
- No need to change hands to switch a kind of work
- Complicated assembly process
- Reduction of cycle time

### Points for the employment of robots

High-speed vision-tracking of horizontal, multiple-joint type robot realizes non-stopping alignment process. It also processes simultaneous tracking for multiple conveyors.

#### Advantages

- High-speed tracking
- No need of alignment device
- Reduction of cycle time
- Stable quality due to automated process




iQ Platform

SQ series supports iQ Platform and enables higher speed control.

►P.636

## [Benefits of migration]

- High-speed control improves tact time!
- Robot CPU in iQ Platform saves wiring
- Multiple robots can be controlled together.
- Robot can be controlled using PLC language!
- Downsized robot saves installation space.
- Improved operability with easy connection of GOT

# Mitsubishi AC servos

## How is the current status of the existing AC servo?

Mitsubishi AC servos


MR-A, MR-J, MR-J2, MR-J2S, MR-H, MR-SA/SB/SC/SD, MR-SO, MR-VA/VC

### [Concerns about the existing equipment]

- AC servos is not tuned correctly and generates large noise.
- Takes time to complete positioning.
- Motor seems to be okay but the amplifier is a concern.

### [Concerns for migrating]

- Are there compatible products to the existing obsolete products?
- Can the hardware be replaced easily?
- How can we replace the parameters?

**Mitsubishi Electric can eliminate these concerns!**

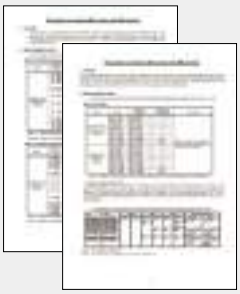
## Various tools are available to migrate to the latest products.

### Mitsubishi Electric

#### Replacement support documents

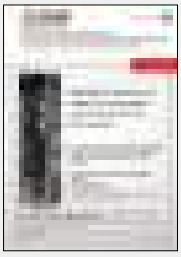
- MR-J2-Super series migration catalog

- Cautions on replacement of the MR-J/MR-H series



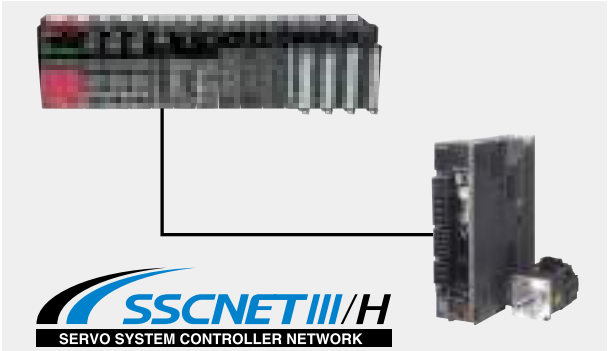
- Migration Guide from MR-J2 Super/J2M series to MR-J4 series

- New Product Newsletter for MR-J2S-B SSCNET conversion unit



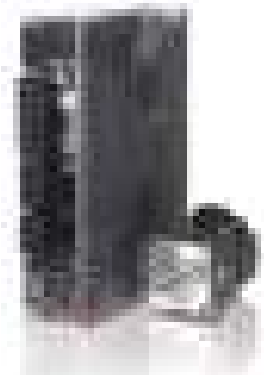
### MR-J4-B is recommended for replacing legacy Mitsubishi products and other manufacturers products.

- SSCNET III/H enables a simple system with less wiring.
- MR Configurator2 enables easy adjustment, monitor display, parameter setting, etc.



# Migrate to the latest Mitsubishi AC servos!!

Abundant tools to support easy migration are available.
In multi-axis control, combining the motion controller contributes to function upgrade and space saving!



►P.270

MITSUBISHI SERVO AMPLIFIERS & MOTORS
**MELSERVO-J4**

0.05kW to 22kW

## Partner manufacturer

●Migratoin tools available from Mitsubishi Electric System & Service Co. Ltd.

For replacing MR-J series

For replacing MR-J2S series

For replacing MR-H series

For replacing MR-SA series

For example

In case of MR-J2S series

Servo can be replaced with MR-J3A type using the migration tool.

## [Benefits of migration]

- Easy servo adjustment to fit the equipment!
- Easy wiring with SSCNET III/H or SSCNET III.
- High-response control improves tact time!
- Easy setting of electronic gear.
- Smooth operation due to reduced cogging torque
- Easy tuning function
- Abundant lineup enables selection of product suitable for the required specifications!
- Space saving design allows close contact installation

# Mitsubishi low-voltage distribution control equipment

## How is the current status of the existing low-voltage distribution control equipment?

### Low-voltage circuit breakers

No-fuse circuit breaker
NF225-SS series

No-fuse circuit breaker
NF2000 series

Need to replace the breaker because the current capacity has changed.

Concerned about aging products malfunctioning.

Need to replace the large obsolete products to save space.

### Electromagnetic switches

Electromagnetic contactors
MS-K series

Concerned about aging products malfunctioning.

Want to save space by migrating to the latest products.

### Power management measuring unit

Mechanical measuring unit

Concerned about aging products malfunctioning.

Need to reduce measuring work.

**Mitsubishi Electric can eliminate these concerns!**

## Migrate to the latest Mitsubishi low-voltage distribution control equipment!!

No-fuse circuit breakers

Low-voltage air circuit breakers

Downsized products allows panel space saving.
Functions can be upgraded just by replacing.
Can prevent unnecessary operations of the earth-leakage circuit breaker by high function IC.

Electromagnetic contactors
**MS-T series**

Terminal cover installed for added safety.
Downsized products allows panel space saving.

Electronic multi-measuring instruments
ME96SS series

LCD improves visibility.
Easy data collection with communication function.
Various options facilitate setting changes for the display and output devices (electronic measuring instrument).

## Product catalogs

●Mitsubishi WS-V Series Molded Case Circuit Breakers and Earth-leakage Circuit Breakers

●Mitsubishi WS-AE Series Low Voltage Air Circuit Breakers

## Product catalogs

●Mitsubishi MS-T Series Electromagnetic switches

## Product catalogs

●Mitsubishi Super-S Series Electronic Multi-measuring Instrument ME96SS

Migrations by Mitsubishi Electric

# Furthermore, Mitsubishi's migration can:

| Energy measuring unit EcoMonitorLight | MDU breaker* | No-fuse circuit breaker/ earth-leakage circuit breaker equipped with leakage current indication* |
|---|---|---|
| Single-circuit measuring unit, display unit, and setting unit integrated into a single measuring unit. Allows easy and low cost energy "visualization". Built-in MODBUS® communication allows system upgrade. | In addition to circuit breaker function, this product continuously monitors the electric circuit information (power amount, load current, leakage current, etc.) and enables centralized monitoring through communication. | These products monitors leakage current data and investigate causes of electric leakage. |

* These equipment are not sold in the USA.

Mitsubishi FA products can "visualize" power management equipment and of production equipment.

Directly connected to Q series PLC.

Electric power measuring unit [QE84WH]
PLC measures power information up to 4 channels which enables standard data control and state monitoring in each production equipment.

Insulation monitoring unit [QE821LG]
PLC continuously monitors the insulation status and supports preventive maintenance of the production equipment.

## [Benefits of migration]

**Low-voltage circuit breakers**

- Downsized to save panel space.
- New circuit breaking technology allows higher performance.
- Contribute to energy saving and preventive maintenance through monitoring of the electric circuit information using the MDU breaker and others.

**Electromagnetic switches**

- Safe and easy wiring with CAN terminal.
- Detachable arc cover makes inspection easy.
- Save energy with low power consumption coil.

**Electronic multi-measuring instrument**

- Wide viewing angle LCD improves visibility.
- Set data transceiver allows easy setting and management.

# The production capability of your factory

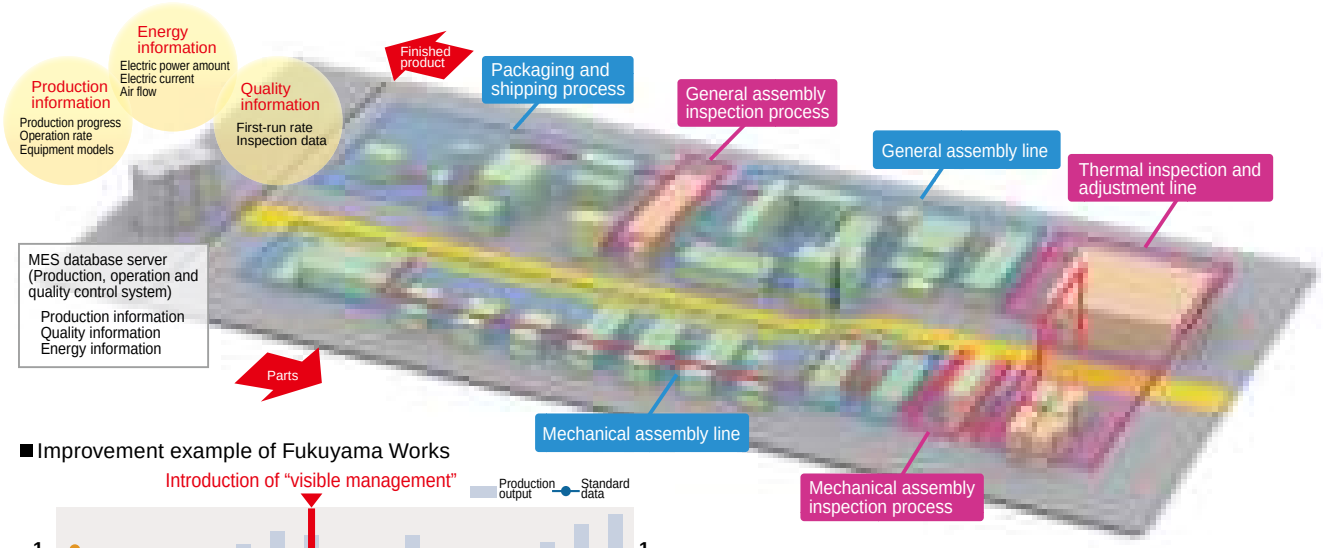
The MES interface is the key to realize the visual platform “e-F@ctory”.
A broad lineup of MES interface products of Mitsubishi Electric enables direct connection between the MES (manufacturing execution system) database and the shop floor equipment without communication gateways such as personal computers.

●Mitsubishi FA Integrated Solution e-F@ctory

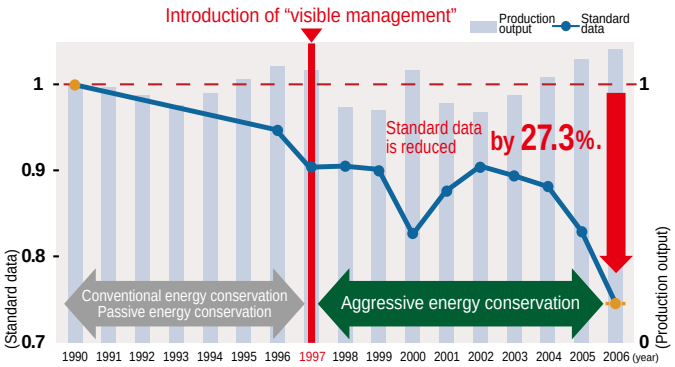



# “Aggressive energy conservation”

Mitsubishi Electric’s Fukuyama Works adopted “visible management”, and is now implement “aggressive energy conservation” efforts. Fukuyama Works has realized an economical and ecological “eco factory”, and uses its eco expertise to engage in the energy conservation business.




■Improvement example of Fukuyama Works




**Reduction by**
**27.3% in standard data**
* Performance in 2006 compared to 1990

**Reduction of approximately**
**23 million yen in basic power cost**
* Performance in 2006 compared to 1990

Reduction of approximately
**100 million yen**
in basic power cost
* Performance in 2006 compared to 1990

# Mitsubishi Electric's simple, convenient and compact EcoWebServerIII is advanced to support visible management of energy.

●Mitsubishi Energy-saving Data Collection Server EcoWebServerIII

## ●What is EcoWebServer?

EcoWebServer is an all-in-one type data collection server having excellent functions essential in energy-saving management of alarm units and machines.

**Two types selectable**

CC-Link connection type　　B-NET connection type




## Remain available! Inherited functions

| The setting software is provided as an accessory. There is no necessity to create programs. | The newly adopted universal design makes graphs easier to see. | Virtual measurement and production quantity are incorporated in the standard data control. | The measured data are processed and saved easily. |
|---|---|---|---|
| **Simple setting Simple extension** | **Graph display** | **Calculation function** | **CSV format Compatible with FTP** |

## Powered up! Improved performance

| The daily data saving period has been extended from 2 months to 6 months. Extended saving period | The number of virtual measurement points and standard data measurement points have been increased. | The zoom data collection period has been reduced. |
|---|---|---|
| **Extended saving period** | **Enhanced calculation function** | **1 minute minimum** |

## New functions added! Additional functions

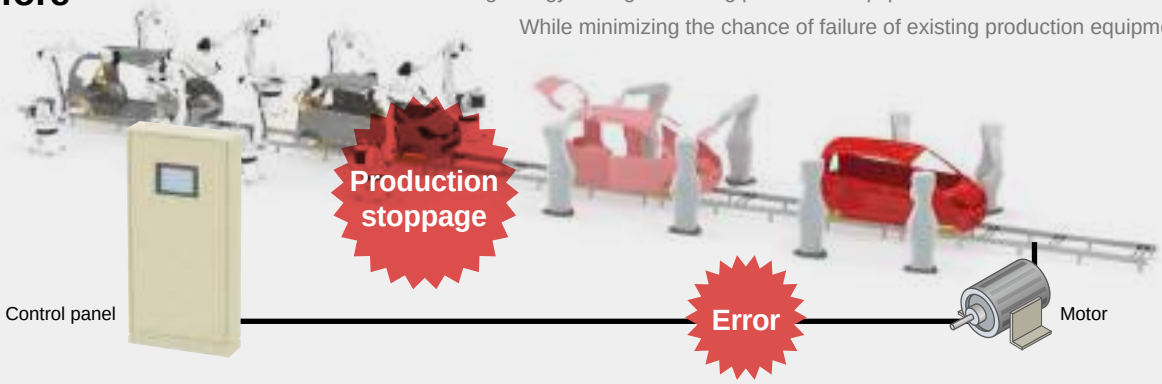
| Alarm outputs have been enabled to enhance the monitoring function. | The temperature and humidity data are collected for each section and application. | The energy loss in the equipment has been made visible. |
|---|---|---|
| **Up to 16 contact outputs** | **Multiple comparison** | **Equipment monitoring** |

Various graph displays are available to construct the "mechanism to let workers be aware" of status changes.

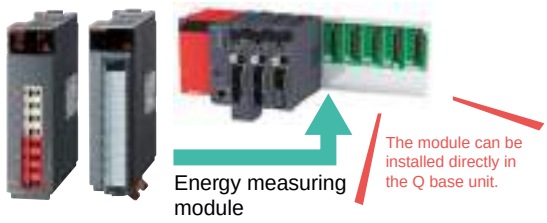
# Power measurement and insulation monitoring together with PLC migration realize energy saving and preventive maintenance!

## Before

Promoting energy saving in existing production equipment…
While minimizing the chance of failure of existing production equipment...




## Energy Measuring Module Installation Example

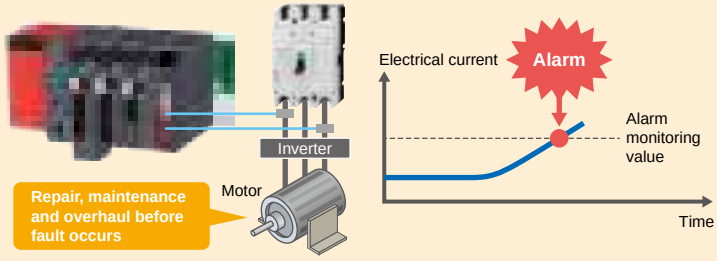



- Specific energy consumption can be managed in detail according to individual items or processes to assist in reducing the power consumption of production equipment and realize energy savings.
- Constantly measuring current (or power) consumption can help prevent serious faults and equipment failure, ultimately resulting in reduced production losses.

**Preventive Maintenance** Constant measurement of the electrical current

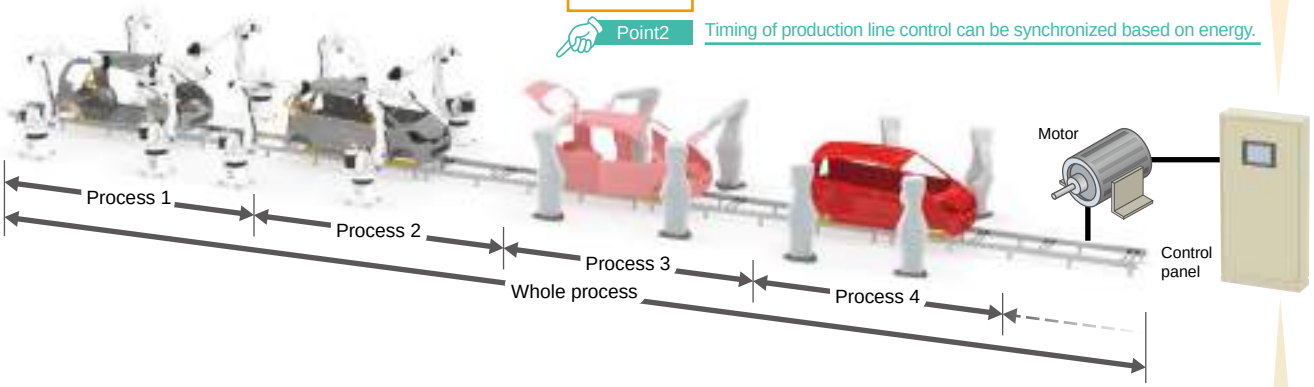
**Point1** Preventive maintenance measures are taken before equipment stoppage.

Constant monitoring of the current value

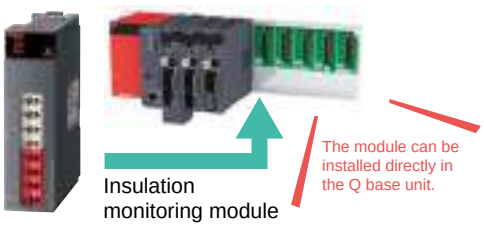



**Energy Saving** Item or process, synchronizing the control timing

**Point2** Timing of production line control can be synchronized based on energy.



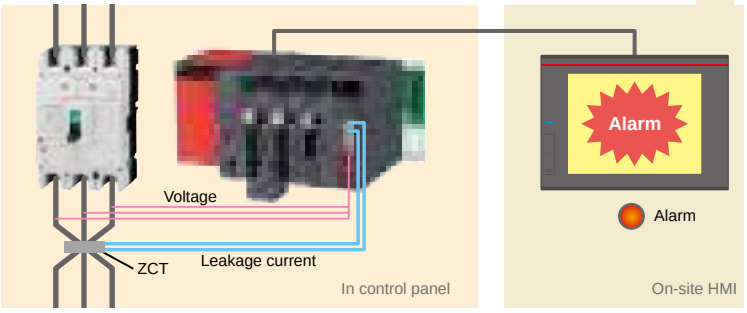

## Insulation Monitoring Module Installation Example




- Maintenance man-hours can be reduced by improving the efficiency of periodic inspection work.
- The resistive-component leakage current (Ior) can be measured so that a leakage current caused by insulation deterioration can be identified.

**Preventive Maintenance** Constant measurement of the Leakage current value, and constant monitoring for insulation deterioration for each unit/load

**Point3** Prevention of sudden failure of machines and lines / Detection of insulation deterioration (earth leakage) at early stage



# Global web site

### Easily accessibility to the FA information of Mitsubishi Electric all over the world!

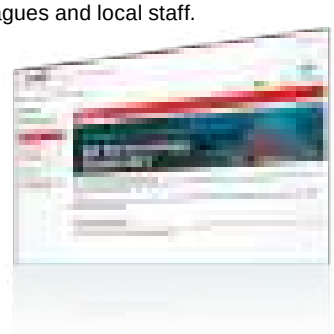
From “Worldwide” provided at the upper right corner of the top page, you can easily access to the FA web sites all over the world. On the pages for each country, you can check not only products purchasable all over the world but also the information on products developed specially for the region, catalogs and manuals in each language and various regional services. Please utilize “Worldwide” for expanding your business overseas.

Global FA web site **www.MitsubishiElectric.com/fa**

# Business support

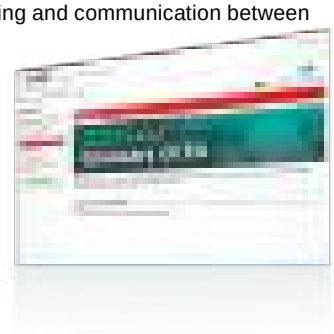
### ◆ Dictionaries

These dictionaries contain references to more than 4000 words related to the world of FA.  Use them to support and improve the communication between colleagues and local staff.



### ◆ Glossaries

These glossaries contain more than 750 specialized technical terms associated with the use and operation of FA products helping to improve understanding and communication between businesses and local staff.

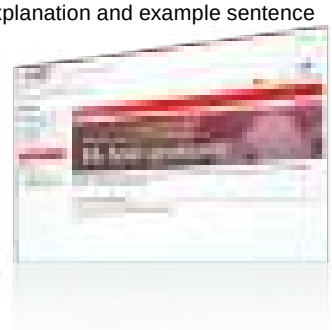


### ◆ Phrasebook

These phrasebooks can be used to support communication between local staff and Japanese enginners. The phrasebooks contain many everyday phrases as well as numerous examples related to the manufacturing environment.

### ◆ On-site lexicon

These lexicon's are designed to support the on-site communication between Japanese engineers and local staff. For each word a relevant FA explanation and example sentence are provided.



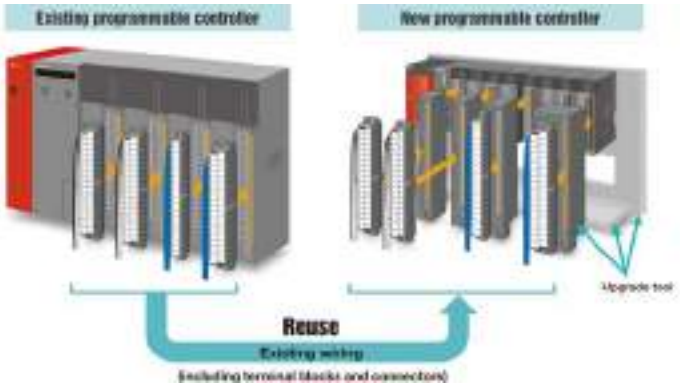
# MITSUBISHI ELECTRIC ENGINEERING CO., LTD.

Mitsubishi Electric Engineering Co., Ltd. designs and sells peripheral components of Mitsubishi PLCs including PLC upgrade support equipment, wiring saving equipment and man-hour saving equipment.

## PLC migration (upgrade) tools

Mitsubishi Electric Engineering Co., Ltd. offers migration (upgrade) tools for replacing the MELSEC-A series with the MELSEC-Q series and replacing the MELSEC-AnS series with the MELSEC-L/Q series.
The migration work time and wiring mistakes are considerably reduced by utilizing the existing wiring (including terminal blocks and connectors).

● Catalog




## FA merchandise (FA goods)

Wiring saving equipment and man-hour saving equipment support the wiring of the PLCs.
These equipment reduce man-hours for wiring inside and outside the panel and wiring mistakes, and realize safety backed up by high reliability.

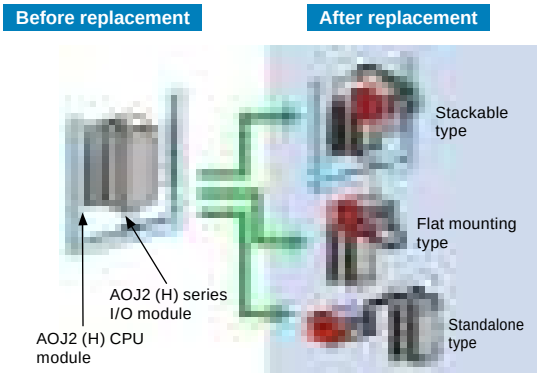
● Catalog

For the acquisition of Upgrade Tool and FA merchandise (FA goods), please contact your local Mitsubishi Electric sales office or sales representative.

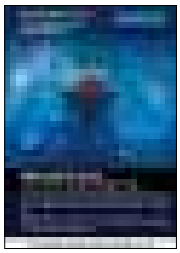
# Mitsubishi Electric System & Service Co., Ltd.

## AOJ2 migration tool

This migration tool is used to replace the MELSEC-AOJ2 with the Q series.
It consists of the interface module (to which the wired terminal block of the existing I/O module can be directly mounted), Q series PLC mounting members and connection cables.
Either of three types of installation methods can be selected in accordance with the installation space.
This migration tool utilizes the existing wiring to reduce wiring mistakes and work time.




● Catalog



## AC servo migration tool

This migration tool is used to replace the MR-J2Super series with the MR-J4 series.
Because the existing mounting dimensions and cables are compatible, replacement can be performed in a short time.
This migration tool is available also for step-by step migration consisting of primary replacement (in which only the amplifier is replaced) and secondary replacement (in which the motor is replaced).It utilizes your assets effectively.


● Catalog

## FA integrated network cables

Mitsubishi Electric System & Service Co., Ltd. offers various network cables and wiring equipment for the controller network “CC-Link IE Control”, field network “CC-Link IE Field” and motion network “SSCNET III/H” to correspond with various applications.

CC-Link IE Control

Optical fiber cable for controller network “CC-Link IE Control”

Connection terminal for controller network “CC-Link IE Control”

CC-Link IE Field

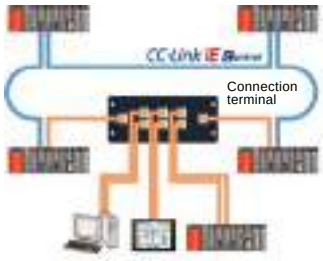
Ethernet cable for field network “CC-Link IE Field”

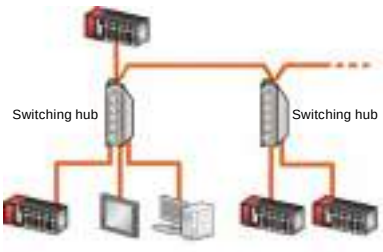
Industrial switching hub for field network “CC-Link IE Field”

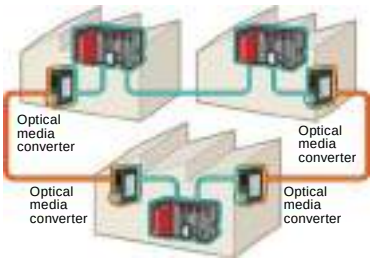
SSCNET III/H

Optical fiber cable for motion network “SSCNET III/H”

Optical media converter for controller network “CC-Link IE Control”




## Mitsubishi AC servo cable for MELSERVO-J4/J3/JN series

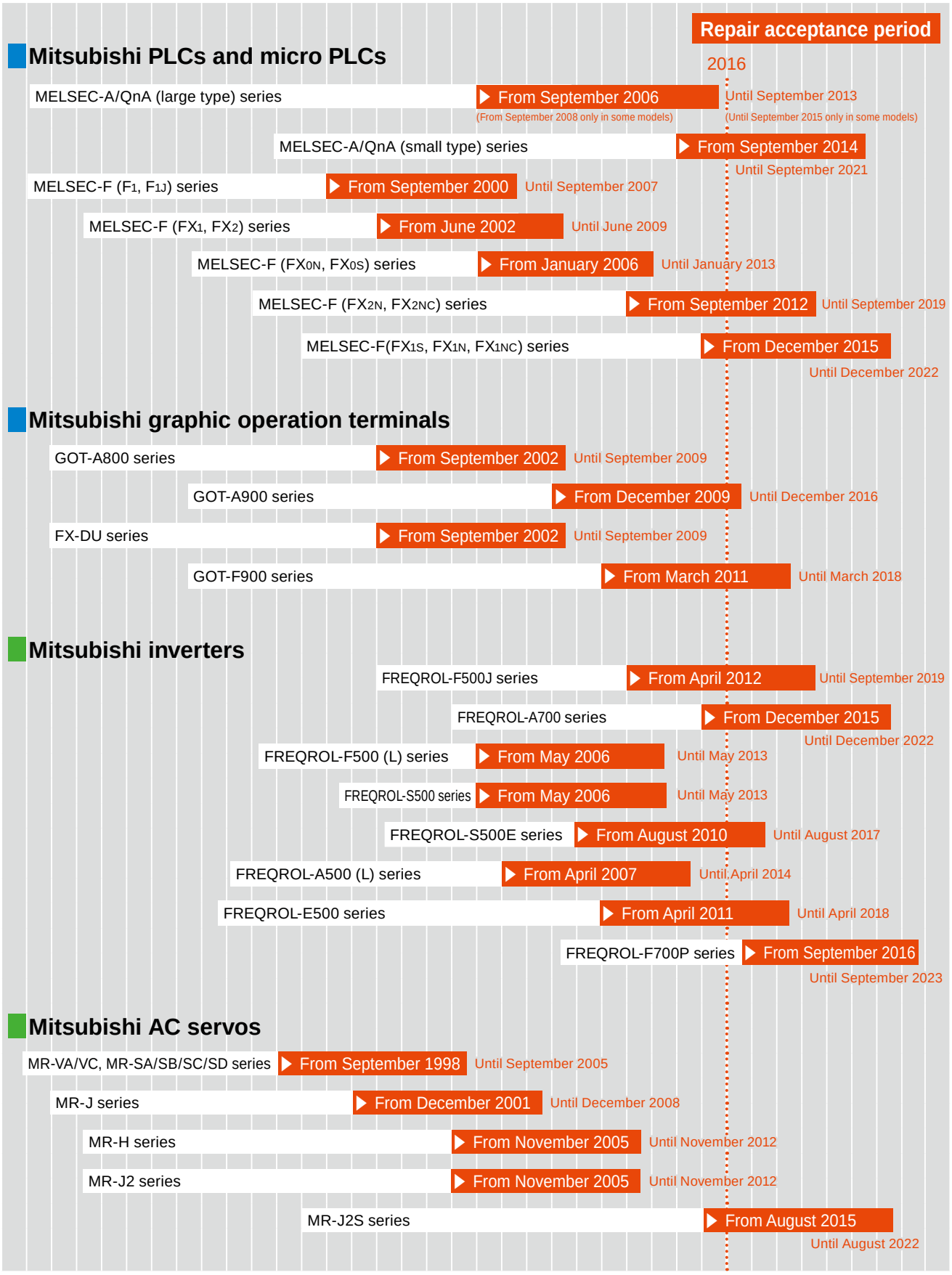
- This cable enables relay connection, and is available in a case in which the AC servo should be separated from the machine side during transportation or installation, a case in which a highly flexible part should be adopted partially in the AC servo, and other cases.
- Mitsubishi Electric System & Service Co., Ltd. produces cables (increment:1 m) for Mitsubishi MR-J4/J3/JN series servo encoders, power supplies and electromagnetic brakes.

∗ Mitsubishi Electric System & Service Co., Ltd. produces cables other than cables of standard length sold by Mitsubishi Electric Corporation.

# Production discontinuance of major FA products



Below is the repair acceptance period of major models and series in which production of the main unit are already discontinued. Production may be discontinued even in other models and series not shown below, and production may be discontinued before the date shown below or may be continued in some models and series shown below. Refer to the Mitsubishi Electric's website or contact Mitsubishi Electric sales representatives for further information.




## Mitsubishi distribution control product

Migration time of Mitsubishi distribution control product due to deterioration

| Model | Recommended migration time (after start of use) |
|---|---|
| Molded-case circuit breaker<br>Earth-leakage circuit breaker | 15 years or specified number of times of switching |
| Electromagnetic switch | 10 years or specified number of times of switching |

# Production/ Development

# We Strive to Respond to Customers Needs in All Aspects of Our Production and Development Processes and Quality

## Production

We manufacture products that satisfy our customers needs, with leading-edge production lines and technologies.

In cooperation with our network of factories and overseas production bases, our mother factory in Nagoya, Japan, has developed systems and solutions, such as e-F@ctory, that are designed to optimize and strengthen manufacturing and production processes. This is demonstrated through the total “visualization” of the factory operations from ensuring the highest level of productivity and machine optimization to energy management applied throughout the total plant operation.

Nagoya Works

Shinshiro Factory

Kani Factory

Nagoya Works (Nagoya, Aichi)

As the core factory of our FA business, Nagoya Works creates an extensive lineup and network of FA products. Its goal is to contribute to production throughout the world and become the No.1 FA supplier to our customers.

Fukuyama Works (Fukuyama, Hiroshima)

Fukuyama Works utilizes its world-class power distribution and control technology to manufacture protective, measurement and control equipment. It also produces a wide range of ecological and economical energy-saving products.

Nakatsugawa Works (Nakatsugawa, Gifu)

Nakatsugawa Works contributes to the future of lifestyles and the planet through environmentally conscious systems. It manufactures ventilators and industrial fans that create comfortable environments while saving energy.

Power Distribution Systems Center (Marugame, Kagawa)

The Power Distribution Systems Center specializes in vacuum circuit breakers and other electrical distribution equipment for factories, office buildings, public facilities, power plants, and railway substations, in addition to control and monitoring systems.

Mitsubishi Electric FA Industrial Products Corporation (Fukuoka, Fukuoka)

This site provides solutions to various needs in the area of geared motors, and hoists, which serve as driving sources for a broad range of equipment, from transport to food production.

Mitsubishi Electric India Pvt. Ltd.

We manufacture inverters, power distribution control devices, PLC and HMI, and we are building a manufacturing, sales, and service system that is responsive to the needs of the Indian market.

Mitsubishi Electric Automation (Thailand) Co., Ltd.

Founded as a production base for three-phase induction motors, but it now manufactures electric energy meter and die-cast parts, mainly for domestic use in Thailand.

Mitsubishi Electric Automation Manufacturing (Changshu) Co., Ltd.

Manufacturing servo, NC, and other drive control equipment. Production is local to meet the growing demand in China.

Mitsubishi Electric Low Voltage Equipmet (Xiamen) Co., Ltd.

Manufacturing low voltage power distribution and control equipment. The company is responding to the expansion of our customers’ production facilities in China.

Mitsubishi Electric Dalian Industrial Products Co., Ltd.

Founded as a production base for breakers, this site also manufactures inverters and electrical discharge machines today. It intends to further upgrade its production processes as a strategic overseas production base.

## Development
We identify new customer needs promptly and accelerate our R&D cycle to respond to those needs.

### Core Development Processes
To develop products in response to diversifying needs, two core development centers have been created integrating the related departments of FA and Industrial Automation Machinery. These state-of-the-art centers maximise the technology synergies to produce world-class products.

FA Development Center (within Nagoya Works)

The FA Development Center pursues solutions for our customers' diverse and advanced needs in the areas of control technology, networking, HMIs, complex software, drives etc.

Industrial Automation Development Center (within Nagoya Works)

The state-of-the-art development environment is capable of responding to trends for more compact features, higher precision, and higher speeds. The design, processing technology and service domains have been brought together to strengthen Mitsubishi Electric's total development power.

### Comprehensive strength
To promote the development of competitive products and create technologies for the future we foster world-leading R&D activities whilst utilizing our network of overseas and domestic research institutes.

Advanced Technology R&D Center (Amagasaki, Hyogo)

As an advanced technology base for all of Mitsubishi Electric's business areas, the R&D Center has many responsibilities: from the development of common infrastructure technologies and new products to the research and development of potential new businesses for the future.

Information and Technology R&D Center (Kamakura, Kanagawa)

The R&D Center plays an important role in creating new businesses and innovating existing ones through basic research and development in the areas of information, communications, and optical and electromagnetic technologies.

### Development at the global level
We develop products that satisfy the needs of our overseas customers, propose new global-scale FA business plans, adopt cutting-edge technologies from overseas and promote other development activities, all from a global perspective.

European Development Center (Düsseldorf, Germany)

In addition to investigating and researching cutting-edge technologies, the European Development Center develops products for the European market, in the languages of the European countries, as well as working to obtain various EU standards and certifications.

North American Development Center (Chicago, Boston) USA

As a planning and development base for new products and new business creation in North America, the North American Development Center aims to incubate new FA businesses and investigate advanced technologies.

China Design (Dalian, China)

Based on close cooperation between sales departments and our mother factory, we are expanding our product lineup and developing new specifications for the Chinese market.

Indian Development Center (Pune, India)

The company develops for the Indian market. Also, as a development base for the global market, it partners with other development bases to develop common technologies for FA equipment.

## Quality
In response to our customers' trust and confidence, we constantly review and reinforce our quality management system.

Anechoic room

Manufacturing servo, NC, and other drive control equipment. Production is local to meet the growing demand in China.

LSI evaluation facility

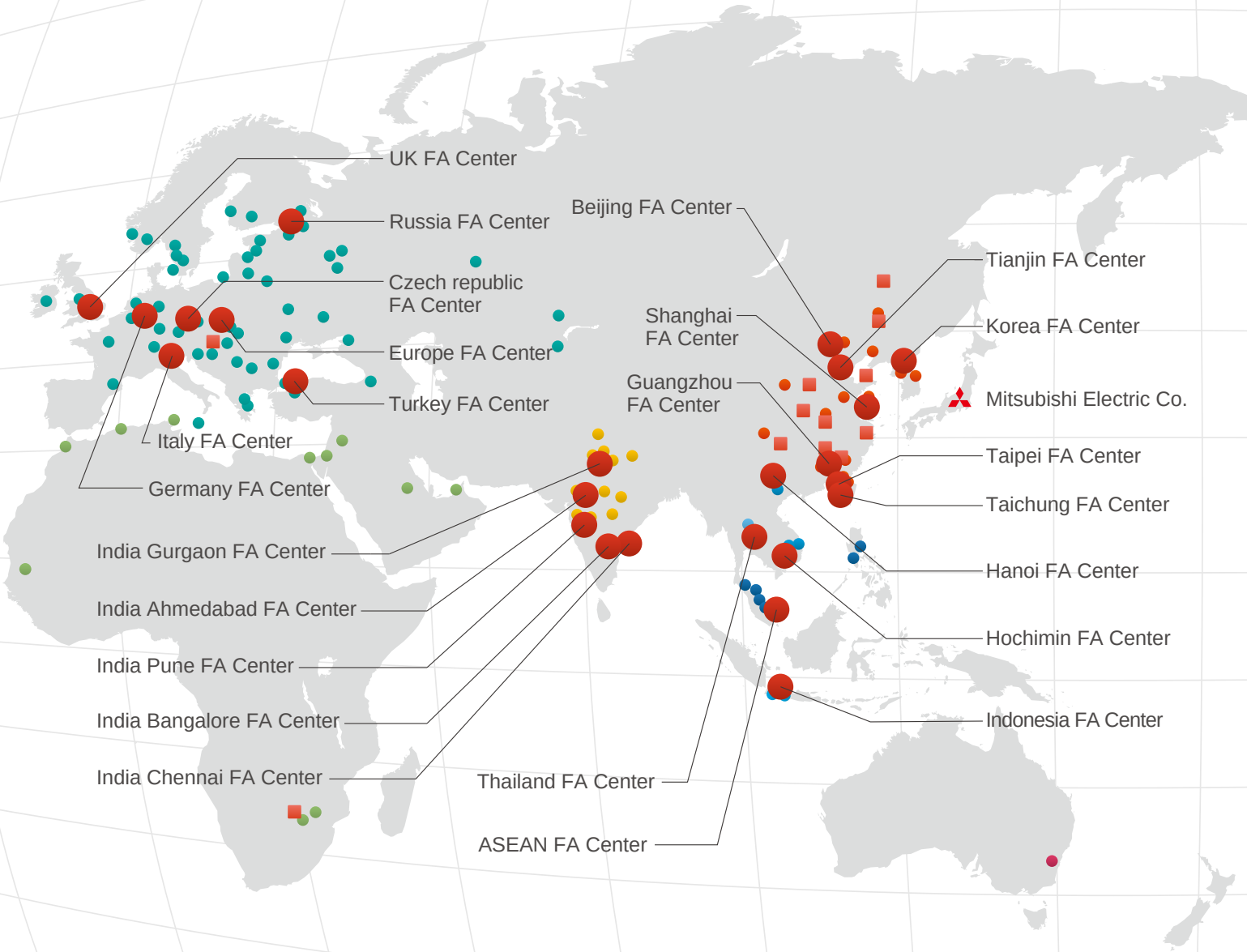
Manufacturing low voltage power distribution and control equipment. The company is responding to the expansion of our customers' production facilities in China.

Inspecting machining equipment performance

We exhaustively inspect the drive control and machining performance of machining equipment, testing to ensure continuing precision machining after delivery.

GLOBAL NETWORK

# Our Global Network Delivers Reliable Technologies and Security All Over the World

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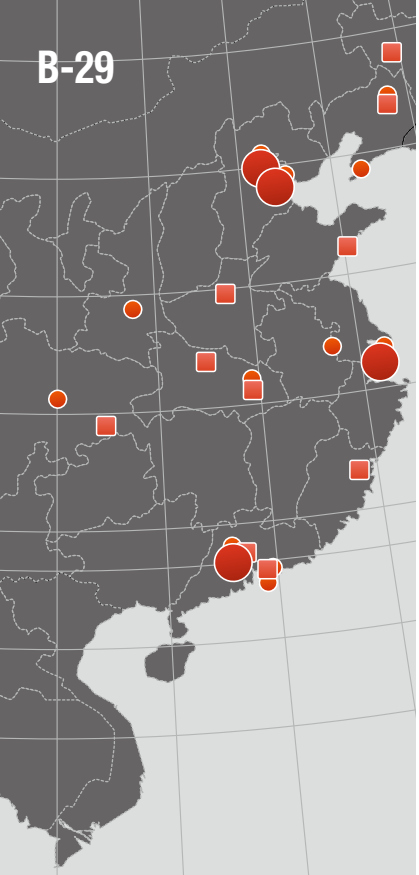
## Index



China Mainland

# China Main Land

## Shanghai FA Center

PLC HMI SV INV RB CNC LVS MC

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HP http://www.meach.cn　LANGUAGE Chinese, Japanese, English
* Japanese engineers are stationed in the FA Center.

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* Robot:華南地区受付窓口

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Sales offices　PLC Programmable Controllers　HMI Human-Machine Interfaces　SV AC Servos, Servo System Controllers　INV Inverters

## FA Center Satellite

### MITSUBISHI ELECTRIC SHENYANG FA Center Satellite
PLC HMI SV INV CNC

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HP http://www.szxingdong.com LANGUAGE Chinese

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HP http://www.hnbf.cn LANGUAGE Chinese

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HP http://cn.mitsubishielectric.com/fa/zh LANGUAGE Chinese, Japanese, English

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RB Industrial Robots CNC Computerized Numerical Controllers LVS Low-voltage Circuit Breakers MC Contactors and Motor Starters * For repairing or after-sales technical support, please contact your nearest FA Center.

China Mainland

# China Main Land

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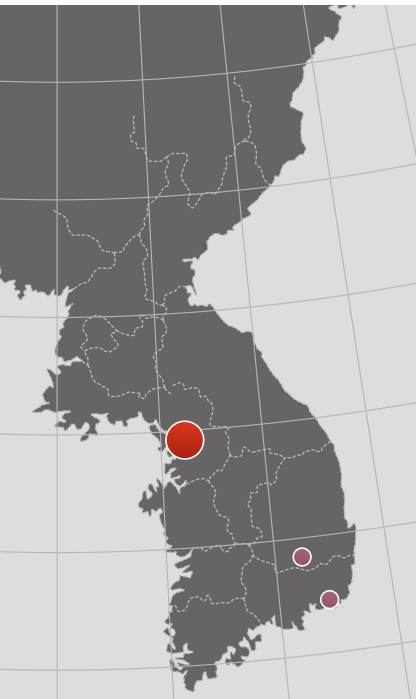

Korea

# Korea

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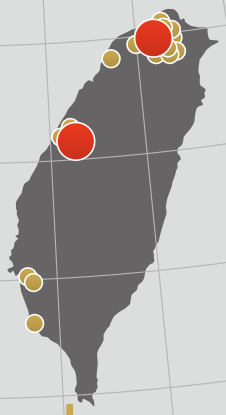

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RB CNC

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ASEAN

# ASEAN

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Indonesia

# Indonesia

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The Plaza Office Tower, 28th Floor JL. MH. Thamrin Kav 28-30, Jakarta, 10350, Indonesia
TEL +62-21 2992 3322 FAX +62-21 2992 3323
HP http://stcid.setsuyo.asia
LANGUAGE Indonesian, English, Japanese

### PT. Autoflex Globalindo
PLC HMI SV INV
Jl. MT. Haryono 141 Semarang Central Java 50123, Indonesia
TEL +62-24 358 5577 FAX +62-24 355 9798
HP http://www.autoflexindo.com
LANGUAGE Indonesian, English

### PT. Flexindomas
PLC HMI SV INV
Komplek Ruko Latumenten Jl. Prof. Dr. Latumenten No. 17B Jakarta Barat 11330, Indonesia
TEL +62-21 6313 1151, +62-21 630 1980 FAX +62-21 631 3154
HP http://www.id.pumasautomation.com
LANGUAGE Indonesian, English

### PT. Mitsol Teknik Indonesia
PLC HMI SV INV
Jl. Jemur Sari 76 D20, Surabaya 60237, Indonesia
TEL +62-31 847 6488 FAX +62-31 847 5462
HP http://www.mistol.co.id
LANGUAGE Indonesian, English

### PT. Abadi Bangun Bersama
PLC HMI SV INV
Komplek Kopo Mas Regency Ruko C-8B JL. KH. Wahid Hasyim, Bandung, Indonesia
TEL +62-22 543 6852 FAX +62-22 543 6696
LANGUAGE Indonesian, English

### PT. Setsuyo Astec - Semarang Office
PLC HMI SV INV
Jalan MT Haryono No.525 Semarang, Jawa Tengah, Indonesia
TEL +62-24 844 7899 FAX +62-24 841 7666
HP http://www.stcid.setsuyo.asia
LANGUAGE Indonesian, English

### PT. Setsuyo Astec - Surabaya Office
PLC HMI SV INV
Jl. Raya Meganti Karangan No.411, Wiyung, Surabaya, Jawa Timur 60228 Indonesia
TEL +62-31 752 7351
HP http://www.stcid.setsuyo.asia
LANGUAGE Indonesian, English

### PT. Sahabat Indonesia
LVS MC
Muara Karang Selatan Blok A Utara No. 1.Kawasan Industri Pergudangan, Jakarta Utara 14440, Jakarta, Indonesia
TEL +62-21 661 0651 FAX +62-21 660 3700
HP http://sahabatindo.com/
LANGUAGE Indonesian, English

Vietnam

# Vietnam

## Hanoi FA Center

PLC HMI SV INV RB

### Mitsubishi Electric Vietnam Company Limited
### Hanoi Branch Office

6th Floor, Detech Tower, 8 Ton That Thuyet Street, My Dinh2 Ward,
Nam Tu Liem District, Hanoi, Vietnam

TEL +84-4-3937-8075 FAX +84-4-3937-8076
HP http://www.MitsubishiElectric.asia/Vietnam
LANGUAGE Vietnamiese, English, Japanese

* Japanese engineers are stationed in the FA Center.

## Ho Chi Minh FA Center

PLC HMI SV INV RB

### Mitsubishi Electric Vietnam Company Limited

Unit 01-04, 10th Floor, Vincom Center, 72 Le Thanh Ton Street, District 1,
Ho Chi Minh City, Vietnam

TEL +84-8-3910-5945 FAX +84-8-3910-5947
HP http://www.MitsubishiElectric.asia/Vietnam
LANGUAGE Vietnamiese, English

## Sales Offices

### Mitsubishi Electric Vietnam Company Limited

PLC HMI SV INV RB CNC LVS MC

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District 1, Ho Chi Minh City, Vietnam

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HP http://www.mitsubishielectric.asia/vietnam/
LANGUAGE Vietnamiese, English, Japanese

### Mitsubishi Electric Vietnam Company Limited
### Hanoi Branch

PLC HMI SV INV RB CNC LVS MC

6th Floor, Detech Tower, 8 Ton That Thuyet Street,
My Dinh2 Ward, Nam Tu Liem District, Hanoi, Vietnam

TEL +84-4-3937-8075 FAX +84-4-3937-8076
HP http://www.mitsubishielectric.asia/vietnam/
LANGUAGE Vietnamiese, English, Japanese

## Distributors

### SA GIANG TRADING CO., Ltd.

PLC HMI SV INV RB LVS MC

Room 11.3B , 11th Floor, Ree Tower, 09 Doan Van Bo St., Ward 12,
Dist.4, HCMC, Vietnam

TEL +84-8-3943-1568/69/70 FAX +84-8-3943-1571
HP http://www.sagiangvn.com
LANGUAGE Vietnamese, English, Japanese

### APC INDUSTRY CORPORATION

PLC HMI SV INV RB LVS MC

No10 21 Road, Linh Chieu Ward, Thu Duc District,
Ho Chi Minh, Vietnam

TEL +84-8-3722-3605 FAX +84-8-3722-5120
LANGUAGE Vietnamese, English

### SA GIANG TRADING CO., Ltd. Hanoi office

PLC HMI SV INV RB LVS MC

6 Floor, Bac Ha - C14 Building, To Huu Street, Trung
Van Ward, Nam Tu Liem District, Ha Noi, Viet Nam.

TEL +84-4-3573-7646(Rep) FAX +84-4-3573-7650(Rep)
HP http://www.sagiangvn.com
LANGUAGE Vietnamese, English

### NARASAKI SANGYO CO., LTD.
### HANOI REPRESENTATIVE OFFICE

PLC HMI SV INV RB LVS MC

R.308, HITC Building, 239 Xuan Thuy Str., Dich Vong Hau Ward,
Cau Giay Dist, Hanoi, Vietnam

TEL +84-4-3724-7063 FAX +84-4-3724-7065
LANGUAGE Vietnamese, English, Japanese

### DUY HUNG TECHCOM CO., LTD.

PLC HMI SV INV RB LVS MC

Villa 2A-20, 16B1 str, Village of European Vietnamese Resident,
Mo Lao ward, Ha Dong dist, Hanoi, Vietnam.

TEL +84-4-3540-9046 FAX +84-4-3540-9049
HP http://www.duyhung.vn/
LANGUAGE Vietamese, English

### DUY HUNG TECHCOM CO., LTD. HCM Branch

PLC HMI SV INV RB LVS MC

3rd Floor, No.32 D5 str, Ward 25, Binh Thanh dist, Ho Chi Minh,
Vietnam

TEL +84-4 354 09046 FAX +84-4 354 09049
HP http://www.duyhung.vn/
LANGUAGE Vietamese, English


# Thailand

## Thailand FA Center

PLC HMI SV INV RB CNC

**Mitsubishi Electric Factory Automation (Thailand) Co., Ltd.**
12th Floor, SV.City Building, Office Tower 1,
No. 896/19 and 20 Rama 3 Road, Kwaeng Bangpongpang,
Knet Yannawa, Bangkok 10120, Thailand
TEL +66-2682-6522 to 31
FAX +66-2682-6020 HP http://www.mitsubishifa.co.th/
LANGUAGE Thai, English, Japanese
* Japanese engineers are stationed in the FA Center.

### Sales Offices

**Mitsubishi Electric Factory Automation (Thailand) Co., Ltd.** PLC HMI SV INV RB CNC
12th Floor, SV.City Building, Office Tower 1, No. 896/19 and 20 Rama 3 Road, Kwaeng Bangpongpang, Khet Yannawa, Bangkok 10120, Thailand
TEL +66-2682-6522 to 31 FAX +66-2682-6020
HP http://www.MitsubishiFA.co.th
LANGUAGE Thai, English, Japanese

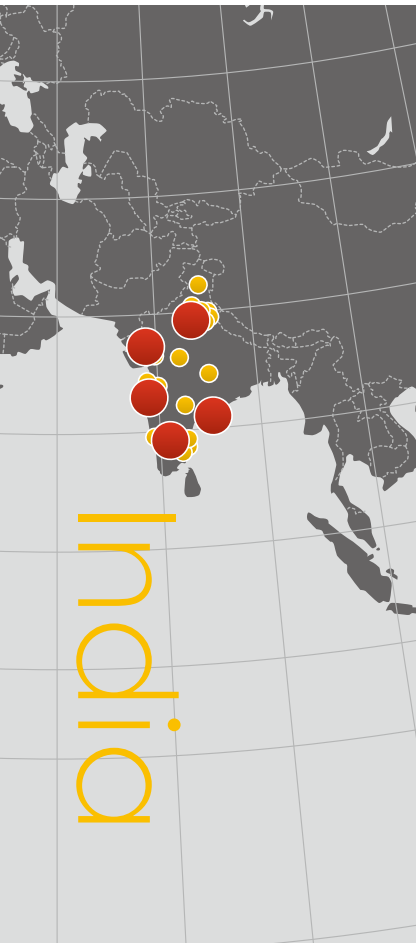
**Mitsubishi Electric Factory Automaition (Thailand) Co.,Ltd. Bowin Branch** PLC HMI SV INV RB CNC
333/122, 123 Moo.3, Tumbol Bowin Amphur Sriracha, Chonburi 20230, Thailand
TEL +66-2682-6522 FAX +66-3819-5873
HP http://www.MitsubishiFA.co.th
LANGUAGE Thai, English

**Mitsubishi Electric Automation (Thailand) Co., Ltd.** IM*
Bang-Chan Industrial Estate No.111 Moo 4, Serithai Rd, T.Kannayao, A.Kannayao, Bangkok 10230 Thailand
TEL +66-2517-1326 FAX +66-2919-9885
HP http://www.meath-co.com
LANGUAGE Thai, English, Japanese

* This IM (Induction Motor) is different from the one sold in Japan. For further information, please contact MITSUBISHI ELECTRIC AUTOMATION (THAILAND) CO., LTD.
* Induction Motor

### Distributors

**United Trading & Import Co., Ltd.** LVS MC
77/12 Bamrungmuang Road, Klong Mahanak Pomprab
Bangkok Thailand
TEL +66-2223-4220 to 23 FAX +66-2224-5960
HP http://www.utic.co.th LANGUAGE Thai, English




# India

## India Pune FA Center

PLC HMI SV INV RB CNC LVS MC

**Mitsubishi Electric India Pvt. Ltd.**
**Pune Branch**
Emerald House, EL-3, J Block, M.I.D.C., Bhosari, Pune - 411026,
Maharashtra, India
TEL +91-20-2710-2000 FAX +91-20-2710-2100
HP http://www.mitsubishielectric.in/ LANGUAGE Japanese, English, Hindi, Marathi
* Japanese engineers are stationed in the FA Center.

## India Gurgaon FA Center

PLC HMI SV INV RB CNC LVS MC

**Mitsubishi Electric India Pvt. Ltd.**
**Gurgaon Head Office**
2nd Floor, Tower A & B, Cyber Greens, DLF Cyber City, DLF Phase - III,
Gurgaon - 122002, Haryana, India
TEL +91-124-463-0300 FAX +91-124-463-0399
HP http://www.mitsubishielectric.in LANGUAGE Japanese, English, Hindi
* Japanese engineers are stationed in the FA Center.

## India Bangalore FA Center

PLC HMI SV INV RB CNC LVS MC

**Mitsubishi Electric India Pvt. Ltd.**
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Prestige Emerald, 6th Floor, Municipal No.2, Madras Bank Road,
Bangalore - 560001, Karnataka, India
TEL +91-80-4020-1600 FAX +91-80-4020-1699
HP http://www.mitsubishielectric.in LANGUAGE Kannad, Hindi, English

RB Industrial Robots CNC Computerized Numerical Controllers LVS Low-voltage Circuit Breakers MC Contactors and Motor Starters * For repairing or after-sales technical support, please contact your nearest FA Center.

India

# India

## India Chennai FA Center

PLC HMI SV INV LVS MC

**Mitsubishi Electric India Pvt. Ltd.**
**Chennai Branch**
Citilights Corporate Centre No. 1, Vivekananda Road, Srinivasa Nagar, Chetpet, Chennai - 600031, Tamil Nadu, India
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HP http://www.mitsubishielectric.in LANGUAGE Tamil, Hindi, English

## India Ahmedabad FA Center

PLC HMI SV INV LVS MC

**Mitsubishi Electric India Pvt. Ltd.**
**Ahmedabad Branch**
B/4, 3rd Floor, SAFAL Profitaire, Corporate Road, Prahaladnagar, Satellite, Ahmedabad - 380015, Gujarat, India
TEL +91-7965120063
HP http://www.mitsubishielectric.in LANGUAGE Gujarati, Hindi, English

## Regional Sales Office in India

**Mitsubishi Electric India Pvt. Ltd. Pune Branch** PLC HMI SV INV RB CNC LVS MC
Emerald House, EL-3, J Block, M.I.D.C., Bhosari, Pune - 411026, Maharashtra, India
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## Sales Offices

**Mitsubishi Electric India Pvt. Ltd.**
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2nd Floor, Tower A & B, Cyber Greens, DLF Cyber City, DLF Phase - III, Gurgaon - 122002, Haryana, India
TEL +91-124-4630300 FAX +91-124-4630399
HP http://www.mitsubishielectric.in LANGUAGE Hindi, English, Japanese

**Mitsubishi Electric India Pvt. Ltd.**
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Prestige Emerald, 6th Floor, Municipal No.2, Madras Bank Road, (Lavelle Road), Bangalore 560001, Karnataka, India
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HP http://www.mitsubishielectric.in LANGUAGE Kannad, Hindi, English

**Mitsubishi Electric India Pvt. Ltd.**
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Citilights Corporate Centre No. 1, Vivekananda Road, Srinivasa Nagar, Chetpet, Chennai-600031, Tamil Nadu, India
TEL +91-44-4554-8772 FAX +91-44-4554-8773
HP http://www.mitsubishielectric.in LANGUAGE Tamil, Hindi, English

**Mitsubishi Electric India Pvt. Ltd.**
**Ahmedabad Branch** PLC HMI SV INV LVS MC
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HP http://www.mitsubishielectric.in LANGUAGE Gujarati, Hindi, English

**Mitsubishi Electric India Pvt. Ltd.**
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HP http://www.mitsubishielectric.in LANGUAGE Gujarati, Hindi, English

**Mitsubishi Electric India Pvt. Ltd.**
**Mumbai Branch** PLC HMI SV INV LVS MC
106 MAGNUM OPUS, (E), Santacruz West, Mumbai, 400055, Maharashtra, India
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**Mitsubishi Electric India Pvt. Ltd.**
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TEL +91-40-2772-2519 FAX +91-40-2772-2519
HP http://www.mitsubishielectric.in LANGUAGE Telugu, Hindi, English

**Mitsubishi Electric India Pvt. Ltd.**
**Coimbatore Branch** PLC HMI SV INV LVS MC
2nd Floor, Door No.1604, Trichy Road, Near ICICI Bank, Coimbatore - 641018, Tamil Nadu, India
TEL +91-81- 2944-5670
HP http://www.mitsubishielectric.in
LANGUAGE Malayalam, Tamil, Hindi, English

**Mitsubishi Electric India Pvt. Ltd.**
**Rudrapur Branch** PLC HMI SV INV LVS MC
181/6, Awas Vikas Ring Road, Rudrapur, Dist-USN - 263153, Uttarakhand, India
TEL +91-5944-246899
HP http://www.mitsubishielectric.in
LANGUAGE Hindi, English

**Mitsubishi Electric India Pvt. Ltd.**
**Nagpur Branch** PLC HMI SV INV LVS MC
Plot No.8, NIIT Layout, Ravindra Nagar, Ring Road, Nagpur, Maharashtra, India
TEL +91-712-2284020
HP http://www.mitsubishielectric.in
LANGUAGE Marathi, Hindi, English

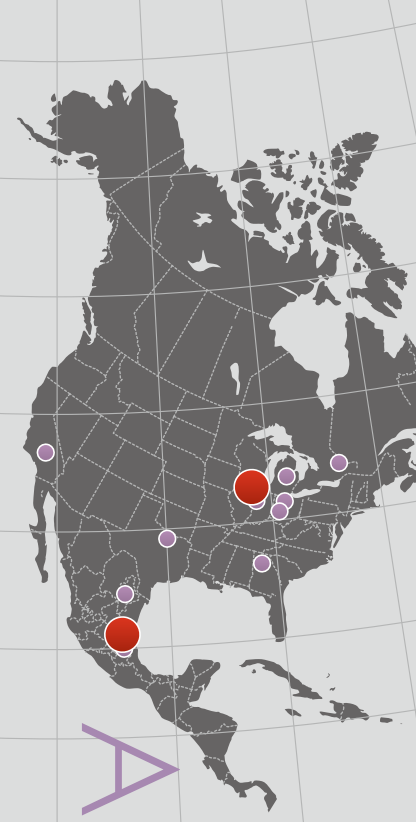
**Mitsubishi Electric India Pvt. Ltd.**
**Indore Branch** PLC HMI SV INV LVS MC
110 1st Floor, Shagun Commercial Complex, Plot No.7/PU-4, Scheme No.54, Vijay Nagar, Indore - 452010, Madhya Pradesh, India
TEL +91-731-6050013
HP http://www.mitsubishielectric.in
LANGUAGE Hindi, English

Oceania

# Oceania

## Sales Offices

**AUSTRALIA**
**MITSUBISHI ELECTRIC AUSTRALIA PTY. LTD.** PLC HMI SV INV CNC
348 Victoria Road, P.O. Box 11, Rydalmere, N.S.W 2116, Australia
TEL +61-2-9684-7777 FAX +61-2-9684-7245
HP http://www.mitsubishielectric.com.au LANGUAGE English



Americas / Mexico

# Americas / Mexico

## North America FA Center

PLC HMI SV INV RB CNC LVS MC

### Mitsubishi Electric Automation, Inc.

500 Corporate Woods Parkway, Vernon Hills, IL 60061, U.S.A.

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FAX +1-847-478-2253, +1-847-478-2650 CNC, +1-847-478-2396 LVS MC
HP https://us.mitsubishielectric.com/fa/en LANGUAGE English, Jpanese

* Japanese engineers are stationed in the FA Center.

### TEL Technical Consulting

(Support hours: 7:00 to 19:00 (CST))

TEL 1-800-950-7781
LANGUAGE English

TEL +1-847-478-2469 PLC HMI
+1-847-478-2334 SV INV RB LVS MC
LANGUAGE Japanese

## Regional Sales Office in America

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FAX +1-847-478-2253, +1-847-478-2650 CNC, +1-847-478-2396 LVS MC
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LANGUAGE English, Spanish, Japanese

## Sales Offices

### CANADIAN REGION

**Mitsubishi Electric Automation, Inc. Canadian Region**
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4299 14th Avenue, Markham, Ontario L3R OJ2, Canada
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FAX +1-905-475-7935
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LANGUAGE English

### SOUTH OHIO

**Mitsubishi Electric Automation, Inc. Central Region Branch Office (Cincinati office - South Ohio)**
PLC HMI SV INV LVS MC
World Park 5 10166 International Blvd. Cincinnati, Ohio 45246, U.S.A.
TEL +1-513-785-0530
HP https://us.mitsubishielectric.com/fa/en
LANGUAGE English

### NORTH OHIO

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670 Vandermark Rd Sidney, Ohio 45365, U.S.A
TEL +1-937-492-3058 FAX +1-937-492-3058
HP https://us.mitsubishielectric.com/fa/en
LANGUAGE English, Japanese

### MICHIGAN

**Mitsubishi Electric Automation, Inc. Central Region Branch Office (Northville - Michigan)**
PLC HMI SV INV LVS MC
15603 Centennial Drive, Northville, MI 48168, U.S.A.
TEL +1-734-453-6200 FAX +1-734-455-4299
HP https://us.mitsubishielectric.com/fa/en
LANGUAGE English

### EASTERN REGION

**Mitsubishi Electric Automation, Inc. Eastern Region Headquarters** PLC HMI SV INV RB CNC LVS MC
1845 Satellite Boulevard Suite 450, Duluth, GA 30097, U.S.A.
TEL +1-678-258-4500 FAX +1-847-876-6684
HP https://us.mitsubishielectric.com/fa/en
LANGUAGE English

### WESTERN REGION

**Mitsubishi Electric Automation, Inc. Western Region Headquarters** PLC HMI SV INV RB CNC LVS MC
5900-B Katella Ave, Cypress, CA 90630, U.S.A
TEL +1-714-699-2626
FAX +1-714-699-2620
HP https://us.mitsubishielectric.com/fa/en
LANGUAGE English

**Mitsubishi Electric Automation, Inc. Western Region Branch Office-California** PLC HMI SV INV LVS MC
48511 Warm Springs Blvd, Suite 209 Fremont, CA 94539, U.S.A.
TEL +1-510-344-8020
HP https://us.mitsubishielectric.com/fa/en
LANGUAGE English, Japanese

### TEXAS

**Mitsubishi Electric Automation, Inc. Western Region Grapevine - Texas** PLC HMI SV INV RB CNC LVS MC
1000 Nolen Drive, Suite 200, Grapevine, TX 76051, U.S.A.
TEL +1-817-416-9767, +1-817-251-7468 CNC
FAX +1-817-416-5000
HP https://us.mitsubishielectric.com/fa/en
LANGUAGE English, Spanish

## Mexico FA Center

PLC HMI SV INV

### Mitsubishi Electric Automation, Inc. Mexico Branch

Mariano Escobedo #69, Col. Zona Industrial, Tlalnepantla Edo. México, C.P. 54030

TEL +52-55-3067-7500
HP https://mx.mitsubishielectric.com/fa/en
LANGUAGE Spanish, English, Jpanese

* Japanese engineers are stationed in the FA Center.

## Sales Offices

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TEL +52-55-3067-7511(Rep)
+52-55-3067-7500(Technical Support)
HP https://us.mitsubishielectric.com/fa/en
LANGUAGE English, Spanish, Japanese

### Mitsubishi Electric Automation, Inc. Monterrey Office

PLC HMI SV INV RB CNC LVS MC
Plaza Mirage, AV. Gonzalitos 460 Sur, Local 28, Col. San Jeronimo, Monterrey, Nuevo Leon, C.P. 64640, Mexico
TEL +52-55-3067-7521
HP https://us.mitsubishielectric.com/fa/en
LANGUAGE English, Spanish

Brazil

# Brazil

## Brazil FA Center

PLC HMI SV INV RB LVS MC

### Mitsubishi Electric do Brasil Comércio e Serviços Ltda.

Avenida Adelino Cardana, 293, 21 andar, Bethaville, Barueri SP, Brasil
TEL +55-11-4689-3000 FAX +55-11-4689-3016
HP http://www.mitsubishielectric.com/fa/br_pt/
LANGUAGE Portuguese, English, Japanese

## Brazil Votorantim FA Center

CNC

### MELCO CNC do Brasil Comercio e Servicos S.A.

Avenida Gisele Constantino, 1578, Parque Bela Vista - Votorantim-SP, Brazil
TEL +55-15-3023-9000 FAX +55-15-3363-9911
LANGUAGE Portuguese, English, Japanese

## Sales Offices

### Mitsubishi Electric do Brasil Comércio e Serviços Ltda.

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TEL +55-11-4689-3000 FAX +55-11-4689-3016
HP http://www.mitsubishielectric.com/fa/br_pt/
LANGUAGE Portuguese, English, Japanese

### MELCO CNC do Brasil Comercio e Servicos S.A.

CNC
Avenida Gisele Constantino,1578, Parque Bela Vista - Votorantim-SP, Brazil
TEL +55-15-3023-9000
LANGUAGE Portuguese, English, Japanese

## Distributors

### ARTCOM COM. E DISTRIBUICAO DE MAQ. E EQUIPAMENTOS INDUSTRIAIS LTDA.

PLC HMI SV INV
Av. Getulio Vargas, 943, Bairro Niteroi, CEP 92480-000, Canoas - RS, Brasil
TEL +55-51-3031-7677
HP http://www.artcom-rs.com.br/
LANGUAGE Portuguese

### Automotion Ind. Com. Imp. e Exp. Ltda.

PLC HMI SV INV
Acesso Jose Sartorelli, KM 2.1 - CEP 18550-000, Boituva - SP, Brazil
TEL +55-15-3363-9900 FAX +55-15-3363-9911
HP http://www.automotion.com.br/
LANGUAGE Portuguese, English

### CETEM Automacao Industrial LTDA.

PLC HMI SV INV
Rua Candido Benicio, 1381, Bairro Praca Seca, CEP 21321-802, Rio de Janeiro - RJ, Brasil
TEL +55-21-3350-8833
HP http://www.cetemrj.com.br/
LANGUAGE Portuguese, English

### CIM Automacao LTDA.

PLC HMI SV INV RB
Rua Minas Gerais, 409, Diadema - CEP 09941-760, Sao Paulo - SP, Brasil
TEL +55-11-3389-1118 FAX +55-11-3389-1110
HP http://www.cimautomacao.com.br/
LANGUAGE Portuguese, English

### LARATEC COM DE FERRAMENTAS LTDA.

PLC HMI SV INV
Rua Albano Reis, 1058, Bom Retiro, CEP 80520-530, Curitiba - PR, Brasil
TEL +55-41-3022-1666
HP http://www.laratec.com.br
LANGUAGE Portuguese

### MPA Automacao LTDA.

PLC HMI SV INV
Av. ENG. EURICO VIANA - SETOR LESTE, Bairro VILA NOVA, CEP 74740-170, GOIANIA - GO, Brasil
TEL +55-62-3541-0015
HP http://www.mpaautomacao.com.br
LANGUAGE Portuguese

### RGO COMERCIO MANUTENCAO E IMP DE EQUIP ELETRONICOS LTDA.

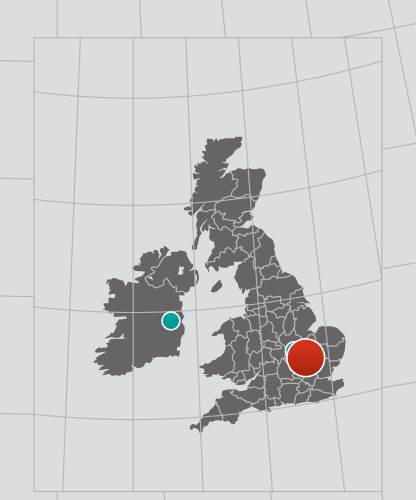
PLC HMI INV
Rua Sergio Cardoso, 72, Jardim Paraiso, CEP 13211-374, Jundiai - SP, Brasil
TEL +55-11-3963-6020
HP http://www.rgoeletronica.com.br
LANGUAGE Portuguese

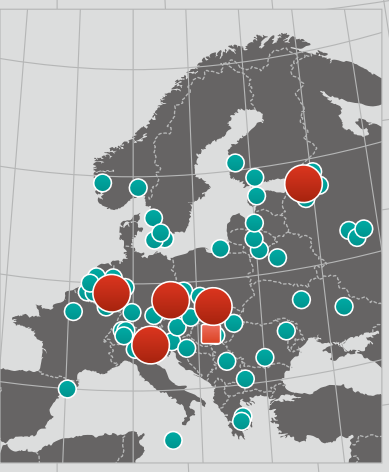
### SEMATEX AUTOMACAO INDUSTRIAL LTDA.

PLC HMI SV INV
Rua Buenos Aires, 459 - Sala 101, Ponta Aguda, CEP 89051-050, Blumenau - SC, Brasil
TEL +55-47-3323-8000
HP http://www.sematex.com.br/
LANGUAGE Portuguese

### SUNXTRONIC DA AMAZ IMP E EXP LTDA.

PLC HMI SV INV RB
Rua Jose Paranagua, 470C - Centro, CEP 69005-130, Manaus - AM, Brasil
TEL +55-92-3233-5497 FAX +55-92-3233-9723
HP http://www.sunxtronic.com.br/
LANGUAGE Portuguese, English





Europe

# Europe

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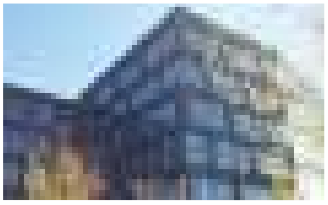

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http://mechatronics.mitsubishielectric.it/it/ CNC
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# Europe

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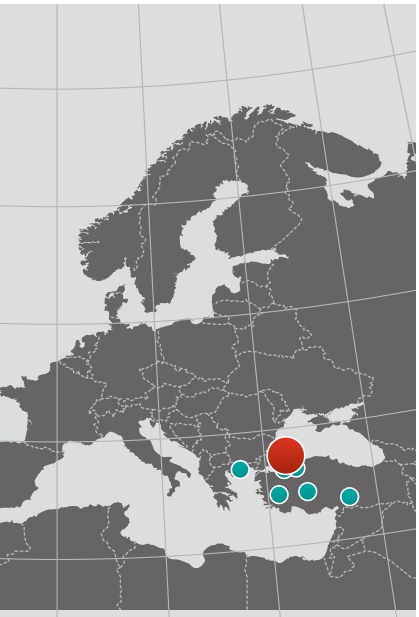

Turkey

# Turkey

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HP http://www.geotekotomasyon.com/iletisim.html
LANGUAGE Turkish, English

**BİRMAG MÜHENDİSLİK SAN.TİC.LTD.ŞTİ.** PLC HMI SV INV LVS MC
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* If you need any information regarding countries or regions other than listed above, please contact Europe FA center.

Middle East/Africa

# Middle East/Africa

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### MITSUBISHI ELECTRIC EUROPE South Africa FA Center Satellite PLC HMI SV INV

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TEL +27-11-658-8100
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#### ISRAEL

**Sherf Motion Technologies Ltd.** HMI SV INV
Rehov Hamerkava 19, IL-58851 Holon, Israel
TEL +972-3-5595462 FAX +972-3-5560182
HP http://www.sherfmotion.co.il
LANGUAGE Hebrew, English

**GIRIT CELADON LTD.** PLC HMI
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LANGUAGE Hebrew, English

**ILAN&GAVISH Automation** PLC HMI RB
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LANGUAGE Hebrew, English

#### LEBANON

**CEG Liban - Comptoir d'Electricité Générale Liban** PLC HMI SV INV LVS MC
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#### Other Middle East Arab Countries/Cyprus

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### Africa

#### ALGERIA

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#### MOROCCO

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#### SENEGAL

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HP http://www.motiontronix.co.za LANGUAGE English

**CBI-electric** LVS MC
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#### TUNISIA

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HP http://www.motra-electric.com LANGUAGE French, English

RB Industrial Robots CNC Computerized Numerical Controllers LVS Low-voltage Circuit Breakers MC Contactors and Motor Starters * For repairing or after-sales technical support, please contact your nearest FA Center.

# Warranty

## Warranty Information

### 1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter “Failure”) found to be the responsibility of Mitsubishi occur during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative. However, if repairs are required onsite, actual expenses to send an engineer will be borne by the customer. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

**[Gratis Warranty Term]**

The gratis warranty term of the product shall be between 12 months[*1] and 36 months[*2] after the date of purchase or delivery to a designated place.

Note that the product shall be distributed for a maximum period of 6 months after shipment, and the longest gratis warranty term after manufacturing shall be between 18 months[*1] and 42 months[*2]. In addition, the gratis warranty term of the product repaired shall not exceed the gratis warranty term before repairs.

**[Gratis Warranty Range]**

(1) The customer shall be responsible for the primary failure diagnosis unless otherwise specified.

If requested by the customer, Mitsubishi Electric Corporation or its representative firm may carry out the primary failure diagnosis at the customer’s expense.

The primary failure diagnosis will, however, be free of charge should the cause of failure be attributable to Mitsubishi Electric Corporation.

(2) The warranty shall apply only to the product used under normal situations such as when the usage state, method and/or environment conform to the conditions / precautions stated in the instruction manual, the user’s manual, the caution labels on the product, etc. The range shall be limited to normal use within the usage state, usage methods, usage environment, etc. which follow the conditions, precautions, etc. given in the instruction manual, user’s manual, caution labels on the product, etc.

(3) Even within the gratis warranty term, repairs shall be charged in the following cases.

①Any failure occurring from inappropriate storage or handling of the product, carelessness or negligence of the customer. Failure caused by the customer’s hardware or software design.

②Any failure caused by unapproved modifications, etc., to the product by the customer.

③When the Mitsubishi product is assembled into the customer’s device, any failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the customer’s device is subject to or judged as necessary by industry standards, had been provided.

④Any failure that could have been avoided if consumable parts designated in the user’s manual etc. had been correctly serviced or replaced.

⑤Replacement of consumable parts.

⑥Any failure caused by external irresistible forces such as fires or abnormal voltages, and any failure caused by force majeure such as earthquakes, lightning, wind and water damage.

⑦Any failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.

⑧Any other failure found not to be the responsibility of Mitsubishi or admitted not to be so by the customer.

### 2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for 7 years (4 years for the safety controller) after production of the product is discontinued.

Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.

(2) Product supply (including repair parts) is not available after production is discontinued.

### 3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi’s local overseas FA Center. Note that the repair conditions at each FA Center may differ.

## 4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to damages caused by any cause found not to be the responsibility of Mitsubishi, loss in opportunity, lost profits incurred to the customer by failures of Mitsubishi products, special damages and secondary damages, whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products, replacement by the customer, maintenance of on-site equipment, start-up test run and other tasks.

## 5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

## 6. Product application

(1) In using the Mitsubishi product, the usage conditions shall be that the application will not lead to a major accident even if any problem or fault should occur in the product, and that backup and fail-safe functions are systematically provided outside of the device for any problem or fault.

(2) The Mitsubishi product has been designed and manufactured for applications in general industries, etc.

Thus, the product should not be used in applications that could affect the public, such as use in nuclear power plants or other power plants operated by respective power companies, and that require a special quality assurance system, such as use for railway companies or public sectors.

Also, the product should not be used in applications that could have significant impact on human life or property, such as use in aircraft, medical or railway services, incineration / fuel devices, manned transportation equipment, equipment for recreation / amusement, or safety devices.

However, Mitsubishi Electric Corporation may consider the possibility of using the product even in these fore-mentioned applications, if the customer acknowledges that the product has only limited application and that any special quality is not required.

(3) Depending on the product, because there shall be other terms defined that are not included in this context, please confirm when you place an order.

*1: The products (Safety controller / Inverter / Low-voltage circuit breaker / Magnetic contactors and starters / Power management measuring devices) whose gratis warranty term is either 12 months after delivery or 18 months after manufacturing.

*2: The products (Programmable controller (including C language controller) / Servo system controller / GOT / Energy-saving support device) whose gratis warranty term is either 36 months after delivery or 42 months after manufacturing.

*3: The gratis warranty term of the industrial robot shall be for either 12 months after delivery or 2000 operating hours (possible operating hours of 8 hours per day × 250 days).

*4: Oil mist environment for industrial robots

As a result of tests conducted using cutting oils shown in the table on the right, Mitsubishi confirms that the product satisfies IP (Ingress Protection) specifications. Using the product in an environment where any cutting oils other than those shown in the table on the right may cause the product to decrease in IP performance. Also, the warranty does not apply if a failure occurs in the product used in an atmosphere where any cutting oil other than those shown in the table on the right is used or where a robot is directly exposed to water, oil or dust beyond IP specs limits. If the customer wants to use a type of cutting oil, other than the applicable oils confirmed, Mitsubishi is ready to conduct a verification test of the oil on the behalf of the customer. For the latest information about any types of cutting oils, other than those listed in the table on the right, which have been confirmed as applicable, visit the website “Mitsubishi FA Site” (URL<http://www.mitsubishielectric.co.jp/fa>).

**Cutting oils for oil mist environmental test**

| No. | Oil name | Manufacturer | Property | Operating condition |
|---|---|---|---|---|
| 1 | Castrol hysol X | Castrol | Water soluble | 20 fold dilution |
| 2 | Castrol Syntilo 9954 | Castrol | Water soluble | 20 fold dilution |
| 3 | Yushiro oil CE | Yushiro Chemical Industry | Water-insoluble | – |
| 4 | Yushiroken E10 | Yushiro Chemical Industry | Water soluble | 20 fold dilution |
| 5 | Yushiroken synthetic 770TG | Yushiro Chemical Industry | Water soluble | 20 fold dilution |
| 6 | Yushiroken FX90 | Yushiro Chemical Industry | Water soluble | 20 fold dilution |
| 7 | SUNCUT ES-50N | Nippon Grease | Water-insoluble | – |
| 8 | Searching cut SG555 | Kyowa Oil Lubricants | Water-insoluble | – |
| 9 | Emul cut FA-800 | Kyodo Yushi | Water soluble | – |

*5: Usage environment for Magnetic contactors and starters

Do not use the product in the following locations, as it may cause the product to malfunction or shorten its operation life.

① Where the ambient temperature exceeds the range of -5 to +40°C.
② Where the average daily temperature exceeds 35°C.
③ Where the altitude exceeds 1000m.
④ Where abnormal vibration or shock happens.
⑤ Where there is the excessive amount of dust.
⑥ Where hazardous gases such as explosive, corrosive and flammable gases are generated.
⑦ Where there is the excessive amount of moisture or oil mist.
⑧ Where there is too much snow and ice.
⑨ Where it is always wet.
⑩ Where it is directly exposed to sea breeze.

# Index

| Model | Product name | Page |
|---|---|---|
| A1SADP-Q-SET2 | AnS-Q module conversion adapter | 239 |
| A1SJ71AP23Q | MELSECNET(II) local station data link module | 239 |
| A1SJ71AT23BQ | MELSECNET/B local station data link module | 239 |
| A6CAP-WP2 | Network Related Products Protective cap for unused connector | 235 |
| A6CON1 | MELSEC-Q Series Connector | 216, 235 |
| A6CON1E | MELSEC-Q Series Connector | 216, 235 |
| A6CON2 | MELSEC-Q Series Connector | 216, 235 |
| A6CON2E | MELSEC-Q Series Connector | 216, 235 |
| A6CON3 | MELSEC-Q Series Connector | 216, 235 |
| A6CON3E | MELSEC-Q Series Connector | 216, 235 |
| A6CON4 | MELSEC-Q Series Connector | 216, 235 |
| A6CON-L5P (35505-6000-B0M GF) | Network Related Products One-touch connector plug for communication (10pcs) | 235 |
| A6CON-LJ5P (35720-L200-B00 AK) | Network Related Products Online connector | 235 |
| A6CON-P214 (33104-6000FL) | Network Related Products One-touch connector plug (20pcs) | 235 |
| A6CON-P220 (33104-6100FL) | Network Related Products One-touch connector plug (20pcs) | 235 |
| A6CON-P514 (33104-6200FL) | Network Related Products One-touch connector plug (20pcs) | 235 |
| A6CON-P520 (33104-6300FL) | Network Related Products One-touch connector plug (20pcs) | 235 |
| A6CON-PW5P (35505-6080-A00 GF) | Network Related Products One-touch connector plug for power supply and FG (10pcs) | 235 |
| A6CON-PW5P-SOD (35505-6180-A00 GF) | Network Related Products One-touch connector plug for power supply and FG (10pcs) | 235 |
| A6CON-PWJ5P (35720-L200-A00 AK) | Network Related Products Online connector | 235 |
| A6CON-TR11N | Network Related Products One-touch connector plug with teminating resitor (1pc) | 235 |
| A6CVR-16 | Network Related Products Protective cover for remote I/O module | 235 |
| A6CVR-32 | Network Related Products Protective cover for remote I/O module | 235 |
| A6CVR-8 | Network Related Products Protective cover for remote I/O module | 235 |
| A6CVR-VCE16 | Network Related Products Protective cover for remote I/O module | 235 |
| A6CVR-VCE8 | Network Related Products Protective cover for remote I/O module | 235 |
| A6GA-CCMFP1NN300F | Network Related Products CC-Link Related Products | 232 |
| A6GA-CCMFP1NN60F | Network Related Products CC-Link Related Products | 232 |
| A6GA-CCMFP2ANN 300F | Network Related Products CC-Link Related Products | 232 |
| A6GA-CCMFP2ANN 60F | Network Related Products CC-Link Related Products | 232 |
| A6GA-CCMFP2NN 300F | Network Related Products CC-Link Related Products | 232 |
| A6GA-CCMFP2NN 60F | Network Related Products CC-Link Related Products | 232 |
| A6GA-CCMFP3NN 300F | Network Related Products CC-Link Related Products | 232 |
| A6GA-CCMFP3NN 60F | Network Related Products CC-Link Related Products | 232 |
| A6TBX36-E | MELSEC-Q Series Connector/terminal block conversion module | 217, 235 |
| A6TBX54-E | MELSEC-Q Series Connector/terminal block conversion module | 217, 235 |
| A6TBX70 | MELSEC-Q Series Connector/terminal block conversion module | 217, 235 |
| A6TBX70-E | MELSEC-Q Series Connector/terminal block conversion module | 217, 235 |

| Model | Product name | Page |
|---|---|---|
| A6TBXY36 | MELSEC-Q Series Connector/terminal block conversion module | 217, 235 |
| A6TBXY54 | MELSEC-Q Series Connector/terminal block conversion module | 217, 235 |
| A6TBY36-E | MELSEC-Q Series Connector/terminal block conversion module | 217, 235 |
| A6TBY54-E | MELSEC-Q Series Connector/terminal block conversion module | 217, 235 |
| A6TE2-16SRN | MELSEC-Q Series Relay terminal module | 217, 235 |
| A7GT-CNB | Bus connector conversion box | 629 |
| A9GT-QCNB | Bus extension connector box | 624, 629 |
| AC05TB | MELSEC-Q Series Connector/terminal block conversion module | 217, 235 |
| AC05TB-E | MELSEC-Q Series Connector/terminal block conversion module | 217, 235 |
| AC06TE | MELSEC-Q Series Relay terminal module | 217, 235 |
| AC100TB | MELSEC-Q Series Connector/terminal block conversion module | 217, 235 |
| AC100TE | MELSEC-Q Series Relay terminal module | 217, 235 |
| AC10TB | MELSEC-Q Series Connector/terminal block conversion module | 217, 235 |
| AC10TB-E | MELSEC-Q Series Connector/terminal block conversion module | 217, 235 |
| AC10TE | MELSEC-Q Series Relay terminal module | 217, 235 |
| AC20TB | MELSEC-Q Series Connector/terminal block conversion module | 217, 235 |
| AC20TB-E | MELSEC-Q Series Connector/terminal block conversion module | 217, 235 |
| AC30TB | MELSEC-Q Series Connector/terminal block conversion module | 217, 235 |
| AC30TB-E | MELSEC-Q Series Connector/terminal block conversion module | 217, 235 |
| AC30TE | MELSEC-Q Series Relay terminal module | 217, 235 |
| AC50TB | MELSEC-Q Series Connector/terminal block conversion module | 217, 235 |
| AC50TB-E | MELSEC-Q Series Connector/terminal block conversion module | 217, 235 |
| AC50TE | MELSEC-Q Series Relay terminal module | 217, 235 |
| AC80TB | MELSEC-Q Series Connector/terminal block conversion module | 217, 235 |
| AE1000-SW | Low Voltage Air Circuit Breakers (AE-SW Series) | 710 |
| AE1250-SW | Low Voltage Air Circuit Breakers (AE-SW Series) | 710 |
| AE1600-SW | Low Voltage Air Circuit Breakers (AE-SW Series) | 710 |
| AE2000-SW | Low Voltage Air Circuit Breakers (AE-SW Series) | 710 |
| AE2000-SWA | Low Voltage Air Circuit Breakers (AE-SW Series) | 710 |
| AE2500-SW | Low Voltage Air Circuit Breakers (AE-SW Series) | 710 |
| AE3200-SW | Low Voltage Air Circuit Breakers (AE-SW Series) | 710 |
| AE4000-SW | Low Voltage Air Circuit Breakers (AE-SW Series) | 711 |
| AE4000-SWA | Low Voltage Air Circuit Breakers (AE-SW Series) | 710 |
| AE5000-SW | Low Voltage Air Circuit Breakers (AE-SW Series) | 711 |
| AE6300-SW | Low Voltage Air Circuit Breakers (AE-SW Series) | 711 |
| AE630-SW | Low Voltage Air Circuit Breakers (AE-SW Series) | 710 |
| AJ65ABTP3-16D | Network Related Products Remote I/O Module Input modules with diagnostic function | 171, 231 |
| AJ65ABTP3-16DE | Network Related Products Remote I/O Module Input modules with diagnostic function | 171, 231 |

# Index

| Model | Product name | Page |
|---|---|---|
| AJ65SBTB2-16T1 | Network Related Products Remote I/O Module Output module | 168, 230 |
| AJ65SBTB2-8T | Network Related Products Remote I/O Module Output module | 168, 230 |
| AJ65SBTB2-8T1 | Network Related Products Remote I/O Module Output module | 168, 230 |
| AJ65SBTB2N-16A | Network Related Products Remote I/O Module Input module | 168, 230 |
| AJ65SBTB2N-16R | Network Related Products Remote I/O Module Output module | 168, 230 |
| AJ65SBTB2N-16S | Network Related Products Remote I/O Module Output module | 168, 230 |
| AJ65SBTB2N-8A | Network Related Products Remote I/O Module Input module | 168, 230 |
| AJ65SBTB2N-8R | Network Related Products Remote I/O Module Output module | 168, 230 |
| AJ65SBTB2N-8S | Network Related Products Remote I/O Module Output module | 168, 230 |
| AJ65SBTB3-16D | Network Related Products Remote I/O Module Input module | 168, 230 |
| AJ65SBTB3-16D5 | Network Related Products Remote I/O Module Input module | 168, 230 |
| AJ65SBTB3-16KD | Network Related Products Remote I/O Module Input module | 168, 230 |
| AJ65SBTB32-16DR | Network Related Products Remote I/O Module I/O composite module | 169, 230 |
| AJ65SBTB32-16DT | Network Related Products Remote I/O Module I/O composite module | 169, 230 |
| AJ65SBTB32-16DT2 | Network Related Products Remote I/O Module I/O composite module | 169, 230 |
| AJ65SBTB32-16KDR | Network Related Products Remote I/O Module I/O composite module | 169, 230 |
| AJ65SBTB32-16KDT2 | Network Related Products Remote I/O Module I/O composite module | 169, 230 |
| AJ65SBTB32-16KDT8 | Network Related Products Remote I/O Module I/O composite module | 169, 230 |
| AJ65SBTB32-8DT | Network Related Products Remote I/O Module I/O composite module | 169, 230 |
| AJ65SBTB32-8DT2 | Network Related Products Remote I/O Module I/O composite module | 169, 230 |
| AJ65SBTB3-8D | Network Related Products Remote I/O Module Input module | 168, 230 |
| AJ65SBTC1-32D | Network Related Products Remote I/O Module Input module | 173, 231 |
| AJ65SBTC1-32D1 | Network Related Products Remote I/O Module Input module | 173, 231 |
| AJ65SBTC1-32DT | Network Related Products Remote I/O Module I/O composite module | 173, 231 |
| AJ65SBTC1-32DT1 | Network Related Products Remote I/O Module I/O composite module | 173, 231 |
| AJ65SBTC1-32DT2 | Network Related Products Remote I/O Module I/O composite module | 173, 231 |
| AJ65SBTC1-32DT3 | Network Related Products Remote I/O Module I/O composite module | 173, 231 |
| AJ65SBTC1-32T | Network Related Products Remote I/O Module Output module | 173, 231 |
| AJ65SBTC1-32T1 | Network Related Products Remote I/O Module Output module | 173, 231 |
| AJ65SBTC4-16DE | Network Related Products Remote I/O Module Input module | 173, 231 |
| AJ65SBTC4-16DN | Network Related Products Remote I/O Module Input module | 173, 231 |
| AJ65SBTC4-16DT | Network Related Products Remote I/O Module I/O composite module | 173, 231 |
| AJ65SBTC4-16DT2 | Network Related Products Remote I/O Module I/O composite module | 173, 231 |
| AJ65SBTCF1-32D | Network Related Products Remote I/O Module Input module | 174, 231 |
| AJ65SBTCF1-32DT | Network Related Products Remote I/O Module I/O composite module | 174, 231 |
| AJ65SBTCF1-32T | Network Related Products Remote I/O Module Output module | 174, 231 |
| AJ65SBT-CLB | Network Related Products Bridge Module | 177, 233 |
| AJ65SBT-RPG | Network Related Products Repeater Module | 176, 232 |
| AJ65SBT-RPS | Network Related Products Repeater Module | 176, 232 |
| AJ65SBT-RPT | Network Related Products Repeater Module | 176, 232 |
| AJ65VBTCE2-16T | Network Related Products Remote I/O Module Output module | 172, 231 |
| AJ65VBTCE2-8T | Network Related Products Remote I/O Module Output module | 172, 231 |
| AJ65VBTCE3-16D | Network Related Products Remote I/O Module Input module | 172, 231 |
| AJ65VBTCE3-16DE | Network Related Products Remote I/O Module Input module | 172, 231 |
| AJ65VBTCE3-16DTE | Network Related Products Remote I/O Module I/O composite module | 172, 231 |
| AJ65VBTCE3-16TE | Network Related Products Remote I/O Module Output module | 172, 231 |
| AJ65VBTCE32-16DT | Network Related Products Remote I/O Module I/O composite module | 172, 231 |
| AJ65VBTCE32-32DT | Network Related Products Remote I/O Module I/O composite module | 172, 231 |
| AJ65VBTCE3-32D | Network Related Products Remote I/O Module Input module | 172, 231 |
| AJ65VBTCE3-32DE | Network Related Products Remote I/O Module Input module | 172, 231 |
| AJ65VBTCE3-32DTE | Network Related Products Remote I/O Module I/O composite module | 172, 231 |
| AJ65VBTCE3-8D | Network Related Products Remote I/O Module Input module | 172, 231 |
| AJ65VBTCF1-32DT1 | Network Related Products Remote I/O Module I/O composite module | 174, 231 |
| AJ65VBTCFJ1-32DT1 | Network Related Products Remote I/O Module I/O composite module | 174, 231 |
| AJ65VBTCU2-16T | Network Related Products Remote I/O Module Output module | 173, 231 |
| AJ65VBTCU2-8T | Network Related Products Remote I/O Module Output module | 173, 231 |
| AJ65VBTCU3-16D1 | Network Related Products Remote I/O Module Input module | 173, 231 |
| AJ65VBTCU3-8D1 | Network Related Products Remote I/O Module Input module | 173, 231 |
| AJ65VBTCU-68ADIN | Network Related Products Analog Module Current input | 175, 232 |
| AJ65VBTCU-68ADVN | Network Related Products Analog Module Voltage input | 175, 232 |
| AJ65VBTCU-68DAVN | Network Related Products Analog Module Voltage output | 175, 232 |
| AJ65VBTS2-16T | Network Related Products Remote I/O Module Output module | 171, 231 |
| AJ65VBTS2-32T | Network Related Products Remote I/O Module Output module | 171, 231 |
| AJ65VBTS3-16D | Network Related Products Remote I/O Module Input module | 171, 231 |
| AJ65VBTS32-16DT | Network Related Products Remote I/O Module I/O composite module | 171, 231 |
| AJ65VBTS32-32DT | Network Related Products Remote I/O Module I/O composite module | 171, 231 |
| AJ65VBTS3-32D | Network Related Products Remote I/O Module Input module | 171, 231 |
| AL-05DLS | Circuit Protector | 705, 706 |
| AL2-10MR-A | MELSEC-F Series α2 Main Units | 225 |
| AL2-10MR-D | MELSEC-F Series α2 Main Units | 225 |
| AL2-14MR-A | MELSEC-F Series α2 Main Units | 225 |
| AL2-14MR-D | MELSEC-F Series α2 Main Units | 225 |
| AL2-24MR-A | MELSEC-F Series α2 Main Units | 225 |
| AL2-24MR-D | MELSEC-F Series α2 Main Units | 225 |
| AL2-2DA | MELSEC-F Series α Extension Modules | 225 |
| AL2-2PT-ADP | MELSEC-F Series α Extension Modules | 225 |

# Index

# Index

| Model | Product name | Page |
|---|---|---|
| FX2N-8EYR-ES/UL | MELSEC-F Series FX2N Extension Blocks | 226 |
| FX2N-8EYT-ESS/UL | MELSEC-F Series FX2N Extension Blocks | 226 |
| FX2NC-100BPCB | MELSEC iQ-F Series Power cable | 211 |
| FX2NC-100MPCB | MELSEC iQ-F Series Power cable | 211 |
| FX2NC-10BPCB1 | MELSEC iQ-F Series Power cable | 211 |
| FX2NC-16EX-DS | MELSEC-F Series FX2NC Extension Blocks | 226 |
| FX2NC-16EX-T-DS | MELSEC-F Series FX2NC Extension Blocks | 226 |
| FX2NC-16EYR-T-DS | MELSEC-F Series FX2NC Extension Blocks | 226 |
| FX2NC-16EYT-DSS | MELSEC-F Series FX2NC Extension Blocks | 226 |
| FX2NC-1HC | MELSEC-F Series FX2NC Special Adapters & Special Function Blocks | 226 |
| FX2NC-232ADP | MELSEC-F Series FX2NC Special Adapters & Special Function Blocks | 226 |
| FX2NC-32EX-DS | MELSEC-F Series FX2NC Extension Blocks | 226 |
| FX2NC-32EYT-DSS | MELSEC-F Series FX2NC Extension Blocks | 226 |
| FX2NC-485ADP | MELSEC-F Series FX2NC Special Adapters & Special Function Blocks | 226 |
| FX2NC-4AD | MELSEC-F Series FX2NC Special Adapters & Special Function Blocks | 226 |
| FX2NC-4DA | MELSEC-F Series FX2NC Special Adapters & Special Function Blocks | 226 |
| FX2NC-CNV-IF | MELSEC-F Series FX2NC Special Adapters & Special Function Blocks | 226 |
| FX2N-CNV-BC | MELSEC-F Series Accessories | 226 |
| FX-30P | MELSEC-F Series Accessories | 226 |
| FX-32E-TB | MELSEC iQ-F Series Terminal module | 85, 211 |
| FX-32E-TB/UL | MELSEC iQ-F Series Terminal module | 85, 211, 226 |
| FX3G-14M□/□□ | MELSEC-F Series FX3G Main Units | 138 |
| FX3G-14M□/□□□ | MELSEC-F Series FX3G Main Units | 138 |
| FX3G-14MR/DS | MELSEC-F Series FX3G Main Units | 225 |
| FX3G-14MR/ES-A | MELSEC-F Series FX3G Main Units | 225 |
| FX3G-14MT/DS | MELSEC-F Series FX3G Main Units | 225 |
| FX3G-14MT/DSS | MELSEC-F Series FX3G Main Units | 225 |
| FX3G-14MT/ES-A | MELSEC-F Series FX3G Main Units | 225 |
| FX3G-14MT/ESS | MELSEC-F Series FX3G Main Units | 225 |
| FX3G-1DA-BD | MELSEC-F Series FX3G Analog | 138, 226 |
| FX3G-232-BD | MELSEC-F Series FX3G Communication | 138, 226 |
| FX3G-24M□/□□ | MELSEC-F Series FX3G Main Units | 138 |
| FX3G-24M□/□□□ | MELSEC-F Series FX3G Main Units | 138 |
| FX3G-24MR/DS | MELSEC-F Series FX3G Main Units | 225 |
| FX3G-24MR/ES-A | MELSEC-F Series FX3G Main Units | 225 |
| FX3G-24MT/DS | MELSEC-F Series FX3G Main Units | 225 |
| FX3G-24MT/DSS | MELSEC-F Series FX3G Main Units | 225 |
| FX3G-24MT/ES-A | MELSEC-F Series FX3G Main Units | 225 |

| Model | Product name | Page |
|---|---|---|
| FX3G-24MT/ESS | MELSEC-F Series FX3G Main Units | 225 |
| FX3G-2AD-BD | MELSEC-F Series FX3G Analog | 138, 226 |
| FX3G-40M□/□□ | MELSEC-F Series FX3G Main Units | 138 |
| FX3G-40M□/□□□ | MELSEC-F Series FX3G Main Units | 138 |
| FX3G-40MR/DS | MELSEC-F Series FX3G Main Units | 225 |
| FX3G-40MR/ES-A | MELSEC-F Series FX3G Main Units | 225 |
| FX3G-40MT/DS | MELSEC-F Series FX3G Main Units | 225 |
| FX3G-40MT/DSS | MELSEC-F Series FX3G Main Units | 225 |
| FX3G-40MT/ES-A | MELSEC-F Series FX3G Main Units | 225 |
| FX3G-40MT/ESS | MELSEC-F Series FX3G Main Units | 225 |
| FX3G-422-BD | MELSEC-F Series FX3G Communication | 138, 226 |
| FX3G-485-BD | MELSEC-F Series FX3G Communication | 138, 226 |
| FX3G-5DM | MELSEC-F Series FX3G Display Module | 139, 226 |
| FX3G-60M□/□□ | MELSEC-F Series FX3G Main Units | 138 |
| FX3G-60M□/□□□ | MELSEC-F Series FX3G Main Units | 138 |
| FX3G-60MR/DS | MELSEC-F Series FX3G Main Units | 225 |
| FX3G-60MR/ES-A | MELSEC-F Series FX3G Main Units | 225 |
| FX3G-60MT/DS | MELSEC-F Series FX3G Main Units | 225 |
| FX3G-60MT/DSS | MELSEC-F Series FX3G Main Units | 225 |
| FX3G-60MT/ES-A | MELSEC-F Series FX3G Main Units | 225 |
| FX3G-60MT/ESS | MELSEC-F Series FX3G Main Units | 225 |
| FX3G-8AV-BD | MELSEC-F Series FX3G Analog Setpoint | 138, 226 |
| FX3GC-32MT/D | MELSEC-F Series FX3GC Main Units | 140, 225 |
| FX3GC-32MT/DSS | MELSEC-F Series FX3GC Main Units | 140, 225 |
| FX3G-CNV-ADP | MELSEC-F Series FX3G Interface Adapter | 138, 226 |
| FX3G-EEPROM-32L | MELSEC-F Series FX3G Memory Cassette | 139, 226 |
| FX3S-10M□/□□ | MELSEC-F Series FX3S Main Units | 143 |
| FX3S-10M□/□□□ | MELSEC-F Series FX3S Main Units | 143 |
| FX3S-10MR/ES | MELSEC-F Series FX3S Main Units | 225 |
| FX3S-10MT/ES | MELSEC-F Series FX3S Main Units | 225 |
| FX3S-10MT/ESS | MELSEC-F Series FX3S Main Units | 225 |
| FX3S-14M□/□□ | MELSEC-F Series FX3S Main Units | 143 |
| FX3S-14M□/□□□ | MELSEC-F Series FX3S Main Units | 143 |
| FX3S-14MR/ES | MELSEC-F Series FX3S Main Units | 225 |
| FX3S-14MT/ES | MELSEC-F Series FX3S Main Units | 225 |
| FX3S-14MT/ESS | MELSEC-F Series FX3S Main Units | 225 |
| FX3S-20M□/□□ | MELSEC-F Series FX3S Main Units | 143 |
| FX3S-20M□/□□□ | MELSEC-F Series FX3S Main Units | 143 |

# Index

| Model | Product name | Page |
|---|---|---|
| FX3U-80M□/□□ | MELSEC-F Series FX3U Main Units | 136 |
| FX3U-80M□/□□□ | MELSEC-F Series FX3U Main Units | 136 |
| FX3U-80MR/DS | MELSEC-F Series FX3U Main Units | 225 |
| FX3U-80MR/ES-A | MELSEC-F Series FX3U Main Units | 225 |
| FX3U-80MT/DS | MELSEC-F Series FX3U Main Units | 225 |
| FX3U-80MT/DSS | MELSEC-F Series FX3U Main Units | 225 |
| FX3U-80MT/ES-A | MELSEC-F Series FX3U Main Units | 225 |
| FX3U-80MT/ESS | MELSEC-F Series FX3U Main Units | 225 |
| FX3U-8AV-BD | MELSEC-F Series FX3U Analog Setpoint | 136, 226 |
| FX3UC-16M□/□ | MELSEC-F Series FX3UC Main Units | 144 |
| FX3UC-16M□/□□ | MELSEC-F Series FX3UC Main Units | 144 |
| FX3UC-16M□/□□□ | MELSEC-F Series FX3UC Main Units | 144 |
| FX3UC-16MR/DS-T | MELSEC-F Series FX3UC Main Units | 225 |
| FX3UC-16MR/D-T | MELSEC-F Series FX3UC Main Units | 225 |
| FX3UC-16MT/D | MELSEC-F Series FX3UC Main Units | 225 |
| FX3UC-16MT/DSS | MELSEC-F Series FX3UC Main Units | 225 |
| FX3UC-1PS-5V | MELSEC-F Series<br>FX3UC Special Function Blocks | 226 |
| FX3UC-32M□/□ | MELSEC-F Series FX3UC Main Units | 144 |
| FX3UC-32M□/□□ | MELSEC-F Series FX3UC Main Units | 144 |
| FX3UC-32M□/□□□ | MELSEC-F Series FX3UC Main Units | 144 |
| FX3UC-32MT/D | MELSEC-F Series FX3UC Main Units | 225 |
| FX3UC-32MT/DSS | MELSEC-F Series FX3UC Main Units | 225 |
| FX3UC-32MT-LT(-2) | Network Related Products<br>CC-Link Related Products | 233 |
| FX3UC-4AD | MELSEC-F Series<br>FX3UC Special Function Blocks Analog | 145, 226 |
| FX3UC-64M□/□ | MELSEC-F Series FX3UC Main Units | 144 |
| FX3UC-64M□/□□ | MELSEC-F Series FX3UC Main Units | 144 |
| FX3UC-64M□/□□□ | MELSEC-F Series FX3UC Main Units | 144 |
| FX3UC-64MT/D | MELSEC-F Series FX3UC Main Units | 225 |
| FX3UC-64MT/DSS | MELSEC-F Series FX3UC Main Units | 225 |
| FX3UC-96M□/□ | MELSEC-F Series FX3UC Main Units | 144 |
| FX3UC-96M□/□□ | MELSEC-F Series FX3UC Main Units | 144 |
| FX3UC-96M□/□□□ | MELSEC-F Series FX3UC Main Units | 144 |
| FX3UC-96MT/D | MELSEC-F Series FX3UC Main Units | 225 |
| FX3UC-96MT/DSS | MELSEC-F Series FX3UC Main Units | 225 |
| FX3U-CF-ADP | MELSEC-F Series FX3U Data Logging | 136, 226 |
| FX3U-CNV-BD | MELSEC-F Series FX3U Interface Board | 136, 226 |
| FX3U-ENET-ADP | MELSEC-F Series FX3U Network | 136, 226 |
| FX3U-ENET-L | MELSEC-F Series FX3U Network | 137, 226 |

| Model | Product name | Page |
|---|---|---|
| FX3U-FLROM-□□ | MELSEC-F Series FX3U Memory Cassettes | 137 |
| FX3U-FLROM-□□□ | MELSEC-F Series FX3U Memory Cassettes | 137 |
| FX3U-FLROM-16 | MELSEC-F Series Memory Cassettes | 226 |
| FX3U-FLROM-1M | MELSEC-F Series Memory Cassettes | 226 |
| FX3U-FLROM-64 | MELSEC-F Series Memory Cassettes | 226 |
| FX3U-FLROM-64L | MELSEC-F Series Memory Cassettes | 226 |
| FX3U-USB-BD | MELSEC-F Series FX3U Communication | 136, 226 |
| FX-485PC-IF | MELSEC-F Series Accessories | 226 |
| FX5-16ET/ES-H | MELSEC iQ-F Series I/O module<br>(extension cable type) | 63, 67, 69, 72, 77, 79, 82, 85, 209 |
| FX5-16ET/ESS-H | MELSEC iQ-F Series I/O module<br>(extension cable type) | 63, 67, 69, 72, 77, 80, 82, 85, 209 |
| FX5-16EX/ES | MELSEC iQ-F Series I/O module<br>(extension cable type) | 63, 69, 77, 82, 85, 209 |
| FX5-16EYR/ES | MELSEC iQ-F Series I/O module<br>(extension cable type) | 63, 69, 80, 82, 85, 209 |
| FX5-16EYT/ES | MELSEC iQ-F Series I/O module<br>(extension cable type) | 63, 69, 79, 82, 85, 209 |
| FX5-16EYT/ESS | MELSEC iQ-F Series I/O module<br>(extension cable type) | 63, 69, 80, 82, 85, 209 |
| FX5-1PSU-5V | MELSEC iQ-F Series<br>FX5 Extension power supply module | 63, 83, 85, 210 |
| FX5-232ADP | MELSEC iQ-F Series FX5U | 58, 60, 64, 70, 82, 85, 210 |
| FX5-232-BD | MELSEC iQ-F Series FX5U | 58, 64, 82, 85, 210 |
| FX5-30EC | MELSEC iQ-F Series<br>Extended extension cable | 85, 211 |
| FX5-32ER/DS | MELSEC iQ-F Series I/O module (DC power supply/DC input type) (extension cable type) | 63, 69, 78, 80, 82, 85, 209 |
| FX5-32ER/ES | MELSEC iQ-F Series I/O module (AC power supply/DC input type) (extension cable type) | 63, 78, 80, 82, 85, 209 |
| FX5-32ET/DS | MELSEC iQ-F Series I/O module (DC power supply/DC input type) (extension cable type) | 63, 69, 78, 79, 82, 85, 209 |
| FX5-32ET/DSS | MELSEC iQ-F Series I/O module (DC power supply/DC input type) (extension cable type) | 63, 69, 78, 80, 82, 85, 209 |
| FX5-32ET/ES | MELSEC iQ-F Series I/O module (AC power supply/DC input type) (extension cable type) | 63, 78, 79, 82, 85, 209 |
| FX5-32ET/ESS | MELSEC iQ-F Series I/O module (AC power supply/DC input type) (extension cable type) | 63, 78, 80, 82, 85, 209 |
| FX5-40SSC-S | MELSEC iQ-F Series<br>FX5 intelligent function module | 63, 69, 84, 85, 210 |
| FX5-422-BD-GOT | MELSEC iQ-F Series FX5U | 58, 64, 82, 85, 210 |
| FX5-485ADP | MELSEC iQ-F Series FX5U | 58, 60, 64, 70, 82, 85, 210 |
| FX5-485-BD | MELSEC iQ-F Series FX5U | 58, 64, 82, 85, 210 |
| FX5-4AD-ADP | MELSEC iQ-F Series FX5U | 58, 60, 64, 70, 74, 82, 85, 210 |
| FX5-4DA-ADP | MELSEC iQ-F Series FX5U | 58, 60, 64, 70, 74, 82, 85, 210 |
| FX5-65EC | MELSEC iQ-F Series<br>Extended extension cable | 85, 211 |
| FX5-8EX/ES | MELSEC iQ-F Series I/O module<br>(extension cable type) | 63, 69, 77, 82, 85, 209 |
| FX5-8EYR/ES | MELSEC iQ-F Series I/O module<br>(extension cable type) | 63, 69, 80, 82, 85, 209 |
| FX5-8EYT/ES | MELSEC iQ-F Series I/O module<br>(extension cable type) | 63, 69, 79, 82, 85, 209 |
| FX5-8EYT/ESS | MELSEC iQ-F Series I/O module<br>(extension cable type) | 63, 69, 80, 82, 85, 209 |
| FX5-C16EX/D | MELSEC iQ-F Series FX5UC | 60, 64, 69, 77, 82, 85, 209 |
| FX5-C16EX/DS | MELSEC iQ-F Series FX5UC | 60, 64, 69, 77, 82, 85, 209 |
| FX5-C16EYT/D | MELSEC iQ-F Series FX5UC | 60, 64, 69, 79, 82, 85, 209 |

# Index

| Model | Product name | Page |
|---|---|---|
| GT10-□□PSCB | Protective sheet | 628 |
| GT10-□□PSCW | Protective sheet | 628 |
| GT10-□□PSGB | Protective sheet | 628 |
| GT10-□□PSGW | Protective sheet | 628 |
| GT10-20PCO | Protective cover for oil | 623 |
| GT1030 | GOT1000 GT10 model | 596, 601, 602, 603, 626 |
| GT1030-HB□(W)(2) | GOT1000 GT10 model | 605, 607 |
| GT10-30PCO | Oil resistant cover | 628 |
| GT105□ | GOT1000 GT10 model | 600, 602, 603, 626 |
| GT105□-Q□BD | GOT1000 GT10 model | 605, 607 |
| GT1050 | GOT1000 GT10 model | 596, 600, 626 |
| GT10-50FMB | GT10 memory board | 627 |
| GT1055 | GOT1000 GT10 model | 596, 600, 626 |
| GT10-9PT5S | Connector conversion adapter | 626 |
| GT10-C□□□R4-25P | RS-422 cable | 624, 629 |
| GT10-C□□□R4-8P | RS-422 cable | 624, 629 |
| GT10-C□□□R4-8PC | RS-422 cable | 624, 629 |
| GT10-C02H-6PT9P | Barcode reader connection cable RS-232 cable | 625, 630 |
| GT10-C02H-9SC | RS-422 cable | 624, 629 |
| GT10-C10EXUSB-5S | Extended USB waterproof cable | 625, 630 |
| GT10-C10R4-8PL | RS-422 cable | 624, 629 |
| GT10-C30R2-6P | RS-232 cable | 625 |
| GT10-LDR | GT10 memory loader | 627 |
| GT10-RS2TUSB-5S | USB cable | 630 |
| GT11-50BAT | Battery | 623, 628 |
| GT11-50UCOV | USB protective cover | 628 |
| GT11H-C□□□ | External connection cable | 630 |
| GT11H-C□□□-32P | External connection cable | 630 |
| GT11H-C□□□-37P | External connection cable | 630 |
| GT11H-C15R2-6P | FA device connection relay cable | 630 |
| GT11H-C15R4-□P | FA device connection relay cable | 630 |
| GT11H-C30R2-6P | RS-232 cable | 629 |
| GT11H-CCL | CC-Link interface unit | 626 |
| GT11H-CNB-37S | Connector conversion box for Handy GOT | 630 |
| GT11HS-CCL | CC-Link interface unit | 626 |
| GT145□ | GOT1000 GT14 model | 602, 626 |
| GT145□-Q□BDE | GOT1000 GT14 model | 605, 607 |
| GT1450 | GOT1000 GT14 model | 596, 603, 626 |

| Model | Product name | Page |
|---|---|---|
| GT14-50UCOV | USB protective cover | 628 |
| GT1455 | GOT1000 GT14 model | 596, 599, 603, 626 |
| GT14-C10EXUSB-4S | Extension USB waterproof cable | 630 |
| GT14H-50ATT | Handy GOT wall-mounting fixture | 628 |
| GT14-RS2T4-9P | RS-232/485 Signal Conversion Adapter | 626 |
| GT14-VNCSKEY | VNC® server function license | 627 |
| GT15-□□STAND | Stand | 623, 628 |
| GT15-50ATT-□□ | Attachment | 623 |
| GT15-50ATT-85 | Attachment | 628 |
| GT15-50ATT-95W | Attachment | 628 |
| GT15-60ATT-□□ | Attachment | 623 |
| GT15-60ATT-77 | Attachment | 628 |
| GT15-60ATT-87 | Attachment | 628 |
| GT15-60ATT-96 | Attachment | 628 |
| GT15-60ATT-97 | Attachment | 628 |
| GT15-70ATT-□□ | Attachment | 623 |
| GT15-70ATT-87 | Attachment | 628 |
| GT15-70ATT-98 | Attachment | 628 |
| GT15-75QBUS2L | Q bus connection unit | 621 |
| GT15-75QBUSL | Q bus connection unit | 621 |
| GT15-A1SC□□B | Bus connection cable for QnA/ACPU/motion controller CPU (A series) | 629 |
| GT15-A1SC□□NB | Bus connection cable for QnA/ACPU/motion controller CPU (A series) | 629 |
| GT15-A370C□□B | Bus connection cable for QnA/ACPU/motion controller CPU (A series) | 629 |
| GT15-A370C□□B-S1 | Bus connection cable for QnA/ACPU/motion controller CPU (A series) | 629 |
| GT15-AC□□B | Bus connection cable for QnA/ACPU/motion controller CPU (A series) | 629 |
| GT15-AFC | Ferrite core set for A bus cable (two-pack) | 629 |
| GT15-BAT | Battery | 628 |
| GT15-C□□□BS | Bus connection cable for QnA/ACPU/motion controller CPU (A series) | 629 |
| GT15-C□□□EXSS-1 | Bus connection cable for QnA/ACPU/motion controller CPU (A series) | 629 |
| GT15-C□□BS | Bus connection cable for QnA/ACPU/motion controller CPU (A series) | 629 |
| GT15-C□□NB | Bus connection cable for QnA/ACPU/motion controller CPU (A series) | 629 |
| GT15-C03HTB | Conversion cable for connecting external I/O unit | 625, 630 |
| GT15-C50VG | Analog RGB cable | 625, 630 |
| GT15-CFCD | CF card unit | 627 |
| GT15-CFEX-C08SET | CF card extension unit | 603, 627 |
| GT15-DIO | External I/O unit | 622, 627 |
| GT15-DIOR | External I/O unit | 622, 627 |
| GT15-EXCNB | Buffer circuit cable | 629 |

# Index

| Model | Product name | Page |
|---|---|---|
| GT21-04RPCO | Protective cover for oil | 623 |
| GT21-04RPSCC-UC | Protective sheet | 623 |
| GT21-C□□□R4-25P5 | RS-422 cable | 624 |
| GT21-C□□□R4-8P5 | RS-422 cable | 624 |
| GT23□□ | GOT2000 GT23 model | 580 |
| GT2308 | GOT2000 GT23model | 568, 586, 587, 592, 595, 620 |
| GT2310 | GOT2000 GT23model | 568, 586, 587, 592, 595, 620 |
| GT25□□ | GOT2000 GT25 model | 580 |
| GT25-□□FIT-EXS | Special fitting | 623 |
| GT25-□□PSCC | Protective sheet | 623 |
| GT25-□□PSCC-UC | Protective sheet | 623 |
| GT25-□□PSGC | Protective sheet | 623 |
| GT25-05PCO | Protective cover for oil | 623 |
| GT25-05UCOV | USB environmental protection cover | 623 |
| GT2508 | GOT2000 GT25model | 569, 585, 590, 594, 620, 621 |
| GT2508F | GOT2000 GT25model | 569, 585, 591, 594, 620 |
| GT2510 | GOT2000 GT25model | 569, 584, 585, 590, 594, 620, 621 |
| GT2510F | GOT2000 GT25model | 569, 584, 585, 591, 594, 620 |
| GT2512 | GOT2000 GT25model | 568, 584, 585, 590, 594, 620, 621 |
| GT2512F | GOT2000 GT25model | 568, 584, 585, 591, 594, 620 |
| GT25F-□□ESGS | Environmental protection sheet | 623 |
| GT25-FNADP | Field network adapter unit | 621 |
| GT25-J71E71-100 | Ethernet communication unit | 621 |
| GT25-MESIFKEY-□ | MES I/F Function License | 622 |
| GT25-PCRAKEY-□ | Remote Personal Computer Operation Function (Ethernet) License | 622 |
| GT25-UCOV | USB environmental protection cover | 623 |
| GT25-VNCSKEY-□ | VNC Server Function License | 622 |
| GT25-WEBSKEY-□ | GOT Mobile Function License | 622 |
| GT25-WLAN | Wireless LAN communication unit | 621 |
| GT27□□ | GOT2000 GT27 model | 580 |
| GT2705 | GOT2000 GT27model | 569, 583, 590, 593, 620, 621 |
| GT2708 | GOT2000 GT27model | 569, 583, 590, 593, 620, 621 |
| GT2710 | GOT2000 GT27model | 569, 582, 583, 590, 593, 620, 621 |
| GT2712 | GOT2000 GT27model | 568, 582, 583, 590, 593, 620, 621 |
| GT2715 | GOT2000 GT27model | 568, 582, 583, 590, 593, 620, 621 |
| GT27-15PSCC | Protective sheet | 623 |
| GT27-15PSGC | Protective sheet | 623 |
| GT27-MMR-Z | Multimedia unit | 622 |
| GT27-R2 | RGB input unit | 622 |
| GT27-R2-Z | RGB input unit | 622 |
| GT27-ROUT | RGB output unit | 622 |
| GT27-ROUT-Z | RGB output unit | 622 |
| GT27-SGTKEY-U | License key for GT SoftGOT2000 | 622 |
| GT27-V4R1-Z | Video/RGB input unit | 622 |
| GT27-V4-Z | Video input unit | 622 |
| **H** | | |
| H-6FH45XX/M/C | Industrial Robot | 652 |
| HG-AK□□36 | HG-AK Series servo motor | 366, 367, 377 |
| HG-AK□□36B | HG-AK Series servo motor | 366, 367, 377 |
| HG-AK□□36B-S100 | HG-AK Series servo motor | 377 |
| HG-AK□□36-S100 | HG-AK Series servo motor | 377 |
| HG-JR□□□1 | HG-JR Series servo motor | 354, 355, 373, 374 |
| HG-JR□□□14 | HG-JR Series servo motor | 356, 357, 373, 374 |
| HG-JR□□□14B | HG-JR Series servo motor | 356, 357, 373 |
| HG-JR□□□14MB | HG-JR Series servo motor | 361 |
| HG-JR□□□1B | HG-JR Series servo motor | 354, 355, 373 |
| HG-JR□□□1M | HG-JR Series servo motor | 358, 359, 373, 374 |
| HG-JR□□□1M4 | HG-JR Series servo motor | 360, 361, 373, 374 |
| HG-JR□□□1M4B | HG-JR Series servo motor | 360, 373 |
| HG-JR□□□1MB | HG-JR Series servo motor | 358, 359, 373 |
| HG-JR□□1 | HG-JR Series servo motor | 354, 355, 373 |
| HG-JR□□14 | HG-JR Series servo motor | 356, 357, 373 |
| HG-JR□□14B | HG-JR Series servo motor | 356, 357, 373 |
| HG-JR□□14MB | HG-JR Series servo motor | 361 |
| HG-JR□□1B | HG-JR Series servo motor | 354, 355, 373 |
| HG-JR□□1M | HG-JR Series servo motor | 358, 359, 373 |
| HG-JR□□1M4 | HG-JR Series servo motor | 360, 361, 373 |
| HG-JR□□1M4B | HG-JR Series servo motor | 360, 373 |
| HG-JR□□1MB | HG-JR Series servo motor | 358, 359, 373 |
| HG-JR□□3 | HG-JR Series servo motor | 350, 351, 371, 372 |
| HG-JR□□34 | HG-JR Series servo motor | 352, 353, 371, 372 |
| HG-JR□□34B | HG-JR Series servo motor | 352, 353, 371, 372 |
| HG-JR□□3B | HG-JR Series servo motor | 350, 351, 371, 372 |
| HG-JR□3 | HG-JR Series servo motor | 350, 351 |
| HG-JR□34 | HG-JR Series servo motor | 352, 353 |
| HG-JR□34B | HG-JR Series servo motor | 352, 353 |

# Index

| Model | Product name | Page |
|---|---|---|
| LD62D | MELSEC-L Series<br>High-Speed Counter Module | 128, 224 |
| LD75D1 | MELSEC-L Series Positioning Module | 127, 224 |
| LD75D2 | MELSEC-L Series Positioning Module | 127, 224 |
| LD75D4 | MELSEC-L Series Positioning Module | 127, 224 |
| LD75P1 | MELSEC-L Series Positioning Module | 127, 224 |
| LD75P2 | MELSEC-L Series Positioning Module | 127, 224 |
| LD75P4 | MELSEC-L Series Positioning Module | 127, 224 |
| LD77MS16 | MELSEC-L Series Simple Motion Module | 127, 224, 241,<br>256, 258 to 261 |
| LD77MS2 | MELSEC-L Series Simple Motion Module | 127, 224, 241,<br>256, 258 to 261 |
| LD77MS4 | MELSEC-L Series Simple Motion Module | 127, 224, 241,<br>256, 258 to 261 |
| LG69 | MELSEC-L Series Space module | 223, 239 |
| LH42C4NT1P | MELSEC-L Series I/O Combined Module | 125, 223, 125, 223 |
| LJ51AW12AL | MELSEC-L Series<br>AnyWireASLINK Master Module | 130, 224 |
| LJ61BT11 | MELSEC-L Series<br>CC-Link Master/Local Module | 129, 224, 230 |
| LJ61CL12 | MELSEC-L Series<br>CC-Link/LT Master Module | 130, 224, 233 |
| LJ71C24 | MELSEC-L Series<br>Serial Communication Module | 131, 224 |
| LJ71C24-R2 | MELSEC-L Series<br>Serial Communication Module | 131, 224 |
| LJ71E71-100 | MELSEC-L Series<br>Ethernet Interface Module | 129, 224 |
| LJ71GF11-T2 | MELSEC-L Series<br>CC-Link IE Field Network Module | 129, 224, 228 |
| LJ72GF15-T2 | MELSEC-L Series<br>CC-Link IE Field Network Module | 129, 224, 228 |
| LJ72MS15 | MELSEC-L Series<br>SSCNET III/H Head Module | 131, 224 |
| LM-FP2B-06M-1SS0 | LM-F Series Linear servo motor<br>Primary side | 384, 385, 392 |
| LM-FP2D-12M-1SS0 | LM-F Series Linear servo motor<br>Primary side | 384, 385, 392 |
| LM-FP2F-18M-1SS0 | LM-F Series Linear servo motor<br>Primary side | 384, 385, 392 |
| LM-FP4B-12M-1SS0 | LM-F Series Linear servo motor<br>Primary side | 384, 385, 392 |
| LM-FP4D-24M-1SS0 | LM-F Series Linear servo motor<br>Primary side | 384, 385, 392 |
| LM-FP4F-36M-1SS0 | LM-F Series Linear servo motor<br>Primary side | 384, 385, 392 |
| LM-FP4H-48M-1SS0 | LM-F Series Linear servo motor<br>Primary side | 384, 385, 392 |
| LM-FP5H-60M-1SS0 | LM-F Series Linear servo motor<br>Primary side | 384, 385, 392 |
| LM-FS20-480-1SS0 | LM-F Series Linear servo motor<br>Secondary side | 384, 393 |
| LM-FS20-576-1SS0 | LM-F Series Linear servo motor<br>Secondary side | 384, 393 |
| LM-FS40-480-1SS0 | LM-F Series Linear servo motor<br>Secondary side | 384, 393 |
| LM-FS40-576-1SS0 | LM-F Series Linear servo motor<br>Secondary side | 384, 393 |
| LM-FS50-480-1SS0 | LM-F Series Linear servo motor<br>Secondary side | 384, 393 |
| LM-FS50-576-1SS0 | LM-F Series Linear servo motor<br>Secondary side | 384, 393 |
| LM-H3P2A-07P-BSS0 | LM-H3 Series Linear servo motor<br>Primary side | 382, 383, 390 |
| LM-H3P3A-12P-CSS0 | LM-H3 Series Linear servo motor<br>Primary side | 382, 383, 390 |
| LM-H3P3B-24P-CSS0 | LM-H3 Series Linear servo motor<br>Primary side | 382, 383, 390 |
| LM-H3P3C-36P-CSS0 | LM-H3 Series Linear servo motor<br>Primary side | 382, 383, 390 |
| LM-H3P3D-48P-CSS0 | LM-H3 Series Linear servo motor<br>Primary side | 382, 383, 390 |
| LM-H3P7A-24P-ASS0 | LM-H3 Series Linear servo motor<br>Primary side | 382, 383, 390 |
| LM-H3P7B-48P-ASS0 | LM-H3 Series Linear servo motor<br>Primary side | 382, 383, 390 |
| LM-H3P7C-72P-ASS0 | LM-H3 Series Linear servo motor<br>Primary side | 382, 383, 390 |
| LM-H3P7D-96P-ASS0 | LM-H3 Series Linear servo motor<br>Primary side | 382, 383, 390 |
| LM-H3S20-288-BSS0 | LM-H3 Series Linear servo motor<br>Secondary side | 382, 391 |
| LM-H3S20-384-BSS0 | LM-H3 Series Linear servo motor<br>Secondary side | 382, 391 |
| LM-H3S20-480-BSS0 | LM-H3 Series Linear servo motor<br>Secondary side | 382, 391 |
| LM-H3S20-768-BSS0 | LM-H3 Series Linear servo motor<br>Secondary side | 382, 391 |
| LM-H3S30-288-CSS0 | LM-H3 Series Linear servo motor<br>Secondary side | 382, 391 |
| LM-H3S30-384-CSS0 | LM-H3 Series Linear servo motor<br>Secondary side | 382, 391 |
| LM-H3S30-480-CSS0 | LM-H3 Series Linear servo motor<br>Secondary side | 382, 391 |
| LM-H3S30-768-CSS0 | LM-H3 Series Linear servo motor<br>Secondary side | 382, 391 |
| LM-H3S70-288-ASS0 | LM-H3 Series Linear servo motor<br>Secondary side | 382, 391 |
| LM-H3S70-384-ASS0 | LM-H3 Series Linear servo motor<br>Secondary side | 382, 391 |
| LM-H3S70-480-ASS0 | LM-H3 Series Linear servo motor<br>Secondary side | 382, 391 |
| LM-H3S70-768-ASS0 | LM-H3 Series Linear servo motor<br>Secondary side | 382, 391 |
| LM-K2P1A-01M-2SS1 | LM-K2 Series Linear servo motor<br>Primary side | 386, 387, 394 |
| LM-K2P1C-03M-2SS1 | LM-K2 Series Linear servo motor<br>Primary side | 386, 387, 394 |
| LM-K2P2A-02M-1SS1 | LM-K2 Series Linear servo motor<br>Primary side | 386, 387, 394 |
| LM-K2P2C-07M-1SS1 | LM-K2 Series Linear servo motor<br>Primary side | 386, 387, 394 |
| LM-K2P2E-12M-1SS1 | LM-K2 Series Linear servo motor<br>Primary side | 386, 387, 394 |
| LM-K2P3C-14M-1SS1 | LM-K2 Series Linear servo motor<br>Primary side | 386, 387, 394 |
| LM-K2P3E-24M-1SS1 | LM-K2 Series Linear servo motor<br>Primary side | 386, 387, 394 |
| LM-K2S10-288-2SS1 | LM-K2 Series Linear servo motor<br>Secondary side | 386, 395 |
| LM-K2S10-384-2SS1 | LM-K2 Series Linear servo motor<br>Secondary side | 386, 395 |
| LM-K2S10-480-2SS1 | LM-K2 Series Linear servo motor<br>Secondary side | 386, 395 |
| LM-K2S10-768-2SS1 | LM-K2 Series Linear servo motor<br>Secondary side | 386, 395 |
| LM-K2S20-288-1SS1 | LM-K2 Series Linear servo motor<br>Secondary side | 386, 395 |
| LM-K2S20-384-1SS1 | LM-K2 Series Linear servo motor<br>Secondary side | 386, 395 |
| LM-K2S20-480-1SS1 | LM-K2 Series Linear servo motor<br>Secondary side | 386, 395 |
| LM-K2S20-768-1SS1 | LM-K2 Series Linear servo motor<br>Secondary side | 386, 395 |
| LM-K2S30-288-1SS1 | LM-K2 Series Linear servo motor<br>Secondary side | 386, 395 |
| LM-K2S30-384-1SS1 | LM-K2 Series Linear servo motor<br>Secondary side | 386, 395 |
| LM-K2S30-480-1SS1 | LM-K2 Series Linear servo motor<br>Secondary side | 386, 395 |
| LM-K2S30-768-1SS1 | LM-K2 Series Linear servo motor<br>Secondary side | 386, 395 |
| LM-U2P2B-40M-2SS0 | LM-U2 Series Linear servo motor<br>Primary side | 388, 389, 396 |

# Index

# Index

| Model | Product name | Page |
|---|---|---|
| NV630-HEW | NV-H/NV-R (High-performance class)<br>Harmonic Surge Ready | 687, 814 |
| NV630-SEW | NV-S (Standard class)<br>Harmonic Surge Ready | 685, 814 |
| NV630-SW | NV-S (Standard class)<br>Harmonic Surge Ready | 685, 812 |
| NV63-CV | NV-C (Economy class)<br>Harmonic Surge Ready | 682, 800 |
| NV63-HV | NV-H/NV-R (High-performance class)<br>Harmonic Surge Ready | 686, 800 |
| NV63-SV | NV-S (Standard class)<br>Harmonic Surge Ready | 684, 800 |
| NV800-HEW | NV-H/NV-R (High-performance class)<br>Harmonic Surge Ready | 687, 816 |
| NV800-SEW | NV-S (Standard class)<br>Harmonic Surge Ready | 685, 816 |
| NV-ZBA | Earth Leakage Relay | 712 |
| NV-ZHA | Earth Leakage Relay | 712 |
| NV-ZLA | Earth Leakage Relay | 712 |
| NV-ZSA | Earth Leakage Relay | 712 |
| NZ1MEM-□GBSD | Memory card SD memory card | 206, 211, 214, 222, 623 |
| NZ1MEM-16GBSD | MELSEC iQ-R Series CPU module | 206, 214, 222 |
| NZ2AW1C1BY | Network Related Products Bridge Module | 177, 230 |
| NZ2AW1C2AL | Network Related Products Bridge Module | 177, 230 |
| NZ2AW1C2D2 | Network Related Products Bridge Module | 177, 230 |
| NZ2AW1GFAL | Network Related Products Bridge Module | 167, 229 |
| NZ2EHF-T8 | Network Related Products<br>Ethernet Compatible Products | 182, 234 |
| NZ2EHG-T8 | Network Related Products<br>Ethernet Related Product | 234 |
| NZ2EHG-T8N | Network Related Products<br>Ethernet Compatible Products | 182 |
| NZ2EX2B1-16D | Network Related Products<br>Extension Module Input module | 165, 229 |
| NZ2EX2B1-16T | Network Related Products<br>Extension Module Output module | 165, 229 |
| NZ2EX2B1-16TE | Network Related Products<br>Extension Module Output module | 165, 229 |
| NZ2EX2B1N-16D | Network Related Products<br>Extension Module Input module | 165, 229 |
| NZ2EX2B1N-16T | Network Related Products<br>Extension Module Output module | 165, 229 |
| NZ2EX2B1N-16TE | Network Related Products<br>Extension Module Output module | 165, 229 |
| NZ2EX2B-60AD4 | Network Related Products<br>Extension Analog Input Modules | 166, 229 |
| NZ2EX2Bz-60DA4 | Network Related Products<br>Extension Analog Output Modules | 166 |
| NZ2EX2S1-16D | Network Related Products<br>Extension Module Input module | 165, 229 |
| NZ2EX2S1-16T | Network Related Products<br>Extension Module Output module | 165, 229 |
| NZ2EX2S1-16TE | Network Related Products<br>Extension Module Output module | 165, 229 |
| NZ2EXSS2-8TE | Network Related Products<br>Safety Remote I/O Module | 166, 229 |
| NZ2GF2B1N1-16D | Network Related Products<br>Remote I/O Module Input module | 162, 228 |
| NZ2GF2B1N1-16T | Network Related Products<br>Remote I/O Module Output module | 162, 229 |
| NZ2GF2B1N1-16TE | Network Related Products<br>Remote I/O Module Output module | 162, 229 |
| NZ2GF2B1N-16D | Network Related Products<br>Remote I/O Module Input module | 162, 228 |
| NZ2GF2B1N-16T | Network Related Products<br>Remote I/O Module Output module | 162, 229 |

| Model | Product name | Page |
|---|---|---|
| NZ2GF2B1N-16TE | Network Related Products<br>Remote I/O Module Output module | 162, 229 |
| NZ2GF2B-60TCRT4 | Network Related Products<br>Temperature Control Module | 164, 229 |
| NZ2GF2B-60TCTT4 | Network Related Products<br>Temperature Control Module | 164, 229 |
| NZ2GF2BN-60AD4 | Network Related Products<br>Voltage, current input | 164, 229 |
| NZ2GF2BN-60DA4 | Network Related Products<br>Voltage, current output | 164, 229 |
| NZ2GF2S1-16D | Network Related Products<br>Remote I/O Module Input module | 162, 228 |
| NZ2GF2S1-16T | Network Related Products<br>Remote I/O Module Output module | 162, 229 |
| NZ2GF2S1-16TE | Network Related Products<br>Remote I/O Module Output module | 162, 229 |
| NZ2GF-CCB | Network Related Products Bridge Module | 167, 229, 230 |
| NZ2GFCE3-16D | Network Related Products<br>Remote I/O Module Input module | 163, 228 |
| NZ2GFCE3-16DE | Network Related Products<br>Remote I/O Module Input module | 163, 228 |
| NZ2GFCE3-16T | Network Related Products<br>Remote I/O Module Output module | 163, 229 |
| NZ2GFCE3-16TE | Network Related Products<br>Remote I/O Module Output module | 163, 229 |
| NZ2GFCE3-32D | Network Related Products<br>Remote I/O Module Input module | 163, 228 |
| NZ2GFCE3-32DT | Network Related Products<br>Remote I/O Module I/O composite module | 163, 229 |
| NZ2GFCE3-32T | Network Related Products<br>Remote I/O Module Output module | 163, 229 |
| NZ2GFCF1-32D | Network Related Products<br>Remote I/O Module Input module | 164, 228 |
| NZ2GFCF1-32DT | Network Related Products<br>Remote I/O Module I/O composite module | 164, 229 |
| NZ2GFCF1-32T | Network Related Products<br>Remote I/O Module Output module | 164, 229 |
| NZ2GFCF-D62PD2 | Network Related Products<br>High-Speed Counter Module | 165, 229 |
| NZ2GFCM1-16D | Network Related Products<br>Remote I/O Module Input module | 163, 228 |
| NZ2GFCM1-16DE | Network Related Products<br>Remote I/O Module Input module | 163, 228 |
| NZ2GFCM1-16T | Network Related Products<br>Remote I/O Module Output module | 163, 229 |
| NZ2GFCM1-16TE | Network Related Products<br>Remote I/O Module Output module | 163, 229 |
| NZ2GF-ETB | Network Related Products<br>Ethernet Adapter Module | 167, 229, 234 |
| NZ2GFSS2-32D | Network Related Products<br>Safety Remote I/O Module | 166, 229 |
| NZ2MC-16MBS | MELSEC iQ-R Series CPU module | 206 |
| NZ2MC-1MBS | MELSEC iQ-R Series CPU module | 206 |
| NZ2MC-2MBS | MELSEC iQ-R Series CPU module | 206 |
| NZ2MC-4MBS | MELSEC iQ-R Series CPU module | 206 |
| NZ2MC-8MBS | MELSEC iQ-R Series CPU module | 206 |
| NZ2MC-8MBSE | MELSEC iQ-R Series CPU module | 206 |
| NZ2MHG-T8F2 | Network Related Products<br>Ethernet Compatible Products | 182 |
| NZ2WL-CN | Network Related Products<br>Ethernet Related Product | 234 |
| NZ2WL-EU | Network Related Products<br>Ethernet Related Product | 234 |
| NZ2WL-JPA | Network Related Products<br>Ethernet Compatible Products | 182 |
| NZ2WL-JPS | Network Related Products<br>Ethernet Compatible Products | 182 |
| NZ2WL-KR | Network Related Products<br>Ethernet Related Product | 234 |

# Index

| Model | Product name | Page |
|---|---|---|
| Q2MEM-BAT | MELSEC-Q Series CPU module | 214 |
| Q312B | MELSEC-Q Series Base Unit | 97, 215 |
| Q312DB | MELSEC-Q Series Base Unit | 97, 215 |
| Q32SB | MELSEC-Q Series Base Unit | 97, 215 |
| Q33B | MELSEC-Q Series Base Unit | 97, 215 |
| Q33SB | MELSEC-Q Series Base Unit | 97, 215 |
| Q35B | MELSEC-Q Series Base Unit | 97, 215 |
| Q35BL | Q Series large type base unit | 239 |
| Q35BLS | Q Series large type base unit (AnS Series size) | 239 |
| Q35BLS-D | Q Series large type base unit (AnS Series size) | 239 |
| Q35DB | MELSEC-Q Series Base Unit | 97, 215 |
| Q35SB | MELSEC-Q Series Base Unit | 97, 215 |
| Q38B | MELSEC-Q Series Base Unit | 97, 215 |
| Q38BL | Q Series large type base unit | 239 |
| Q38BLS | Q Series large type base unit (AnS Series size) | 239 |
| Q38BLS-D | Q Series large type base unit (AnS Series size) | 239 |
| Q38DB | MELSEC-Q Series Base Unit | 97, 215 |
| Q3MEM-4MBS | MELSEC-Q Series CPU module | 214 |
| Q3MEM-4MBS-SET | MELSEC-Q Series CPU module | 214 |
| Q3MEM-8MBS | MELSEC-Q Series CPU module | 214 |
| Q3MEM-8MBS-SET | MELSEC-Q Series CPU module | 214 |
| Q3MEM-BAT | MELSEC-Q Series CPU module | 214 |
| Q3MEM-CV | MELSEC-Q Series CPU module | 214 |
| Q3MEM-CV-H | MELSEC-Q Series CPU module | 214 |
| Q4MCA-1MBS | MELSEC-Q Series CPU module | 214 |
| Q4MCA-2MBS | MELSEC-Q Series CPU module | 214 |
| Q4MCA-4MBS | MELSEC-Q Series CPU module | 214 |
| Q4MCA-8MBS | MELSEC-Q Series CPU module | 214 |
| Q50BD-CCV2 | Network Related Products CC-Link Related Products | 232 |
| Q50UDEHCPU | MELSEC-Q Series Programmable Controller CPU | 92, 113, 212 |
| Q52B | MELSEC-Q Series Base Unit | 97, 215 |
| Q55B | MELSEC-Q Series Base Unit | 97, 215 |
| Q55BL | Q Series large type base unit | 239 |
| Q55BLS | Q Series large type base unit (AnS Series size) | 239 |
| Q55BLS-D | Q Series large type base unit (AnS Series size) | 239 |
| Q612B | MELSEC-Q Series Base Unit | 97, 215 |
| Q61LD | MELSEC-Q Series Load cell input | 100, 218 |
| Q61P | MELSEC-Q Series Power Supply Module | 97, 215 |

| Model | Product name | Page |
|---|---|---|
| Q61P-D | MELSEC-Q Series Power Supply Module | 97, 215 |
| Q61SP | MELSEC-Q Series Power Supply Module | 97, 215 |
| Q62AD-DGH | MELSEC-Q Series Current input | 100, 218 |
| Q62DA-FG | MELSEC-Q Series Voltage/current output | 100, 218 |
| Q62DAN | MELSEC-Q Series Voltage/current output | 100, 218 |
| Q62HLC | MELSEC-Q Series Loop control | 101, 218 |
| Q62P | MELSEC-Q Series Power Supply Module | 97, 215 |
| Q63B | MELSEC-Q Series Base Unit | 97, 215 |
| Q63P | MELSEC-Q Series Power Supply Module | 97, 215 |
| Q63RP | MELSEC-Q Series Power Supply Module | 97, 215 |
| Q64AD | MELSEC-Q Series Voltage/current input | 100, 218 |
| Q64AD2DA | MELSEC-Q Series Voltage and current input/output | 100, 218 |
| Q64AD-GH | MELSEC-Q Series Voltage/current input | 100, 218 |
| Q64ADH | MELSEC-Q Series Voltage/current input | 100, 218 |
| Q64DAH | MELSEC-Q Series Voltage/current output | 100, 218 |
| Q64DAN | MELSEC-Q Series Voltage/current output | 100, 218 |
| Q64PN | MELSEC-Q Series Power Supply Module | 97, 215 |
| Q64RD | MELSEC-Q Series Temperature input | 101, 218 |
| Q64RD-G | MELSEC-Q Series Temperature input | 101, 218 |
| Q64RP | MELSEC-Q Series Power Supply Module | 97 |
| Q64RPN | MELSEC-Q Series Power supply module | 215 |
| Q64TCRTBWN | MELSEC-Q Series Temperature control | 101, 218 |
| Q64TCRTN | MELSEC-Q Series Temperature control | 101, 218 |
| Q64TCTTBWN | MELSEC-Q Series Temperature control | 101, 218 |
| Q64TCTTN | MELSEC-Q Series Temperature control | 101, 218 |
| Q64TD | MELSEC-Q Series Temperature input | 101, 218 |
| Q64TDV-GH | MELSEC-Q Series Temperature input | 101, 218 |
| Q65B | MELSEC-Q Series Base Unit | 97, 215 |
| Q65BL | Q Series large type base unit | 239 |
| Q65BLS | Q Series large type base unit (AnS Series size) | 239 |
| Q65BLS-D | Q Series large type base unit (AnS Series size) | 239 |
| Q65WRB | MELSEC-Q Series Base Unit | 97, 215 |
| Q66AD-DG | MELSEC-Q Series Current input | 100, 218 |
| Q66DA-G | MELSEC-Q Series Voltage/current output | 100, 218 |
| Q68AD-G | MELSEC-Q Series Voltage/current input | 100, 218 |
| Q68ADI | MELSEC-Q Series Current input | 100, 218 |
| Q68ADV | MELSEC-Q Series Voltage input | 100, 218 |
| Q68B | MELSEC-Q Series Base Unit | 97, 215 |

# Index

| Model | Product name | Page |
|---|---|---|
| QD75D4 | MELSEC-Q Series Positioning Module | 103, 219 |
| QD75D4N | MELSEC-Q Series Positioning Module | 103, 219 |
| QD75M1 | MELSEC-Q Series Positioning | 219 |
| QD75M2 | MELSEC-Q Series Positioning | 219 |
| QD75M4 | MELSEC-Q Series Positioning | 219 |
| QD75MH1 | MELSEC-Q Series Positioning Module | 103, 219 |
| QD75MH2 | MELSEC-Q Series Positioning Module | 103, 219 |
| QD75MH4 | MELSEC-Q Series Positioning Module | 103, 219 |
| QD75P1 | MELSEC-Q Series Positioning Module | 103, 219 |
| QD75P1N | MELSEC-Q Series Positioning Module | 103, 219 |
| QD75P2 | MELSEC-Q Series Positioning Module | 103, 219 |
| QD75P2N | MELSEC-Q Series Positioning Module | 103, 219 |
| QD75P4 | MELSEC-Q Series Positioning Module | 103, 219 |
| QD75P4N | MELSEC-Q Series Positioning Module | 103, 219 |
| QD77GF16 | MELSEC-Q Series Simple Motion Module | 102, 219, 228, 251, 254 |
| QD77GF4 | MELSEC-Q Series Simple Motion Module | 102, 228 |
| QD77GF8 | MELSEC-Q Series Simple Motion Module | 102, 228 |
| QD77MS16 | MELSEC-Q Series Simple Motion Module | 102, 219, 241, 255, 258 to 261 |
| QD77MS2 | MELSEC-Q Series Simple Motion Module | 102, 219, 241, 255, 258 to 261 |
| QD77MS4 | MELSEC-Q Series Simple Motion Module | 102, 219, 241, 255, 258 to 261 |
| QD81DL96 | MELSEC-Q Series High-speed Data Logger Module | 106, 220 |
| QD81MEM-1GBC | MELSEC-Q Series CPU module | 214, 220 |
| QD81MEM-2GBC | MELSEC-Q Series CPU module | 214, 220 |
| QD81MEM-4GBC | MELSEC-Q Series CPU module | 214, 220 |
| QD81MEM-512MBC | MELSEC-Q Series CPU module | 214, 220 |
| QD81MEM-8GBC | MELSEC-Q Series CPU module | 214, 220 |
| QE81WH | MELSEC-Q Series Energy Measuring Module | 105, 220, 920 |
| QE81WH4W | MELSEC-Q Series Energy Measuring Module | 105, 220, 920 |
| QE82LG | MELSEC-Q Series Isolation Monitoring Module | 105, 220, 922 |
| QE83WH4W | MELSEC-Q Series Energy Measuring Module | 105, 220, 920 |
| QE84WH | MELSEC-Q Series Energy Measuring Module | 105, 220, 920 |
| QE8WH4VT | MELSEC-Q Series Energy measuring | 220 |
| QG60 | MELSEC iQ-R Series Base unit | 207, 215 |
| QG69L | Q Series large type base unit | 239 |
| QG69LS | Q Series large type base unit (AnS Series size) | 239 |
| QH42P | MELSEC-Q Series I/O Combined Module | 99, 216 |
| QI60 | MELSEC-Q Series Interrupt Module | 98, 216 |
| QJ51AW12AL | MELSEC-Q Series AnyWireASLINK Master Module | 110, 221 |

| Model | Product name | Page |
|---|---|---|
| QJ61BT11N | MELSEC-Q Series CC-Link Network Module | 108, 221, 230 |
| QJ61CL12 | MELSEC-Q Series CC-Link/LT Network Module | 109, 221, 233 |
| QJ71AS92 | MELSEC-Q Series As-i Master Module | 111, 221 |
| QJ71BR11 | MELSEC-Q Series MELSECNET/H Network Module | 109, 221 |
| QJ71C24N | MELSEC-Q Series Serial Communication Module | 111, 220 |
| QJ71C24N (-R2/R4) | MELSEC-Q Series MODBUS® | 221 |
| QJ71C24N-R2 | MELSEC-Q Series Serial Communication Module | 111, 220 |
| QJ71C24N-R4 | MELSEC-Q Series Serial Communication Module | 111, 220 |
| QJ71DC96 | MELSEC-Q Series High-Speed Data Communication Module | 107, 220 |
| QJ71E71-100 | MELSEC-Q Series Ethernet Interface Module | 108, 220, 221 |
| QJ71E71-B2 | MELSEC-Q Series Information module | 220 |
| QJ71E71-B5 | MELSEC-Q Series Information module | 220 |
| QJ71FL71-B2 | MELSEC-Q Series Control network module | 221 |
| QJ71FL71-B2-F01 | MELSEC-Q Series Control network module | 221 |
| QJ71FL71-B5 | MELSEC-Q Series Control network module | 221 |
| QJ71FL71-B5-F01 | MELSEC-Q Series Control network module | 221 |
| QJ71FL71-T | MELSEC-Q Series FL-net (OPCN-2) Version 1.00 | 110, 221 |
| QJ71FL71-T-F01 | MELSEC-Q Series FL-net (OPCN-2) Version 2.00 | 110, 221 |
| QJ71GF11-T2 | MELSEC-Q Series CC-Link IE Field Network Module | 108, 221, 228 |
| QJ71GP21S-SX | MELSEC-Q Series CC-Link IE Control Network Module | 108, 221, 228 |
| QJ71GP21-SX | MELSEC-Q Series CC-Link IE Control Network Module | 108, 221, 228 |
| QJ71LP21-25 | MELSEC-Q Series MELSECNET/H Network Module | 109, 221 |
| QJ71LP21G | MELSEC-Q Series MELSECNET/H Network Module | 109, 221 |
| QJ71LP21S-25 | MELSEC-Q Series MELSECNET/H Network Module | 109, 221 |
| QJ71MB91 | MELSEC-Q Series MODBUS®, MODBUS®/ TCP Interface Module | 111, 221 |
| QJ71MES96 | MELSEC-Q Series MES Interface Module | 106, 220 |
| QJ71MT91 | MELSEC-Q Series MODBUS®, MODBUS®/ TCP Interface Module | 111, 221 |
| QJ71NT11B | MELSEC-Q Series MELSECNET/H Network Module | 109, 221 |
| QJ72BR15 | MELSEC-Q Series MELSECNET/H Network Module | 109, 221 |
| QJ72LP25-25 | MELSEC-Q Series MELSECNET/H Network Module | 109, 221 |
| QJ72LP25G | MELSEC-Q Series MELSECNET/H Network Module | 109, 221 |
| QnUDE(H)CPU | MELSEC-Q Series SLMP (MC protocol) | 221 |
| QnUDVCPU | MELSEC-Q Series SLMP (MC protocol) | 221 |
| QS001CPU | MELSEC-QS/WS Series Safety CPU module | 158 |
| QS001CPU(-K) | MELSEC-QS/WS Series CPU Module | 152, 227 |
| QS034B(-K) | MELSEC-QS/WS Series Safety Nain Base Unit | 152, 227 |
| QS061P-A1(-K) | MELSEC-QS/WS Series Safety Power Supply Module | 152, 227 |
| QS061P-A2(-K) | MELSEC-QS/WS Series Safety Power Supply Module | 152, 227 |

# Index

| Model | Product name | Page |
|---|---|---|
| R16CPU | MELSEC iQ-R Series Programmable Controller CPU Module | 30, 44, 45, 206 |
| R16ENCPU | MELSEC iQ-R Series Programmable Controller CPU Module | 30, 44, 45, 206, 228 |
| R16MTCPU | MELSEC iQ-R Series Motion CPU Module | 33, 206 |
| R16PCPU | MELSEC iQ-R Series Process CPU Module | 31, 44, 45, 206 |
| R16SFCPU | MELSEC iQ-R Series Programmable Controller CPU Module | 46, 47 |
| R16SFCPU-SET | MELSEC iQ-R Series Safety CPU | 32, 206 |
| R310B-HT | MELSEC iQ-R Series Base Unit | 34, 207 |
| R310RB | MELSEC iQ-R Series Base Unit | 34, 207 |
| R312B | MELSEC iQ-R Series Base Unit | 34, 207 |
| R32CPU | MELSEC iQ-R Series Programmable Controller CPU Module | 30, 44, 45, 206 |
| R32ENCPU | MELSEC iQ-R Series Programmable Controller CPU Module | 30, 44, 45, 206, 228 |
| R32MTCPU | MELSEC iQ-R Series Motion CPU Module | 33, 206 |
| R32PCPU | MELSEC iQ-R Series Process CPU Module | 31, 44, 45, 206 |
| R32SFCPU | MELSEC iQ-R Series Programmable Controller CPU Module | 46, 47 |
| R32SFCPU-SET | MELSEC iQ-R Series Safety CPU | 32, 206 |
| R32TB | Standard teaching pendant (7m, 15m) | 658 |
| R33TB | Standard teaching pendant (7m, 15m) | 658 |
| R35B | MELSEC iQ-R Series Base Unit | 34, 207 |
| R38B | MELSEC iQ-R Series Base Unit | 34, 207 |
| R38RB-HT | MELSEC iQ-R Series Base Unit | 34, 207 |
| R56TB | High-function teaching pendant (7m, 15m) | 658 |
| R57TB | High-function teaching pendant (7m, 15m) | 658 |
| R60AD16-G | MELSEC iQ-R Series Analog Input/Analog Output | 36, 208 |
| R60AD4 | MELSEC iQ-R Series Analog Input/Analog Output | 36, 208 |
| R60AD8-G | MELSEC iQ-R Series Analog Input/Analog Output | 36, 208 |
| R60ADH4 | MELSEC iQ-R Series Analog Input/Analog Output | 36, 208 |
| R60ADI8 | MELSEC iQ-R Series Analog Input/Analog Output | 36, 208 |
| R60ADV8 | MELSEC iQ-R Series Analog Input/Analog Output | 36, 208 |
| R60DA16-G | MELSEC iQ-R Series Analog Input/Analog Output | 36, 208 |
| R60DA4 | MELSEC iQ-R Series Analog Input/Analog Output | 36, 208 |
| R60DA8-G | MELSEC iQ-R Series Analog Input/Analog Output | 36, 208 |
| R60DAI8 | MELSEC iQ-R Series Analog Input/Analog Output | 36, 208 |
| R60DAV8 | MELSEC iQ-R Series Analog Input/Analog Output | 36, 208 |
| R60RD8-G | MELSEC iQ-R Series Temperature Input Module | 37, 208 |
| R60TCRT4 | MELSEC iQ-R Series Temperature Control Module | 37, 208 |
| R60TCRT4BW | MELSEC iQ-R Series Temperature Control Module | 37, 208 |
| R60TCTRT2TT2 | MELSEC iQ-R Series Temperature Control Module | 37, 208 |
| R60TCTRT2TT2BW | MELSEC iQ-R Series Temperature Control Module | 37, 208 |

| Model | Product name | Page |
|---|---|---|
| R60TD8-G | MELSEC iQ-R Series Temperature Input Module | 37, 208 |
| R610B-HT | MELSEC iQ-R Series Base Unit | 34, 207 |
| R610RB | MELSEC iQ-R Series Base Unit | 34, 207 |
| R612B | MELSEC iQ-R Series Base Unit | 34, 207 |
| R61P | MELSEC iQ-R Series Power Supply Module | 34, 207 |
| R62P | MELSEC iQ-R Series Power Supply Module | 34, 207 |
| R63P | MELSEC iQ-R Series Power Supply Module | 34, 207 |
| R64MTCPU | MELSEC iQ-R Series Motion CPU Module | 33, 206 |
| R64P | MELSEC iQ-R Series Power Supply Module | 34, 207 |
| R64RP | MELSEC iQ-R Series Power Supply Module | 34, 207 |
| R65B | MELSEC iQ-R Series Base Unit | 34, 207 |
| R68B | MELSEC iQ-R Series Base Unit | 34, 207 |
| R68RB-HT | MELSEC iQ-R Series Base Unit | 34, 207 |
| R6DIN1 | MELSEC iQ-R Series Base unit | 207 |
| R6RFM | MELSEC iQ-R Series Redundant Function Module | 31, 206 |
| RC06B | MELSEC iQ-R Series Base unit | 207 |
| RC12B | MELSEC iQ-R Series Base unit | 207 |
| RC30B | MELSEC iQ-R Series Base unit | 207 |
| RC50B | MELSEC iQ-R Series Base unit | 207 |
| RD55UP06-V | MELSEC iQ-R Series C Intelligent Function Module | 40, 208 |
| RD62D2 | MELSEC iQ-R Series High-speed Counter Module | 39, 208 |
| RD62P2E | MELSEC iQ-R Series High-speed Counter Module | 39, 208 |
| RD75D2 | MELSEC iQ-R Series Positioning Module | 39, 208 |
| RD75D4 | MELSEC iQ-R Series Positioning Module | 39, 208 |
| RD75P2 | MELSEC iQ-R Series Positioning Module | 39, 208 |
| RD75P4 | MELSEC iQ-R Series Positioning Module | 39, 208 |
| RD77GF16 | MELSEC iQ-R Series Simple Motion Module | 38, 208, 228 |
| RD77GF4 | MELSEC iQ-R Series Simple Motion Module | 38, 208, 228 |
| RD77GF8 | MELSEC iQ-R Series Simple Motion Module | 38, 208, 228 |
| RD77MS16 | MELSEC iQ-R Series Simple Motion Module | 38, 208 |
| RD77MS2 | MELSEC iQ-R Series Simple Motion Module | 38, 208 |
| RD77MS4 | MELSEC iQ-R Series Simple Motion Module | 38, 208 |
| RD77MS8 | MELSEC iQ-R Series Simple Motion Module | 38, 208 |
| RD81DL96 | MELSEC iQ-R Series High-speed Data Logger Module | 40, 208 |
| RD81MES96 | MELSEC iQ-R Series MES Interface Module | 40, 208 |
| RG60 | MELSEC iQ-R Series Base unit | 207 |
| RH-12FH55XX/M/C | Industrial Robot | 653 |
| RH-12FH70XX/M/C | Industrial Robot | 653 |

# Index

| Model | Product name | Page |
|---|---|---|
| SD-2×N□□□ | DC Operate magnetic Contactors | 878 |
| SD-N□□□ | DC Operate magnetic Contactors | 878 |
| SD-Q□□ | DC Interface Contactors | 880 |
| SD-QR□□ | DC Interface Contactors | 880 |
| SHTA400-05DLS | Circuit Protector | 705, 706 |
| SHTD048-05DLS | Circuit Protector | 705, 706 |
| SL-□ | Magnetic Contactors Open type NonReversing | 861, 862 |
| SL-2×N□□□ | Magnetic Contactor AC closing coil reversing | 879 |
| SLD-□ | Magnetic Contactors Open type NonReversing | 861, 862 |
| SLD-2×N□□□ | Magnetic Contactor DC closing coil reversing | 879 |
| SLD-N□□□ | Magnetic Contactor DC closing coil non-reversing | 879 |
| SLD-T□FN | Magnetic Contactors Open type NonReversing | 861 |
| SL-N□□□ | Magnetic Contactor AC closing coil non-reversing | 879 |
| SL-T□□ | Magnetic Contactor AC closing coil non-reversing | 879 |
| SL-T□FN | Magnetic Contactors Open type NonReversing | 861 |
| S-N□□□ | Magnetic Contactors Open type Non-Reversing | 872, 877 |
| SR-K□ | Contactor Relays Specification | 888 |
| SR-T□ | Contactor Relays Specification | 887 |
| S-T□□ | Magnetic Contactors Open type Non-Reversing | 871, 875 |
| SW0D5C-CNVW-E | MELSOFT iQ Works | 236 |
| SW0D5C-QCTU-E | MELSOFT iQ Works | 236 |
| SW0D5C-QFLU-E | MELSOFT iQ Works | 236 |
| SW0D5C-QTCU-E | MELSOFT iQ Works | 236 |
| SW1D5C-FBDQ-E | Engineering and Programming Software PX Developer | 200, 237 |
| SW1D5C-FBDQ-J | Engineering and Programming Software PX Developer | 200 |
| SW1D5C-FXSSC-E | Engineering and Programming Software FX Configurator-FP | 200 |
| SW1D5C-FXSSC-J | Engineering and Programming Software FX Configurator-FP | 200 |
| SW1D5C-QASU-E | MELSOFT iQ Works | 236 |
| SW1D5C-QMBU-E | MELSOFT iQ Works | 236 |
| SW1D5C-QPTU-E | MELSOFT iQ Works | 236 |
| SW1D5C-QTIU-E | MELSOFT iQ Works | 236 |
| SW1D5-FXENETL-E | Engineering and Programming Software FX3U-ENET-L setup tool | 200 |
| SW1D5-FXENETL-J | Engineering and Programming Software FX3U-ENET-L setup tool | 200 |
| SW1DNC-ACTAND-B | Engineering and Programming Software MX Component for Android™ | 200 |
| SW1DNC-CWSIM-E | CW-Sim | 238 |
| SW1DNC-CWSIM-EZ | CW-Sim | 238 |
| SW1DNC-CWSIMSA-E | CW-Sim | 238 |
| SW1DNC-FBDQMON-E | Engineering and Programming Software PX Developer monitoring tool | 200, 237 |

| Model | Product name | Page |
|---|---|---|
| SW1DNC-FBDQMON-J | Engineering and Programming Software PX Developer monitoring tool | 200, 236 |
| SW1DNC-GTWK3-E | MELSOFT iQ Works | 236 |
| SW1DNC-GXW2-E | Engineering and Programming Software GX Works2 | 200, 236 |
| SW1DNC-GXW2-J | Engineering and Programming Software GX Works2 | 200, 236 |
| SW1DNC-IQWK-E | MELSOFT iQ Works | 263 |
| SW1DNC-MESIF-E | Engineering and Programming Software MX MESInterface | 200, 237 |
| SW1DNC-MESIF-J | Engineering and Programming Software MX MESInterface | 200 |
| SW1DNC-MTW2-E | MELSOFT iQ Works | 236 |
| SW1DND-CWWLQ12-E | CW Workbench | 238 |
| SW1DND-CWWLQ12-EVZ | CW Workbench | 238 |
| SW1DND-CWWLQ12-EZ | CW Workbench | 238 |
| SW1DND-CWWLQ24-E | CW Workbench | 238 |
| SW1DND-CWWLQ24-EVZ | CW Workbench | 238 |
| SW1DND-CWWLQ24-EZ | CW Workbench | 238 |
| SW1DND-GTWK3-□ | HMI/GOT Screen Design Software MELSOFT GT Works3 | 622, 627 |
| SW1DND-GXW2-E | Motion controller software MELSOFT GX Works2 | 263 |
| SW1DND-GXW3-E | Engineering and Programming Software GX Works3 | 200, 210, 236 |
| SW1DND-GXW3-J | Engineering and Programming Software GX Works3 | 200 |
| SW1DND-IQWK-E | MELSOFT iQ Works | 236, 627 |
| SW1DND-MTW2-E | Motion controller software MELSOFT MT Works2 | 263 |
| SW1DND-RCCPU-E | Engineering and Programming Software CW Configurator | 200 |
| SW1DND-RCCPU-J | Engineering and Programming Software CW Configurator | 200 |
| SW1DND-RMESIF-E | Engineering and Programming Software MX MESInterface-R | 200 |
| SW1DND-RMESIF-J | Engineering and Programming Software MX MESInterface-R | 200 |
| SW1DNN-DCUTL-E | Engineering and Programming Software High-speed data communication unit tool | 200 |
| SW1DNN-DCUTL-J | Engineering and Programming Software High-speed data communication unit tool | 200 |
| SW1DNN-DLUTL-E | Engineering and Programming Software Tool for high-speed data logger unit | 200 |
| SW1DNN-DLUTL-J | Engineering and Programming Software Tool for high-speed data logger unit | 200 |
| SW1DNN-LLUTL-M | Engineering and Programming Software CPU unit logging setup tool | 200 |
| SW1DNN-NLUTL-E | Engineering and Programming Software BOX data logger setup tool | 200 |
| SW1DNN-NLUTL-J | Engineering and Programming Software BOX data logger setup tool | 200 |
| SW1DNN-RDLUTL-E | Engineering and Programming Software Tool for high-speed data logger unit | 200 |
| SW1DNN-RDLUTL-J | Engineering and Programming Software Tool for high-speed data logger unit | 200 |
| SW1DNN-VIEWER-M | Engineering and Programming Software GX LogViewer | 200 |
| SW1DNN-WS0ADR-B | Engineering and Programming Software Safety controller setup and monitoring tools | 200, 227 |
| SW1IVD-AD51HP | MELSEC-Q Series Information module | 220 |
| SW1MIC-ACTIOS-B | Engineering and Programming Software MX Component for iOS | 200 |
| SW2D5C-EXP-E | MELSOFT iQ Works | 237 |

# Index

| Model | Product name | Page |
|---|---|---|
| UN-CZ□2 | MS-T/N series Optional Units | 890 |
| UN-CZ□4 | MS-T/N series Optional Units | 890 |
| UN-CZ605 | MS-T/N series Optional Units | 890 |
| UN-FD | Solid State Contactors (Standard Models) | 892, 893 |
| UN-FD□(CX) | MS-T/N series Optional Units | 891 |
| UN-LL□□(CX) | MS-T/N series Optional Units | 890 |
| UN-ML□ | MS-T/N series Optional Units | 891 |
| UN-RM20 | MS-T/N series Optional Units | 891 |
| UN-RR□ | MS-T/N series Optional Units | 891 |
| UN-SA□□ | MS-T/N series Optional Units | 891 |
| UN-SA□□□ | MS-T/N series Optional Units | 891 |
| UN-SA□3 | MS-T/N series Optional Units | 891 |
| UN-SA33 | MS-T/N series Optional Units | 891 |
| UN-SD□ | MS-T/N series Optional Units | 891 |
| UN-SG□ | MS-T/N series Optional Units | 891 |
| UN-SY□□ | MS-T/N series Optional Units | 890 |
| UN-SY□□(CX) | MS-T/N series Optional Units | 890 |
| UN-TH□ | MS-T/N series Optional Units | 891 |
| UN-TL□ | MS-T/N series Optional Units | 891 |
| UN-YD□ | MS-T/N series Optional Units | 891 |
| UN-YG□ | MS-T/N series Optional Units | 891 |
| UN-YY□ | MS-T/N series Optional Units | 891 |
| US-H□□ | Solid State Contactor | 893 |
| US-H□□DD | Solid State Contactor | 893 |
| US-K□□□ | Solid State Contactors (Standard Models) | 893 |
| US-K□□□TE | Solid State Contactors (Standard Models) | 893 |
| US-K70 | Solid State Contactors (Standard Models) | 892 |
| US-KD8 | Solid State Contactor<br>(For Direct Current Load) | 893 |
| US-KH□□□ | Solid State Contactors (Standard Models) | 893 |
| US-KH□□□TE | Solid State Contactors (Standard Models) | 893 |
| US-KH70 | Solid State Contactors (Standard Models) | 892 |
| US-N□□ | Solid State Contactors (Standard Models) | 892 |
| US-N□□NS | Solid State Contactors (Standard Models) | 892 |
| US-N□□NSTE | Solid State Contactors (Standard Models) | 892 |
| US-N□□TE | Solid State Contactors (Standard Models) | 892 |
| US-N□SS | Solid State Contactors (Standard Models) | 892 |
| US-N□SSTE | Solid State Contactors (Standard Models) | 892 |
| US-NH□□NS | Solid State Contactors (Standard Models) | 892 |

| Model | Product name | Page |
|---|---|---|
| US-NH□□NSTE | Solid State Contactors (Standard Models) | 892 |
| UT-2B4 | Motor Circuit Breakers Bus bar | 900 |
| UT-2B5 | Motor Circuit Breakers Bus bar | 900 |
| UT-3B4 | Motor Circuit Breakers Bus bar | 900 |
| UT-3B5 | Motor Circuit Breakers Bus bar | 900 |
| UT-AX□ | MS-T series Optional Units | 889 |
| UT-AX□(BC) | MS-T/N series Optional Units | 890 |
| UT-AX□□ | MS-T series Optional Units | 889 |
| UT-AX□□(BC) | MS-T/N series Optional Units | 890 |
| UT-BT20 | Motor Circuit Breakers Mounting base unit | 900 |
| UT-BT32 | Motor Circuit Breakers Mounting base unit | 900 |
| UT-BT32D | Motor Circuit Breakers Mounting base unit | 900 |
| UT-CV□ | MS-T/N series Optional Units | 890 |
| UT-CV3 | Motor Circuit Breakers<br>Line side terminal adapter kit | 900 |
| UT-CW□ | MS-T/N series Optional Units | 890 |
| UT-EP3 | Motor Circuit Breakers<br>3 phase feed-in terminal | 900 |
| UT-HZ18(BC) | MS-T/N series Optional Units | 891 |
| UT-MAL | Motor Circuit Breakers | 898, 900 |
| UT-MALLL | Motor Circuit Breakers | 898, 900 |
| UT-MAX | Motor Circuit Breakers | 898, 900 |
| UT-MAXLL | Motor Circuit Breakers | 898, 900 |
| UT-ML□□ | MS-T series Optional Units | 889 |
| UT-ML□□(BC) | MS-T/N series Optional Units | 891 |
| UT-MQ12 | Motor Circuit Breakers<br>Connection conductor unit | 900 |
| UT-MT20 | Motor Circuit Breakers<br>Connection conductor unit | 900 |
| UT-MT20D | Motor Circuit Breakers<br>Connection conductor unit | 900 |
| UT-MT32 | Motor Circuit Breakers<br>Connection conductor unit | 900 |
| UT-MT32D | Motor Circuit Breakers<br>Connection conductor unit | 900 |
| UT-RR□ | MS-T/N series Optional Units | 891 |
| UT-RT10 | Motor Circuit Breakers Jointing block unit | 900 |
| UT-RT20 | Motor Circuit Breakers Jointing block unit | 900 |
| UT-RT32 | Motor Circuit Breakers Jointing block unit | 900 |
| UT-SA□□ | MS-T series Optional Units | 889, 891 |
| UT-SA□3 | MS-T/N series Optional Units | 891 |
| UT-SA33□ | MS-T/N series Optional Units | 891 |
| UT-SD□ | MS-T/N series Optional Units | 891 |
| UT-SG□ | MS-T/N series Optional Units | 891 |
| UT-SY□□(BC) | MS-T/N series Optional Units | 890 |

# Index

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