OMRON

GD Series

# IO-Link Master Unit (Multi-Network Compatible)

## User's Manual Common Edition

### GD-ILM□□□-MLP

IO-Link Master Unit

Z512-E1-02

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# Introduction

Thank you for purchasing the IO-Link Master Unit GD-ILM16C-MLP and GD-ILM16E-MLP.
This manual contains essential information for using the IO-Link Master Unit GD-ILM16C-MLP and GD-ILM16E-MLP regardless of the field network type (for the essential information on each field network type, refer to the respective communication section).
Please read this manual and make sure you understand the functionality and performance of the product before you attempt to build a system. After reading the manual, keep it in a safe and accessible location for further reference.

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## Intended Audience

This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent).

- Personnel in charge of introducing FA systems.
- Personnel in charge of designing FA systems.
- Personnel in charge of installing and maintaining FA systems.
- Personnel in charge of managing FA systems and facilities.

## Applicable Products

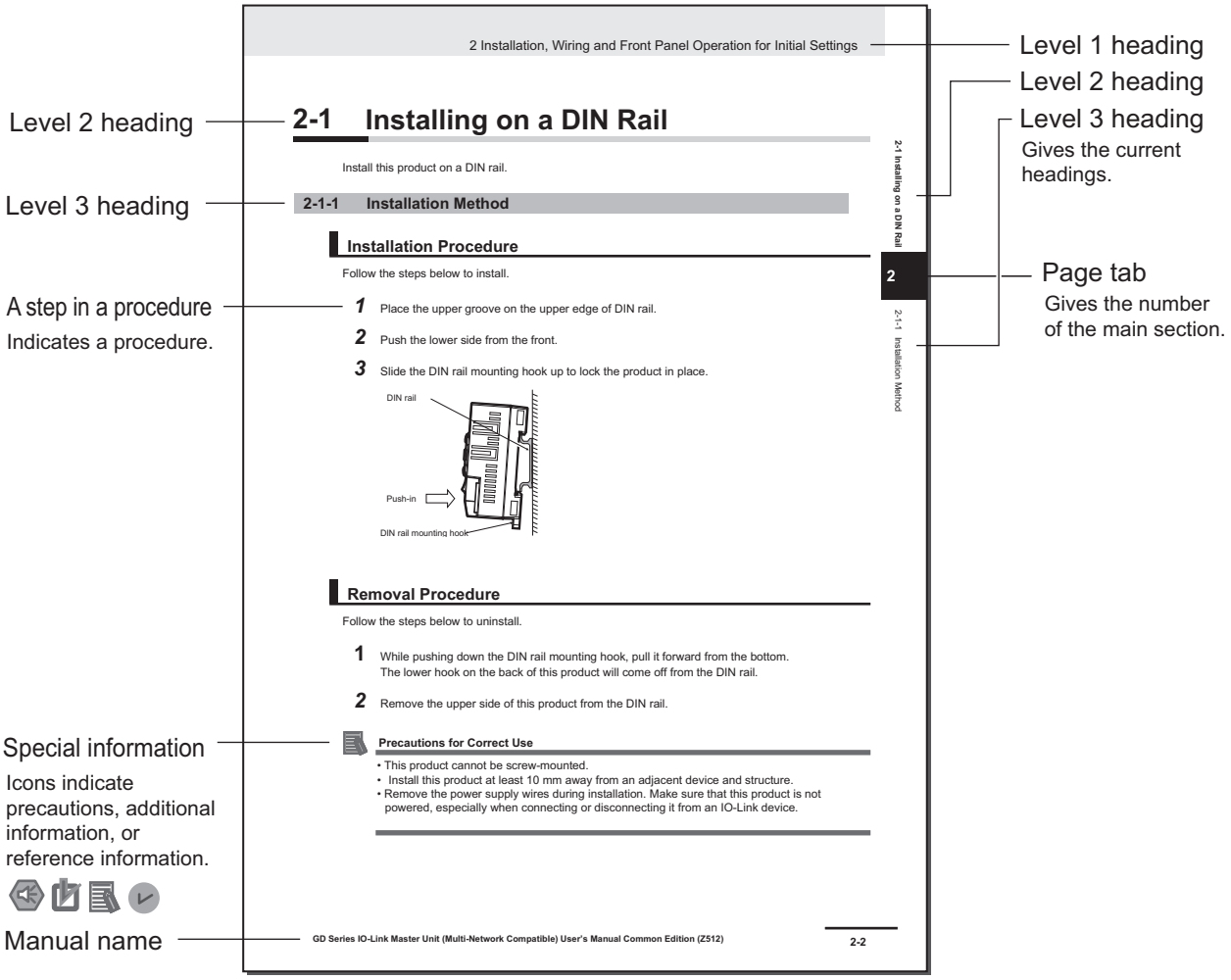
This manual covers the following product.

- GD-series IO-Link Master Unit
  - GD-ILM16C-MLP
  - GD-ILM16E-MLP

# Manual Structure

## Page Structure

The following page structure is used in this manual.




This illustration is provided only as a sample. It may not literally appear in this manual.

## Special Information

Special information in this manual is classified as follows:

**Important**

This summarizes particularly important points about its performance, including the things to be observed during operation and the advice on usage.

**Additional Information**

Additional information to read as required.
This information is provided to increase understanding or make operation easier.

**Version Information**

Information on differences in specifications and functionality for products with different unit versions and for different versions of the Support Software is given.

## Notations Used in this Manual

These are the notations used in this manual.

**Precautions for Correct Use**

This indicates particularly important points to observe during operation.

**Additional Information**

This information is useful for operation.

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## Warranty, Limitations of Liability

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It shall be the users sole responsibility to determine and use adequate measures and checkpoints to satisfy the users particular requirements for (i) antivirus protection, (ii) data input and output, (iii) maintaining a means for reconstruction of lost data, (iv) preventing Omron Products and/or software installed thereon from being infected with computer viruses and (v) protecting Omron Products from unauthorized access.

# Safety Precautions

This manual uses the following symbols to display safety precautions for ensuring safe operation of the IO-Link Master Unit GD-ILM16C-MLP and GD-ILM16E-MLP (hereafter, *this product*).
Precautions listed here describe important information about safety. Make sure to follow them accordingly.

## Definition of Precautionary Information

The indications and their meanings are as follows.

| | |
|---|---|
| ⚠ **WARNING** | Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Additionally, there may be severe property damage. |

## Symbols

| | |
|---|---|
|  | The ○ and slash symbol indicates operations that you must not do.<br>The specific operation is shown in the ○ and explained in text.<br>This example indicates a prohibition of disassembly. |
|  | The ● symbol indicates operations that you must do.<br>The specific operation is shown in the ● and explained in text.<br>This example shows a general precaution for something that you must do. |

## Warning

**⚠ WARNING**

Do not disassemble, repair, modify, deform under pressure, or attempt to incinerate this product. Doing so may cause injury or fire.

**Virus protection**
Install and maintain the latest commercially available antivirus software on computers connected to control systems.

**Prevention of unauthorized access**

To prevent unauthorized access to OMRON products, implement the following measures.

- Introduction of physical controls that allow only authorized users to access control systems and equipment
- Prevention of access from untrusted devices by minimizing network connections to control systems and equipment
- Separation from IT networks through introduction of firewalls (blocking unused communications ports, restricting communications hosts)
- Use of virtual private networks (VPNs) when remote access to control systems and equipment is necessary
- Introduction of multi-factor authentication for remote access to control systems and equipment
- Use and frequent change of strong passwords
- Preliminary virus scanning for use of external storage devices such as USB memory sticks in control systems and equipment

**Protection of I/O data**

Confirm the validity of backup, range check, etc. in case of unintended modification of I/O data to control systems and equipment.

- Data range check
- Validation and preparation of backup and restore processes in case of data tampering or errors
- Safety design such as emergency stop and fallback operation in anticipation of data tampering and errors

**Restoration of lost data**

Periodically back up and maintain setting data as a measure against data loss.

When an intranet environment is used via a global address, connecting to an unauthorized terminal or server, such as SCADA or HMI, may result in network security issues such as spoofing or tampering. Take adequate measures on your own, such as restricting access to terminals, using terminals with secure functions, and locking the installation area.

When building an intranet, communications problems may occur due to cable disconnection or unauthorized network equipment.
Take adequate measures to restrict physical access to network equipment, for example, by locking the installation area.

Equipment with SD Memory Card functionality poses a security risk that a third party may remove or illegally unmount removable media to illegally acquire, tamper with, or replace files and data contained in them.
Take adequate measures on your own to restrict physical access to the Controller, for example, by locking the installation area, controlling entry to the room, or taking appropriate control measures for the removable media.

**Security Measures for Wave Inspire HUB**

- To prevent computer viruses, install antivirus software on a computer where you use this software.
  Make sure to keep the antivirus software updated.
- Keep your computer's OS updated to avoid security risks caused by a vulnerability in the OS.
  Make sure that the user name and password for the OS or this software are properly set and managed to prevent unauthorized use by others.
- Always use the highest version of this software to add new features, increase operability, and enhance security.
- Set up a firewall (e.g., disabling unused communication ports, limiting communication hosts, etc.) on a network for a control system and devices to separate them from other IT networks.
- Use a virtual private network (VPN) for remote access to a control system and devices from this software.

# Precautions for Safe Use

- Do not install this product or its cables in any of the following locations. Doing so may cause a fire, damage, or a malfunction.
  a) Locations where dust, salt, iron powders, or vapor (steam) is present.
  b) Locations subjected to corrosive gases, flammable gases, or explosive atmospheres.
  c) Locations where water, oil, or chemical splashes may occur.
  d) Locations where heavy vibrations or impacts may occur.
  e) Locations where the ambient temperature exceeds the rated range.
  f) Locations subject to rapid temperature changes (or where condensation occurs).
  g) Locations with strong electric or magnetic fields.
  h) Outdoor locations or locations subject to direct light.
- Field network communication is shut off
  The process output data is held or cleared according to the *IO-Link and network error handling* of the Master Unit parameters in this product. It also holds or turns off PNP/NPN output data. At this time, take safety measures outside this product so that the system works on the safe side.
- After IO-Link communication has been shut off
  If the IO-Link communication fails, the process input data is held or cleared according to the *IO-Link and network error handling* of the Master Unit parameters in this product. At this time, take safety measures outside this product so that the system works on the safe side.
- Do not use the product at voltages or with AC power supplies that exceed the rated voltage. Doing so may cause a fire or damage the product.
- If you detect any malfunction including emission of smoke, abnormal smells or sounds, or the body becoming very hot, immediately stop operating the product and turn off the power. Failure to do so can cause fire.
- Do not connect an actuator that does not support IO-Link to the port of this product set to IO-Link mode.
  Depending on the operation of establishing IO-Link communication, the actuator may repeat ON/OFF operation with an unintended short cycle.

# Precautions for Correct Use

- Do not use this product in water or in a location where it may be exposed to water. If water enters the product, immediately stop operating the product. Doing so may cause a fire or damage the product.
- When wiring this product, do so properly according to this manual and specified user's manuals. Incorrect wiring can cause product failure or malfunction.
- Use this product mounted on a DIN rail secured with the end plates (PFP-M) sold separately.
- Connect only specified cables to this product. Use of cables other than those specified can cause malfunction.
- If you notice an abnormal condition such as a strange odor, extreme heating of the unit, or smoke, immediately stop using the product, turn off the power, and consult your dealer.
- Make sure to attach the protective cap when the RJ45 connector of this product is not attached to a cable. When removing the RJ45 connector, do not touch the terminals inside the connector or allow foreign objects to get inside.
- Keep wiring separate from high voltage and motor circuits. Using the same wiring can cause malfunction or failure. If this is unavoidable, shield with a conductor such as an earthed conduit.
- Install this product as far away as possible from high-voltage equipment, equipment that generates large switching surges and equipment that generates noise, such as welding machines or inverter motors.
- Tighten the mounting screws for the power terminal block with a torque value of 0.25 N•m or less.
- Do not apply torsional stress to cables. Doing so can cause cables and connectors to malfunction. Fix communication cables connected to this product within lengths of 30 cm without applying stress to the product.
- Make sure to turn OFF the power before connecting or disconnecting cables and connectors, or replacing IO-Link devices. Connection or disconnection while running can cause malfunction.
- This product generates heat during operation, so do not maintain physical contact for long periods of time. Doing so can cause low-temperature burns, etc.
- Always hold the connector when connecting or disconnecting cables and do not apply excessive force to cables.
- When using power cables or commercially available switching regulators, make sure the frame ground (FG) is grounded.
- Make sure to use an isolation transformer for DC power supply. If a surge occurs in the power supply used, use a surge absorber for the source of generation.
-  Dispose in accordance with applicable regulations.
- Do not use this product in environments other than industrial environments. If used in other environments, it may cause induction and radiation interference.
- When the program in the host master station processes the process input data in IO-Link mode, make sure to confirm that the IO-Link Ready flag is ON before executing the program.
- Wait until after transient state (approx. 2 sec.) when power is turned ON before use.
- Do not exceed 1,000,000 writing operations of the EEPROM (non-volatile memory). Setting information is written to the EEPROM when setting changes are made.

# Regulations and Standards

## Conformance to EU Directives

This IO-Link Master Unit complies with EN61131-2.

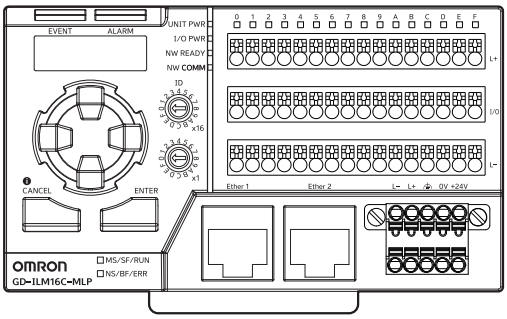
The GD-series products comply with EU Directives. To ensure that the machine or device in which the GD-series products are used complies with EU Directives, the following precautions must be observed.

- You must use SELV and LIM circuits or UL 1310 Class 2 power supplies for the DC power supplies that are connected as the unit/input power supplies and output power supplies for the GD-series products. We recommend that you use the OMRON S8VK-S/S8VK-G-series Power Supplies.
- GD-series products that comply with EU Directives also conform to the Common Emission Standard. Radiated emission characteristics (10-m regulations) may vary depending on the configuration of the control panel used, other devices connected to the control panel, wiring, and other conditions. You must therefore confirm that the overall machine or equipment in which the GD-series products are used complies with EU Directives.

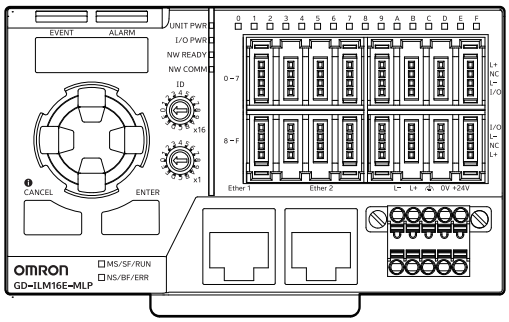
# Checking the Included Items

Before you use this product, check the items included with it. If there are any defective or damaged items, please contact OMRON or your local distributor.

## Product Packaging




● GD-ILM16C-MLP unit




● GD-ILM16E-MLP unit

- Device terminal block x 3 (for GD-ILM16C-MLP only)
- Power terminal block
- RJ45 connector protective cap x 2 (attached to unit)
- Instruction Manual
- Compliance sheet

*1. If the terminal block is lost or damaged, order the following model.
Device terminal block: GD-ILM16C-XP (contains 1)
Power terminal block: GD-ILM16-XV

## Other Required Items

### Cables

This product uses the following cables.

| Type | Specifications |
|---|---|
| Ethernet cable | Ethernet cables that fulfill the following specifications<br>• Connector: RJ45 plug connector<br>• Cable: Use an Ethernet cable of category 5 or above that complies with a standard (1000BASE-T, 100BASE-TX, 10BASE-T).<br>Refer to the manual for Product Communication Edition according to the field network type.<br>For details, refer to the user's manual of each field network master. |

### Switching Hub

The usable switching hubs depend on the communication type of the field network.
Refer to the manual for Product Communication Edition according to the field network type.

# Related Manuals

Manuals related to this manual are as follows. Reference them as needed.

| Manual number | Manual name | Details |
|---|---|---|
| Z514 | GD Series IO-Link Master Unit (Multi-Network Compatible) User's Manual EtherNet/IP Edition | Describes common functions and performance as well as operation when using *EtherNet/IP* as the field network.<br>Be sure to read this when using cyclic or acyclic communication via EtherNet/IP. |
| Z516 | GD Series IO-Link Master Unit (Multi-Network Compatible) User's Manual Ethernet & Modbus/TCP Edition | Describes common functions and performance as well as operation when using *Ethernet & Modbus/TCP* as the field network.<br>Be sure to read this when using Modbus/TCP communication or Ethernet socket communication. |
| Z517 | GD Series IO-Link Master Unit (Multi-Network Compatible) User's Manual CC-Link IE Field Basic Edition | Describes common functions and performance as well as operation when using *CC-Link IE Field Basic* as the field network.<br>Be sure to read this when using cyclic communication via CC-Link IE Field Basic. |
| Z518 | GD Series Wave Inspire HUB Operation Manual | Provides necessary information for operating OMRON Support Software (Wave Inspire HUB) for the GD Series. |

# Terminology

This explains the terminology used in this document.

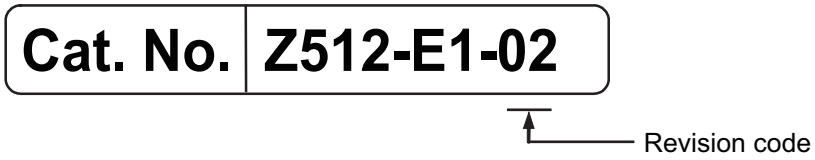
| Terminology | Description |
|---|---|
| IO-Link Master Unit | This is OMRON's IO-Link Master Unit that supports various field network communications.<br>This device performs IO-Link communication with IO-Link devices in an IO-Link system, and also operates as a local station of field network.<br>This is referred to as *this product* within this document. |
| IO-Link device | This is an I/O device, such as a sensor or actuator, that can perform IO-Link communication with the IO-Link Master Unit. |
| SIO device | This is an I/O device that does not support IO-Link communication. |
| I/O assignment settings | Specifies IO-Link communication or digital input/output with an external device (IO-Link device or SIO device) connected to IO-Link Master Unit (this product). The following can be selected for each device to be connected.<br>• Mode IO-Link<br>• Input mode PNP<br>• Input mode NPN<br>• Output mode PNP<br>• Output mode NPN<br>• Not used<br>**Note** For this product, IO-LinkPin2PNP as per the specifications. |
| Process I/O communication | For IO-Link communication, cyclic communication will be used for requests from the IO-Link Master Unit to IO-Link devices. |
| ISDU handling | For IO-Link communication, acyclic communication will be used for requests from the IO-Link Master Unit to IO-Link devices. |
| Event communication | For IO-Link communication, acyclic communication will be used for notifications from IO-Link devices to the IO-Link Master Unit. When an event occurs on any IO-Link device, the event flag and up to the latest 6 event types/event codes of the IO-Link device on each port are displayed in the *Event data read* of the Master Unit parameters of this product. |
| Cycle time | This describes the IO-Link communication cycle time. |
| Process input data | For IO-Link communication process I/O communication, cyclic data transmission will be used for data from IO-Link devices to the IO-Link Master Unit. |
| Process output data | For IO-Link communication process I/O communication, cyclic data transmission will be used for data from the IO-Link Master Unit to IO-Link devices. |
| Port | Port for connecting external devices to the IO-Link Master Unit (this product)<br>Numbers from 0 to F (hexadecimal) are preassigned. |
| Master Unit parameters | Data of this product that can be read and written by operating the controls on the front of this product, acyclic communication on the field network, or extended access in cyclic communication. |
| Process data | Data of the IO-Link device that can be read and written using IO-Link process I/O communication.<br>General name for process input data or process output data. |
| Service data | Data of the IO-Link device that can be read and written using IO-Link ISDU handling (acyclic). |
| Events | Shows events that occur within the IO-Link device. There are 3 types: notifications, errors and warnings. |
| Event code | Each IO-Link device event has an associated event (notification, error, warning) code.<br>When the event flag turns ON, the event code is read by executing the acyclic communication program on the field network master. Alternatively, the event code can be checked using the event/error display window on the front of the product. |
| Errors | Refers to errors with this product. When an error occurs, the error code and the specified index number and sub-index number that caused the error are stored in the *Latest error code for each port readout* field of the product's Master Unit parameters. |

| Terminology | Description |
|---|---|
| Error code | Error codes detected by the IO-Link Master Unit (this product).<br>If the error flag is ON, the field network master can execute a acyclic communication program to read the error code. The error code can be checked using the event/error display on the front of the product. |
| IO-Link ready flag | One type of process input data. A flag that turns ON when communicating with IO-Link devices on all connection ports and when field network communication with the field network master is established. |
| Event flag | One type of process input data. A flag that turns ON when an event occurs on one or more IO-Link devices.<br>The latest port in which the event occurred is stored in the latest event port. |
| Error flag | One type of process input data. A flag that turns ON when an error occurs on one or more IO-Link devices.<br>The latest port in which the error occurred is stored in the latest error port. |
| Extended access | A communication method that allows the cyclic communication area to be used (without using acyclic communication) to read and write parameters.<br>The following can be accessed.<br>• Any service data in any connected IO-Link device<br>• Product Master Unit parameters |
| Byte length or target selection to access | Specify the target to access when extended access is enabled.<br>• Connected device of any port or Master Unit parameter of this product (specify the data size to be read and written at this time). |
| I/O synchronization | Synchronizes multiple port IO-Link communication or digital I/O transfer. |
| Process data sequence conversion | Converts the IO-Link device process data to little endian format or big endian format and transfers it to the field network. Specify for each port. |
| Little endian format | One of the methods of arranging data in bytes, in which data is arranged in reverse order from the lowest-order byte. |
| Big endian format | One of the methods of arranging data in bytes, in which the data is arranged in order from the highest-order byte. |
| Device validation | With IO-Link communication, process data is transferred only when the IO-Link device has the same registered revision ID, type ID, serial number, or model name. Specify for each port. |
| Revision ID | IO-Link protocol version implemented on the IO-Link device. |
| Device ID | The ID that identifies the type. A generic term for vendor ID and device ID. |
| Vendor ID | ID that identifies the manufacturer of the IO-Link device. |
| Device ID | ID that identifies the type of the IO-Link device (consisting of one or more types). |
| IO-Link communication and network error handling | When the field network communication shuts down, IO-Link process output data is retained or cleared to zero. It also holds or turns off PNP/NPN output data.<br>When IO-Link communication shuts down, IO-Link process input data is retained or cleared to zero. This provides a fail-safe. Set for each IO-Link port. |
| Input hold time | Holds ON for the specified time after the input signal turns ON. Specify for each port. |
| Input filter time | Configures the filter that removes input signal noise. Specify for each port. |
| Manual backup/restore of settings | Manually backs up/restores the parameters in the device. Specify for each port. |
| Automatic storage (backup/restore) of settings | Automatically backs up/restores the parameters in the device. Specify for each port. |
| Storage data | If the IO-Link device supports the data storage function, this is the parameter in the IO-Link device that can be backed up to or restored from this product. |

| Terminology | Description |
|---|---|
| Wave Inspire HUB | This is OMRON's free Support Software that allows you to change settings and monitor process data for this product and connected IO-Link devices via Ethernet communication.<br>It enables automatic collection of IODD files, managing setting information as projects, bulk writing of settings, and visualization of measured values and judgment results, and more. |

# Revision History

A manual revision code appears as a suffix to the catalog number on the front and back covers of the manual.




| Revision code | Date | Revised content |
|---|---|---|
| 01 | February 2026 | Original production |
| 02 | March 2026 | Corrected mistakes. |

# 1



# Overview

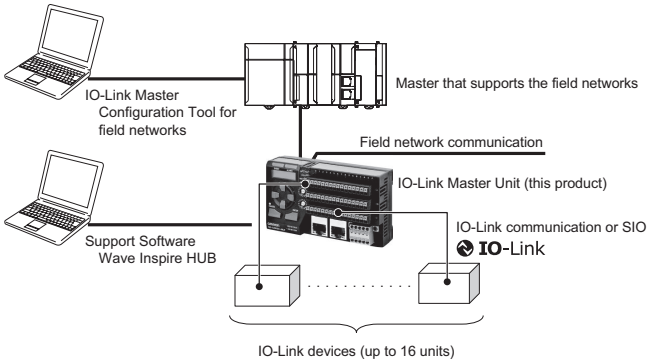
This section describes an overview of the IO-Link Master Unit (hereafter referred to as *this product*).

# 1-1 Product Overview

This product is an IO-Link Master Unit equipped with the field network communication function.
This communicates in an upper network with a field network master that supports a field network, and simultaneously performs IO-Link process data communication with the connected IO-Link devices.
Depending on the network type, it is also capable of receiving communication messages from the master that supports field network communication, with IO-Link ISDU handling, and reading/writing service data in the IO-Link device when necessary.

It can also be used to check and change settings, check process data, and check events using the front panel controls.
Moreover, using OMRON Support Software Wave Inspire HUB for free, it is possible to change settings and monitor process data for this product and connected IO-Link devices via Ethernet communication.

## Structure Example of Field Network and IO-Link System




## Features

- The field network can be switched among the followings in the setting menu.
  a) EtherNet/IP (default value)
  b) Ethernet & Modbus/TCP
  c) CC-Link IE Field Basic
- No. of IO-Link port: Up to 16
- NPN device connection is possible with SIO. Mixed connection of NPN devices and PNP devices is possible. Moreover, the output is equipped with an overcurrent protection circuit.
- IO-Link communication can be processed with independent hardware logics to achieve the fastest cycle time of the specifications, 0.3 ms.
- A time stamp can also be added to the process input data. As a result, it is possible to read the time when the process input data was taken from this product, as being with the network time, at a resolution of 15.26 µs.
  Additionally, adding parity information calculated from process input data and time information, it is possible to ensure the integrity of process input data and time (data integrity: DI).

Also, time data read from parameters of IO-Link devices can be stored in this product, and then can be read by a master PLC.

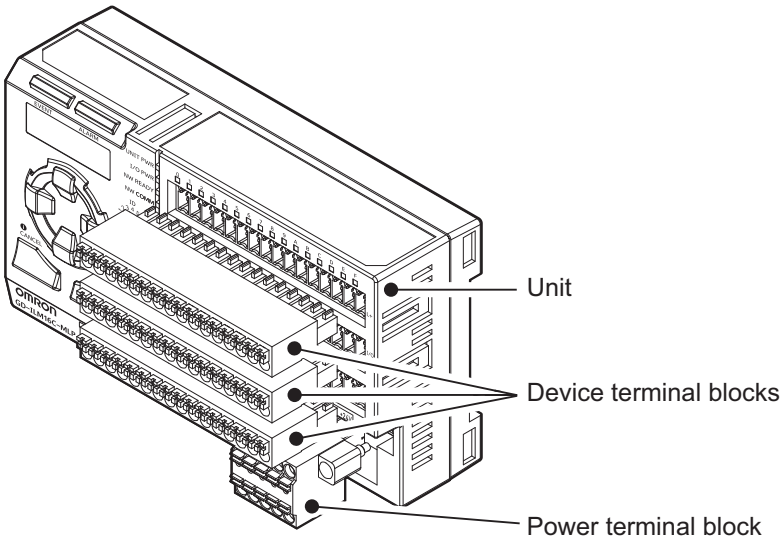
- It is possible to connect the rotary encoder as an SIO device to this product and send the current value of the high-speed counter to the field network master on the process data side.
- The OLED display and operation keys enable the following actions on the front panel:
  a) Master Unit parameter setting
  b) I/O assignment status monitoring
  c) Display in multiple languages is supported. (English, French, German, Italian, Japanese, Korean, Portuguese, Simplified Chinese, Spanish, Traditional Chinese)
- The type ID (vendor ID and device ID) of the IO-Link device can be saved in the unit, enabling the device connection and configuration to be verified. Furthermore, the serial number and model name can be referred.
- The IO-Link device settings can also be saved (as backups) on this product enabling device settings that are saved prior to device replacement to be uploaded (restored) from this product to the replaced IO-Link device (both automatic and manual methods are available).

# 1-2 Part Names and Functions

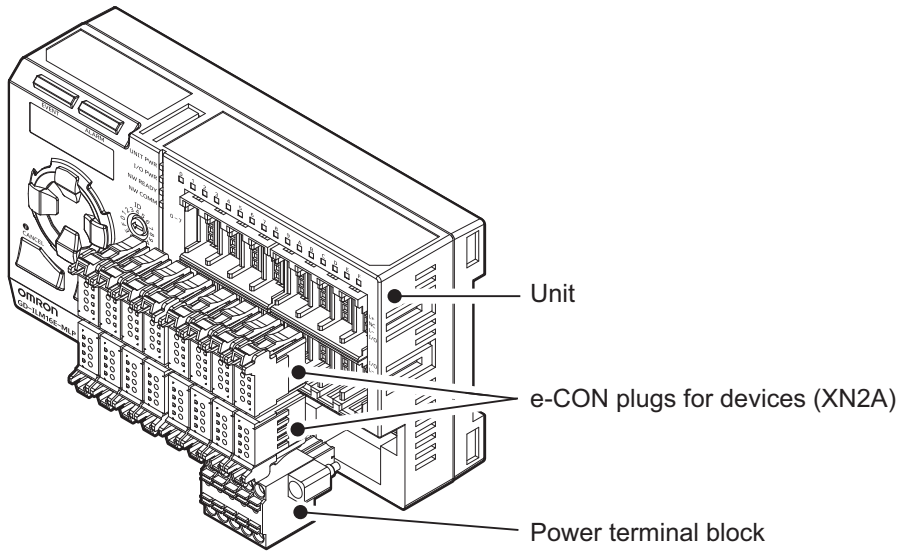
## 1-2-1 Prior to Use

Assemble the included device terminal blocks (three pieces) and power terminal block (one piece) to the main unit as shown below.

**Note** For the GD-ILM16E-MLP devices, purchase OMRON e-CON plugs (XN2A) separately as it is not included.



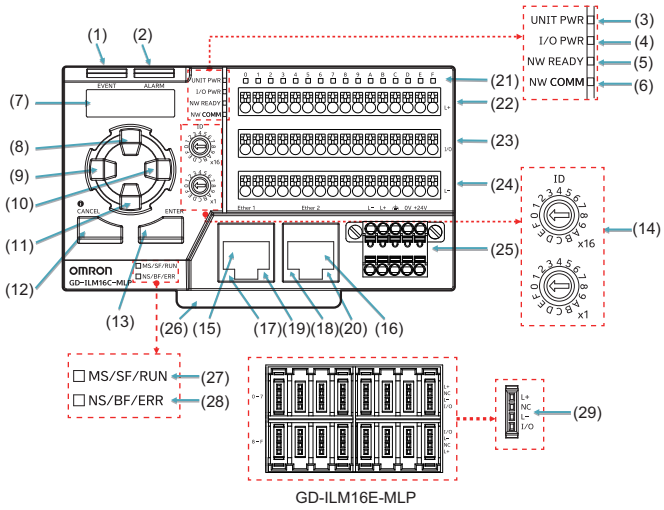

GD-ILM16C-MLP




GD-ILM16E-MLP

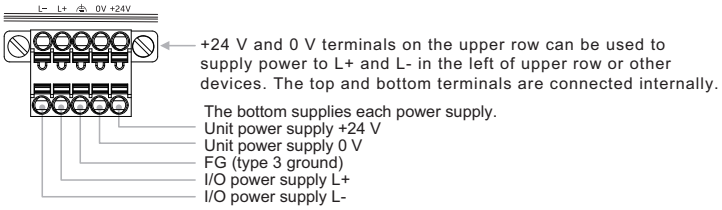
## 1-2-2 Part Names and Functions

The names and functions of each part after assembling the terminal blocks are as follows.




| No. | Name | Details |
|---|---|---|
| (1) | EVENT LED (yellow) | Blinks while an event is occurring on one of the connected IO-Link devices.<br>At this time, the *event flag* is turned ON. For details about *event flags*, refer to the *Cyclic Communication* section. |
| (2) | ALARM LED (Red) | Blinks while this product is detecting an error. At this time, the *error flag* is turned ON. For details about *error flags*, refer to the *Cyclic Communication* section. |
| (3) | UNIT PWR LED (Blue-green) | Indicates the status of the unit power supply of this machine.<br>Illuminated: Power on<br>Off: Power off or unit power supply voltage drop. |
| (4) | I/O PWR LED (Blue-green) | Indicates the power supply status of the I/O power supply.<br>Illuminated: I/O power supply available (17 V or higher)<br>Blinking: I/O voltage is in the range of 10 - 17 V.<br>Off: No I/O power supply, or I/O voltage drop (less than 10 V). |
| (5) | NW READY LED (Blue-green) | Lights when the internal IC of the field network starts up. |
| (6) | NW COMM LED (Blue-green) | Displays the status of the field network communication.<br>Illuminated: Normal communication<br>Blinking: Communication interruption<br>Off: Not communicating |
| (7) | Display | A display for showing various information.<br>The display will turn off automatically after 10 minutes of inactivity.<br>Press any key to resume the display.<br>If the cumulative display drive time is 100 hours or less, automatic shut off of the display is not activated. |
| (8) | ↑ key | Press at the following times.<br>• To switch menu<br>• To increase parameters<br>• To switch to previous setting item<br>• To switch the process data being displayed |
| (9) | ← key | Press at the following times.<br>• To switch to the previous port<br>• Move the digit of the parameter to be changed to the left |

| No. | Name | Details |
|---|---|---|
| (10) | → key | Press at the following times.<br>• To switch to the next port<br>• Move the digit of the parameter to be changed to the right |
| (11) | ↓ key | Press at the following times.<br>• To switch menu<br>• To decrease parameters<br>• To switch to next setting item<br>• To switch the process data being displayed |
| (12) | ⓘ/CANCEL key | Press at the following times.<br>• To show help<br>• Batch display of I/O assignment<br>• Canceling parameter changes |
| (13) | **ENTER** key | Press at the following times.<br>• Entering the parameter change mode<br>• Confirming parameter changes<br>• Clearing errors or events<br>• Selecting menus and confirming |
| (14) | Last octet setting switches for this product's IP address | Sets the last octet of the IP address value (the "n" in 192.168.250.n). Multiply the value of the upper switch by 16, then add it to the value of lower switch. |
| (15) | Ethernet connector Ether1 | Ether1 and Ether2 connectors (RJ45 connector) for the field network connection. Connect the Ethernet cable. |
| (16) | Ethernet connector Ether2 | |
| (17) | LINK LED (green) | Lights when the Ethernet connection is enabled. |
| (18) | LINK LED (green) | |
| (19) | DATA LED (yellow) | Lights when data is being sent/received via Ethernet. |
| (20) | DATA LED (yellow) | |
| (21) | 0 - F LED (orange) | Indicates the ON/OFF status of the inputs or outputs.<br>During IO-Link communication, the ON/OFF status of the least significant bit of the BOOL type data specified in the process input data or the same bit of the process output data is displayed (*1).<br>Blinks if the PNP or NPN output is in an overcurrent state.<br>*1. The contents of the process input data format with index number 14 and the process output data format with index number 15 in the IO-Link device are read, interpreted, and displayed. |
| (22) | Device terminal block (L+) | Supplies 24 VDC to I/O devices.<br>The (25) terminal block I/O power supply L+ is connected internally. |
| (23) | Device terminal block (I/O) | Connects the signal to the I/O device. |
| (24) | Device terminal block (L-) | Connects 0 V to I/O devices.<br>The (25) terminal block I/O power supply L- is connected internally. |

| No. | Name | Details |
|---|---|---|
| (25) | Power terminal block (0, +24 V) | Supply the unit power supply (+24 V, 0 V), FG, and the I/O power supply (L+, L-).<br>  |
| (26) | DIN rail mounting hook | The part where the lower hook on the back of this product slides for attaching/removing the product to/from the DIN rail. |
| (27) | MS/SF/RUN | Displays the field network status. |
| (28) | NS/BF/ERR | |
| (29) | e-CON socket for device (4 poles) | L+: Supplies 24 VDC to input/output devices. The (25) terminal block I/O power supply L+ is connected internally.<br>L-: Supplies 0 V to input/output devices. The (25) terminal block I/O power supply L- is connected internally.<br>I/O: Supplies signals to input/output devices. |

# 1-3 Basic Procedures

The process from installing and setting this product through establishment of field network and IO-Link communication is described below.

| Procedure | Details | | References |
|---|---|---|---|
| Prior confirmation | System configuration decision:<br>• IO-Link device or SIO device types and number used<br>• I/O assignment settings<br>• Allocating process data by initial value, automatically allocating from the actual IO-Link device or manually setting the number of input/output words of the IO-Link device for each port | | *1-1 Product Overview* on page 1-2<br>*Section 4 Product Functions* on page 4-1 |
| | • Data I/O design | Depends on field network types | Communication manual of field network selected on this product |
| | • Selection of filed network connection | | |
| | • Preparing the field network connection cable and switching hub | | |
| | • Assignment and setting of the last octet of field network's IP address on this product | | |
| Hardware installation and wiring | Installing the field network master | | Manual of field network master |
| | Assemble the included device terminal blocks (three pieces) and power terminal block (one piece) to the main unit | | *1-2 Part Names and Functions* on page 1-4 |
| | Installing on a DIN Rail | | *2-1 Installing on a DIN Rail* on page 2-2 |
| | Setting the address of this product on the network (Depending on the field network) | | Communication manual of field network selected on this product |
| | Connection of Ethernet cable for field network | | Communication manual of field network selected on this product |
| | Wiring to IO-Link connection terminals | | *2-3-2 Unit Power and I/O Power Supply Connections* on page 2-6 |
| | Connection of unit power supply | | *2-3-2 Unit Power and I/O Power Supply Connections* on page 2-6 |
| Initial setting of this product | Turn-on of the unit power | | *2-4 Initial Settings through Front Panel Operations* on page 2-13 |
| | Language selection | | |
| | Network type setting | | |
| | I/O Assignment Settings | | |
| Operation to communicate with the field network master | Confirming that the **Network Type** is set to the used filed network | | Communication manual of field network selected on this product |
| | (When necessary) Installing profiles for the field network on this product | Depends on field network types | Communication manual of field network selected on this product<br>Manual of field network master<br>Manual of the configuration software for the field network |
| | Creating communication settings or communication programs | | |
| | (When necessary) Download communication settings to network master | | |

| Procedure | Details | References |
|---|---|---|
| Product parameter setting | In case of front panel operations on this product | *5-1-3 Master Unit Parameter Display* on page 5-5<br>*5-1-4 Master Unit Parameter List with Product Front Panel Operations* on page 5-6 |
| | Setting with OMRON Support Software Wave Inspire HUB | Wave Inspire HUB Operation Manual |
| | (As required) Setting by the communication programs on a field network master | Communication manual for the field network type selected on this product |
| IO-Link device parameter setting | In case of front panel operations on this product | *5-1-5 Device Identification Display* on page 5-18 |
| | Setting with OMRON Support Software Wave Inspire HUB | Wave Inspire HUB Operation Manual |
| | (As required) Setting by the communication programs on a field network master | Communication manual for the field network type selected on this product |
| Starting communication | Start system (power ON) | |
| | Starting a field network<br>Starting IO-Link communication | Manual of field network master<br>*5-1-2 Process Data Display* on page 5-3 |
| Checking operation | Check of display of IO-Link devices on field network master and this product | Manual of field network master<br>Each IO-Link device manual |
| | Check of read and write data by a field network master | Manual of field network master |
| | Check of read and write of process data between this product and IO-Link devices | Each IO-Link device manual |
| | Check of read and write data by communication between this product and field network master | Manual of field network master |
| | (When necessary) Execution of communication programs on PLC for read and write between this product and IO-Link devices | Communication manual of field network selected on this product |
| Troubleshooting | Check of display of IO-Link devices and communication response on a field network master and this product | *Section 7 Troubleshooting* on page 7-1<br>Communication manual of field network selected on this product |

**Precautions for Correct Use**

While the IO-Link ready flag is ON, perform read and write of process data.

# 2

# Installation, Wiring and Front Panel Operation for Initial Settings



Describes initial settings for this product's installation, the last octet value of this product's IP address, communication connection, power supply wiring, and front panel operation.

# 2-1 Installing on a DIN Rail

Install this product on a DIN rail.

**Additional Information**

- This product cannot be screw-mounted.
- Install this product at least 10 mm away from an adjacent device and structure.
- Remove the power supply wires during installation. Make sure that this product is not powered, especially when connecting or disconnecting it from an IO-Link device.

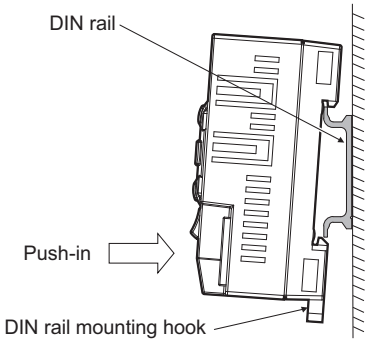
## Installation Procedure

Follow the steps below to install.

***1*** Place the upper groove on the upper edge of DIN rail.

***2*** Push the lower side from the front.

***3*** Slide the DIN rail mounting hook up to lock the product in place.




## Removal Procedure

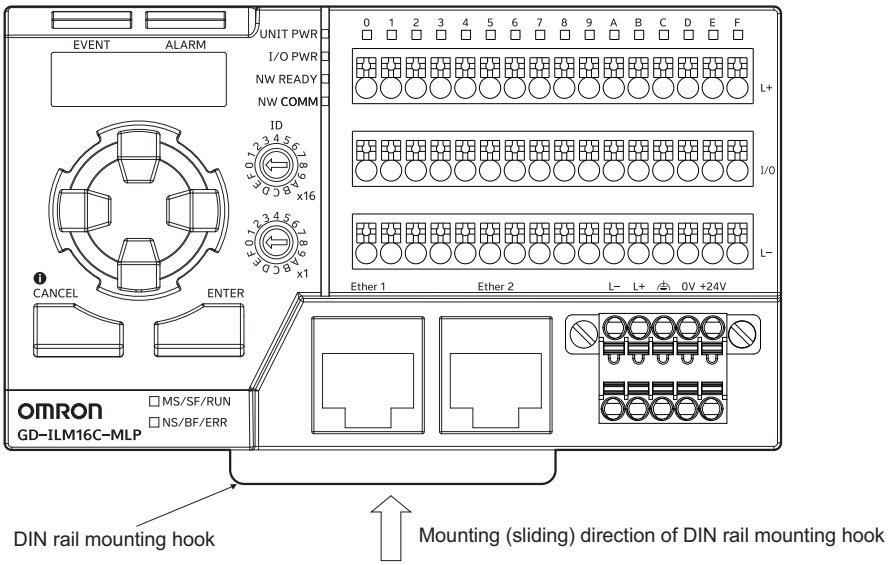
Follow the steps below to uninstall.

***1*** While pushing down the DIN rail mounting hook, pull it forward from the bottom.
The lower hook on the back of this product will come off from the DIN rail.

***2*** Remove the upper side of this product from the DIN rail.

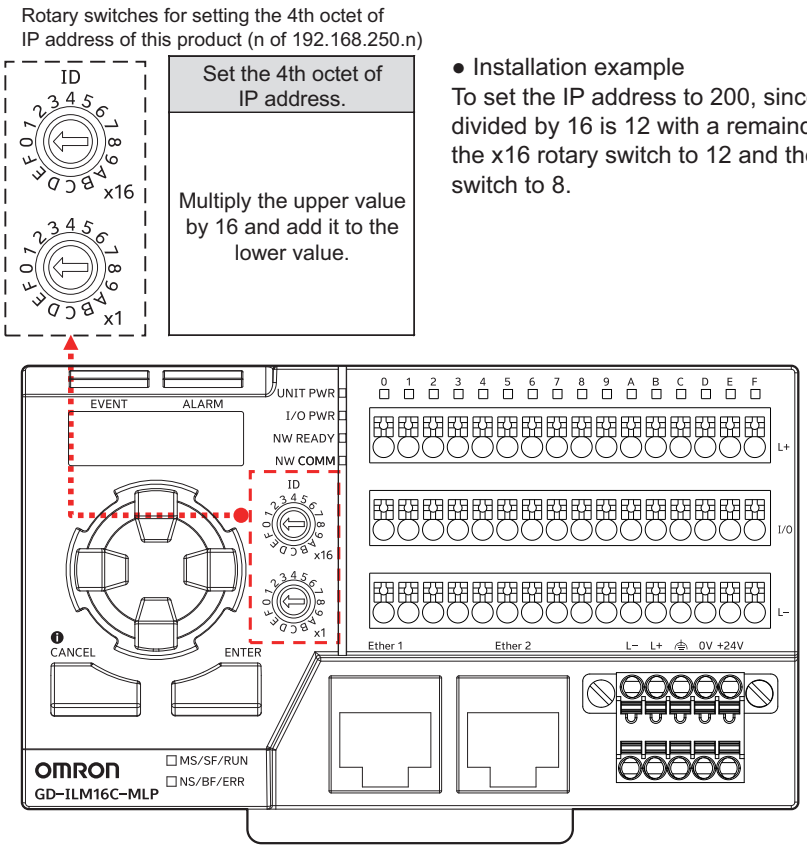
Important

- What to do if the DIN rail mounting hook comes off
  If the DIN rail mounting hook comes off when removing this product, slide it back into place from the bottom to restore it its original state.


EVENT
ALARM
UNIT PWR
I/O PWR
NW READY
NW COMM
ID
x16
x1
CANCEL
ENTER
0 1 2 3 4 5 6 7 8 9 A B C D E F
L+
I/O
L−
Ether 1
Ether 2
L− L+ 0V +24V
OMRON
GD−ILM16C−MLP
MS/SF/RUN
NS/BF/ERR
DIN rail mounting hook
Mounting (sliding) direction of DIN rail mounting hook

# 2-2 Setting Last Octet for This Product's IP Address

When the upper 3 octets of network IP address are *192.168.250.*, set the last octet of this product on the rotary switches on the front panel, before turning power on.



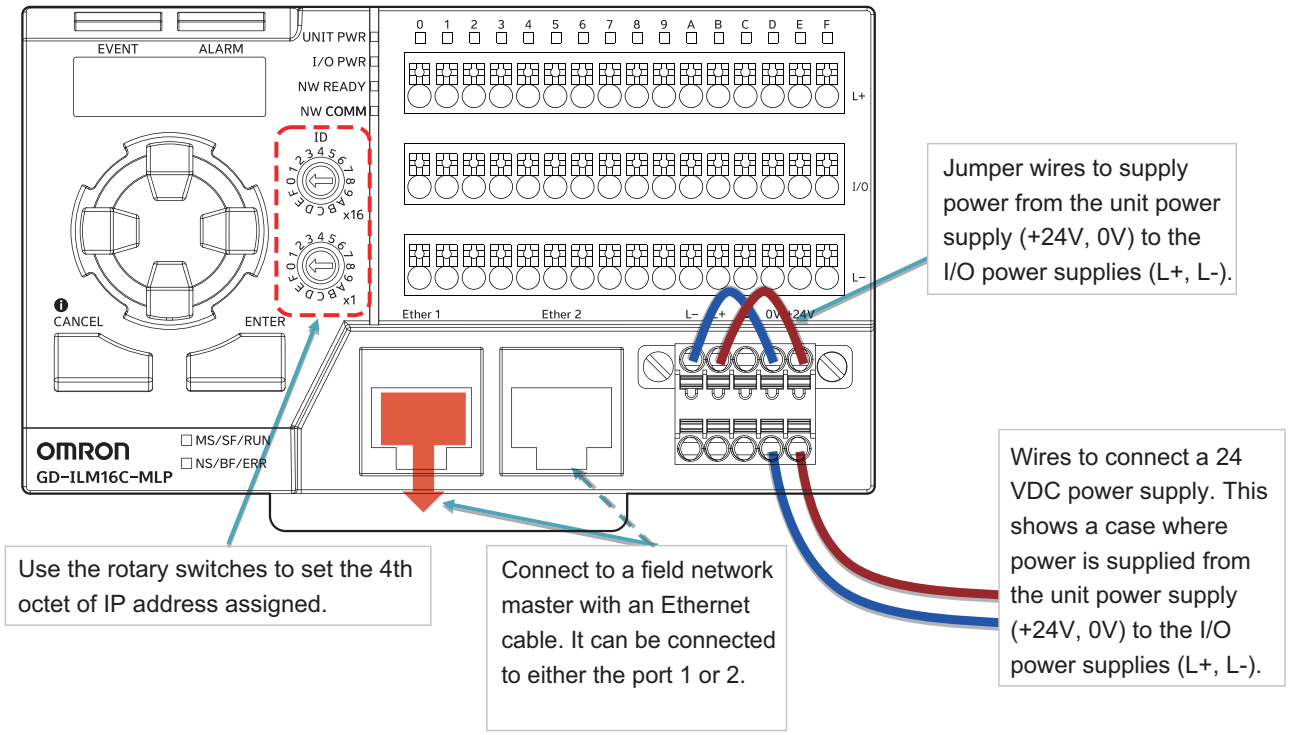

● Installation example
To set the IP address to 200, since 200 divided by 16 is 12 with a remainder of 8, set the x16 rotary switch to 12 and the x1 rotary switch to 8.

**Note** The above figure is for GD-ILM16C-MLP. The same applies to GD-ILM16E-MLP.

When the upper 3 octets of IP address are not *192.168.250.*, set an address in *M82. IP address* in the Master Unit parameter through front panel operations. Turning the front rotary switch while the power is on will automatically switch to *M82. IP address*.
**Note** The last octet (4th octet) can only be set with the rotary switch.

The setting method differs depending on the field network type.
Refer to the communication manual of this product, according to selected field network.

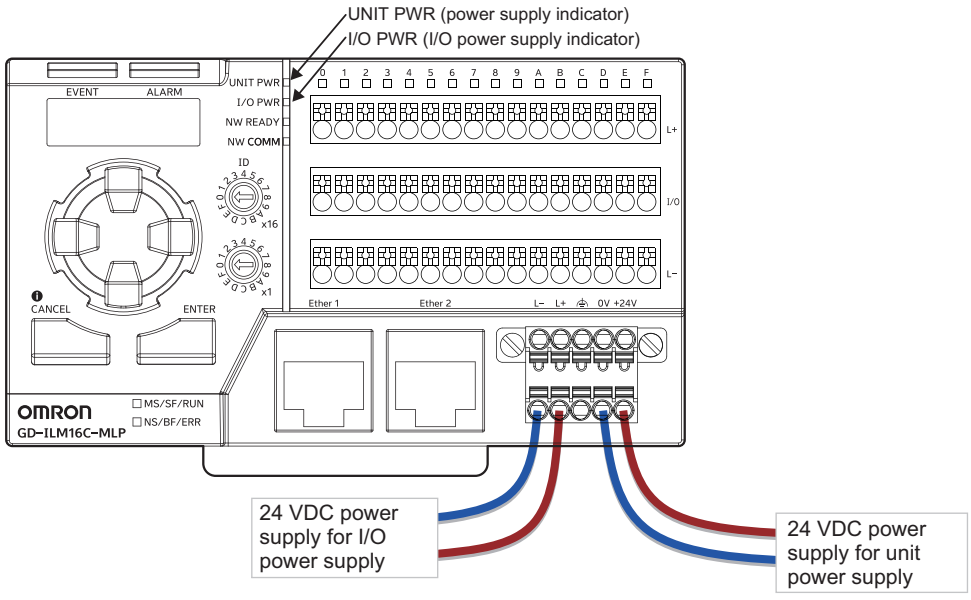
# 2-3 Wiring




**Note** The above figure is for GD-ILM16C-MLP. The same applies to GD-ILM16E-MLP.

## 2-3-1 Checking the Power Supply

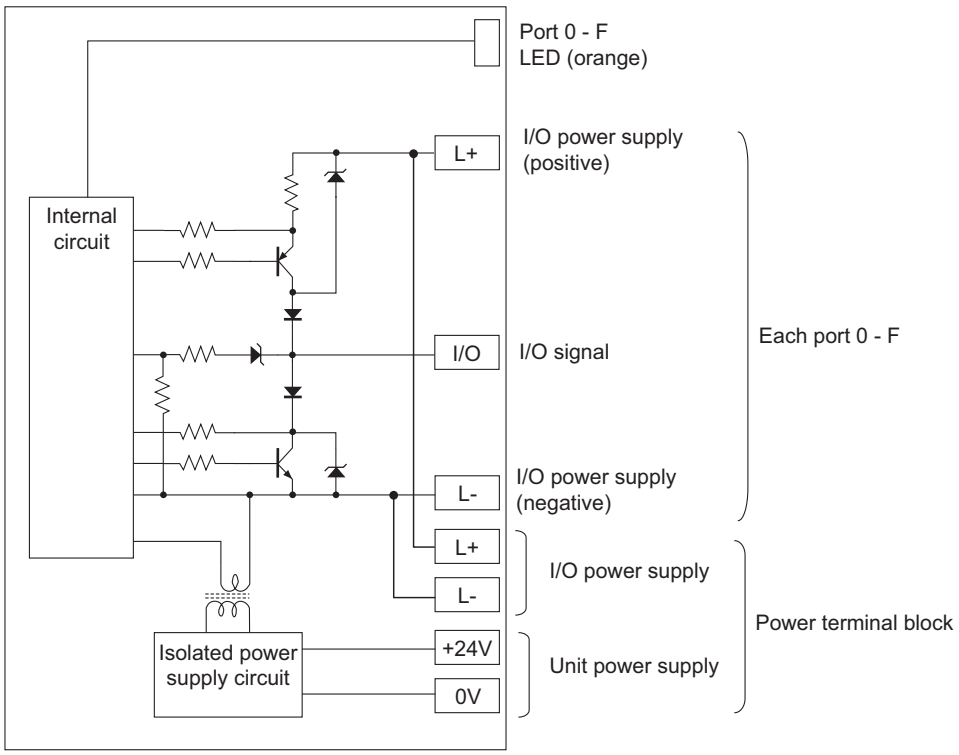
Turn the power on and check that the *UNIT PWR* (power supply indicator) and *I/O PWR* (input/output power indicator) LEDs are illuminated. If these are not illuminated, check the power supply and wiring. If the *I/O PWR* (input/output power indicator) LED is blinking, it indicates that the power supply voltage is low (lower than 17 V).




**Note** The above figure is for GD-ILM16C-MLP. The same applies to GD-ILM16E-MLP.

## 2-3-2 Unit Power and I/O Power Supply Connections

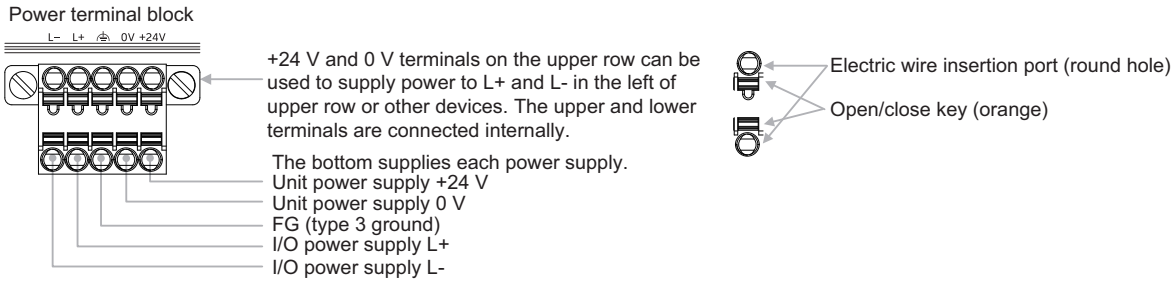
### Internal Circuit Diagram




### Wiring to the Power Terminal Block

Unit power and I/O power are supplied to the power terminal block.

Use the upper terminals for jumper connection to share the unit power supply with I/O power.

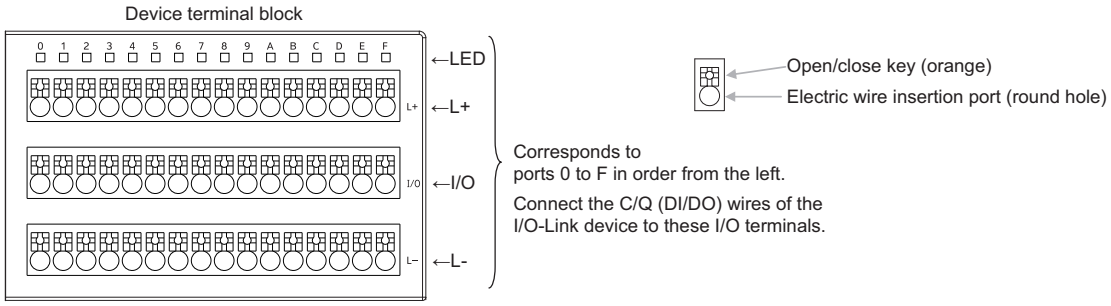



**Additional Information**

For the wires to be used and recommended ferrule, refer to *Wire Installation* on page 2-9 to *Recommended Ferrule and Crimping Tool* on page 2-9.

## Wiring to Device Terminal Block or E-Con

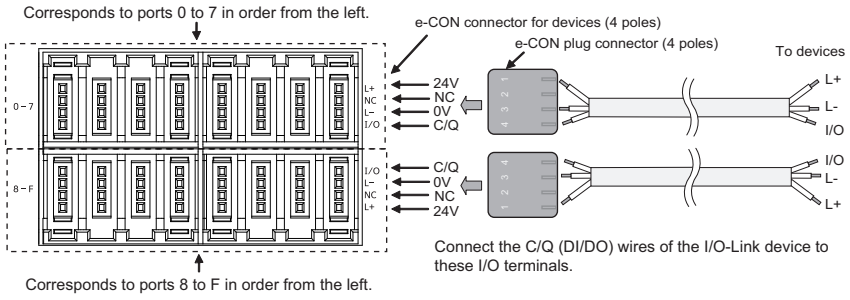
### ● For GD-ILM16C-MLP




**Additional Information**

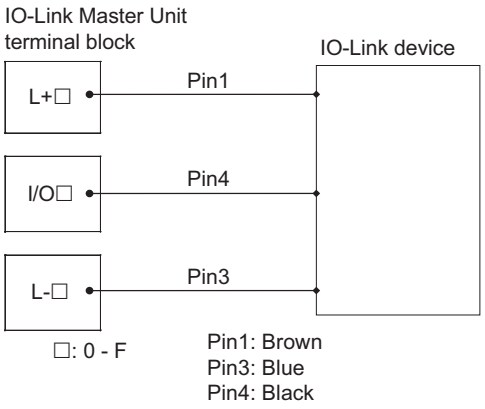
For the wires to be used and recommended ferrule, refer to *Wire Installation* on page 2-9 to *Recommended Ferrule and Crimping Tool* on page 2-9.

### ● For GD-ILM16E-MLP



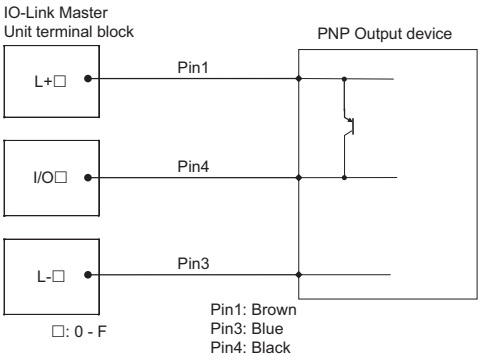

Applicable wires should be with a temperature rating of 75°C or higher.
And, match the wire size to the e-CON plug specifications.

### ● IO-Link Communication Wiring

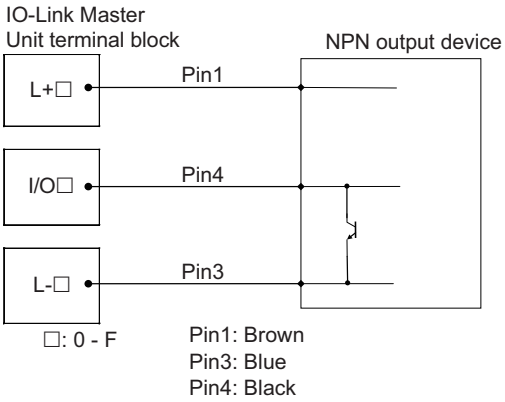


## ● SIO Mode

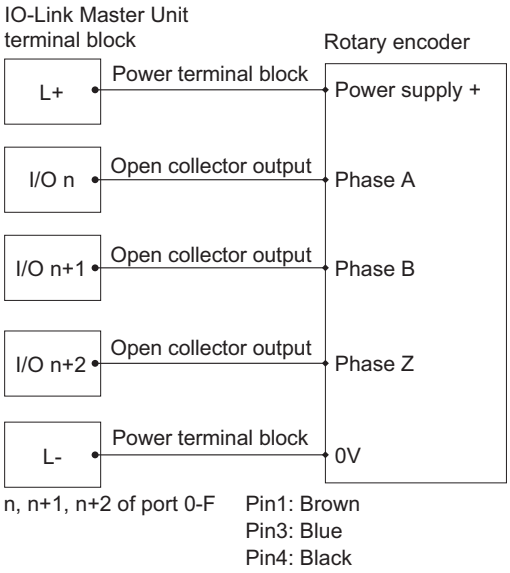
- Wiring for source (PNP input)



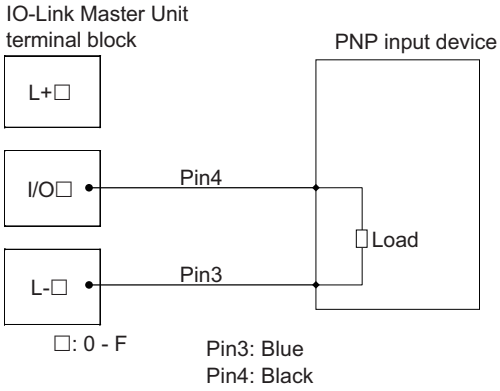

- Wiring for sink (NPN input)



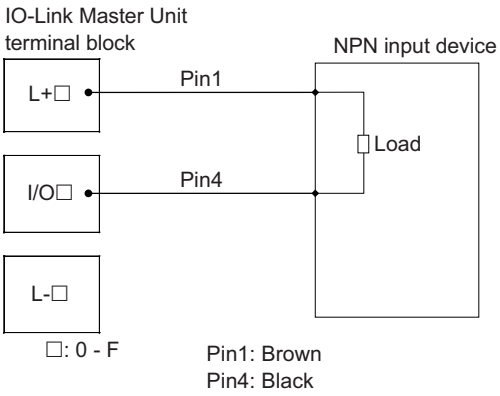

- Rotary encoder wiring



- Wiring for source (PNP output)




- Wiring for sink (NPN output)




## Wire Installation

A single or stranded wire can be used, and a ferrule can be attached to the tip of the wire.
The stripped length of single or stranded wire should be 10 mm.

### ● Wire to be Used

- Power terminal block for +24 V, 0 V, L+, L- and FG
  AWG 24 to 16
  Use wires with a rated temperature of 75°C or higher.
- Device terminal block for L+, I/O and L- (for GD-ILM16C-MLP)
  AWG 28 to 16
  Use wires with a rated temperature of 75°C or higher.
- Cable Length
  Up to 30 m (between power source and IO-Link Master Unit)
  Up to 20 m (between IO-Link Master Unit and IO-Link device)

### ● Recommended Ferrule and Crimping Tool

- Ferrule for the power terminal block
  The recommended ferrule is AI 0.5-10 WH (AWG20) from PHOENIX CONTACT.
  For dimensions and ferrules other than that listed above, refer to the table below.
- Ferrule for the device terminal block

The recommended ferrule is AI 0.25-8 YE (AWG24) from PHOENIX CONTACT.
For dimensions and ferrules other than that listed above, refer to the table below.

- Crimping tool
  The recommended crimping tool is CRIMPFOX 6 from PHOENIX CONTACT.
  When using a crimping tool other than the recommended one, use a type that crimps from the top and bottom (2 directions). If other tools are used to crimp and insert the terminal block, the terminal block may be damaged when pulling it out.

(Unit: mm)

| Terminal block | AWG | Ferrules from PHOENIX CONTACT | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Model | Dimensions | | | | | | |
| | | | L1 | L2 | D1 | S1 | D2 | S2 | Insulation sleeve color |
| Device terminal block For GD-ILM16C-MLP | 24 | AI 0.25-8 YE | 12.50 | 8.00 | 0.80 | 0.15 | 2.00 | 0.25 | Yellow |
| | 22 | AI 0.34-10 TQ | 14.50 | 10.00 | 0.80 | 0.15 | 2.00 | 0.25 | Turquoise |
| | 20 | AI 0.5-10 WH | 16.00 | 10.00 | 1.10 | 0.15 | 2.50 | 0.25 | White |
| | 18 | AI 1-10 RD | 16.00 | 10.00 | 1.50 | 0.15 | 3.00 | 0.30 | Red |
| | 16 | AI 1.5-10 BK | 16.50 | 10.00 | 1.80 | 0.15 | 3.40 | 0.30 | Black |
| Power terminal block | 24 | AI 0.25-8 YE | 12.50 | 8.00 | 0.80 | 0.15 | 2.00 | 0.25 | Yellow |
| | 22 | AI 0.34-10 TQ | 14.50 | 10.00 | 0.80 | 0.15 | 2.00 | 0.25 | Turquoise |
| | 20 | AI 0.5-10 WH | 16.00 | 10.00 | 1.10 | 0.15 | 2.50 | 0.25 | White |
| | 18 | A 1-8 | - | 8.00 | 1.40 | 0.15 | - | - | Without insulation sleeve |
| | 16 | A 1.5-10 | - | 10.00 | 1.70 | 0.15 | - | - | Without insulation sleeve |

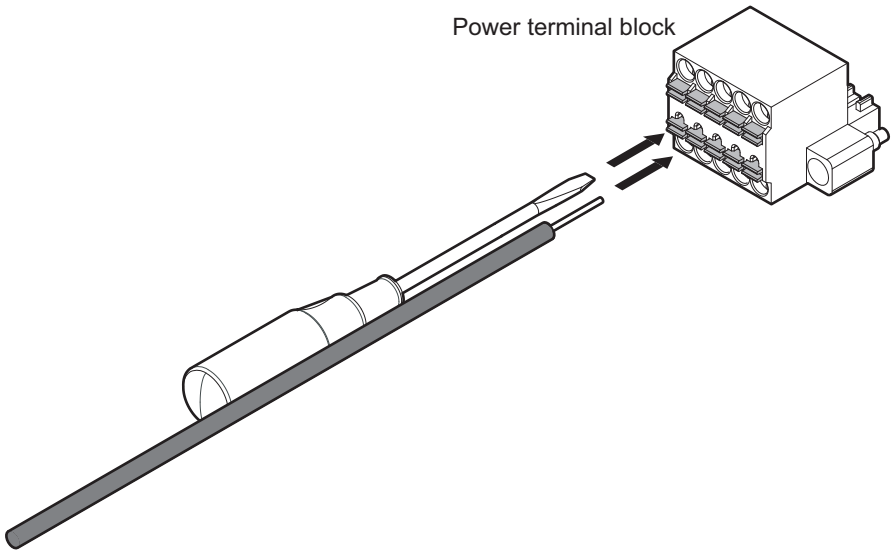
*1. The contents of ferrules are as of February 2026.

## ● Wire Installation Method

***1*** Press the open/close key (orange) of the wire insertion port for installation with a precision flat-head screwdriver.

***2*** Insert the wire from the wire insertion port while pressing the open/close key. Insert the wire until the tip reaches the bottom.

***3*** Release the open/close key to complete wiring. Pull gently to make sure it does not come loose.

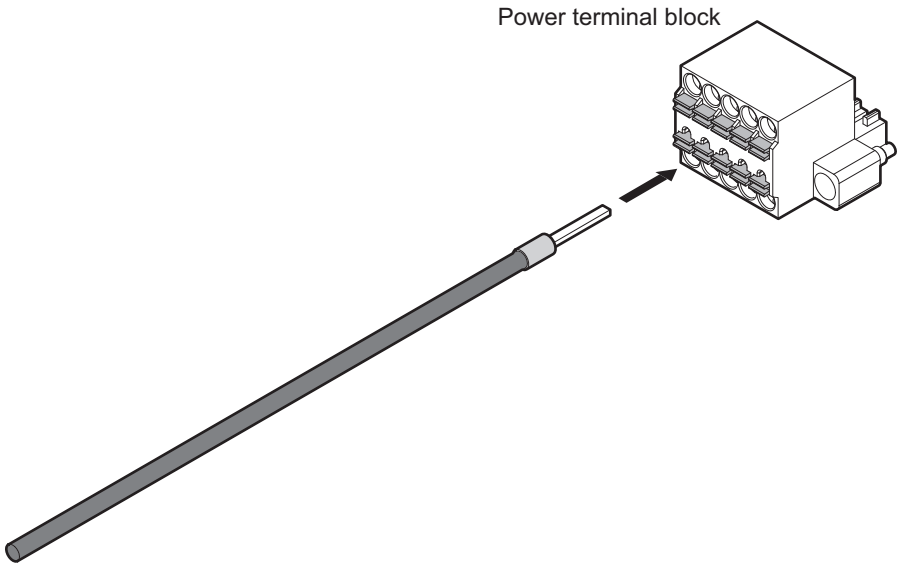



**Note** For device terminal blocks, insert in the same way.

## ● Wire with Ferrule Installation Method

***1*** Insert the wire with the ferrule attached through the wire insertion port. Insert the ferrule until the tip of the ferrule reaches the bottom. (In the case of ferrule, it can be inserted without pressing the open/close key.)

***2*** Insert it until it reaches the bottom and the wiring is complete. Pull gently to make sure it does not come loose.

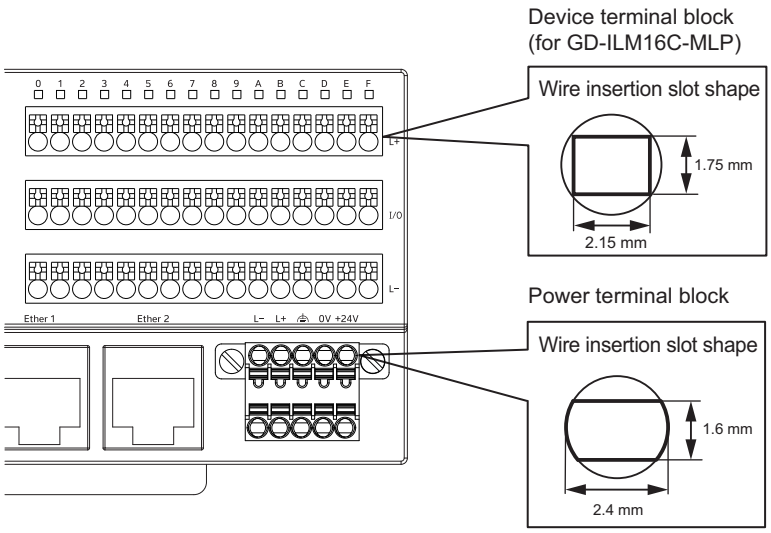



**Note** For device terminal blocks, insert in the same way.

## ● Wire Insertion Slot Shape

Before inserting a wire or ferrule, check the shape of the wire insertion port below and the diameter and orientation of the wire or ferrule.

Inserting a wire or ferrule larger than the wire insertion port shown below may damage the terminal block.

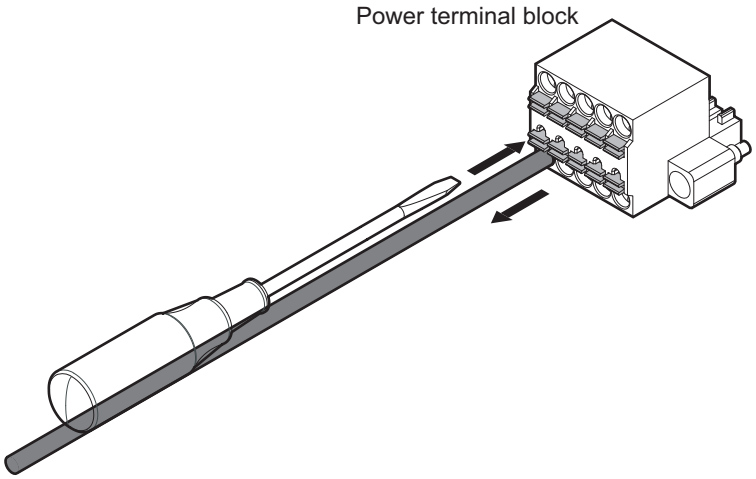



## ● Wire Removal

***1*** Press the open/close key (orange) of the wire insertion port to be removed with a precision flat-head screwdriver.

***2*** Pull out the wire while holding down the open/close key.

**Note** If the ferrule is stuck inside the terminal block and cannot be removed, the terminal block may be damaged by forceful removal. If the ferrule is stuck, move the ferrule up, down, left, or right while pressing in the open/close key to remove the stuck part, and then pull it out.




**Note** For device terminal blocks, pull out in the same way.

# 2-4 Initial Settings through Front Panel Operations

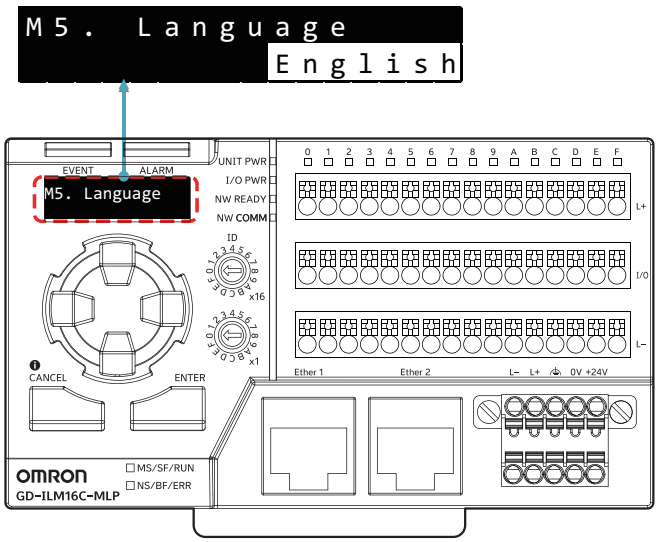
Shown here are the initial setting procedures via front panel operations of this product, upon newly use of this product.

## 2-4-1 Powering Up the Field Network Master

When available, apply power to the field network master station in advance.
This makes it possible to check whether the field network master is connected correctly.

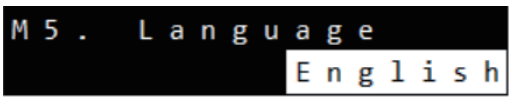
## 2-4-2 Language

When you turn the power on for the first time, *M5.Language* menu is shown on the display on the upper left of this product, as shown below.




**Note** The above figure is for GD-ILM16C-MLP. The same applies to GD-ILM16E-MLP.

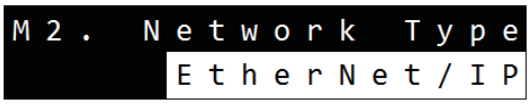
The language displayed will change each time you press the ↑ key.




Press the **ENTER** key.
The language setting changes to English.

## 2-4-3 Network Type Setting

Subsequently, the display automatically switches to the network type setting screen shown below.



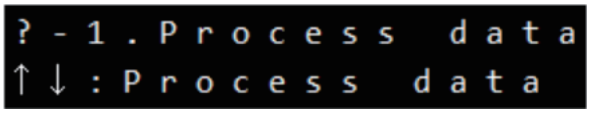

The factory default network type setting is *EtherNet/IP*.
Regarding *M2. Network type*, refer to *5-1-4 Master Unit Parameter List with Product Front Panel Operations* on page 5-6.
Press the ↑ key and select the field network type to use.
Press the **ENTER** key.
The network type switches to the field network type to be used. Wait about twenty seconds while the network chip firmware rewrites.
When rewriting is complete, this product will reboot automatically.


After the reboot, the process data display will appear (if language selection is completed).

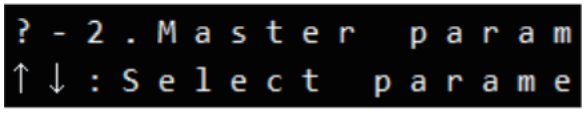
## 2-4-4 I/O Assignment Settings

The default setting for the I/O function is *Unused* for all ports. Change the I/O function settings as needed.

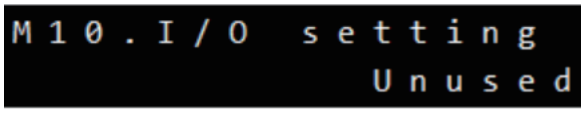
After startup, press the **CANCEL** key to move to the top menu of the following process data display.
For window transition, refer to *5-1-1 Overview of Display Operations* on page 5-2.




Press the ↓ key. The display switches to the top menu of the following Master Unit parameter setting.




Press the **ENTER** key. The screen switches to the top menu of the following Master Unit parameter setting.



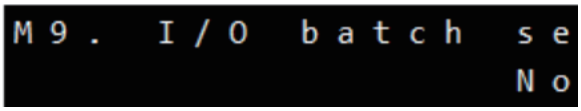

As you can see, all the I/O function settings are set to *Unused* by default. Change the I/O function settings as needed.
The same setting of I/O assignments to all ports can be made by batch.

**Additional Information**

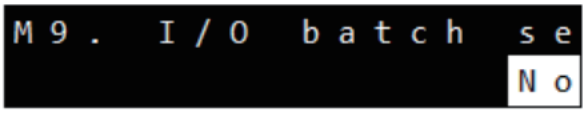
- The setting can be changed efficiently by selecting the functions you use most in this batch change and then change ports with other settings individually in *M10. I/O setting*.

## For I/O Assignment Batch Setting

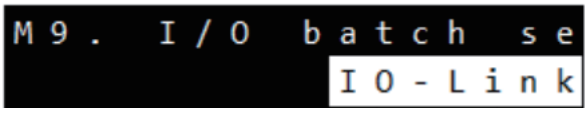
Press the ↑ key. The screen switches to the *I/O batch setting* screen as shown below.



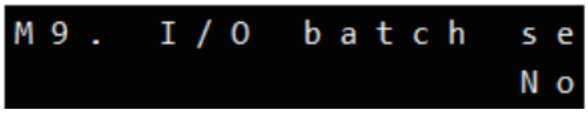

Press the **ENTER** key to change the set value.



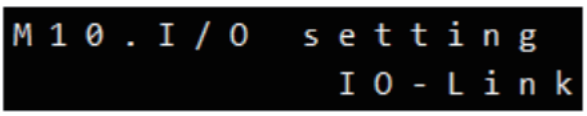

Pressing the ↑ key will scroll through *IO-Link* → *pnp input* → *npn input* → *PNP output* → *NPN output* → *Unused* options in order.
Select the function to be set with the ↑ or ↓ key and press the **ENTER** key.



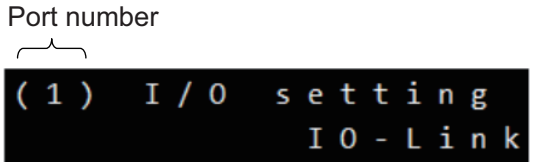

Click the **No** or **CANCEL** key to return without changing the settings.




To set the I/O function for each port, click the ↓ key to display *M10. I/O setting*.

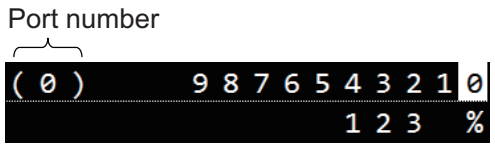



To switch ports, press the ← or → keys.




To change the settings, press the **ENTER** key. The parameter flashes (the parameter can be changed at this time). Press the ↑ or ↓ keys to select the value to set. Press the **ENTER** key to confirm the set value.

The following display is an example of the start display of process data when turning the power on after selecting the language.




Refer to *5-1 Front Panel Operations* on page 5-2 for details of settings.

# 3

# Communication



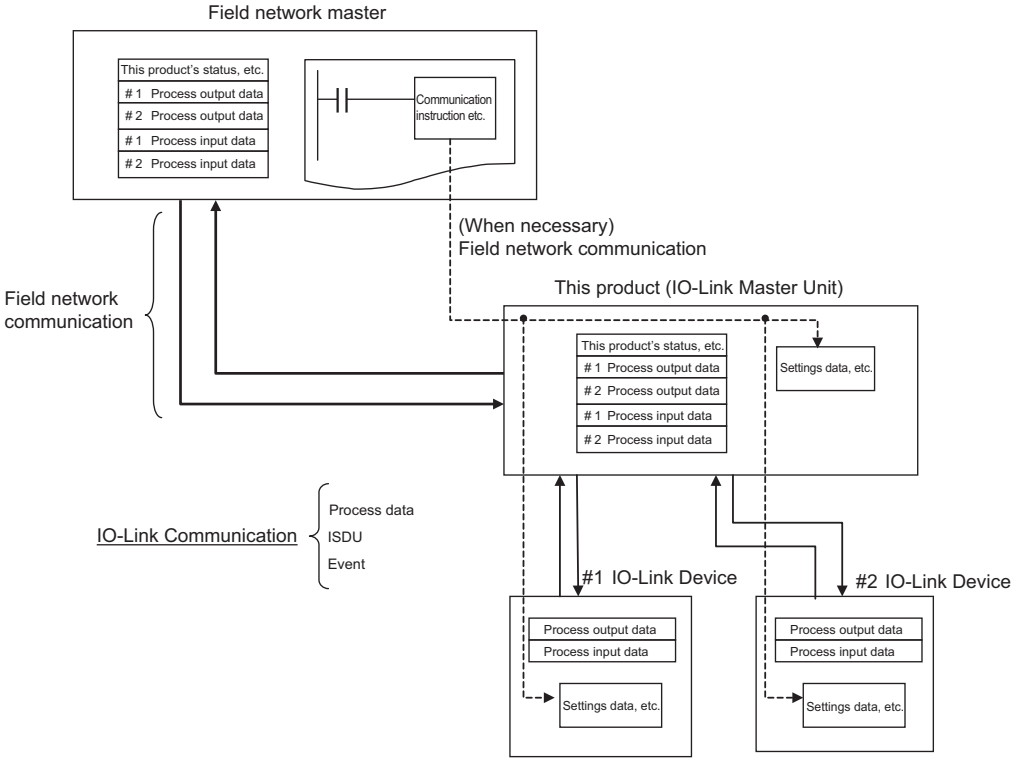
This section provides an overview of how this product performs field network communication and IO-Link communication, and information on the initial settings for performing IO-Link communication.

# 3-1 Communication System Overview

This section describes the communication that can be executed with the field network master and connected IO-Link devices.

- Field network communication according to the field network type is possible.
- IO-Link communication with the connected IO-Link device is possible.

IO-Link communication includes process data communication, ISDU communication and event communication.




## 3-1-1 Field Network Communication

The following field network types can be selected on this product in the setting menu.

- EtherNet/IP (default value)
- Ethernet & Modbus/TCP
- CC-Link IE Field Basic

The setting is made in **M2. Network type** in the Master Unit parameter setting.

The details of the communication with the field network differs depending on the field network type. Refer to the manual for Product Communication Edition according to the field network type.

## 3-1-2 IO-Link Communication

This product can execute the following IO-Link communication.

## Process Data

This product periodically exchanges predetermined data to and from the connected IO-Link devices.
This communication is automatically executed, when the power is turned ON.
The process data can, also, be monitored on the front display of this product.

The method of reading and writing process data from the field network master differs depending on the field network type. Refer to the manual for Product Communication Edition according to the field network type.

**Additional Information**

The method of accessing process data from the field network master and the size of each port for each field network type are as follows. Note that the size of the initial value of the process data differs depending on the field network type.

| Network type | | Accessing process data from the field network master | Size of the process data for each port | |
|---|---|---|---|---|
| | | | Default value | Setting range by Master Unit parameter M40/41 *1 |
| EtherNet/IP | | Access process data assigned to this product by IO-Link process communication | Input: 32 bytes (16 words)<br>Output: 4 bytes (2 words) | Maximum input of 496 bytes (248 words) for all ports<br>Maximum output of 492 bytes (246 words) for all ports |
| CC-Link IE Field Basic *2 | | | Input: 4 bytes (2 words)<br>Output: 4 bytes (2 words) | Maximum input of 64 bytes (32 words) for all ports<br>Maximum output of 64 bytes (32 words) for all ports |
| Ethernet & Modbus/TCP | Socket communication | | | |
| | Modbus/TCP communication | Direct access to process data in an IO-Link device via Modbus/TCP communication | Input: 32 bytes (16 words)<br>Output: 32 bytes (16 words) | Not defined |

*1. For EtherNet/IP and CC-Link IE Field Basic, it is the range when extended access is disabled.
*2. When using the CC-Link IE Field Basic with socket communication or with Modbus/TCP communication, it's not possible to write to the process data.

**Additional Information**

This product can input/output the following data to/from the host master regardless of the field network type.

| Direction | Type | Generic data name | Size | Details |
|---|---|---|---|---|
| This product → Host master | This product's status data | Assignment status data | 1 Word | It consists of the following.<br>• Error flag<br>• IO-Link ready flag<br>• Latest error port<br>• Event flag<br>• I/O power supply flag<br>• Output overcurrent flag<br>• Latest event port<br>For details, refer to *Reading this product's status data* in *4-1 Product Functions* on page 4-2. |
| | Process data with connected IO-Link device Communication data | IO-Link process input data | Depends on the IO-Link device | For the process data of an IO-Link device, refer to the process data details of the specific IO-Link device. |
| Host master → This product | Operation data to this product | Allocated operation data | 1 Word | It consists of the following.<br>• Clear the latest error<br>• Clear the latest event<br>• Reset encoder counter<br>For details, refer to *Writing operation data of this product* in *4-1 Product Functions* on page 4-2. |
| | Process data with connected IO-Link device Communication data | IO-Link process output data | Depends on the IO-Link device | For the process data of an IO-Link device, refer to the process data details of the specific IO-Link device. |

## ISDU Handling (Indexed Service Data Unit Handling)

This product can read and write the data of a specified index in the service data of the connected IO-Link devices as needed. This depends on the read/write instruction from the field network master or the device parameters set using the front panel operations.
The method of reading and writing from the field network master differs depending on the field network type. Refer to the manual for Product Communication Edition according to the field network type.
Refer to each IO-Link device index list for service data.

## Event

If there is a extreme pressure drop, etc., with an IO-Link device on a given port, the product receives the event code and event type sent from the IO-Link device and saves it in the memory of this product. It can store up to six event types and event codes.
At this time, the *event flag* turns ON, and the port number where the event took place is stored in *Latest event port*. On this condition, from field network master station communication program, it is possible to access the Master Unit parameter *event data readout* and read out the event code and event type.
Alternatively, the event name and event code can be checked using the event/error display on the front display of this product.

Thereby, the following IO-Link device status can be obtained on the field network master side when they occur.
Errors (ex.: breakdowns, short-circuits) and maintenance information (ex.: reach to predicted maintenance time)

Refer to each IO-Link device index list for its event codes.
The position of event-related flags by the field network communication depends on the field network type. Refer to the manual for Product Communication Edition according to the field network type.

# 3-2 Initial Settings for IO-Link Communication

This section describes the operations required for this product to perform the IO-Link communication with IO-Link devices.

The initial settings required for field network communication differ depending on the field network type. Refer to the manual for Product Communication Edition according to the field network type.

## 3-2-1 Checking I/O Mode Assignments

The I/O setting assignment status can be checked on the front display of this product.
After selecting the language, in the startup screen of process data displayed when turning on the power, press the **ENTER** key for a batch display of the I/O assignment status as below.


Example:
I: IO -Link Mode setting (IO-Link device is not connected while blinking)
n: NPN input mode setting
N: NPN output mode setting
- : Not used

Refer to *Section 5 Front Panel Operations* on page 5-1 for details.

## 3-2-2 Confirming the Network Type Setting

Make sure that the Master Unit parameter **M2. Network type** is set to the field network type to be used.
Set in the initial settings for front panel operations. Refer to *2-4-3 Network Type Setting* on page 2-13 for further information.

For setting *M2. Network type* of the Master Unit parameter, refer to *5-1-4 Master Unit Parameter List with Product Front Panel Operations* on page 5-6.

# 4

# Product Functions

This chapter describes the functions of this product.

# 4-1 Product Functions

Following is a list of product functions.

| Category | Function | I/O assignment settings | Product functions |
|---|---|---|---|
| Basic IO-Link communication | Process data | IO-Link mode | The method of reading and writing process data of the IO-Link device from the field network master differs depending on the field network type. Refer to the manual for Product Communication Edition according to the field network type. |
| | ISDU | IO-Link mode | The method of reading and writing the service data of the IO-Link device via ISDU handling from the field network master differs depending on the field network type. Refer to the manual for Product Communication Edition according to the field network type. |
| | Event communication | IO-Link mode | If the event flag is ON, the event code can be read using the acyclic communication program on the field network master.<br>Up to six history records stored in this product (event types: notification, warning, error; event sources: device, master, etc.).<br>For details, refer to the *Event communication* section of the corresponding communication edition. |
| Reading and writing the Master Unit parameters of this product | Reading and writing the Master Unit parameters of this product | - | The Master Unit parameters of this product can be read and written by acyclic communication from the field network master.<br>The method of reading and writing from the field network master of the Master Unit parameters of this product differs depending on the field network type. Refer to the manual for Product Communication Edition according to the field network type.<br>The parameter numbers / target numbers and values of the Master Unit parameters are common among the field networks. (However, some Master Unit parameter numbers do not exist in some field network types. Refer to *List of Product Master Unit Parameters* in the corresponding communication section.) |
| Reading the status data of this product | | - | The following *allocated status data* can be read by cyclic communication or acyclic communication from the field network master. |
| | Error flag | IO-Link mode or SIO[*1] | This flag turns on, when an error is generated in this product.<br>When this flag is 1 (on), access the *Latest error code read by port* through acyclic communication.<br>Refer to *Data for Access from PLC* in *List of Product Master Unit Parameters* of each communication edition for *Latest error code read by port* data. |
| | IO-Link ready flag | IO-Link mode | When communications with all IO-Link devices and a master station of EtherNet/IP or CC-Link IE Field Basic are established, this flag turns on. Read and/or write with the IO-Link devices through the cyclic or acyclic communication can be executed.<br>**Note** This flag will turn to 1 (on) even when not all ports' I/O setting assignments are in IO-Link mode. |
| | Synchronization establishment flag (Depending on the field network type) | IO-Link mode | This flag turns on, when I/O synchronization (set value number: M21) is set to any of 2/3/4/5/6 (0.4 ms/0.8 ms/1.6 ms/3.2 ms/6.4 ms cycle), while the internal timer in this product is synchronized (within +/-20 μs) with the network time.<br>**Note** It does not exist if the field network type is *Ethernet & Modbus/TCP*. |
| | Port with the latest error occurred | IO-Link mode or SIO[*1] | Port number of the latest generated error.<br>When accessing the *Latest error code read by port* through acyclic communication, specify the port based on this value. |

| Category | Function | I/O assignment settings | Product functions |
|---|---|---|---|
| | Event flag | IO-Link mode | This flag turns on, when an event is occurring in one of the connected IO-Link devices.<br>When this flag is 1 (on), access the *Event data readout by port* data through acyclic communication.<br>Refer to *Data for Access from PLC* in *List of Product Master Unit Parameters* of each communication edition for *Event data read by port*. |
| | I/O power supply flag | SIO*1 | This flag turns on, when power is supplied from the I/O power supply. |
| | Output overcurrent flag | SIO*1 | This flag turns on, when overcurrent is generated in SIO (output). |
| | Port with the latest event occurred | IO-Link mode | Port number of the latest generated event.<br>When accessing the *Event data read by port* through acyclic communication, specify the port based on this value. |
| Writing operation data to this product | | - | The following *allocated operation data* can be written by cyclic communication or acyclic communication from the field network master. |
| | Clear the latest error | IO-Link mode or SIO*1 | Clears the latest error when rising from 0 (off) to 1 (on). |
| | Clear the latest event | IO-Link mode | Clear the latest event when rising from 0 (off) to 1 (on). |
| | Reset encoder counter | SIO*1 | When the SIO device is an encoder, the high-speed counter of this product will be reset when the SIO device rises from 0 (off) to 1 (on). |

| Category | Function | I/O assignment settings | Product functions |
|---|---|---|---|
| Assignment of IO-Link device process data to this product | Process data automatic allocation/ manual setting | IO-Link mode | The process data can be allocated with a size other than the initial value either by setting each port manually or automatically based on the actual device.<br>The initial value of the allocation size differs depending on the network type as follows.<br>**For EtherNet/IP**<br>• Input: 32 bytes for each port (20 bytes for port F only when extended access is disabled. 16 bytes for port F only when extended access is enabled)<br>• Output: 4 bytes for each port (ports 0 - F when extended access is disabled. Ports 0 - D when extended access is enabled. )<br>**For CC-Link IE Field Basic**<br>• Input: 4 bytes (2 words) for each port (ports 0 - E when extended access is enabled)<br>• Output: 4 bytes (2 words) for each port (ports 0 - D when extended access is enabled)<br>**Using Ethernet & Modbus/TCP and socket communication**<br>• Input: 4 bytes for each port<br>• Output: 4 bytes for each port<br>**Using Ethernet & Modbus/TCP, and Modbus TCP/UDP communication**<br>This setting is irrelevant.<br><br>It is used for any of the following purposes.<br>• If there is an IO-Link device of a size other than the above<br>• When you do not want to allocate unused ports or create empty areas for used ports on the field network master (however, there will be empty areas after the allocation).<br>• When automatic setting is used, it is not necessary to check the specifications of each IO-Link device. However, as automatic setting is executed on both the input and output, it needs to be set manually in you wish to choose either input or output.<br><br>If it is not connected to the network or the parameter is 0 words, it will be allocated in a shortened manner. However, empty areas after allocation exist in the cyclic communication area. |

| Category | Function | I/O assignment settings | Product functions |
|---|---|---|---|
| IO-Link device validation | Device validation | IO-Link mode | This function verifies the compatibility and identity of a connected IO-Link device.<br>When this parameter is written, the model, model name (sum value) and serial number of the IO-Link device connected to each port are saved to the storage data on this product.<br>When IO-Link communication is started the next time (including when the power of this product is turned on, or when I/O assignment is changed to IO-Link mode), this function runs a preset validation method that was set. If a validation error occurs, it does not perform cyclic communication with the applicable IO-Link device(*1).<br>The following settings are available.<br>• Validation/type ID (vendor ID and device ID): Verify the type ID only.<br>• Validation/type ID + model name: Verify the type ID and model name.<br>• Validation/type ID + serial number: Verify the type ID and serial number.<br>• No validation: Validation is not performed. Cyclic communication is performed unconditionally with the applicable IO-Link device(*2). The registered model, ID serial number and model name will also be deleted.<br><br>Error codes:<br>• Type ID mismatch:<br>Validated: FFFE h<br>Not validated: FF23 h<br>• Model name mismatch: FFF4 h<br>• Serial number mismatch: FFFC h<br>• Revision ID mismatch: 6001 h<br><br>*1. If automatic restoration is enabled, automatic restoration will be performed (parameters will be transfered from this product to the IO-Link device).<br>*2. However, even if this is set to *Not validated*, only the type ID will be verified when the power (unit power supply and I/O power supply) is turned ON if there is already storage data in this product. An error (FF23 h) will occur if the model ID does not match. (If the user changes the connected model after backup, an error is generated to notify the user that storage data for a different type ID remains.) If this is set to *Not validated*, the revision ID (that is, the IO-Link protocol version implemented in the IO-Link device) will not be verified.<br><br>Usage: This prevents malfunction by stopping cyclic communication with the IO-Link device, in case that an IO-Link device is replaced with an unexpected IO-Link device or is connected in a wrong port. |

| Category | Function | I/O assignment settings | Product functions |
|---|---|---|---|
| I/O operation during communication error | IO-Link communication and network error handling | IO-Link mode | • Output hold: Hold IO-Link process output data and PNP/NPN output when field network communication is disconnected. Input will be OFF.<br>• Input hold: Hold IO-Link process input data when communication is disconnected with a certain IO-Link device. Output will be OFF.<br>• All hold: Hold IO-Link process input data when communication is disconnected with a certain IO-Link device. Hold process output data and PNP/NPN output when field network communication is disconnected.<br>• Clear (default value): Clear IO-Link process input data to zero when communication is disconnected with a certain IO-Link device. Also, when the field network communication shuts down, IO-Link process output data is cleared to zero. Clear process input data to zero. Turn PNP/NPN output OFF.<br><br>Usage: This implements a failsafe by either holding IO-Link process data or clearing it to zero, when there is an IO-Link communication or field network communication error. |
| | | SIO[*1] | • Output hold: Hold PNP/NPN output data when field network communication is disconnected. Turn PNP/NPN input data OFF.<br>• Clear: Turn PNP/NPN output data OFF when field network communication is disconnected.<br><br>Usage: This implements a failsafe by either holding PNP/NPN output data or turning it OFF, when there is a field network communication error. |
| IO-Link communication related | IO-Link ready flag | IO-Link mode | This function turns ON when all ports are engaged in IO-Link communication and a field network communication has been established with the field network master.<br>This is used as an execution condition for process input, process output and acyclic communication. |

| Category | Function | I/O assignment settings | Product functions |
|---|---|---|---|
| | Endianness conversion of process data | IO-Link mode | The upper and lower bytes of the input/output process data of the IO-Link device are exchanged to communicate with the host controller.<br><br>Little endian LSB:default<br>Convert big endian data of IO-Link device to little endian and access.<br>It can be handled as little endian data from the upper network.<br>If the data is an odd number of bytes, the value of the upper byte of the most significant word after word conversion is 0x00.<br><br>Big endian MSB<br>Access big endian data of IO-Link device as big endian.<br>It can be handled as big endian data from the upper network.<br>If the data is an odd number of bytes, the value of the lower byte of the least significant word after word conversion is 0x00.<br><br>Little endian MSB<br>Convert big endian data of IO-Link device to little endian and access.<br>It can be handled as little endian data from the upper network.<br>If the data is an odd number of bytes, the value of the lower byte of the least significant word after word conversion is 0x00.<br><br>Swap bytes<br>Accesses the process data of the IO-Link device by swapping the upper and lower bytes in units of one word (two bytes).<br><br>• Applications: When using IO-Link devices that handle upper and lower bytes in reverse, or when handling data with an odd number of bytes as word data, byte swapping on the host controller side is no longer required. |
| I/O synchronization setting | I/O synchronization | IO-Link mode or SIO*1 | Use IO-Link communication or digital I/O transfer to maintain synchronization for IO-Link devices on multiple ports.<br>Usage example:<br>• Sample data from multiple sensors at the same time.<br>• Control multiple electric actuators synchronously. |
| Time information function | Network time | IO-Link mode or SIO*1 | The network time (parameter number: M65) is displayed on this product, which takes the time zone (parameter number: M6) into consideration. The internal timer of this product can also be synchronized with the network time (using the I/O synchronization [parameter number: M21] setting). |
| | Synchronization establishment flag (Depending on the field network type) | IO-Link mode or SIO*1 | This flag turns ON when the internal timer of this product is synchronized with the network time (within +/-20 μs).<br>**Note** It does not exist if the field network type is *Ethernet & Modbus/TCP*. |
| | Allocation of time information to process input data | IO-Link mode or SIO*1 | Time information and parity information can be added to process input data. This is set using time stamp (parameter number: M44). |
| | Storage of time when a parameter is read from IO-Link device | IO-Link mode | The time when a parameter is read from an IO-Link device is saved in this product, then to be read from the host PLC. |

| Category | Function | I/O assignment settings | Product functions |
|---|---|---|---|
| IO-Link device parameter backup/ restore (from/to this product) | Manual backup/ restore of settings | IO-Link mode | This function manually backs up and restores parameters (stored parameters) stored in IO-Link devices.<br>Select one of the followings. The process can be executed either by operating the controls on the front panel of this product, or by writing parameters from the field network master.<br>• Restore: Download (*restore*) storage data stored in this product to an IO-Link device.<br>• Backup: Upload (*backup*) parameters from the IO-Link device to this product.<br>• Delete: Delete all IO-Link device storage data stored in this product.<br>**Note 1.** This function can be used only if the connected IO-Link device supports the data storage function.<br>**Note 2.** Error code *FFFF h* will occur if the vendor ID or device ID of the restore target IO-Link device differs from the storage data from this product, when restoring.<br><br>Usage: This allows parameters from the old IO-Link device to be carried over from this product, when replacing an IO-Link device with a new device. |
| | Automatic device parameter backup | IO-Link mode | This function automatically backs up and restores parameters (stored parameters) stored in IO-Link devices.<br>**Note** This function can be used only if the connected IO-Link device supports the data storage function.<br>Select from the followings.<br>• Restore: When IO-Link communication starts, automatically download (*restore*) the storage data in this product to the IO-Link device, if the IO-Link device storage data in this product does not match the parameters in the connected IO-Link device(*1).<br>*1. The Master Unit parameters in this product will overwrite, when IO-Link communication is next started, even if the parameters in the IO-Link device are changed during IO-Link communication.<br><br>• Backup: Upload (*backup*) parameters from the IO-Link device to this product, if parameters in the IO-Link device are changed during IO-Link communication.<br>• Restore and backup: Automatically restore or backup so that storage data in this product always matches parameters in the IO-Link device.<br>• None: Restore and backup are not automatically performed.<br><br>**Note** Error code *FFFF h* will occur if the vendor ID or device ID of the restore target IO-Link device differs from the storage data from this product, when automatically restoring.<br>Usage: This allows parameters from the old IO-Link device to be carried over from this product, when replacing an IO-Link device with a new device. |
| Input-related | Input hold time | SIO*1 | This function holds ON for the specified time once the input signal turns ON.<br>Usage: This ensures that even SIO input signals with a short ON time are transmitted to the field network master. The hold time can be increased for situations where the sensor ON time is short and the field network master cannot reliably pick up that the sensor is ON. |
| | Input filter time | SIO*1 | This function sets a filter to eliminate input signal noise.<br>Usage: This can eliminate erroneous input caused by noise or erroneous sensor detection on workpiece edges, etc. |

| Category | Function | I/O assignment settings | Product functions |
|---|---|---|---|
| | Encoder input (high-speed counter function) | SIO*2 | The high-speed counter function can be used by connecting the incremental encoder with open collector output to this product as an SIO device.<br>Assign phase A and phase B (and phase Z, if required) to each port with PNP or NPN input in SIO mode. This assignment is specified using the Master Unit parameter *M18. Pulse input*.<br>The port numbers assigned to phase A, phase B, and phase Z must be in continuous order (if phase A is n, phase B must be n+1 and phase Z must be n+2).<br><br>• When using phase A and phase B as input (regardless of whether phase Z is used)<br>The count is multiplied by four, and the count value will be 13 bits per rotation with 32 bits for the rotation count.<br>The count maximum frequency is 250 kpps.<br>a) Count values of one rotation or lower will fit in one word (two bytes) on the process input data side of the port assigned to phase A.<br>b) 32 bits for the rotation count will fit in two words (four bytes) from the second word (+4) on the process input data side of the port assigned to phase A.<br><br>• When using only phase A as input<br>The count is doubled, the count value is 45 bits, and it is input in 3 words on the process input data side (however, this product can only display up to 32 bits).<br><br>In all above cases, the current count value of 3 words (6 bytes) is cleared when the *reset encoder counter* (output byte address +2, bit address 6) rises from 0 (OFF) to 1 (ON).<br>Note that the count current value mentioned above is the value when the cyclic communication data of the field network is updated. |
| Status monitoring-related | Number of IO-Link communication errors | IO-Link mode | This counts the number of IO-Link communication errors on each port.<br>Usage: This can be used when diagnosing IO-Link communication quality based on the number of communication errors. |
| | I/O power supply flag | IO-Link mode | This function monitors whether the I/O power supply is on or off.<br>Usage: This monitors whether the product I/O power supply is on or off. |
| | I/O power supply voltage | IO-Link mode | This function can be used to check the voltage supplied to the I/O power supply. (Unit: 0.1 V)<br>Usage: This monitors the voltage of the product I/O power supply. |
| | Output overcurrent flag | SIO*1 | This function turns RX15 (hexadecimal value) ON when there is a PNP/NPN output overcurrent.<br>Usage: An output overcurrent occurs when this flag is ON, so this can be used to discover issues such as a short circuit in the load. |
| | Total operation hours of IO-Link Master Unit | IO-Link mode or SIO*1 | This function can be used to check the cumulative operating time since this product was first turned ON. (Unit: hours)<br>Usage: This can be used for product maintenance. |
| | Display drive time | IO-Link mode or SIO*1 | This function can be used to check the cumulative operating time since the front display on this product was turned ON. (Unit: hours)<br>Usage: This can be used for product maintenance. |
| | Internal temperature | IO-Link mode or SIO*1 | This function can be used to check the internal temperature of this product. (Unit: 0.1°C)<br>Usage: This can be used for product maintenance. |

*1. SIO: Either mode of PNP input, NPN input, PNP output or NPN output

*2. SIO: Either mode of PNP input or NPN input

# 5

# Front Panel Operations

This chapter describes how to operate the front panel of this product.

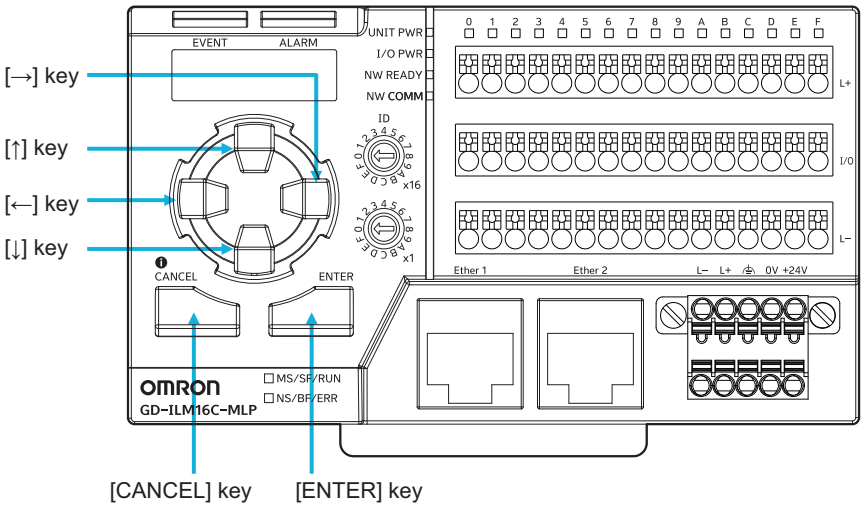
# 5-1 Front Panel Operations

## 5-1-1 Overview of Display Operations

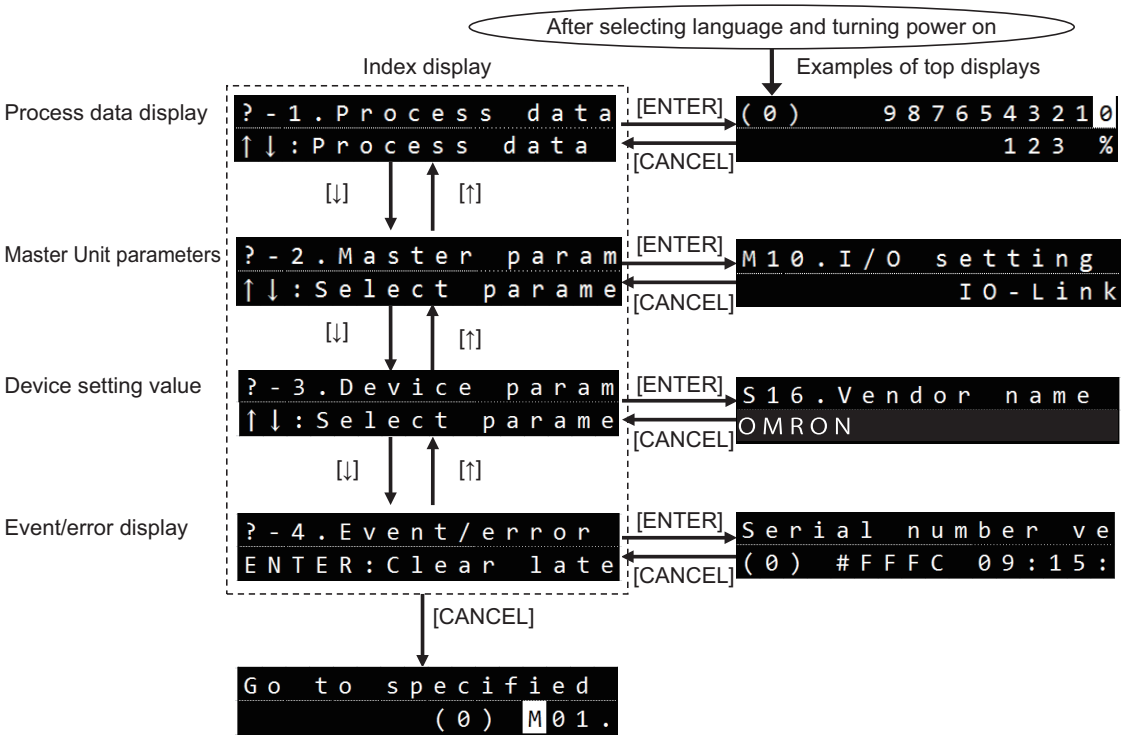
The following display operations can be made through the front panel of this product.

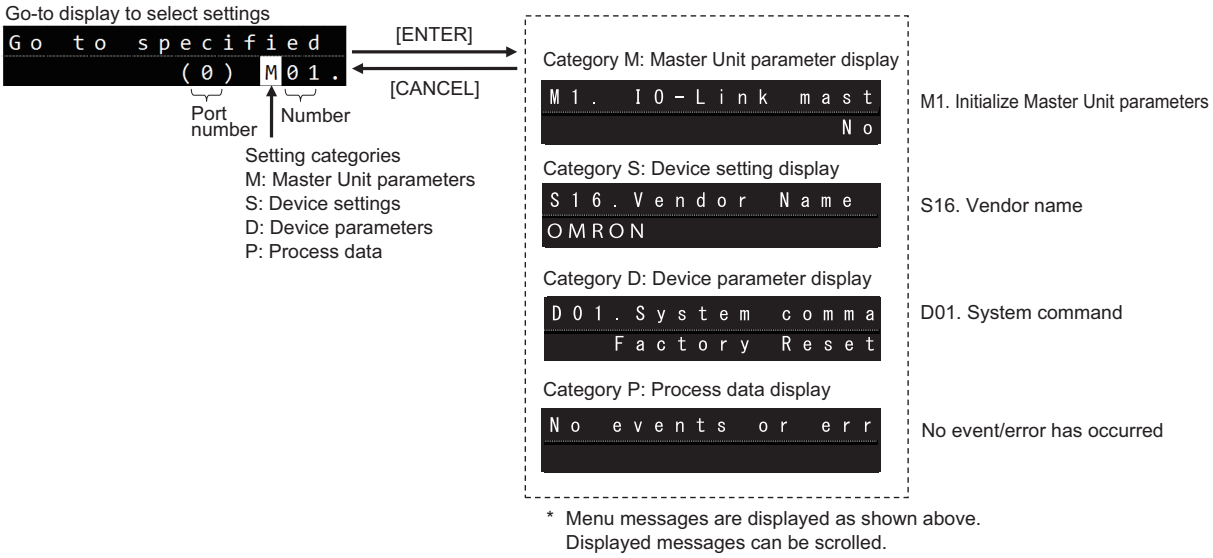
- Process data display
- Master Unit parameter display
- Device setting display
- Event/Error Display

The displays are operated, using the following keys.




**Note** The above figure is for GD-ILM16C-MLP. The same applies to GD-ILM16E-MLP.





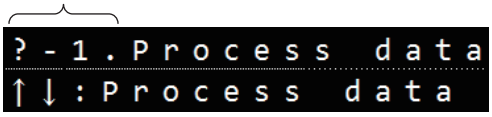

* Menu messages are displayed as shown above.
Displayed messages can be scrolled.

## 5-1-2 Process Data Display

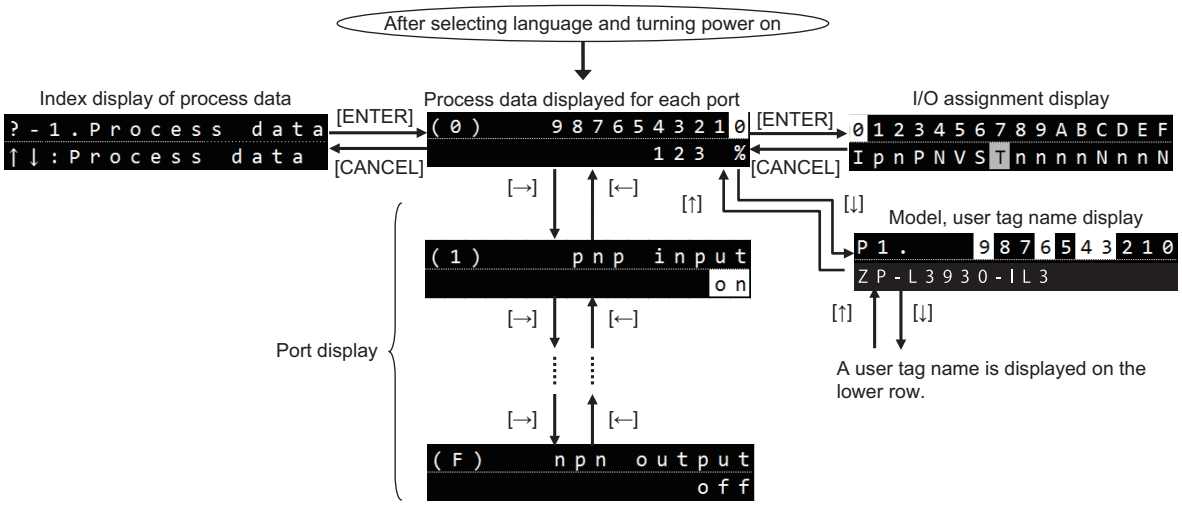
I/O assignment or process data is displayed.

Index display:

Menu number

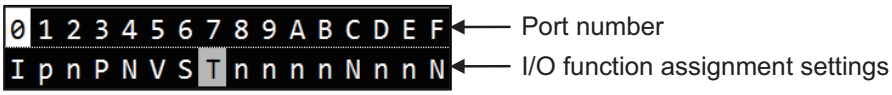



Menu transition:




## I/O Assignment Display

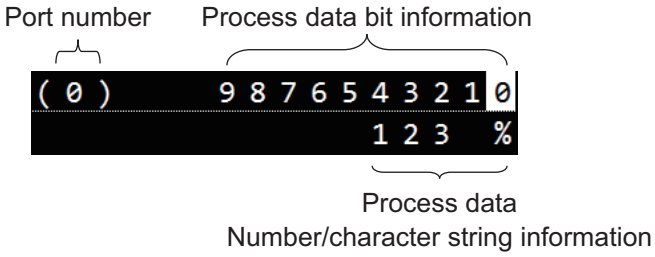
This display shows the I/O assignment setting (and device validation status) for each port, as well as any current IO-Link communication errors or validation errors.




The I/O assignment and device validation settings for each port are displayed using the following codes beneath the port number.
I: IO-Link mode (no validation) note: This blinks, when an IO-Link device is not connected or there is a communication error
V: IO-Link mode (validation/Type ID)
S: IO-Link mode (validation/serial number)
T: IO-Link mode (validation/model name)
p: PNP input mode
n: NPN input mode
P: PNP output mode
N: NPN output mode
—: Unused

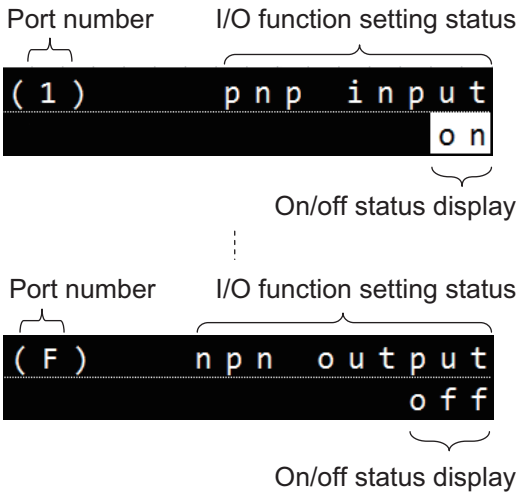
In IO-Link mode, the IO-Link device connection status, communication status and device validation status are indicated by blinking the following characters.
I blinking: An IO-Link device is not connected or there is a communication error.
V blinking: An IO-Link device with different type ID (vendor ID or device ID) is connected.
S blinking: An IO-Link device with different type ID (vendor ID or device ID) or serial number is connected.
T blinking: An IO-Link device with different type ID (vendor ID or device ID) or model name is connected.
If I, V, S or T are shown as a lowercase letter (i, v, s or t), it indicates that the process input data of the IO-Link device is invalid.

## Process Data Display




The display shown above is displayed upon power on, after language setting.
The following are displayed on the upper row.
Left: Port number (0 to F)
Right: Process data bit information (up to 10 bits)
Pressing the ↑ and ↓ keys switches the lower row as follows.
- Process input data (hexadecimal)
- Process output data (hexadecimal)

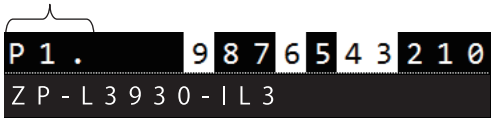
Examples:




Process data switch/product type/user tag name display

Examples:

Process data input number (starting from P1.), process data output number (starting from Q1.)




The following are displayed on the upper row.

Left: P☐: (process input data number), Q☐: (process output data number)

**Note** Numbers are assigned continuously including P and Q.
The display will switch to “(0)” for approximately one second after transitioning to this menu. If IO-Link device process data for port x was being displayed, “(x)” will be displayed.

Right: Process data bit information (up to 10 bits)

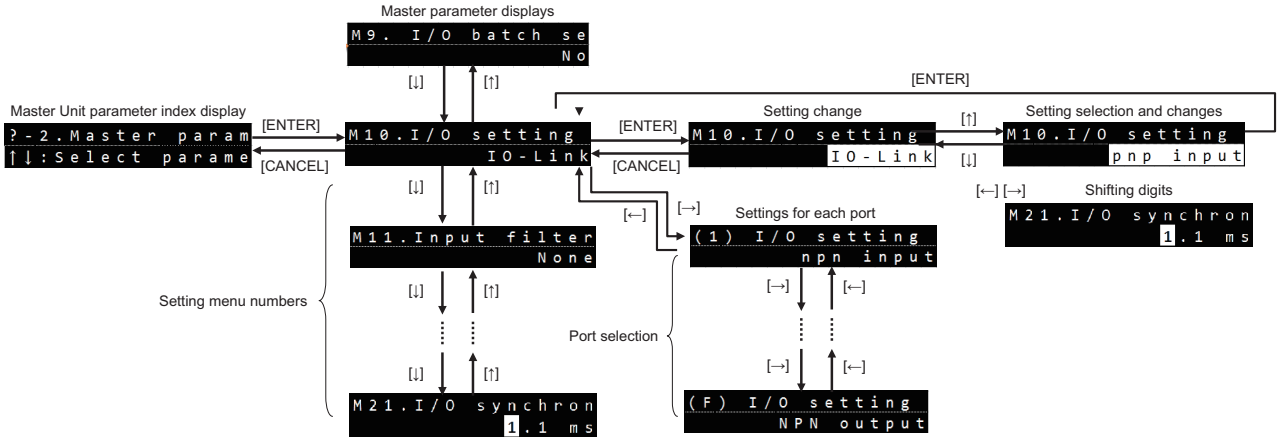
The model number or user tag name is displayed in the lower row.

## 5-1-3 Master Unit Parameter Display

Through the operations of front panel of this product, the Master Unit parameters, user settings, of this product can be edited and monitored.

Index display:


Display transition:




**Note M5. Language** will be displayed, when the power is turned on for the first time. Refer to *2-4-2 Language* on page 2-13 for further information.

Description of each display:

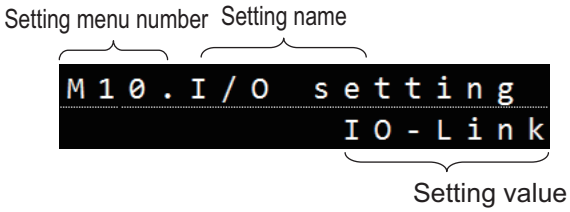
The followings are displayed on the upper row.

Left: M□: Setting menu number of this product

Right: Setting name

The setting value is displayed on the lower row.

Examples:




Port settings

Examples:

Port number display (will switch to port number display when the port is switched or five seconds have passed).


## 5-1-4 Master Unit Parameter List with Product Front Panel Operations

The following shows the Master Unit parameters with product front panel operations.

| Setting Items (setting value number following by setting name) | R/W | Setting for product or port | Setting value range | Description |
|---|---|---|---|---|
| M1. IO-Link Master Unit parameters reset | RW | This product | No (default value) | Do not reset Master Unit parameters to factory default. |
| | | | IO-Link | Resets Master Unit parameters to factory default. The I/O assignment settings will be changed to IO-Link mode for all ports.<br>The registered vendor ID, device ID, serial number and storage data will also be deleted.<br>The network type, network number and language will not be reset to the factory defaults. |
| | | | pnp input | Resets Master Unit parameters to factory defaults with the I/O assignment settings set to PNP input mode for all ports. |
| | | | npn input | Resets Master Unit parameters to factory defaults with the I/O assignment settings set to NPN input mode for all ports. |
| | | | PNP output | Resets Master Unit parameters to factory defaults with the I/O assignment settings set to PNP output mode for all ports. |
| | | | NPN output | Resets Master Unit parameters to factory defaults with the I/O assignment settings set to NPN output mode for all ports. |
| | | | Not used | Resets Master Unit parameters to factory defaults with the I/O assignment settings set to unused for all ports. |
| | | | Delete IODD | Delete the installed IODD data. Parameters will not be reset to the factory defaults. |
| | | | Factory defaults | Resets settings (including network settings and language) to the factory defaults. I/O assignment settings will be changed to unused. IODD data is not deleted. |
| M2. Network type | RW | This product | EtherNet/IP (default value) | *EtherNet/IP* is used for the field network type. |
| | | | Ethernet & Modbus/TCP | Uses *Ethernet and Modbus TCP/IP, UDP/IP* for the field network type. |
| | | | CC-Link IEF Basic | Uses *CC-Link IE Field Basic* for the field network type. |
| M4. Display brightness | RW | This product | 5 to 100% (default value: 35%) | Set the brightness of the display. |
| M5. Language | RW | This product | English (default value) | Set the display language to English. |
| | | | Japanese | Set the display language to Japanese. Shift-JIS is used for the character code. |
| | | | German | Set the display language to German. |
| | | | Simplified Chinese | Set the display language to Chinese (simplified). GB2312 is used for the character code. |
| | | | French | Set the display language to French. |
| | | | Spanish | Set the display language to Spanish. |
| | | | Portuguese | Set the display language to Portuguese. |
| | | | Italian | Set the display language to Italian. |
| | | | Korean | Set the display language to Korean. EUC-kr is used for the character code. |
| | | | Traditional Chinese | Set the display language to traditional Chinese. Big-5 is used for the character code. |
| M6. Time zone -UTC- | RW | This product | -24 to 24 (Default value: 0) | Set the time zone displayed as the network time (setting value number: M65). If the network time set in the host is based on UTC, setting the time zone to 9.00 will display the time in Japan time (JST).<br>**Note** The date will be written differently from the values set in the field network. |

| Setting Items (setting value number following by setting name) | R/W | Setting for product or port | Setting value range | Description |
|---|---|---|---|---|
| M8. User tag name of this IO-Link Master Unit | RW | This product | Up to 32 characters | Set the user tag name for this product. |
| M9. I/O batch setting | RW | All ports | No (default value) | |
| | | | IO-Link | Change I/O assignment settings for all ports to IO-Link mode. |
| | | | pnp input | Change I/O assignment for all ports to PNP input mode. |
| | | | npn input | Change I/O assignment for all ports to NPN input mode. |
| | | | PNP output | Change I/O assignment for all ports to PNP output mode. |
| | | | NPN output | Change I/O assignment for all ports to NPN output mode. |
| | | | Not used | Change I/O assignment for all ports to unused. |
| M10. I/O setting | RW | Each port | IO-Link | Connect the IO-Link device to the applicable port and perform control using process data. |
| | | | pnp input | Connect a PNP output device to the applicable port. |
| | | | npn input | Connect an NPN output device to the applicable port. |
| | | | PNP output | Connect a PNP input device to the applicable port. |
| | | | NPN output | Connect an NPN input device to the applicable port. |
| | | | Unused (default value) | Turn input OFF and output nothing for the applicable port. |
| M11. Input filter time | RW | Each port | None (default value) | The noise filter (on delay) is not used. |
| | | | 0.1 ms | Set the denoise filter for 0.1 ms for PNP/NPN inputs, detecting pulse widths of exceeding 0.1 ms. |
| | | | 1 ms | Set the denoise filter for 1 ms for PNP/NPN inputs, detecting pulse widths of exceeding 1 ms. |
| | | | 5 ms | Set the denoise filter for 5 ms for PNP/NPN inputs, detecting pulse widths of exceeding 5 ms. |
| | | | 10 ms | Set the denoise filter for 10 ms for PNP/NPN inputs, detecting pulse widths of exceeding 10 ms. |
| | | | 20 ms | Set the denoise filter for 20 ms for PNP/NPN inputs, detecting pulse widths of exceeding 20 ms. |
| M12. Input hold time | RW | Each port | None (default value) | The input hold is not used. |
| | | | 1 ms | Holds an input for 1 ms upon its turn on. |
| | | | 15 ms | Holds an input for 15 ms upon its turn on. |
| | | | 100 ms | Holds an input for 100 ms upon its turn on. |
| M13. IO-Link and network error handling | RW | Each port | Clear (default value) | Clear process input data to “0” when communication with the IO-Link device is disconnected. Clear process output data to “0” and turn PNP/NPN output OFF when field network is disconnected. |
| | | | Input hold | Hold process input data when communication with the IO-Link device is disconnected. Turn output OFF. |
| | | | Output hold | Hold process output data and PNP/NPN output when field network is disconnected. Turn input OFF. |
| | | | All hold | Hold process input data when communication with the IO-Link device is disconnected. Hold process output data and PNP/NPN output when field network is disconnected. |

| Setting Items (setting value number following by setting name) | R/W | Setting for product or port | Setting value range | Description |
|---|---|---|---|---|
| M16. Bit assignment of Process input data | RW | Each port | Valid judgment | Turns ON the digital input bit for the corresponding port when the IO-Link device's process input data is valid. |
| | | | 0 (default value) to 254 | Specifies which bit from the first bit of the process input data defined as boolean (bit) data in the IO-Link device's process input data information to use as the input ON/OFF information.<br>Data formats other than Boolean, such as Integer, cannot be specified. |
| M17. Input port to output | RW | Each port | None (default value) | Turns ON or OFF the PNP/NPN output based on the process output data bit information. |
| | | | 0 to 15 | Turns ON or OFF the PNP/NPN output based on the input bit information for "the specified port number + 1". Use this when the IO-Link device's process input data bit information needs to be output as-is to the outside. |
| M18. Pulse input | RW | Each port | None | Does not use the counter function. |
| | | | ABZ | Uses all of phase A, phase B, and phase Z of the incremental encoder.<br>The rotation count is incremented or decremented at the rising edge of the Z phase, with the count value cleared.<br>The count value is incremented at both the rising edge and falling edge of the input pulse. |
| | | | AB | Uses only phase A and phase B of the incremental encoder.<br>The count value is incremented at both the rising edge and falling edge of the input pulse. |
| | | | Single | The count value is incremented at both the rising edge and falling edge of the input pulse. |
| | | | Frequency | Measures the frequency of the single-phase pulse input in units of 1 Hz every second. |
| | | | High response | This is used when a high-speed response is required.<br>It measures the frequency of the AB-phase or single-phase pulse input at the rising edge of each input cycle. |
| M19. Input inversion | RW | Each port | None | Passes the input status of the specified port as-is to the inside. |
| | | | Reverse | Passes the input status of the specified port to the inside after reversing it. |

| Setting Items (setting value number following by setting name) | R/W | Setting for product or port | Setting value range | Description |
|---|---|---|---|---|
| M21. I/O synchronization | RW | Each port | Asynchronous (default value) | IO-Link communication is made at the fastest communication time of each device.<br>The digital I/O status is updated as needed.<br>If anything other than *Asynchronous* is set for the setting value, the actual cycle time for IO-Link will be the same or longer compared with asynchronous. The IO-Link cycle time value written to the IO-Link device will be the asynchronous value. |
| | | | network synchronization | For future reservations. The behavior is the same as asynchronous. |
| | | | 0.4 ms synchronous timer | Use the internal timer of this product to synchronize (I/O synchronization) IO-Link communication or digital I/O transfer among multiple ports with the same settings, at a cycle of 0.4, 0.8, 1.6, 3.2 or 6.4 ms.<br>The built-in timer is used to synchronize IO-Link communication and PNP/NPN input/output transfer at intervals of 0.4/0.8/1.6/3.2/6.4 ms. Write the network time from the host field network periodically to synchronize with the network time.<br>The synchronous timer calculates data under 4 seconds for the network time counted every 15.26 µs as ×625÷256 and converts it to a time in 6.25 µs increments, with the lower 10 bits (0 - 1023) as the timer value from 0 to 6.4 ms.<br>The *Synchronization establishment flag* turns ON when the internal timer of this product is synchronized with the network time (within +/-20 µs) (If the field network type is *Ethernet & Modbus/TCP*, the *Synchronization establishment flag* does not exist). |
| | | | 0.8 ms synchronous timer | |
| | | | 1.6 ms synchronous timer | |
| | | | 3.2 ms synchronous timer | |
| | | | 6.4 ms synchronous timer | |
| | | | 0.4 - 100.0 ms | Specify the IO-Link communication cycle time.<br>This will be asynchronous with the network. |
| M22. Lowest frequency | RW | Each port | 27.2 Hz | Measures the lowest frequency with a cycle of 16 rising edges of the pulse input. This ensures stable measured values with improved frequency measurement resolution, although the measurable lowest frequency is 27.2 Hz. |
| | | | 13.6 Hz | Measures the lowest frequency with a cycle of 8 rising edges of the pulse input. |
| | | | 6.8 Hz | Measures the lowest frequency with a cycle of 4 rising edges of the pulse input. |
| | | | 3.4 Hz | Measures the lowest frequency with a cycle of 2 rising edges of the pulse input. |
| | | | 1.7 Hz | Measures the lowest frequency with a cycle of 1 rising edges of the pulse input. |
| M29. Device ID | RW | Each port | 0 - FFFFFF h | This is the device ID of the IO-Link device used with *M30. Device validation*.<br>There is normally no need to set this. However, it may be possible to switch functionality for some IO-Link devices by changing the registered device ID here. To do so, specify the registration device ID here in hexadecimal. If the setting value is changed, the IO-Link device communicates from the beginning. |

| Setting Items (setting value number following by setting name) | R/W | Setting for product or port | Setting value range | Description |
|---|---|---|---|---|
| M30. Device validation | RW | Each port | None (default value) | Communicate unconditionally with the connected IO-Link device. The registered type ID (vendor ID and device ID) will also be deleted.<br>**Note 1.** If there is already storage data in this product, the type ID of the connected IO-Link device will be compared with the type ID of the storage data when the power (module power supply and I/O power supply) is turned ON, even if this is set to *None*. An error (FF23h) will be generated if they differ.<br>**Note 2.** An error (FFFB h) will not occur even if IO-Link communication is established 10 seconds after I/O power supply is turned ON. |
| | | | Type ID | Transfer process data only if the device is the same as the registered type ID (vendor ID and device ID).<br>If the type ID differs, an error (FFFE h) will occur and process data with the applicable IO-Link device will be invalidated.<br>When the setting value is written, the type (vendor ID and device ID), model name sum value and serial number of the connected IO-Link device will be registered.<br>**Note 1.** An error (FFFB h) will occur if IO-Link communication is not established within 10 seconds after I/O power supply is turned ON.<br>**Note 2.** The revision ID will also be verified. |
| | | | Serial number | Transfer process data only for devices where the serial number is the same as the registered type (vendor ID and device ID).<br>If the type ID differs, an error (FFFE h) will occur and process data with the applicable IO-Link device will be invalidated.<br>If the serial number differs, an error (FFFC h) will occur and process data will be invalidated. Automatic restore will be performed if the automatic restore setting is activated.<br>When the setting value is written, the type (vendor ID and device ID), model name sum value and serial number of the connected IO-Link device will be registered.<br>**Note 1.** An error (FFFB h) will occur if IO-Link communication is not established within 10 seconds after I/O power supply is turned ON.<br>**Note 2.** The revision ID will also be verified. |

| Setting Items (setting value number following by setting name) | R/W | Setting for product or port | Setting value range | Description |
|---|---|---|---|---|
| | | | Type name | Transfer process data only if the device is the same as the registered type (vendor ID and device ID) and model name.<br>If the type ID differs, an error (FFFE h) will occur and process data with the applicable IO-Link device will be invalidated.<br>If the model name differs, an error (FFF4 h) will occur and process data will be invalidated. Automatic restore will be performed if the automatic restore setting is activated.<br>When the setting value is written, the type (vendor ID and device ID), model name sum value and serial number of the connected IO-Link device will be registered.<br>**Note 1.** An error (FFFB h) will occur if IO-Link communication is not established within 10 seconds after I/O power supply is turned ON.<br>**Note 2.** The revision ID will also be verified. |
| M31. Automatic device parameter backup | RW | Each port | None (default value) | Restore and backup are not automatically performed. Storage functionality is controlled manually (M32. Device parameter backup/restore). |
| | | | Backup | Automatically perform a backup (upload parameters to this product) when there is a change to an IO-Link device setting value.<br>If IO-Link device parameters are changed from this product, the backup operation will automatically start 10 seconds after the last change.<br>**Note** If a device with a different vendor ID or device ID is connected, a backup will be performed each time upon startup. Re-configure *M30. Device validation* immediately to clear the validation error (FFFE h). |
| | | | Restore | Automatically restore (download parameters from this product to the IO-Link device) if the IO-Link device parameters differ from the data stored on this product during startup.<br>In this case, note that even if the IO-Link device set value is changed, it will be overwritten at the next startup with the data saved in this product. |
| | | | Both | Automatically perform both backup and restore.<br>The storage data stored on this product will always match the IO-Link device parameters.<br>In other words, IO-Link device parameters are backed up to this product whenever they are changed. If any parameter is different from the IO-Link device during startup, the parameters stored in this product will be restored. |
| | | | Update | Saves a backup of the IO-Link device settings as storage data without generating an error even if the device ID of the connected IO-Link device differs from the device ID stored in this product. Note that connecting an incorrect IO-Link device accidentally allows the backup of the IO-Link device's settings to overwrite the existing storage data. |

| Setting Items (setting value number following by setting name) | R/W | Setting for product or port | Setting value range | Description |
|---|---|---|---|---|
| M32. Device parameter backup/restoration | RW | Each port | No (default value) | Manual backup/restore of parameters is not performed. |
| | | | Backup | Manually backup the IO-Link device (upload parameters from the device to this product). |
| | | | Restore | Manually restore to the IO-Link device (download parameters from this product to the device).<br>**Note** This will not be performed if there is no backup data stored in this product. |
| | | | Delete | Delete backup data stored in this product.<br>**Note** This will not be performed if there is no backup data stored in this product. |
| M33. Conditions for applying IODD data | RW | Each port | Device | For the GD Series, this function cannot be used because IODD installation is not supported. |
| | | | IODD (default value) | |
| M40. Process input data words allocation | RW | Each port | 0 to 16 Words<br>(Default value: Depends on the *M2. Network type* setting.<br>**For EtherNet/IP**: 16 words<br>**For CC-Link IE Field Basic** or **For socket communication via Ethernet & Modbus/TCP**: 2 words<br>**For Modbus TCP/UDP communication with Ethernet & Modbus/TCP**: This setting is irrelevant.) | Set the number of words allocated to this product for the process input data of the applicable IO-Link device.<br>• If the set number of words is 0, the process input data for that port will not be assigned.<br>• If the number of set words is smaller than the number of bytes of the process input data for the connected IO-Link device, process input data exceeding the set size will be ignored (it will not be transferred from the IO-Link device to this product).<br>• If the number of set words is larger than the number of bytes of the process input data for the connected IO-Link device, “0” will be transferred in the portion of data exceeding the size of the process input data from the IO-Link device to this product. |
| M41. Process output data words allocation | RW | Each port | 0 to 16 Words<br>(Default value: 2 words regardless of the network type.<br>However, **Using Ethernet & Modbus/TCP and Modbus TCP/UDP communication**: This setting is irrelevant.) | Set the number of words allocated to this product for the process output data of the applicable IO-Link device.<br>• If the set number of words is 0, the process input data for that port will not be assigned.<br>• If the number of set words is smaller than the size of the process output data for the connected IO-Link device, “0” will be transferred in the portion of the process output data exceeding the set size from this product to the IO-Link device.<br>• If the number of set words is larger than the size of the process output data for the connected IO-Link device, the portion of data exceeding the size of the process output data will be ignored (it will not be transferred from this product to the IO-Link device). |
| M42. Process data words auto allocation | RW | This product | No (default value) | Automatic allocation of process data word is not performed. |
| | | | Yes | Word allocation for process input/output data (setting value number: M40/M41) will be automatically set according to the specified amount of process input/output data for the connected IO-Link device.<br>Perform this with the required IO-Link device connected and all IO-Link communication established.<br>“0” will be written for the number of process input/output data allocation words on any ports without IO-Link communication established. |

| Setting Items (setting value number following by setting name) | R/W | Setting for product or port | Setting value range | Description |
|---|---|---|---|---|
| M43. Process data LSB/MSB | RW | Each port | Little endian LSB (default value) | Accesses the process data of the IO-Link device by converting it into little-endian format starting from the lower byte (LSB). |
| | | | Big endian MSB | Accesses the process data of the IO-Link device as-is in big-endian format. |
| | | | Little endian MSB | Accesses the process data of the IO-Link device by converting it into little-endian format starting from the upper byte (MSB). |
| | | | Swap bytes | Accesses the process data of the IO-Link device by swapping the upper and lower bytes in units of one word (two bytes). |
| M44. Timestamp | RW | This product | No (default value) | Time and parity data are not added to process input data. |
| | | | Serial | Attach the serial time when the process input data was obtained and store it as three-word data, after process input data is allocated.<br>The serial time is a value where the first one word is the result of dividing one second by 65536 (= 15.2 µs). The remaining two words are used as data to count each second (with Jan. 1, 1970 00:00 as “0”). |
| | | | Time | Attach the time and date taking the time zone -UTC- (setting value number: M6) against the network time when process input data was obtained into consideration, and store it as four-word BCD format data, after process input data is allocated.<br>This is a value where the first one word is the result of dividing one second by 65536 (= 15.2 µs). The remaining three words are six bytes of data containing in order the seconds, minutes, hours, day and month. |
| | | | Serial + Parity | Store the parity information from the process input data and time information as one word following the serial time described above.<br>Parity information is a value determined by running exclusive OR (XOR) at the individual word level for 35AC h, process input data and time information.<br>Time information is used to prevent data falsification. |
| | | | Time + parity | Store the parity information from the process input data and time information as one word following the time described above.<br>Parity information is a value determined by running exclusive OR (XOR) at the individual word level for 35AC h, process input data and time information.<br>Time information is used to prevent data falsification. |
| M51. IO-Link cycle time -Process value- | R | Each port | 0.1 ms increments | Actual cycle time with an IO-Link device |
| M52. IO-Link transmission rate | R | Each port | Not used | Communication is not established with the IO-Link device. |
| | | | COM1(4800 bps) | Communicating over COM1 with the IO-Link device. |
| | | | COM2(38.4 kbps) | Communicating over COM2 with the IO-Link device. |
| | | | COM3(230.4 kbps) | Communicating over COM3 with the IO-Link device. |
| M53. IO-Link communication error | R | Each port | 0 to 255 | The number of communication errors with the IO-Link device. This will be cleared, when the data is overwritten or the power is turned on again. |

| Setting Items (setting value number following by setting name) | R/W | Setting for product or port | Setting value range | Description |
|---|---|---|---|---|
| M54. ISDU checksum error | R | Each port | 0 to 255 | The number of ISDU communication checksum errors with the IO-Link device. This will be cleared, when the data is overwritten or the power is turned on again. |
| M55. IO-Link transmission rate error | R | Each port | 0.1% increments | The communication speed measurement error for the IO-Link device. Check the number of communication errors if the measurement error is ±3% or larger. |
| M56. IO-Link signal width error | R | Each port | 0.1% increments | The ON/OFF ratio measurement error for IO-Link device communication signals. Check the number of communication errors if the measurement error is ±20% or larger. |
| M57. IO-Link communication mode | R | Each port | NOCOM | IO-Link has not started communication. |
| | | | STARTUP | Reading basic information for the IO-Link device. The process will stop here if there is a revision ID error. |
| | | | PREOPERATE | In a state prior to exchanging process data. |
| | | | OPERATE | Exchanging process data and operating. |
| | | | STARTUP(Rev.1.0) | Same as above.<br>However, this indicates the IO-Link device has a revision ID of 1.0 (10 h). |
| | | | PREOPERATE (Rev.1.0) | |
| | | | OPERATE(Rev.1.0) | |
| M58. Storage backup time | R | Each port | Time and date | Display the time when storage data was backed up.<br>This will be displayed as “00:00:00 00/00/00” if there is no backup data.<br>The date will be written as YY/MM/DD (for Japanese, Korean, Chinese and Traditional Chinese), MM/DD/YY (for English) or DD/MM/YY (other languages). |
| M60. System program version of IO-Link Master Unit | R | This product | P.PPNNLLFF | Display the data version of the program, etc.<br>P.PP: Firmware, NN: Network chip, LL: Logic, FF: Font |
| M61. Total operation hours of IO-Link Master Unit | R | This product | Displayed in 0.1 hour increments | Display the total cumulative operation time of this product since the power was first turned ON. This is counted internally in 7.5 minute increments, so any time under 7.5 minutes when the power is turned OFF will be discarded. |
| M62. Display drive time | R | This product | Displayed in 0.01 hour increments | Displays the time that the display has been activated, since the first power on. This is counted internally in 56 second increments, but is written to memory every 7.5 minutes (as with the operation hours). After 100 hours have elapsed, the display automatically turns off, after 10 minutes any key on this product is not operated. |
| M63. I/O power supply voltage | R | This product | 0.1 V increments | Display the voltage of the I/O power supply. The measurement accuracy is +/-5%. |
| M64. Internal temperature | R | This product | 0.1°C increments | Display the internal temperature. The measurement accuracy is +/-2°C. |
| M65. Network time | R | This product | Time and date | Displays the time and date in consideration of the M6. Time zone in the network time. The date will be written as YY/MM/DD (in Japanese and Chinese), MM/DD/YY (in English) or DD/MM/YY (other languages). |
| M66. Network communication cycle | R | This product | 0.00 to 150.00 ms | Display the cycle at which process data is sent to and received from the field network.<br>It will be forced to operate at a 150 ms cycle if the field network is disconnected. |

| Setting Items (setting value number following by setting name) | R/W | Setting for product or port | Setting value range | Description |
|---|---|---|---|---|
| M67. Network timeout time | RW | This product | 0 to 30000 | This is valid only when *M2. Network type* is *Ethernet & Modbus/TCP*.<br>When Ethernet communication stops and the specified time elapses, a *network communication stop error* (FFFA h) occurs.<br>The time is specified in 10 ms increments from 0 to 30000 (300 seconds).<br>The default value is 0. If the value is 0, even if Ethernet communication is interrupted, the data is considered to have been updated internally at about 10 ms cycle and no error occurs. An error will occur if the Ethernet cable is disconnected. |
| M80. Default gateway | RW | This product | 0.0.0.0 to 255.255.255.255 | Set if otherwise specified on the field network. If not, keep the default value.<br>The default value is 0.0.0.0.<br>This is valid only when *M2. Network type* is *EtherNet/IP*, *CC-Link IE Field Basic* or *Ethernet & Modbus/TCP*. |
| M81. Subnet mask | RW | This product | 0.0.0.0 to 255.255.255.255 | Set if otherwise specified on the field network. If not, keep the default value.<br>The default value is 255.255.255.0.<br>This is valid only when *M2. Network type* is *EtherNet/IP*, *CC-Link IE Field Basic* or *Ethernet & Modbus/TCP*. |
| M82. IP address | RW | This product | 0.0.0.n to 255.255.255.n | Set the first to third octets of IP address of this product to any value. The fourth octet (n) can only be set with the rotary switch.<br>The initial value for the product's IP address is 192.168.250.n.<br>Turning the front rotary switches of this product while the power is on will automatically switch to *M82. IP address* setting window.<br>This is valid only when *M2. Network type* is *EtherNet/IP*, *CC-Link IE Field Basic* or *Ethernet & Modbus/TCP*. |
| C1. Device reset | W | Each port | No (default value) | Reset is not performed. |
| | | | Reboot | Send system command 80 h to the IO-Link device. |
| | | | Application reset | Send system command 81 h to the IO-Link device. |
| | | | Initialize parameters | Send system command 82 h to the IO-Link device. |
| | | | Back-to-box | Send system command 83 h to the IO-Link device. |

**Note 1.** M29 and M52 through M66 described above will not be displayed using the up and down keys in the Master Unit parameter menu. Enter the setting value number directly to navigate. The up and down keys can be used to select for 10 minutes after navigating.

**Note 2.** Supplementary explanation for *M43. Process data LSB/MSB*
The following examples illustrate how the storage order of byte data differs depending on the setting when IO-Link process data is converted into words.

Setting
Little endian LSB *default
Big endian MSB
Little endian MSB
Swap bytes

IO-Link device process data (when the number of bytes is **even**)

| Byte |
|---|
| n+0 |
| n+1 |
| n+2 |
| n+3 |
| n+4 |
| n+5 |

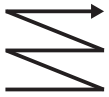
Example: 6 bytes in total

Endianness of the IO-Link Master Unit process data after word conversion

| Word | Upper | Lower |
|---|---|---|
| N+0 | n+4 byte | n+5 byte |
| N+1 | n+2 byte | n+3 byte |
| N+2 | n+0 byte | n+1 byte |

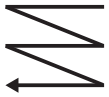
Master Unit parameter M43. Process data

**Little endian LSB *default**



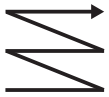
| Word | Upper | Lower |
|---|---|---|
| N+0 | n+1 byte | n+0 byte |
| N+1 | n+3 byte | n+2 byte |
| N+2 | n+5 byte | n+4 byte |

**Big endian MSB**



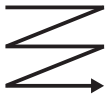
| Word | Upper | Lower |
|---|---|---|
| N+0 | n+4 byte | n+5 byte |
| N+1 | n+2 byte | n+3 byte |
| N+2 | n+0 byte | n+1 byte |

**Little endian MSB**



| Word | Upper | Lower |
|---|---|---|
| N+0 | n+0 byte | n+1 byte |
| N+1 | n+2 byte | n+3 byte |
| N+2 | n+4 byte | n+5 byte |

**Swap bytes**



IO-Link device process data (when the number of bytes is **odd**)

| Byte |
|---|
| n+0 |
| n+1 |
| n+2 |
| n+3 |
| n+4 |

Example: 5 bytes in total

Endianness of the IO-Link Master Unit process data after word conversion

| Word | Upper | Lower |
|---|---|---|
| N+0 | n+3 byte | n+4 byte |
| N+1 | n+1 byte | n+2 byte |
| N+2 | 0x00 (Fixed) | n+0 byte |

Master Unit parameter M43. Process data

**Little endian LSB *default**

| Word | Upper | Lower |
|---|---|---|
| N+0 | n+1 byte | n+0 byte |
| N+1 | n+3 byte | n+2 byte |
| N+2 | 0x00 (Fixed) | n+4 byte |

**Big endian MSB**

| Word | Upper | Lower |
|---|---|---|
| N+0 | n+4 byte | 0x00 (Fixed) |
| N+1 | n+2 byte | n+3 byte |
| N+2 | n+0 byte | n+1 byte |

**Little endian MSB**

| Word | Upper | Lower |
|---|---|---|
| N+0 | n+0 byte | n+1 byte |
| N+1 | n+2 byte | n+3 byte |
| N+2 | n+4 byte | 0x00 (Fixed) |

**Swap bytes**

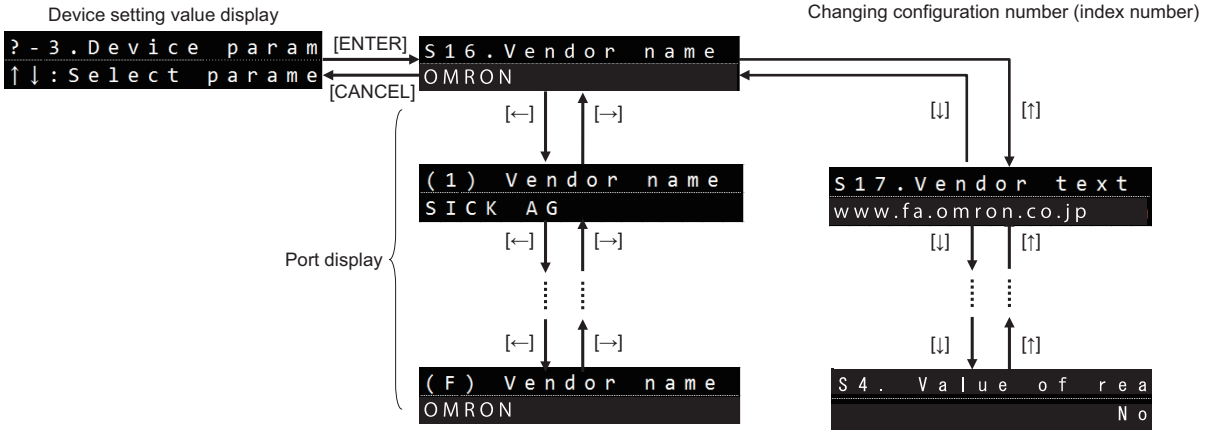
## 5-1-5 Device Identification Display

Device information from each IO-Link device can be confirmed and a specified index number can be read and written by this product.

Index display:


(Not displayed if an IO-Link device is not connected)

Menu transition:




Description of each display:

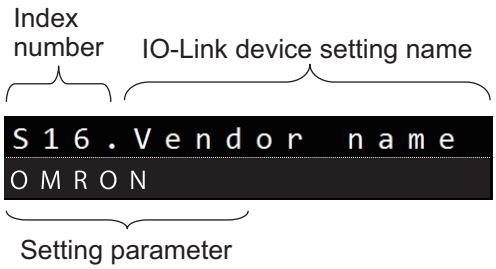
The followings are displayed on the upper row.

Left: S☐ (IO-Link device index number)

Right: Setting name

The setting value is displayed on the lower row.

Example:




### Device Information Confirmation

The following device information of standard indexes can be read.

### ● Standard Indexes

| Setting (upper row) | Description | Read-only: R, Read/write: R/W |
|---|---|---|
| S16. Vendor name | Read the value of index 16 (vendor name) and display it as a character string. | R |
| S17. Vendor text | Read the value of index 17 (vendor text) and display it as a character string. | R |
| S18. Product type | Read the value of index 18 (product name) and display it as a character string. | R |
| S19. Product ID | Read the value of index 19 (product ID) and display it as a character string. | R |
| S20. Product function | Read the value of index 20 (product text) and display it as a character string. | R |
| S21. Serial number | Read the value of index 21 (serial number) and display it as a character string. | R |
| S22. Hardware revision | Read the value of index 22 (hardware revision) and display it as a character string. | R |
| S23. Firmware revision | Read the value of index 23 (firmware revision) and display it as a character string. | R |
| S24. User tag name | Read the value of index 24 (application specific tag) and display it as a character string. | R/W |

### ● Manual Setting of Setting Data (For a Specified Index Number)

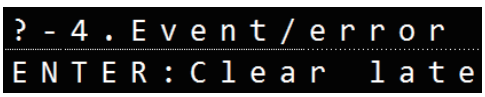
As shown below, an index number can be specified, and its setting data can be read and written manually.

| Setting (upper row) | Description | Read-only: R, Read/write: R/W |
|---|---|---|
| S1. Index to read | Specifies an index number directly to access a device. (Access to the index number 3 is restricted by the IO-Link specifications.) | R/W |
| S2. Subindex | Next, specify the subindex number directly. | R/W |
| S3. Type of index | Specify the setting value data type of the index to access.<br>Select either signed number, signed integer, character string or hexadecimal floating point number (read-only). | R/W |
| S4. Read data | Read data is displayed. "----------" will be displayed if a read error occurs.<br>Press the ENTER key to edit the setting value.<br>Press the ENTER key again to write that setting value. | R/W |

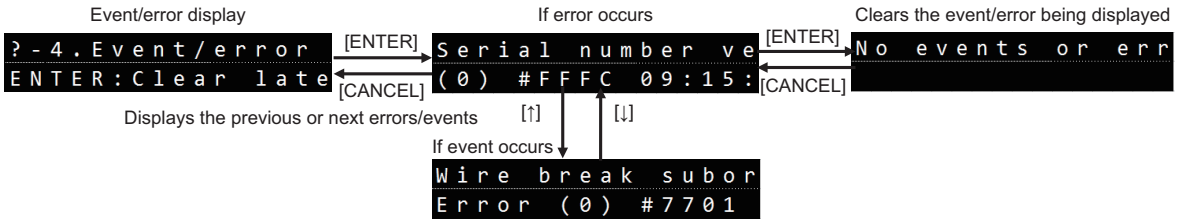
## 5-1-6 Event/Error Display

The event code/event name for the latest and six most recent events can be read from the IO-Link device, along with the error code/error message of present error.

Index display:

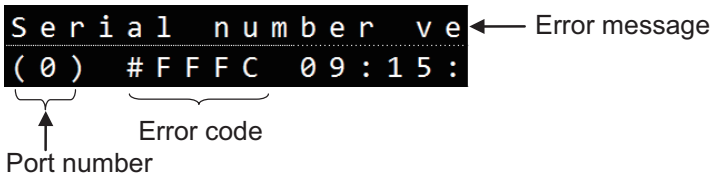



Menu transition:




If an error

Example:




The error message is displayed on the upper row.

The followings are displayed on the lower row.

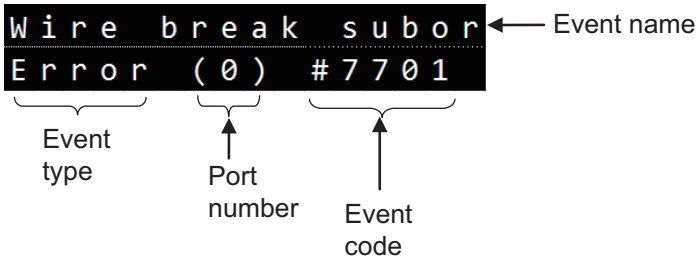
Left: Port number (0 to F)

Right: Error code (#) and error time (example: #FFFC 09:00:59 20/06/24)

**Note** The index number and subindex number that caused the error will be displayed after the error code and before the error time on the row beneath the error message (*Invalid index number*), as shown below.
Example: Index=0064-01 (index number: 0064, subindex number: 01)

If an event

Example:




The event name is displayed on the upper row.

The followings are displayed on the lower row.

Left: Event type (notification, error or warning)

Center: Port number (0 to F)

Right: Event code (#) and event time (example: #7701 09:00:59 20/06/24)

Clears the event/error being displayed

The following is an example where no errors or events have occurred.


A message indicating no errors/events is displayed on the upper row.

# 6

# Specifications

This chapter describes the specifications of this product.

# 6-1 Specifications

## 6-1-1 General Specifications

| Item | | GD-ILM16C-MLP | GD-ILM16E-MLP |
|---|---|---|---|
| Number of ports | | 16 | |
| Power supply voltage | | 24 VDC +/-15% (SELV and LIM power supplies, or UL 1310 Class 2 power supplies) | |
| Current consumption (Only Master Unit) | | 195 mA or less | |
| Maximum current of the port | | 0.2 A or less per 1 port, 2.5 A or less per 16 port | |
| Maximum power current | | 8 A (Total of unit power supply and I/O power supply) | |
| Insulation resistance | | 20 MΩ or more (between external power supply and unit power supply at 500 VDC) | |
| Connectors | Field network | 2x RJ45 Socket | |
| | Power supply | Spring-clamp terminal block, 5-pole, 2-row | |
| | Input/output | 3x 16-channel spring-clamp terminal blocks | 16x e-CON sockets, 4 poles |
| Indicators | | POWER LED (blue green), EVENT LED (yellow), ALARM LED (red), I/O LED (orange) | |
| Display | | OLED (Display language: English, Japanese, Simplified Chinese, Traditional Chinese, Korean, French, Spanish, German, Portuguese, Italian) | |
| Field network | | • EtherNet/IP<br>• Ethernet & Modbus/TCP<br>• CC-Link IE Field Basic<br>(Switch in settings) | |
| I/O assignment | | Switchable in the following 6 modes by setting for each port:<br>• Unused (default)<br>• IO-Link communication mode<br>• SIO (PNP input) mode<br>• SIO (NPN input) mode<br>• SIO (PNP output) mode<br>• SIO (NPN output) mode | |
| IO-Link communication specifications | IO-Link revision | 1.1 | |
| | Communication speed | COM1 (4800 bps)/COM2 (38400 bps)/COM3 (230.4 kbps) | |
| | Physical layer | IO-Link-compliant | |
| | Minimum cycle time | 0.3 ms | |
| | Data | Periodic: Process data, Status<br>Aperiodic: Devices data, Event | |
| Input Specifications | Rated input voltage | 24 VDC +/-20% (SELV and LIM power supplies, or UL 1310 Class 2 power supplies) *1 | |
| | Voltage and current at ON | PNP: 15 VDC or more, 5.5 mA or more<br>NPN: Power supply voltage-13 VDC or less, 3.0 mA or more | |
| | Voltage and current at OFF | PNP: 10 VDC or less, 2.0 mA or less<br>NPN: Power supply voltage-8 VDC or more, 2.0 mA or less | |
| | Input resistance | PNP: 5.5 mA rated current circuit load, NPN: 4.7kΩ | |
| | Input filter time | 0 ms (default), 0.1 ms, 1 ms, 5 ms, 10 ms, 20 ms | |

| Item | | GD-ILM16C-MLP | GD-ILM16E-MLP |
|---|---|---|---|
| Output Specifications | Rated load voltage | 10.8 to 26.4 VDC (SELV and LIM power supplies, or UL 1310 Class 2 power supplies)*1 | |
| | Maximum output load current | 0.2 A per 1 port, 2.5 A per 16 port | |
| | Overcurrent protection current | Current limiting (0.5A) by Overcurrent protection function | |
| | OFF output leakage current | PNP: 0.1 mA or less<br>NPN: 0.2 mA or less | |
| | Residual Voltage | PNP: 1.8 V or less<br>NPN: 1.6 V or less | |
| | Output response time | 0.1 ms or less | |
| Environmental resistance | Operating/Storage temperature | Operating: 0 to 55°C, Storage: -25 to +75°C (no freezing or condensation) | |
| | Operating/Storage humidity | Operating/Storage: 5 to 95% RH (no condensation) | |
| | Vibration resistance | IEC 61131-2 compliant<br>Vibration frequency: 5 to 8.4 Hz, single amplitude: 3.5 mm<br>Vibration frequency: 8.4 to 150 Hz, acceleration: 10m/s$^2$ (1.0 G)<br>Number of sweeps: 10 times each in 3 directions along X, Y, and Z axes | |
| | Shock resistance | IEC 61131-2 compliant<br>Peak acceleration: 150m/s$^2$ (15 G), 3 times each in 3 directions along X, Y, and Z axes (total of 18 times) | |
| | Operating environment | No corrosive gas | |
| | Operating altitude | 0 to 2000 m | |
| | Installation location | In door use | |
| | Degree of protection | IP20 | |
| Overvoltage category | | II or less | |
| Pollution degree | | 2 or less | |
| Equipment class | | Class I | |
| Material | | Case: PC, keys/DIN rail mounting hook: POM, terminal block: PA | |
| Weight | | Approx. 195 g (including terminal blocks, when not wired) | |
| Included accessories | | Instruction manual, compliance sheet, power terminal block, 2x RJ45 connector protective cap (attached to unit), 3x device terminal block | Instruction manual, compliance sheet, power terminal block, 2x RJ45 connector protective cap (attached to unit) |

*1. Use a Class 2 power supply or a power supply compliant with SELV (Safety Extra-Low Voltage) circuit and LIM (Limited Energy Circuit) circuit standards.

## 6-1-2 Field Network Communication Specifications

### EtherNet/IP Communication Specifications

| Item | Specifications |
|---|---|
| | GD-ILM16□-MLP |
| Host Network Communication Protocol | EtherNet/IP |
| Applicable version | EtherNet/IP adapter |
| Authentication version | CT21 |
| Conforming standard | IEEE802.3u |

| Item | Specifications |
|---|---|
| | GD-ILM16□-MLP |
| Transmission speed | 10 Mbps (10BASE-T), 100 Mbps (100BASE-TX) |
| Cable | Twisted pair cable (STP), Category 5, 5e or higher |
| Ethernet Connection Type | Star configuration, linear bus configuration, device level ring configuration |
| Distance between nodes | Within 100 m |
| IP address configuration | Static IP address only |
| Cyclic Communication (Implicit Message) | Class1 service |
| Acyclic Communication (Explicit Message) | • Class3 message<br>• UCMM |
| Support objects | • Identity object<br>• Message Router object<br>• Assembly object<br>• Connection Manager object<br>• DLR object<br>• QoS object<br>• TCP/IP Interface object<br>• Ethernet Link object<br>• This unit's object<br>• IO-Link device object connected to this unit |
| Reset service | • Type0<br>• Type1 |
| Maximum no. of connections | Class1: 5, Class3: 8, UCMM:8 |
| Packet interval (RPI) | 1-3200 ms |
| Unit Allowable Communications Band Width | 1000 pps |
| EtherNet/IP Product Internal Response Time | 0.6 ms or less |
| Extended access function | This function uses cyclic communication to read and write settings for this product and IO-Link devices. Host master side programs can be simplified. |
| Other functions | • ACD (Address Conflict Detection)<br>• DLR (Device Level Ring)<br>• Auto Negotiation<br>• Auto MDIX<br>• Quick Connect |

## Ethernet & Modbus/TCP Communication Specifications

| Item | Specifications |
|---|---|
| | GD-ILM16□-MLP |
| Host network communication protocol | Modbus TCP/UDP communication or Ethernet socket communication |
| Conforming standard | IEEE802.3u |
| Transmission speed | 10 Mbps (10BASE-T), 100 Mbps (100BASE-TX) |
| Cable | Twisted pair cable (STP), Category 5, 5e and above |
| Ethernet connection type | Star configuration, linear bus configuration |

| Item | | Specifications |
|---|---|---|
| | | GD-ILM16□-MLP |
| Modbus communication | Master (client)/Server | Operates as a Modbus server |
| | Transport layer protocol | TCP or UDP |
| | Port number | 502 (common to TCP/IP and UDP/IP) |
| | Corresponding function code | 3, 6, 16, 23 |
| | Register number | 400001 to 465536 |
| | Distance between nodes | Within 100 m |
| | IP address setting | Static IP address only |
| | Number of connectable units | Number of units that can be connected from one Modbus/TCP master: It depends on the specifications of the Modbus/TCP master |
| | Number of simultaneous connections | Modbus/TCP: 2<br>Modbus/UDP: 4 |
| Socket communication | Transport layer protocol | TCP or UDP |
| | Port number | 2001 (common to TCP/IP and UDP/IP) |
| | IP address setting | Static IP address only |
| | Number of simultaneous connections | TCP/IP: 2<br>UDP/IP: 4 |

## CC-Link IE Field Basic Communication Specifications

| Item | | Specifications |
|---|---|---|
| | | GD-ILM16□-MLP |
| Host network communication protocol | | CC-Link IE Field Basic communication, socket communication (UDP/IP, TCP/IP), or Modbus/TCP |
| Conforming standard | | IEEE802.3u |
| Transmission speed | | 100 Mbps (100BASE-TX) |
| Cable | | Twisted pair cable (STP), Category 5, 5e or higher |
| Ethernet connection type | | Star configuration, linear bus configuration |
| Cyclic communication | Method | CC-Link IE Field Basic cyclic transmission |
| | By station type | Slave station |
| | Number of occupied stations | 1 |
| | Distance between nodes | Within 100 m |
| | IP address setting | Static IP address |
| | Product standard response time | 0.6 ms |
| | Extended access function | This function uses cyclic communication to read and write settings for this product and IO-Link devices. Host master side programs can be simplified. |
| | Port number | • Cyclic data transmission: 61450 (UDP)<br>• Node connection: 61451 (UDP) |

| Item | | Specifications |
|---|---|---|
| | | GD-ILM16□-MLP |
| Acyclic communication | Method | Socket communication (UDP/IP or TCP/IP) or Modbus/TCP communication |
| | Access target | Both socket communication and Modbus/TCP: Reading and writing of setting values is possible, as well as reading of process data (writing to process data is not applicable).<br>**Note** Socket communication setting values background access mode is possible. |
| | Number of simultaneous connections | • Socket communication (UDP/IP: 4, TCP/IP: 1)<br>• Modbus/TCP communication: 2 |
| | IP address setting | Static IP address |
| | Port number | • Socket communication: 2001 (both TCP and UDP)<br>• Modbus/TCP communication: 502 |

# 6-2 Data Processing Time

## 6-2-1 Access Time to IO-Link Parameters via IO-Link ISDU Handling

When IO-Link ISDU handling is used to write IO-Link device parameters, the time required for writing will depend on the IO-Link cycle time and the data length of the IO-Link device parameters to write. Although this does not include the delay time for acyclic communication of field network itself, this delay will not have much of an effect.

Expect data writing to take 10 ms at the fastest IO-Link cycle time.
This time may exceed 100 ms if the data length is long or the IO-Link cycle time is slow.

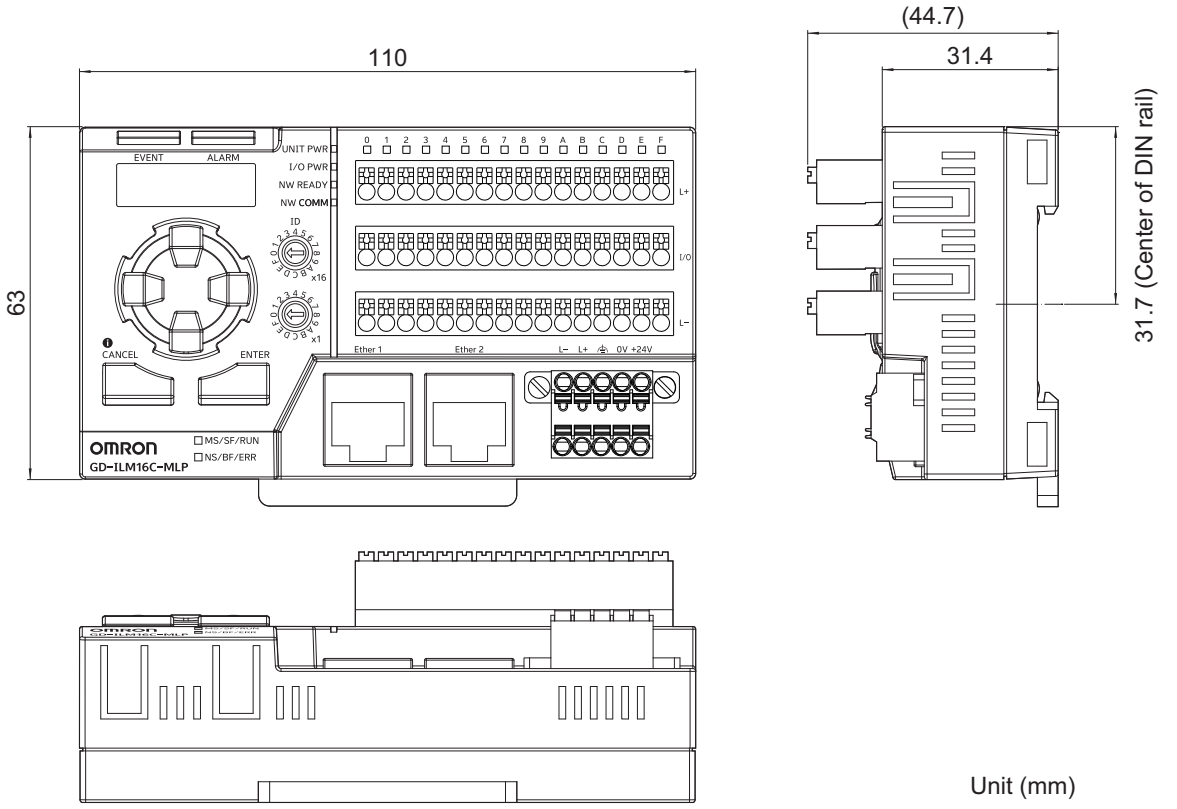
Examples are shown below.

| Item | Read example | | | Write example | | |
|---|---|---|---|---|---|---|
| Index number to access*1 | 40 | 80 | 1000 | 41 | 80 | 1000 |
| Subindex number to access*2 | 0 | 1 | 0 | 0 | 1 | 0 |
| Number of data bytes to access*3 | 4 bytes | 4 bytes | 8 bytes | 2 bytes | 4 bytes | 16 bytes |
| Busy count until IO-Link device returns response | 1 | 1 | 1 | 1 | 1 | 1 |
| Actual cycle time for IO-Link communication | 0.6 ms | 1 ms | 2 ms | 0.6 ms | 1 ms | 2 ms |
| Number of bytes for on-request data for IO-Link device (1, 2, 8, 32) | 1 byte | 1 byte | 1 byte | 1 byte | 1 byte | 1 byte |
| Number of command and checksum bytes | 5 bytes | 6 bytes | 7 bytes | 5 bytes | 6 bytes | 7 bytes |
| Number of cycles required for access | 10 | 11 | 16 | 8 | 11 | 25 |
| Resulting time until access is complete | 6 ms | 11 ms | 32 ms | 4.8 ms | 11 ms | 50 ms |

*1. Index numbers 256 and above are specified as three bytes regardless of the subindex number.
*2. This will be specified as two bytes if the index number is 255 or lower and the subindex number is not 0.
*3. If the number of command and checksum bytes is 16 or higher (including the specified number of index number bytes described above and the number of bytes to write) when written, the number of bytes will be increased by one to specify the number of bytes. When reading, if the number of bytes to read is 14 or higher, the number of bytes will be increased by one to specify the number of bytes.

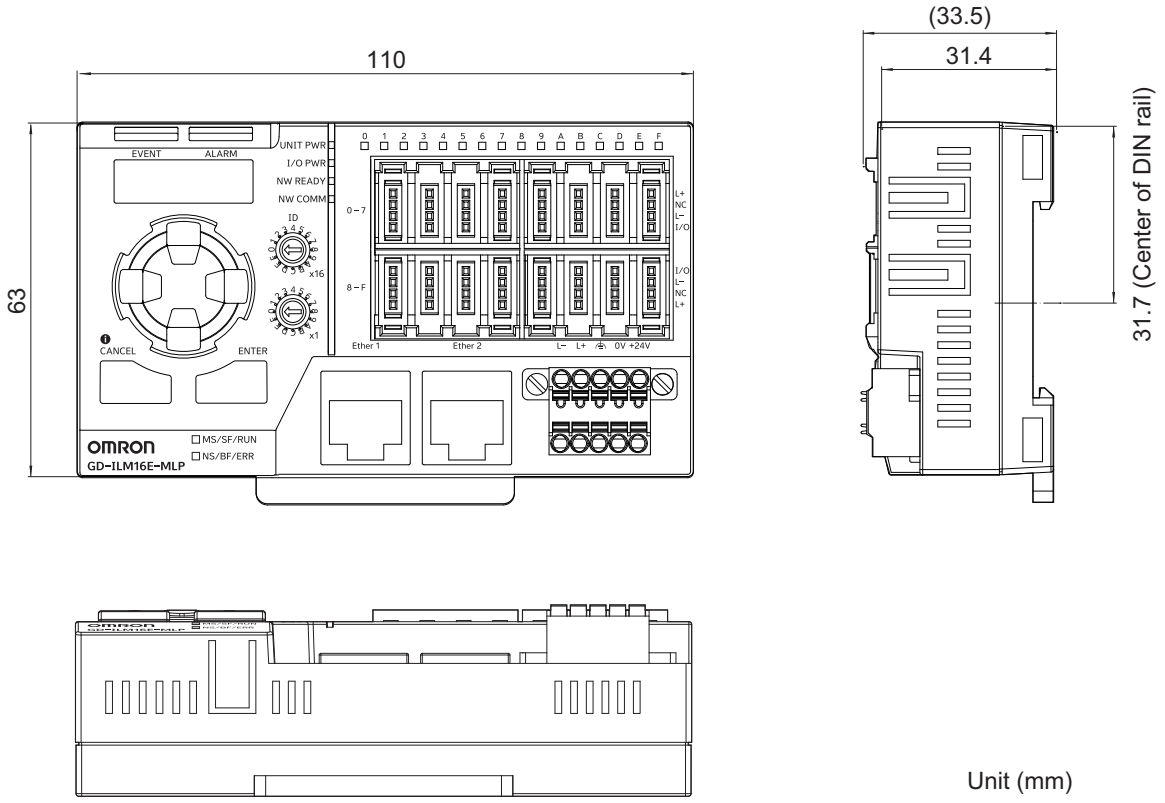
# 6-3 Dimensions

## GD-ILM16C-MLP




Unit (mm)

## GD-ILM16E-MLP




Unit (mm)

# 7

# Troubleshooting

This chapter describes what you need to know for use of this product, such as troubleshooting.

# 7-1 Troubleshooting

## 7-1-1 Troubleshooting Based on LEDs

| Front LEDs (on this product) | Status | Procedure |
|---|---|---|
| POWER | | |
| Off | Power is not supplied to this product correctly | Check and resolve the following potential causes of power interruption. Restart this product according to the specifications of the connected field network master.<br>• Are the power cables connected correctly?<br>• Are the power cables broken?<br>• Is the power supply voltage within the specified range?<br>• Is the power capacity sufficient?<br>• Is the power supply faulty? |

| Front LEDs (on this product) | Status | Procedure |
|---|---|---|
| Ether1 or Ether2 | | |
| Off | Network cable is disconnected | Check whether the Ether1 or Ether2 network cable is disconnected. |

| Front LEDs (on this product) | | Status | Details | Procedure |
|---|---|---|---|---|
| EVENT | ALARM | | | |
| Flashing yellow | - | Event occurring in IO-Link device | An event has occurred in the IO-Link device connected to a port.<br>The *Event flag* (assigned to byte address +2 and bit address 7) also turns ON. The applicable port is also stored in *Latest event port* (assigned to byte address +2 and bit address 0 to 3). | The event code can be read using the following procedures.<br>• Using acyclic communication of field network master, read from *Read event data* in Master Unit parameters<br>or,<br>• Check the *Event/error display window* on the front of this product<br><br>Then, implement the required measures based on the event code of each IO-Link device. |
| - | Flashing red | Error occurring in this product | An error has occurred in this product.<br>The *Error flag* (assigned to byte address +2 and bit address 7) also turns ON. The applicable port is also stored in (byte address +3 and bit address 0 to 3). | The error code can be read using the following procedures.<br>• Using acyclic communication from field network master, read from *Read latest error code by port* in Master Unit parameters<br>or,<br>• Check the *Event/error display window* on the front of this product<br><br>Refer to *7-1-3 Error Code List* on page 7-5 and implement the required measures. |

## 7-1-2 Troubleshooting Based on Symptoms

| Symptom | Front LEDs (on this product) | Cyclic communication flag | Error code (hexadecimal) | Probable cause | | Procedure |
|---|---|---|---|---|---|---|
| Unable to communicate (IO-Link communication) with an IO-Link device | I/O PWR OFF | I/O power supply flag OFF | - | I/O power supply error | I/O power supply OFF error | Confirm the voltage at the Device terminal block (L+) or power terminal block. |
| | | | | | Below 12 V. | |
| | ALARM LED flashing red | IO-Link ready flag OFF and error flag ON | 1001 (after IO-Link communication has been established once) | IO-Link communication error | The IO-Link cable is disconnected. | Confirm that the IO-Link cable is connected. |
| | | | | | The IO-Link cable is shorted. | |
| | | | | | The IO-Link device has failed. | Replace the IO-Link device. |
| Data sent to/received from an IO-Link device via IO-Link communication cannot be read/written properly by field network master | ALARM LED OFF | - | - | Process data was read and written when IO-Link communication was not properly established with the IO-Link device. | The IO-Link ready flag was not read as an execution condition. | Read process data with the IO-Link ready flag ON. |
| | | | | | IO-Link ready flag is not written as an execution condition. | Write process data with the IO-Link ready flag ON. |
| | | | | When process data (in bytes) in the IO-Link device is expanded into words in the field network master, the high-order/low-order bytes are reversed. | Depending on the type of IO-Link device, process data from the low-order byte in the IO-Link device must be allocated as words in order from the low-order byte to the low-order word in the field network master, when process data stored in bytes in the IO-Link device is allocated to the field network master. | Change the setting of *Process data sequence conversion* in the Master Unit parameters of this product from the default of *Little endian* to *Big endian*. |
| | | | | Process data from an IO-Link device is not allocated to the field network master. | When used with the default value, the process output data of the connected IO-Link device exceeds 4 bytes. | • Set the following values to change the initial value of the process data of the corresponding port.<br>• Process data words auto allocation (setting value number: M42): Yes<br>or<br>• Process output data words allocation (setting value number: M41) |

| Symptom | Front LEDs (on this product) | Cyclic communication flag | Error code (hexadecimal) | Probable cause | | Procedure |
|---|---|---|---|---|---|---|
| | | | | | When changing the initial value, the total process output data of all connected IO-Link devices exceeds 32 words (64 bytes) while extended access is disabled. Or, it exceeds 28 words (56 bytes) while extended access is enabled. | • If there is process data that does not need to be allocated:<br>Ensure that the process data of all connected IO-Link devices does not exceed 32 words (64 bytes) or 28 words (56 bytes) for output. Set the following values and manually set the process data for each port (restrict and allocate the number of works for output for the IO-Link device on each port to this product).<br>• Process data words auto allocation (setting value number: M42): None<br>or<br>• Process output data words allocation (setting value number: M41)<br><br>• If there is no process data that does not need to be allocated:<br>Use an additional product to reduce the number of IO-Link devices connected to this product using IO-Link communication. |
| | EVENT LED flashing yellow | Event flag ON | - | Device event (error level) occurring in IO-Link device | | Check the event/error display window or send a noncyclic communication program from the field network master to read the event code. Refer to the manual for the IO-Link device being used and perform troubleshooting. |
| | ALARM LED flashing red | Error flag ON | FFFA | Field network communication stopped | | Confirm the status of the field network. |
| | | | FFFB | IO-Link device not connected | | Confirm that the applicable IO-Link device is connected.<br>Or, change the setting value for device validation (setting value number: M30) to *None*.<br>Or, set the I/O assignment settings (setting value number: M10) to a value other than *IO-Link* for any ports not connected to an IO-Link device. |
| | | | FF23 | The vendor ID or device ID differs between the stored data and the connected IO-Link device. | | Confirm the vendor ID and device ID of the applicable IO-Link device. Or, clear the storage data. |
| | | | FFF3 | The revision ID of the IO-Link device to validate is not registered in this product (00 h) | | Change the setting value for device validation (setting value number: M30) to *None*.<br>Or, register the revision ID of the IO-Link device to verify. |
| | | | FFF4 | IO-Link device validation error (model name mismatch) | | If the correct IO-Link device is currently connected, overwrite with this setting value (*Model name*) to re-register with the model name of the currently connected IO-Link.<br>Or, connect the correct IO-Link device. |

| Symptom | Front LEDs (on this product) | Cyclic communication flag | Error code (hexadecimal) | Probable cause | Procedure |
|---|---|---|---|---|---|
| | | | FFFC | IO-Link device validation error (serial number mismatch) | If the correct IO-Link device is currently connected, overwrite with this setting value (*Serial number*) to re-register with the serial number of the currently connected IO-Link device.<br>Or, connect the correct IO-Link device. |
| | | | FFFE | IO-Link device validation error (vendor ID or device ID mismatch) | If the correct IO-Link device is currently connected, overwrite with this setting value (*type ID*) to re-register with the vendor ID and device ID of the currently connected IO-Link device.<br>Or, connect the correct IO-Link device. |
| | | | 6001 | IO-Link device validation error (revision ID mismatch) | If the correct IO-Link device is currently connected, overwrite with this setting value (a value other than *None (default value)*) to re-register with the revision ID of the currently connected IO-Link.<br>Or, connect the correct IO-Link device. |
| Storage data cannot be restored to the IO-Link device using the manual backup/restore of settings or automatic device parameter backup functions. | ALARM LED flashing red | Error flag ON | FFFD | No backup data found in this product | Backup the parameters from the applicable IO-Link device to this product. |
| | | | FFFF | The type ID of the IO-Link device to restore does not match | Confirm the type ID of the applicable IO-Link device. |

## 7-1-3 Error Code List

| Code (hexadecimal) | Message | Conditions | Procedure |
|---|---|---|---|
| 1000 | No Service generated in ISDU handling | This occurs when the start code of the ISDU handling response used to access the parameters of the IO-Link device is “0” (No Service). | A setting value that is not supported by the IO-Link device is being accessed in this case.<br>This error may occur as an ISDU communication error when the power supply for the IO-Link device becomes unstable and turns OFF. In this case, correct the power supply capacity. |
| 1001 | IO-Link communication has stopped | This occurs when communication is established with an IO-Link device but then is disconnected.<br>This error does not occur if the I/O power supply is shutdown. The error is also automatically cleared if IO-Link communication is restored. | Check the wiring between the IO-Link device and this product. Check the I/O power supply. Confirm whether the issue is resolved after changing the connection to another port for this product or replacing the IO-Link device and cable. |
| 1100 | Timeout generated in ISDU handling | When using ISDU handling to access an IO-Link device setting value, no ISDU handling response is received even after five seconds have passed. | Confirm what you are trying to access on the IO-Link device (index number, write data, etc.). |

| Code (hexadecimal) | Message | Conditions | Procedure |
|---|---|---|---|
| 5600 | Checksum error generated in ISDU handling | When using ISDU handling to access an IO-Link device setting value, a mismatch occurs when calculating the checksum of the ISDU handling response. | This could be caused by noise between the IO-Link device and this product.<br>Resolve this through such means as using a separate conduit for the power line, or maintaining distance between the C/Q wires of other IO-Link devices (do not bundle wires together). Confirm that the cable between the IO-Link device and this product is not too long (over 20 m). |
| 5700 | Unregulated ISDU handling data length | This occurs when the data length of the ISDU handling response is either “0” or too long, when using ISDU communication to access an IO-Link device setting value. | |
| 6001 | Revision ID validation error | The revision ID registered in this product does not match the revision ID of the connected IO-Link device. Process data is not transferred and parameters are not accessed. | Change the setting value for device validation (setting value number: M30) to *None*. |
| 8033 | Setting value is too long | This occurs when the data length is too long, when using ISDU handling to access an IO-Link device setting value. | Write data using the data length specified for the IO-Link device. |
| FF23 | Storage data does not match the connected device vendor ID or device ID | This occurs when the value of the vendor ID or device ID of the connected IO-Link device differs from the stored storage data, when device validation (setting value number: M30) is set to *None* and storage data exists (however, this only occurs when power is turned ON). | If an IO-Link device with a vendor ID or device ID that differs from the storage data is connected, connect the correct IO-Link device.<br>If it is safe to delete the storage data stored on this product by port, write with device parameter backup/restore (setting value number: M32) set to *Delete*. |
| FF24 | Storage buffer overload | This occurs when setting value data is too long and cannot be stored, when backing up parameters from an IO-Link device.<br>The data length stored during backup will be *16 bytes + index 18 (model name) length + number of parameters to backup × 4 + total data length of parameters to backup*. This can be stored as long as it is 4,032 bytes or less. | Backup cannot be performed for the connected IO-Link device because the storage data is too large. |
| FF25 | Storage data access was blocked | This occurs when access to storage data is locked on the IO-Link device. | If this is required, release the lock setting (index number 12) on the IO-Link device. |
| FFEA | Duplicate IP address (only where the field network type is EtherNet/IP or Ethernet & Modbus/TCP) | A module with a duplicate IP address was connected. | Confirm the IP address of the connected module. |
| FFEB | Timeout generated in conflict with ISDU handling | While attempting to perform ISDU handling on the same IO-Link port, ISDU handling was being used elsewhere and communication could not be performed within a time 330 times the cycle time. | Storage takes some time, so wait a short while and try ISDU handling again (access by index number to IO-Link device). |
| FFEC | EEPROM write protection signal abnormality | The write protection signal is always permitted for the EEPROM used for saving parameters, etc. | This will not cause any immediate issues with operation. However, this indicates a hardware error and the hardware will need to be replaced. |
| FFED | Failure in EEPROM writing | Setting value, storage data and operation time writing failed. | There is something wrong with the connection to the EEPROM, or the EEPROM has reached its maximum number of writes. It can be rewritten 1,000,000 times. |
| FFEE | IO-Link trace has stopped automatically | This is a notification indicating that IO-Link tracing has stopped due to an error occurring or the buffer being full. | Read the IO-Link trace data and confirm communication information. |

| Code (hexadecimal) | Message | Conditions | Procedure |
|---|---|---|---|
| FFEF | Storage was interrupted | An error response was received from the IO-Link device while backing up to or restoring from storage, and the storage stopped operating.<br>Backed up data will not be saved. The data being restored may have partially been transferred to the IO-Link device. | Perform the storage operation (backup or restore) again.<br>If this occurs again, it may be due to noise. If so, resolve this through such means as using a separate conduit for the power line, or maintaining distance between the C/Q wires of other IO-Link devices (do not bundle wires together). Confirm that the cable between the IO-Link device and this product is not too long (over 20 m).<br>If this still occurs, it may be caused by the firmware of the IO-Link device or this product. If so, update or replace the firmware of the IO-Link device or this product. |
| FFF0 | Invalid data in setting value information | There is an invalid character in the setting value information provided by the IO-Link device, or a value exceeding the permitted value was specified. | This is caused by the firmware of the IO-Link device or this product. Update or replace the firmware of the IO-Link device or this product. |
| FFF1 | Writing firmware data is abnormal | An attempt to write invalid data was made when updating the firmware. | Firmware data to write is not correct. Reacquire the file and try again. |
| FFF3 | The revision ID of the IO-Link device to verify is not registered in this product. | This occurs when the revision ID registered to this product is “00 h”, when device validation (setting value number: M30) is set to a value other than *None*. | Change the setting value for device validation (setting value number: M30) to *None*.<br>Or, register the revision ID of the IO-Link device to verify. |
| FFF4 | IO-Link device model name is different | This occurs when the model name (index number 18 [product name] character string) of the registered IO-Link device differs from the model name of the device that is actually connected, when device validation (setting value number: M30) is set to *Type name*. Cyclic communication is not performed with the applicable IO-Link device. | Change the setting value for device validation (setting value number: M30) to a value other than *Type name*.<br>Or, connect the correct IO-Link device. |
| FFF5 | Unsupported setting value version | The version of the setting value data restored to setting value memory is new, and it may not be possible to recognize some of it. | Update the firmware of this product. |
| FFF6 | Internal temperature is too high | This occurs when the temperature of the main CPU exceeds 85°C. The error occurs every 10 minutes. | Lower the operating temperature of this product, install a cooling fan, or lower the output load current (for example, by using a separate relay). |
| FFF7 | EEPROM write frequency is too high | The setting value write count occurs under the following conditions.<br>• The count is cleared if nothing is written for 450 seconds.<br>• When writing twice with a frequency of once in less than 1 second.<br>• When writing 20 times with a frequency of 1 in less than 10 seconds.<br>• When writing 200 times with a frequency of 1 in less than 110 seconds. | Confirm whether setting value write operations are being performed frequently from the host PLC.<br>Confirm whether IO-Link device parameters are frequently rewritten, with automatic device parameter backup (setting value number: M31) set to *Backup* or *Both*. |
| FFF8 | Software version does not match | There is version incompatibility with the main firmware, field network communication firmware or IO-Link communication logic, and some functions may not operate normally. | Update the FPGA data of this product and the network chip firmware. |
| FFF9 | Network chip is not operating | This occurs when there is no communication between the main CPU and the chip that is performing field network processing. | The network chip may have failed, or power may have turned OFF while the network chip firmware was being updated. |

| Code (hexadecimal) | Message | Conditions | Procedure |
|---|---|---|---|
| FFFA | Network communication has stopped | This occurs when field network communication is established but then disconnected. The error will be automatically cleared when the status is restored. | Check whether the Ethernet cable is disconnected, the host PLC has been reset, or the power has turned OFF. Confirm the host PLC parameters. This product may stop being recognized on the network if host PLC network settings are changed. |
| FFFB | IO-Link device is not connected | This occurs when the IO-Link device is not connected under the following conditions.<br>• The IO-Link device is not connected when running storage functions (manual or automatic backup/restore of IO-Link device)<br>• Ten seconds elapse without the IO-Link device connecting after the I/O power supply is turned ON, when device validation (setting value number: M30) is set to a value other than *None*<br>• The IO-Link device is not connected when confirming device information or reading/writing a setting value number from the device parameters window<br>• The user switched to the device setting value window when connected to a device that does not support ISDU communication | Connect the IO-Link device properly.<br>Or, change the setting value for device validation (setting value number: M30) to *None*.<br>Or, set the I/O assignment settings (setting value number: M10) to a value other than *IO-Link* for any ports not connected to an IO-Link device. |
| FFFC | Serial number validation error | This occurs when the registered serial number differs from the serial number of the connected IO-Link device, when device validation (setting value number: M30) is set to *Serial number*. Cyclic communication is not performed with the applicable IO-Link device. | Change the setting value for device validation (setting value number: M30) to a value other than *Serial number*.<br>Or, connect the correct IO-Link device. |
| FFFD | No backup data | This occurs when storage data is not saved in this product, when restoring storage data to an IO-Link device. | A backup must be performed in order to perform a restore. Select *Backup* in device parameter backup/restore (setting value number: M32) and perform a backup. |
| FFFE | IO-Link device type ID is different | This occurs when the registered vendor ID or device ID differs from the value of the connected IO-Link device, when device validation (setting value number: M30) is set to a value other than *None*. Cyclic communication is not performed with the applicable IO-Link device. | Change the setting value for device validation (setting value number: M30) to *None*.<br>Or, connect the correct IO-Link device. |
| FFFF | Type ID of the device to restore is different | This occurs when the vendor ID or device ID differs when storage data is restored (manual restore or automatic restore) to an IO-Link device. | Connect the correct IO-Link device. |

*1. Errors will be ignored if the same error code occurs within one second on the same port.

*2. Up to 20 entries will be stored across all ports in the buffer used to store error information. Error information will begin being discarded beginning with the oldest entry when the number of entries exceeds 20.

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**OMRON Corporation** **Industrial Automation Company**

**Kyoto, JAPAN** **Contact : www.ia.omron.com**

***Regional Headquarters***

**OMRON EUROPE B.V.**
Wegalaan 67-69, 2132 JD Hoofddorp
The Netherlands
Tel: (31) 2356-81-300 Fax: (31) 2356-81-388

**OMRON ELECTRONICS LLC**
2895 Greenspoint Parkway, Suite 200
Hoffman Estates, IL 60169 U.S.A.
Tel: (1) 847-843-7900 Fax: (1) 847-843-7787

**OMRON ASIA PACIFIC PTE. LTD.**
438B Alexandra Road, #08-01/02 Alexandra
Technopark, Singapore 119968
Tel: (65) 6835-3011 Fax: (65) 6835-3011

**OMRON (CHINA) CO., LTD.**
Room 2211, Bank of China Tower,
200 Yin Cheng Zhong Road,
PuDong New Area, Shanghai, 200120, China
Tel: (86) 21-6023-0333 Fax: (86) 21-5037-2388

**Authorized Distributor:**



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