

GD Series

IO-Link Master Unit (Multi-Network Compatible)

User's Manual

CC-Link IE Field Basic Edition

GD-ILM□□□-MLP

IO-Link Master Unit



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Introduction

Thank you for purchasing the IO-Link Master Unit GD-ILM16C-MLP and GD-ILM16E-MLP.

This manual contains the information required when using *CC-Link IE Field Basic* as the host network. 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

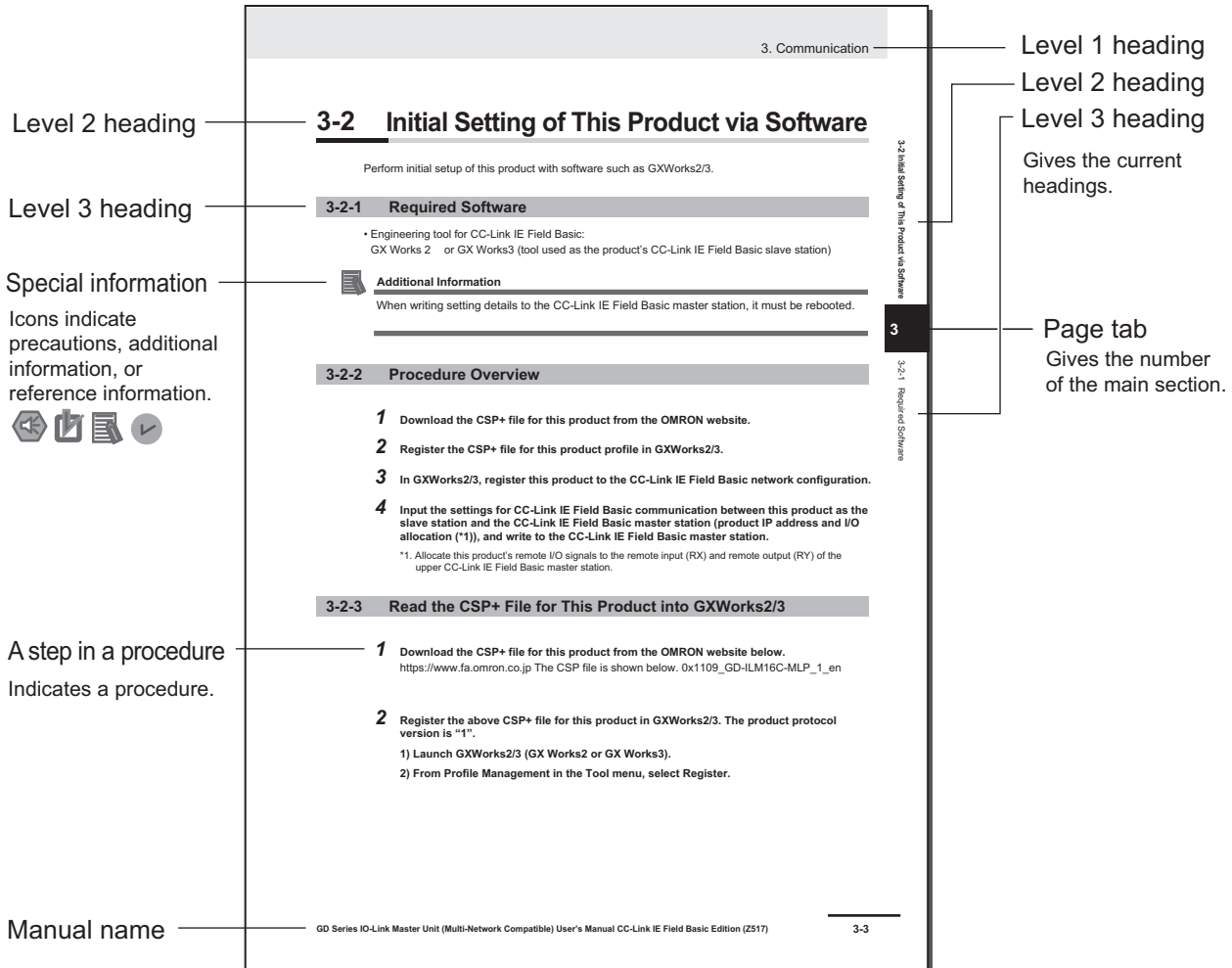
This manual covers the following product.

- 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.

Sections in this Manual

1	Overview	1
2	Product Initial Settings Related to CC-Link IE Field Basic	2
3	Communication	3
4	Specifications	4
5	Troubleshooting	5
A	Appendices	A
I	Index	I

CONTENTS

Introduction	1
Intended Audience	1
Applicable Products	1
Manual Structure.....	2
Page Structure	2
Special Information	2
Notations Used in this Manual	3
Sections in this Manual	5
Terms and Conditions Agreement.....	9
Warranty, Limitations of Liability	9
Application Considerations	10
Disclaimers	10
Statement of security responsibilities for assumed use cases and against threats.....	11
Safety Precautions.....	12
Precautions for Safe Use	13
Precautions for Correct Use	14
Regulations and Standards	15
Checking the Included Items	16
Related Manuals.....	17
Terminology.....	18
Revision History.....	19

Section 1 Overview

1-1 Product Overview	1-2
1-2 Part Names and Functions.....	1-4
1-2-1 Part Names and Functions.....	1-4
1-3 Inputting/Outputting IO-Link Devices and Process Data	1-5
1-4 Setting/Monitoring Product Master Unit Parameters	1-6
1-5 Setting/Monitoring IO-Link Device Service Data.....	1-7
1-6 Basic Procedures.....	1-8

Section 2 Product Initial Settings Related to CC-Link IE Field Basic

2-1 Ethernet Connection.....	2-2
2-1-1 Connector and Cable	2-2

2-1-2	Ethernet Connection Type.....	2-2
2-2	Initial Settings for Front Panel Controls	2-3
2-2-1	Powering up the CC-Link IE Field Basic Master Station	2-3
2-2-2	Language	2-3
2-2-3	Network Type Setting	2-3
2-2-4	Product IP Address Setting	2-4

Section 3 Communication

3-1	Communication System Overview	3-2
3-2	Initial Setting of This Product via Software	3-3
3-2-1	Required Software	3-3
3-2-2	Procedure Overview	3-3
3-2-3	Read the CSP+ File for This Product into GXWorks2/3	3-3
3-2-4	Setting CC-Link IE Field Basic Master Unit Parameters	3-5
3-2-5	Registering the Product to the CC-Link IE Field Basic Configuration	3-6
3-2-6	Writing Configuration Contents to the CC-Link IE Field Basic Master Station	3-10
3-3	Cyclic Communication (Cyclic Transmission/Process I/O Communication)	3-12
3-3-1	Assigning the Host CC-Link IE Field Basic Master Station to Link Devices	3-12
3-3-2	Normal Assignment (Extended Access Disabled)	3-12
3-3-3	Extended Access Enabled Assignment	3-16
3-3-4	Process Data Words Allocation Example	3-22
3-3-5	Process Data Reading and Writing Methods	3-23
3-3-6	Assignment Data List by Objective with Extended Access Enabled	3-24
3-3-7	Actual Access Extension Methods	3-24
3-4	Acyclic Communication (socket or Modbus/TCP communication)	3-26
3-4-1	Socket Communication (UDP/IP or TCP/IP)	3-26
3-4-2	Modbus/TCP Communication	3-29
3-4-3	Event Communication	3-30
3-5	Specific Communication Examples (including sample programs)	3-31
3-5-1	Example of Cyclic Communication	3-31
3-5-2	Example of Acyclic Communication	3-32

Section 4 Specification

4-1	Specification	4-2
4-1-1	Communication Specifications	4-2
4-2	Data Processing Time	4-3
4-2-1	Process Data Response Time Calculation	4-3
4-2-2	I/O Response Time Example	4-5

Section 5 Troubleshooting

5-1	Troubleshooting	5-2
5-1-1	Troubleshooting Based on LEDs	5-2
5-1-2	Troubleshooting Based on Symptoms	5-3
5-1-3	Error Code List	5-3

Appendices

A-1	List of Product Master Unit Parameters	A-2
A-1-1	User Settings	A-2
A-1-2	Data for access from PLC	A-16
A-2	Sample Socket Communication Program	A-24

Index

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Safety Precautions

Refer to the *GD Series IO-Link Master Unit (Multi-Network Compatible) User's Manual Common Edition (Cat. No. Z512)* (hereinafter abbreviated as the *Common Edition*) for safety precautions.

Precautions for Safe Use

Refer to the *GD Series IO-Link Master Unit (Multi-Network Compatible) User's Manual Common Edition (Cat. No. Z512)* (hereinafter abbreviated as the *Common Edition*) for precautions for safe use.

Precautions for Correct Use

Refer to the *GD Series IO-Link Master Unit (Multi-Network Compatible) User's Manual Common Edition (Cat. No. Z512)* (hereinafter abbreviated as the *Common Edition*) for precautions for use.

Regulations and Standards

Refer to the *GD Series IO-Link Master Unit (Multi-Network Compatible) User's Manual Common Edition (Cat. No. Z512)* (hereinafter abbreviated to as the *Common Edition*) for regulations and standards.

Checking the Included Items

Refer to the *GD Series IO-Link Master Unit (Multi-Network Compatible) User's Manual Common Edition (Cat. No. Z512)* (hereinafter abbreviated as the *Common Edition*) for included items.

Related Manuals

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

Manual number	Manual name	Details
Z512	GD-series IO-Link Master Unit (Multi-Network Compatible) User's Manual Common Edition GD-ILM□□□-MLP (Referred to herein as the <i>Common Edition</i> .)	Describes this product's common functions and performance as well as operation. Be sure to read these documents.
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
CC-Link IE Field Basic master station	Station which controls the entire CC-Link IE Field Basic network. Able to perform cyclic and acyclic communication with all stations. 1 unit exists per 1 network. For short, it is also called the <i>host master station</i> .
Cyclic communication (cyclic transmission and process I/O communication)	The host master station regularly reads and writes the status/flag of this product and the process input/output data of the IO-Link device. This product executes process I/O communication (of IO-Link) with the IO-Link device.
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.
Acyclic communication (socket or Modbus/TCP communication)	Reads and writes the designated data in this product or an IO-Link device as necessary, using arbitrary socket communication from the host master station or the Module FB for Mitsubishi Electric PLC below. <ul style="list-style-type: none"> • For reading: UDP_READ • For writing: UDP_WRITE As well, this product also supports Modbus/TCP communication. However, neither socket communication nor Modbus/TCP communication is capable of writing process data.
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 communication	For IO-Link communication, acyclic communication will be used for requests from the IO-Link Master Unit to IO-Link devices.
Link scan time	Indicates CC-Link IE Field Basic communication link scan time.
GXWorks2/3	A generic term for GX Works3 and GX Works2.
Remote output (RY)	Information output from the CC-Link IE Field Basic master station to the slave stations in bits. Link device type.
Remote input (RX)	Information input from the slave stations to the CC-Link IE Field Basic master station in bits. Link device type.
Remote register (RWr)	Information input from the slave stations to the CC-Link IE Field Basic master station in units of 16 bits (1 word). Link device type.
Remote register (RWw)	Information output from the CC-Link IE Field Basic master station to the slave stations in units of 16 bits (1 word). Link device type.
Link device	Devices that make up the interior of a CC-Link IE Field Basic network. Generic name for RX, RY, RWr, and RWw.
Socket communication	Indicates product unique protocol communication within Ethernet socket communication. This communication designates the IP address and port number (2001 on this product) to send and receive data with UDP/IP or TCP/IP.
Modbus/TCP communication	Request messages are issued from the Modbus/TCP master, and retaining registers within this product are read and written. When this happens, depending on the retaining register number, this product executes ISDU communication (of IO-Link) with the IO-Link device.

Revision History

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

Cat. No. Z517-E1-02

↑
Revision code

Revision code	Date	Revised content
01	February 2026	Original production
02	April 2026	Corrected mistakes.

1

Overview

This section provides an overview of the use of *CC-Link IE Field Basic* as the host network.

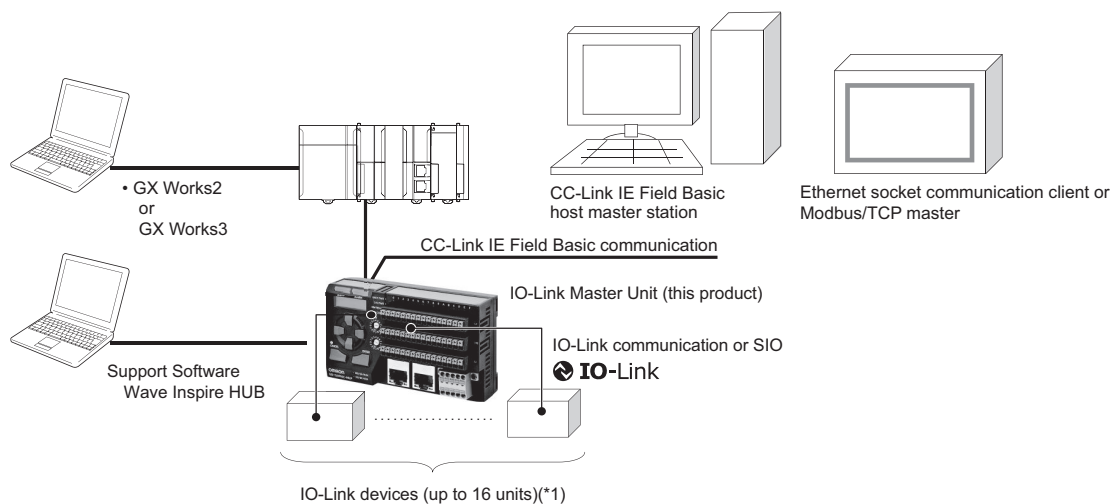
1-1	Product Overview	1-2
1-2	Part Names and Functions	1-4
1-2-1	Part Names and Functions.....	1-4
1-3	Inputting/Outputting IO-Link Devices and Process Data	1-5
1-4	Setting/Monitoring Product Master Unit Parameters	1-6
1-5	Setting/Monitoring IO-Link Device Service Data	1-7
1-6	Basic Procedures	1-8

1-1 Product Overview

When setting the network type to *CC-Link IE Field Basic*, this product conducts cyclic communication with the CC-Link IE Field Basic communication master as a CC-Link IE Field Basic communication slave station, while simultaneously communicating IO-Link process data with the connected IO-Link devices.

Regarding acyclic communication, it is also possible to send/receive data from the socket communication client on settings of this product or the connected IO-Link devices and to read/write IO-Link device process input. Similar processing is also possible with Modbus/TCP communication.

CC-Link IE Field Basic and IO-Link System Configuration Example



*1. To connect a maximum of 16 IO-Link devices to this product, the following conditions are required.

Product process data size with the connected IO-Link device group:

Input: Max. 32 words for all ports total

Output: Max. 32 words for all ports total

Features

- The host network type can be switched among the following depending on the setting.
 - a) EtherNet/IP (default value)
 - b) Ethernet & Modbus/TCP
 - c) CC-Link IE Field Basic
- With the *CC-Link IE Field Basic* network type, CC-Link IE Field Basic communication is possible as cyclic communication and socket or Modbus/TCP communication as acyclic communication.
- CC-Link IE Field Basic cyclic communication enables input/output with up to 16 IO-Link devices (for default values, 2 words each input/output per device). Further, reading and writing with partial cyclic communication, without using acyclic communication, is possible for settings of this product, IO-Link device designated index/sub-index values (this is called extended access).
- 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 machine, as synchronized with the network time, with a resolution of 15.26 μ s.

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).

As well, the time can be read from the IO-Link device setting value, stored in this product, and then read from the host PLC.

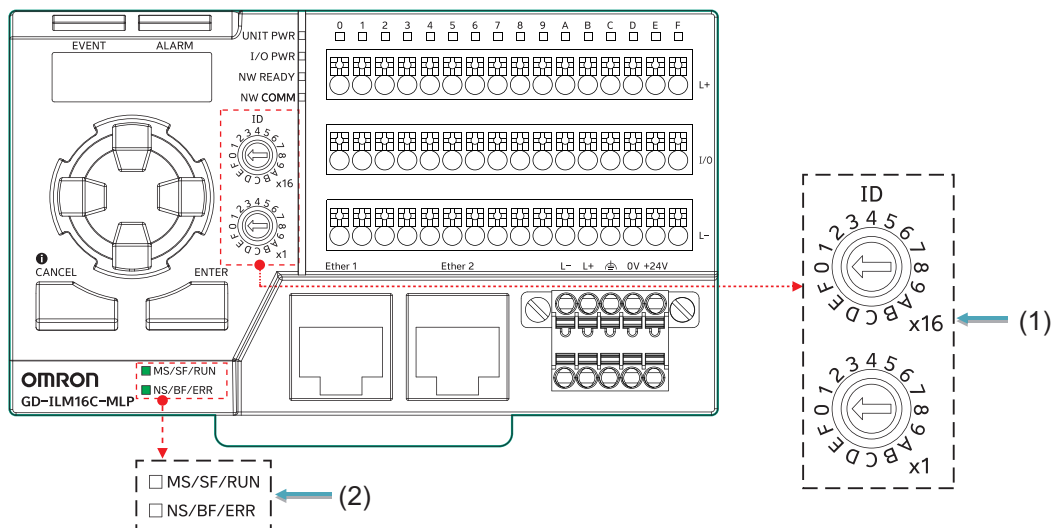
- Through socket communication, it is also possible to read and write this product's settings or IO-Link device designated index/sub-index values as necessary. IO-Link device process input can also be read (process output writing is not possible).
- Similar processing is also possible with Modbus/TCP communication.

1-2 Part Names and Functions

1-2-1 Part Names and Functions

The part names and functions after assembling the terminal block, when using *CC-Link IE Field Basic* as the host network, are as follows.

Refer to the Common Edition for other part names and functions.



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

1. IP address lowest digit setting switch

Sets the lowest digit of the IP address value (the “n” in 192.168.250.n). The top value is multiplied by 16 and added to the bottom value.

To set other arbitrary IP addresses, refer to *2-2-4 Product IP Address Setting* on page 2-4.

2. MS/SF/RUN LED, NS/BF/ERR LED

Displays the host network status.

As below for CC-Link IE Field Basic.

a) MS/SF/RUN

Off: Network chip is not active or power is off.

Blinking: Network chip is working.

Lit: Network chip is ready.

b) NS/BF/ERR

Off: Ethernet cable is not connected or power is off.

Blinking: Ethernet cable is connected, but communication has not been established.

Lit: Ethernet communication has been established. This may also indicate that communication is ready.

1-3 Inputting/Outputting IO-Link Devices and Process Data

This section explains how to input/output process data of IO-Link devices connected to the product.

The input/output methods are as below.

Method	Description	Reference
1) Input/output via cyclic communication	IO-Link device process data is assigned to the CC-Link IE Field Basic master station link device.	---
	For default value <ul style="list-style-type: none"> Input (IO-Link device → CC-Link IE Field Basic master station): 2 words/device Output (CC-Link IE Field Basic master station → IO-Link device): 2 words/device 	3-3 <i>Cyclic Communication (Cyclic Transmission/Process I/O Communication)</i> on page 3-12
	For other than default value <p>The following manual or auto allocations are possible.</p> <p>Manual allocation: With the following Master Unit parameters for this product, the allocation size is set to other than default values for each port.</p> <ul style="list-style-type: none"> Input: <i>M40. Process input data words allocation</i>: 0 to 16 words per port (default value: 2 words) Output: <i>M41. Process output data words allocation</i>: 0 to 16 words per port (default value: 2 words) <p>Automatic Assignment: In accordance with the actual IO-Link device specifications, the above Master Unit parameter word allocation is automatically set. This depends on setting <i>M42. Process data words auto allocation</i> to Yes (1).</p>	<i>Chapter 4: Product Functions</i> in the Common Edition
2) Confirmation with front panel controls	Confirmation is done with product front panel operation.	<i>Chapter 5 Front Panel Operations</i> in the Common Edition
3) Input via acyclic communication	Socket or Modbus/TCP communication enables input only (output writing is not possible)	3-4-1 <i>Socket Communication (UDP/IP or TCP/IP)</i> on page 3-26 3-4-2 <i>Modbus/TCP Communication</i> on page 3-29

1-4 Setting/Monitoring Product Master Unit Parameters

This section describes how to set/monitor product Master Unit parameters.

As shown below, there are three setting/monitoring methods.

Method	Description	Reference
1) Setting with front panel controls	Setting is done with product front panel operation.	<i>Chapter 5 Front Panel Operations</i> in the Common Edition
2) Setting via a client socket communication program, or by Modbus/TCP communication	Setting/monitoring is possible via a client communication program, or by Modbus/TCP communication.	<ul style="list-style-type: none"> • <i>3-4-1 Socket Communication (UDP/IP or TCP/IP)</i> on page 3-26 • <i>A-2 Sample Socket Communication Program</i> on page A-24
3) Setting via cyclic communication extended access	Specific Master Unit parameters can be read/written by cyclic communication operation alone (via extended access).	<i>3-3 Cyclic Communication (Cyclic Transmission/Process I/O Communication)</i> on page 3-12

1-5 Setting/Monitoring IO-Link Device Service Data

This section explains how to set service data inside IO-Link devices connected to the product.

As shown below, there are three setting/monitoring methods.

Method	Description	Reference
1) Setting/monitoring via a client socket communication program, or by Modbus/TCP communication	Setting/monitoring is possible via a client communication program, or by Modbus/TCP communication.	<ul style="list-style-type: none"> • 3-4-1 <i>Socket Communication (UDP/IP or TCP/IP)</i> on page 3-26 • 3-4-2 <i>Modbus/TCP Communication</i> on page 3-29
2) Setting/monitoring via cyclic communication extended access	Specific service data can be read/written by cyclic communication operation alone (via extended access).	3-3 <i>Cyclic Communication (Cyclic Transmission/Process I/O Communication)</i> on page 3-12
3) Setting/monitoring with front panel controls	Setting/monitoring is possible with front panel controls.	5-1-5 <i>Device Identification Display</i> in the Common Edition

1-6 Basic Procedures

The process from installing and setting this product through beginning CC-Link IE Field Basic and IO-Link communication is indicated below.

Step	Description	Reference	
Prior confirmation	System configuration decision: <ul style="list-style-type: none"> IO-Link device types and number used In particular, calculate the number of connectable IO-Link devices based on the total process data size of each IO-Link device (Related to the above) Determine whether to automatically allocate process data from the actual IO-Link device or manually set the number of input or output words for the IO-Link device for each port Each port I/O allocation settings 	1-1 <i>Product Overview</i> on page 1-2 3-3 <i>Cyclic Communication (Cyclic Transmission/Process I/O Communication)</i> on page 3-12 Common Edition	
	Data I/O design: <ul style="list-style-type: none"> Whether to access settings with cyclic communication data operation, using cyclic communication (whether to use <i>extended access</i>) What to read and write to this product or IO-Link device using acyclic communication 	3-3 <i>Cyclic Communication (Cyclic Transmission/Process I/O Communication)</i> on page 3-12 3-4 <i>Acyclic Communication (socket or Modbus/TCP communication)</i> on page 3-26	
Hardware installation and wiring	CC-Link IE Field Basic master mounting	Manual for the CC-Link IE Field Basic master station used	
Initial settings for front panel controls	Set <i>Network type</i> to <i>CC-Link IE Field Basic</i>	2-2 <i>Initial Settings for Front Panel Controls</i> on page 2-3	
	Set product IP address lowest digit (the “n” in 192.168.250.n) by product front panel rotary switch	2-2-4 <i>Product IP Address Setting</i> on page 2-4	
Initial setting via GXWorks 2/3	Register this product to the CC-Link IE Field Basic network	Reading CSP+ Files into GXWorks2/3	3-2-3 <i>Read the CSP+ File for This Product into GXWorks2/3</i> on page 3-3
		In GXWorks2/3, register this product to the CC-Link IE Field Basic network configuration	3-2-4 <i>Setting CC-Link IE Field Basic Master Unit Parameters</i> on page 3-5
		Network configuration settings for CC-Link IE Field Basic between this product and the CC-Link IE Field Basic master station (product IP address setting and input/output assignment on GXWorks2/3)	
		Writing configuration contents to the CC-Link IE Field Basic master station	3-2-6 <i>Writing Configuration Contents to the CC-Link IE Field Basic Master Station</i> on page 3-10
		CC-Link IE Field Basic established (NW COMM LED on product front panel lights up blue-green)	1-2 <i>Part Names and Functions</i> on page 1-4
Product parameter setting	Using front panel controls	Common Edition	
	When using socket communication from the host master station or Modbus/TCP/ISDU communication	3-4 <i>Acyclic Communication (socket or Modbus/TCP communication)</i> on page 3-26	
IO-Link device service data setting	Using front panel controls	Common Edition	
	When using socket communication from the host master station or Modbus/TCP/ISDU communication		

Step	Description	Reference
Starting communication	Start system (power ON)	
	CC-Link IE Field Basic starts IO-Link communication starts	Manual for the CC-Link IE Field Basic master station used
Checking operation	Verify CC-Link IE Field Basic master station and this product/IO-Link device display	Manual for the CC-Link IE Field Basic master station used <i>1-2 Part Names and Functions</i> on page 1-4 and <i>5-1 Troubleshooting</i> on page 5-2 Each IO-Link device manual
	Verifying read/write data between this product and an IO-Link device	Each IO-Link device manual
	Confirmation of data reading/writing via cyclic communication between the CC-Link IE Field Basic master station and this product	<i>3-3 Cyclic Communication (Cyclic Transmission/Process I/O Communication)</i> on page 3-12 Manual for the CC-Link IE Field Basic master station used
	Product or IO-Link device reading/writing via acyclic (UDP or TCP socket/ISDU) communication (as necessary) Executing socket communication <ul style="list-style-type: none"> • For reading: UDP_READ • For writing: UDP_WRITE or Modbus/TCP/ISDU communication	<i>3-4 Acyclic Communication (socket or Modbus/TCP communication)</i> on page 3-26
Troubleshooting	Confirmation of the CC-Link IE Field Basic master station and this product/IO-Link device display, response confirmation via acyclic (UDP or TCP socket/ISDU) communication	<i>Section 5 Troubleshooting</i> on page 5-1



Additional Information

Product Master Unit parameters and connected IO-Link device settings can be changed by either of the following methods.
The applications of each are as follows.

Method	Main application	Reference
1) Unit front operation	Startup or maintenance	<i>2-2 Initial Settings for Front Panel Controls</i> on page 2-3
2) Acyclic communication from the host master station	Controlled operation	<ul style="list-style-type: none"> • <i>3-4 Acyclic Communication (socket or Modbus/TCP communication)</i> on page 3-26 • <i>A-1 List of Product Master Unit Parameters</i> on page A-2



Precautions for Correct Use

- If more than 32 words are used on either the input or the output in total, the excess process data will not be assigned to the host master station (and will be ignored).
To connect a maximum of 16 IO-Link devices to this product, the following conditions are required.
Product process data size with the connected IO-Link device group:
Input: Max. 32 words for all ports total
Output: Max. 32 words for all ports total
- When the IO-Link ready flag is ON, read and write process data.

2

Product Initial Settings Related to CC-Link IE Field Basic

2

Describes initial setting for this product's IP address setting, communication connection, and front panel operation.

2-1	Ethernet Connection	2-2
2-1-1	Connector and Cable	2-2
2-1-2	Ethernet Connection Type.....	2-2
2-2	Initial Settings for Front Panel Controls	2-3
2-2-1	Powering up the CC-Link IE Field Basic Master Station	2-3
2-2-2	Language	2-3
2-2-3	Network Type Setting	2-3
2-2-4	Product IP Address Setting	2-4

2-1 Ethernet Connection

Shown here is the Ethernet connection configuration when using CC-Link IE Field Basic as the host network.

2-1-1 Connector and Cable

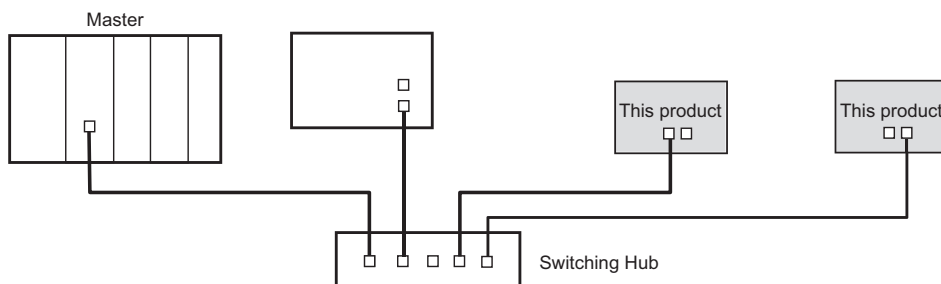
The Ethernet cable may be connected to either of the RJ45 connectors at left or right of the product. For the cable, use an Ethernet cable that complies with the standard (100BASE-TX). For details, refer to the CC-Link IE Field Basic master station manuals.

2-1-2 Ethernet Connection Type

Topologies capable of CC-Link IE Field Basic are star or linear bus configurations.

● Star Configuration

The star configuration network enables connection of various devices from a Switching Hub. Connection to either Ether1 or Ether2 of the product is possible.

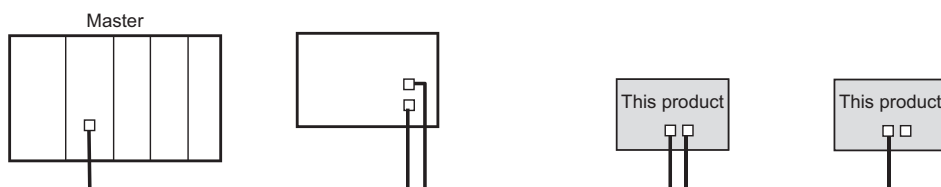


● Linear Bus Configuration

A linear bus configuration type network is a connection format in which devices are connected by daisy chain.

It does not require a Switching Hub and shortens the required length of LAN cables.

The upstream device (toward the master) and downstream device can be connected to either Ether1 or Ether2 on this product.



For details, refer to the CC-Link IE Field Basic master station manuals.

2-2 Initial Settings for Front Panel Controls

Shown here is the initial setting method via product front panel operation when using *CC-Link IE Field Basic* as the host network.

2-2-1 Powering up the CC-Link IE Field Basic Master Station

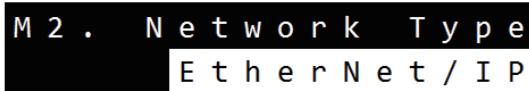
When available, apply power to the CC-Link IE Field Basic master station in advance. This makes it possible to check whether the master station is connected correctly.

2-2-2 Language

After turning the product on for the first time, select the language setting.

2-2-3 Network Type Setting

Continuing, the window automatically switches to the network type setting screen shown below.



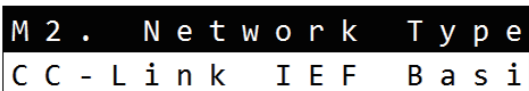
M 2 . Network Type
EtherNet / IP

The factory default network type setting is *EtherNet/IP*.

When setting the host industrial network to *CC-Link IE Field Basic*, change the network type setting here to *CC-Link IE Field Basic*.

Regarding *M2. Network type*, refer to *5-1-4 Master Unit Parameter List with Product Front Panel Operations* in the Common Edition.

Press the ↑ button four times. *CC-Link IE Field Basic* will be displayed as below (scroll display).



M 2 . Network Type
CC - Link IEF Basic

Press the **ENTER** button. The network type will switch to *CC-Link IE Field Basic*. Wait about twenty seconds while the network chip firmware rewrites.

When rewriting is complete, there will be an automatic reboot.

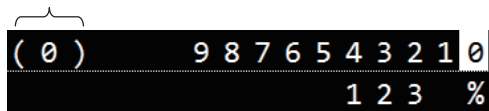


KEEP POWER ON
• • • • •

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

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

Port number



Refer to *5-1 Front Panel Operations* in the Common Edition for further information about front panel operation.

2-2-4 Product IP Address Setting

Set the product IP address with the operation below. The value set here will also be set as the product IP address in the CC-Link IE Field Basic network configuration setting on GXWorks2/3 (see *3-2-4 Setting CC-Link IE Field Basic Master Unit Parameters* on page 3-5).

- 1** Turn the rotary switch on the product front panel when the power is on.
The Master Unit parameter will automatically switch to *M82. IP address*.
- 2** Set the product IP address in accordance with the CC-Link IE Field Basic master station IP address (highest 3 digits): the highest 3 digits should be the same as the master station IP address and the lowest digit unique to the product.

Note The factory default product IP address is 192.168.250.n (the n value is determined by the front panel rotary switch).
The default gateway value is 0.0.0.0. When a change is required, set the *M80. Default gateway* Master Unit parameter with product front panel controls.
The subnet mask default value is 255.255.255.0. When a change is required, set the *M81. Subnet mask* Master Unit parameter with product front panel controls.



Additional Information

- Note that with the product IP address set to the factory default, 192.168.250.n (where n depends on the front panel rotary switch), if, for example, the network address in CC-Link IE Field Basic communication is 192.168.3.□, the product will not be able to communicate with the master station.
- Static IP is the only way to set the product IP address (the IP address cannot be acquired via BOOTP or DHCP).

When changing the IP address, default gateway, or subnet mask with product front panel controls, refer to *5-1 Front Panel Operations* in the Common Edition.

3

Communication

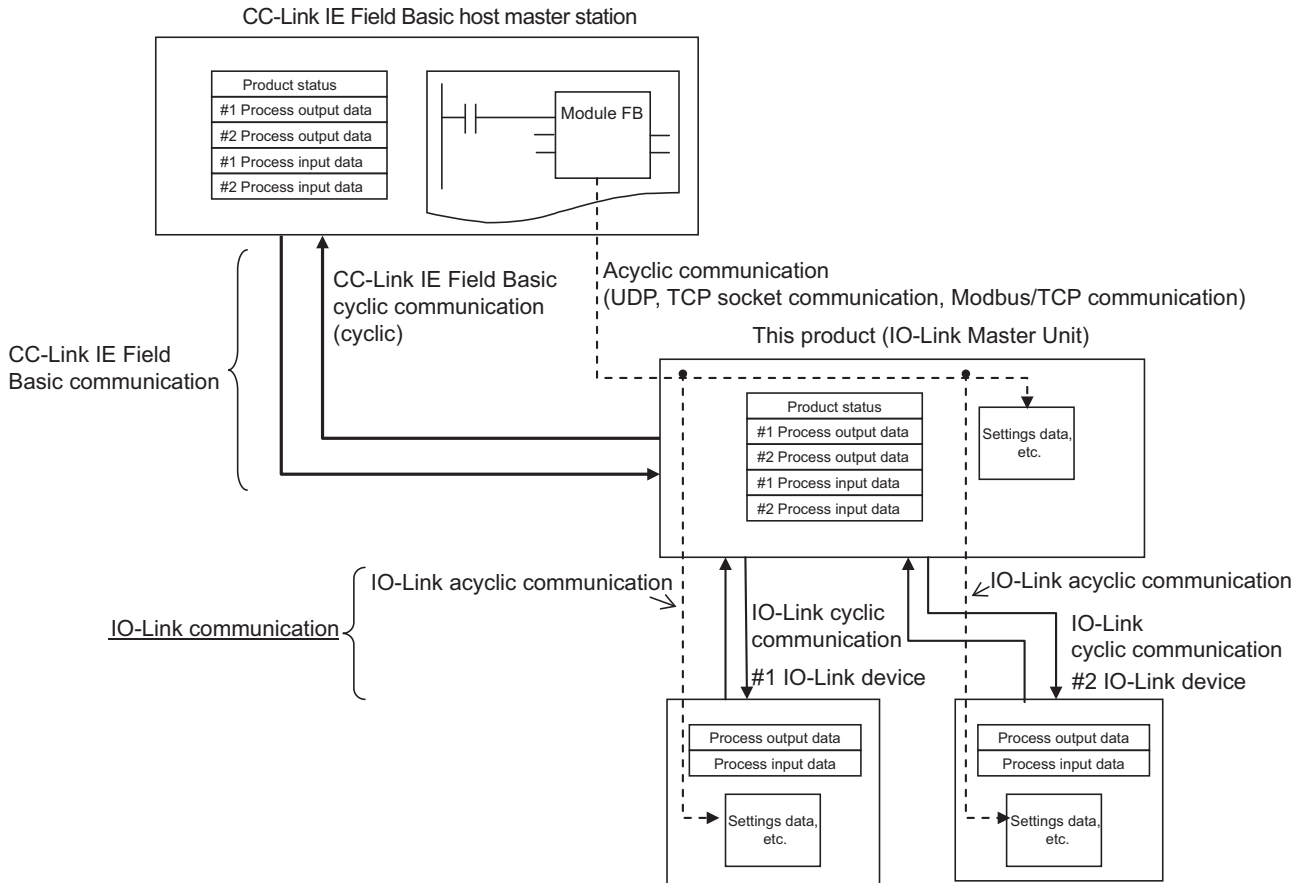
This section describes the initial settings for CC-Link IE Field Basic communication and IO-Link communication, the configuration of the data to be handled, and communication examples.

3-1	Communication System Overview	3-2
3-2	Initial Setting of This Product via Software	3-3
3-2-1	Required Software.....	3-3
3-2-2	Procedure Overview	3-3
3-2-3	Read the CSP+ File for This Product into GXWorks2/3	3-3
3-2-4	Setting CC-Link IE Field Basic Master Unit Parameters	3-5
3-2-5	Registering the Product to the CC-Link IE Field Basic Configuration	3-6
3-2-6	Writing Configuration Contents to the CC-Link IE Field Basic Master Station	3-10
3-3	Cyclic Communication (Cyclic Transmission/Process I/O Communication)	3-12
3-3-1	Assigning the Host CC-Link IE Field Basic Master Station to Link Devices..	3-12
3-3-2	Normal Assignment (Extended Access Disabled).....	3-12
3-3-3	Extended Access Enabled Assignment.....	3-16
3-3-4	Process Data Words Allocation Example	3-22
3-3-5	Process Data Reading and Writing Methods	3-23
3-3-6	Assignment Data List by Objective with Extended Access Enabled	3-24
3-3-7	Actual Access Extension Methods	3-24
3-4	Acyclic Communication (socket or Modbus/TCP communication).....	3-26
3-4-1	Socket Communication (UDP/IP or TCP/IP)	3-26
3-4-2	Modbus/TCP Communication	3-29
3-4-3	Event Communication	3-30
3-5	Specific Communication Examples (including sample programs)	3-31
3-5-1	Example of Cyclic Communication	3-31
3-5-2	Example of Acyclic Communication	3-32

3-1 Communication System Overview

This product performs IO-Link cyclic communication with the connected IO-Link devices. It collects data from these IO-Link devices and, along with its own status, conveys them through CC-Link IE Field Basic cyclic communication with the CC-Link IE Field Basic master station.

As well, the product can perform acyclic communication with its own and various connected IO-Link device service data from socket communication and Modbus/TCP communication programs (*1).



*1. However, neither socket communication nor Modbus/TCP communication is capable of writing process data.

3-2 Initial Setting of This Product via Software

Perform initial setup of this product with software such as GXWorks2/3.

Note The procedures described below reference screen captures from GX Works2 or GX Works3, with red frames, arrows, and other annotations added to the referenced images for illustrative purposes.

3-2-1 Required Software

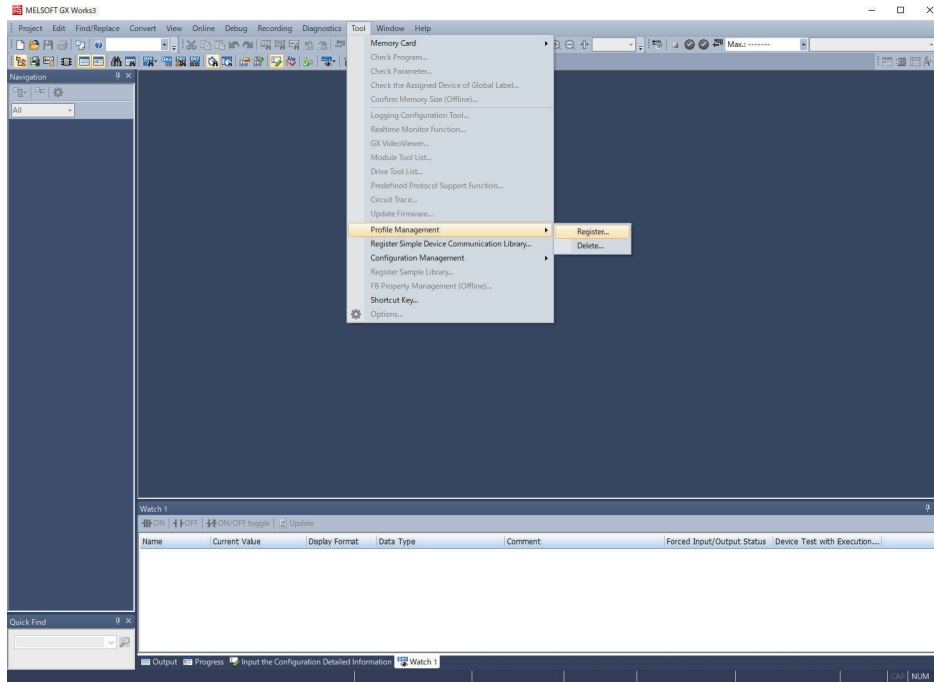
- Engineering tool for CC-Link IE Field Basic:
GX Works2 or GX Works3 (tool used as the product's CC-Link IE Field Basic slave station)

3-2-2 Procedure Overview

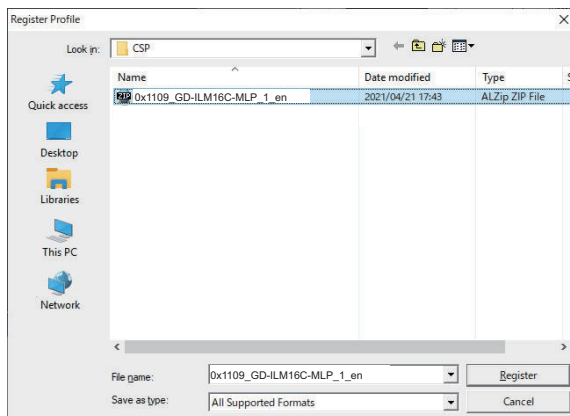
- 1** Download the CSP+ file for this product from the OMRON website.
- 2** Register the CSP+ file for this product profile in GXWorks2/3.
- 3** In GXWorks2/3, register this product to the CC-Link IE Field Basic network configuration.
- 4** Input the settings for CC-Link IE Field Basic communication between this product as the slave station and the CC-Link IE Field Basic master station (product IP address and I/O allocation (*1)), and write to the CC-Link IE Field Basic master station.
*1. Allocate this product's remote I/O signals to the remote input (RX) and remote output (RY) of the upper CC-Link IE Field Basic master station.

3-2-3 Read the CSP+ File for This Product into GXWorks2/3

- 1** Download the CSP+ file for this product from the OMRON website below.
<https://www.fa.omron.co.jp>
The CSP file is shown below.
0x1109_GD-ILM16C-MLP_1_en
- 2** Register the above CSP+ file for this product in GXWorks2/3. The product protocol version is 1.
 - 1) Launch GXWorks2/3 (GX Works2 or GX Works3).
 - 2) From **Profile Management** in the **Tool** menu, select **Register**.



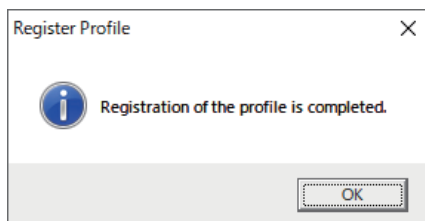
3 Select the CSP+ file prepared in advance and click the **Register** button.



The file is compressed in .zip format and can be registered without unzipping.

Multiple files can also be selected for simultaneous registration by pressing the **Ctrl** and **Shift** keys.

When registration completes normally, the following dialog box will be displayed.



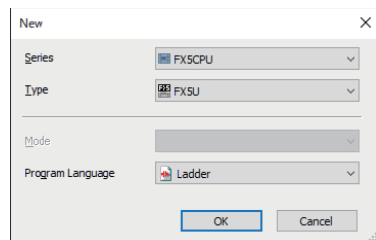
4 Click the **OK** button and close the window.
This completes the CSP+ file reading.

- 5** Continuing, create a new project or open an existing one in GXWorks2/3. Select **New** in the **Project** menu.

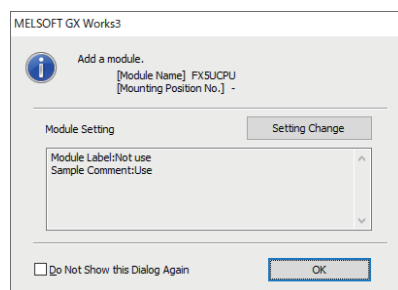
If possible, connect the PLC CPU module and computer with a USB cable and turn on the power.

As well, after setting the product's own IP address with *M82. IP address*, connect to the CC-Link IE Field Basic Master Unit with an Ethernet cable and turn on the power.

Select the *Series*, *Type*, and *Program Language* to use for the CPU module.



The following dialog box is displayed to confirm the addition of the CPU module (depending on the configuration, the addition may complete automatically without showing the dialog box).

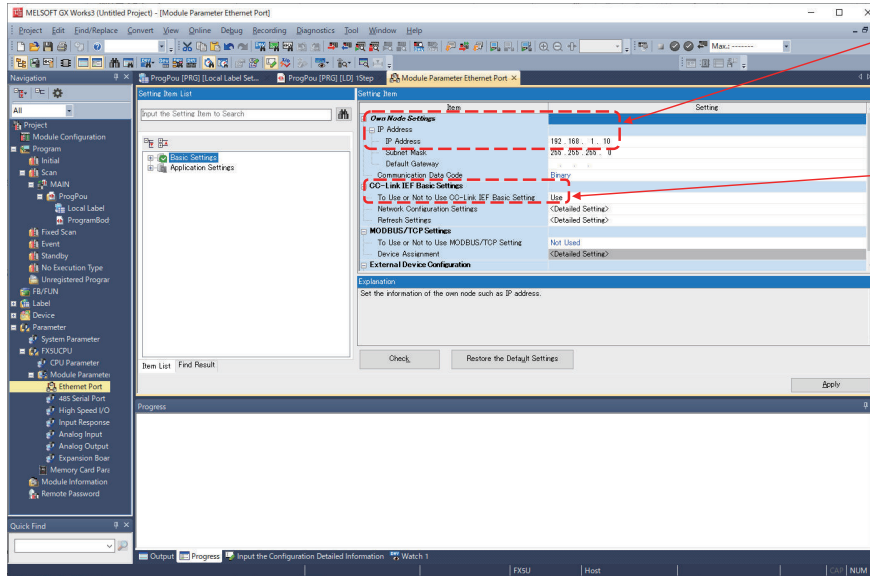


3-2-4 Setting CC-Link IE Field Basic Master Unit Parameters

Set the CC-Link IE Field Basic Master Unit parameters.

From the module information under Parameter in the navigation tree, double-click on the FX5U CPU module parameter Ethernet port. *Own-Node Setting* is displayed at right: set the master station IP address.

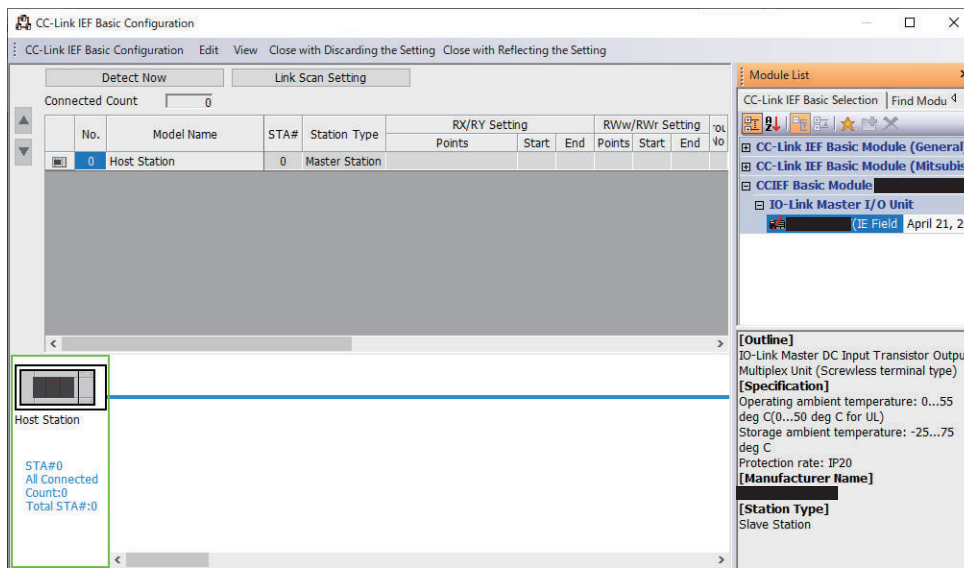
As well, *CC-Link IE Field Basic Setting* are displayed below. Change *To Use or Not to Use CC-Link IE Field Basic Setting* to *Use*.



Set the CC-Link IE Field Basic master IP address.
The value should be the same as this product's IP address up to the upper three bytes (192.168.1 here).

Change "To Use or Not to Use CC-Link IE Field Basic Setting" to Use.
Next, double-click **Detailed Setting** in Network Configuration Settings.

Next, double-click **Detailed Setting** in Network Configuration Settings.
The *CC-Link IE Field Basic Configuration* screen below is displayed.



3-2-5 Registering the Product to the CC-Link IE Field Basic Configuration

In GXWorks2/3, register this product to the CC-Link IE Field Basic configuration.

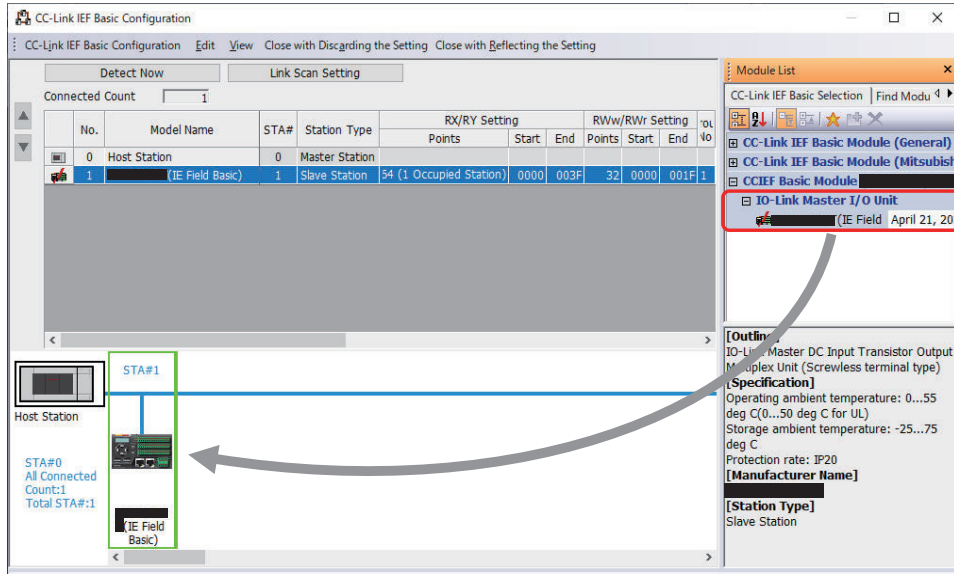
Registering the Product to the CC-Link IE Field Basic Configuration Offline.

Scroll down the list of modules at right to display *CC-link IE Field Basic Module*.

Open this to find *GD-ILM16C-MLP* or *GD-ILM16E-MLP* under *IO-Link Master I/O Unit*. The profile version can be confirmed with this date.

Drag and drop *GD-ILM16C-MLP* or *GD-ILM16E-MLP* into the network map at left.

This product's number of occupied stations is 1.

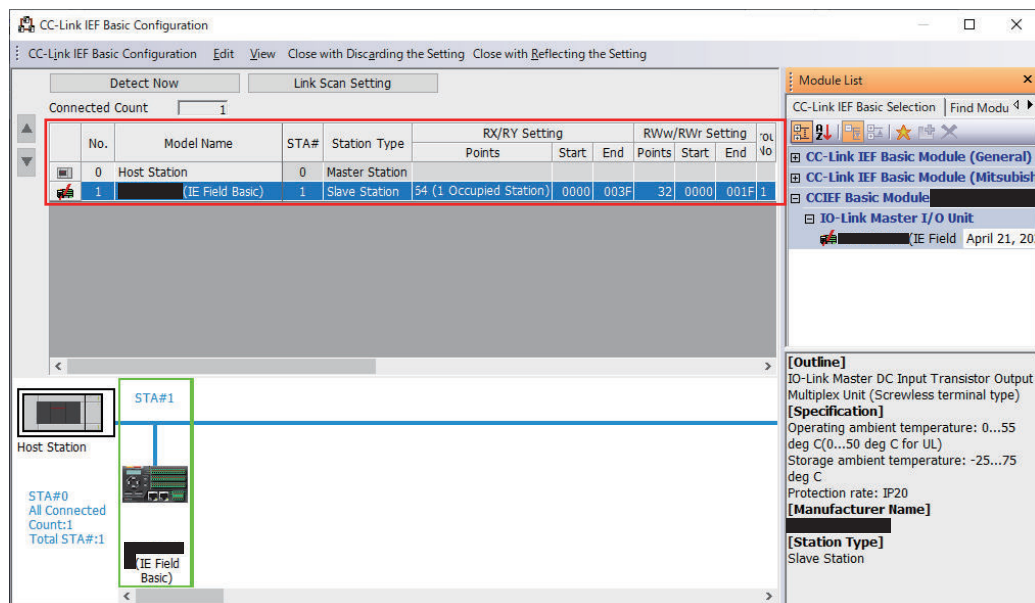


This product will be added to the network map.



Additional Information

The dragged and dropped modules will also be displayed in the list of stations at top.

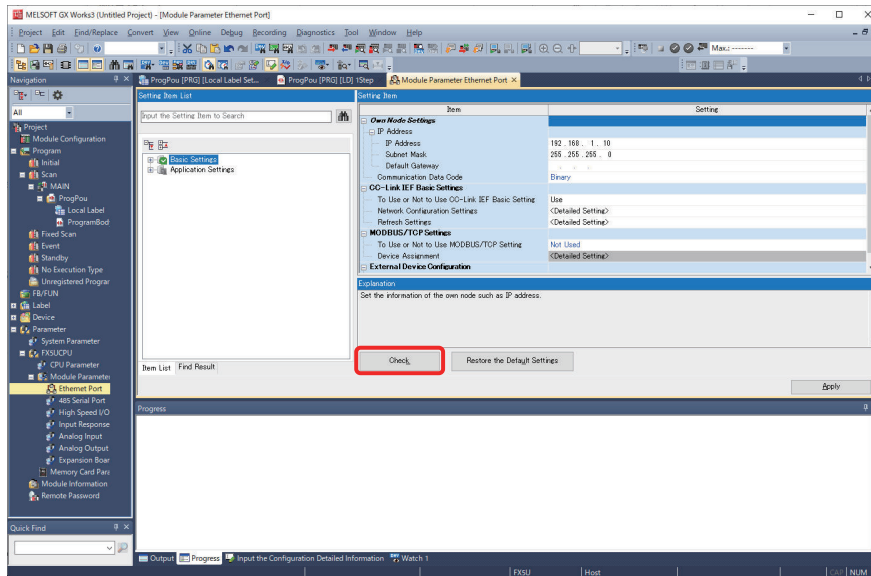


In the list of stations displayed at top, set the product's IP address, subnet mask, and allocation of link devices (RX, RY, RWr, RWw) to the product.

Setting Items	Description
Station number	The top slave station number will be displayed.
IP Address	Set the product's IP number. Set the same value as the Master Unit parameter <i>M82</i> . <i>IP address</i> .
Subnet mask	Set the product's IP number. Set the same value as the Master Unit parameter <i>M81</i> . <i>Subnet mask</i> . The default value is 255.255.255.0.

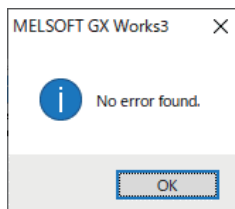
Setting Items	Description
RX/RX setting	Set the following allocations for RX and RY. Points (*1), Start, End *1: 64 points (bits) each are set automatically.
RWw/RWr setting	Set the following allocations for RWw and RWr. Points (*2), Start, End *2: 32 points (words) each are set automatically.

Click **Close with Reflecting the Setting**. The Basic Setting window will return.

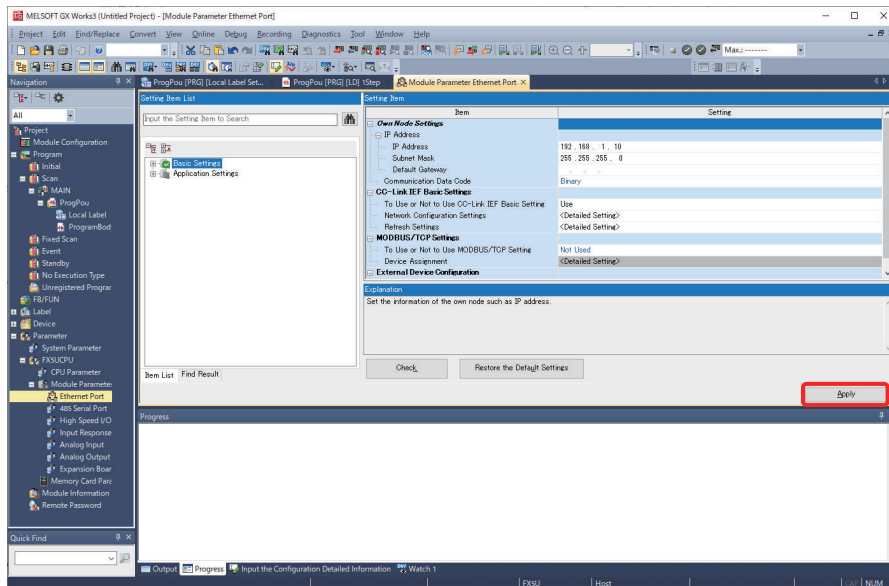


Click the **Check** button.

If there is no problem, the following dialog box will be displayed.



Click the **OK** button. The window below will return.

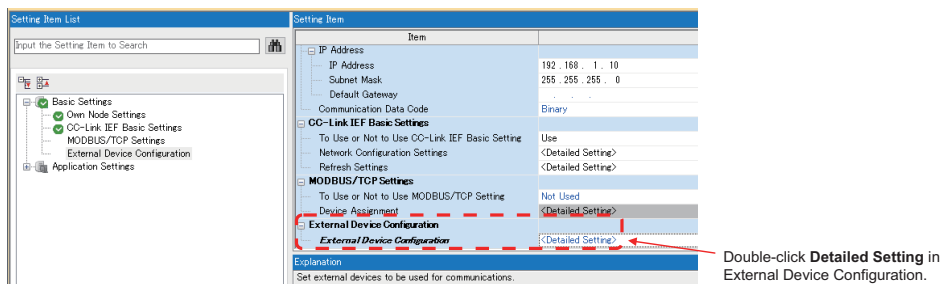


Click the **Apply** button.

If using only cyclic communication, then at this point the necessary information for CC-Link IE Field Basic network communication has all been input.

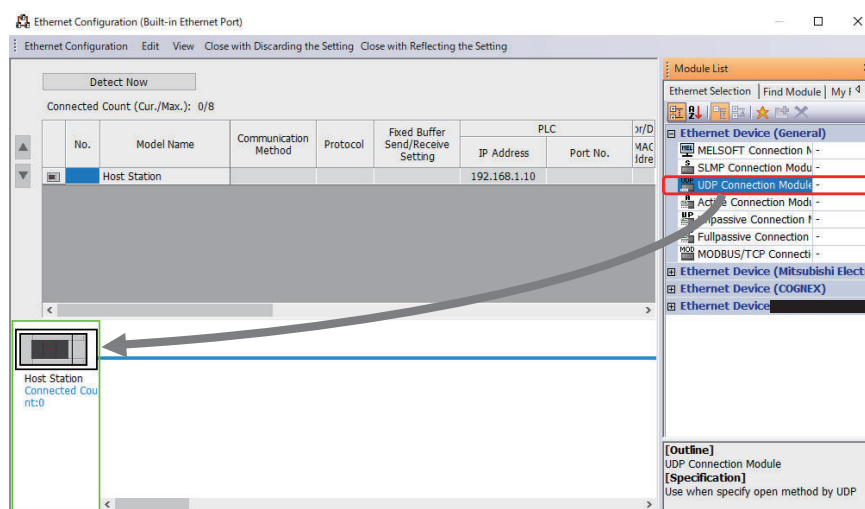
When using a socket communication program to read and write setting values with regard to the product, the next required step is *External Device Configuration*.

Double-click **Detailed Setting** in *External Device Configuration*.



The Ethernet configuration screen below will be displayed.

Drag and drop *UDP Connection Module*, under *Ethernet Devices (General)* in the unit list at right, into the network map at left.



Set the port number to be used with UDP communication.

The port number used is 2001 fixed.

The IP Address is the previous value.

This port number is used to identify commands sent by UDP. Set a different number for each module. Some of the numbers are reserved; for details, see the master station Ethernet manual.

Check whether this product is registered as a UDP Connection Module.

At this point, the necessary information for CC-Link IE Field Basic network communication has all been input.

However, here the settings have been made only on the computer, and the setting details also need to be written to the CC-Link IE Field Basic master station.

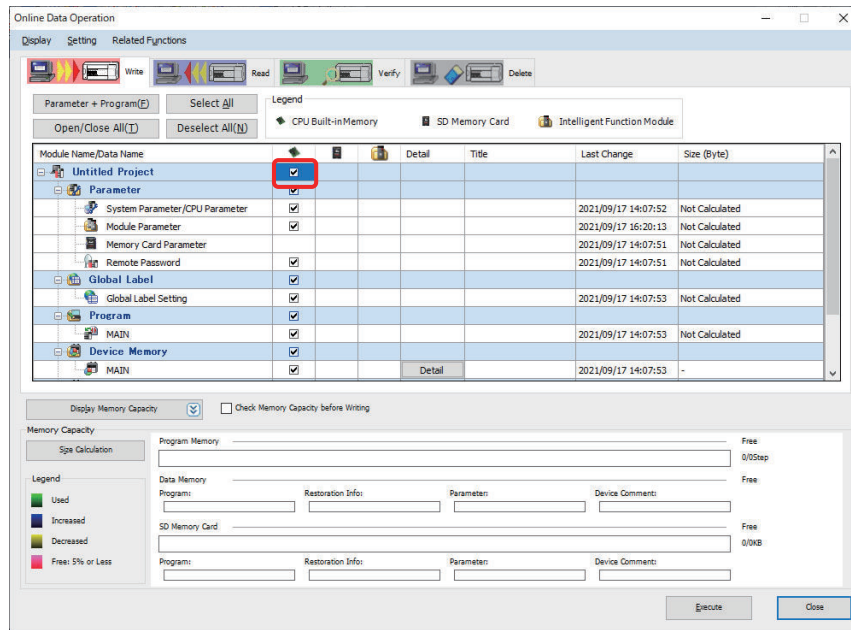
3-2-6 Writing Configuration Contents to the CC-Link IE Field Basic Master Station

Online, write the setting details required for CC-Link IE Field Basic to the CC-Link IE Field Basic master station.

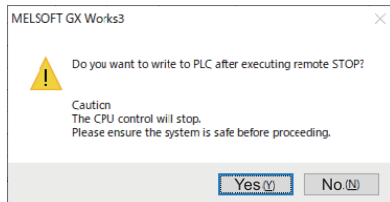
From the **Online** menu, select **Write to PLC**.

Select the parameter to write.

As this is the first time, check the **Untitled Project** checkbox.



Click the **Execute** button to display the confirmation dialog box for continued writing to the PLC.
 Click the **Yes** button. The confirmation dialog box for execution of writing to the PLC after remote stop will be displayed.
 Click the **Yes** button. The following confirmation dialog box will be displayed.
 Click the **Yes to all** button to begin writing. When complete, the following dialog box will be displayed.



Here the CC-Link IE Field Basic settings are complete on the CC-Link IE Field Basic master station side.

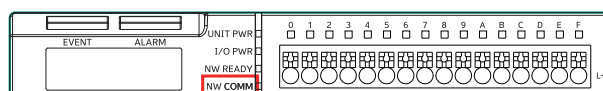
Here, reset the host master station side CPU module.

Restart the CPU module and confirm that CC-Link IE Field Basic communication is established (the Ethernet SD/RD LED is blinking and the product's NW COMM LED is lit).



Additional Information

- When writing setting details to the CC-Link IE Field Basic master station, it must be rebooted.
- If the product front panel NW COMM LED does not light up blue-green (showing normal communication) even after setting is complete, once again check the GXWorks2/3 settings and product settings.



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

- If communication is not possible even after all the confirmation above, refer to the manuals for each CC-Link IE Field Basic master station.

3-3 Cyclic Communication (Cyclic Transmission/Process I/O Communication)

This product exchanges the following data regularly in CC-Link IE Field Basic with the CC-Link IE Field Basic master station link device (RX/Ry/RWr/RWw).

- Digital input/digital output in SIO mode, product status/operation flags: Bit unit
- IO-Link device I/O maximum 32 bytes of process data: Word unit

3-3-1 Assigning the Host CC-Link IE Field Basic Master Station to Link Devices

This product assigns the *RX/Ry setting* and *RWw/RWr setting* in GXWorks2/3 parameter settings **Basic Settings - Network Configuration Settings** from the set start numbers to the host master station link devices.



Additional Information

Below, this manual explains how to indicate the product status/operation flag link device address with RX/Ry setting start number 00.

Ex.: Event flag: RX17, Latest Event port: RX10-13

Normal Assignment and Extended Access Enabled Assignment

The unit can be switched between using either of the following two assignment methods.

- Normal assignment: Assignment method where everything is cyclic data shared type.
- Extended access enabled assignment: This assignment method allows setting values to be accessed without using acyclic communication, for normal cyclic data shared type assignments. The following can be accessed.
 - Any service data in any connected IO-Link device
 - Product Master Unit parameters

The assignment method (normal assignment or extended access enabled assignment) is specified using *Extended access enable flag* (RY10).

The following is shown when both the *M40. Process input data words allocation* and *M41. Process output data words allocation* Master Unit parameters are the default values.

3-3-2 Normal Assignment (Extended Access Disabled)

The master station link device allocation to this product when *Extended access enable flag* (RY10) is set to 0 (OFF: Extended access disabled) is as below.

Link de-vice	Word ad- dress (Start number +)	Bit address*1															
		F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
RX	0□	Digital input (port 0-F: corresponds to bit address 0-F)															
	1□	Error	IO-Link ready	Synchronization established	Reserved	Latest error port				Event	I/O power supply	Output overcurrent	Reserved	Latest event port			
RY	0□	Digital output (port 0-F: corresponds to bit address 0-F)															
	1□	Clear the latest error	Reserved						Clear the latest event	Encoder counter reset	Reserved				Extended access disabled		
RW _r	00	Process input data port 0*2															
	01																
	02	Process input data port 1*2															
	03																
															
	1E	Process input data port F*2															
1F																	
RW _w	00	Process output data port 0*2															
	01																
	02	Process output data port 1*2															
	03																
															
	1E	Process output data port F*2															
1F																	

*1. Depending on the CC-Link IE Field Basic master product, some bit addresses are only 0 to 7. In that case, bit addresses 8 to F can be accessed with the following word (byte) address.

*2. Process input and output data are assigned two words (four bytes) per port at default values.

With the product Master Unit parameters *M40. Process input data words allocation* or *M41. Process output data words allocation*, it is possible to allocate nothing or to change to a different number of words.

With the product Master Unit parameter *M42. Process data words auto allocation*, automatic setting of M40/M41 above is possible from the actual IO-Link device specifications.

Assigned Data Content (During Normal Allocation)

● Digital Input/Digital Output (SIO Mode) And Product Status/Operation Flags

- Input from this product to CC-Link IE Field Basic master station

Assignment	Category	Host master station assigned link device address (Start number +)	Data name	Description
Host master station remote input (RX)	Digital input in SIO mode	RX00 to 0F	Digital input (Port 0 to F)	Digital input data in SIO mode (PNP input or NPN input). In IO-Link mode, the least-significant value of the bit data defined in process input data format is reflected (this function does not exist on the process data output side).
	Product status	RX1F	Error flag	Changes to 1 (ON) when an error is generated in this product. When this flag is at 1 (ON), access the <i>Latest error code readout by port</i> through acyclic communication. Refer to A-1-2 <i>Data for access from PLC</i> on page A-16 for <i>Latest error code readout by port</i> .
		RX1E	IO-Link ready flag	When communication is established with all IO-Link devices and cyclic communication with the CC-Link IE Field Basic master station, if this flag is at 1 (ON), execute read and write with the IO-Link devices through cyclic or acyclic communication. Note This flag will go to 1 (ON) even when not all ports' I/O setting assignments are in IO-Link mode.
		RX1D	Synchronization establishment flag	Changes to 1 (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.
		RX18 to 1C	Latest error port	Port number of the latest generated error. When accessing the <i>Latest error code readout by port</i> through acyclic communication, specify the port based on this value.
		RX17	Event flag	Changes to 1 (ON) when an event is occurring in one of the connected IO-Link devices. When this flag is at 1 (ON), access the <i>Event data readout by port</i> data through acyclic communication. Refer to A-1-2 <i>Data for access from PLC</i> on page A-16 for <i>Latest event data readout by port</i> .
		RX16	I/O power supply flag	Changes to 1 (ON) when power is being supplied for I/O by the I/O power supply.
		RX15	Output overcurrent flag	Changes to 1 (ON) when overcurrent is generated in SIO (output).

Assignment	Category	Host master station assigned link device address (Start number +)	Data name	Description
		RX10 to 13	Latest event port	Port number of the latest generated event. When accessing the <i>Event data readout by port</i> through acyclic communication, specify the port based on this value.

- Output from CC-Link IE Field Basic master station to this product

Assignment	Category	Host master station assigned link device address (Start number +)	Data name	Description
Host master station remote output (RY)	Digital output in SIO mode	RY00 to 0F	Digital output (Port 0 to F)	Digital output data in SIO mode (PNP output or NPN output).
	Product operation flag	RY1F	Clear the latest error	When starting up from 0 (OFF) to 1 (ON), the latest errors are cleared.
		RY17	Clear the latest event	When starting up from 0 (OFF) to 1 (ON), the latest events are cleared.
		RY16	Encoder counter reset	If a SIO device is the encoder, when starting up from 0 (OFF) to 1 (ON), the product internal high-speed counter is reset.
	RY10	Extended access enable flag	Specify extended access disabled (normal) assignment as the assignment method for the cyclic communication area. 0 (OFF): Extended access disabled	

● Process Data

- Input from this product to CC-Link IE Field Basic master station

Type and direction	Assignment	Host master station assigned link device address (Start number +)	Data name	Description
Input from IO-Link devices	Host master station remote register (RWr)	RWr00 to 1F	Process input data Port 0 to F	Process input data in IO-Link communication mode. Two words (four bytes) per port at default values.

- Output from CC-Link IE Field Basic master station to this product

Type and direction	Assignment	Host master station assigned link device address (Start number +)	Data name	Description
Output to IO-Link devices	Host master station remote register (RWw)	RWw00 to 1F	Process output data Port 0 to F	Process output data in IO-Link communication mode. Two words (four bytes) per port at default values.

IO-Link device process data is converted to little endian format with default values within the product. The *Process data LSB/MSB Master Unit* parameter can be used to change this to big endian format for each port.

3-3-3 Extended Access Enabled Assignment

The master station link device allocation to this product when *Extended access enable flag* (RY10) is set to 1 (ON: Extended access enabled) is as below.

Link device	Word address (Start number +)	Bit address															
		F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
RX	0□	Digital input (port 0-F: corresponds to bit address 0-F)															
	1□	Error	IO-Link ready	Synchronization established	Access error	Latest error port				Event	I/O power supply	Output overcurrent	Access completed	Latest event port			
RY	0□	Digital output (port 0-F: corresponds to bit address 0-F)															
	1□	Clear the latest error	Reserved	Little endian access	GD-ILM16C-MLP/-ILM16E-MLP parameter designation	Applicable IO-Link port (0 to F)				Clear the latest event	Encoder counter reset	Reserved			Write request	Read request	Extended access enabled

Link de- vice	Word ad- dress (Start number +)	Bit address															
		F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
RW _r	00	Process input data port 0*1															
	01																
	02	Process input data port 1*1															
	03																
															
	1C	Process input data port E*1															
	1D																
	1E	Extended access read data															
1F																	
RW _w	00	Process output data port 0*1															
	01																
	02	Process output data port 1*1															
	03																
															
	1A	Process output data port D*1															
	1B																
	1C	Index number or setting value number specification															
	1D	Reserved				Byte length or tar- get selection to ac- cess				Subindex number or target number							
	1E	Extended access write data															
1F																	

- *1. Process input and output data are assigned two words per port at default values.
 With the product Master Unit parameters *M40. Process input data words allocation* or *M41. Process output data words allocation*, it is possible to change as below.
 No allocation or different number of words
 With the product Master Unit parameter *M42. Process data words auto allocation*, automatic setting of *M40/M41* above is possible from the actual IO-Link device specifications.

Assignment Data Details (when extended access is enabled)

● Digital Input/Digital Output (SIO Mode) and Product Status/Operation Flags

- Input from this product to CC-Link IE Field Basic master station

Assignment	Category	Host master station as- signed link de- vice address (Start number +)	Data name	Description
Host master station re- mote input (RX)	Digital input in SIO mode	RX00 to 0F	Digital input (Port 0 to F)	Digital input data in SIO mode (PNP input or NPN input). In IO-Link mode, the least-significant value of the bit data defined in process input data format is reflected. (This function does not exist on the process output data side.)

Assignment	Category	Host master station assigned link device address (Start number +)	Data name	Description
	Product status	RX1F	Error flag	Changes to 1 (ON) when an error is generated in this product. When this flag is at 1 (ON), access the <i>Latest error code readout by port</i> through acyclic communication. Refer to A-1-2 <i>Data for access from PLC</i> on page A-16 for <i>Latest error code readout by port</i> data.
		RX1E	IO-Link ready flag	When communication is established with all IO-Link devices and cyclic communication with the CC-Link IE Field Basic master station, if this flag is at 1 (ON), execute read and write with the IO-Link devices through cyclic or acyclic communication. Note This flag will go to 1 (ON) even when not all ports' I/O setting assignments are in IO-Link mode.
		RX1D	Synchronization establishment flag	Changes to 1 (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.
		RX1C	Access error (Extended access enabled assignment only)	Changes to 1 (ON) along with the access completed bit if an error occurs when requesting reading/writing.
		RX18 to 1B	Latest error port	Port number of the latest generated error. When accessing the <i>Latest error code readout by port</i> through acyclic communication, specify the port based on this value.
		RX17	Event flag	Changes to 1 (ON) when an event is occurring in one of the connected IO-Link devices. When this flag is at 1 (ON), access the <i>Event data readout by port</i> data through acyclic communication. Refer to A-1-2 <i>Data for access from PLC</i> on page A-16 for <i>Latest event data readout by port</i> .
		RX16	I/O power supply flag	Changes to 1 (ON) when power is being supplied for I/O by the I/O power supply.
		RX15	Output overcurrent flag	Changes to 1 (ON) when overcurrent is generated in SIO (output).
		RX14	Access completed (Extended access enabled assignment only)	Turns ON when reading/writing has completed. If the read/write request bit is turned off, this bit will also change to 0 (OFF).

Assignment	Category	Host master station assigned link device address (Start number +)	Data name	Description
		RX10 to 13	Latest event port	Port number of the latest generated event. When accessing the <i>Event data readout by port</i> through acyclic communication, specify the port based on this value.

- Output from CC-Link IE Field Basic master station to this product

Assignment	Category	Host master station assigned link device address (Start number +)	Data name	Description
Host master station remote output (RY)	Digital output in SIO mode	RY00 to 0F	Digital output (port 0 to F)	Digital output data in SIO mode (PNP output or NPN output).
	Product operation flag	RY1F	Clear the latest error	When starting up from 0 (OFF) to 1 (ON), the latest errors are cleared.
		RY1D	Little endian access (Extended access enabled assignment only)	Specify the byte unit order for <i>Extended access read data</i> or <i>Extended access write data</i> . 1 (ON): Read and write service data (setting values, etc.) in the IO-Link device in little endian format. Set to 1 (ON) when reading and writing general service data in the IO-Link device. 0 (OFF): Read and write service data (setting values, etc.) in the IO-Link device in big endian format.
		RY1C	GD-ILM16C-MLP/-ILM16E-MLP parameter designation (Extended access enabled assignment only)	Designate the extended access destination as either this product or an IO-Link device. 1 (ON): Designates access to this product's Master Unit parameters. Note Reading/writing product Master Unit parameter data is in little endian format (fixed). 0 (OFF): Designates access to service data (setting values, etc.) in the IO-Link device.
		RY18 to RY1B	Port No. of IO-Link to access (0 to F) (Extended access enabled assignment only)	If "GD-ILM16C-MLP/-ILM16E-MLP parameter designation" is 0 (OFF), specify the IO-Link device port number to access.
		RY17	Clear the latest event	When starting up from 0 (OFF) to 1 (ON), the latest events are cleared.

Assignment	Category	Host master station assigned link device address (Start number +)	Data name	Description
		RY16	Encoder counter reset	If a SIO device is the encoder, when starting up from 0 (OFF) to 1 (ON), the product internal high-speed counter is reset.
		RY12	Write request (Extended access enabled assignment only)	When this bit starts up, the designated data writing begins.
		RY11	Read request (Extended access enabled assignment only)	When this bit starts up, the designated data reading begins.
		RY10	Extended access enable flag	Specify extended access enabled assignment as the assignment method for the cyclic communication area. 1 (ON): Extended access enabled

● Process Data/Extended Access-Related Data

- Input from this product to CC-Link IE Field Basic master station

Assignment	Category	Host master station assigned link device address (Start number +)	Data name	Description
Host master station remote register (RWr)	Input from IO-Link devices	RWr00 to RWr1D	Process input data Port 0 to E	Process input data in IO-Link communication mode. Two words (four bytes) per port at default values.
	Extended access read data	RWr1E, RWr1F	Extended access read data	The value read during extended access. Two words (four bytes). If <i>Little endian access</i> is 1 (ON), the byte address +500 will be the lowest-order byte. <ul style="list-style-type: none"> • Upon a read request, the data read from the target (this product or the IO-Link device) is stored. • For a write request, a value of 0 will be stored when the operation is complete. • If there is an access error, the extended access error code will be stored. Refer to the <i>Extended Access Error Code List</i> on page 3-21 later in this document for details on extended access error codes.

- Output from CC-Link IE Field Basic master station to this product

Assignment	Category	Host master station assigned link device address (Start number +)	Data name	Description
Host master station remote register (RWw)	Output to IO-Link devices	RWw00 to 1B	Process output data Port 0 to D	Process output data in IO-Link communication mode. Two words (four bytes) per port at default values.
	Extended access specified data	RWw1C	Index number or setting value number specification	When byte length or target selection to access is 1 to 4 bytes (reading/writing of 1- to 4-byte data), designate the index number of the service data (setting values, etc.) inside the target IO-Link device, the product IO-Link device setting, or designate the setting of the product Master Unit parameter setting value number.
		RWw1D bit address 8 to A	Byte length or target selection to access	Designate whether the read/write target is a connected IO-Link device on an arbitrary port or this product's Master Unit parameters (in that case, also designate the read/write data size at the same time). 1 to 4: Reading/writing 1- to 4-byte data (the read/write target is the connected IO-Link device or this product's Master Unit parameters)
		RWw1D bit address 0 to 7	Subindex number or target number	When byte length or target selection to access is 1 to 4 bytes (reading/writing of 1- to 4-byte data), designate the subindex number of the service data (setting values, etc.) inside the target IO-Link device or the product Master Unit parameter target number.
	Extended access write data	RWw1E, RWw1F	Extended access write data	Specify the setting value to write via extended access. The data length is two words (four bytes) maximum. Upon a write request, this value will be sent to the target (this product or the IO-Link device). If <i>Little endian access</i> is 1 (ON), RWw1E bit address 0 through 7 will be the lowest-order byte.

IO-Link device process data is converted to little endian format with default values within the product. The *Process data LSB/MSB* Master Unit parameter can be used to change this to big endian format for each port.

● Extended Access Error Code List

The following error codes are stored in the front byte (RWr1E bits 0 through 7) of the extended access read data when an access error occurs during extended access.

Error Codes	Description
11 h	The specified index number does not exist in the IO-Link device for which reading was attempted.

Error Codes	Description
23 h	Failed to write setting value (attempted to write a read-only setting value).
30 h	Outside the range of setting value write data.
33 h	The set value data for which writing was attempted is too long.
34 h	The read setting value data length is 0 (read error).
80 h	The port number to be accessed is out of range.
81 h	The IO-Link device for which set value writing was attempted is not connected.
82 h	The IO-Link device for which set value writing was attempted does not support ISDU communication.
94 h	Cannot be executed when the storage function is BUSY.

3-3-4 Process Data Words Allocation Example

Below are allocation to this product, allocation to the host master station link device (in this case, a word unit remote register is used for the example), and an actual allocation device example with an IO-Link device connected to this product.

Product port number	IO-Link device process data size example		Result of product auto allocation execution		Host master station remote register		Host master station actual device example	
	Process input data byte count	Byte count data byte count	Process input data word count	Process output data word count	RWr (address hexadecimal) Ex.: RWw/RWr start: 00	RWw (address hexadecimal) Ex.: RWw/RWr start: 00	Ex.: W100 up (address hexadecimal)	Ex.: W200 up (address hexadecimal)
0	2	0	1	0	RWr00	---	W100	---
1	2	0	1	0	RWr01	---	W101	---
2	0	2	0	1	---	RWw00	---	W200
3	Not used		0	0				
4	4	0	2	0	RWr02 - 03	---	W102 - 103	---
5	3	0	2	0	RWr04 - 05	---	W104 - 105	---
6	Not used		0	0				
7	Not used		0	0				
8	16	0	8	0	RWr06 - 0D	---	W106 - 10D	---
9	0	1	0	1	---	RWw01	---	W201
A	Not used		0	0				
B	Not used		0	0				
C	Not used		0	0				
D	4	0	2	0	RWr0E - 0F	---	W10E - 10F	---
E	Not used		0	0				
F	Not used		0	0				



Precautions for Correct Use

- When either input or output exceeds a total of 32 words (64 bytes), the process data exceeding the total will not be assigned to the host master station (it will be ignored).
To connect a maximum of 16 IO-Link devices to this product, the following conditions are required.

Product process data size with the connected IO-Link device group:

Input: Total of 32 words (64 bytes) over all ports

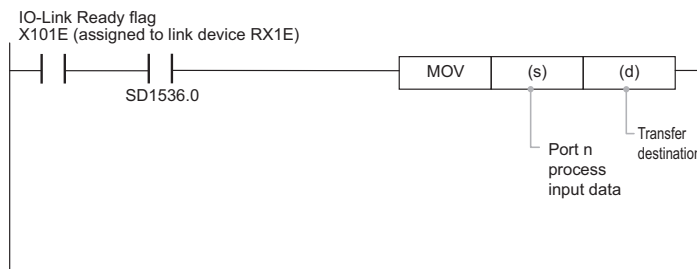
Output: Total of 32 words (64 bytes) over all ports

3-3-5 Process Data Reading and Writing Methods

When the IO-Link Ready flag is ON and the CC-Link IE Field Basic data link is normal, read process data.

Ex.: Reading process input data from an IO-Link device on a given port

With input conditions of link device assigned the IO-Link Ready flag (for instance X101E) ON and SD1536 (cyclic transmission status of each station; when product station number = 1 (among stations 1 to 16)) ON, read out.

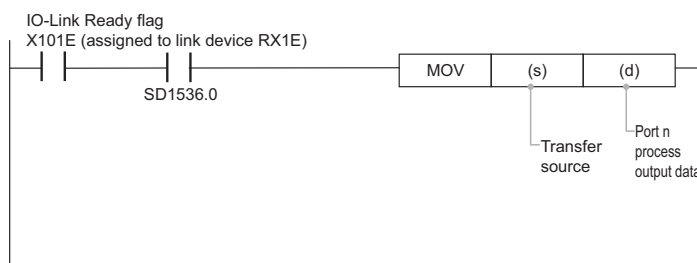


When the IO-Link Ready flag is ON and the CC-Link IE Field Basic data link is normal, write process data.

Ex.: Writing process output data from an IO-Link device on a given port

With input conditions of link device assigned the IO-Link Ready flag (for instance X101E) ON and SD1536 (cyclic transmission status of each station; when product station number = 1 (among stations 1 to 16)) ON, write.

Because there is a communication abnormality when the IO-Link Ready flag is 0 (OFF), handle data transfer destinations suitably.



Precautions for Correct Use

When the IO-Link ready flag is ON, read and write process data.

3-3-6 Assignment Data List by Objective with Extended Access Enabled

Assigned data	Extended access	Byte length or target selection to access	Port No. of IO-Link to access	Little endian access	GD-ILM16C-MLP/-ILM16E-MLP parameter designation	Index number or setting value number	Subindex number or target number	Connection order from left end of target sensor unit	Write	Read	Read/write size designation
Link device address	RY10	RWw1D bit address 8 to A	RY18 to RY1B	RY1D	RY1C	RWw1C	RWw1D bit address 0 to 7	RWw1C bit address 8 to F	RY12	RY11	Depends on byte length or target selection to access
In this situation											
To read/write product Master Unit parameters to/from cyclic data	1 (ON)	1 to 4 (designate byte length)	Irrelevant	Irrelevant (little endian fixed)	1 (ON)	IO-Link device setting or product Master Unit parameter setting value number	Master Unit parameter target port	Irrelevant	1 (ON) or 0 (OFF) designation		Depends on byte length or target selection to access (1 to 4 bytes)
To designate designated IO-Link device index/subindex and read/write data to cyclic		1 to 4	Designation	1 (ON): Little endian format	0 (OFF)	Index number	Subindex number	Irrelevant			Depends on byte length or target selection to access (1 to 4 bytes)

3-3-7 Actual Access Extension Methods

When the IO-Link Ready flag is at 1 (ON) and the CC-Link IE Field Basic data link is normal, read/write the specific address of the specific target via extended access.

To Write to IO-Link Device Service Data Via Extended Access

- Set extended access (RY10) = 1 (ON).
- Designate the target port with target IO-Link port designation (RY18 to RY1B).
- Designate the index number with the index number (RWw1C) and the subindex with the subindex number (output RWw1D, bit address 0 to 7).

- Designate the target IO-Link device service data in little endian format, and set the little endian access (RY1D) to 1 (ON).
- Set the data to be written to extended access write data (RWw1E, RWw1F). When setting little endian access (RY1D) to 1 (ON) as above, write data will be stored in little endian format. RWw1E bits 0 to 7 are the lowest-order bytes and RWw1F bits 8 to F are the highest-order bytes.
- Designate the byte length (1 to 4) to write with the byte length or target selection to access (RWw1D bit address 8 to A).
- When writing, the write request bit (RY12) will change from 0 (OFF) to 1 (ON) as it starts up.
- When access completed = 1 (ON), writing is complete. However, when access error = 1 (ON) at the same time, an error has occurred. Check the extended access read data (RWr1E bit address 0 to 7) error code list.

To Write to Product Master Unit Parameters via Extended Access

- Set extended access (RY10) = 1 (ON).
- Designate the Master Unit parameters for this product with GD-ILM16C-MLP/-ILM16E-MLP parameter designation (RY1C).
- Designate the setting value number with the setting value number (RWw1C) and the target number with the target port (RWw1D, bit address 0 to 7).
- Set the data to be written to extended access write data (RWw1E, RWw1F). Store write data as little endian format. RWw1E bits 0 to 7 are the lowest-order bytes and RWw1F bits 8 to F are the highest-order bytes.
- Designate the byte length to write with the byte length or target selection to access (RWw1D bit address 8 to A).
- When writing, the write request bit (RY12) will change from 0 (OFF) to 1 (ON) as it starts up.
- When access completed = 1 (ON), writing is complete. However, when access error = 1 (ON) at the same time, an error has occurred. Check the extended access read data error code list.

3-4 Acyclic Communication (socket or Modbus/TCP communication)

This product supports socket communication (UDP/IP or TCP/IP) or Modbus/TCP communication with regard to acyclic communication.

Thereby, reading/writing of product Master Unit parameters and IO-Link device internal service data is possible, as well as reading of process data. However, neither socket communication nor Modbus/TCP communication is capable of writing process data.

Further, this product can perform acyclic communication (ISDU communication) with IO-Link devices based on socket communication or Modbus/TCP communication from the host.

3-4-1 Socket Communication (UDP/IP or TCP/IP)

When the product network type is set to *CC-Link IE Field Basic*, access is possible via socket communication (UDP/IP or TCP/IP) from the client to the product.

Socket Communication Program

After port open processing, the client sends or receives the following data to the product. When data transmission is complete, the port is closed.

Data configuration for data transmission between the client and this product is as below.

● Transmitted Data

Number of bytes	Data meaning	Data value	Description
+0	Command	53 h	Data access request
+1	Transfer data designation	Bit 0	Reading process input data/digital input data/allocated status data* ¹ Reads out a total of fixed 32 words for all used ports + 1 word digital input + 1 word allocated status data as a batch.
		Bit 2	Setting value access
		Bit 3	Execute by writing setting value access
		Bit 4	Background access mode (When reading/writing data to/from slow IO-Link devices, execution will take place without stopping socket communication from elsewhere.) Also, the normal response code in this mode when bit 2 (setting value access) is 1 will be 62 h (reading) or 42 h (writing). When bit 2 (setting value access) is 0, confirm the response to the command sent immediately before.
		Bit 5	Background access mode forced cancel
		Bits 7 to 6	Reserved (0)

Number of bytes	Data meaning	Data value	Description
+2	Module designation	80 h to 8F h	IO-Link device port 0 to 15
		C0 h to CF h	Data length 4 bytes or less for IO-Link devices ports 0 to 15 will be handled as little endian
		FF h	Product Master Unit parameters
+3	Index number or Master Unit parameter number (low-order byte)		Setting value access index number (low-order byte) or Master Unit parameter number (low-order)
+4	Index number or Master Unit parameter number (high-order byte)		Setting value access index number (high-order byte) or Master Unit parameter number (high-order)
+5	Subindex number		Setting value access subindex number
+6	Write data		Reading setting value byte length* ² (2 bytes) or writing setting value (1 to 500 bytes) continue.
+7	Same as above		
(below like-wise)			

- *1. Allocated status data
Allocated status data is composed of the following bits.

Bit	Data name
15	Error flag
14	IO-Link ready flag
8 to 11	Latest error port
7	Event flag
6	I/O power supply flag
5	Output overcurrent flag
0 to 3	Latest event port

For data content, refer to *Reading the status data of this product* in 4-1 Product Functions in the Common Edition.

- *2.
- When the setting value byte length for reading is set to 0, the response will correspond to the actual setting value length. In that case, the maximum readable byte length is 500 bytes.
 - When the transfer data designation is 10 h, there is no need to send the reading setting value byte length.

● Received Data

Number of bytes	Data meaning	Data value	Description
+0	Response code	41 h	Setting value writing normal response
		4E h	No data designation response
		61 h	Setting value reading normal response
		62 h	Setting value reading data in preparation in background access mode
		42 h	Setting value writing processing in background access mode
		51 h	Background access mode cancel complete
		45 h	Setting value writing abnormal response
		46 h	Setting value writing abnormal response (extended error code)
		65 h	Setting value reading abnormal response
		66 h	Setting value reading abnormal response (extended error code)
+1	Error Codes	00 h	Normal
		02 h	Received socket data is too short
		03 h	Timeout generated in setting value access
		04 h	An unexpected response has returned in setting value access
		05 h	Module designation value is out of range
		06 h	Readout byte count is too long (over 500 bytes)
		07 h	Additional access request made during data access Note After making a background access request, be sure to set the send data +1 transfer data designation to 10 h and complete reading or writing, or to 20 h and interrupt.
		08 h	Background access has not been executed even once
		Extended error code	
+2	Read data or next response code		Read data is a setting value (1 to 500 bytes). Ex.: Normal response when transfer data designation is 07 h
+3	Same as above		70 h, 00 h, process input data 68 bytes, 50 h, 00 h, 61 h, 00 h, setting value read data
(below likewise)			

Example of Data Transmission

Below is an example of data transmission to/from this product using socket communication.

● Ex.: Master Unit Parameter Reading

Reads the product's Master Unit parameter number 8.

- Send data string (Master Unit parameter reading)

Byte order	Data value	Description
+0	53 h	Command

Byte order	Data value	Description
+1	04 h	Bit 3 = read designation (0), bit 2 = setting value access
+2	FF h	Module designation = product Master Unit parameters
+3	08 h	Master Unit parameter number (decimal 8) low order
+4	00 h	Master Unit parameter number (decimal 8) high order
+5	00 h	Subindex number (decimal 0)
+6	00 h	Reading setting value byte length (decimal 0) low order Note For 0, only the actual data count is read.
+7	00 h	Reading setting value byte length (decimal 0) high order

- Response data string

Byte order	Data value	Description
+0	61 h	Setting value reading normal response
+1	00 h	Normal response code
	30 h	Read data (1st byte of character string "012345")
	31 h	Read data (2nd byte of character string "012345")
	32 h	Read data (3rd byte of character string "012345")
	33 h	Read data (4th byte of character string "012345")
	34 h	Read data (5th byte of character string "012345")
	35 h	Read data (6th byte of character string "012345")

3-4-2 Modbus/TCP Communication

When the product network type is set to *CC-Link IE Field Basic*, access is possible via Modbus/TCP communication from the Modbus/TCP master to the product.

The register numbers below can be accessed.

Register number	Category	Description
00000 to 00067	Product operation-related	This area is for operation of this product from UI devices such as HMI (display)/SCADA. It includes the display indicator character string readout, button operation read/write, display screen switching, and operation lock.
00068 to 00070	Network time-related	The time counted within this product.
00071 to 00087	Status-related	This includes content related to allocated status data, errors, and events.
00088	Operations	Operations such as error clearing are conducted.
00089 to 00345	Digital/process data input-related	SIO digital input and IO-Link process input data (32 bytes/port). Note The content below is for readout only. 00346: Digital data output 00347 to 00602: Process data output
00603 to 03871	Index access library-related	This is a library area for ISDU communication with IO-Link devices. In order to designate an arbitrary index/subindex and read/write to/from connected IO-Link devices, this area registers port number/index number designations, etc. (up to 128 items) to a library (called the <i>index access library</i>) and gives operation instructions.

Register number	Category	Description
03872 to 04123	Registered register number library-related	This area registers product non-sequential register numbers in a library (called the <i>registered register number library</i>) in advance and batch-reads designation sizes beginning with one of these numbers. Available only when reading from the Modbus/TCP master (possible only with function codes 03 h or 17 h). Not used for writing. One area registers frequently designated arbitrary register numbers (up to 125 items) as a library, another designates readout size, and a third contains execution data for the registered register number library.
04124 to 04126	Index access library/registered register number library backup operation-related	This area conducts backup (save) operation of the index access library (0070 to 03871) and registered register number library (3872 to 3997) data to product non-volatile memory. When the power is next turned on, rewriting to the index access library or registered register number library on the user's part is not required.
05500 to 06565	Master Unit parameter-related	This area reads and writes product Master Unit parameters.

For details of the product holding register designated during Modbus/TCP communication, refer to *3-2-2 Detailed list of register numbers* in the *Ethernet & Modbus/TCP Edition*.

3-4-3 Event Communication

If there is an extreme pressure drop, etc., with an IO-Link device on a given port, the product spontaneously receives the event code and event type sent from the IO-Link device and saves it in product memory.

At this time, the event flag (allocated to host master station RX17) turns ON, and the port number where the event took place is stored in *Latest Event port* (allocated to host master station RX10 to 13). On this condition, from a client socket communication program, it is possible to access the Master Unit parameter *Event data readout* and read out the event code and event type.

Thereby, the following IO-Link device phenomena can be grasped on the host master station side when they occur.

Errors (ex.: breakdowns, short-circuits) and maintenance information (ex.: maintenance predictive period complete)

Refer to each IO-Link device index list for their event codes.

3-5 Specific Communication Examples (including sample programs)

3-5-1 Example of Cyclic Communication

Below is an example of combining IO-Link communication and SIO for cyclic communication.

Example Combining IO-Link Communication and SIO

Process input data (4 bytes) from the port 0 IO-Link device is read from the lower direction (default value).

Process output data (4 bytes) to the port 1 IO-Link device is written from the upper direction.

Reads bit input data from the port 2 SIO device (NPN type presence sensor).

Host master side refresh settings

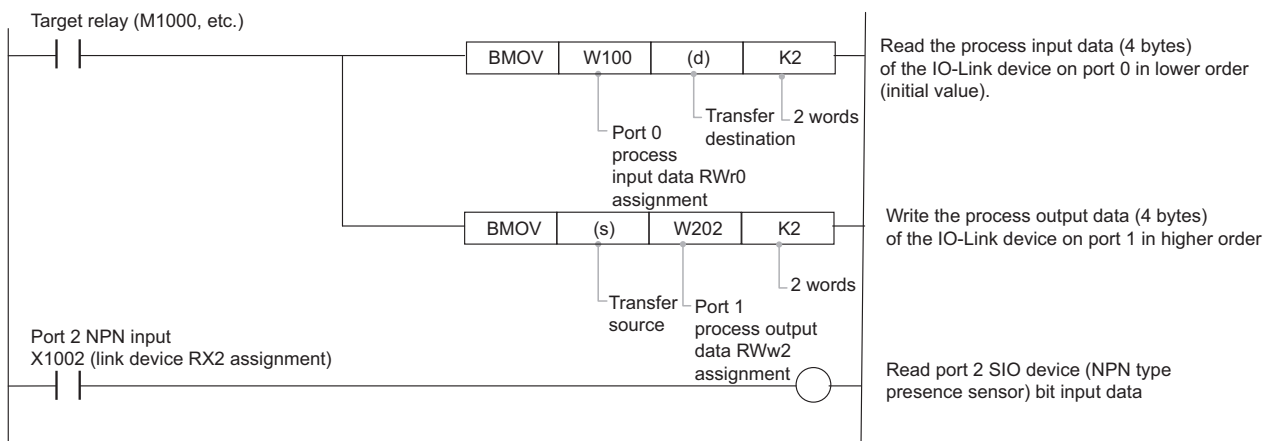
Link side					CPU side					
Device name	Points	Start	End		Target	Device name	Points	Start	End	
RX	64	00000	003F	↔	Designated device	X	32	01000	01077	
RY	64	00000	003F	↔	Designated device	Y	32	01000	01077	
RWr	32	00000	001F	↔	Designated device	W	32	00100	0011F	
RWw	32	00000	001F	↔	Designated device	W	32	00200	0021F	

Product CC-Link IE Field Basic station number: Ex.: 1

Product Master Unit settings:

- I/O assignment function setting (set value number: M10)
Port 0: IO-Link, Port 1: IO-Link, Port 2: NPN input
- Process data LSB/MSB (setting value number: M43):
Port 1: Higher order (Big endian)

Master side program example:



3-5-2 Example of Acyclic Communication

To use acyclic communication to read and write IO-Link device service data, create a socket communication program.

Refer to *3-4-1 Socket Communication (UDP/IP or TCP/IP)* on page 3-26 and *A-2 Sample Socket Communication Program* on page A-24 for the programming procedures.

Refer to *A-1 List of Product Master Unit Parameters* on page A-2 for product Master Unit parameters.

Refer to each IO-Link device index list for their service data.



Specification

This section describes the specifications of this product.

4-1	Specification	4-2
4-1-1	Communication Specifications	4-2
4-2	Data Processing Time.....	4-3
4-2-1	Process Data Response Time Calculation	4-3
4-2-2	I/O Response Time Example.....	4-5

4-1 Specification

4-1-1 Communication Specifications

Item	Specification	
	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 station
	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	<ul style="list-style-type: none"> Cyclic data transmission: 61450 (UDP) Node connection: 61451 (UDP)
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). Note Socket communication setting values background access mode is possible.
	Number of simultaneous connections	<ul style="list-style-type: none"> Socket communication (UDP/IP: 4, TCP/IP: 1) Modbus/TCP communication: 2
	IP address setting	Static IP address only
	Port number	<ul style="list-style-type: none"> Socket communication: 2001 (both TCP and UDP) Modbus/TCP communication: 502

4-2 Data Processing Time

4-2-1 Process Data Response Time Calculation

The process data response time from the CC-Link IE Field Basic master and through IO-Link is indicated as follows.



Additional Information

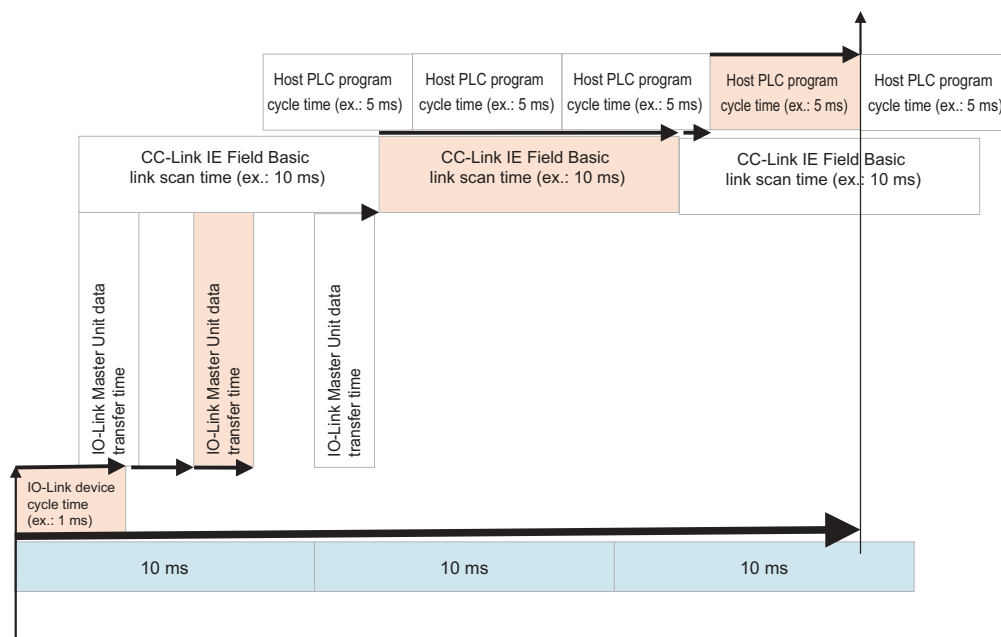
Product standard response time is 0.6 ms. As necessary, divide slave stations into fast-response and slow-response groups. Based on the standard response time of other slave stations in the same group, calculate the link scan time.
With regard to the CC-Link IE Field Basic link scan time calculation, refer to the manual of the CC-Link IE Field Basic master.

When CC-Link IE Field Basic and IO-Link Are Not Synchronized

● Process Input Data

$(\text{IO-Link cycle time}) \times (1 \text{ to } 2) + (\text{CC-Link IE Field Basic link scan time}) \times (1 \text{ to } 2) + (\text{host PLC program cycle time}) \times (1 \text{ to } 2)$

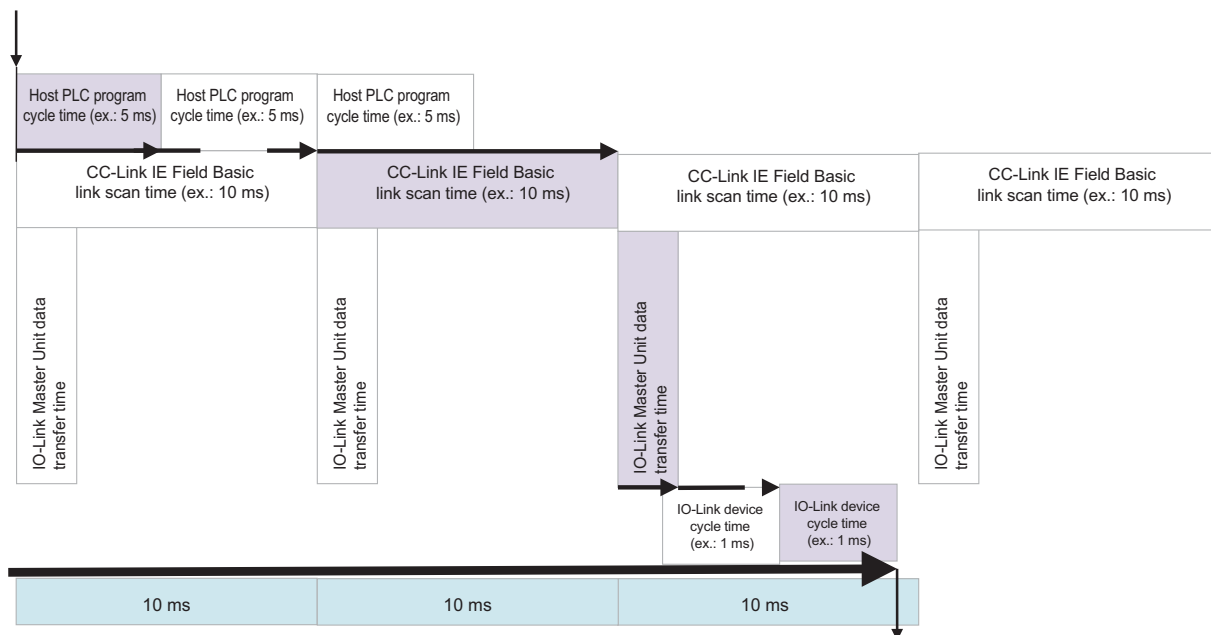
Example:



● Process Output Data

$(\text{host PLC program cycle time}) + (\text{CC-Link IE Field Basic link scan time}) \times (1 \text{ to } 2) + (\text{IO-Link cycle time}) \times (1 \text{ to } 2)$

Example:



IO-Link Communication Response Time

The minimum cycle time for IO-Link devices is defined by individual device.

- Minimum cycle time of “0”: The fastest cycle time supported by this product will be used.
- Minimum cycle time specified: This product will communicate with the IO-Link device at the specified cycle time.

The actual IO-Link communication cycle time can be confirmed in the *Master Unit parameters (M51. IO-Link cycle time process value)* for this product.

Note This product performs IO-Link communication using hardware logic rather than software, so the fastest time is 0.3 ms.

The cycle time can be specified on this product. This is set in *Master Unit parameters M21. I/O synchronization* in this product. However, it cannot be set faster than the minimum cycle time of the IO-Link device.

Sample Cycle Time for IO-Link

Conditions: Process input data bytes: 2, process output data bytes: 0, on-request data bytes: 1
 Minimum 0.35 ms: Add the command, checksum and reserve bytes, and then multiply by 0.05 ms.
 COM3: 0.4 ms (time under 0.1 ms rounded up)
 COM2: 2.4 ms
 COM1: 19.2 ms

Synchronization Function Between IO-Link Communication and Digital I/O

For CC-Link IE Field Basic, if the Master Unit parameter *M21. I/O synchronization* is set to *Synchronous timer 0.8/1.6/3.2/6.4 ms* in this product, the internal timer of this product will be used to

synchronize IO-Link communication or digital I/O transfer between multiple ports set to the same setting value at a cycle of 0.8/1.6/3.2/6.4 ms. (This can also be confirmed in Master Unit parameter *M51*. *IO-Link cycle time process value*).

However, in order to suppress noise generated by the communication signal, IO-Link communication delays each port 0.56 μ s instead of sending at the exact same time.

Internal Data Transfer Processing Time for This Product

IO-Link device process input data is first rearranged through software in this product, and then transferred to the CC-Link IE Field Basic processing chip.

The processing time depends on the number of process data bytes for the IO-Link devices on all ports. Transfer takes place at approximately 0.1 to 0.4 ms.

4-2-2 I/O Response Time Example

In the following example, the I/O response time is calculated for a system where 16 OMRON E3AS-HL photoelectric sensors (IO-Link-compatible) are connected to this product using IO-Link communication.

Note that the minimum cycle time for E3AS-HL sensors (IO-Link-compatible) is 1.2 ms.

Conditions: Possible with the CC-Link IE Field Basic link scan time set to 3 ms.

E3AS-HL photoelectric sensor process data: Averaged received light level % (bit 15 - 1) + output (bit 0) (default value)

The time required for output to pass from the 16 E3AS-HL sensors, through this product, into the host PLC, and then to be programmed is as follows.

IO-Link device cycle time 1.2 ms \times (1 to 2) + CC-Link IE Field Basic link scan time 3 ms \times (1 to 2) + host PLC program cycle time 1 ms \times (1 to 2) = 5.2 to 10.4 ms

5

Troubleshooting

Describes methods of troubleshooting related to CC-Link IE Field Basic communication.

5-1	Troubleshooting	5-2
5-1-1	Troubleshooting Based on LEDs	5-2
5-1-2	Troubleshooting Based on Symptoms.....	5-3
5-1-3	Error Code List	5-3

5-1 Troubleshooting

5-1-1 Troubleshooting Based on LEDs

Front LEDs (on this product)		Status	Description	Correction
NS	MS			
Lit red	Flashing red	Duplicate IP addresses within the network		Make sure the IP address is not a duplicate of any other.
Off	Flashing green	Ethernet cable is not connected		Confirm that the Ethernet cable is connected.
		IP address is not set correctly		Confirm the product IP address setting.
Flashing green	Lit green	Network starting up (about 7 seconds)		If the subnet mask is not 255.255.255.0 and the default gateway is not 0.0.0.0, change to these settings.
		Connection not established	Network configuration setting is wrong	Check whether the network configuration setting is correct on GX Works2/3.
			IP address setting is invalid	<ul style="list-style-type: none"> Check whether the device IP address is correctly set on the master side. Make sure the network part is the same in the master and product IP addresses. Example: If the subnet mask is 255.255.255.0: Master: <u>192.168.0.2</u> This product: <u>192.168.0.1</u> (the underlined part is the network part)

Front LEDs (on this product)		Status	Correction
Ether1 or Ether2			
Off		LAN cable is disconnected	Check whether the Ether1 or Ether2 LAN cables are disconnected.

Front LEDs (on this product)		Status	Description	Correction
NW READY	NW COMM			
Lit blue-green	---	IC inside CC-Link IE Field Basic startup	The CC-Link IE Field Basic network chip is starting up.	---
Off	---		The CC-Link IE Field Basic network chip is not operating.	If the NW READY LED does not stay ON (blue-green) even though the power is ON, check the UNIT PWR LED. If the NW READY LED is unlit even though the UNIT PWR LED is lit, the power voltage may be extremely low, or the network type switching may have failed, preventing startup.
Flashing blue-green	---	Network chip firmware transferring	The CC-Link IE Field Basic network chip firmware is undergoing internal transfer.	---

Front LEDs (on this product)		Status	Description	Correction
NW READY	NW COMM			
Lit blue-green	Lit blue-green	CC-Link IE Field Basic communication status	Communication with the CC-Link IE Field Basic master station is normal.	---
Lit blue-green	Flashing blue-green		Communication disconnection	<ul style="list-style-type: none"> • Confirm the CC-Link IE Field Basic master status (for details, refer to the manual of the CC-Link IE Field Basic master station in use). • Confirm the status of the CC-Link IE Field Basic cable. • Confirm the status of the Switching Hub between the CC-Link IE Field Basic master and this product. • Confirm the following if no problems are found. <ol style="list-style-type: none"> a) IP Address Setting b) Subnet mask setting c) Default gateway setting After changing the IP address, subnet mask, or default gateway setting, restart the product power.
---	Off		Not communicating	<ul style="list-style-type: none"> • Check the following items: <ol style="list-style-type: none"> a) Communication wiring with the CC-Link IE Field Basic master station b) Product front panel IP address lowest digit setting c) CC-Link IE Field Basic master status • Reset the CPU module of the host PLC.

5-1-2 Troubleshooting Based on Symptoms

Phenomenon	Front LEDs (on this product)	Cyclic communication flag	Error code (hexadecimal)	Probable cause	Correction
Data sent to/received from an IO-Link device via IO-Link communication cannot be read/written properly by CC-Link IE Field Basic	ALARM LED flashing red	Error flag ON	FFFA	CC-Link IE Field Basic communication has stopped	Confirm the status of the host network (CC-Link IE Field Basic).

5-1-3 Error Code List

Code (hexadecimal)	Message	Conditions	Correction
1000	No Service generated in ISDU communication	This occurs when the start code of the ISDU communication response used to access the setting value for the IO-Link device is "0" (No Service).	<p>A setting value that is not supported by the IO-Link device is being accessed in this case. Confirm what you are trying to access (index number, etc.).</p> <p>This ISDU handling error may occur when the power supply to the IO-Link device is unstable. Use a power supply with sufficient capacity.</p>
1001	IO-Link communication has stopped	This occurs when communication is established with an IO-Link device but then is disconnected. This error does not occur if the I/O power supply is shut down. 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.

Code (hexadecimal)	Message	Conditions	Correction
1100	Timeout generated in ISDU communication	When using ISDU communication to access an IO-Link device setting value, no ISDU communication 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.).
5600	Checksum error generated in ISDU communication	When using ISDU communication to access an IO-Link device setting value, a mismatch occurs when calculating the checksum of the ISDU communication response.	This could be caused by noise between the IO-Link device and this product. 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 communication data length	This occurs when the data length of the ISDU communication response is either "0" or too long, when using ISDU communication to access an IO-Link device setting value.	
6001	Revision ID verification 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 setting values are not accessed.	Change the setting value for device verification (setting value number: M30) to <i>None</i> .
8033	Setting value is too long	This occurs when the data length is too long, when using ISDU communication 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 verification (setting value number: M30) is set to <i>None</i> 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. 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 <i>Delete</i> .
FF24	Storage buffer overload	This occurs when setting value data is too long and cannot be stored, when backing up setting values from an IO-Link device. The data length stored during backup will be <i>16 bytes + index 18 (model name) length + number of setting values to backup × 4 + total data length of setting values to backup</i> . 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 refused	This occurs when access to storage data is locked on the IO-Link device.	If required, release the lock setting (index number 12) on the IO-Link device.
FFEA	Duplicate IP addresses	A module with a duplicate IP address was connected.	Confirm the IP address of the connected module.
FFEB	Timeout generated in conflict with ISDU communication	While attempting to perform ISDU communication on the same IO-Link port, ISDU communication was being used elsewhere and communication could not be performed within 330 times the cycle time.	Storage takes some time, so wait a short while and try ISDU communication 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 setting values, 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	Correction
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. 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. 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). 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.	There is something wrong with the data for the firmware being written. 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 verification (setting value number: M30) is set to a value other than <i>None</i> .	Change the setting value for device verification (setting value number: M30) to <i>None</i> . Alternately, 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 verification (setting value number: M30) is set to <i>Type name</i> . Cyclic communication is not performed with the applicable IO-Link device.	Change the setting value for device verification (setting value number: M30) to a value other than <i>Type name</i> . Alternately, 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. <ul style="list-style-type: none"> The count is cleared if nothing is written for 450 seconds. When writing twice with a frequency of once in less than 1 second. When writing 20 times with a frequency of once in less than 10 seconds. When writing 200 times with a frequency of once in less than 110 seconds. 	Confirm whether setting value write operations are being performed frequently from the host PLC. Confirm whether IO-Link device setting values are frequently rewritten, with automatic device parameter backup (setting value number: M31) set to <i>Backup</i> or <i>Both</i> .
FFF8	Software version does not match	There is version incompatibility with the main firmware, host 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 host 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	Correction
FFFA	Network communication has stopped	This occurs when host CC-Link IE Field Basic 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. <ul style="list-style-type: none"> The IO-Link device is not connected when running storage functions (manual or automatic backup/restore of IO-Link device) Ten seconds elapse without the IO-Link device connecting after the I/O power supply is turned ON, when device verification (setting value number: M30) is set to a value other than <i>None</i> The IO-Link device is not connected when confirming device information or reading/writing a setting value number from the device setting values window 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. Alternately, change the setting value for device verification (setting value number: M30) to <i>None</i> . Alternately, set the I/O assignment settings (setting value number: M10) to a value other than <i>IO-Link</i> for any ports not connected to an IO-Link device.
FFFC	Serial number verification error	This occurs when the registered serial number differs from the serial number of the connected IO-Link device, when device verification (setting value number: M30) is set to <i>Serial number</i> . Cyclic communication is not performed with the applicable IO-Link device.	Change the setting value for device verification (setting value number: M30) to a value other than <i>Serial number</i> . Alternately, 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 <i>Backup</i> 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 verification (setting value number: M30) is set to a value other than <i>None</i> . Cyclic communication is not performed with the applicable IO-Link device.	Change the setting value for device verification (setting value number: M30) to <i>None</i> . Alternately, 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.

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

Note 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.



Appendices

This section describes the Product Master Unit parameters when reading/writing with socket communication.

A-1	List of Product Master Unit Parameters	A-2
A-1-1	User Settings	A-2
A-1-2	Data for access from PLC	A-16
A-2	Sample Socket Communication Program	A-24

A-1 List of Product Master Unit Parameters

This list shows product Master Unit parameters which can be set/monitored with Modbus/TCP communication or socket communication.

- For Modbus/TCP communication, it is done via writing/reading register numbers 05500 to 06565.
- For socket communication, it is done by designating bit 2/3 with transfer data designation (setting value access/writing or reading), FF h with module designation (product Master Unit parameters), Master Unit parameter number and target number, and reading/writing.

Refer to *5-1-4 Master Unit Parameter List with Product Front Panel Operations* in the Common Edition for details on setting/monitoring with front panel operation.

The Master Unit parameters are classified as below.

- User settings
- Data for access from PLC

Note that this product's Master Unit parameters are handled as little endian (beginning from the low-order byte).

A-1-1 User Settings

In socket communication, designate a Master Unit parameter number and target number from the table below.

Note In the right column of the table below, items that can be accessed via product front panel operation, Modbus/TCP operation, or socket communication are marked with “●”.

Master Unit parameter numbers DEC (HEX)	Target numbers 0 to 15: Corresponds to channel number 0: This product	Data name	R/W	Format	Length in bytes	Value	Front panel controls (Master Unit parameter numbers)	Modbus/TCP Communication (Register number)	Socket communication	
1 (1 h)	0	IO-Link Master Unit parameters reset	RW	UINT	1	0 (Default value)	None	●(M1)	●(06500)	●
						1	Initialize I/O assignment for all ports in IO-Link mode. (Storage data, display language, network type, and network No. will not be initialized)			
						2	As above, initialize I/O assignment for all ports in PNP input mode.			
						3	As above, initialize I/O assignment for all ports in NPN input mode.			
						4	As above, initialize I/O assignment for all ports in PNP output mode.			
						5	As above, initialize I/O assignment for all ports in NPN output mode.			
						6	As above, initialize I/O assignment for all ports as unused.			
						7	Delete the installed IODD data.			
						8	Initialize including network setting and language as well. I/O assignment is unused. IODD data is not deleted.			
2 (2 h)	0	Network type	RW	UINT	1	Designate the host industrial network type.	●(M2)	●(06250)	●	
						2 (Default value)				EtherNet/IP
						5				Ethernet&Modbus/TCP
						6				CC-Link IE Field Basic
4 (4 h)	0	Display brightness	RW	UINT	1	1 to 20 (Default: 7) Display brightness Values multiplied by 5 are equivalent to % display.	●(M4)	●(05900)	●	



Master Unit parameter numbers DEC (HEX)	Target numbers 0 to 15: Corresponds to channel number 0: This product	Data name	R/W	Format	Length in bytes	Value	Front panel controls (Master Unit parameter numbers)	Modbus/TCP Communication (Register number)	Socket communication	
5 (5 h)	0	Language	RW	UINT	1	0 (Default value)	English	●(M5)	●(05901)	●
						1	Japanese			
						2	German			
						3	Chinese (Simplified)			
						4	French			
						5	Spanish			
						6	Portuguese			
						7	Italian			
						9	Korean			
						10	Chinese (Traditional)			
6 (6 h)	0	Time zone	RW	INT	1	-96 to 96 (Default: 0)	Set the displayed network time (setting value number: M65) to the time difference (15-minute units). If UTC is the standard used for the network time set by the host, setting the time difference to 9 x 4 = 36 will display Japanese time (JST).	●(M6)	●(05902)	●
8 (8 h)	0	User tag name	RW	STRING	1 to 32	Up to 32 characters	Set the product user tag name up to 32 characters.	●(M8)	●(05800 to 05815)	●
9 (9 h)	0	I/O assignment batch settings	RW	UINT	1	0 (Default value)	None	●(M9)	●(06501)	●
						1	Change I/O assignment settings for all ports to IO-Link mode.			
						2	Change I/O assignment for all ports to PNP input mode.			
						3	Change I/O assignment for all ports to NPN input mode.			
						4	Change I/O assignment for all ports to PNP output mode.			
						5	Change I/O assignment for all ports to NPN output mode.			
						6	Change I/O assignment for all ports to unused.			

Master Unit parameter numbers DEC (HEX)	Target numbers 0 to 15: Corresponds to channel number 0: This product	Data name	R/W	Format	Length in bytes	Value	Front panel controls (Master Unit parameter numbers)	Modbus/TCP Communication (Register number)	Socket communication	
10 (A h)	0 to 15	I/O assignment settings	RW	UINT	1	0	IO-Link mode	●(M10)	●(05500 to 05515)	●
						1	PNP input mode: Internal pull-down resistance is enabled.			
						2	NPN input mode: Internal pull-up resistance is enabled.			
						3	PNP output mode			
						4	NPN output mode			
						5 (Default value)	Not used			
11 (B h)	0 to 15	Input filter time	RW	UINT	1	0 (Default value)	None	●(M11)	●(05516 to 05531)	●
						1	0.1 ms			
						2	1 ms			
						3	5 ms			
						4	10 ms			
						5	20 ms			
12 (C h)	0 to 15	Input hold time	RW	UINT	1	0 (Default value)	None	●(M12)	●(05532 to 05547)	●
						1	1 ms			
						2	15 ms			
						3	100 ms			
13 (D h)	0 to 15	IO-Link communication and network error output	RW	UINT	1	0 (Default value)	Clear	●(M13)	●(05548 to 05563)	●
						1	Input hold			
						2	Output hold			
						3	All Hold			

A

Master Unit parameter numbers DEC (HEX)	Target numbers 0 to 15: Corresponds to channel number 0: This product	Data name	R/W	Format	Length in bytes	Value	Front panel controls (Master Unit parameter numbers)	Modbus/TCP Communication (Register number)	Socket communication	
16 (10 h)	0 to 15	Process input data bit position	RW	INT	1	-1	●(M16)			
						0 to 254				Turns ON RX0□ for the corresponding port when the IO-Link device's process input data is valid. 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. Data formats other than Boolean, such as Integer, cannot be specified.
17 (11 h)	0 to 15	Input port to output	RW	UINT	1	0	●(M17)			
						1 to 16				Turns ON or OFF the PNP/NPN output based on the process output data bit information. 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.
18 (12 h)	0 to 15	Pulse input	RW	UINT	1	None	●(M18)			
						ABZ				Does not use the counter function. Uses all of phase A, phase B, and phase Z of the incremental encoder. The rotation count is incremented or decremented at the rising edge of the Z phase, with the count value cleared. 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. 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. It measures the frequency of the AB-phase or single-phase pulse input at the rising edge of each input cycle.

Master Unit parameter numbers DEC (HEX)	Target numbers 0 to 15: Corresponds to channel number 0: This product	Data name	R/W	Format	Length in bytes	Value	Front panel controls (Master Unit parameter numbers)	Modbus/TCP Communication (Register number)	Socket communication	
19 (13 h)	0 to 15	Input inversion	RW	UJINT	1	None	●(M19)			
						Reverse				Passes the input status of the specified port to the inside after reversing it.
21 (15 h)	0 to 15	I/O synchronization	RW	UJINT	2	0 (Default value)	●(M21)	●(05564 to 05579)	●	
						2				Using the product's internal timer, at an 0.4 ms cycle, synchronize IO-Link communication or digital I/O transfer between multiple ports with the same setting (I/O synchronization).
						3				As above, synchronization at 0.8 ms cycle
						4				As above, synchronization at 1.6 ms cycle
						5				As above, synchronization at 3.2 ms cycle
						6				As above, synchronization at 6.4 ms cycle
						7 to 1003				Specify the IO-Link communication cycle time at 0.4 ms to 100.0 ms.
22 (16 h)	0 to 15	Lowest frequency	RW	UJINT	1	27.2 Hz	●(M22)			
						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.
29 (1D h)	0 to 15	Device ID	RW	UJINT	3	0x0 - 0xFFFFFFFF (Default: 0x0)	●(M29)	●(05830 to 05893)	●	

Master Unit parameter numbers DEC (HEX)	Target numbers 0 to 15: Corresponds to channel number 0: This product	Data name	R/W	Format	Length in bytes	Value	Front panel controls (Master Unit parameter numbers)	Modbus/TCP Communication (Register number)	Socket communication	
30 (1E h)	0 to 15	Device verification	RW	UINT	1	0 (Default value)	None Note Even for <i>None</i> , if storage data is already saved in the product, when turning on the power (unit and I/O power), the IO-Link device type ID and storage data type ID will be verified. An error (FF23 h) will occur if the type ID does not match. The revision ID is not verified.	●(M30)	●(05580 to 05595)	●
						1	Type ID (vendor ID and device ID) verification If the registered type ID and connected device type ID are different, an error (FFFE h: type ID verification error) is generated and the process data with the relevant IO-Link device is treated as invalid. As well, if IO-Link communication is not established within 10 seconds of turning on the I/O power, an error (FFFB h: IO-Link device not connected) is generated. At the same time, the revision ID is also verified.			
						2	Type ID + serial number verification Even if the type IDs (vendor ID and device ID) match, if the serial number is different, an error (FFFC h: serial number verify error) is generated, and the process data with the relevant IO-Link device is invalidated. Other operations are the same as set value 1.			
						3	Type ID + device model name verification Even if the type IDs (vendor ID and device ID) match, if the device model name is different, an error (FFF4 h: model name verification error) is generated, and the process data with the relevant IO-Link device is invalidated. Other operations are the same as set value 1.			

Master Unit parameter numbers DEC (HEX)	Target numbers 0 to 15: Corresponds to channel number 0: This product	Data name	R/W	Format	Length in bytes	Value	Front panel controls (Master Unit parameter numbers)	Modbus/TCP Communication (Register number)	Socket communication	
31 (1F h)	0 to 15	Automatic device parameter backup	RW	UJNT	1	0 (Default value)	None	●(M31)	●(05596 to 05611)	●
						1	Auto backup When IO-Link device set values are changed, they are automatically backed up in this product. If IO-Link device setting values are changed from this product, the backup operation will automatically start 10 seconds after the last change. Note When a device with a different vendor ID or device ID is connected, backup is executed at every startup, so reset <i>Device verification</i> (set value number: M30) to correct the verification error (FFFE h) as soon as possible.			
						2	Auto restoration At startup, if the IO-Link device set value is different from the one stored in the product, it will be automatically restored (set value downloaded from the product to the IO-Link device). 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.			
						3	Perform auto backup and auto restoration as above together The storage data stored on this product will always match the IO-Link device setting values. In other words, IO-Link device setting values are backed up to this product whenever they are changed. If any setting values are different from the IO-Link device during startup, the setting values stored in this product will be restored.			

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Master Unit parameter numbers DEC (HEX)	Target numbers 0 to 15: Corresponds to channel number 0: This product	Data name	R/W	Format	Length in bytes	Value	Front panel controls (Master Unit parameter numbers)	Modbus/TCP Communication (Register number)	Socket communication	
32 (20 h)	0 to 15	Device parameter backup/restore	RW	UINT	1	0 (Default value)	None	●(M32)	●(06550 to 06565)	●
						1	Execute backup (uploading set values from devices to this product) manually			
						2	Execute restoration (downloading set values from the product to devices) manually			
						3	Delete backup data saved in the product manually			
33 (21 h)	0 to 15	Conditions for applying IODD data	RW	UINT	1	0	Device Prioritized	●(M33)	●(05612 to 05627)	●
						1 (Default value)	IODD data Prioritized			
40 (28 h)	0 to 15	Process input data words allocation	RW	UINT	1	0 to 16 (Default: 2) Process input data words allocated to the input cyclic communication area When the setting value is 0 words, it will be allocated from the end.	●(M40)	●(05628 to 05643)	●	

Master Unit parameter numbers DEC (HEX)	Target numbers 0 to 15: Corresponds to channel number 0: This product	Data name	R/W	Format	Length in bytes	Value	Front panel controls (Master Unit parameter numbers)	Modbus/TCP Communication (Register number)	Socket communication
41 (29 h)	0 to 15	Process output data words allocation	RW	UINT	1	0 to 16 (Default: 2) Process output data words allocated to the output cyclic communication area When the setting value is 0 words, it will be allocated from the end.	●(M41)	●(05644 to 05659)	●
42 (2A h)	0	Process data words auto allocation	RW	UINT	1	0 (Default value) None	●(M42)	●	●
						1 Auto allocation			
43 (2B h)	0 to 15	Process data LSB/MSB	RW	UINT	1	0 (Default value) Lower order (Little)	●(M43)	●(05660 to 05675)	●
						1 Higher order (Big)			
						2 Higher order (Little)			
44 (2C h)	0	Time stamp	RW	UINT	1	0 (Default value) No	●(M44)	●(05904)	●
						1 Serial			
						2 Common Era			
						3 Serial + Parity			
						4 Common Era + Parity			
Refer to M44. <i>Timestamp</i> in 5-1-4 Master Unit Parameter List with Product Front Panel Operations in the Common Edition for details.									

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Master Unit parameter numbers DEC (HEX)	Target numbers 0 to 15: Corresponds to channel number 0. This product	Data name	R/W	Format	Length in bytes	Value		Front panel controls (Master Unit parameter numbers)	Modbus/TCP Communication (Register number)	Socket communication
51 (33 h)	0 to 15	IO-Link cycle time	R	UINT	2	1 to 1000	0.1 ms increments	●(M51)	●(06100 to 06115)	●
52 (34 h)	0 to 15	IO-Link transmission rate	R	UINT	1	0	Not communicating	●(M52)	●(06116 to 06131)	●
						1	COM1			
						2	COM2			
						3	COM3			
53 (35 h)	0 to 15	Number of IO-Link communication errors	R	UINT	1	0 to 255	To clear, write 1 in set value 114 h offset +0.	●(M53)	●(06132 to 06147)	●
54 (36 h)	0 to 15	Number of IO-Link ISDU checksum errors	R	UINT	1	0 to 255	To clear, write 1 in set value 114 h offset +0.	●(M54)	●(06148 to 06163)	●

Master Unit parameter numbers DEC (HEX)	Target numbers 0 to 15: Corresponds to channel number 0: This product	Data name	R/W	Format	Length in bytes	Value		Front panel controls (Master Unit parameter numbers)	Modbus/TCP Communication (Register number)	Socket communication
55 (37 h)	0 to 15	IO-Link transmission rate error	R	INT	2	-1000 to 1000	IO-Link transmission rate error (0.1% unit, signed)	●(M55)	●(06164 to 06179)	●
56 (38 h)	0 to 15	IO-Link signal width error	R	INT	2	-1000 to 1000	IO-Link transmission signal width error (0.1% unit, signed)	●(M56)	●(06180 to 06195)	●
57 (39 h)	0 to 15	IO-Link communication mode	R	UINT	1	0 to 7	0: NOCOM 1: STARTUP 2: PREOPERATE 3: OPERATE 5: STARTUP (Rev.1.0) 6: PREOPERATE (Rev.1.0) 7: OPERATE (Rev.1.0) Refer to M57. IO-Link communication mode in 5-1-4 Master Unit Parameter List with Product Front Panel Operations in the Common Edition for details.	●(M57)	●(06196 to 06211)	●
58 (3A h)	0 to 15	Storage backup time	R	STRING	17	00:00:00_00/01/01 to 23:59:59_9/12/31	The storage data backup time is displayed as below. Ex.: December 31, 2022 18:59:00 18:59:00_22/12/31	●(M58)	●(06320 to 06463)	●

Master Unit parameter numbers DEC (HEX)	Target numbers 0 to 15: Corresponds to channel number 0: This product	Data name	R/W	Format	Length in bytes	Value	Front panel controls (Master Unit parameter numbers)	Modbus/TCP Communication (Register number)	Socket communication
60 (3Ch)	0	System program version of IO-Link Master Unit	R	UINT	4	P.PPNNLLFF Displays the data version of the program, etc. P.PP: Firmware, NN: Network chip, LL: Logic, FF: Font 4 bytes in decimal.	●(M60)	●(06300, 06301)	●
61 (3Dh)	0	Total operation hours of IO-Link Master Unit	R	UINT	4	0 to 2097151 (239 years)	●(M61)	●(06302, 06303)	●
62 (3Eh)	0	Display drive time	R	UINT	4	0 to 262143 (30 years)	●(M62)	●(06304, 06305)	●
63 (3Fh)	0	I/O power supply voltage	R	UINT	2	0 to 308 Voltage supplied to product I/O power supply (unit: 0.1 V)	●(M63)	●(06251)	●

Master Unit parameter numbers DEC (HEX)	Target numbers 0 to 15: Corresponds to channel number 0: This product	Data name	R/W	Format	Length in bytes	Value	Front panel controls (Master Unit parameter numbers)	Modbus/TCP Communication (Register number)	Socket communication
64 (40 h)	0	Internal temperature	R	INT	2	-2739 to 10457 Product internal temperature (unit: 0.1°C)	●(M64)	●(06252)	●
65 (41 h)	0	Network time	R	STRING	22	00:00:00.00 00_00/01/0 1 to 23:59:59.00 00_99/12/3 1 Time and date Ex.: December 31, 2022 18:59:00.0000 18:59:00.0000_22/12/31	●(M65)	●(00068 to 00070: hexadecimal value)	●
67 (43 h)	0	Network timeout time	R/W	UINT	2	0 to 30000 When the network type is <i>Ethernet & Modbus/TCP</i> , if Ethernet communication stops and the designated time passes, a network communication error (FFFA h) will be generated. The designated time can be designated in 10ms intervals from 0 to 30,000 (300 seconds). The default value is 0. If set to 0, even if Ethernet communication stops, it will be considered an internal data refresh on a cycle of roughly 10 ms, and no error will be generated. An error will, however, be generated even then if the Ethernet cable is disconnected.	●(M67)	●(05905)	●
80 (50 h)	0	Default gateway	R/W	UINT	4	0.0.0.0 to 255.255.255.255 Set any special designations. If there are none, leave the default values as they are. The default value is 0.0.0.0.	●(M80)	●(06306, 06307)	●
81 (51 h)	0	Subnet mask	R/W	UINT	4	0.0.0.0 to 255.255.255.255 Set any special designations. If there are none, leave the default values as they are. The default value is 255.255.255.0.	●(M81)	●(06308, 06309)	●
82 (52 h)	0	IP Address	R/W	UINT	4	0.0.0.0 to 255.255.255.255 Set the product's IP number to an arbitrary value. Set only when setting to other than the default value of 192.168.250.xxx (xxx is the value set with the rotary switch). Turn the rotary switch on the product front panel when the power is on to move automatically to this <i>M82. IP address</i> setting screen.	●(M82)	●(06310, 06311)	●

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A-1-2 Data for access from PLC

In socket communication, designate a Master Unit parameter number and target number from the table below.

Note In the right column of the table below, items that can be accessed via product front panel operation or socket communication are marked with “●”. For Modbus/TCP communication, as reference, the register number of the equivalent function is shown.

Master Unit parameter numbers	Target numbers	Data name	R/W	Off-set	Value	Front panel controls	Socket communication	Reference: Modbus/TCP Communication or equivalent register number
100 h	0 to 15 (Corresponds to port number)	Latest error code readout by port	R	+0	Error code lower		●	See 00073 to 00075
				+1	Error code upper			
				+2	Lower designated index number causing error			
				+3	Upper designated index number causing error			
				+4	Designated index number causing error			
				+5 to 26	Error time and date text string (in order of generation) See the form below. HH:MM:SS YY:MN:DD (HH: hour, MM: minute, SS: second, YY: year last two digits, MN: month, DD: day) Ex.: Generated at 18:59:00 on February 19, 2020: 18:59:00 20/02/19 Note When 100- μ s unit data is added, HH:MM:SS:ssss YY:MN:DD (ssss: seconds in 100- μ s units).			

Master Unit parameter numbers	Target numbers	Data name	R/W	Off-set	Value	Front panel controls	Socket communication	Reference: Modbus/TCP Communication or equivalent register number
101 h	0 to 15 (Corresponds to port number)	Event data read-out by port	R	+0	Event flag		●	See 00076 to 00087
				+1	Event byte order 1 type* ¹			
				+2	Event Code Lower			
				+3	Event Code Upper			
				+4	0			
				+5	Event byte order 2 type* ¹			
				+6	Event Code Lower			
				+7	Event Code Upper			
				+8	0			
				+9	Event byte order 3 type* ¹			
				+10	Event Code Lower			
				+11	Event Code Upper			
				+12	0			
				+13	Event byte order 4 type* ¹			
				+14	Event Code Lower			
				+15	Event Code Upper			
				+16	0			
				+17	Event byte order 5 type* ¹			
				+18	Event Code Lower			
				+19	Event Code Upper			
				+20	0			
				+21	Event byte order 6 type* ¹			
				+22	Event Code Lower			
				+23	Event Code Upper			
				+24	0			
				150				



Master Unit parameter numbers	Target numbers	Data name	R/W	Off-set	Value	Front panel controls	Socket communication	Reference: Modbus/TCP Communication or equivalent register number	
102 h	0	Set value read-out time from IO-Link devices (binary data)	R	+0	15.265 μ s unit data lower	---	●	None	
				+1	15.265 μ s unit data upper				
				+2	Set 0 as January 1, 1970, 00:00:00, counting data every second lowest-order				
				+3	As above 2nd byte				
				+4	As above 3rd byte				
				+5	Same as above, highest-order				
				+6	Lower parity information with readout set values as word units with exclusive disjunction (XOR) at 35 AC h				
				+7	Same as above, high-order				
	1	Set value read-out time from IO-Link devices (common era data)	R	+0	15.265 μ s unit data lower				
				+1	15.265 μ s unit data upper				
				+2	s				
				+3	min				
				+4	hr				
				+5	day				
				+6	month				
				+7	year				
				+8	Lower parity information with readout set values as word units with exclusive disjunction (XOR) at 0x35AC				
				+9	Same as above, high-order				
	2	Set value read-out time from IO-Link devices (text string data)	R	---	A 27-character text string will be displayed. Ex.: 2020/2/29 18:59:0.1234 parity 8B61 h → 18:59:00.1234 20/02/29 8B61				
	103 h	0 (This product)	Event/error message readout	R	---	Executing readout switches the display to the event/error display window.	---		●
					+0	Corresponding port (0 to 15)			
+1					Designated index number causing error/event qualifier				
+2					Lower index number in error				
+3					Upper index number in error				
+4					Error code lower				
+5					Error code upper				
+6					Message text string				
+7					(continues)				

Master Unit parameter numbers	Target numbers	Data name	R/W	Off-set	Value	Front panel controls	Socket communication	Reference: Modbus/TCP Communication or equivalent register number
104 h	0 (This product)	Button operation	R	+0	Returns the status of the currently pressed button. Value is the same as below.	---	●	00064
			W	---	Writes the decimal below. 1: Right button operation 2: Left button operation 4: ↑ button operation 8: ↓ button operation 16: CANCEL button operation 32: ENTER button operation			
105 h	0	Event/error clear	R	---	Executes operation equivalent to pressing the ENTER, Down, and Up buttons on the event/error menu. Executes with readout	---	●	None
	1	Go to next event						
	2	Return to previous event						
106 h	0 (This product)	Operation Lock	RW	---	Bit 0: Master Unit parameter write lock	---	●	00067
					Bit 1: Device set value write lock			
					Bit 2: Event/error clear operation lock			
					Bit 3: All button operation lock			
107 h	0	Readout display text string (1st row)	R	+0 to +499	Text string on display Character codes: Japanese: Shift-JIS Simplified Chinese: GB2312 Traditional Chinese: Big-5 Korean: EUC-kr	---	●	00000 to 00031
	1	Readout display text string (2nd row)	R					00032 to 00063
108 h	1	Right button operation response	R	---	Operation response when remotely operating product buttons is stored under the following decimals. Responses are as below. 1: Referencing set values 10 - 19: Digit position of set values being edited (equivalent to digits 1-10) 100 up: Digit position in text string being edited Values up to 255 are 1-byte responses; values from 256 up are 2-byte responses. Even if buttons are remotely operated here, the display off timer will not be cleared. When specifying over 192 values, only 192 will be received. The readout values at that point are port numbers.	---	●	00064
	2	Left button operation response						
	4	Up button operation response						
	8	Down button operation response						
	16	CANCEL button operation response						
	32	ENTER button operation response						
	192	Process data information update operation response						

Master Unit parameter numbers	Target numbers	Data name	R/W	Off-set	Value	Front panel controls	Socket communication	Reference: Modbus/TCP Communication or equivalent register number
109 h	0 (This product)	Readout of port numbers displayed	R	+0	When the IO-Link device numbers specified in writing are out of range, an out-of-range error will be generated without switching. The readout will return the current port numbers.	---	●	00065
10A h	0 (This product)	Find Me request	RW	+0	0: Cancel a Find Me request to the product 1: Send a Find Me request to the product. During Find Me, the event/error display will blink and the display will show <i>I am here</i> . Press any button to clear Find Me.	---	●	00088 Bit 0
10D h	0 to 15 (Corresponds to port number)	Model name thumb value registration for verification	R	+0 to +1	Write the model name as a text string to calculate and store the thumb value. The readout value will be a 16-bit thumb value.	---	●	None
			W	+0 to +63				
10E h	0 to 15 (Corresponds to port number)	Vendor ID and device ID registered for verification	RW	+0 to +1	Registered IO-Link device vendor ID	---	●	None
				+2 to +4	Registered IO-Link device ID			
				+5	0			
				+6	Registered IO-Link device revision ID Value 10 h indicates that the revision ID is 1.0. Value 11 h indicates that the revision ID is 1.1.			
10F h	0 to 15 (Corresponds to port number)	Write serial number to be registered	W	+0 to +15	Writes the serial number used for verification with IO-Link devices.	---	●	None
110 h	0 to 15 (Corresponds to port number)	Readout of vendor ID/device ID of storage data backed up in this product and registered vendor ID/device ID and serial number	R	+0 to +1	Vendor ID in product backup data Note In the case of a vendor ID mismatch, it will be invalid and 0 will be read out.	---	●	None
				+2 to +4	Device ID in product backup data Note In the case of a device ID mismatch, it will be invalid and 0 will be read out.			
				+5	0			
				+6 to +7	Storage backup execution times since power on			
				+8 to +9	Storage restoration execution times since power on			
				+10 to +26	Text string of date and time of backup			

Master Unit parameter numbers	Target numbers	Data name	R/W	Off-set	Value	Front panel controls	Socket communication	Reference: Modbus/TCP Communication or equivalent register number
111 h	0 (This product)	Diagnostic information	R	+0	Main memory (EEPROM) checksum error count	---	●	None
				+1	Sub memory (flash) checksum error count			
				+2	Always 0.			
				+3	Bit 0-5: Result of pressing switch alone in past			
				+4 to 5	Display device drive power supply voltage (0.1 V unit)			
				+6	Acyclic communication timeout count			
				+7	Main memory (EEPROM) write frequency Updated every 450 seconds, with an alarm generated at over 200.			
				+8	Maximum value of the internal temperature measured inside the product. (unit: °C)			
				+9	Set value version number (0)			
				+10	Network communication error count			
				+11	Storage function state number (normally 0, changes when storage-related functions operate)			
				+12 to +13	Reserved (always 0)			
				112 h	0 (This product)			
+2 to +17	Output overcurrent count for ports 0 to F. Counted up to 255.							
W	+0	Write 1 to clear all ports' output overcurrent count. Write 2 to 17 to clear ports 0 to F separately.						
113 h	0 to 15 (Corresponds to port number)	Read vendor ID and device ID of IO-Link device currently connected.	R	+0 to +1	Vendor ID	---	●	None
				+2 to +4	Device ID			
				+5	Always 0.			
				+6	Revision ID			
				+7	Always 0.			
				+8 to +9	Function ID			



Master Unit parameter numbers	Target numbers	Data name	R/W	Off-set	Value	Front panel controls	Socket communication	Reference: Modbus/TCP Communication or equivalent register number
114 h	0 to 15 (Corresponds to port number)	IO-Link device diagnostic information	R	+0	Number of IO-Link communication errors.	---	●	None
				+1	IO-Link ISDU sum error count			
				+2 to +3	IO-Link transmission rate error (0.1% unit, signed)			
				+4 to +5	IO-Link transmission signal width error (0.1% unit, signed)			
				+6 to +7	Actual cycle time for IO-Link communication (0.1 ms units)			
				+8	IO-Link transmission rate (0: not communicating, 1: COM1, 2: COM2, 3: COM3)			
				+9	Process input data byte count			
				+10	Process output data byte count			
				+11	IO-Link communication status (0: NOCOM, 1: STARTUP, 2: PREOPERATE, 3: OPERATE, 4-7: Same as 0-3 with IO-Link Revision 1.0)			
				+12	IO-Link device on-request data byte count			
				+13	Process input data disabled (0: Enabled, 1: Disabled)			
0	Clear IO-Link communication error count	W	+0	Write 1 to clear all ports' IO-Link communication error count. Write 2 to 17 to clear ports 0 to F separately.	---	●	None	
1	Clear IO-Link ISDU checksum error count		+0	Write 1 to clear all ports' ISDU checksum error count. Write 2 to 17 to clear ports 0 to F separately.				
1FE h	0 to 31	Readout of IO-Link communication trace data	R	+0 to +127	From the position where the port number was specified, 128 bytes of trace send/receive data will return as a hexadecimal text string. When it is read out, the trace ends. The specified port number 31 is the most recent trace data, 30 is the previous one, and 0 is the oldest data. A ">" is inserted at the start of the send data and a ":" at the start of the receive data.	---	●	None
	0	Start of IO-Link communication trace	W	+0	Bits 3-0: IO-Link device port number Saves the specified IO-Link device send/receive data to buffer memory (4096 bytes). Bit 5: Set to 1 to stop the trace when an IO-Link communication error is generated. Bit 6: Set to 1 to stop the trace when an ISDU communication negative response is generated. Bit 7: Set to 1 to stop the trace when the buffer is full.	---	●	None
1FF h	0 (This product)	Readout of MAC address and serial No.	R	+0 to +5	6-byte MAC address data	---	●	None
				+6	I/O voltage measurement calibrated value			
				+7	Internal temperature measurement calibrated value			
				+8 to 23	Product serial number (16 characters)			

*1. Event type details (from IO-Link specifications)

Bits 7-6: Event generation type (0: Reservation, 1: Single, 2: Generated, 3: Cleared)

Bits 5-4: Event type (0: Reservation, 1: Notification, 2: Warning, 3: Error)

Bit 3: Event generation source (0: Device, 1: Master)

Bits 2-0: Event cause (0: Unclear, 1-3: Reservation, 4: Application, 5-7: Reservation)

A-2 Sample Socket Communication Program

This is a sample socket communication program.

```
// GD-M Series CC-Link IE Field Basic Visual Studio for C++ Sample Program
//
// GD-M_IEFB_sample.cpp: Defines the console application entry point
//

#include "stdafx.h"

// added include file
#include <winsock2.h>;
#include <ws2tcpip.h>;

// configuration property → linker → input → add ws2_32.lib; to added dependent files.
// Project character set uses a multi-byte set, not Unicode.
```

Definitions

```
// Definitions
// #define TCPIP // Undesignated: UDP, designated: TCP/IP

#define PARAM_LEN 400 // setting value maximum data length
#define RESPCODE_LEN 2 // response code length

// definition of module being accessed
#define UNIT_MAIN 0xFF // define GD-ILM16C-MLP unit
#define UNIT_IOL_CH0 0x80 // port 0 IO-Link device
#define UNIT_IOL_CH1 0x81 // port 1 IO-Link device
#define UNIT_IOL_CH2 0x82 // port 2 IO-Link device
#define UNIT_IOL_CH3 0x83 // port 3 IO-Link device
#define UNIT_IOL_CH4 0x84 // port 4 IO-Link device
#define UNIT_IOL_CH5 0x85 // port 5 IO-Link device
#define UNIT_IOL_CH6 0x86 // port 6 IO-Link device
#define UNIT_IOL_CH7 0x87 // port 7 IO-Link device
#define UNIT_IOL_CH8 0x88 // port 8 IO-Link device
#define UNIT_IOL_CH9 0x89 // port 9 IO-Link device
#define UNIT_IOL_CHA 0x8A // port A IO-Link device
#define UNIT_IOL_CHB 0x8B // port B IO-Link device
#define UNIT_IOL_CHC 0x8C // port C IO-Link device
#define UNIT_IOL_CHD 0x8D // port D IO-Link device
```

```

#define UNIT_IOL_CHE    0x8E        // port E IO-Link device
#define UNIT_IOL_CHF    0x8F        // port F IO-Link device

// definition of transfer data
#define PARAM_READ      4           // setting value read
#define PARAM_WRITE (PARAM_READ + 8) // setting value write

// Response code
#define RESP_PWRITE     0x41        // setting value write
#define RESP_WBUSY     0x42        // setting value write busy status
#define RESP_NODATA    0x4E        // no data
#define RESP_PREAD     0x61        // setting value read
#define RESP_PBUSY     0x62        // setting value read busy status

// Ethernet/TCP protocol definition
typedef struct {
    BYTE command;                // command
    BYTE xferData;               // transfer data designation
    BYTE unit;                    // unit designation
    BYTE indexL;                 // low-order index number
    BYTE indexH;                 // high-order index number
    BYTE subindex;               // subindex number
    BYTE readLenL;               // readout byte count low-order
    BYTE readLenH;               // readout byte count high-order
} txDataNoWrite;                // no write

typedef struct {
    BYTE command;                // command
    BYTE xferData;               // transfer data designation
    BYTE unit;                    // unit designation
    BYTE indexL;                 // low-order index number
    BYTE indexH;                 // high-order index number
    BYTE subindex;               // subindex number
    BYTE writeData[PARAM_LEN];   // setting value write data
} txDataPwrite;                 // write setting values only

// send buffer union
union txBlock {
    txDataPwrite pWrite;          // setting value write
    txDataNoWrite noWrite;       // read only
};

typedef struct {
    BYTE respCode;                // response code (RESP_NODATA, RESP_PWRITE)
    BYTE errCode;                 // error code (extended error code)
} rxDataNoRead;                 // no read

```

```

typedef struct {
    BYTE respCode;           // response code (RESP_PREAD)
    BYTE errCode;           // error code (extended error code)
    BYTE readData[PARAM_LEN]; // setting value read data
} rxDataPread;             // read setting values only

// receive buffer union
union rxBlock {
    rxDataPread pRead;      // setting value read only
    rxDataNoRead noRead;   // setting value write only
};

// global variable
struct sockaddr_in dstAddr;

//-----
// socket send/receive
// dstSocket : connection socket ID
// txBuffer : send buffer
// rxBuffer : receive buffer
// txLength : send data length
// rxLength : receive data length
// return : receive data length
//          -1 : send error
//          -2 : receive error
//-----
int sendRecSocket(int dstSocket, char *txBuffer, char *rxBuffer, int txLength, int
rxLength)
{
    // socket send
#ifdef TCPIP
    if (send(dstSocket, txBuffer, txLength, 0) == 0) return -1;
#else
    if (sendto(dstSocket, txBuffer, txLength, 0, (struct sockaddr *)&dstAddr, sizeof(
dstAddr)) == 0) return -1;
#endif

    // socket receive
    int recByte;
    recByte = recv(dstSocket, rxBuffer, rxLength, 0);
    if (recByte < 2) return -2;

    return recByte;
}
//-----

```

```

// receive data console display
// message : response type character string
// recByte : receive data length
// respCode : response code
// respExp : expected response code
// errCode : error code
// buffer : buffer to display
// length : data length to display
// return : Nothing
//-----
void dispRxData(char *message, int recByte, BYTE respCode, BYTE respExp, BYTE errCode, BYTE *buffer, int length)
{
    int i;

    if (recByte == -1) {
        printf("A socket send error has occurred. %n");
    }
    else if (recByte == -2) {
        printf("A socket receive error has occurred. %n");
    }
    else if (respCode != respExp || errCode != 0) {
        printf("The %s response code (0x%02X) is abnormal. %n", message, respCode);
        printf("The error code is 0x%02X. %n", errCode);
    }
    else {
        printf("The %s response code (0x%02X) is normal. %n", message, respCode);
        if (length > 0) {
            // display received data in hexadecimal
            printf("Read data: ");
            for (i = 0; i < length; i++) {
                printf("%02X ", buffer[i]);
            }
            printf("%n");
        }
    }
}
}

```

Main Processing

```

//-----
// Main function
//-----
int main()
{
    // Socket initialization

```

```

WSADATA wsdata;
if (WSAStartup(MAKEWORD(2, 0), &wsdata)) {
    printf("Socket initialization failed¥n");
    return 2;
}

// Set destination IP address
char destination[32];
BYTE ipAdrs3rd = 1; // 3rd byte
BYTE ipAdrs4th = 31; // 4th byte
sprintf_s(destination, 32, "192.168.%d.%d¥0", ipAdrs3rd, ipAdrs4th);

// designate port number (2001 fixed for GD-ILM16C-MLP Ethernet/TCP)
int port = 2001;

// set socket structure
memset(&dstAddr, 0, sizeof(dstAddr));
dstAddr.sin_port = htons(port);
dstAddr.sin_family = AF_INET;
InetPton(AF_INET, destination, &dstAddr.sin_addr.s_addr);

// generate socket
int dstSocket;
#ifdef TCPIP
// TCP/IP connection
dstSocket = socket(AF_INET, SOCK_STREAM, 0);

// connect to socket
if (connect(dstSocket, (struct sockaddr *) &dstAddr, sizeof(dstAddr))) {
    printf("Could not connect to %s¥n", destination);
    return 1;
}
printf("Connected to %s¥n", destination);
#else
// UDP connection
dstSocket = socket(AF_INET, SOCK_DGRAM, 0);
#endif

// Obtained send/receive buffer
union txBlock txBuffer = { 0 };
union rxBlock rxBuffer = { 0 };
int recByte;

```

Sample Program 1: Setting Value Reading

```
//-----
```

```

// Sample 1: Setting value reading
//-----
// Use a data structure suited to the transfer data designation
// Send: No write data, so txBuffer.noWrite
// Receive: Setting value read data, so rxBuffer.pRead
printf("Sample 1¥n");
txBuffer.noWrite.command = 0x53;
txBuffer.noWrite.xferData = PARAM_READ;
txBuffer.noWrite.unit = 0xFF; // target GD-M unit setting values
txBuffer.noWrite.indexH = 0x00;
txBuffer.noWrite.indexL = 0x08; // read index number = 8
txBuffer.noWrite.subindex = 0x00;
txBuffer.noWrite.readLenL = 0; // designate 0 for read data length and response will be actual data length
txBuffer.noWrite.readLenH = 0;

// socket send/receive
recByte = sendRecSocket(
    dstSocket, // socket ID
    (char *)&txBuffer, // send buffer
    (char *)&rxBuffer, // receive buffer
    sizeof(txDataNoWrite), // send data length
    sizeof(rxDataPread) // receive data length
);
dispRxData(
    "Setting value read", // character string to be displayed
    recByte, // receive data length
    rxBuffer.pRead.respCode, // setting value reading response code
    RESP_PREAD, // expected response code
    rxBuffer.pRead.errCode, // setting value read error code
    (BYTE *)&rxBuffer.pRead.readData, // display data address
    recByte - RESPCODE_LEN // data length to be displayed (deleting 1 response code portion)
);

```

Sample Program 2: Setting Value Writing

```

//-----
// Sample 2: Setting value writing
//-----
// Use a data structure suited to the transfer data designation
// Send: Setting value write data, so txBuffer.pWrite
// Receive: Setting value write response, so rxBuffer.noRead
printf("Sample 2¥n");
txBuffer.pWrite.command = 0x53;
txBuffer.pWrite.xferData = PARAM_WRITE;

```

```

txBuffer.pWrite.unit =          0xFF;    // target GD-M unit setting values
txBuffer.pWrite.indexH =        0x00;
txBuffer.pWrite.indexL =        0x08;    // read index number = 8
txBuffer.pWrite.subindex =      0x00;
txBuffer.pWrite.writeData[0] =  'a';    // write data
txBuffer.pWrite.writeData[1] =  'b';
txBuffer.pWrite.writeData[2] =  'c';
txBuffer.pWrite.writeData[3] =  'd';
txBuffer.pWrite.writeData[4] =  'e';
int pWriteLen = 5;                // setting value write byte length

// socket send/receive
recByte = sendRecSocket(
    dstSocket,                    // socket ID
    (char *)&txBuffer,           // send buffer
    (char *)&rxBuffer,          // receive buffer
    sizeof(txDataNoWrite) + pWriteLen, // send data length
    sizeof(rxDataNoRead)         // receive data length
);
dispRxData(
    "Setting value write",        // character string to be displayed
    recByte,                     // receive data length
    rxBuffer.noRead.respCode,     // setting value writing response code
    RESP_PWRITE,                 // expected response code
    rxBuffer.noRead.errCode,     // setting value writing error code
    (BYTE *)&rxBuffer.noRead.errCode, // display data address (dummy)
    0                             // data length to display
);

// socket close
closesocket(dstSocket);
WSACleanup();

return 0;
}

```

Sample Program 3: Setting Value Background Reading

```

//-----
// Sample 3: Setting value background reading
//-----
// Use a data structure suited to the transfer data designation
// Send: No write data, so txBuffer.noWrite
// Receive: Setting value read data, so rxBuffer.pRead
printf("Sample 3¥n");

```

```

txBuffer.noWrite.command = 0x53;
txBuffer.noWrite.xferData = BACK_READ;

txBuffer.noWrite.unit = 0xFF; // target GD-M unit setting values
txBuffer.noWrite.indexH = 0x00;
txBuffer.noWrite.indexL = 0x41; // read index number = 65
txBuffer.noWrite.subindex = 0x00;
txBuffer.noWrite.readLenL = 0; // designate 0 for read data length and resp
onse will be actual data length
txBuffer.noWrite.readLenH = 0;

do {
// socket send/receive
recByte = sendRecSocket(
    dstSocket, // socket ID
    (char *)&txBuffer, // send buffer
    (char *)&rxBuffer, // receive buffer
    sizeof(txDataNoWrite), // send data length
    sizeof(rxDataPread) // receive data length
);
dispRxData(
    "Setting value read", // character string to be displayed
    recByte, // receive data length
    rxBuffer.pRead.respCode, // setting value reading response code
    RESP_PREAD, // expected response code
    rxBuffer.pRead.errCode, // setting value read error code
    (BYTE *)&rxBuffer.pRead.readData, // display data address
    recByte - RESP_CODE_LEN // data length to be displayed (deleting 1 r
esponse code portion)
);

// Change to background access status confirmation
txBuffer.noWrite.xferData = BACK_STATUS;

} while (rxBuffer.pRead.respCode == RESP_PBUSY);

```

Sample Program 4: Setting Value Background Writing

```

//-----
// Sample 4: Setting value background writing
//-----
// Use a data structure suited to the transfer data designation
// Send: No write data, so txBuffer.pWrite
// Receive: Setting value read data, so rxBuffer.noRead
printf("Sample 4¥n");
txBuffer.noWrite.command = 0x53;

```

```

txBuffer.noWrite.xferData = BACK_WRITE;

txBuffer.noWrite.unit =      0xFF;    // target GD-M unit setting values
txBuffer.noWrite.indexH =    0x00;
txBuffer.pWrite.indexL =     0x08;    // read index number = 8
txBuffer.pWrite.subindex =   0x00;
txBuffer.pWrite.writeData[0] = 'A';   // write data
txBuffer.pWrite.writeData[1] = 'B';
txBuffer.pWrite.writeData[2] = 'C';
txBuffer.pWrite.writeData[3] = 'D';
txBuffer.pWrite.writeData[4] = 'E';
txBuffer.pWrite.writeData[5] = 'F';
pWriteLen = 6;                  // setting value write byte length

do {
    // socket send/receive
    recByte = sendRecSocket(
        dstSocket,                // socket ID
        (char *)&txBuffer,        // send buffer
        (char *)&rxBuffer,        // receive buffer
        sizeof(txDataNoWrite) + pWriteLen, // send data length
        sizeof(rxDataNoRead)      // receive data length
    );
    dispRxData(
        "Setting value write",     // character string to be displayed
        recByte,                  // receive data length
        rxBuffer.noRead.respCode,  // setting value writing response code
        RESP_PWRITE,              // expected response code
        rxBuffer.noRead.errCode,   // setting value writing error code
        (BYTE *)&rxBuffer.noRead.errCode, // display data address (dummy)
        0                          // data length to display
    );

    // Change to background access status confirmation
    txBuffer.noWrite.xferData = BACK_STATUS;

} while (rxBuffer.pRead.respCode == RESP_WBUSY);

// socket close
closesocket(dstSocket);
WSACleanup();

return 0;
}

```



Index



Index

- A**
- Access error..... 3-18
 - Acyclic communication (socket or Modbus/TCP communication)..... 18
 - Auto restoration..... A-9
 - Automatic device parameter backup..... A-9
- B**
- Background access..... 3-26
 - Button operation..... A-19
 - Byte length or target selection to access..... 3-21
- C**
- Clear the latest error..... 3-15, 3-19
 - Clear the latest event..... 3-15, 3-19
 - Conditions for applying IODD data..... A-10
 - Cyclic communication (cyclic transmission and process I/O communication)..... 18
- D**
- Device parameter backup/restore..... A-10
 - Device verification..... A-8
 - Digital input..... 3-14, 3-17
 - Digital output..... 3-15
 - Digital/process data input-related..... 3-29
 - Display brightness..... A-3
 - Display drive time..... A-14
- E**
- Encoder counter reset..... 3-15, 3-20
 - Error flag..... 3-14, 3-18, 3-27
 - Event flag..... 3-14, 3-18, 3-27
 - Extended access enable flag..... 3-15, 3-20
 - Extended access enabled assignment..... 3-12
 - Extended access function..... 18
 - Extended access read data..... 3-20
 - Extended access write data..... 3-21
- F**
- Find Me request..... A-20
- G**
- GD-ILM16C-MLP/-ILM16E-MLP parameter designation. 3-19
- I**
- I/O assignment batch settings..... A-4
 - I/O assignment settings..... A-5
 - I/O power supply flag..... 3-14, 3-18, 3-27
 - I/O power supply voltage..... A-14
 - I/O synchronization..... A-7
 - Index access library-related..... 3-29
 - Index access library/registered register number library backup operation-related..... 3-30
 - Index number or setting value number specification..... 3-21
 - Input filter time..... A-5
 - Input hold time..... A-5
 - Internal temperature..... A-15
 - IO-Link..... A-12
 - IO-Link communication and network error output..... A-5
 - IO-Link communication mode..... A-13
 - IO-Link cycle time..... A-12
 - IO-Link Master Unit parameters reset..... A-3
 - IO-Link mode..... A-5
 - IO-Link ready flag..... 3-14, 3-18, 3-27
 - IO-Link signal width error..... A-13
 - IO-Link transmission rate error..... A-13
- L**
- Language..... A-4
 - Latest error port..... 3-14, 3-18, 3-27
 - Latest event port..... 3-15, 3-19, 3-27
 - Little endian access..... 3-19
- M**
- Master Unit parameter-related..... 3-30
- N**
- Network..... A-3
 - Network time..... A-15
 - Network time-related..... 3-29
 - Normal assignment..... 3-12
 - NPN output mode..... A-5
 - Number of IO-Link communication errors..... A-12
- O**
- Output overcurrent flag..... 3-14, 3-18, 3-27
- P**
- PNP output mode..... A-5
 - Port No. of IO-Link to access..... 3-19
 - Process data LSB/MSB..... A-11
 - Process data words auto allocation..... A-11
 - Process input data..... 3-15, 3-20
 - Process input data words allocation..... A-10
 - Process output data..... 3-16, 3-21
 - Process output data words allocation..... A-11
 - Product operation-related..... 3-29

R

- Read request..... 3-20
Registered register number library-related..... 3-30

S

- Setting value access..... 3-26
socket communication..... 3-2
Status-related..... 3-29
Storage backup time..... A-13
Synchronization establishment flag..... 3-14, 3-18
System program version of IO-Link Master Unit..... A-14

T

- Time stamp..... A-11
Time zone..... A-4
Total operation hours of IO-Link Master Unit..... A-14
Type ID (vendor ID and device ID) verification..... A-8
Type ID + device model name verification..... A-8

U

- Unit..... A-4

W

- Write request..... 3-20

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