MITSUBISHI ELECTRIC

FA Sensor

MELSENSOR

Code Reader Connection Guide

-CF26-SR
-CF26-LR
-CF37-SR
-CF37-LR

Powered by COGNEX

This product is designed and manufactured by Cognex Corporation.
*Note that the warranty and general specifications of this product differ from that of programmable controller products.

COGNEX

SAFETY PRECAUTIONS

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.

The precautions given in this manual are concerned with this product only. For the safety precautions for other modules, refer to their respective user's manuals.

In this manual, the safety precautions are classified into two levels: "⚠ WARNING" and "⚠ CAUTION".

⚠ **WARNING**	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ **CAUTION**	Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under "⚠ CAUTION" may lead to serious consequences.

Observe the precautions of both levels because they are important for personal and system safety.

Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Installation Precautions]

⚠ WARNING

- Before touching the code reader, be sure to touch an electric conductor such as grounded metal to discharge the static electricity from your body. Otherwise, damage or faulty operation of the code reader may occur.
- Be sure to install an I/O connector module to a main module. If not installed, dust or water-proof performance may not be obtained.

[Security Precautions]

⚠ WARNING

- To maintain the security (confidentiality, integrity, and availability) of the programmable controller and the system against unauthorized access, denial-of-service (DoS) attacks, computer viruses, and other cyberattacks from external devices via the network, take appropriate measures such as firewalls, virtual private networks (VPNs), and antivirus solutions.

[Installation Precautions]

⚠ CAUTION

- IP protection rating is guaranteed only when all the connectors are connected with cables or sealed with sealing caps.
- The cable is designed to connect with its key aligned with the keyway of the connector on the code reader. Do not force the connections or damage may occur.

[Wiring Precautions]

⚠CAUTION

- Use only 24 VDC and observe the indicated polarity. Otherwise, fire or damage may result.

[Startup and Maintenance Precautions]

⚠CAUTION

- Do not clean the code reader with highly irritating or corrosive solvent such as caustic alkali solution, methyl ethyl ketone (MEK), and gasoline. Doing so may cause a fault.

[Disposal Precautions]

⚠CAUTION

- When disposing of this product, treat it as industrial waste.

PRECAUTIONS FOR USE

Observe the following precautions when installing and operating the code reader, to reduce the risk of injury or equipment damage:

- This device requires the use of an LPS or NEC class 2 power supply.
- To reduce the risk of damage or malfunction due to over-voltage, line noise, electrostatic discharge (ESD), power surges, or other irregularities in the power supply, route all cables away from high-voltage power sources.
- A code reader does not contain user-serviceable parts. Do not make electrical or mechanical modifications to a code reader.
  Unauthorized modifications may void your warranty.
- Changes or modifications not expressly approved by the party responsible for regulatory compliance could void the user's authority to operate the equipment.
- If the bend radius or service loop is smaller than 10 times of the cable diameter, the cable may cause cable shielding degradation, cable damage, or wear out in a short period. The bend radius must begin at least 152.4 mm from the connector.
- Use this device in accordance with this manual.

CONDITIONS OF USE FOR THE PRODUCT

(1) This code reader shall be used in conditions;

i) where any problem, fault or failure occurring in the code reader, if any, shall not lead to any major or serious accident; and

ii) where the backup and fail-safe function are systematically or automatically provided outside of the code reader for the case of any problem, fault or failure occurring in the code reader.

(2) This code reader has been designed and manufactured for the purpose of being used in general industries.

MITSUBISHI ELECTRIC SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY THIS CODE READER THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI ELECTRIC USER'S, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the CODE READER.

("Prohibited Application")

Prohibited Applications include, but not limited to, the use of the code reader in;

- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the code reader.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

Notwithstanding the above restrictions, Mitsubishi Electric may in its sole discretion, authorize use of the code reader in one or more of the Prohibited Applications, provided that the usage of the code reader is limited only for the specific applications agreed to by Mitsubishi Electric and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the code readers are required. For details, please contact the Mitsubishi Electric representative in your region.

(3) Mitsubishi Electric shall have no responsibility or liability for any problems involving code reader trouble and system trouble caused by DoS attacks, unauthorized access, computer viruses, and other cyberattacks.

INTRODUCTION

Thank you for purchasing the Mitsubishi Electric FA sensor, MELSENSOR.
This manual describes the network connections to use the code readers listed below.
Before using the product, please read this manual and relevant manuals carefully, and develop familiarity with the functions and performance of the code reader to handle the product correctly.
Please make sure that the end users read this manual.

Available code readers

○: Connectable, —: Not connectable

Model	Connection to a programmable controller					Connection to a GOT
	CC-Link IE Field Network Basic	SLMP	RS-232	I/O	EtherNet/IP	RS-232
CF26-SR	○	○	○	○	—	○
CF26-LR	○	○	○	○	—	○
CF37-SR	○	○	○	○	○	○
CF37-LR	○	○	○	○	○	○

This manual uses a code reader CF26 as an example to show the system configuration and setting procedures.
A code reader CF37 can be set in the same manner as a CF26.

Installation

To connect a code reader, the following must be installed on a networked personal computer.

■ DataMan Setup Tool for MELSENSOR

This is a setup tool for a code reader.
Download DataMan Setup Tool for MELSENSOR from the Mitsubishi Electric FA website.
www.MitsubishiElectric.co.jp/fa

■ Engineering tool

Install any of the following engineering software, depending on the programmable controller system used.

- GX Works3
- GX Works2

■ Profile

To configure communication settings between a programmable controller and a code reader with an engineering tool, registering a profile to the engineering tool is required.
A profile is data that stores information of a connected device (such as a model name.)
By registering the profile to an engineering tool, the code reader is added in the "Ethernet Configuration" window or the "CC-Link IEF Basic Configuration" window.
For details on how to register a profile, refer to the following manual.
📖GX Works2 Version 1 Operating Manual (Common)
📖GX Works3 Operating Manual
Download the profile of a code reader from the Mitsubishi Electric FA website.
www.MitsubishiElectric.co.jp/fa

■ EDS file

Download the EDS file for a code reader from the Mitsubishi Electric FA website.
www.MitsubishiElectric.co.jp/fa

Reading target

This manual explains the procedures for reading the QR Code as shown below as a setting example.

ABCDEFG01234

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RELEVANT MANUALS

Manual name [Manual number]	Description	Available form
Code Reader Connection Guide [BCN-P5999-1074] (this manual)	Procedures for connecting a code reader to a MELSEC programmable controller to control a code reader through a CC-Link IE Field Network Basic connection, an SLMP connection, an RS-232 connection or an I/O connection	e-Manual PDF
Code Reader Setting Guide [BCN-P5999-1258]	Basic operations of DataMan Setup Tool for MELSENSOR	e-Manual PDF
Code Reader CF26 User's Manual [SH-082092ENG]	Functions, installation methods, system configuration, and required hardware components etc. of a code reader CF26	e-Manual PDF
Code Reader CF37 User's Manual [SH-082325ENG]	Functions, installation methods, system configuration, and required hardware components etc. of a code reader CF37	e-Manual PDF

Point

e-Manual refers to the Mitsubishi Electric FA electronic book manuals that can be browsed using a dedicated tool.

e-Manual has the following features:

- Required information can be cross-searched in multiple manuals.
- Other manuals can be accessed from the links in the manual.
- Hardware specifications of each part can be found from the product figures.
- Pages that users often browse can be bookmarked.
- Sample programs can be copied to an engineering tool.

TERMS

Unless otherwise specified, this manual uses the following terms.

Term	Description
Buffer memory	Memory in an intelligent function module to store data such as setting values and monitor values. For CPU modules, it refers to memory to store data such as setting values and monitor values of the Ethernet function, or data used for data communication of the multiple CPU system function.
Code reader setup tool	DataMan Setup Tool for MELSENSOR. A tool for setting a code reader.
Engineering tool	GX Works3. A tool for setting, programming, debugging, and maintenance of programmable controller.
EtherNet/IP Configuration Tool	EtherNet/IP Configuration Tool for RJ71EIP91
Module label	A label that represents one of memory areas (I/O signals and buffer memory areas) specific to each module in a given character string. For the module used, GX Works3 automatically generates this label, which can be used as a global label.

GENERIC TERMS AND ABBREVIATIONS

Unless otherwise specified, this manual uses the following generic terms and abbreviations.

Generic term/abbreviation	Description
CPU module	A MELSEC iQ-R series CPU module
DMCC	An abbreviation for DataMan Control Commands
RPI	An abbreviation for Requested Packet Interval. A communication cycle that is decided by the originator during communications between EtherNet/IP devices.

1 CC-Link IE Field Network Basic CONNECTION

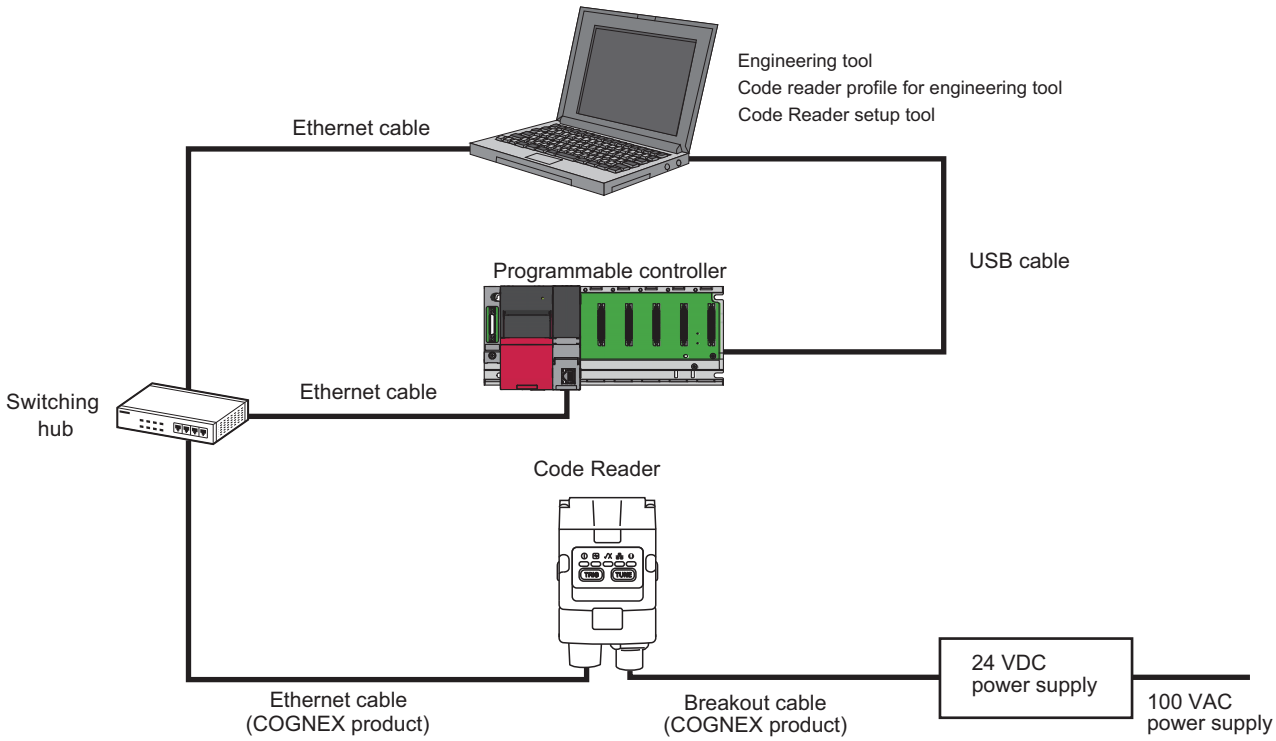
This chapter explains the procedure for connecting a code reader to a programmable controller and controlling the code reader with a CC-Link IE Field Network Basic connection.

Point

For the specifications and troubleshooting of CC-Link IE Field Network Basic, refer to the following:
CC-Link IE Field Network Basic Reference Manual

1.1 System Configuration Example for Connecting a Code Reader

The following figure shows the system configuration for connecting a code reader.



Point

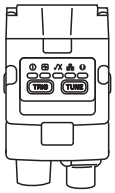
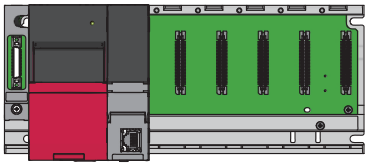
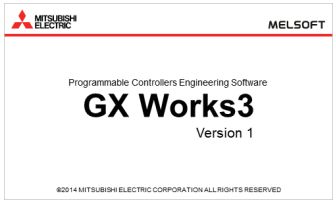
For details on the system configuration, refer to the following:
Code Reader CF26 User's Manual
Code Reader CF37 User's Manual

Configurations

The devices used in the system configuration are as follows.

Required equipment

■ Mitsubishi Electric products

		
Code reader • CF26-SR	Programmable controller • CPU module: R04CPU	Engineering tool • GX Works3

■ COGNEX products

Code reader profile for engineering tool[*1]	Code reader setup tool • DataMan Setup Tool for MELSENSOR[*1]	Ethernet cable • CCB-84901-2001-**(**: 01, 02, 05, 10, or 15)[*2]	Breakout cable • CCB-PWRIO-**(**: 05, 10, or 15)[*3]

*1 Download this product from the Mitsubishi Electric FA website.
www.MitsubishiElectric.co.jp/fa

*2 Cable length (0.6 m, 2 m, 5 m, 10 m, or 15 m), straight

*3 Cable length (5 m, 10 m, or 15 m), shielded twisted-pair cable, straight

■ Commercial products

Switching hub	Ethernet cable	USB cable (Type Mini-B)	24 VDC power supply

Connecting and wiring a code reader

The following explains the considerations and procedure for connecting a code reader to a programmable controller, and connecting to a CC-Link IE Field Network Basic connection.

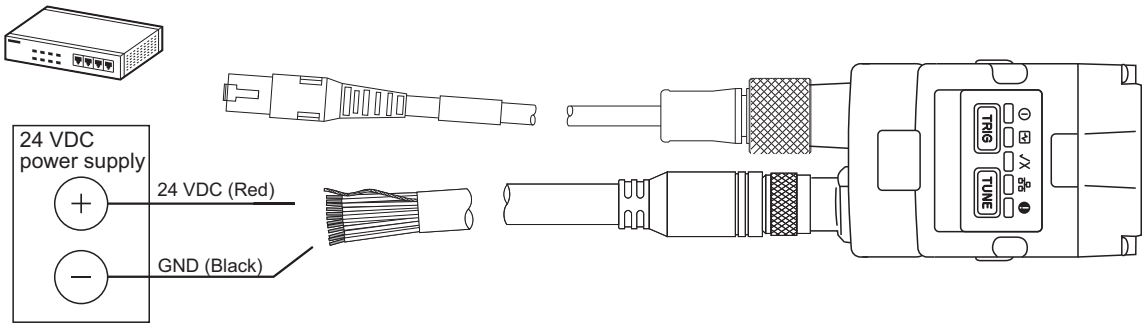
Ex.

Breakout cable: CCB-PWRIO-**(**: 05, 10, or 15)[*1]

[*1] Cable length (5 m, 10 m, or 15 m), shielded twisted-pair cable, straight

Precautions

- Check that a 24 VDC power supply is OFF when connecting a breakout cable to the power supply.
- Cut unused wires or protect them with insulating materials. Be careful not to contact with 24 VDC wires.
- A breakout cable and an Ethernet cable are designed to connect with their key aligned with the keyway of the connector on a code reader. Do not force the connections or damage may occur.
- When powering ON the system, turn ON the power of a programmable controller first, or at the same time as a code reader.



1. Connect the breakout cable to a 24 VDC power supply.

Connect the 24 VDC (red) of the cable to the positive terminal of the power supply, and the GND (black) to the negative terminal.

2. Connect the breakout cable to the power supply, I/O, and RS-232 connector of a code reader.

3. Connect an Ethernet cable to an Ethernet connector and a switching hub of the code reader.

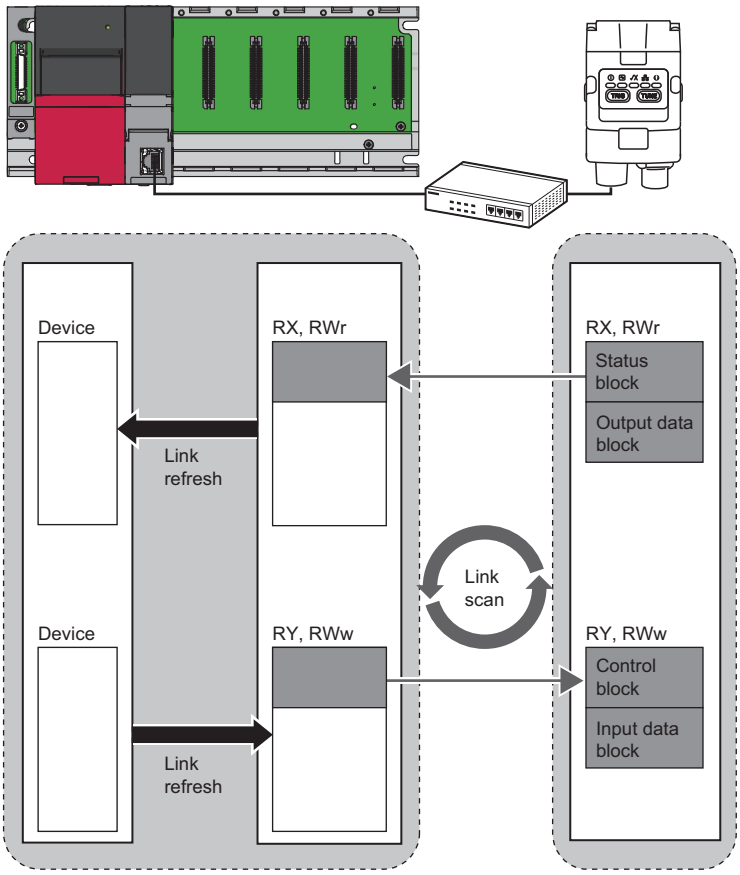
4. Connect the code reader to a programmable controller and a personal computer via the switching hub.

5. Turn the power of the system ON.

1.2 Basic Operations for a CC-Link IE Field Network Basic Connection

Basic operation process for a CC-Link IE Field Network Basic connection

With a CC-Link IE Field Network Basic connection, data communication (cyclic transmission) is periodically performed between a master station (programmable controller) and a slave station (code reader) using link devices.
Remote input and output (RX and RY), and remote registers (RWr and RWw) are used for data communication.
Status block (RX) and output data block (RWr) are link devices to send data from a code reader to a master station (programmable controller).
Control block (RY) and input data block (RWw) are link devices to send data from a master station (programmable controller) to a code reader.



Signals used for a CC-Link IE Field Network Basic connection

For details on each signal to control a code reader, refer to DataMan® Industrial Protocols Manual.
DataMan® Industrial Protocols Manual can be opened by clicking "CF Industrial Protocols Manual" in the help of DataMan Setup Tool for MELSENSOR.

Precautions

Do not write data to '(Reserved)' bits in remote I/O signals (RY/RX) and '(Reserved)' words in remote registers (RWr/RWw). Doing so may cause an unexpected error.

Remote I/O signals (RY/RX)

The following shows the I/O signals for a master station (programmable controller) in a CC-Link IE Field Network Basic connection.

■ Control blocks (RY)

Control blocks (RY) are output signals for a master station (programmable controller) to control a code reader.

Bit	Data name	Description (Application)
0	Trigger Enable	To enable an image capturing trigger by 'Trigger' signal for CC-Link IE Field Network Basic connection. • ON: An image capturing trigger is enabled. • OFF: An image capturing trigger is disabled.
1	Trigger	To trigger image capturing. 'Trigger Ready' bit needs to be ON before generating an image capturing trigger. • ON: image capturing trigger is started. • OFF: —
2	Buffer Results Enable	To enable the buffer for read results. New read results are stored in the buffer queue of a code reader. To acquire the next read results, turn ON 'Results Ack'. • ON: The buffer for read results is enabled. • OFF: The buffer for read results is disabled.
3	Results Ack	To respond to receiving the latest read results. A code reader turns 'Results Available' OFF when recognizing that this bit turns ON. If 'Buffer Results Enable' is turned ON, the next read results are read out from the buffer queue when receiving a response. • ON: Read results are received. • OFF: —
4 to 23	(Reserved)	—
24	Soft Event[*1*2]	To register a code
25		To register a match string
26		To register focus
27		To register brightness
28		To cancel registration
29		(Reserved)
30		To execute a DMCC command[*3]
31		To set a match string
32 to 63	(Reserved)	—

*1 Bits 24 to 31 are virtual discrete input of the code reader.
When the bit turns from OFF to ON, an action associated with the bit is executed.
After the execution, the code reader turns ON the corresponding 'Soft Event Ack' in status blocks to show the action is completed.

*2 Do not execute 'Software Event' that changes code reader settings while processing the trigger.
Changing settings while capturing an image or decoding may cause an unexpected result.

*3 The execution result of the DMCC command cannot be acquired.

■ Status blocks (RX)

Status blocks (RX) are input signals for a master station (programmable controller) to acquire the status of a code reader (status).

Bit	Data name	Description (Application)
0	Trigger Ready	This bit turns ON when 'Trigger Enable' is set and an image capturing trigger can be received. • ON: An image capturing trigger can be received. • OFF: An image capturing trigger cannot be received.
1	Trigger Ack	This bit shows that a code reader recognizes 'Trigger' is ON. Until 'Trigger' is turned OFF, this bit remains ON. • ON: An image capturing trigger is received. • OFF: —
2	Acquiring	This bit shows that a code reader is capturing an image. For a code reader CF26, this bit is '(Reserved).'
3	Missed Acq	This bit shows that image capturing is failed. When the next image capturing trigger is generated, this bit is turned OFF. • ON: Image capturing is failed. • OFF: —
4 to 7	(Reserved)	—
8	Decoding	This bit shows that a code reader is decoding.
9	Decode Complete Toggle	The status of this bit is inverted every time when decoding is completed and read results become available.
10	Results Buffer Overrun	This bit shows that a code reader discards a series of read results after the buffer for read results becomes full. When the next read results are stored in the buffer queue properly, this bit is turned OFF. Only when 'Buffer Results Enable' is enabled, this bit is enabled. • ON: Read results are discarded. • OFF: —
11	Results Available	This bit shows that a series of decode results is available (the Result ID, Result Code, Result Data Length, and Result Data fields contain valid data). Until 'Results Ack' responds, this bit remains ON. • ON: With new read results • OFF: Without new read results
12 to 14	(Reserved)	—
15	General Fault	This bit turns ON when an error occurs in soft event operation. Until the next soft event succeeds or 'Trigger Enable' is turned OFF and then ON again, this bit remains ON. • ON: Error • OFF: No error
16 to 23	(Reserved)	—
24	Soft Event Ack*1	Code registration is completed.
25		Match string registration is completed.
26		Focus registration is completed.
27		Brightness registration is completed.
28		Cancelling registration is completed.
29		(Reserved)
30		DMCC command execution is completed.
31		Match string setting is completed.
32 to 63	(Reserved)	—

*1 These bits turn ON to show that a code reader completes soft event actions.
These bits remain ON until their corresponding 'Soft Event' bits in control blocks are turned OFF.

Remote registers (RWr and RWw)

The following shows the remote registers (RWr and RWw) used for the CC-Link IE Field Network Basic connection.

■ Output data blocks (RWr)

Output data blocks (RWr) are link devices to send data from a code reader to a master station (programmable controller).

Word	Data name	Description (Application)
0	(Reserved)	—
1	Trigger ID	Image capturing trigger ID. ID of an image capturing trigger to be generated next is stored. This is used to verify a generated image capturing trigger and 'Result Data' to be received later. The same value as this ID is returned as 'Result ID' of the corresponding read results.
2	Result ID	Results ID. ID of the read results data which are corresponding to 'Trigger ID' is stored. This is used to verify an image capturing trigger and the corresponding read results data.
3	Result Code	Result code. • Bit 0: 1 = Read, 0 = No Read • Bit 1: 1 = Passed validation, 0 = Failed validation • Bit 2[*1]: 1 = Passed verification, 0 = Failed verification • Bit 3: 1 = Image capturing trigger overrun • Bit 4: 1 = Image capturing buffer overrun • Bit 5 to 15: —
4	Result Data Length	Read results data length. The number of valid bytes of the 'Result Data' field is stored.
5 or later	Result Data	Read results data are stored.

*1 This bit is enabled only when using the verification function compatible models.

■ Input data blocks (RWw)

Input data blocks (RWw) are link devices for a code reader to receive data from a master station (programmable controller).

Word	Data name	Description (Application)
0	(Reserved)	—
1	User Data Length	The number of valid bytes of the 'User Data' field.
2 or later	User Data	User-defined data which can be used as input for capturing an image or decoding.

1.3 Setting the Code Reader

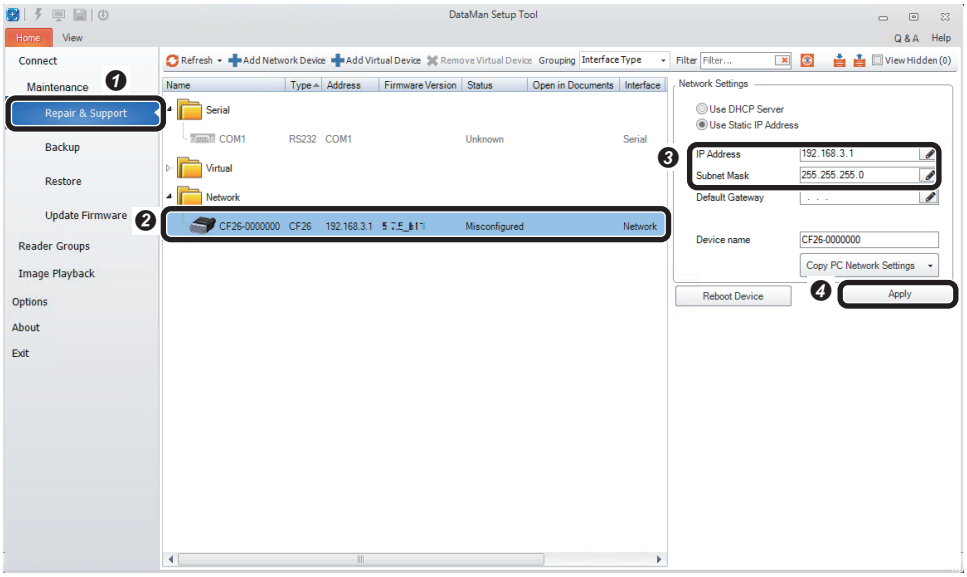
This section explains the procedures for connecting the code reader with a CC-Link IE Field Network Basic connection and the settings for a symbol to be read and the means of communication.

Setting an IP address to a personal computer

Set the IP address (192.168.3.3) to a personal computer.

Connecting the code reader

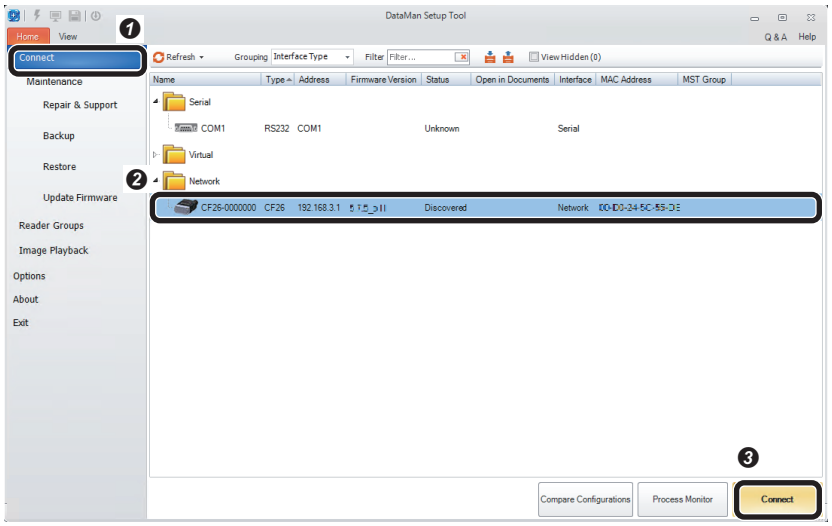
1. Start DataMan Setup Tool for MELSENSOR.
2. Set an IP address and a subnet mask to the code reader.



❶ Select [Repair & Support].
❷ Select the code reader "CF26".
❸ Set an IP address and a subnet mask of the code reader in the "Network Settings" section.
- IP Address: 192.168.3.1
- Subnet Mask: 255.255.255.0

❹ Click the [Apply] button.
The code reader is restarted and the network settings are applied.

3. Connect to the code reader.

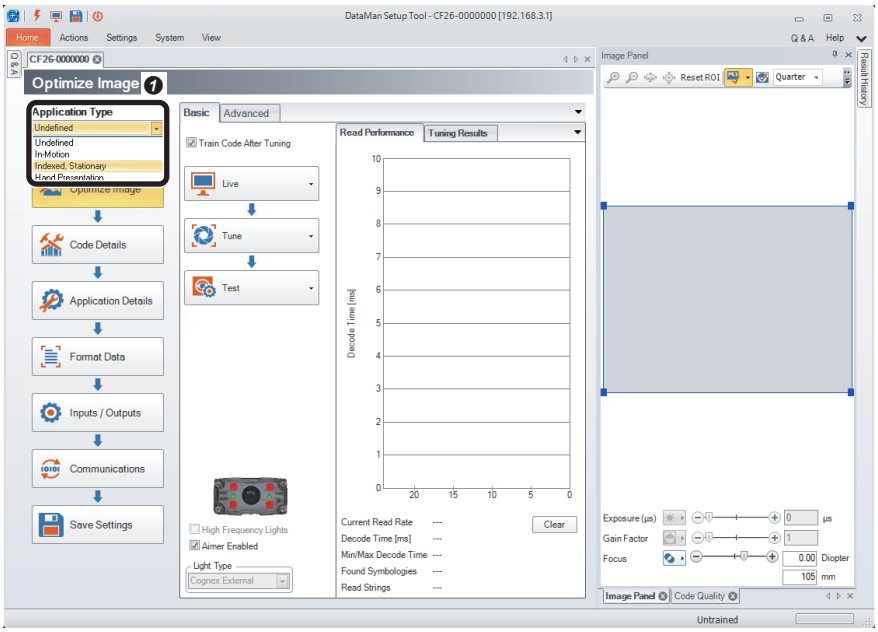


❶ Select [Connect].
❷ Select the code reader.
❸ Click the [Connect] button.

Setting the code reader

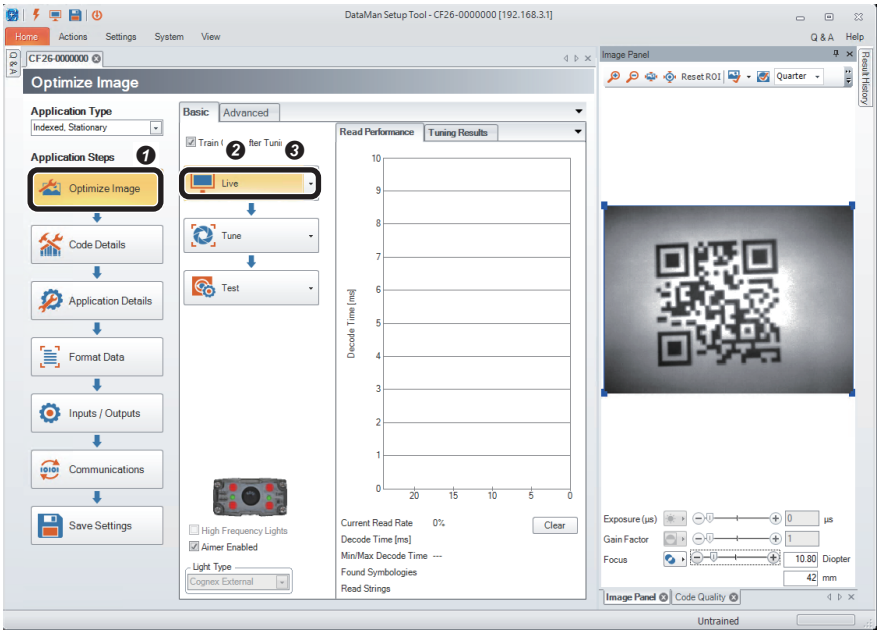
The following shows the procedure from setting to saving the code reader.

1. Select an application type.



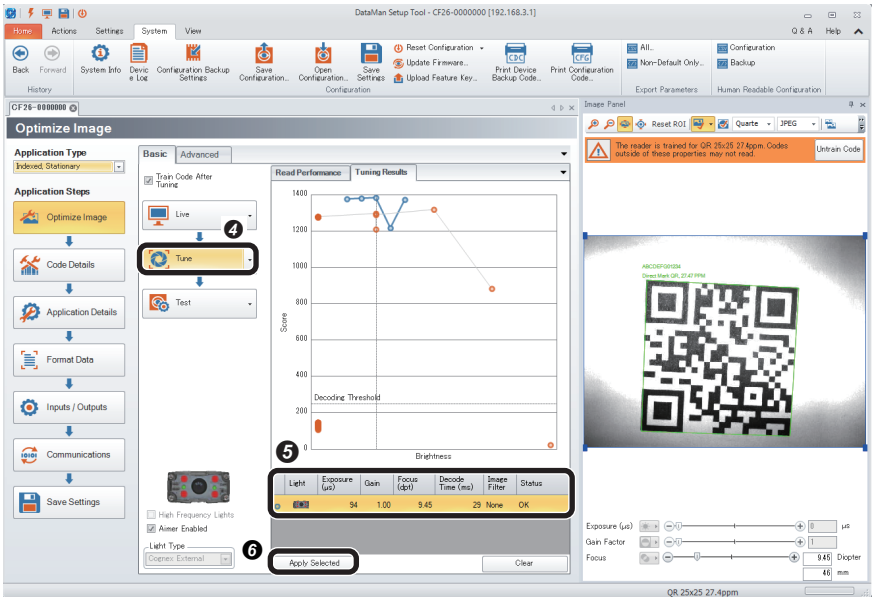
❶ Select "Indexed, Stationary".

2. Import a QR Code to be read in the "Optimize Image" step.



❶ Click the [Optimize Image] button.
❷ Click the [Live] button.
❸ When a QR Code to be read is displayed, click the [Live] button again.

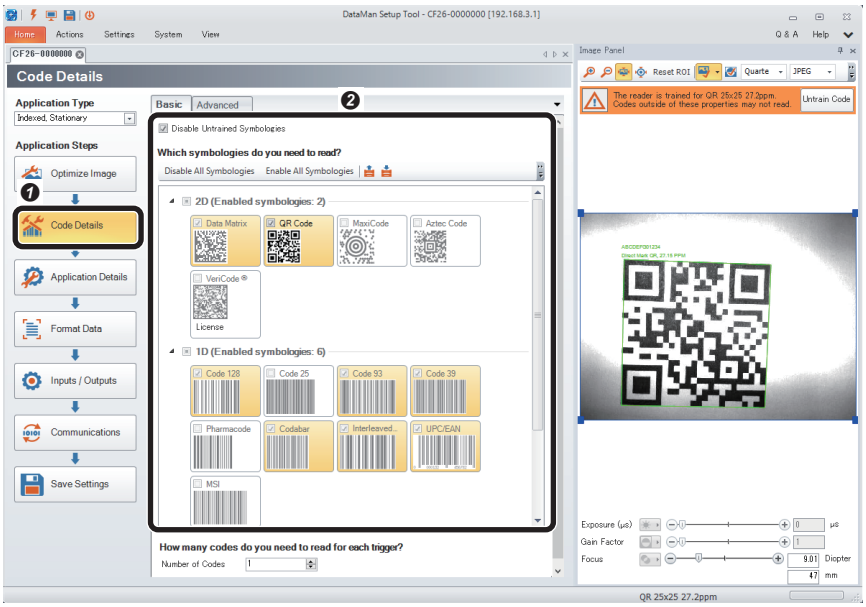
- It is recommended to tune and optimize brightness under the environment that is similar to the actual operating environment.



❹ Click the [Tune] button.
❺ When tuning is completed, an candidate of the setting contents is displayed.
- The number of the displayed candidates varies depending on the work status or the combinations of lights.
- When clicking the candidate, the capturing condition can be checked in "Image Panel".
- If the reading target code still cannot be read even though the code is within the field of vision, the image is captured clearly, and tuning is completed, check that the symbol to be read is enabled in the "Code Details" step.

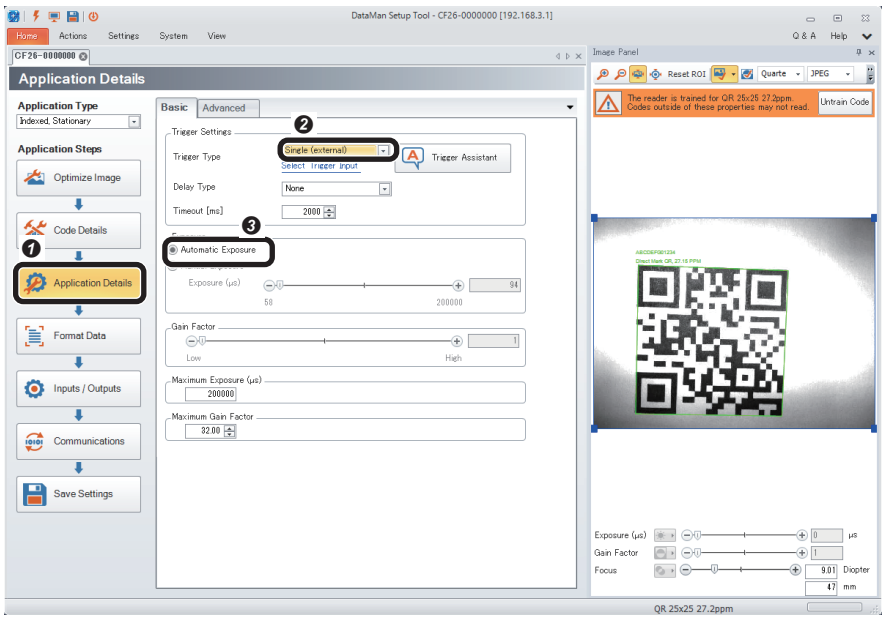
❻ By clicking the [Apply Selected] button, the selected settings are reflected to the code reader.

3. Check that symbols to be read are selected in the "Code Details" step.



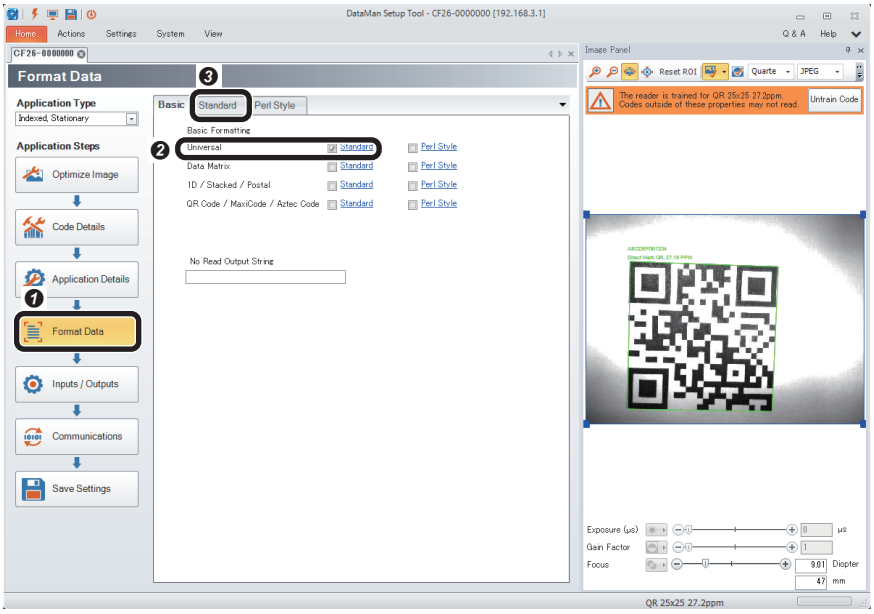
❶ Click the [Code Details] button.
❷ Check that the checkboxes of the symbols to be read are selected.
- Any symbols can be selected by unselecting the checkbox of "Disable Untrained Symbologies."
- The scanning speed can be improved when unselecting the checkboxes of symbols other than the reading target.

4. Set a trigger type and an exposure method in the "Application Details" step.

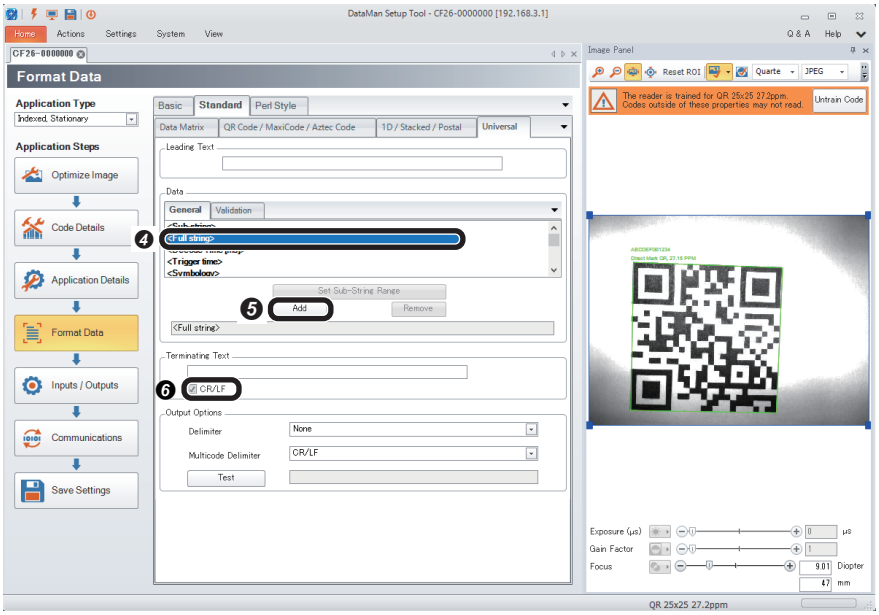


❶ Click the [Application Details] button.
❷ Select "Single (external)" for "Trigger Type" in "Trigger Settings".
❸ Select "Automatic Exposure" for "Exposure".

5. Set the output information of the QR Code in the "Format Data" step.

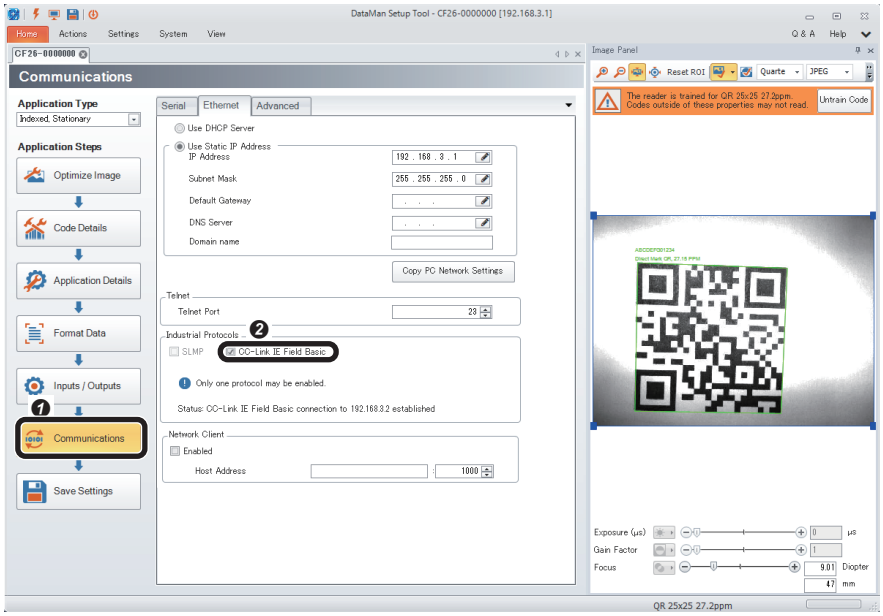


❶ Click the [Format Data] button.
❷ Select the checkbox of "Standard" for "Universal".
❸ Select the [Standard] tab.



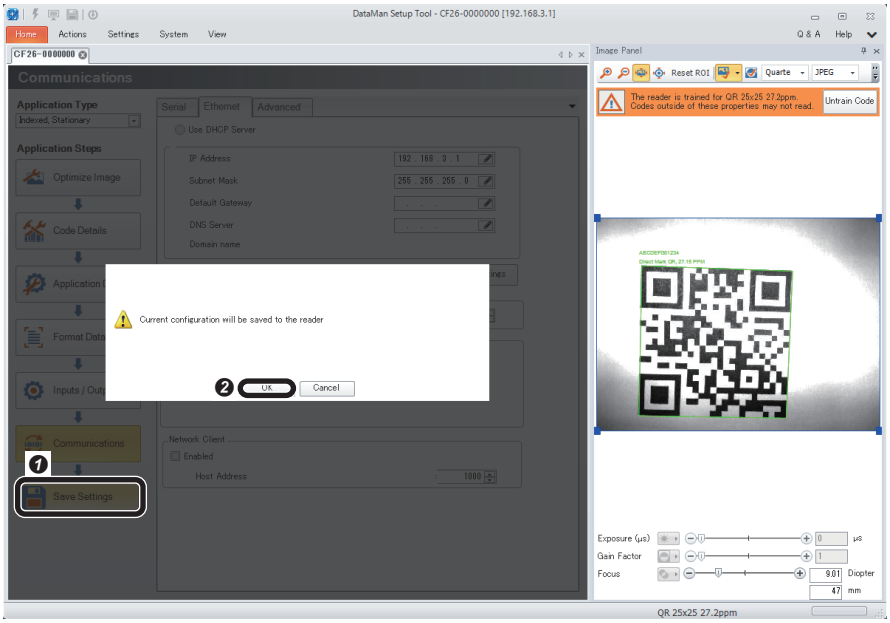
❹ Select "<Full string>" in the [General] tab in "Data."
❺ Click the [Add] button.
❻ Select the checkbox of "CR/LF" for "Terminating Text".

6. Configure the protocol to be used (CC-Link IE Field Network Basic) in the "Communications" step.



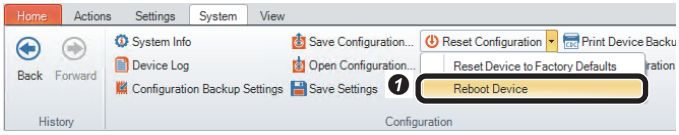
❶ Click the [Communications] button.
❷ Select the checkbox of "CC-Link IE Field Basic" for "Industrial Protocols" in the [Ethernet] tab.

7. Save the settings in the code reader in the "Save Settings" step.



❶ Click the [Save Settings] button.
❷ Click the [OK] button.

8. Restart the code reader.



❶ Select [System] ⇨ [Reset Configuration] ⇨ [Reboot Device].
The code reader is restarted.

1.4 Setting a Programmable Controller

Set parameters of a programmable controller and create a program in an engineering tool.

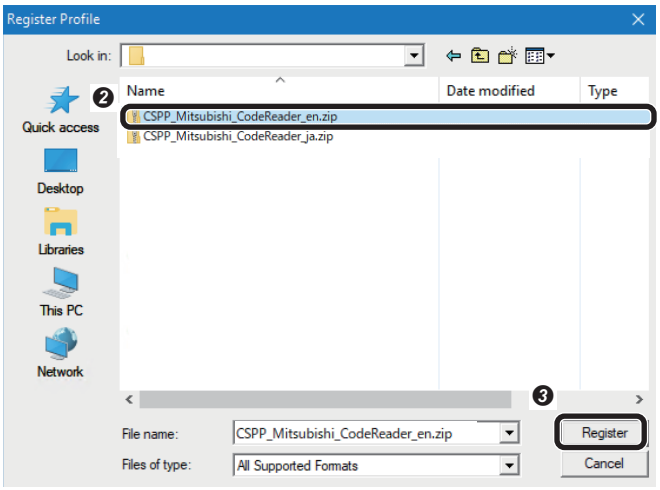
Registering a profile

Register a profile of the code reader in an engineering tool.

Point

Before registering/deleting a profile, log on the personal computer as the user with the administrator authority, and close the project in advance.

1. Start an engineering tool.
2. Resister a profile of the code reader in the "Register Profile" screen.

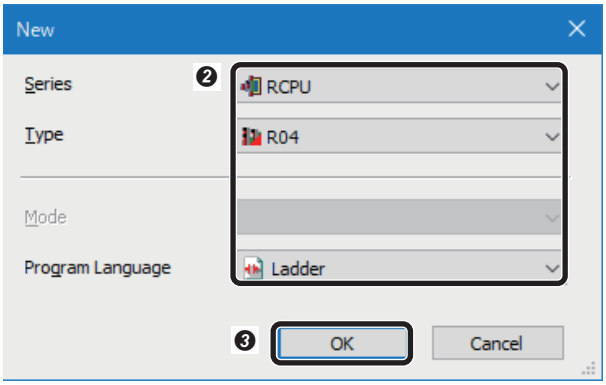


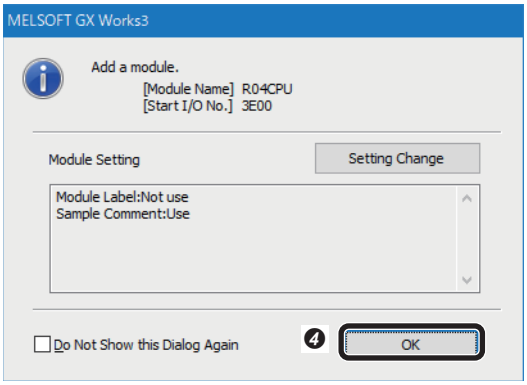
❶ Select [Tool] ⇨ [Profile Management] ⇨ [Register].
The "Register Profile" screen appears.
❷ Select the profile of the code reader obtained previously.
❸ Click the [Register] button.

Setting a programmable controller

Set parameters of a programmable controller.

1. Select a CPU module and a program language in the "New" screen.

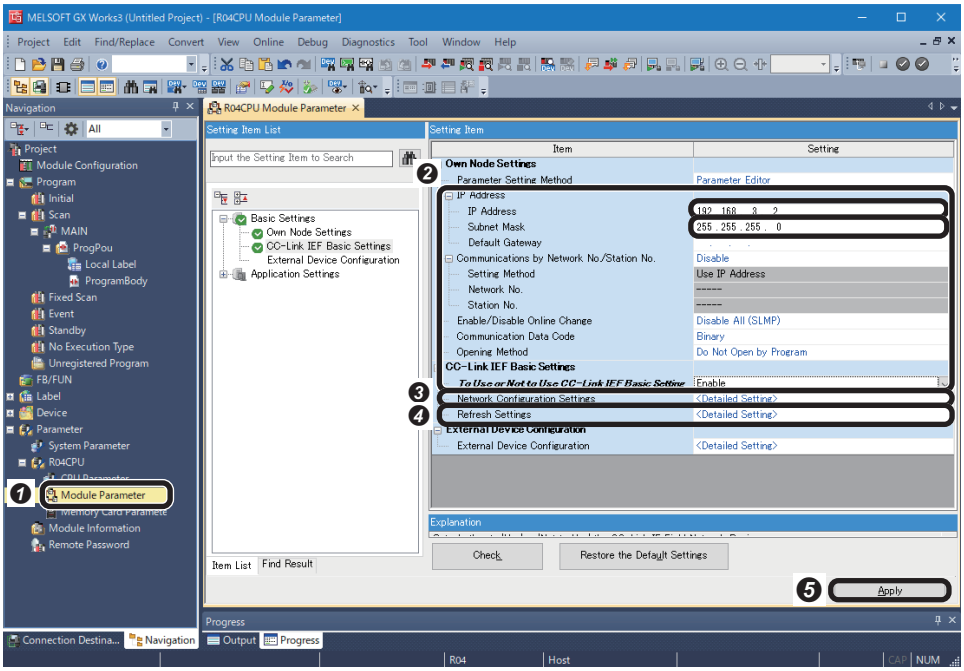




❶ Select [Project] ⇨ [New].
The "New" screen appears.
❷ Set a CPU module and a program language.
- Series: RCPU
- Type: R04
- Program Language: Ladder

❸ Click the [OK] button.
❹ Click the [OK] button.

2. Set module parameters in the module parameter setting screen of the CPU module.

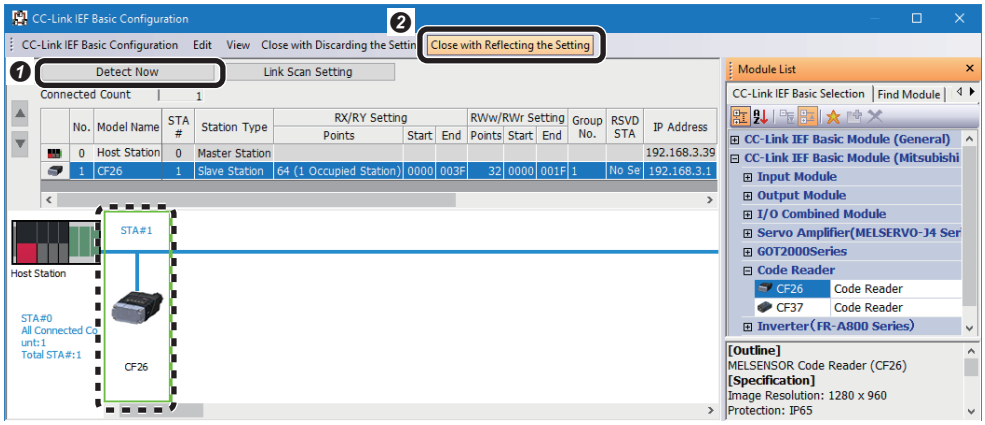


❶ Double-click "Module Parameter" in the "Navigation" window.
The "R04CPU Module Parameter" screen appears.
❷ Set "IP Address", "Subnet Mask" and "To Use or Not to Use CC-Link IEF Basic Setting".
- IP Address: 192.168.3.2
- Subnet Mask: 255.255.255.0
- To Use or Not to Use CC-Link IEF Basic Setting: Enable

❸ Double-click the "<Detailed Setting>" of "Network Configuration Settings".
The "CC-Link IEF Basic Configuration" screen appears. (☞ Page 24 "CC-Link IEF Basic Configuration" screen)
❹ Double-click the "<Detailed Setting>" of "Refresh Settings".
The screen to set the device of the refresh target appears. (☞ Page 24 Refresh settings)
❺ Click the [Apply] button to end the settings.

"CC-Link IEF Basic Configuration" screen

Detect the connected code reader. Make sure to turn ON the power of the programmable controller in advance.



❶ Click the [Detect Now] button.
- Read the displayed message, and click the [Yes] button.
- Check that the connected code reader is displayed.

❷ Select [Close with Reflecting the Setting].

For details on the automatic detection function of connected devices, refer to the following:

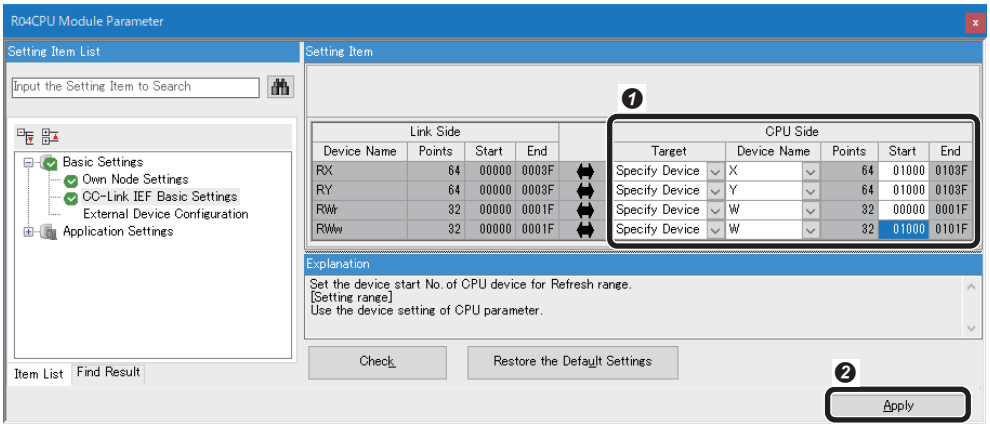
📖iQ Sensor Solution Reference Manual

Point

For the system configuration in which the automatic detection function of connected devices is not supported, a code reader can be added by dragging and dropping "CF26" in "Code Reader" from "CC-Link IEF Basic Module (Mitsubishi Electric Corporation)" in "Module List." Parameter settings are as follows:

- "RX/RY Setting" - "Points": 64 (1 Occupied Station)
- "IP Address": 192.168.3.1 (IP address of a code reader set in DataMan Setup Tool for MELSENSOR)

Refresh settings



❶ Set "Target", "Device Name", and "Start" on the "CPU Side".

❷ Click the [Apply] button to end the parameter settings.

Link side	CPU side				
Device name	**Target**	**Device name**	**Points**	**Start**	**End**
RX	Specify Device	X	64	01000	0103F
RY	Specify Device	Y	64	01000	0103F
RWr	Specify Device	W	32	00000	0001F
RWw	Specify Device	W	32	01000	0101F

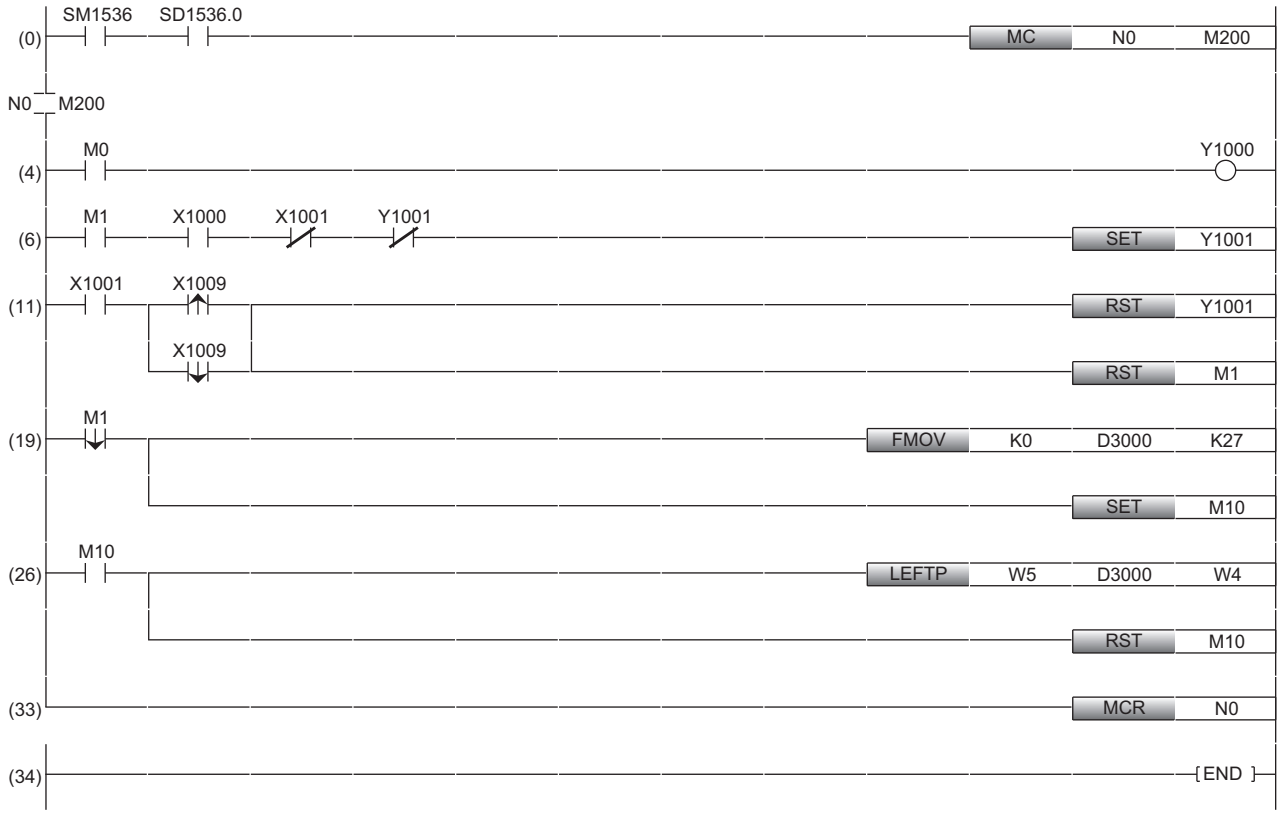
Creating a program

Create a program for controlling the code reader by using the devices set in the refresh settings.

Devices used in the program

Device	Device name	Description
SM1536	Cyclic transmission status	This device is turned ON when the cyclic transmission starts.
SD1536.0	Cyclic transmission status for each station (station No.1)	The cyclic transmission status for each station is stored. The status of the station No.1 is stored to bit 0.
X1000	Image Capturing Trigger Ready	The reception status of 'Image Capturing Trigger Enable' (Y1000) is stored. • ON: An image capturing trigger is enabled. • OFF: An image capturing trigger is disabled.
X1001	Image Capturing Trigger Ack	The reception status of 'Image Capturing Trigger' (Y1001) is stored. • ON: With an image capturing trigger • OFF: Without an image capturing trigger
X1009	Decode Complete	This device is inverted at the completion of decoding of a code reader.
Y1000	Image Capturing Trigger Enable	'Image Capturing Trigger' (Y1001) is enabled while this device is ON.
Y1001	Image Capturing Trigger	An image is captured when this device is turned ON.
W4	Read results data length	Code read results data length is stored.
W5 or later	Read results data	A code read results string is stored.
D3000	Read results data copy area	Read results data in this area are intended to be used in a program or other device.
M0	Image Capturing Trigger Enable command	'Image Capturing Trigger Enable' (Y1000) is turned ON and an image capturing trigger is enabled while this device is turned ON.
M1	Image Capturing Trigger command	'Image Capturing Trigger' (Y1001) is turned ON, and an image is captured when this device is turned ON.
M10	Area clearing execution	This device is turned ON when clearing a read results data copy area.
M200	Communication condition satisfied flag (station No.1)	This device is turned ON while the cyclic transmission with the station No.1 is performed.

Program example



(0): Set an interlock to check that the cyclic transmission is normally performed between the master station (programmable controller) and the station No.1 (code reader).
When the cyclic transmission is normally performed, the program in line (4) and later are executed.

(4): Enable an image capturing trigger on the code reader.

(6): Request the start of the image capture to the code reader ('Image Capturing Trigger'(Y1001) is turned ON).

(11): Perform the processing for the completion of the image capture of the code reader.

(19): Clear a read results data copy area after the completion of decoding the code reader.
In this program, output data block is set to 32 points, thus areas for 27 points in which read results data is stored are cleared.

(26): Copy decoding results after clearing the read results data copy area.

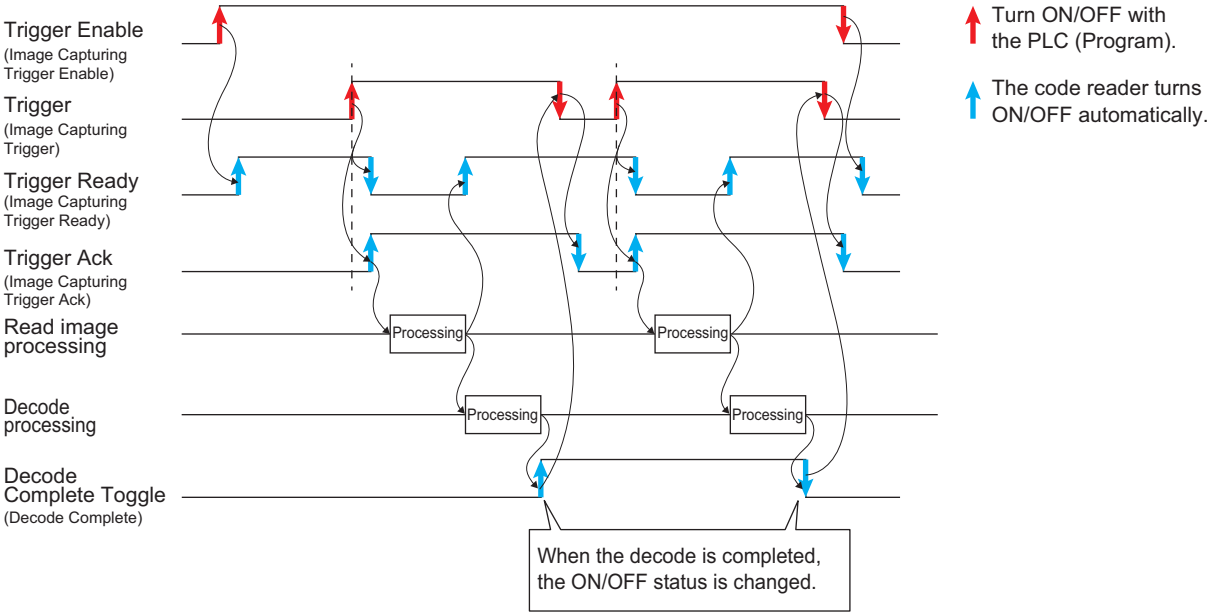
Precautions

Use 'Image Capturing Trigger Ack' (X1001) to set an interlock when checking 'Decode Complete' (X1009).

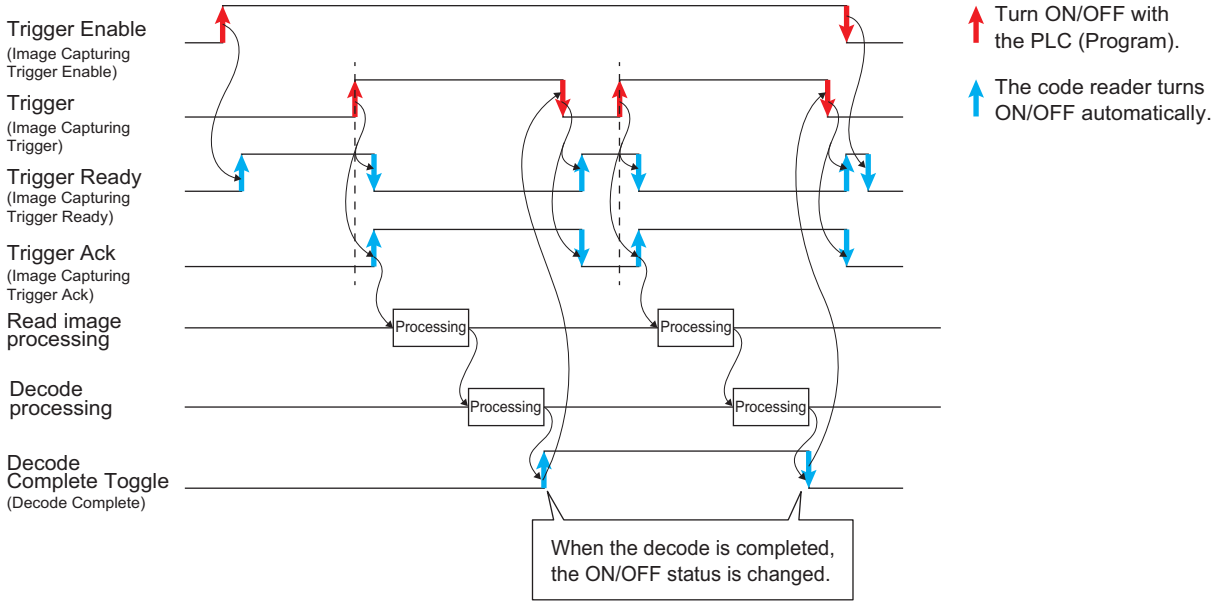
Timing chart of a CC-Link IE Field Network Basic connection

A timing chart when 'Trigger (Image Capturing Trigger)' is turned ON by using a programmable controller is shown below.
To enable the image capturing trigger from a programmable controller, turn ON 'Trigger Enable (Image Capturing Trigger Enable)' of a control block.
When 'Trigger (Image Capturing Trigger)' of a control block is turned ON using a programmable controller while 'Trigger Ready (Image Capturing Trigger Ready)' of a status block is ON by turning ON 'Trigger Enable (Image Capturing Trigger Enable)', the status of a code reader is output to 'Trigger Ack (Image Capturing Trigger Ack)' and 'Decode Complete Toggle (Decode Complete)' of the status block.
The status of 'Decode Complete Toggle (Decode Complete)' is inverted at the completion of decoding.

■ Code reader CF26



■ Code reader CF37

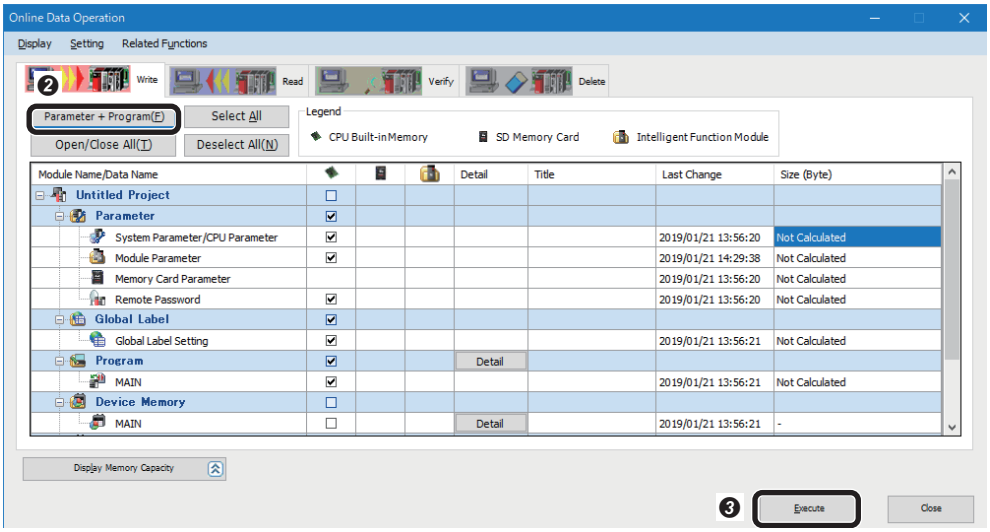


1.5 Writing Data to a Programmable Controller

Write the parameters and program set in an engineering tool to the programmable controller.

Writing to the programmable controller

1. Turn ON the programmable controller.
2. Write parameters and program to the programmable controller in the "Online Data Operation" screen.



❶ Select [Online] ⇨ [Write to PLC]. The "Online Data Operation" screen appears.
❷ Click the [Parameter + Program] button.
❸ Click the [Execute] button.

Restarting the programmable controller

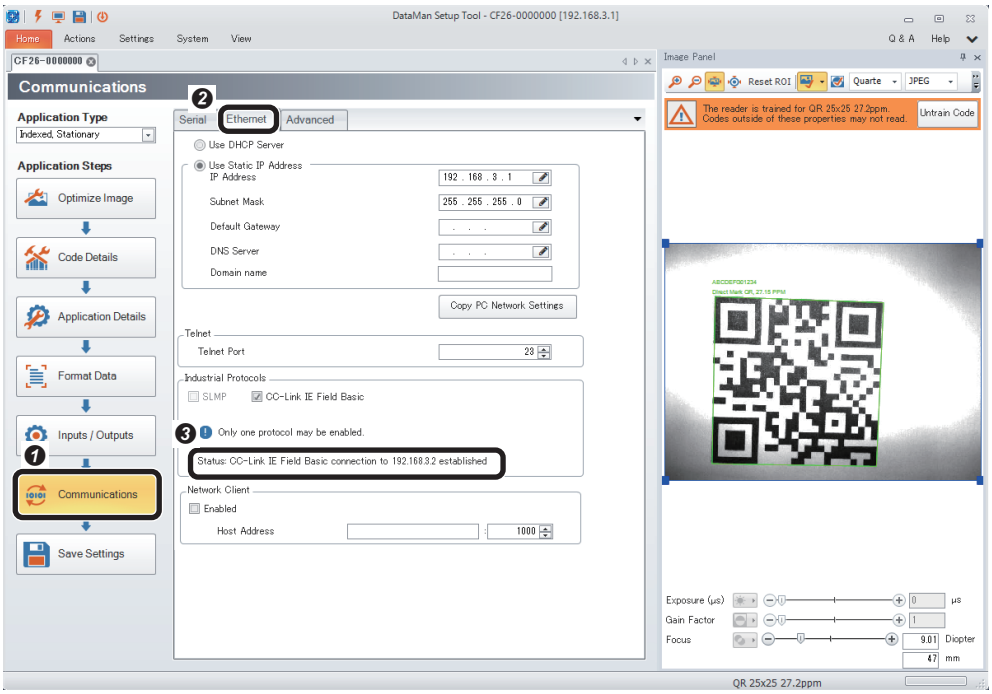
After writing the parameters and program, reset the programmable controller and switch to RUN.

1.6 Checking Operations

Check operation by controlling the code reader using the programmable controller.
Use a created program to check the operation. (☞ Page 25 Creating a program)

Checking the communication status

Check the communication status with a CC-Link IE Field Network Basic connection in DataMan Setup Tool for MELSENSOR.

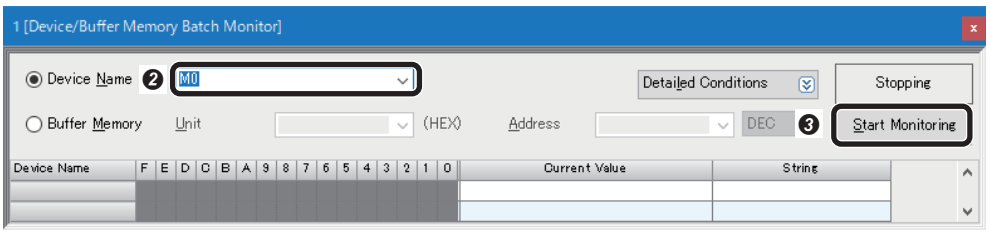


❶ Click the [Communications] button.
❷ Select the [Ethernet] tab.
❸ Check that "CC-Link IE Field Basic connection to 192.168.3.2 established" is displayed in "Status".

Checking read results

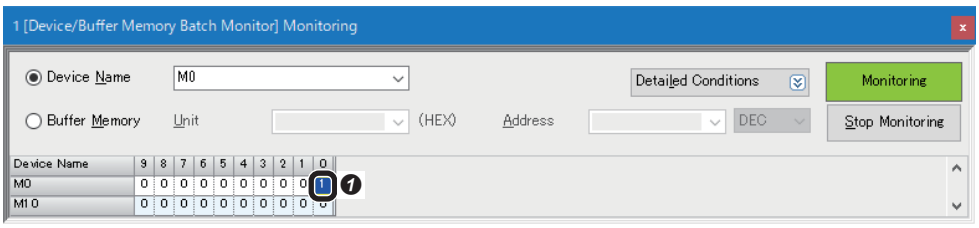
Check the read results of a QR Code in the "Device/Buffer Memory Batch Monitor" window of an engineering tool.

1. Start monitoring in the "Device/Buffer Memory Batch Monitor" window.



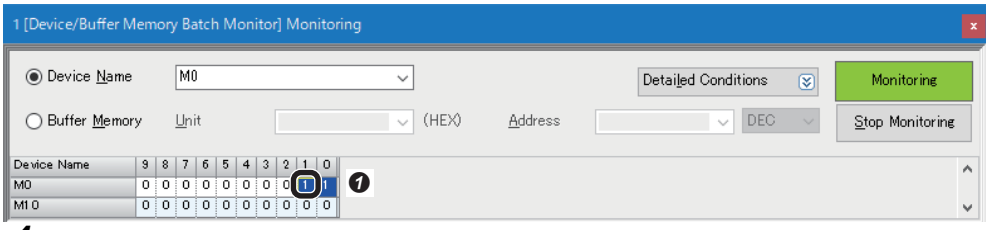
❶ Select [Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch Monitor]. The "Device/Buffer Memory Batch Monitor" window appears.
❷ Enter "M0" for "Device Name".
❸ Click the [Start Monitoring] button.

2. Enable a trigger on the code reader.



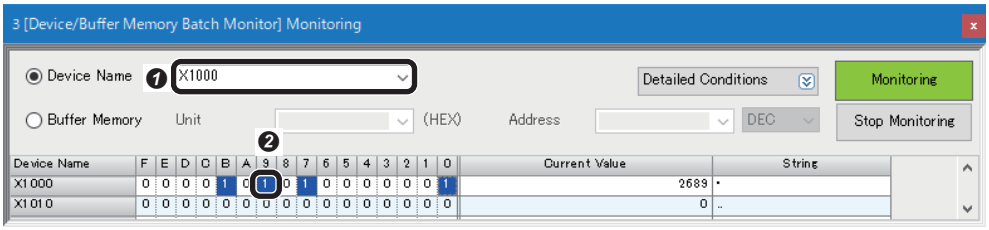
❶ Turn 'Image Capturing Trigger Enable command' (M0) ON.
'Image Capturing Trigger Enable' (Y1000) is turned ON.

3. Turn ON a trigger.



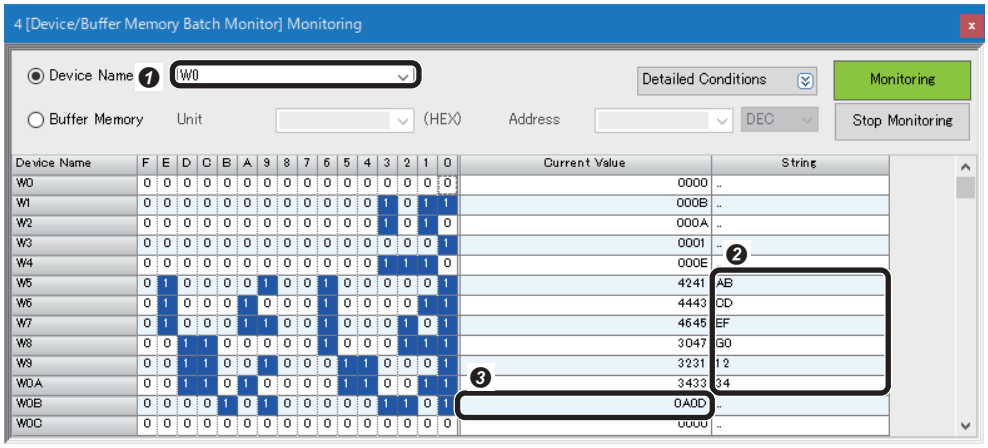
❶ Turn 'Image Capturing Trigger command' (M1) ON.
'Image Capturing Trigger' (Y1001) is turned ON.

4. Check the completion of decoding.



❶ Enter "X1000" for "Device Name".
❷ Check that 'Decode Complete' (X1009) is inverted.

5. Check the read results.



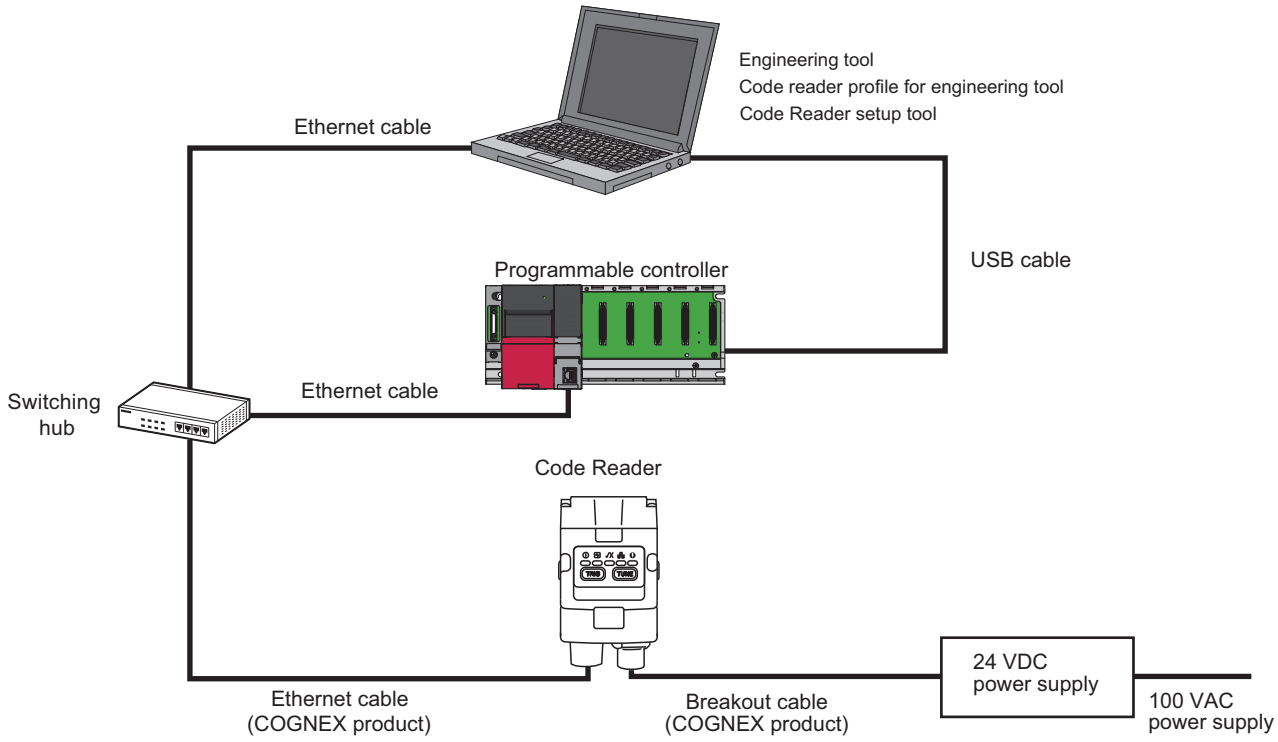
❶ Enter "W0" for "Device Name".
❷ "W5" to "W0A": Check "ABCDEFG01234" is displayed in "String".
❸ "W0B": Check the terminating text "0A0D" (CR/LF) is displayed in "Current Value".

2 SLMP SCANNER CONNECTION

This chapter explains the procedure for connecting a code reader to a programmable controller and controlling the code reader with an SLMP scanner connection.

2.1 System Configuration Example for Connecting a Code Reader

The following figure shows the system configuration for connecting a code reader.



Point

For details on the system configuration, refer to the following:

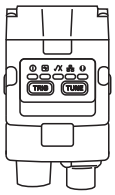
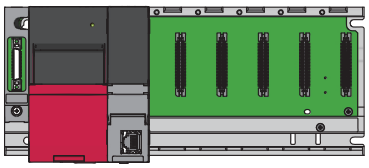
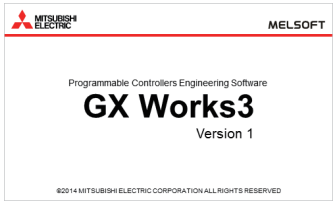
Code Reader CF26 User's Manual
Code Reader CF37 User's Manual

Configurations

The devices used in the system configuration are as follows.

Required equipment

■ Mitsubishi Electric products

		
Code reader • CF26-SR	Programmable controller • CPU module: R04CPU	Engineering tool • GX Works3

■ COGNEX products

Code reader profile for engineering tool*1	Code reader setup tool • DataMan Setup Tool for MELSENSOR*1	Ethernet cable • CCB-84901-2001-**(**: 01, 02, 05, 10, or 15)*2	Breakout cable • CCB-PWRIO-**(**: 05, 10, or 15)*3

*1 Download this product from the Mitsubishi Electric FA website.
www.MitsubishiElectric.co.jp/fa

*2 Cable length (0.6 m, 2 m, 5 m, 10 m, or 15 m), straight

*3 Cable length (5 m, 10 m, or 15 m), shielded twisted-pair cable, straight

■ Commercial products

Switching hub	Ethernet cable	USB cable (Type Mini-B)	24 VDC power supply

Connecting and wiring a code reader

The following explains the considerations and procedure for connecting a code reader to a programmable controller and connecting to an SLMP scanner connection.

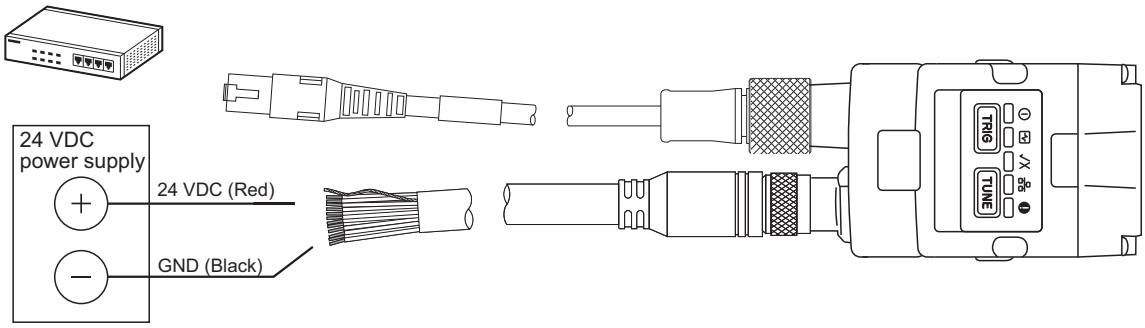
Ex.

Breakout cable: CCB-PWRIO-**(**: 05, 10, or 15)[*1]

[*1] Cable length (5 m, 10 m, or 15 m), shielded twisted-pair cable, straight

Precautions

- Check that a 24 VDC power supply is OFF when connecting a breakout cable to the power supply.
- Cut unused wires or protect them with insulating materials. Be careful not to contact with 24 VDC wires.
- A breakout cable and an Ethernet cable are designed to connect with their key aligned with the keyway of the connector on a code reader. Do not force the connections or damage may occur.
- When powering ON the system, turn ON the power of a programmable controller first, or at the same time as a code reader.



1. Connect the breakout cable to a 24 VDC power supply.

Connect the 24 VDC (red) of the cable to the positive terminal of the power supply, and the GND (black) to the negative terminal.

2. Connect the breakout cable to the power supply, I/O, and RS-232 connector of a code reader.

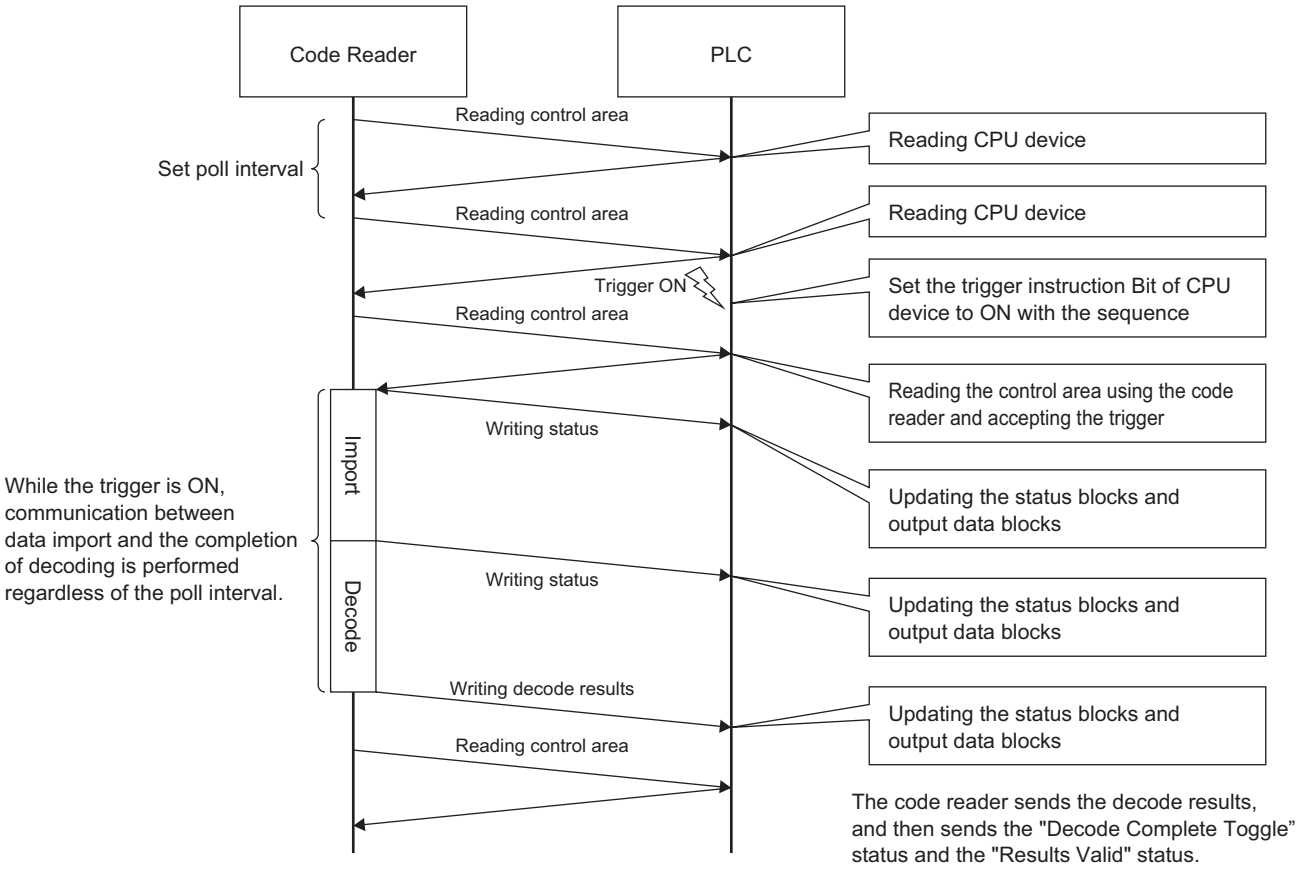
3. Connect an Ethernet cable to an Ethernet connector and a switching hub of the code reader.

4. Connect the code reader to a programmable controller and a personal computer via the switching hub.

5. Turn the power of the system ON.

2.2 Basic Operations for an SLMP Scanner Connection

Basic operation process for an SLMP scanner connection



Basic operations for an SLMP scanner connection

With an SLMP scanner connection, a code reader reads a control block from a programmable controller in the poll interval set with DataMan Setup Tool for MELSENSOR, and performs processing according to the change of the bit information in the control block.

In addition, the status of the processing is written to the corresponding bit in the status block.

By assigning devices of a programmable controller to each of the defined data blocks (including control blocks), a code reader can be controlled using the devices.

The following shows the functions of six data blocks.

Data Blocks	Description
Control block	This block is used to perform control instructions (such as trigger) to a code reader. Bit information is used for the control instructions. A code reader is controlled by turning ON and OFF the devices set to the control block with a programmable controller.
Status block	This block indicates the status of a code reader, and can be checked with bit information.
Input data block	This block is used to input data including parameters from a programmable controller to a code reader. Word information is used to input data.
Output data block	This block is used by a code reader to output data including decode results to a programmable controller. Word information is used to output data.
String command block	This block is used to set DMCC commands to control a code reader. Word information is used to set the commands.
String command result block	This block is used to output the results controlled by DMCC commands. Word information is used to output the results.

Signals used for an SLMP scanner connection

For details on each signal to control a code reader, refer to DataMan® Industrial Protocols Manual.
DataMan® Industrial Protocols Manual can be opened by clicking "CF Industrial Protocols Manual" in the help of DataMan Setup Tool for MELSENSOR.

Precautions

Do not write data to '(Reserved)' bits and words in data blocks. Doing so may cause an unexpected error.

Data blocks

■ Control blocks

Bit	Data name	Description (Application)
0	Trigger Enable	To enable an image capturing trigger by 'Trigger' signal for SLMP scanner connection. • ON: An image capturing trigger is enabled. • OFF: An image capturing trigger is disabled.
1	Trigger	To trigger image capturing. 'Trigger Ready' bit needs to be ON before generating an image capturing trigger. • ON: image capturing trigger is started. • OFF: —
2	Buffer Results Enable	To enable the buffer for read results. New read results are stored in the buffer queue of a code reader. To acquire the next read results, turn ON 'Results Ack'. • ON: The buffer for read results is enabled. • OFF: The buffer for read results is disabled.
3	Results Ack	To respond to receiving the latest read results. A code reader turns 'Results Available' OFF when recognizing that this bit turns ON. If 'Buffer Results Enable' is turned ON, the next read results are read out from the buffer queue when receiving a response. • ON: Read results are received. • OFF: —
4 to 15	(Reserved)	—
16	Set User Data	To transfer the contents of the 'User Data' field to the buffer of a code reader. When the transfer is completed after reading 'User Data', a code reader turns ON 'Set User Data Ack'. • ON: The 'User Data' field is transferred to the buffer of a code reader. • OFF: —
17	Initiate String Cmd	To transfer the contents of the 'String Command' field to a code reader. When command results become available after reading and processing the 'String Command' field, a code reader turns ON 'String Cmd Ack'. • ON: DMCC command is executed. • OFF: —
18 to 23	(Reserved)	—
24	Soft Event[*1*2]	To register a code
25		To register a match string
26		To register focus
27		To register brightness
28		To cancel registration
29		(Reserved)
30		To execute a DMCC command[*3]
31		To set a match string

*1 Bits 24 to 31 are virtual discrete input of the code reader.
When the bit switched from 0 to 1, an action associated with the bit is executed.
After the execution, the code reader turns ON the corresponding 'Soft Event Ack' in status blocks to show the action is completed.

*2 Do not execute 'Software Event' that changes code reader settings while processing the trigger.
Changing settings while capturing an image or decoding may cause an unexpected result.

*3 The execution result of the DMCC command cannot be acquired.

■ Status blocks

Bit	Data name	Description (Application)
0	Trigger Ready	This bit turns ON when 'Trigger Enable' is set and an image capturing trigger can be received. • ON: An image capturing trigger can be received. • OFF: An image capturing trigger cannot be received.
1	Trigger Ack	This bit shows that a code reader recognizes 'Trigger' is ON. Until 'Trigger' is turned OFF, this bit remains ON. • ON: An image capturing trigger is received. • OFF: —
2	Acquiring	This bit shows that a code reader is capturing an image. For a code reader CF26, this bit is '(Reserved).'
3	Missed Acq	This bit shows that image capturing is failed. When the next image capturing trigger is generated, this bit is turned OFF. • ON: Image capturing is failed. • OFF: —
4 to 7	(Reserved)	—
8	Decoding	This bit shows that a code reader is decoding.
9	Decode Complete Toggle	The status of this bit is inverted every time when decoding is completed and read results become available.
10	Results Buffer Overrun	This bit shows that a code reader discards a series of read results after the buffer for read results becomes full. When the next read results are stored in the buffer queue properly, this bit is turned OFF. Only when 'Buffer Results Enable' is enabled, this bit is enabled. • ON: Read results are discarded. • OFF: —
11	Results Available	This bit shows that a series of decode results is available (the Result ID, Result Code, Result Data Length, and Result Data fields contain valid data). Until 'Results Ack' responds, this bit remains ON. • ON: With new read results • OFF: Without new read results
12 to 14	(Reserved)	—
15	General Fault	This bit turns ON when an error occurs in soft event operation. Until the next soft event succeeds or 'Trigger Enable' is turned OFF and then ON again, this bit remains ON. • ON: Error • OFF: No error
16	Set User Data Ack	This bit turns ON when receiving new 'User Data.' Until 'Set User Data' is turned OFF, this bit remains ON. • ON: Transferring the 'User Data' to the buffer of a code reader is completed. • OFF: —
17	String Cmd Ack	This bit turns ON when the latest DMCC command is executed and command response becomes enabled. Until 'Initiate String Cmd' is turned OFF, this bit remains ON • ON: DMCC command is executed. • OFF: —
18 to 23	(Reserved)	—
24	Soft Event Ack*1	Code registration is completed.
25		Match string registration is completed.
26		Focus registration is completed.
27		Brightness registration is completed.
28		Cancelling registration is completed.
29		(Reserved)
30		DMCC command execution is completed.
31		Match string setting is completed.

*1 These bits turn ON to show that a code reader completes soft event actions.
These bits remain ON until their corresponding 'Soft Event' bits in control blocks are turned OFF.

■ Input data blocks

Word	Data name	Description (Application)
0	(Reserved)	—
1	User Data Length	The number of valid bytes of the 'User Data' field.
2 or later	User Data	User-defined data which can be used as input for capturing an image or decoding.

■ Output data blocks

Word	Data name	Description (Application)
0	(Reserved)	—
1	Trigger ID	Image capturing trigger ID. ID of an image capturing trigger to be generated next is stored. This is used to verify a generated image capturing trigger and 'Result Data' to be received later. The same value as this ID is returned as 'Result ID' of the corresponding read results.
2	Result ID	Results ID. ID of the read results which are corresponding to 'Trigger ID' is stored. This is used to verify an image capturing trigger and the corresponding read results.
3	Result Code	Result code. • Bit 0: 1 = Read, 0 = No Read • Bit 1: 1 = Passed validation, 0 = Failed validation • Bit 2*1: 1 = Passed verification, 0 = Failed verification • Bit 3: 1 = Image capturing trigger overrun • Bit 4: 1 = Image capturing buffer overrun • Bit 5 to 15: —
4	Result Data Length	Read results data length. The number of valid bytes of the 'Result Data' field is stored.
5 or later	Result Data	Read results are stored.

*1 This bit is enabled only when using the verification function compatible models.

■ String command blocks

Word	Data name	Description (Application)
0	Length	Data length of string command stored in 'String Command' is saved in bytes.
1 or later	String Command	Command to be executed is stored in ASCII text. No Null termination required.

■ String command result blocks

Word	Data name	Description (Application)
0	Result Code	Result code of executing command is stored. • 0: no error • 1: reader initiated read-string • 100: unidentified error • 101: command invalid • 102: parameter invalid or missing feature • 103: checksum incorrect • 104: parameter rejected/altered due to reader state • 105: reader is offline For details, refer to the command reference of DataMan Control Commands.
1	Length	Data length stored in 'String Command Result' is saved in bytes.
2 or later	String Command Result	The execution result of command is stored in ASCII text.

2.3 Setting the Code Reader

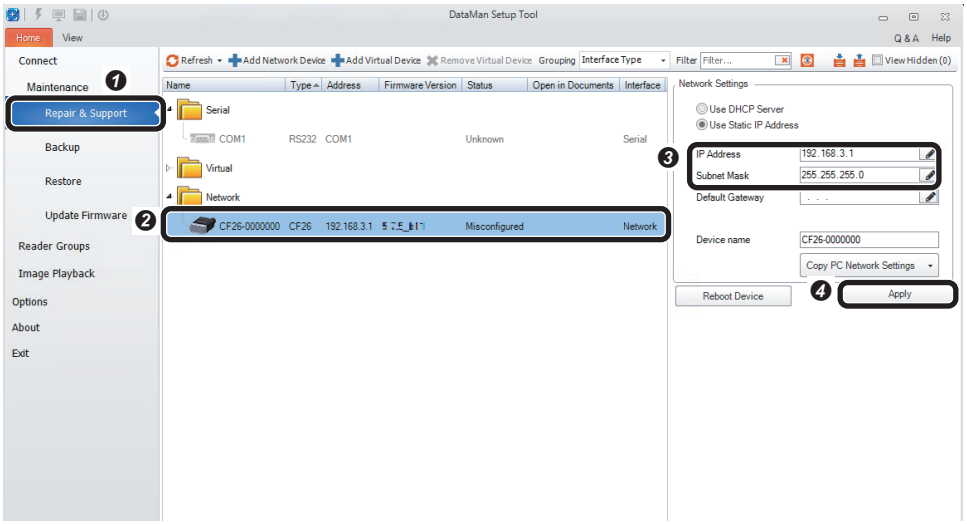
This section explains the procedures for connecting the code reader with an SLMP scanner connection and the settings for a symbol to be read and the means of communication.

Setting an IP address to a personal computer

Set the IP address (192.168.3.3) to a personal computer.

Connecting the code reader

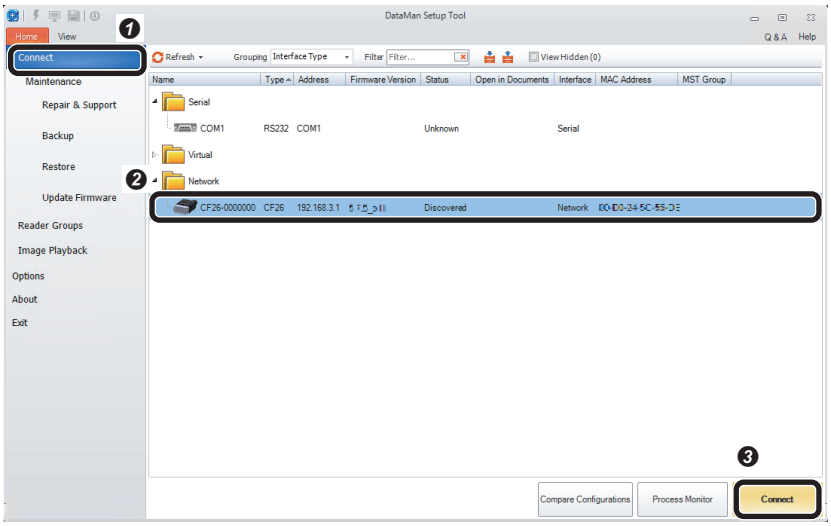
1. Start DataMan Setup Tool for MELSENSOR.
2. Set an IP address and a subnet mask to the code reader.



❶ Select [Repair & Support].
❷ Select the code reader "CF26".
❸ Set an IP address and a subnet mask of the code reader in the "Network Settings" section.
- IP Address: 192.168.3.1
- Subnet Mask: 255.255.255.0

❹ Click the [Apply] button.
The code reader is restarted and the network settings are applied.

3. Connect to the code reader.

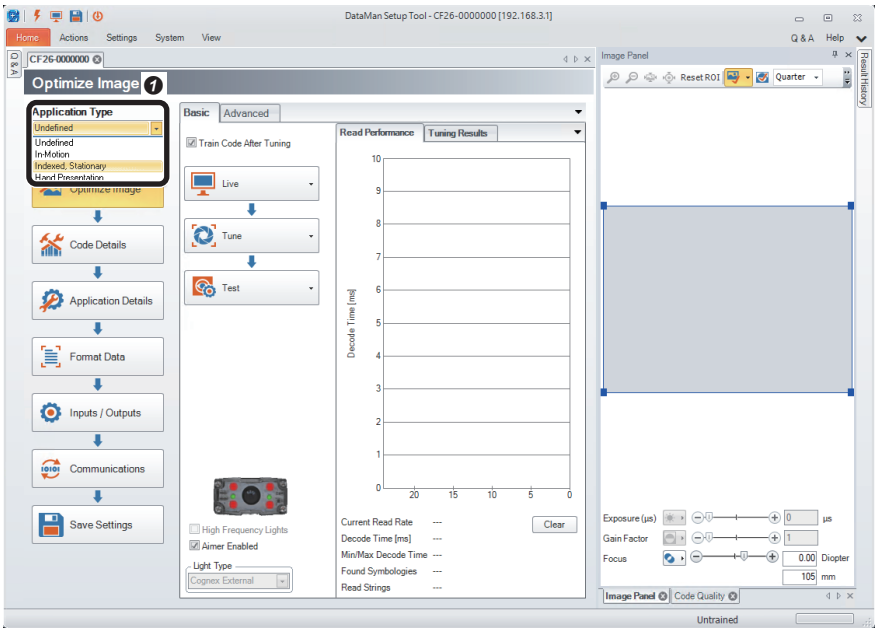


❶ Select [Connect].
❷ Select the code reader.
❸ Click the [Connect] button.

Setting the code reader

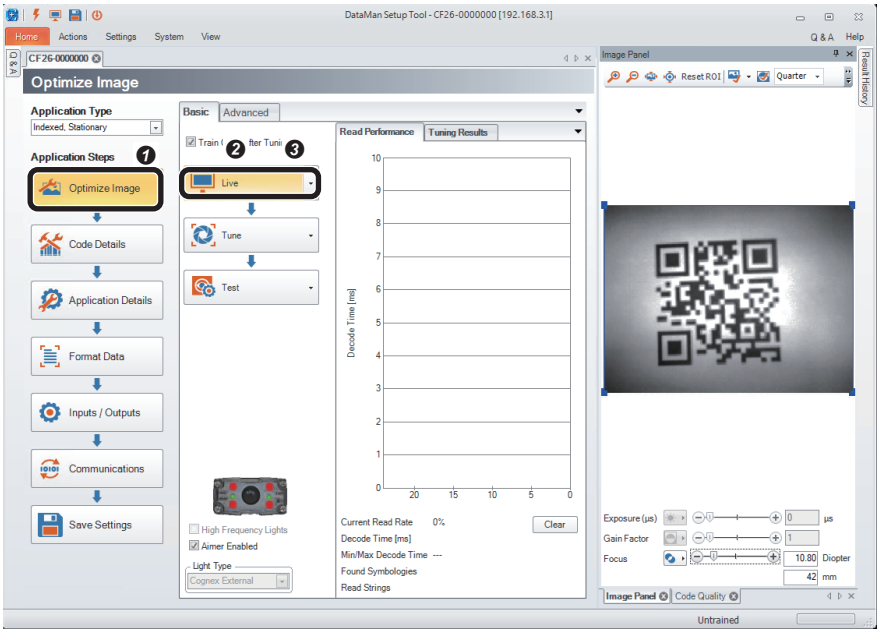
The following shows the procedure from setting to saving the code reader.

1. Set an application type.



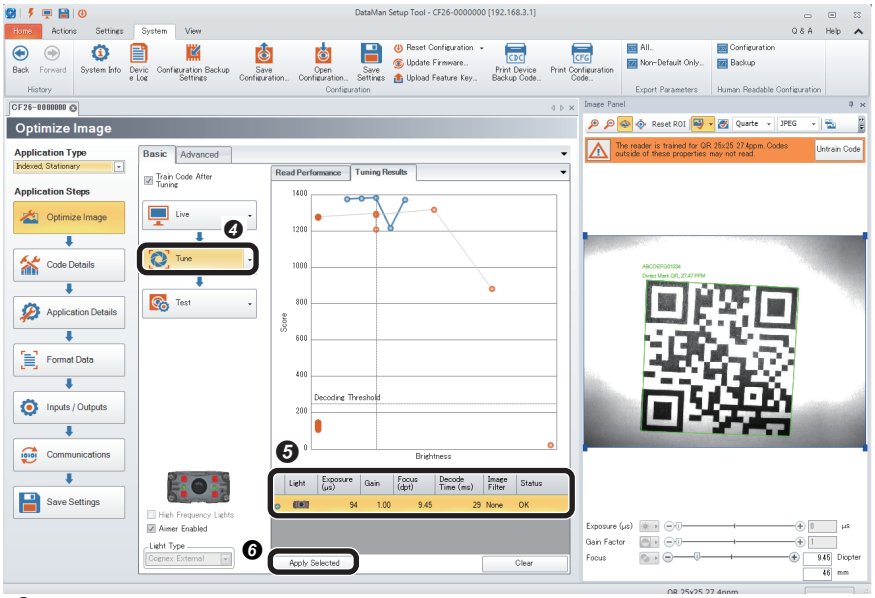
❶ Select "Indexed, Stationary".

2. Import a QR Code to be read in the "Optimize Image" step.



❶ Click the [Optimize Image] button.
❷ Click the [Live] button.
❸ When a QR Code to be read is displayed, click the [Live] button again.

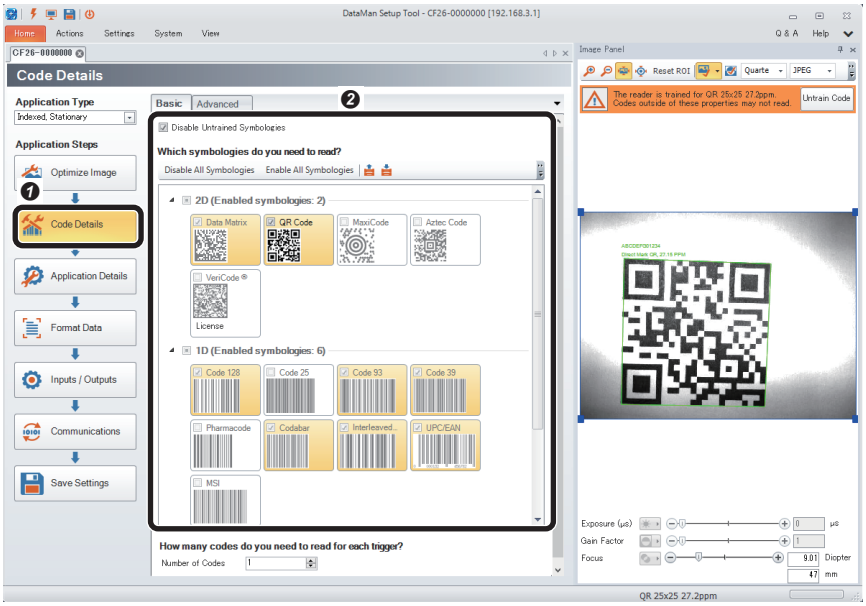
- It is recommended to tune and optimize brightness under the environment that is similar to the actual operating environment.



❹ Click the [Tune] button.
❺ When tuning is completed, an candidate of the setting contents is displayed.
- The number of the displayed candidates varies depending on the work status or the combinations of lights.
- When clicking the candidate, the capturing condition can be checked in "Image Panel".
- If the reading target code still cannot be read even though the code is within the field of vision, the image is captured clearly, and tuning is completed, check that the symbol to be read is enabled in the "Code Details" step.

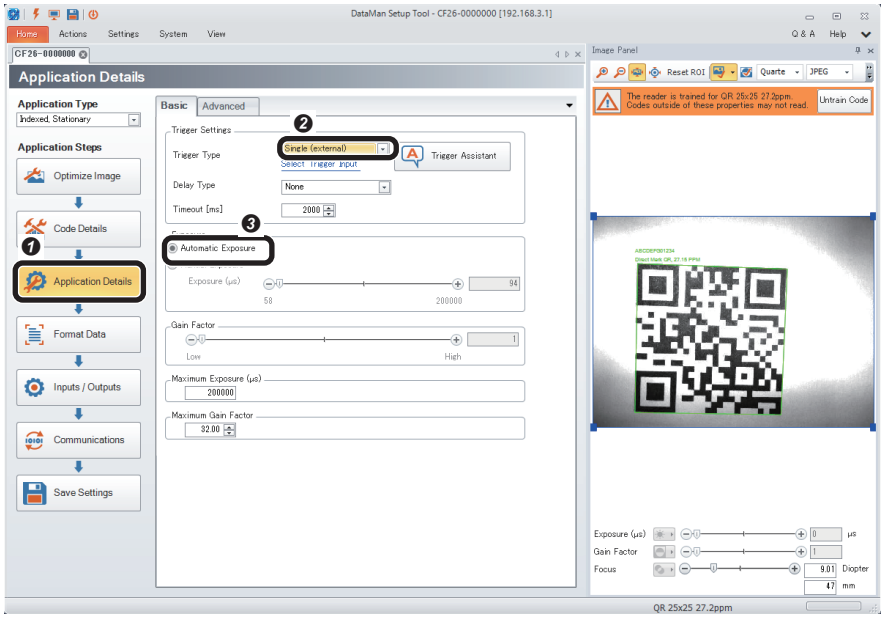
❻ By clicking the [Apply Selected] button, the selected settings are reflected to the code reader.

3. Check that symbols to be read are selected in the "Code Details" step.



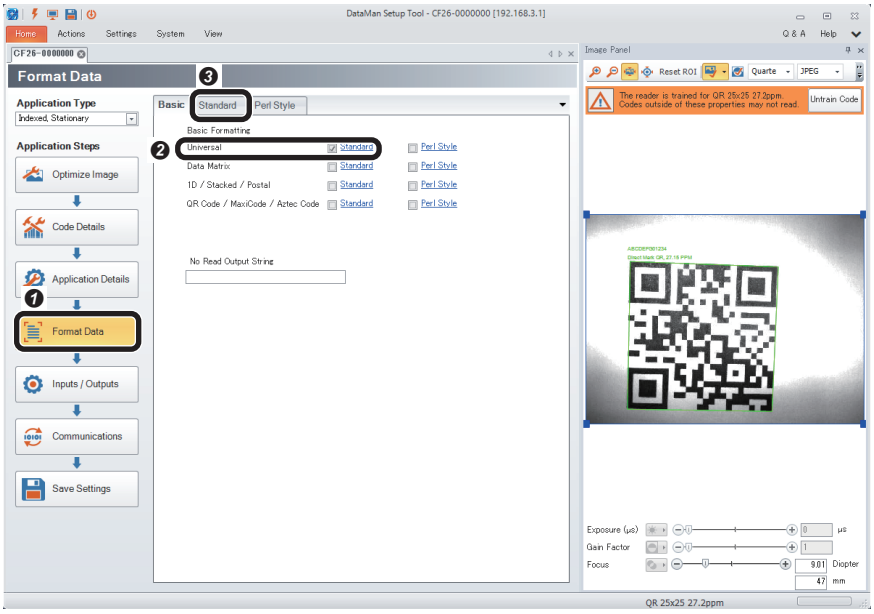
❶ Click the [Code Details] button.
❷ Check that the checkboxes of the symbols to be read are selected.
- Any symbols can be selected by unselecting the checkbox of "Disable Untrained Symbologies."
- The scanning speed can be improved when unselecting the checkboxes of symbols other than the reading target.

4. Set a trigger type and an exposure method in the "Application Details" step.

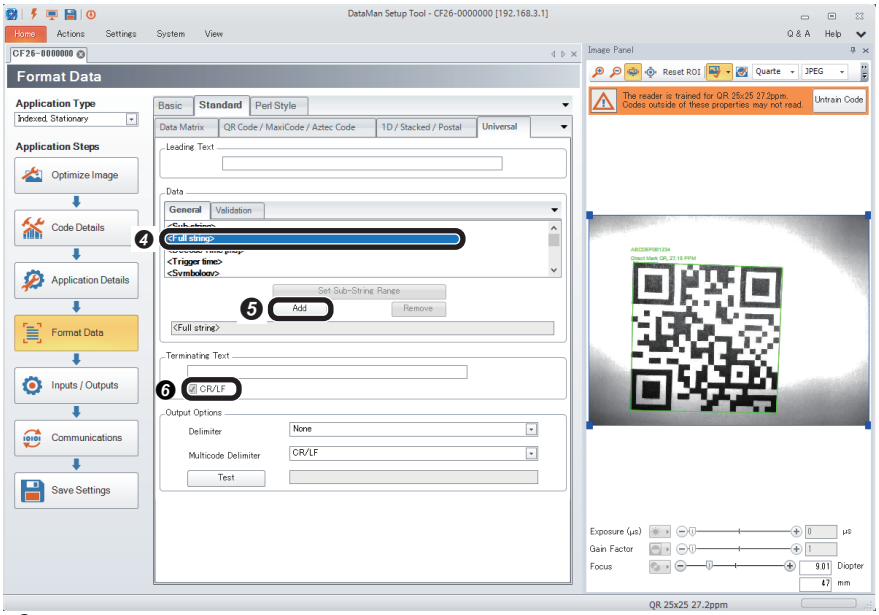


❶ Click the [Application Details] button.
❷ Select "Single (external)" for "Trigger Type" in "Trigger Settings".
❸ Select "Automatic Exposure" for "Exposure".

5. Set the output information of the QR Code in the "Format Data" step.

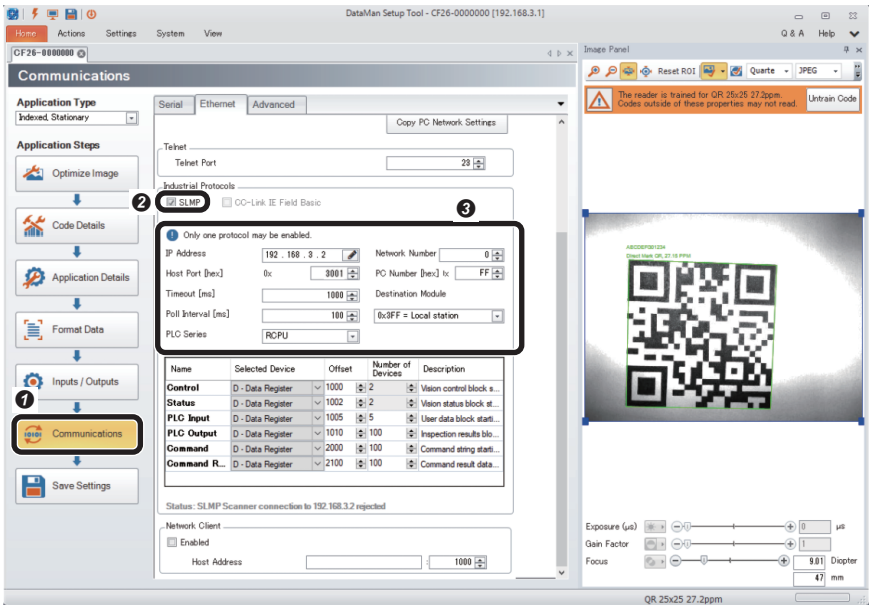


❶ Click the [Format Data] button.
❷ Select the checkbox of "Standard" for "Universal".
❸ Select the [Standard] tab.



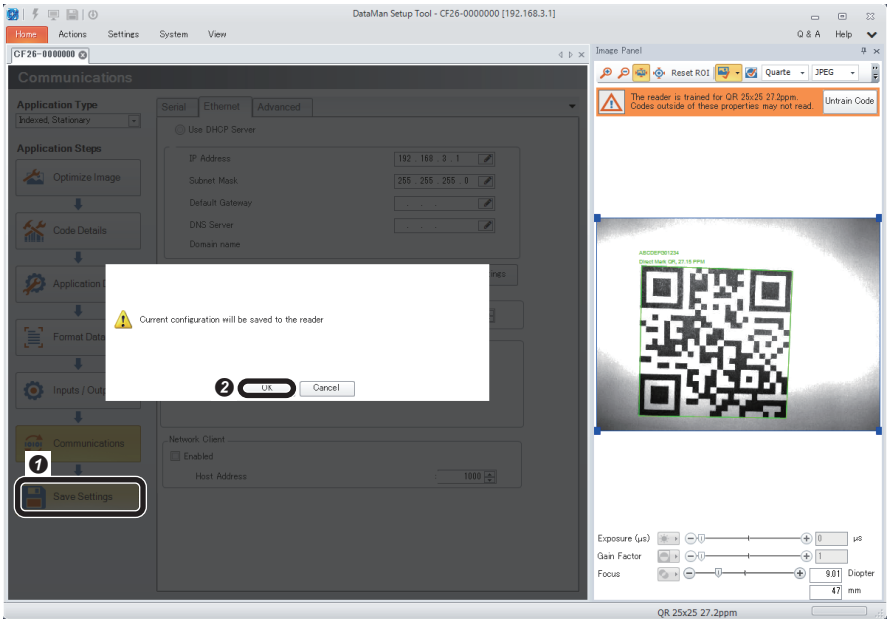
❹ Select "<Full string>" in the [General] tab in "Data."
❺ Click the [Add] button.
❻ Select the checkbox of "CR/LF" for "Terminating Text".

6. Configure the protocol to be used (SLMP scanner) in the "Communications" step.



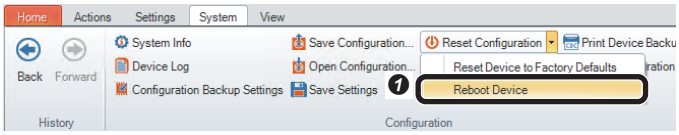
❶ Click the [Communications] button.
❷ Select the checkbox of "SLMP" for "Industrial Protocols" in the [Ethernet] tab.
❸ Set "Industrial Protocols" of the SLMP.
- IP Address: 192.168.3.2*1
- Host Port [hex]: 0x3001*2
- Timeout [ms]: 1000*3
- Poll Interval [ms]: 100*4
- PLC Series: RCPU
- Network Number: 0
- PC Number [hex]: 0xFF
- Destination Module: 0x3FF = Local station
- For setting the table (selected devices, offset, and the number of devices), refer to the following:
☞ Page 42 Table settings in "Industrial Protocols"

7. Save the settings in the code reader in the "Save Settings" step.



❶ Click the [Save Settings] button.
❷ Click the [OK] button.

8. Restart the code reader.



❶ Select [System] ⇨ [Reset Configuration] ⇨ [Reboot Device].
The code reader is restarted.

*1 IP address of the programmable controller
*2 Port number of the programmable controller
*3 When the connection with the code reader is disconnected due to timeout, set a large value for the timeout.
*4 The interval to monitor the programmable controller status can be shortened by setting a small value for the poll interval.

■ Table settings in "Industrial Protocols"

Set values in "Selected Device," "Offset," and "Number of Devices" as follows:

Name	Selected Device	Offset	Number of Devices
Control	D-Data Register	1000	2
Status	D-Data Register	1002	2
PLC Input	D-Data Register	1005	5
PLC Output	D-Data Register	1010	100
Command	D-Data Register	2000	100
Command Result	D-Data Register	2100	100

Precautions

The base representation for "Offset" differs depending on "PLC Series" and "Selected Device" to be selected.
The displays of the base representation are as follows:

- Decimal: Display in decimal (Example: 15)
- Octal: Display in octal prefixed with '0' (Example: 017)
- Hexadecimal: Display in hexadecimal prefixed with '0x' (Example: 0xF)

2.4 Setting a Programmable Controller

Set parameters of a programmable controller and create a program in an engineering tool.

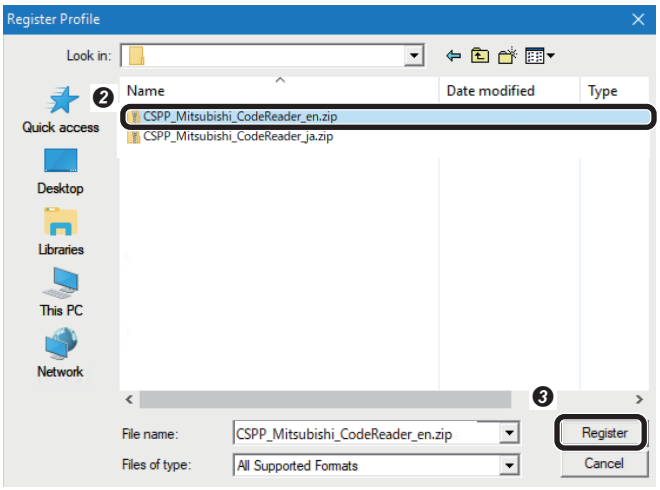
Registering a profile

Register a profile of the code reader in an engineering tool.

Point

Before registering/deleting a profile, log on the personal computer as the user with the administrator authority, and close the project in advance.

1. Start an engineering tool.
2. Resister a profile of the code reader in the "Register Profile" screen.

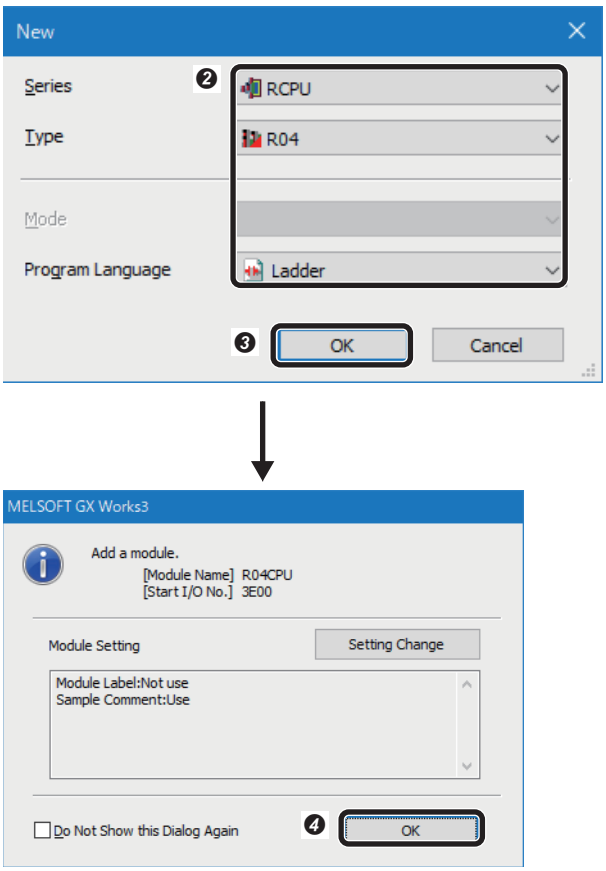


❶ Select [Tool] ⇨ [Profile Management] ⇨ [Register].
The "Register Profile" screen appears.
❷ Select the profile of the code reader obtained previously.
❸ Click the [Register] button.

Setting a programmable controller

Set parameters of a programmable controller.

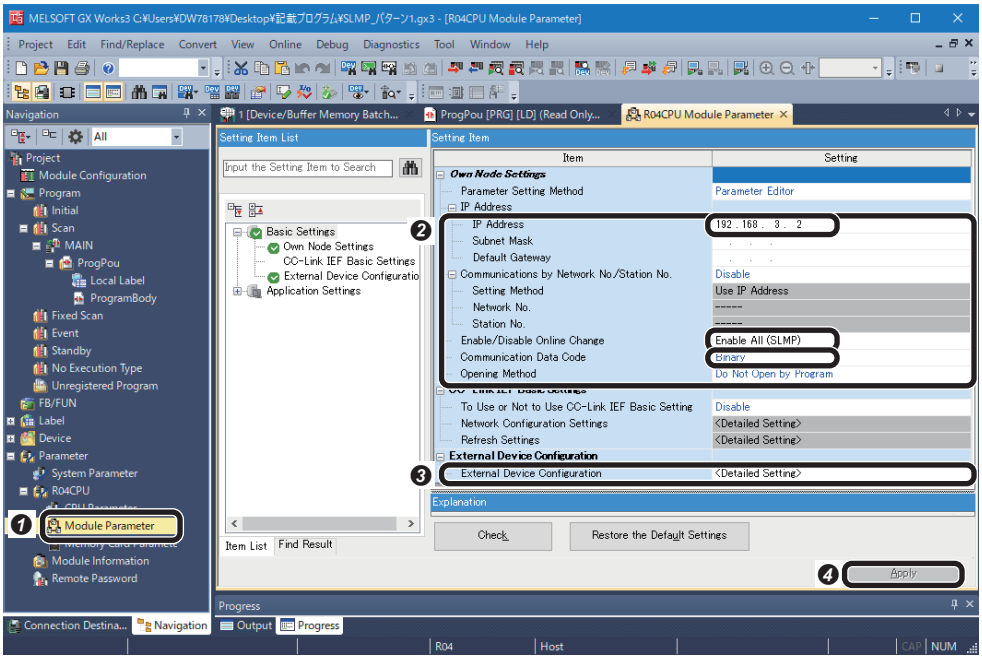
1. Select a CPU module and a program language in the "New" screen.



❶ Select [Project] ⇨ [New].
The "New" screen appears.
❷ Set a CPU module and a program language.
- Series: RCPU
- Type: R04
- Program Language: Ladder

❸ Click the [OK] button.
❹ Click the [OK] button.

2. Set module parameters in the module parameter setting screen of the CPU module.

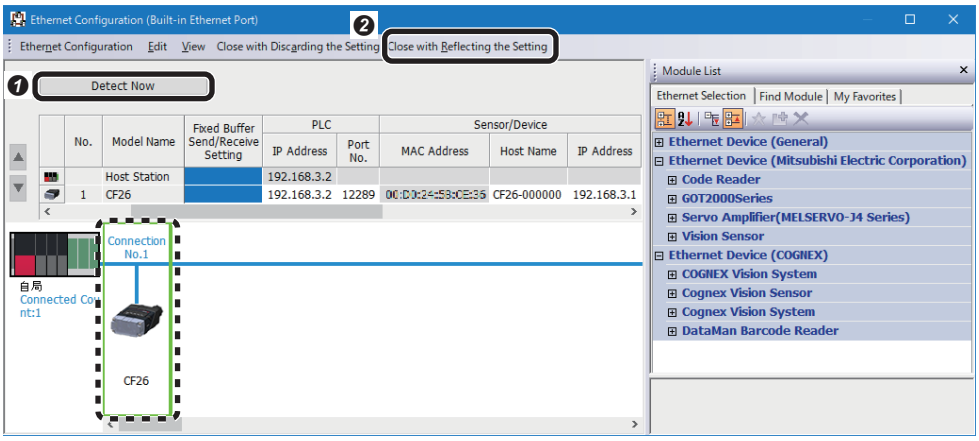


❶ Double-click "Module Parameter" in the "Navigation" window.
The "R04CPU Module Parameter" screen appears.
❷ Set "IP Address", "Enable/Disable Online Change" and "Communication Data Code".
- IP Address: 192.168.3.2
- Enable/Disable Online Change: Enable All (SLMP)
- Communication Data Code: Binary

❸ Double-click "<Detailed Setting>" of "External Device Configuration".
The "Ethernet Configuration" screen appears. (☞ Page 45 The "Ethernet Configuration" screen)
❹ Click the [Apply] button to end the settings.

The "Ethernet Configuration" screen

Detect the connected code reader. Make sure to turn ON the power of the programmable controller in advance.



❶ Click the [Detect Now] button.
- Read the displayed message, and click the [Yes] button.
- Check that the connected code reader is displayed.

❷ Select [Close with Reflecting the Setting].

For details on the automatic detection function of connected devices, refer to the following:

iQ Sensor Solution Reference Manual

Point

For the system configuration in which the automatic detection function of connected devices is not supported, a code reader can be added by dragging and dropping "CF26" in "Code Reader" from "Ethernet Device (Mitsubishi Electric Corporation)" in "Module List." The parameter settings are as follows:

- "Protocol": TCP
- "PLC" - "IP Address": 192.168.3.2 (IP address of a programmable controller set in DataMan Setup Tool for MELSENSOR)
- "PLC" - "Port No.": 12289 (0x3001) (Port number of a programmable controller set in DataMan Setup Tool for MELSENSOR)
- "Sensor·Device" - "IP Address": 192.168.3.1 (IP address of a code reader set in DataMan Setup Tool for MELSENSOR)

Creating a program

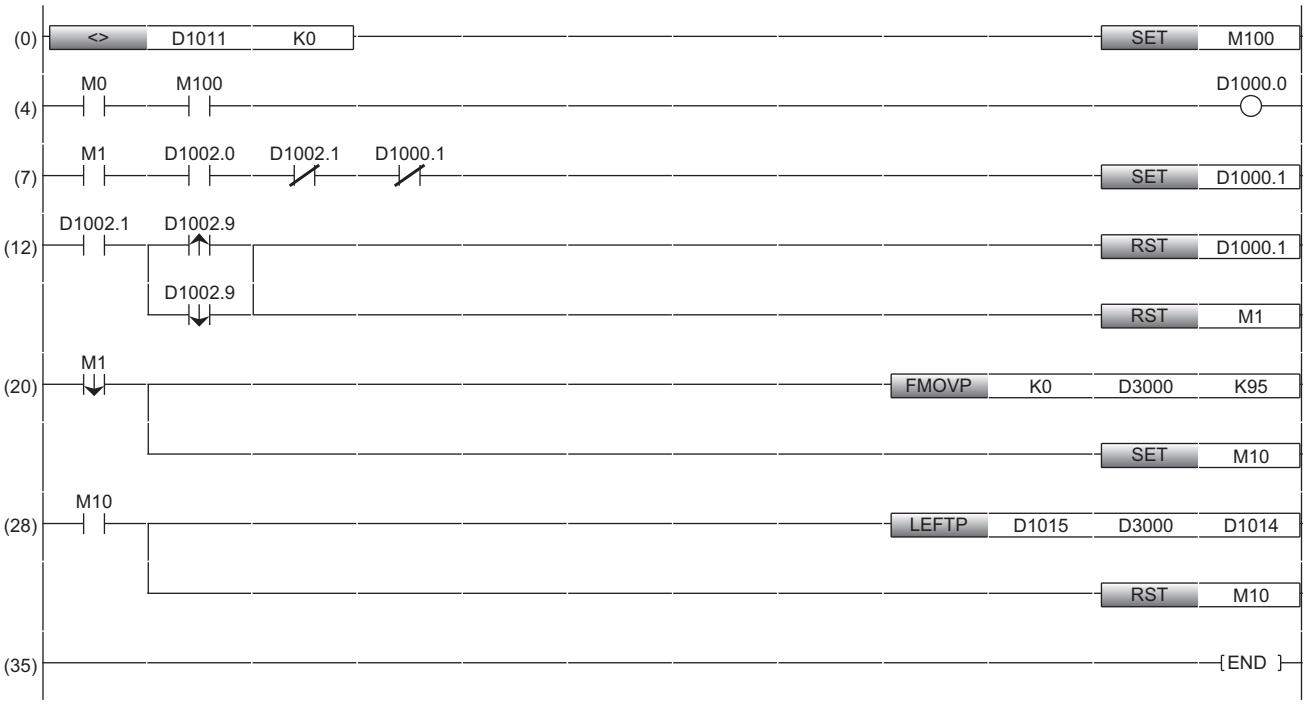
Create a program for controlling a code reader by using the devices set in DataMan Setup Tool for MELSENSOR.

Devices used in the program

Device	Device name	Description
D1000.0	Image Capturing Trigger Enable	'Image Capturing Trigger' (D1000.1) is enabled while this device is ON.
D1000.1	Image Capturing Trigger	An image is captured when this device is turned ON.
D1000.3	Read results data Ack	A code reader is notified that the device received the latest read results data when this device is turned ON.
D1002.0	Image Capturing Trigger Ready	The reception status of 'Image Capturing Trigger Enable' (D1000.0) is stored. • ON: An image capturing trigger is enabled. • OFF: An image capturing trigger is disabled.
D1002.1	Image Capturing Trigger Ack	The reception status of 'Image Capturing Trigger' (D1000.1) is stored. • ON: With an image capturing trigger • OFF: Without an image capturing trigger
D1002.9	Decode Complete	This device is inverted at the completion of decoding of a code reader.
D1002.B	Read results Available	This device is turned ON when new read results data become available.
D1011	Image capturing trigger ID	ID of an image capturing trigger to be generated next is stored.
D1014	Read results data length	Code read results data length is stored.
D1015 or later	Read results data	A code read results string is stored.
D3000	Read results data copy area	Read results data in this area are intended to be used in a program or other device.
M0	Image Capturing Trigger Enable command	'Image Capturing Trigger Enable' (D1000.0) is turned ON and an image capturing trigger is enabled while this device is turned ON.
M1	Image Capturing Trigger command	'Image Capturing Trigger' (D1000.1) is turned ON, and an image is captured when turning this device ON.
M2	Read results Ack command	'Read results data Ack' (D1000.3) is turned ON when turning this device ON, and a code reader is notified that the device received the latest read result data.
M10	Area clearing execution	This device is turned ON when clearing a read results data copy area.
M100	SLMP connection status	This device is turned ON when the SLMP connection is established between a code reader and a programmable controller.

Program example 1

Check the completion of decoding in 'Decode Complete' (D1002.9).



(0): Monitor the startup of a code reader.

(4): Enable an image capturing trigger on the code reader.

(7): Request the start of the image capture to the code reader ('Image Capturing Trigger'(D1000.1) is turned ON).

(12): Perform the processing for the completion of the image capture of the code reader.

(20): Clear a read results data copy area after the completion of decoding the code reader.
In this program, output data block is set to 100 points, thus clear areas for 95 points in which read results data is stored.

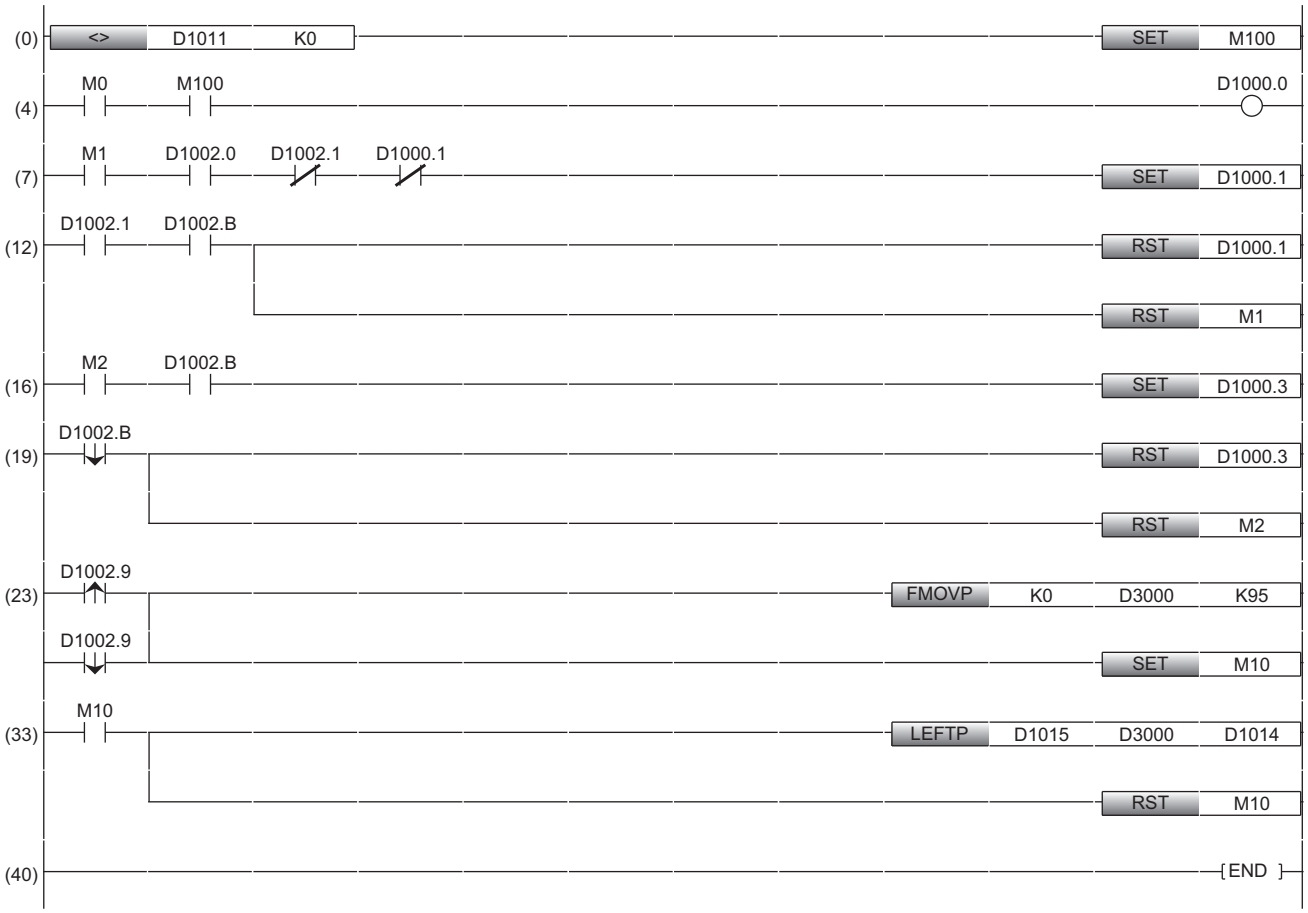
(28): Copy decoded read results after clearing the read results data copy area.

Precautions

Use 'Image Capturing Trigger Ack'(D1002.1) to set an interlock when checking 'Decode Complete' (D1002.9).

Program example 2

Check the completion of decoding in 'Read results Available' (D1002.B).



(0): Monitor the startup of a code reader.

(4): Enable an image capturing trigger on the code reader.

(7): Request the start of the image capture to the code reader ('Image Capturing Trigger'(D1000.1) is turned ON).

(12): Perform the processing for the completion of the image capture of the code reader.

(16)(19): Notify the code reader that the device received new read results data.

(23): Clear a read results data copy area after the completion of decoding the code reader.
In this program, output data block is set to 100 points, thus clear areas for 95 points in which read results data is stored.

(33): Copy decoded read results after clearing the read results data copy area.

Precautions

Use 'Image Capturing Trigger Ack'(D1002.1) to set an interlock when checking 'Read results Available' (D1002.B).

Timing chart of SLMP scanner connection

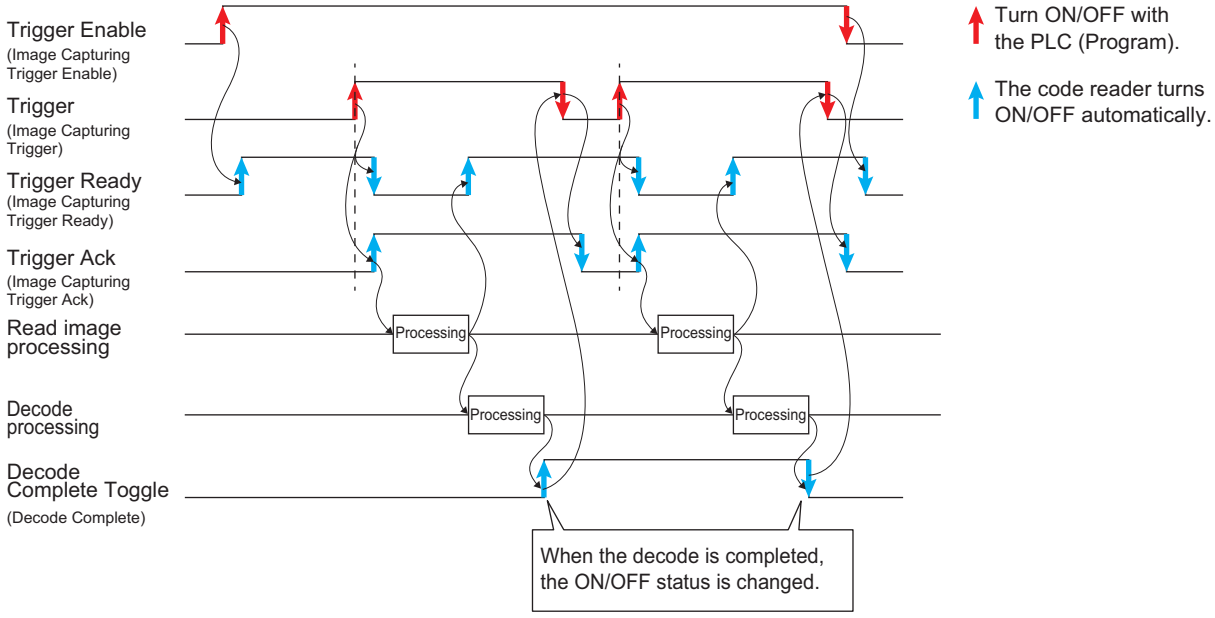
A timing chart when 'Trigger (Image Capturing Trigger)' of a control block is turned ON by using a programmable controller is shown below.

To enable the image capturing trigger from a programmable controller, turn ON 'Trigger Enable (Image Capturing Trigger Enable)' of a control block.

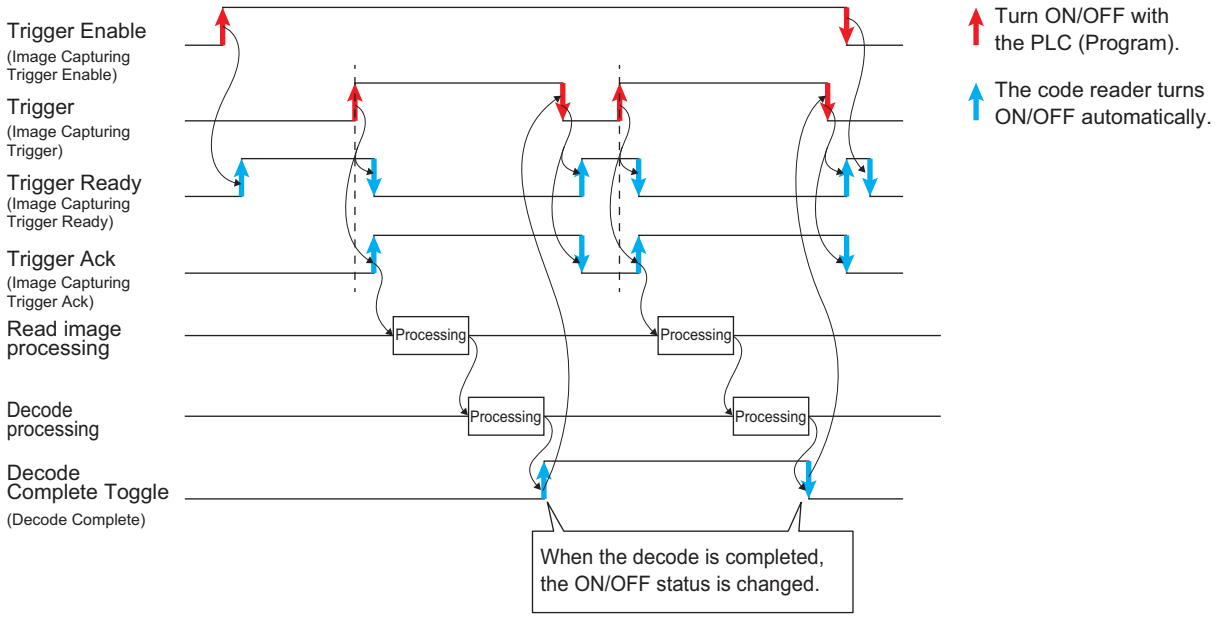
When 'Trigger (Image Capturing Trigger)' of a control block is turned ON using a programmable controller while 'Trigger Ready (Image Capturing Trigger Ready)' of a status block is ON by turning ON 'Trigger Enable (Image Capturing Trigger Enable)', the status of a code reader is output to 'Trigger Ack (Image Capturing Trigger Ack)' and 'Decode Complete Toggle (Decode Complete)' of the status block.

The status of 'Decode Complete Toggle (Decode Complete)' is inverted at the completion of decoding.

■ Code reader CF26



■ Code reader CF37

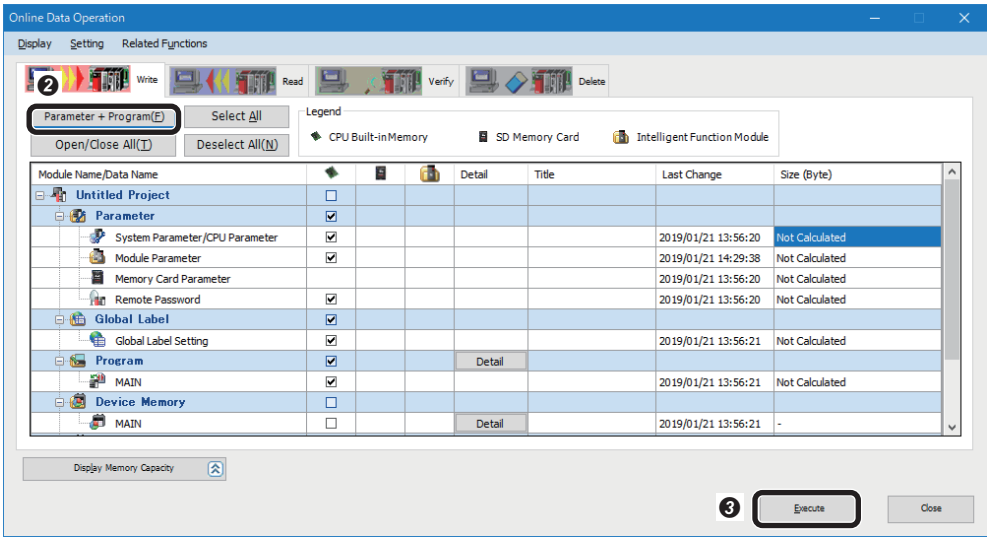


2.5 Writing Data to a Programmable Controller

Write the parameters and program set in an engineering tool to the programmable controller.

Writing to the programmable controller

1. Turn ON the programmable controller.
2. Write parameters and program to the programmable controller in the "Online Data Operation" screen.



❶ Click the [Online] ⇨ [Write to PLC] button.
The "Online Data Operation" screen appears.
❷ Click the [Parameter + Program] button.
❸ Click the [Execute] button.

Restarting the programmable controller

After writing the parameters and program, reset the programmable controller and switch to RUN.

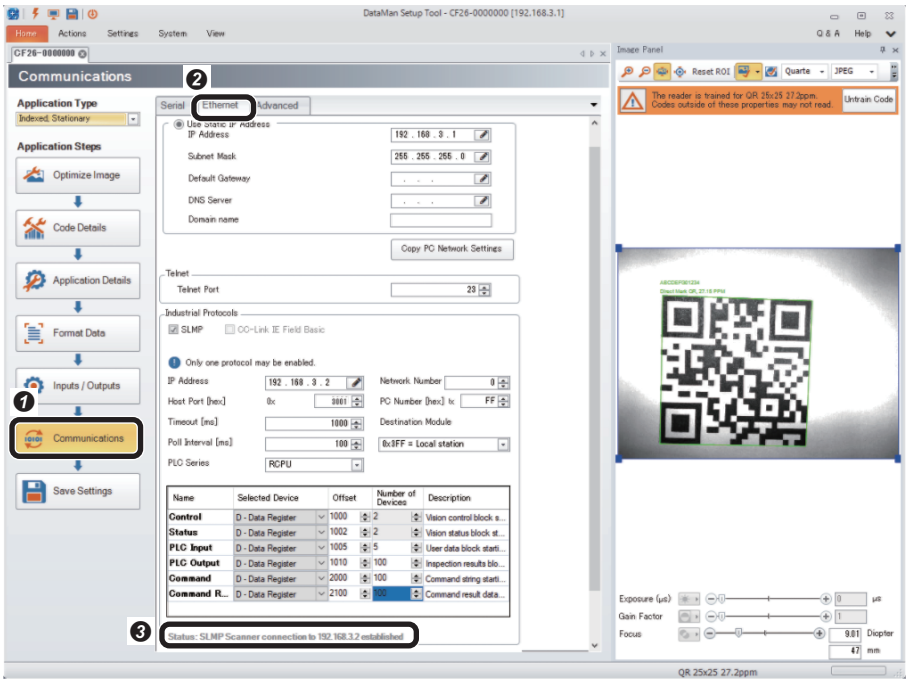
2.6 Checking Operations

Check operation by controlling the code reader using the programmable controller.

Use a created program to check the operation. (☞ Page 46 Creating a program)

Checking the communication status

Check the communication status with an SLMP scanner connection in DataMan Setup Tool for MELSENSOR.



❶ Click the [Communications] button.

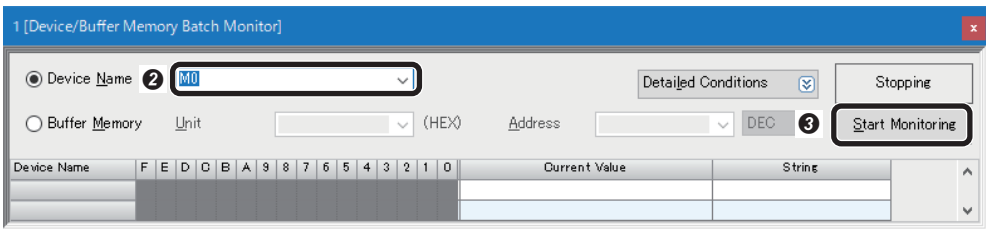
❷ Select the [Ethernet] tab.

❸ Check that "SLMP Scanner connection to 192.168.3.2 established" is displayed in "Status".

Checking read results

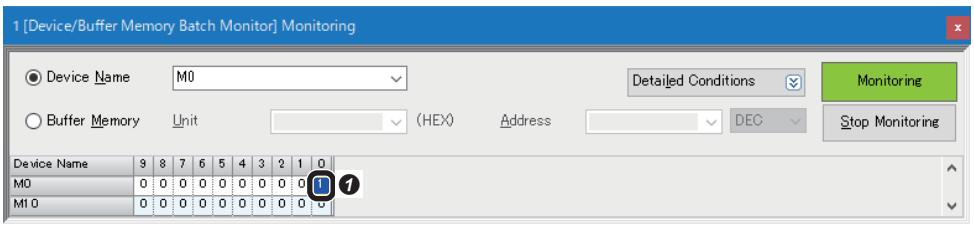
Check read results of a QR Code in an engineering tool.

1. Start monitoring in the "Device/Buffer Memory Batch Monitor" window.



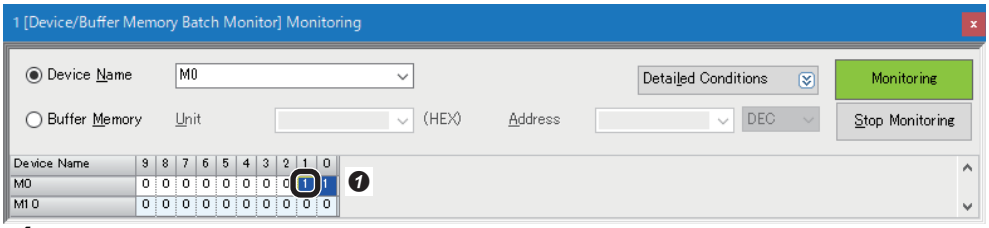
❶ Select [Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch Monitor]. The "Device/Buffer Memory Batch Monitor" window appears.
❷ Enter "M0" for "Device Name".
❸ Click the [Start Monitoring] button.

2. Enable a trigger on the code reader.



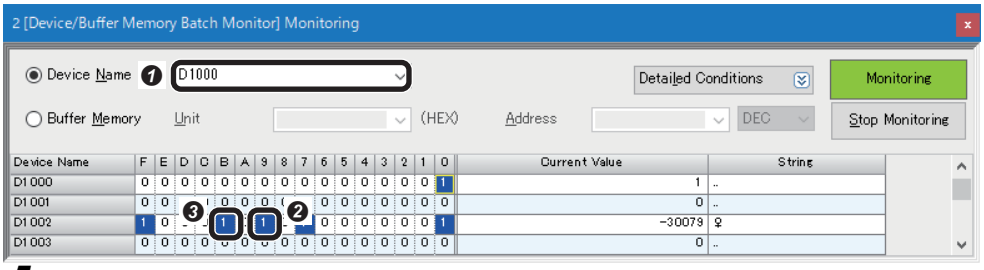
❶ Turn 'Image Capturing Trigger Enable command' (M0) ON.
'Image Capturing Trigger Enable' (D1000.0) is turned ON.

3. Turn ON a trigger.



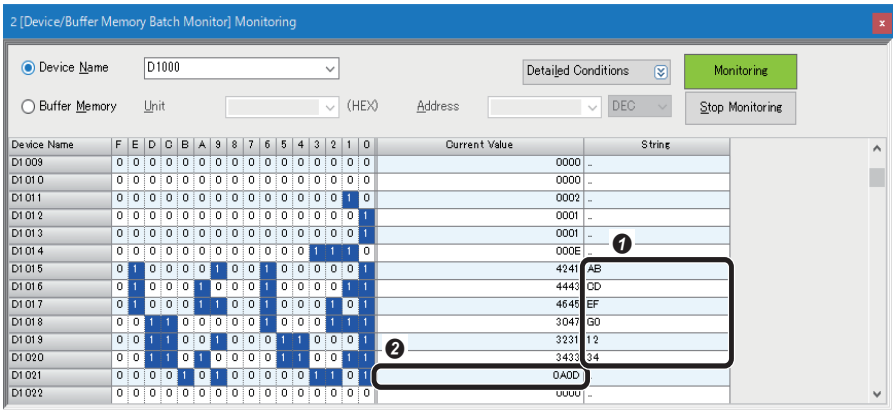
❶ Turn 'Image Capturing Trigger command' (M1) ON.
'Image Capturing Trigger' (D1000.1) is turned ON.

4. Check the completion of decoding.



❶ Enter "D1000" for "Device Name".
❷ Program example 1: Check that 'Decode Complete' (D1002.9) is inverted.
❸ Program example 2: Check that 'Read results Available' (D10002.B) is turned ON.

5. Check the read results.



❶ "D1015" to "D1020": Check "ABCDEFG01234" is displayed in "String."
❷ "D1021": Check the terminating text "0A0D" (CR/LF) is displayed in "Current Value".

DMCC Commands Control

Control and set a code reader by using DMCC (DataMan Control Commands) command.

For details on DMCC commands, refer to the command reference in the help of DataMan Setup Tool for MELSENSOR.

Creating a program

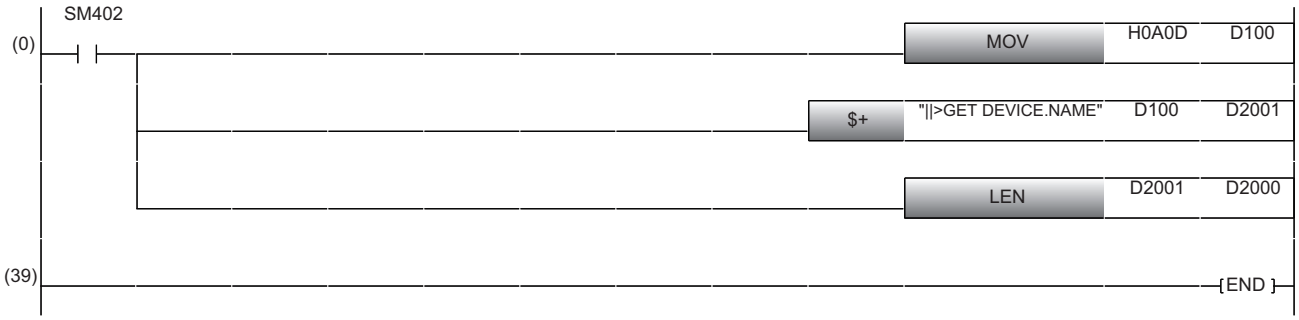
Create a program using the following devices.

■ Devices used in the program

Device	Device name	Description
SM402	Startup ON	When starting up a device, this device is turned OFF and ON once.
D100	Command Terminating Text	The terminating text (CR/LF) is stored.
D2000	String Data Length	The length of a DMCC command is stored.
D2001	Command Strings	A DMCC command to be sent is stored.

■ Program example

Acquire the device name by sending the DMCC command "||>GET DEVICE.NAME".

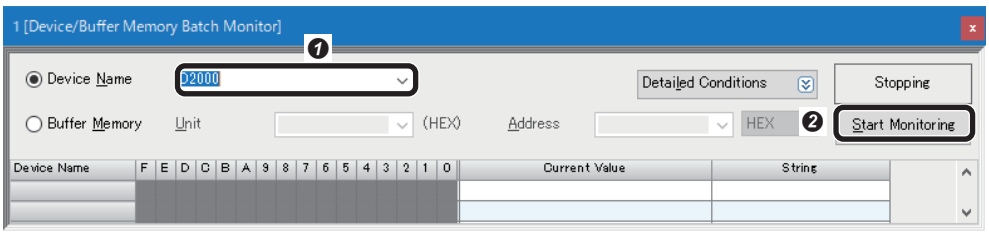


(0): A DMCC command which acquires the device name is executed.

Checking read results

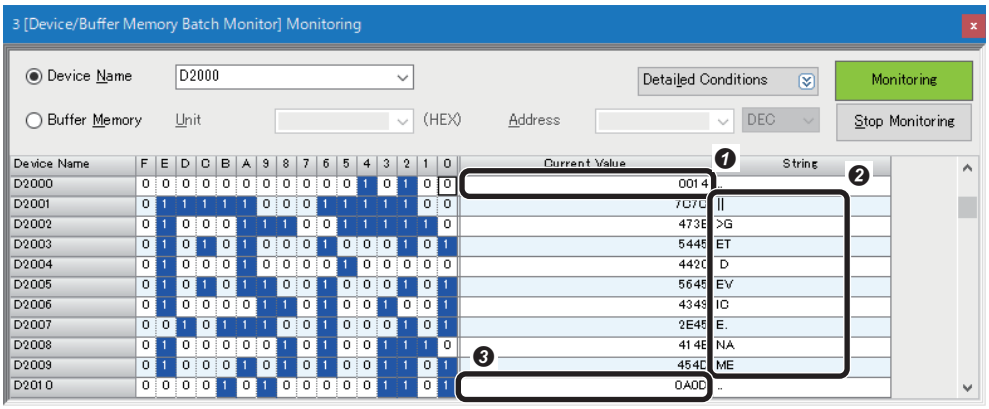
Check the execution result of DMCC commands in an engineering tool.

1. Start monitoring in the "Device/Buffer Memory Batch Monitor" window.



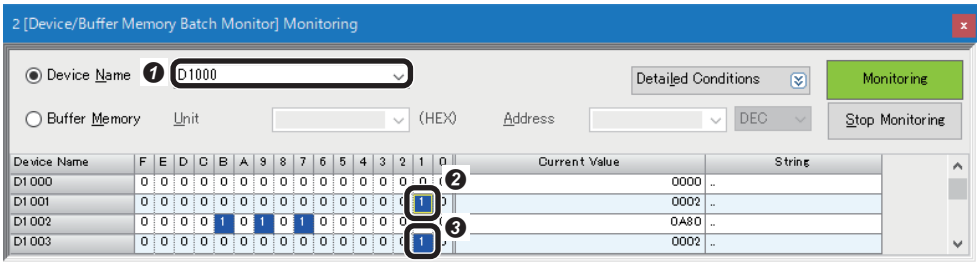
❶ Select [Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch Monitor]. The "Device/Buffer Memory Batch Monitor" window appears.
❷ Enter "D2000" for "Device Name".
❸ Click the [Start Monitoring] button.

2. Check command length and string data length.



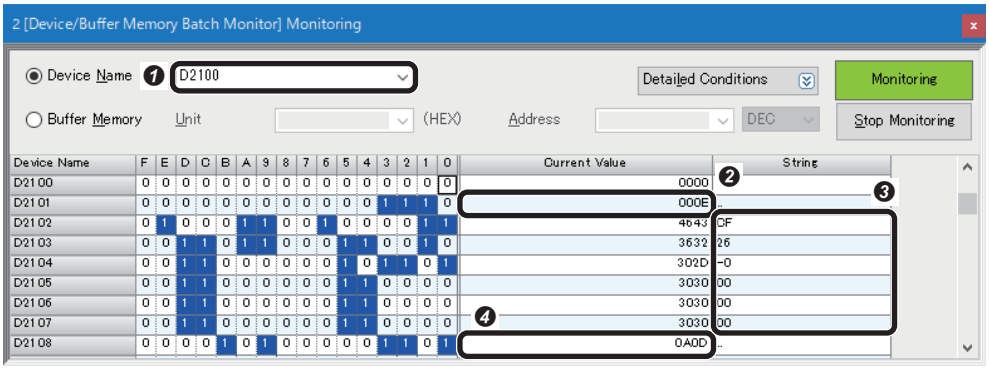
❶ Check the DMCC command data length "0014" is displayed in "Current Value" of "D2000".
❷ Check the DMCC command "||>GET DEVICE.NAME" is displayed in "String" of "D2001" to "D2009."
❸ Check the terminating text "0A0D" (CR/LF) is displayed in "Current Value" of "D2010".

3. Execute the DMCC command.



❶ Enter "D1000" for "Device Name".
❷ Turn ON 'Initiate String Cmd' (D1001.1).
❸ After turning ON 'String Cmd Ack' (D1003.1), turn OFF 'Initiate String Cmd' (D1001.1).

4. Check the execution result of the DMCC command.



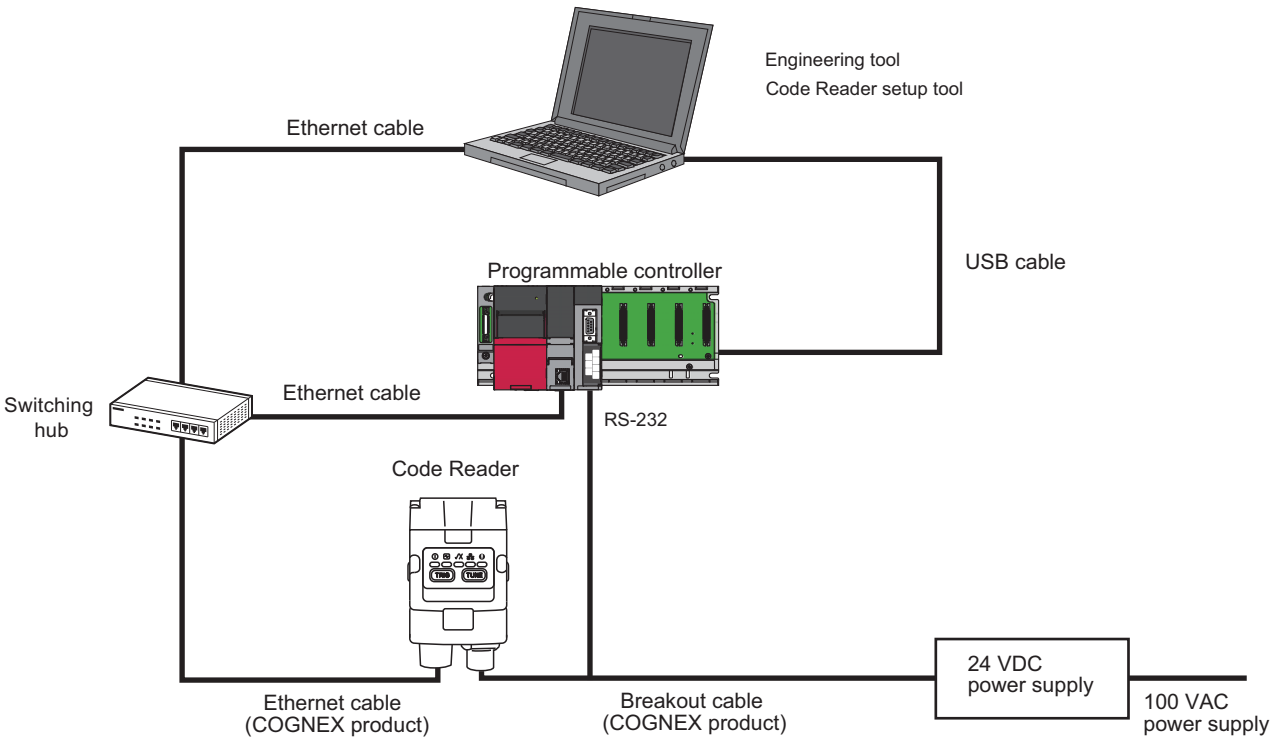
❶ Enter "D2100" for "Device Name".
❷ Check the length of the device name "E" is displayed in "Current Value" of "D2101".
❸ Check the device name (a name of the code reader used) "CF26-0000000" is displayed in "String" of "D2102" to "D2107."
❹ Check the terminating text "0A0D" (CR/LF) is displayed in "Current Value" of "D2108".

3 RS-232 CONNECTION

This chapter explains the procedure for connecting a code reader to a programmable controller and controlling the code reader with an RS-232 connection.

3.1 System Configuration Example for Connecting a Code Reader

The following figure shows the system configuration for connecting a code reader.



Point

For details on the system configuration, refer to the following:

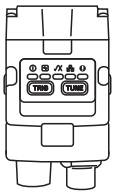
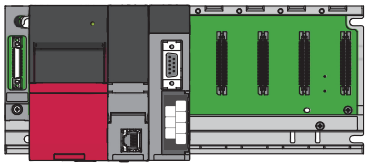
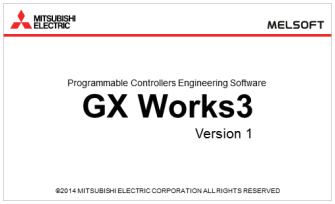
Code Reader CF26 User's Manual
Code Reader CF37 User's Manual

Configurations

The devices used in the system configuration are as follows.

Required equipment

■ Mitsubishi Electric products

		
Code reader • CF26-SR	Programmable controller • CPU module: R04CPU • Serial communication module: RJ71C24	Engineering tool • GX Works3

■ COGNEX products

Code reader setup tool • DataMan Setup Tool for MELSENSOR*1	Ethernet cable • CCB-84901-2001-**(**: 01, 02, 05, 10, or 15)*2	Breakout cable • CCB-PWRIO-**(**: 05, 10, or 15)*3

*1 Download this product from the Mitsubishi Electric FA website.
www.MitsubishiElectric.co.jp/fa

*2 Cable length (0.6 m, 2 m, 5 m, 10 m, or 15 m), straight

*3 Cable length (5 m, 10 m, or 15 m), shielded twisted-pair cable, straight

■ Commercial products

Switching hub	Ethernet cable	USB cable (Type Mini-B)	24 VDC power supply

Connecting and wiring a code reader

The following explains the considerations and procedure for connecting a code reader to a programmable controller and connecting to an RS-232 connection.

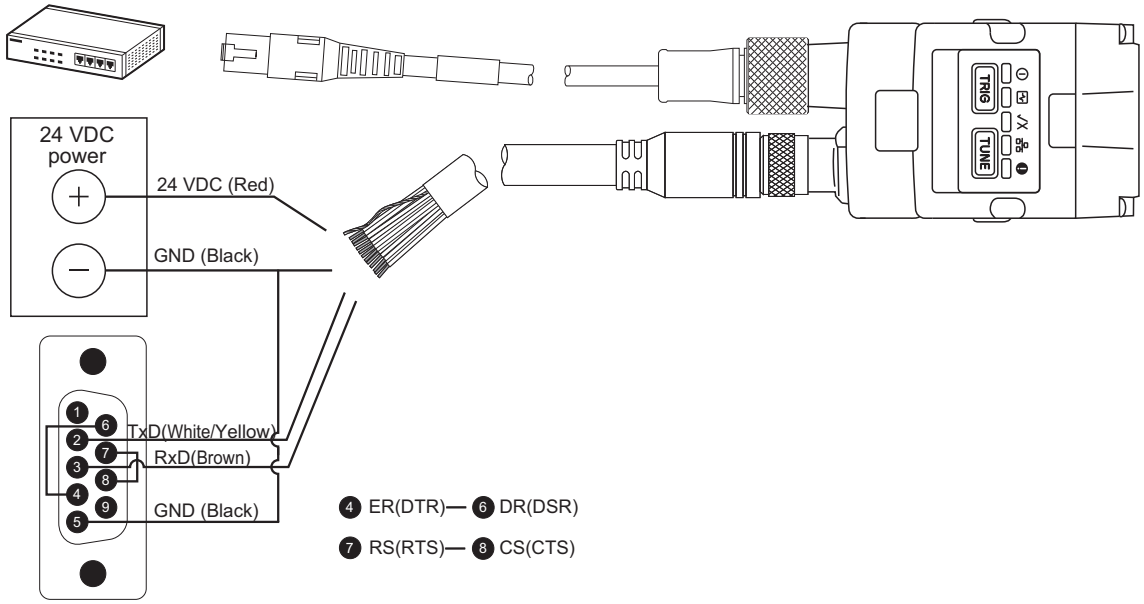
Ex.

Breakout cable: CCB-PWRIO-**(**: 05, 10, or 15)[*1]

[*1] Cable length (5 m, 10 m, or 15 m), shielded twisted-pair cable, straight

Precautions

- Check that a 24 VDC power supply is OFF when connecting a breakout cable to the power supply.
- Cut unused wires or protect them with insulating materials. Be careful not to contact with 24 VDC wires.
- A breakout cable and an Ethernet cable are designed to connect with their key aligned with the keyway of the connector on a code reader. Do not force the connections or damage may occur.
- When powering ON the system, turn ON the power of a code reader first.



1. Connect a breakout cable to an RS-232 connector (D-sub 9 Pin).

Connect a breakout cable to an RS-232 connector (D-sub 9 Pin) as follows: TxD (white and yellow) to ❷ RD (RxD), RxD (brown) to ❸ SD (TxD), and GND (black) to ❺ SG.

In addition, connect the RS-232 connector (D-Sub 9 Pin) as follows: ❹ ER (DTR) to ❻ DR (DSR), and ❼ RS (RTS) to ❽ CS (CTS).

2. Connect a breakout cable to a 24 VDC power supply.

Connect the 24 VDC (red) of the cable to the positive terminal of the power supply, and the GND (black) to the negative terminal.

3. Connect the breakout cable to the power supply, I/O, and RS-232 connector of a code reader.

4. Connect an Ethernet cable to an Ethernet connector and a switching hub of the code reader.

5. Connect the code reader to a programmable controller and a personal computer via the switching hub.

6. Turn the power of the system ON.

3.2 Setting the Code Reader

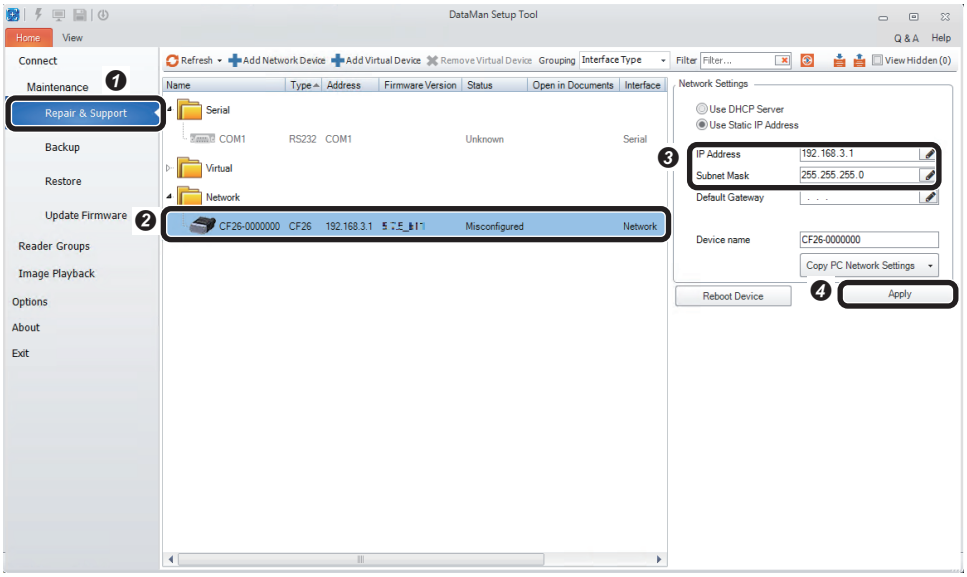
This section explains the procedures for connecting the code reader with an RS-232 connection and the settings for a symbol to be read and the means of communication.

Setting an IP address to a personal computer

Set the IP address (192.168.3.3) to a personal computer.

Connecting the code reader

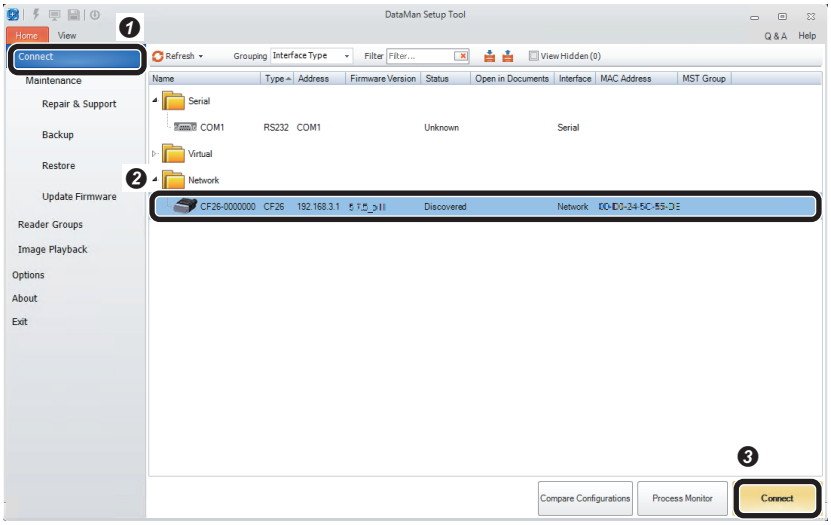
1. Start DataMan Setup Tool for MELSENSOR.
2. Set an IP address and a subnet mask to the code reader.



❶ Select [Repair & Support].
❷ Select the code reader "CF26".
❸ Set an IP address and a subnet mask of the code reader in the "Network Settings" section.
- IP Address: 192.168.3.1
- Subnet Mask: 255.255.255.0

❹ Click the [Apply] button.
The code reader is restarted and the network settings are applied.

3. Connect to the code reader.

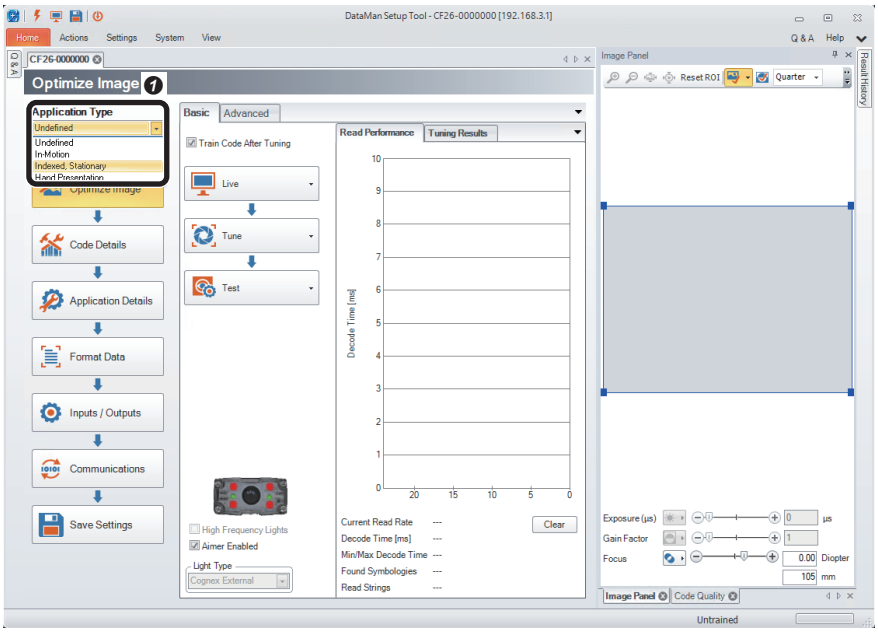


❶ Select [Connect].
❷ Select the code reader.
❸ Click the [Connect] button.

Setting the code reader

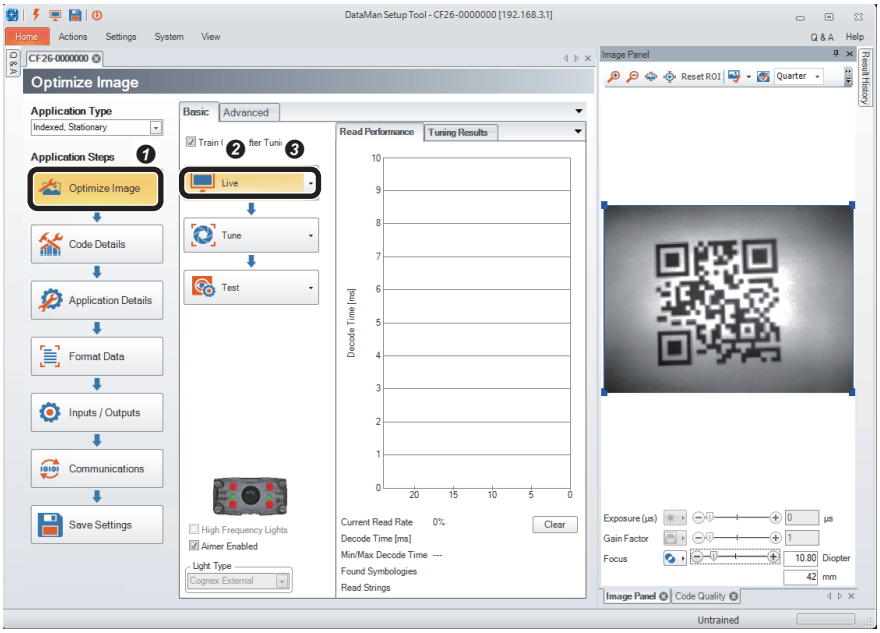
The following shows the procedure from setting to saving the code reader.

1. Set an application type.

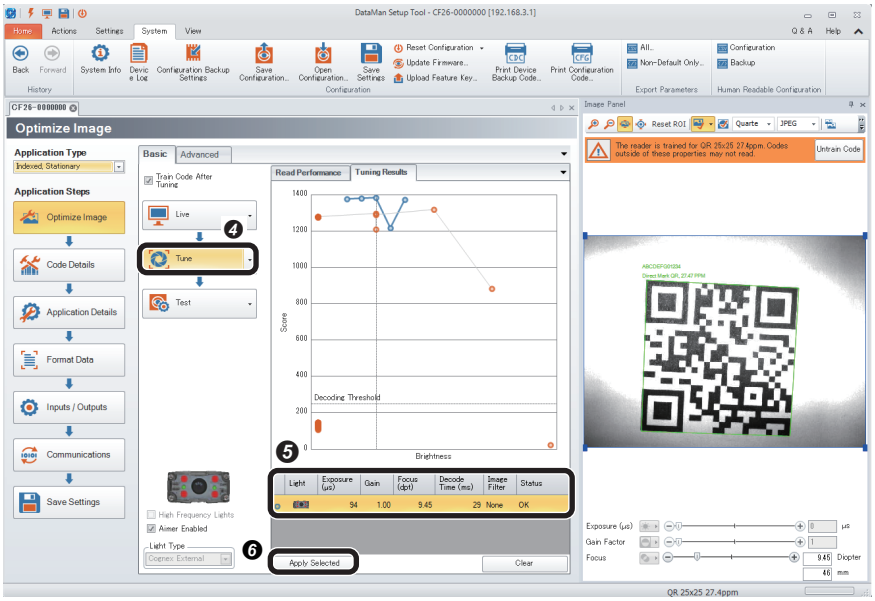


❶ Select "Indexed, Stationary".

2. Import a QR Code to be read in the "Optimize Image" step.



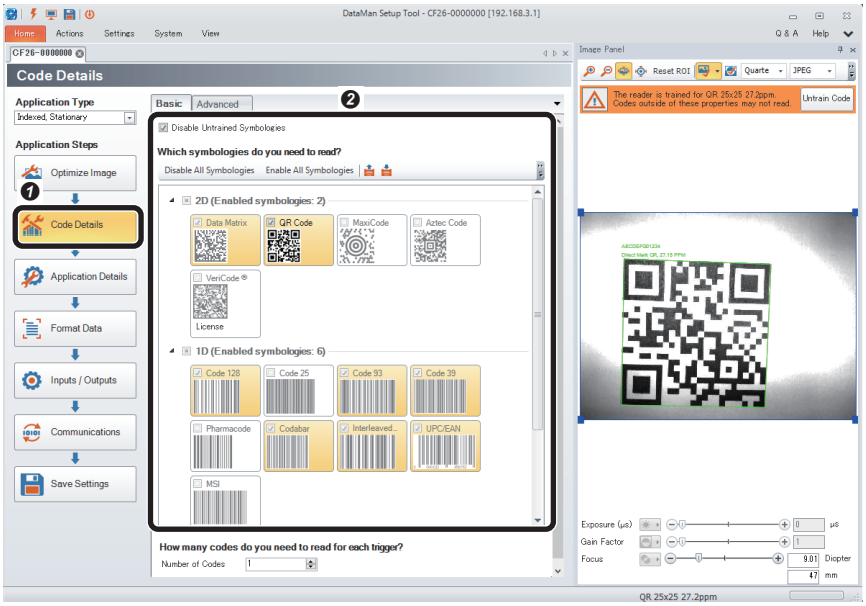
❶ Click the [Optimize Image] button.
❷ Click the [Live] button.
❸ When a QR Code to be read is displayed, click the [Live] button again.
- It is recommended to tune and optimize brightness under the environment that is similar to the actual operating environment.



❹ Click the [Tune] button.
❺ When tuning is completed, an candidate of the setting contents is displayed.
- The number of the displayed candidates varies depending on the work status or the combinations of lights.
- When clicking the candidate, the capturing condition can be checked in "Image Panel".
- If the reading target code still cannot be read even though the code is within the field of vision, the image is captured clearly, and tuning is completed, check that the symbol to be read is enabled in the "Code Details" step.

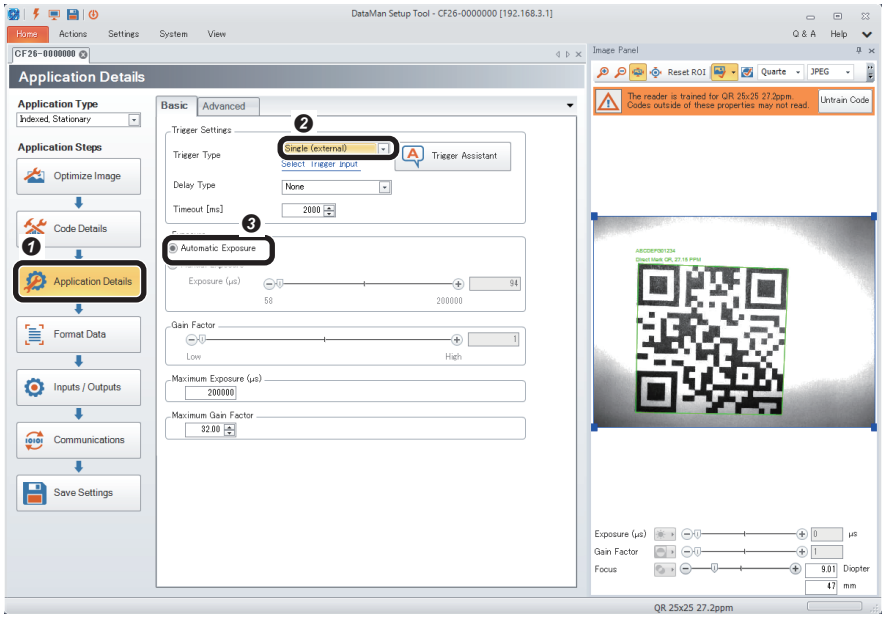
❻ By clicking the [Apply Selected] button, the selected settings are reflected to the code reader.

3. Check that symbols to be read are selected in the "Code Details" step.



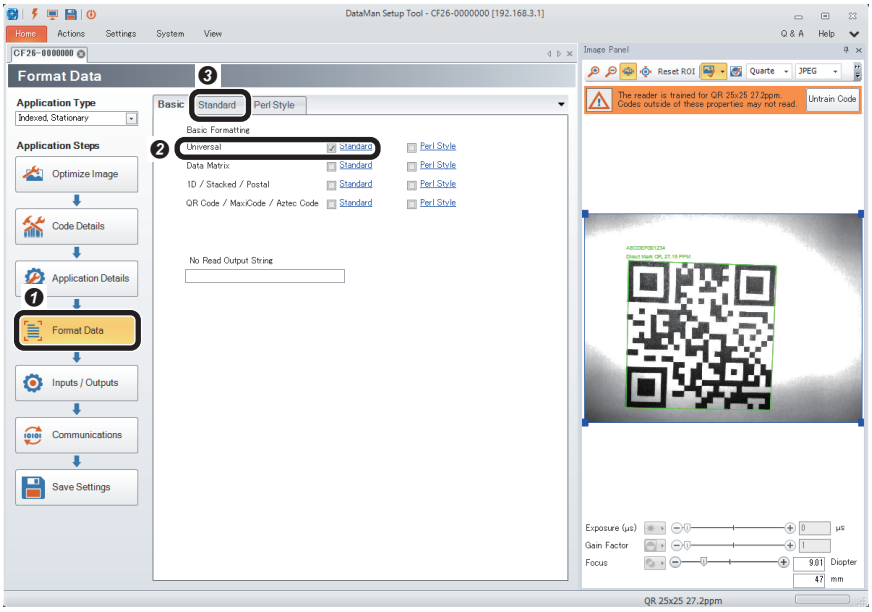
❶ Click the [Code Details] button.
❷ Check that the checkboxes of the symbols to be read are selected.
- Any symbols can be selected by unselecting the checkbox of "Disable Untrained Symbologies."
- The scanning speed can be improved when unselecting the checkboxes of symbols other than the reading target.

4. Set a trigger type and an exposure method in the "Application Details" step.

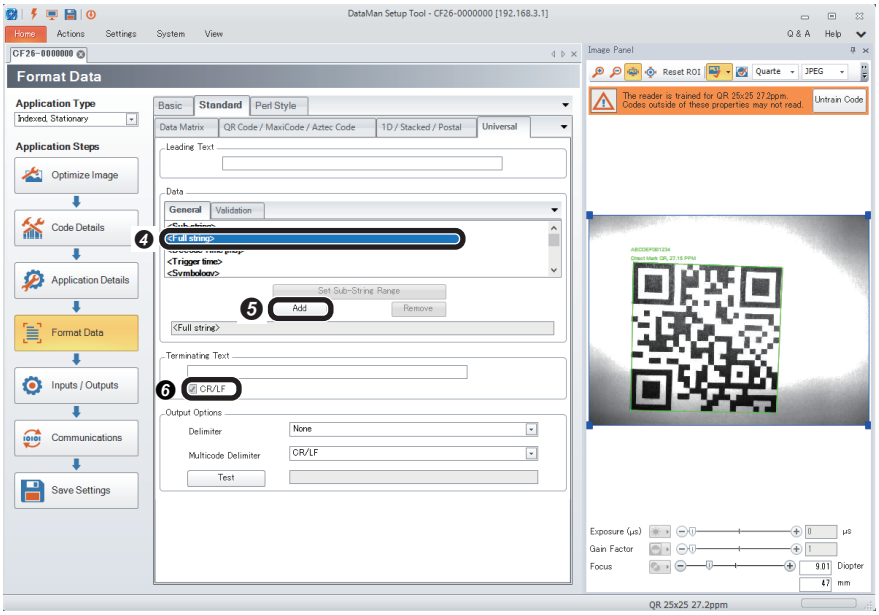


❶ Click the [Application Details] button.
❷ Select "Single (external)" for "Trigger Type" in "Trigger Settings".
❸ Select "Automatic Exposure" for "Exposure".

5. Set the output information of the QR Code in the "Format Data" step.

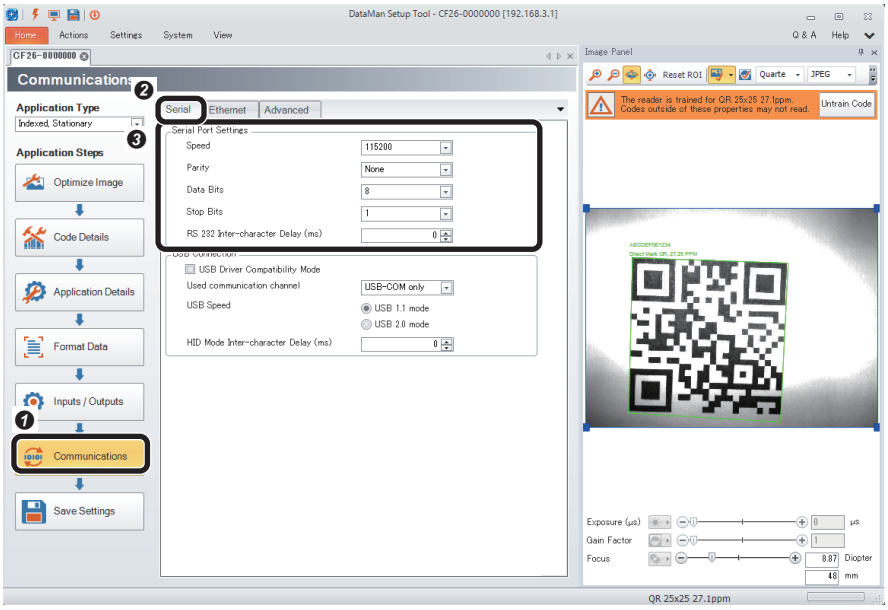


❶ Click the [Format Data] button.
❷ Select the checkbox of "Standard" for "Universal".
❸ Select the [Standard] tab.



❹ Select "<Full string>" in the [General] tab in "Data."
❺ Click the [Add] button.
❻ Select the checkbox of "CR/LF" for "Terminating Text".

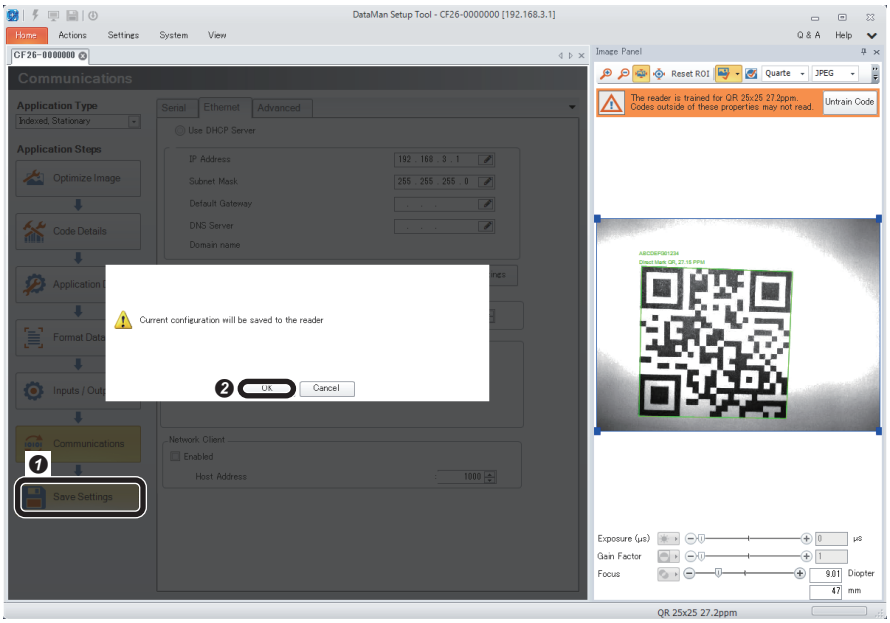
6. Configure settings for communication (serial) in the "Communications" step.



❶ Click the [Communications] button.
❷ Select the [Serial] tab.
❸ Configure the "Serial Port Settings".
- Speed: 115200
- Parity: None
- Data Bits: 8
- Stop Bits: 1
- RS 232 Inter-character Delay (ms): 0

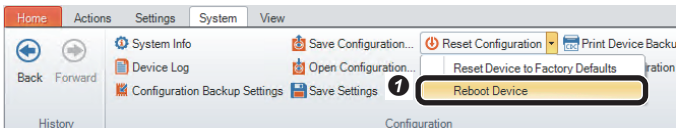
If setting a value for the inter-character delay, set a suitable time for the connection target device.

7. Save the settings in the code reader in the "Save Settings" step.



❶ Click the [Save Settings] button.
❷ Click the [OK] button.

8. Restart the code reader.



❶ Select [System] ⇨ [Reset Configuration] ⇨ [Reboot Device].
The code reader is restarted.

3.3 Setting a Programmable Controller

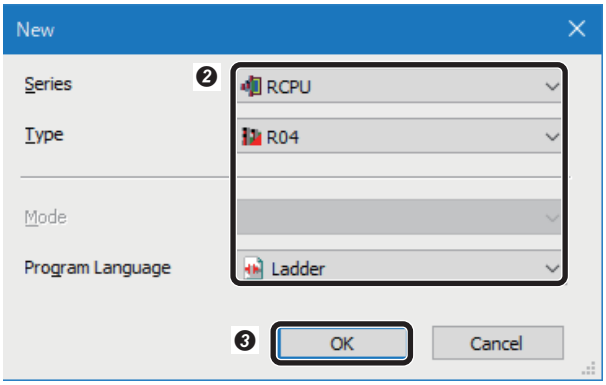
Set parameters of a programmable controller and create a program in an engineering tool.
In RS-232 connection, two communication protocols can be used: a predefined protocol and a nonprocedural protocol.

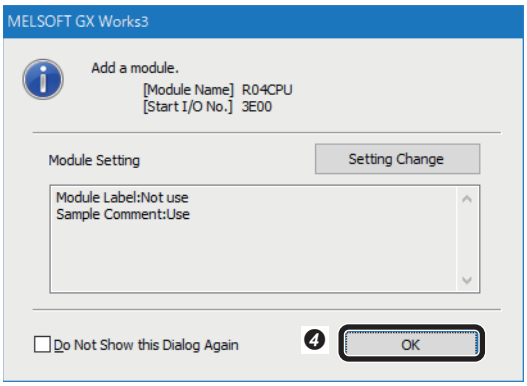
Operation procedure for a predefined protocol

Setting a programmable controller

Set parameters of a programmable controller.

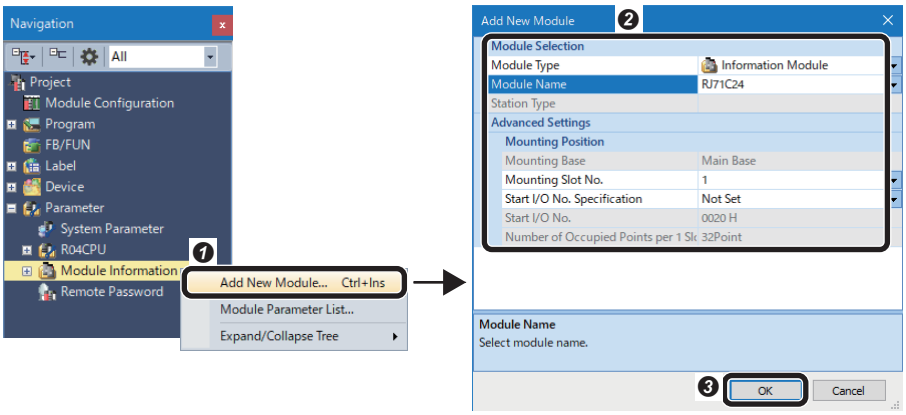
1. Start an engineering tool.
2. Select a CPU module and a program language in the "New" screen.





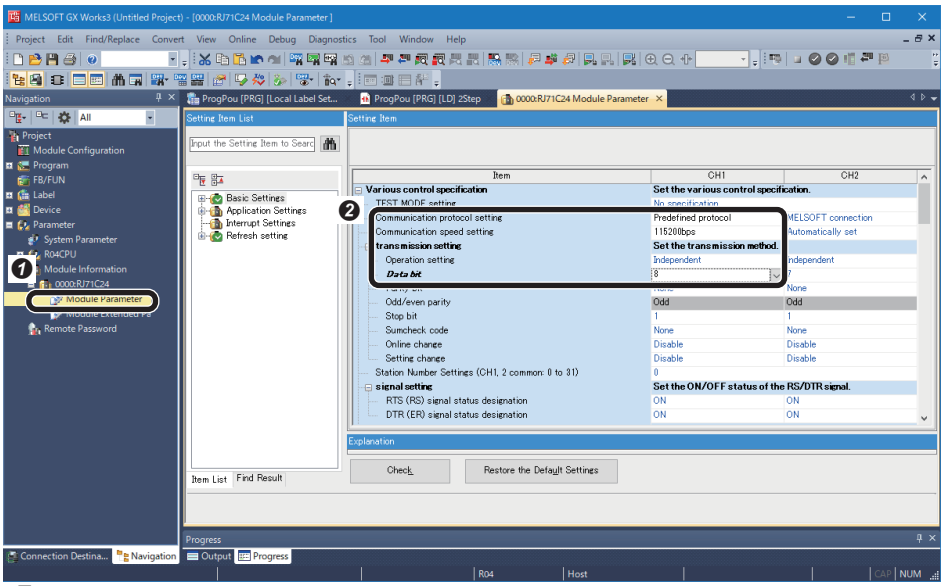
❶ Select [Project] ⇨ [New].
The "New" screen appears.
❷ Set a CPU module and a program language.
• Series: RCPU
• Type: R04
• Program Language: Ladder
❸ Click the [OK] button.
❹ Click the [OK] button.

3. Add an information module in the "Add New Module" screen.



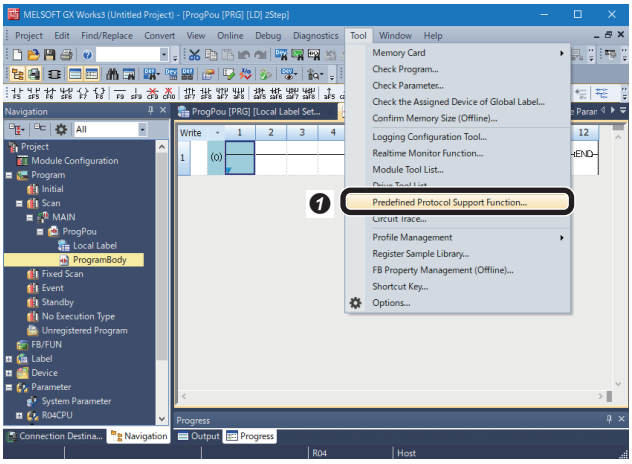
❶ Right-click "Module Information" in the "Navigation" window, and select [Add New Module] in the shortcut menu.
❷ Set the items in "Module Selection".
• Module Type: Information Module
• Module Name: RJ71C24
• Mounting Slot No.: 0
• Start I/O No. Specification: Not Set
❸ Click the [OK] button.

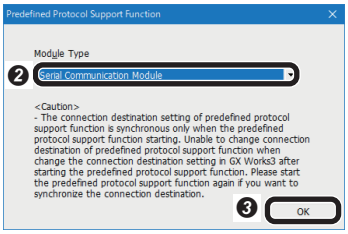
4. Set module parameters in the module parameter setting screen of the information module.



❶ Double-click "Module Parameter" in the "Navigation" window.
❷ Set the module parameter.
- Communication protocol setting: Predefined protocol
- Communication speed setting: 115200bps
- Data bit: 8

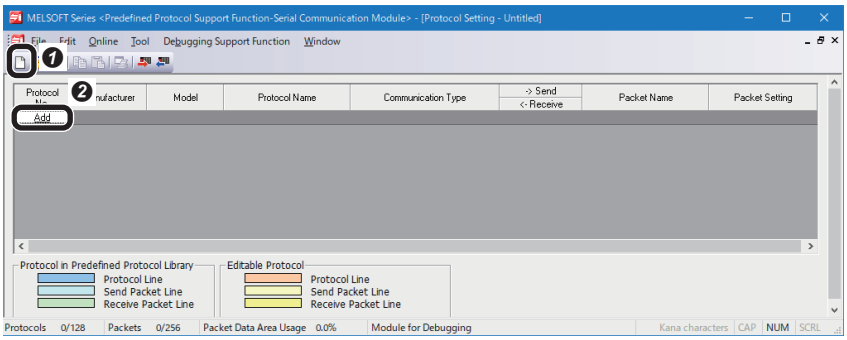
5. Set the predefined protocol support function.

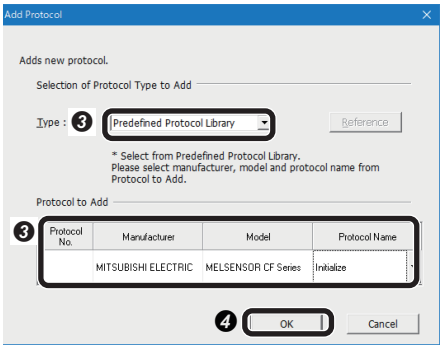




❶ Select [Tool] ⇨ [Predefined Protocol Support Function].
❷ Select "Serial Communication Module" for "Module Type".
❸ Click the [OK] button.

6. Create a communication protocol for a serial communication module.

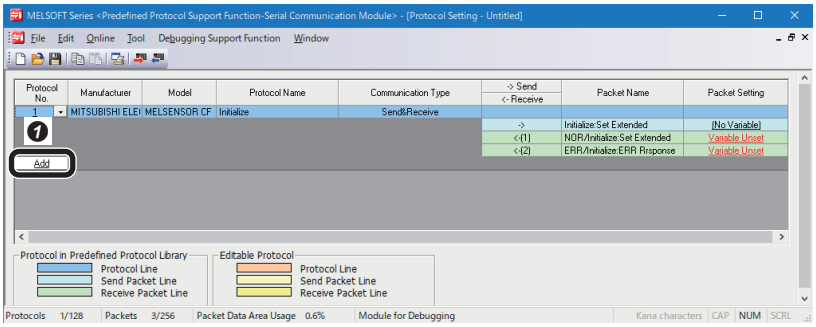


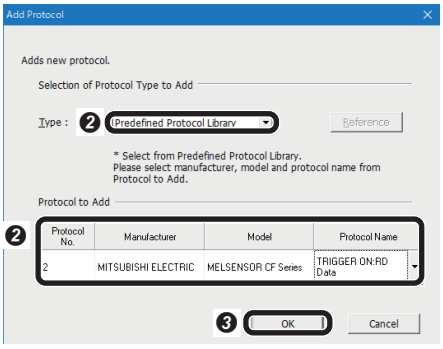


❶ Click (New).
❷ Click the [Add] button.
❸ Add a protocol.
- Type: Predefined Protocol Library
- Manufacturer: MITSUBISHI ELECTRIC
- Model: MELSENSOR CF Series
- Protocol Name: Initialize

❹ Click the [OK] button.

7. Add a trigger to the communication protocol.

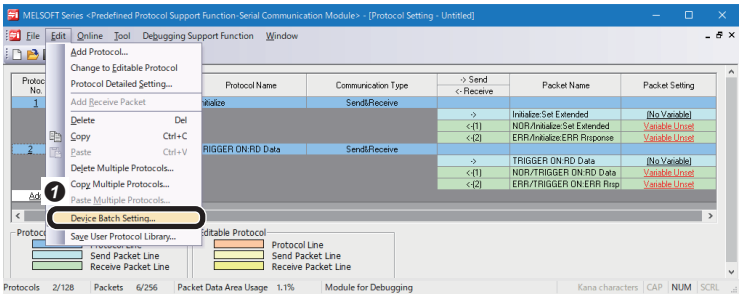


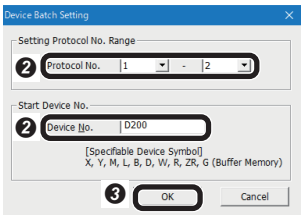


❶ Click the [Add] button.
❷ Add a protocol.
- Type: Predefined Protocol Library
- Manufacturer: MITSUBISHI ELECTRIC
- Model: MELSENSOR CF Series
- Protocol Name: TRIGGER ON: RD Data

❸ Click the [OK] button.

8. Set devices.

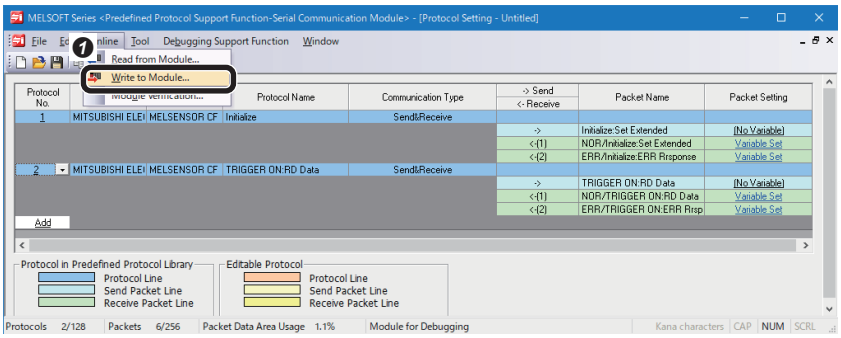


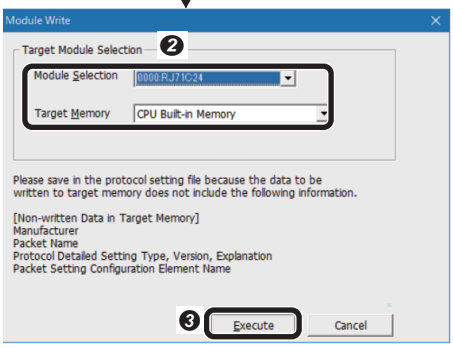


❶ Select [Edit] ⇨ [Device Batch Setting].
❷ Set devices to the configured protocol.
- Protocol No.: 1-2
- Device No.: D200

❸ Click the [OK] button.
- For devices that are set for packets of the protocol, refer to the following:
  ☞ Page 66 Packet setting

9. Write to a programmable controller.





❶ Select [Online] ⇨ [Write to Module].
❷ Set the target module.
- Module Selection: RJ71C24
- Target Memory: CPU Built-in Memory

❸ Click the [Execute] button.

■ Packet setting

The following devices are set for packets of the protocol.

Device	Device name	Description
D200	Initialization Ack	Status is stored when responding to an initialization protocol.
D201	Initialization Error Ack	The error response data of an initialization protocol is stored.
D202	Reception Data Length	The length of data received from a code reader is stored.
D203 to D1202	Reception Character Strings Data	The data of character strings received from a code reader is stored.
D1203	Trigger Error Ack	The error response data of a trigger protocol is stored.

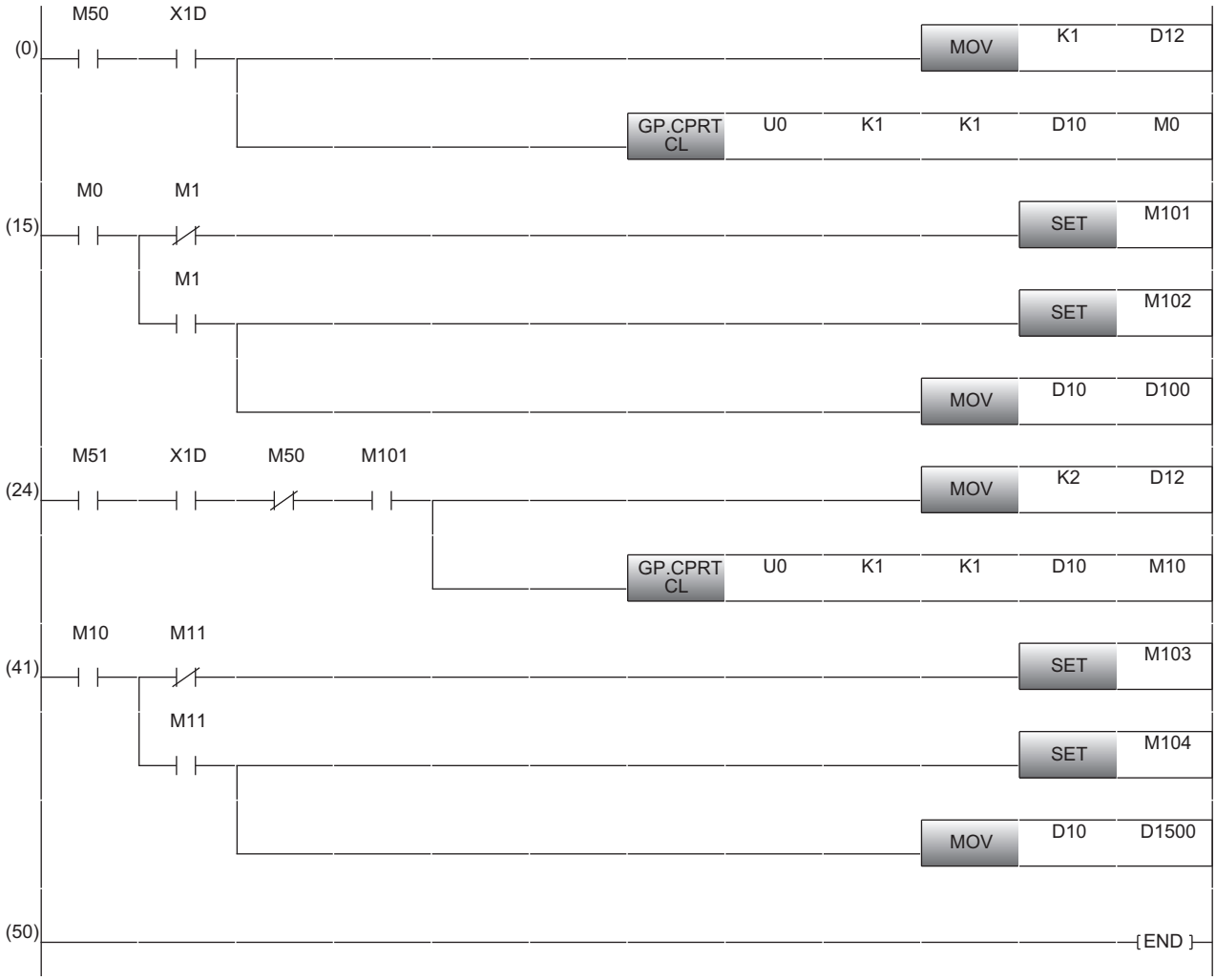
Creating a program

Create a program for controlling the code reader by using the devices set in the predefined protocol support function.

■ Devices used in the program

Device	Device name	Description
M0	Initialization Protocol Execution Completed	This device is turned ON when the execution of an initialization protocol is completed.
M1	Initialization Protocol Execution Failure	This device is turned ON when the execution of an initialization protocol is failed.
M10	Trigger Protocol Execution Completed	This device is turned ON when the execution of a trigger protocol is completed.
M11	Trigger Protocol Execution Failure	This device is turned ON when the execution of a trigger protocol is failed.
M50	Initialization Protocol Execution command	When this device is turned ON, an initialization protocol is executed and initialization is executed.
M51	Trigger Protocol Execution command	When this device is turned ON, a trigger protocol is executed and an image is captured.
M101	Initialization Protocol Execution Completed flag	This device is turned ON when the execution of an initialization protocol is completed.
M102	Initialization Protocol Execution Failure flag	This device is turned ON when the execution of an initialization protocol is failed.
M103	Trigger Protocol Execution Completed flag	This device is turned ON when the execution of a trigger protocol is completed.
M104	Trigger Protocol Execution Failure flag	This device is turned ON when the execution of a trigger protocol is failed.
D10	Start Number of Control Data	Control data is stored.
D12	Execution Protocol Number	A protocol number to be executed is stored.
D100	Initialization Protocol Execution Result	The execution result of an initialization protocol is stored.
D1500	Trigger Protocol Execution Result	The execution result of a read trigger protocol is stored.
X1D	Predefined Protocol Ready	This device is turned ON when a predefined protocol is ready.
U0	Module	The start I/O number of a module is stored.

■ Program example



(0): Request the execution of an initialization protocol.

(15): The processing for the completion of an initialization protocol execution is performed.

(24): Request the execution command of a trigger protocol.

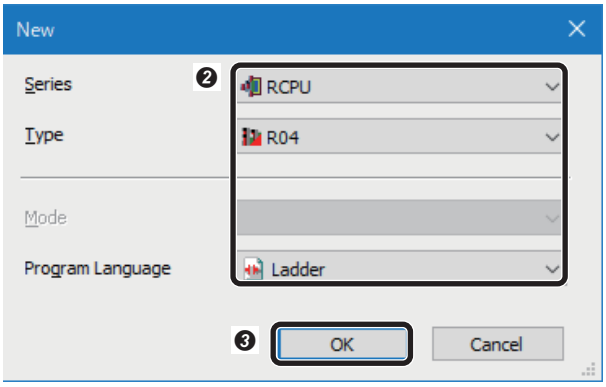
(41): The processing for the completion of a trigger protocol execution is performed.

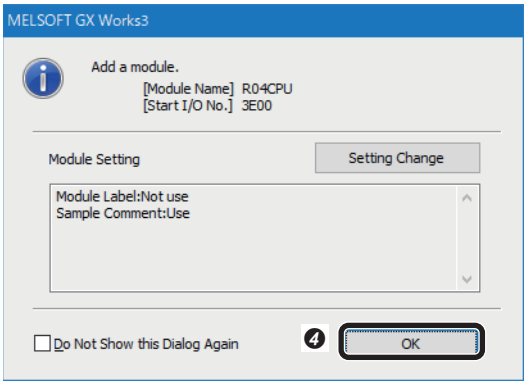
Operation procedure for a nonprocedural protocol

Setting a programmable controller

Set parameters of a programmable controller.

1. Start an engineering tool.
2. Select a CPU module and a program language in the "New" screen.

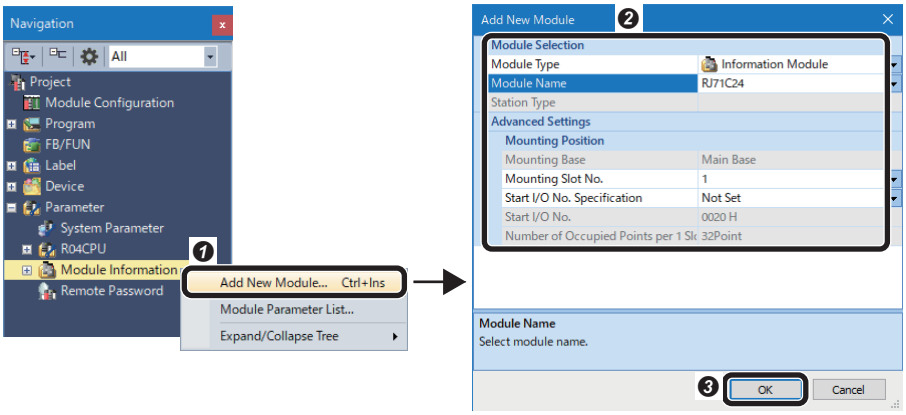




❶ Select [Project] ⇨ [New].
The "New" screen appears.
❷ Set a CPU module and a program language.
- Series: RCPU
- Type: R04
- Program Language: Ladder

❸ Click the [OK] button.
❹ Click the [OK] button.

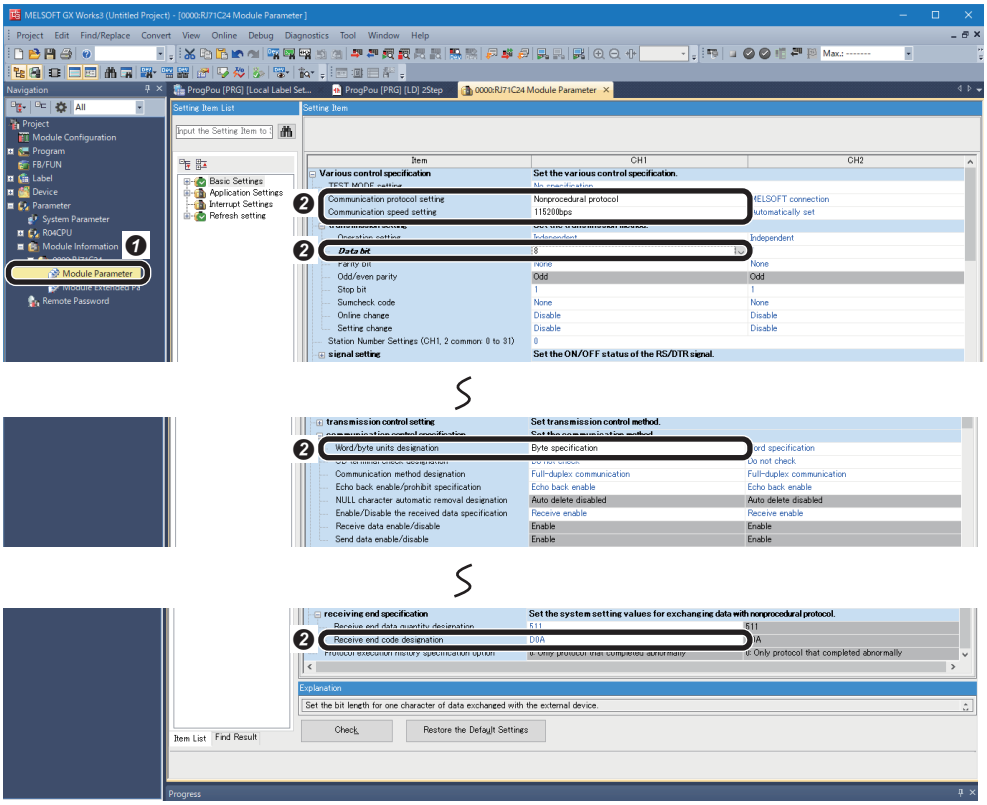
3. Add an information module in the "Add New Module" screen.



❶ Right-click "Module Information" in the "Navigation" window, and select [Add New Module] in the shortcut menu.
❷ Set the items in "Module Selection".
- Module Type: Information Module
- Module Name: RJ71C24
- Mounting Slot No.: 0
- Start I/O No. Specification: Not Set

❸ Click the [OK] button.

4. Set module parameters in the module parameter setting screen of the information module.



❶ Double-click "Module Parameter" in the "Navigation" window.

❷ Set the module parameter.

- Communication protocol setting: Nonprocedural protocol
- Communication speed setting: 115200bps
- Data bit: 8
- Word/byte units designation: Byte specification
- Receive end code designation: D0A

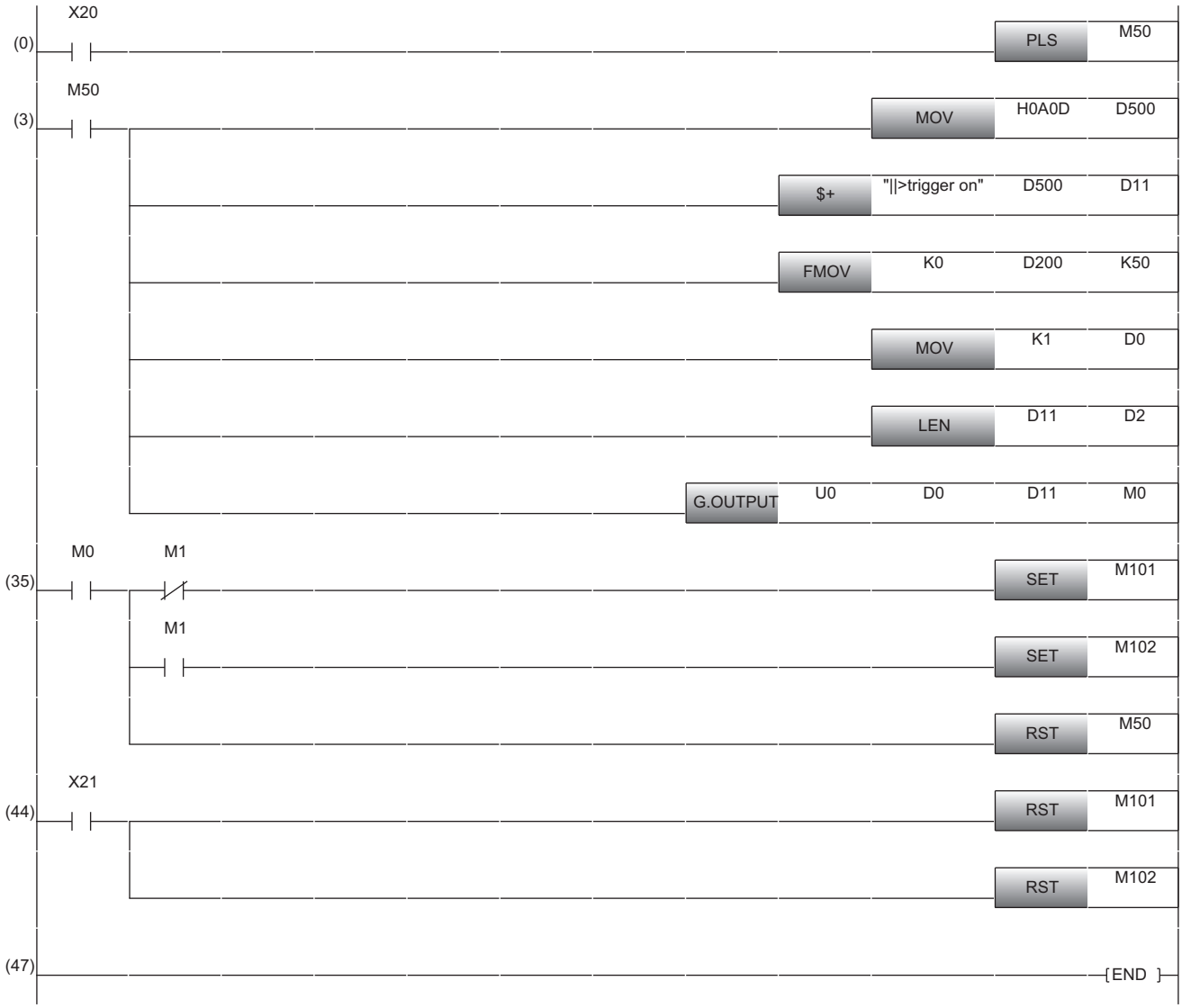
Creating a program

Create a program for controlling the code reader by using the devices set in the module parameters.

■ Devices used in the program

Device	Device name	Description
D0	DMCC Command Transmission CH Designation	This device is used for specifying the DMCC command transmission CH.
D2	DMCC Command Transmission Data Length	The DMCC command transmission data length is stored.
D11	DMCC Command Transmission Character Strings	The DMCC command transmission character strings are stored.
D100	Character Strings Reception CH Designation	This device is used for specifying the character strings reception CH.
D101	Character Strings Reception Result	The result of received character strings is stored. Normal: 0 Error: error codes
D103	Allowance Number of Received Character Strings	The allowance number of received character strings is stored.
D200	Received Character Strings	The received character strings are stored.
D500	DMCC Command Transmission Character Strings Terminating Text	The terminating text of character strings to be sent is stored.
X3	Received Character Strings Read Request	This device is turned ON while performing the read request of received character strings.
X4	Character Strings Reception Error Detection	This device is turned ON when a reception error is detected in character strings.
X20	DMCC Command Transmission Control	'DMCC Command Transmission command' (M50) is turned ON when this device is turned ON.
X21	DMCC Command Transmission Flag Reset	'DMCC Command Transmission Completed flag' (M101) and 'DMCC Command Transmission Failure flag' (M102) are reset when this device is turned ON.
X100	Character Strings Reception Flag Reset	'Character Strings Reception Completed flag' (M35) or 'Character Strings Reception Failure flag' (M36) is reset when this device is turned ON.
M0	DMCC Command Transmission Completed	This device is turned ON when a DMCC command transmission is completed.
M1	DMCC Command Transmission Failure	This device is turned ON when a DMCC command transmission is failed.
M30	Character Strings Reception Completed	This device is turned ON when the reception of character strings is completed.
M31	Character Strings Reception Failure	This device is turned ON when the reception of character strings is failed.
M35	Character Strings Reception Completed flag	This device is turned ON when the reception of character strings is completed.
M36	Character Strings Reception Failure flag	This device is turned ON when the reception of character strings is failed.
M50	DMCC Command Transmission command	When this device is turned ON, a DMCC command transmission is executed.
M51	Character Strings Reception command	When this device is turned ON, the reception of character strings is executed.
M101	DMCC Command Transmission Completed flag	This device is turned ON when a DMCC command transmission is completed.
M102	DMCC Command Transmission Failure flag	This device is turned ON when a DMCC command transmission is failed.
U0	Module	The start I/O number of a module is stored.

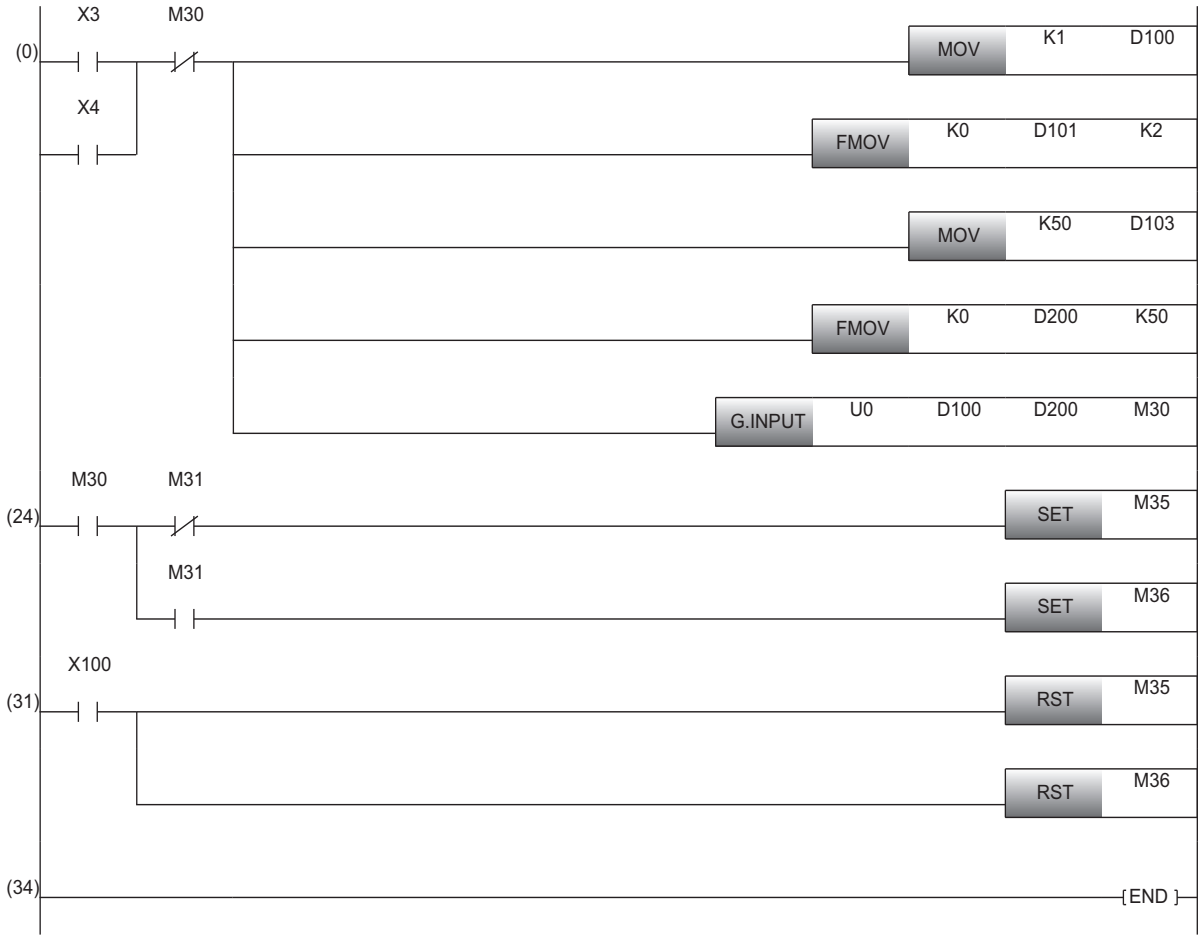
■ Program example (DMCC command transmission)



(0)(3): Request a DMCC command transmission.

(35)(44): The processing for the completion of a DMCC command transmission is performed.

■ Program example (The reception of character strings)



(0): Request for receiving character strings.

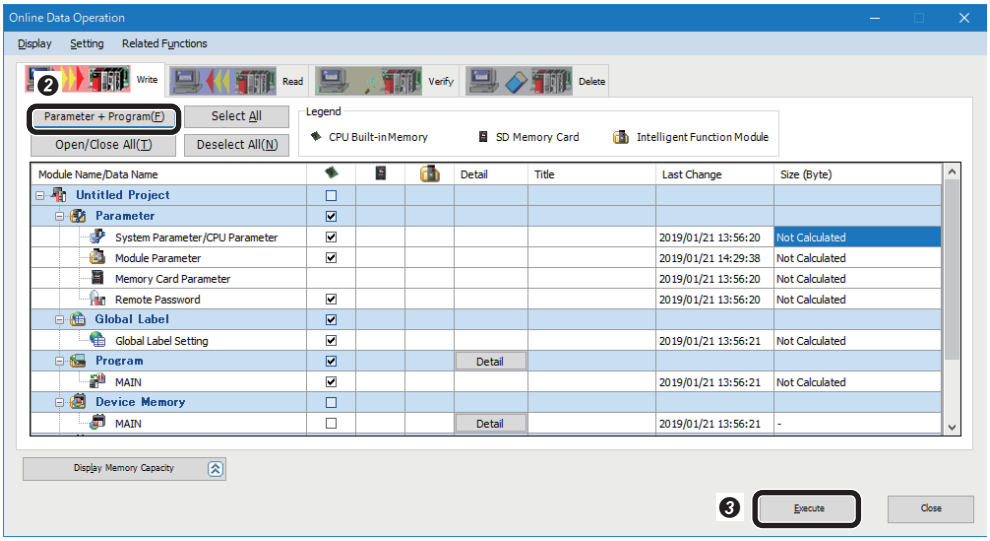
(24)(31): The processing for the completion of receiving character strings is performed.

3.4 Writing Data to a Programmable Controller

Write the parameters set in an engineering tool to the programmable controller.

Writing to the programmable controller

1. Turn ON the programmable controller.
2. Write parameters and program to the programmable controller in the "Online Data Operation" screen.



❶ Click the [Online] ⇨ [Write to PLC] button.
The "Online Data Operation" screen appears.
❷ Click the [Parameter + Program] button.
❸ Click the [Execute] button.

Restarting the programmable controller

After writing the parameters and program, reset the programmable controller and switch to RUN.

3.5 Checking Operations

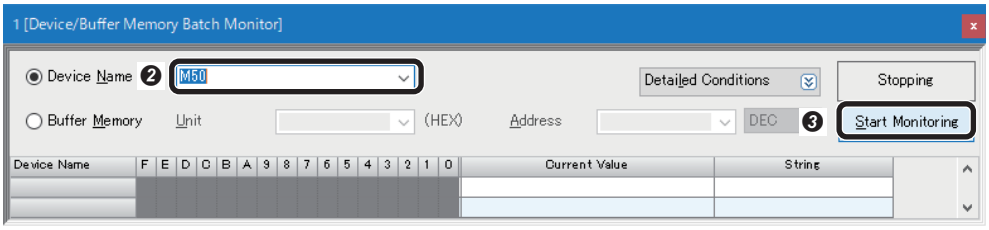
Check operation by controlling the code reader using the programmable controller.

Use a created program to check the operation. (☞ Page 67 Creating a program, ☞ Page 71 Creating a program)

Checking read results (predefined protocol)

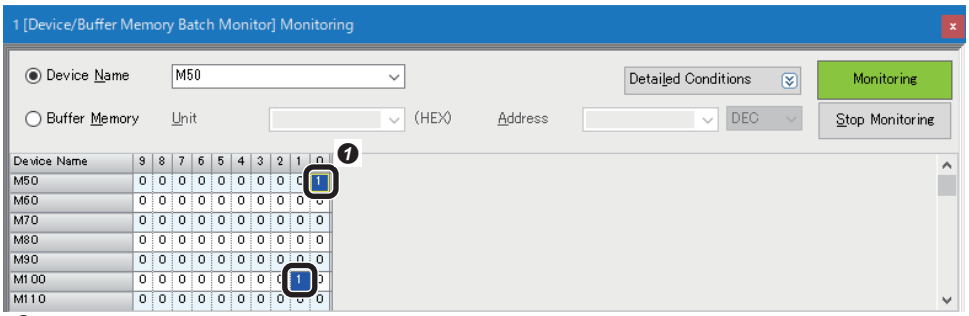
Check the read results of a QR Code in the "Device/Buffer Memory Batch Monitor" window of an engineering tool.

1. Start monitoring in the "Device/Buffer Memory Batch Monitor" window.



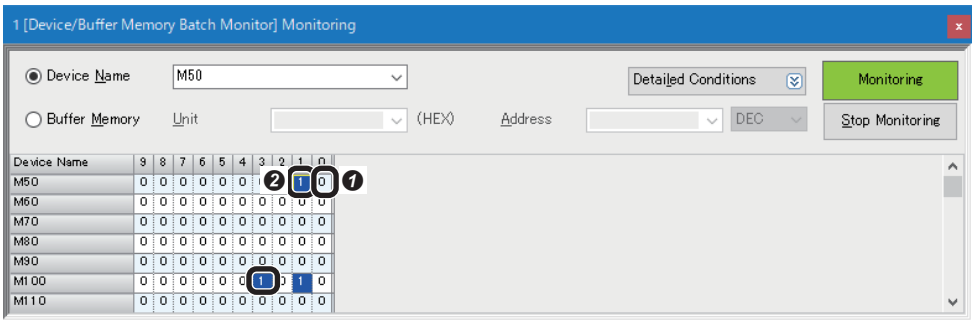
❶ Select [Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch Monitor]. The "Device/Buffer Memory Batch Monitor" window appears.
❷ Enter "M50" for "Device Name".
❸ Click the [Start Monitoring] button.

2. Enable a trigger on the code reader.



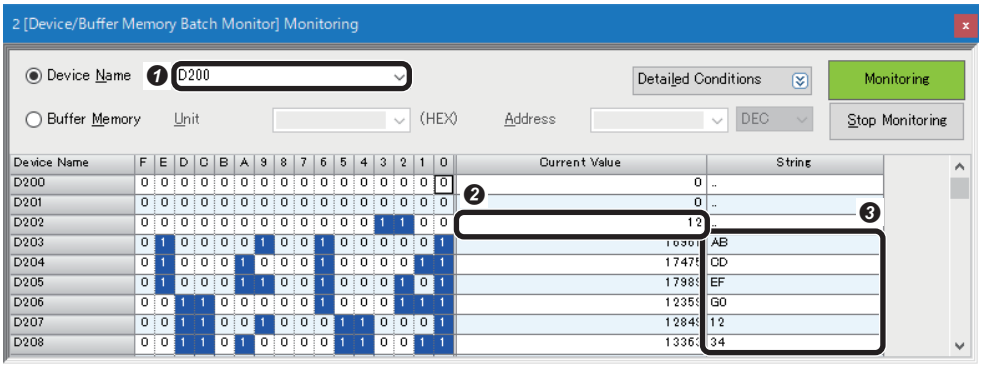
❶ Turn ON 'Initialization Protocol Execution command' (M50). 'Initialization Protocol Execution Completed flag' (M101) is turned ON.

3. Turn ON a trigger.



❶ Turn OFF 'Initialization Protocol Execution command' (M50).
❷ Turn ON 'Trigger Protocol Execution command' (M51). 'Trigger Protocol Execution Completed flag' (M103) is turned ON.

4. Check the read results.



❶ Enter "D200" for "Device Name."
❷ "D202": Check the length of the read character string "C" (12) is stored in "Current Value".
❸ "D203" to "D208": Check "ABCDEFG01234" is displayed in "String".

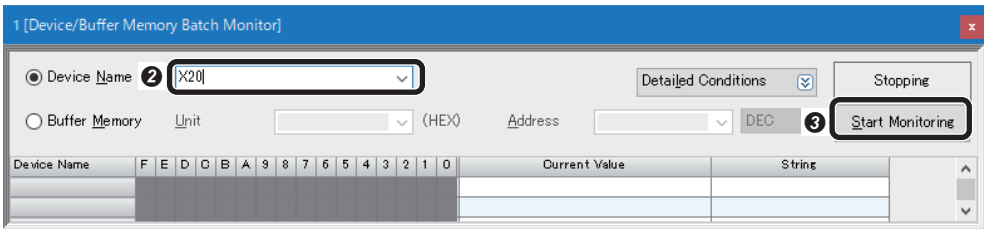
Point

By turning 'Trigger Protocol Execution command' (M51) OFF and then ON, the code can be read again.

Checking read results (nonprocedural protocol)

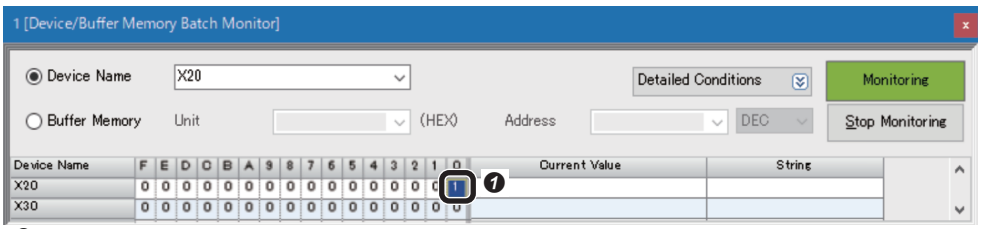
Check the read results of a QR Code in the "Device/Buffer Memory Batch Monitor" window of an engineering tool.

1. Start monitoring in the "Device/Buffer Memory Batch Monitor" window.



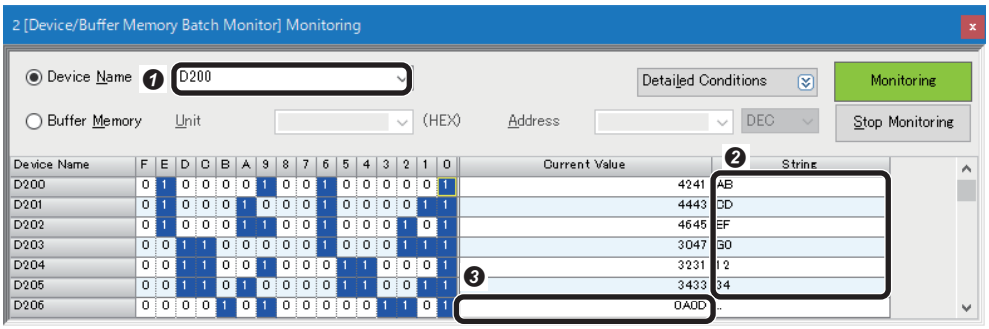
❶ Select [Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch Monitor]. The "Device/Buffer Memory Batch Monitor" window appears.
❷ Enter "X20" for "Device Name".
❸ Click the [Start Monitoring] button.

2. Turn ON a trigger.



❶ Turn ON 'DMCC Command Transmission Control' (X20).

3. Check the read results.



❶ Enter "D200" for "Device Name."
❷ "D200" to "D205": Check "ABCDEFG01234" is displayed in "String".
❸ "D206": Check the terminating text "0A0D" (CR/LF) is stored in "Current Value".

Point

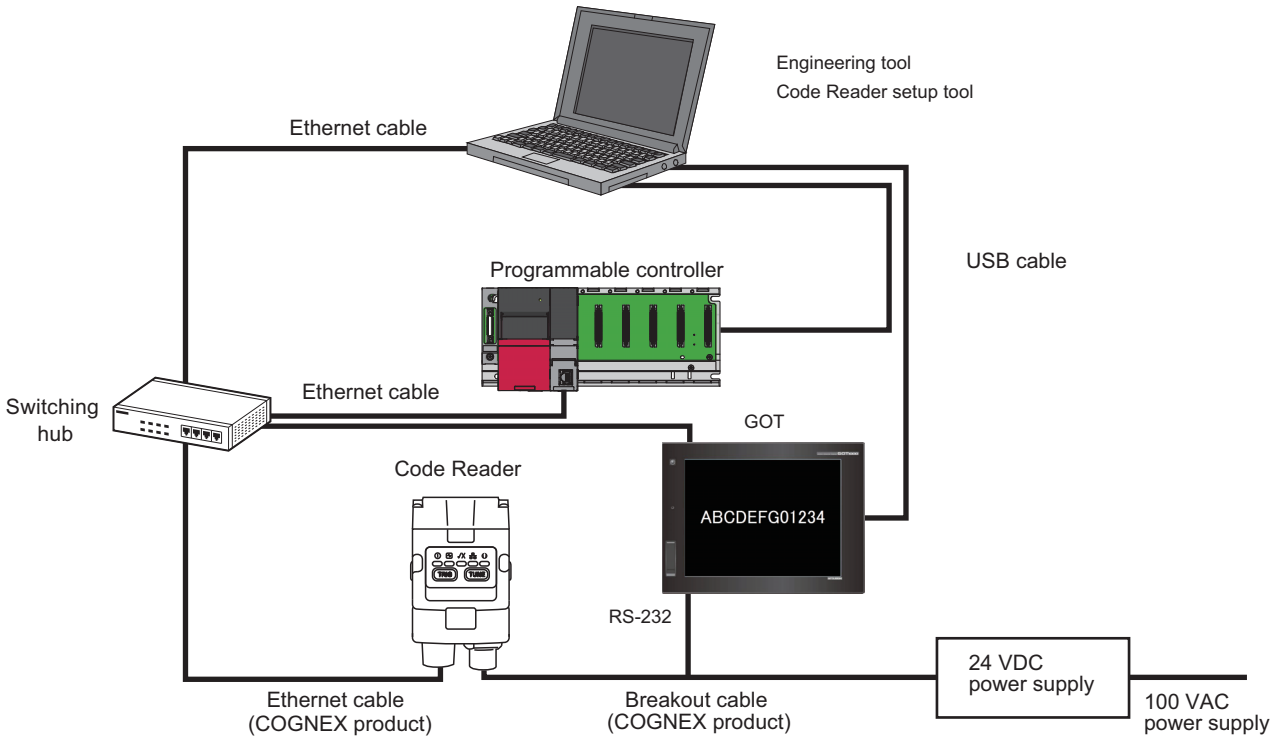
By turning 'DMCC Command Transmission Control' (X20) OFF and then ON, the code can be read again.

4 RS-232 CONNECTION (GOT)

This chapter explains the procedure for connecting a code reader to a GOT and controlling the code reader with an RS-232 connection.

4.1 System Configuration Example for Connecting a Code Reader

The following figure shows the system configuration for connecting a code reader.



Point

For details on the system configuration, refer to the following:

Code Reader CF26 User's Manual

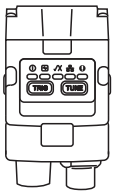
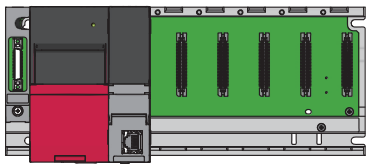
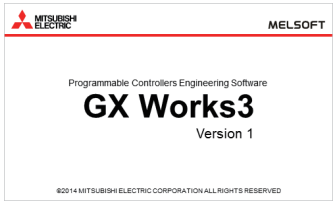
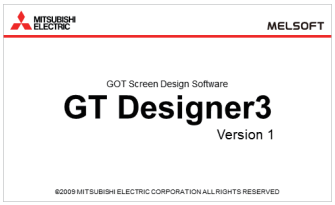
Code Reader CF37 User's Manual

Configurations

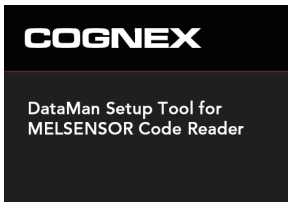
The devices used in the system configuration are as follows.

Required equipment

■ Mitsubishi Electric products

		
Code reader • CF26-SR	Programmable controller • CPU module: R04CPU	Engineering tool • GX Works3
		
Engineering tool • GT Designer3	GOT • GT27-SVGA	

■ COGNEX products

		
Code reader setup tool • DataMan Setup Tool for MELSENSOR*1	Ethernet cable • CCB-84901-2001-**(**: 01, 02, 05, 10, or 15)*2	Breakout cable • CCB-PWRIO-**(**: 05, 10, or 15)*3

*1 Download this product from the Mitsubishi Electric FA website.
www.MitsubishiElectric.co.jp/fa

*2 Cable length (0.6 m, 2 m, 5 m, 10 m, or 15 m), straight

*3 Cable length (5 m, 10 m, or 15 m), shielded twisted-pair cable, straight

■ Commercial products

Switching hub	Ethernet cable	USB cable (Type Mini-B)	24 VDC power supply

Connecting and wiring a code reader

The following explains the considerations and procedure for connecting a code reader to a GOT and connecting to an RS-232 connection.

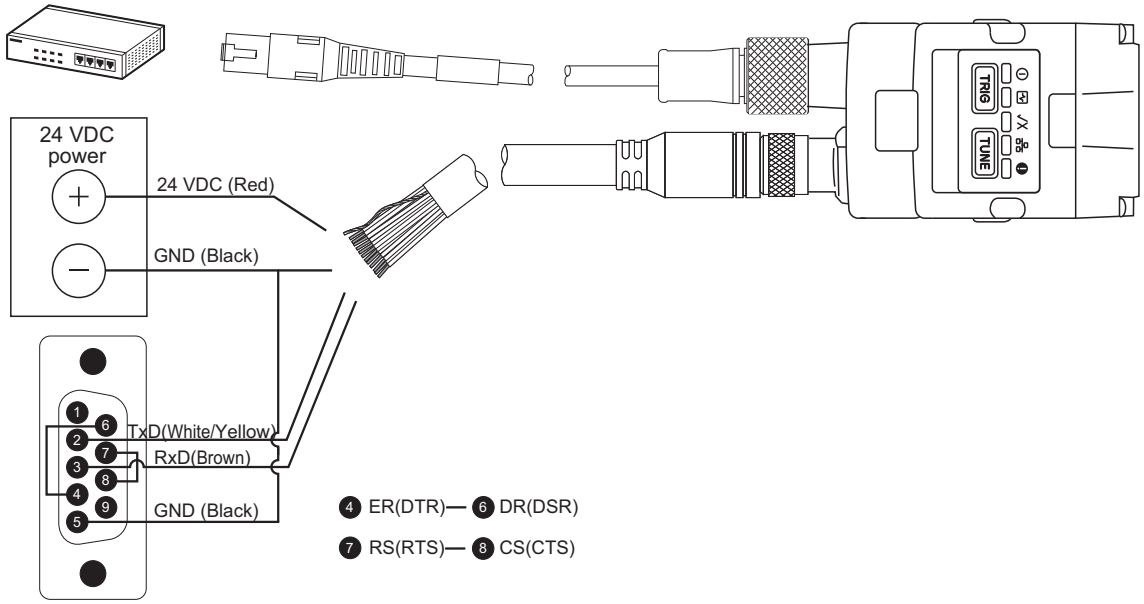
Ex.

Breakout cable: CCB-PWRIO-**(**: 05, 10, or 15)[*1]

[*1] Cable length (5 m, 10 m, or 15 m), shielded twisted-pair cable, straight

Precautions

- Check that a 24 VDC power supply is OFF when connecting a breakout cable to the power supply.
- Cut unused wires or protect them with insulating materials. Be careful not to contact with 24 VDC wires.
- A breakout cable and an Ethernet cable are designed to connect with their key aligned with the keyway of the connector on a code reader. Do not force the connections or damage may occur.
- When powering ON the system, turn ON the power of a code reader first.



1. Connect a breakout cable to an RS-232 connector (D-sub 9 Pin).

Connect a breakout cable and an RS-232 connector (D-sub 9 Pin) as follows: TxD (white and yellow) to ❷ RD (RxD), RxD (brown) to ❸ SD (TxD), and GND (black) to ❺ SG.

In addition, connect the RS-232 connector (D-Sub 9 Pin) as follows: ❹ ER (DTR) to ❻ DR (DSR), and ❼ RS (RTS) to ❽ CS (CTS).

2. Connect the breakout cable to a 24 VDC power supply.

Connect the 24 VDC (red) of the cable to the positive terminal of the power supply, and the GND (black) to the negative terminal.

3. Connect the breakout cable to the power supply, I/O, and RS-232 connector of a code reader.

4. Connect an Ethernet cable to an Ethernet connector and a switching hub of the code reader.

5. Connect the code reader to a GOT.

6. Turn the power of the system ON.

4.2 Setting the Code Reader

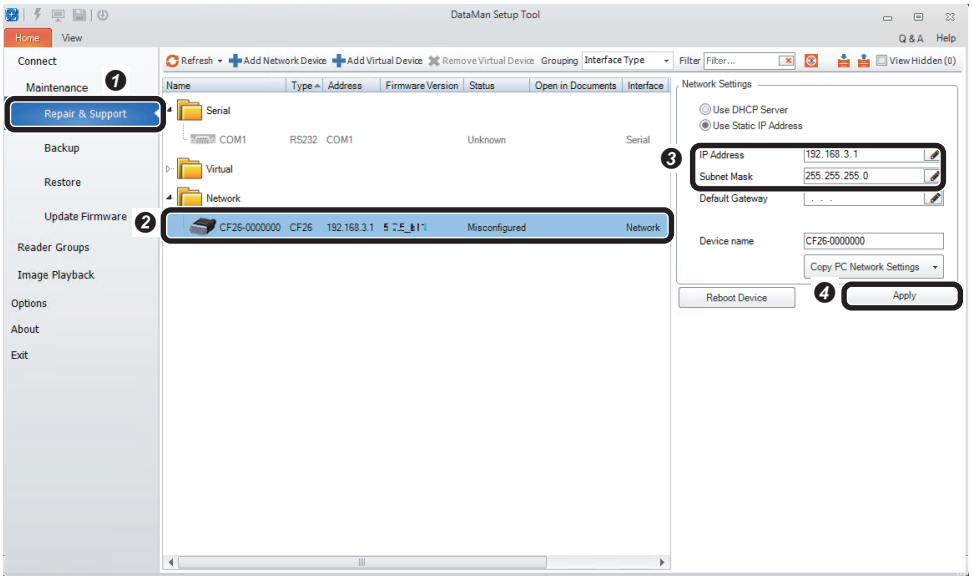
This section explains the procedures for connecting the code reader with an RS-232 connection and the settings for a symbol to be read and the means of communication.

Setting an IP address to a personal computer

Set the IP address (192.168.3.3) to a personal computer.

Connecting the code reader

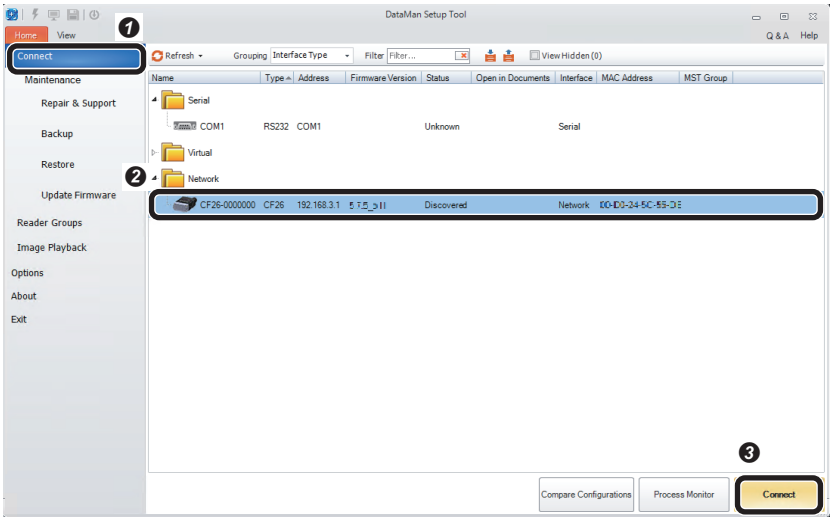
1. Start DataMan Setup Tool for MELSENSOR.
2. Set an IP address and a subnet mask to the code reader.



❶ Select [Repair & Support].
❷ Select the code reader "CF26".
❸ Set an IP address and a subnet mask of the code reader in the "Network Settings" section.
- IP Address: 192.168.3.1
- Subnet Mask: 255.255.255.0

❹ Click the [Apply] button.
The code reader is restarted and the network settings are applied.

3. Connect to the code reader.

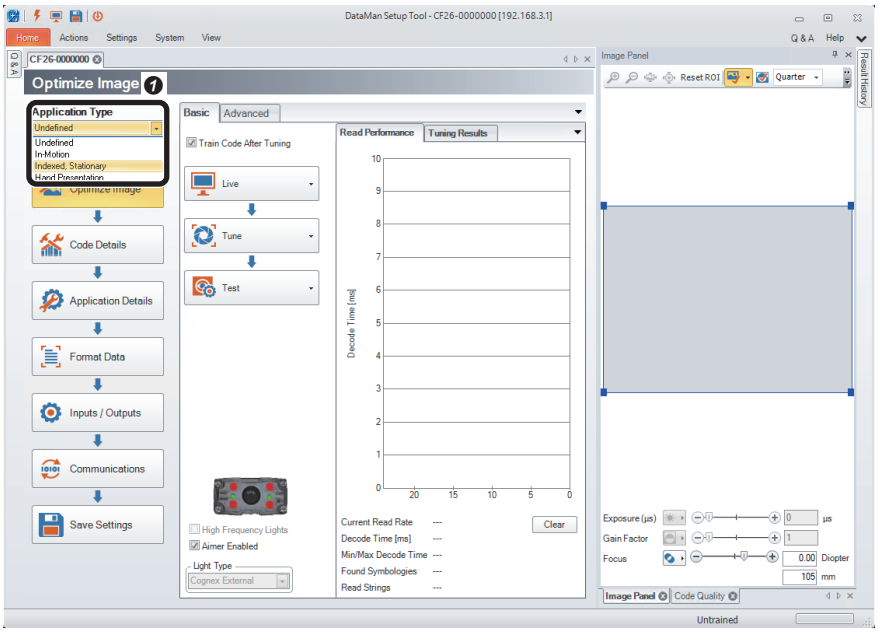


❶ Select [Connect].
❷ Select the code reader.
❸ Click the [Connect] button.

Setting the code reader

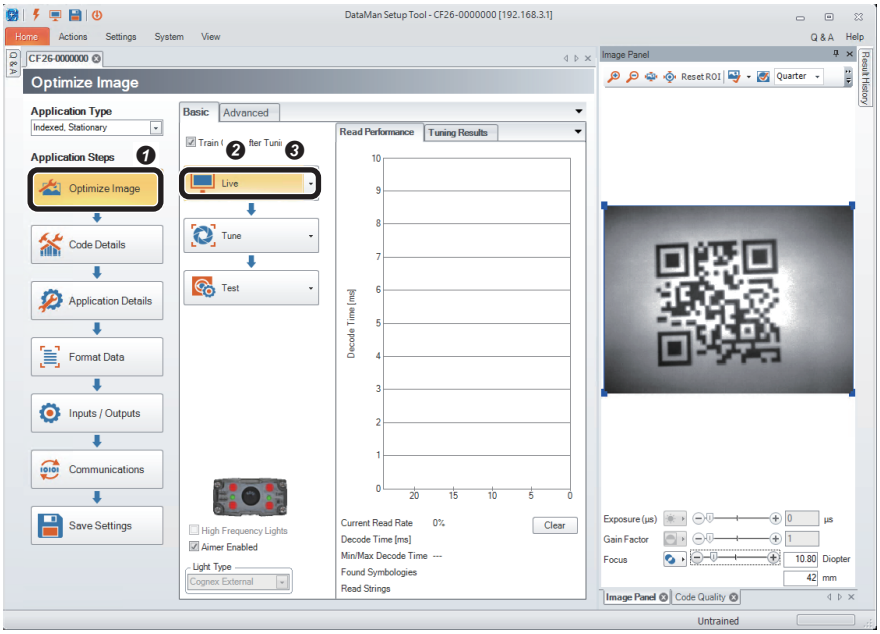
The following shows the procedure from setting to saving the code reader.

1. Set an application type.

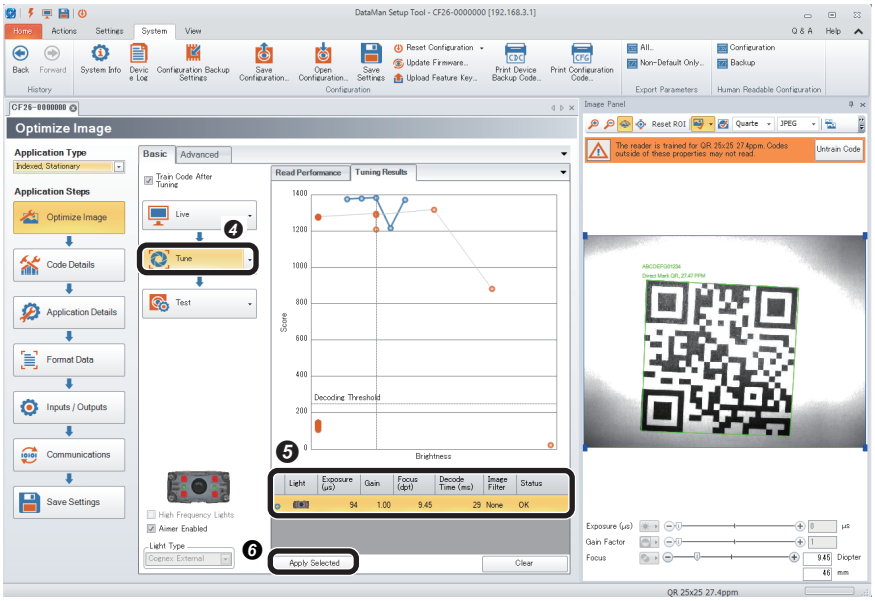


❶ Select "Indexed, Stationary".

2. Import a QR Code to be read in the "Optimize Image" step.



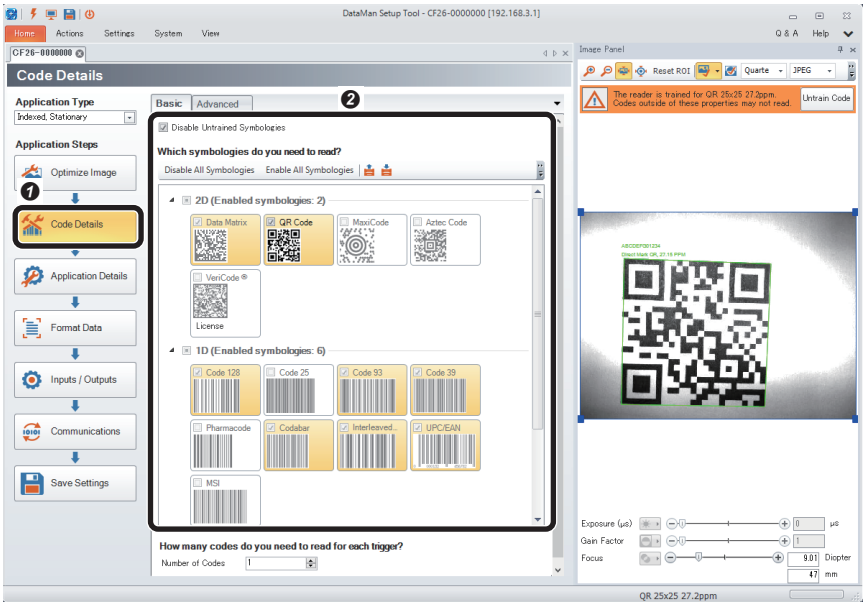
❶ Click the [Optimize Image] button.
❷ Click the [Live] button.
❸ When a QR Code to be read is displayed, click the [Live] button again.
- It is recommended to tune and optimize brightness under the environment that is similar to the actual operating environment.



❹ Click the [Tune] button.
❺ When tuning is completed, an candidate of the setting contents is displayed.
- The number of the displayed candidates varies depending on the work status or the combinations of lights.
- When clicking the candidate, the capturing condition can be checked in "Image Panel".
- If the reading target code still cannot be read even though the code is within the field of vision, the image is captured clearly, and tuning is completed, check that the symbol to be read is enabled in the "Code Details" step.

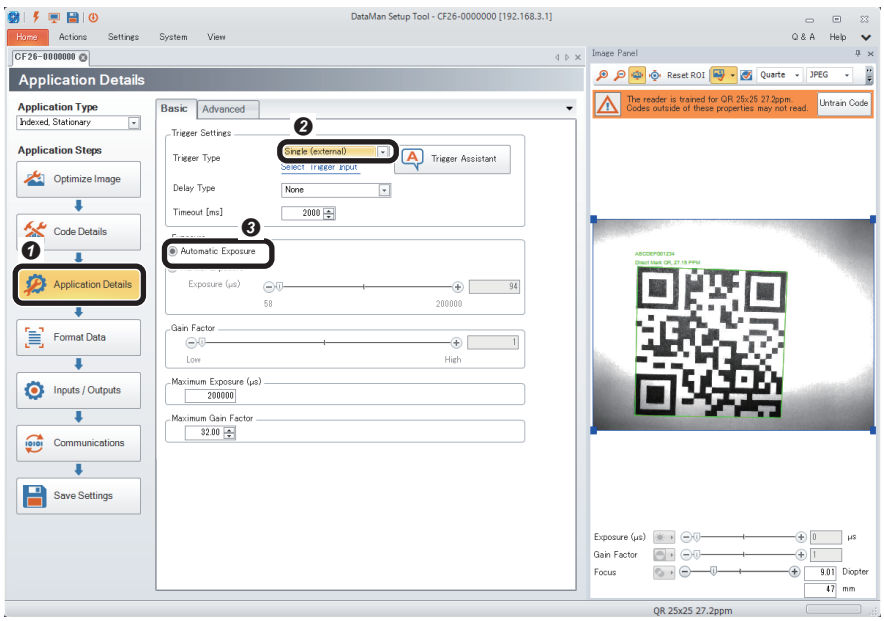
❻ By clicking the [Apply Selected] button, the selected settings are reflected to the code reader.

3. Check that symbols to be read are selected in the "Code Details" step.



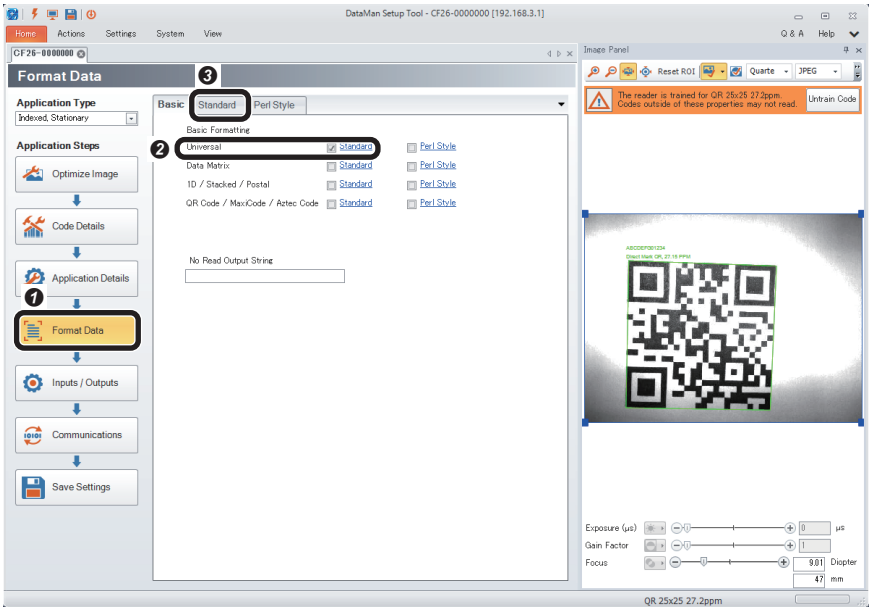
❶ Click the [Code Details] button.
❷ Check that the checkboxes of the symbols to be read are selected.
- Any symbols can be selected by unselecting the checkbox of "Disable Untrained Symbologies."
- The scanning speed can be improved when unselecting the checkboxes of symbols other than the reading target.

4. Set a trigger type and an exposure method in the "Application Details" step.

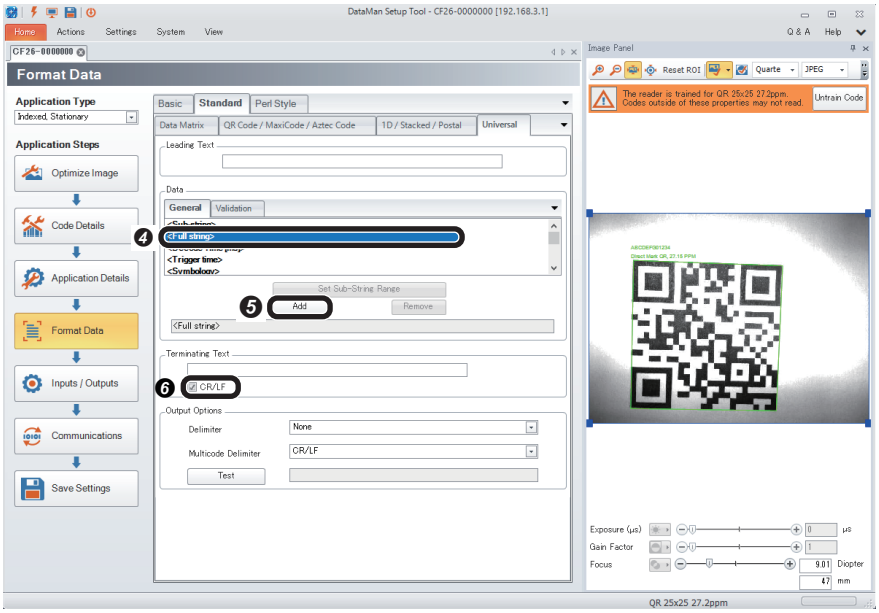


❶ Click the [Application Details] button.
❷ Select "Single (external)" for "Trigger Type" in "Trigger Settings".
❸ Select "Automatic Exposure" for "Exposure".

5. Set the output information of the QR Code in the "Format Data" step.

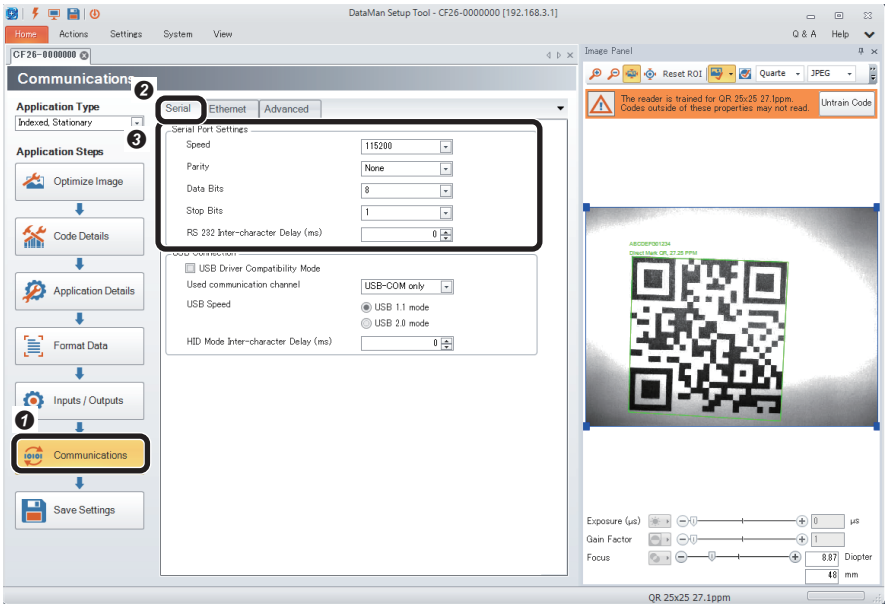


❶ Click the [Format Data] button.
❷ Select the checkbox of "Standard" for "Universal".
❸ Select the [Standard] tab.



❹ Select "<Full string>" in the [General] tab in "Data."
❺ Click the [Add] button.
❻ Select the checkbox of "CR/LF" for "Terminating Text".

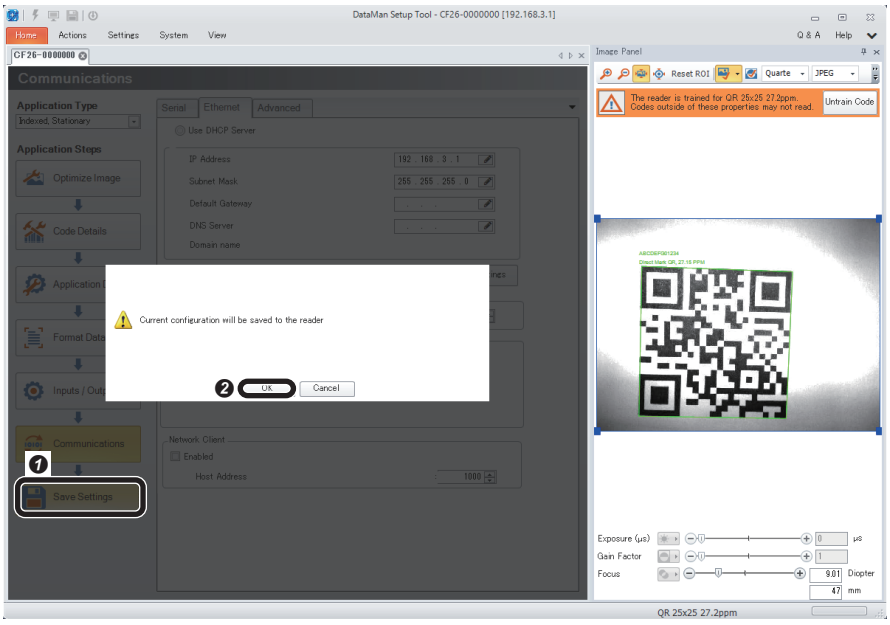
6. Configure settings for communication (serial) in the "Communications" step.



❶ Click the [Communications] button.
❷ Select the [Serial] tab.
❸ Set "Serial Port Settings".
- Speed: 115200
- Parity: None
- Data Bits: 8
- Stop Bits: 1
- RS 232 Inter-character Delay (ms): 0

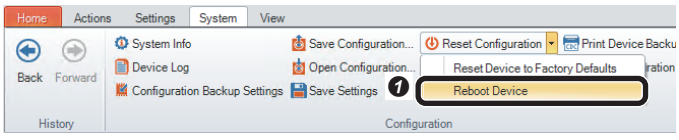
If setting a value for the inter-character delay, set a suitable time for the connection target device.

7. Save the settings in the code reader in the "Save Settings" step.



❶ Click the [Save Settings] button.
❷ Click the [OK] button.

8. Restart the code reader.



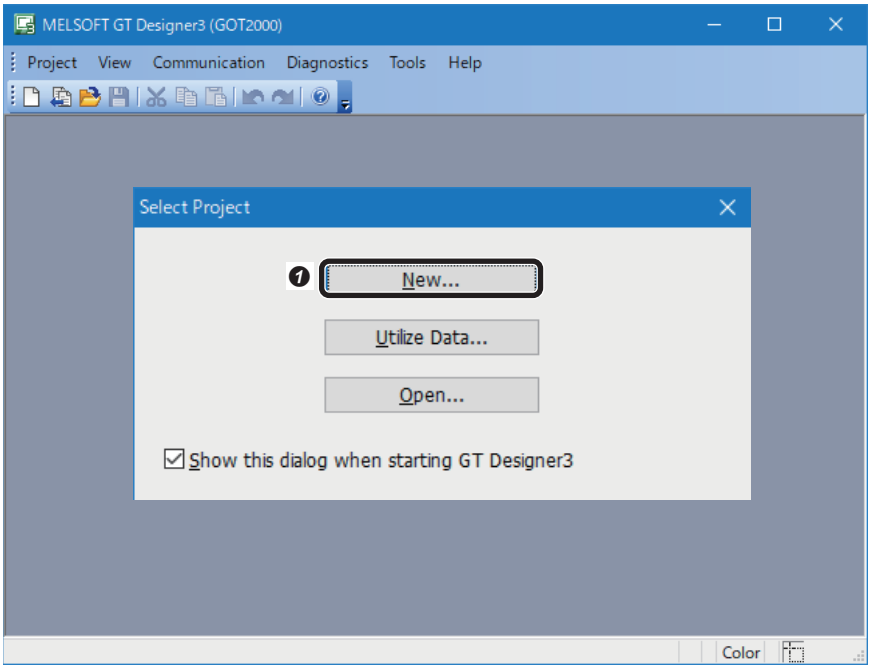
❶ Select [System] ⇨ [Reset Configuration] ⇨ [Reboot Device].
The code reader is restarted.

4.3 Setting a GOT

Set a GOT in GT Designer3.

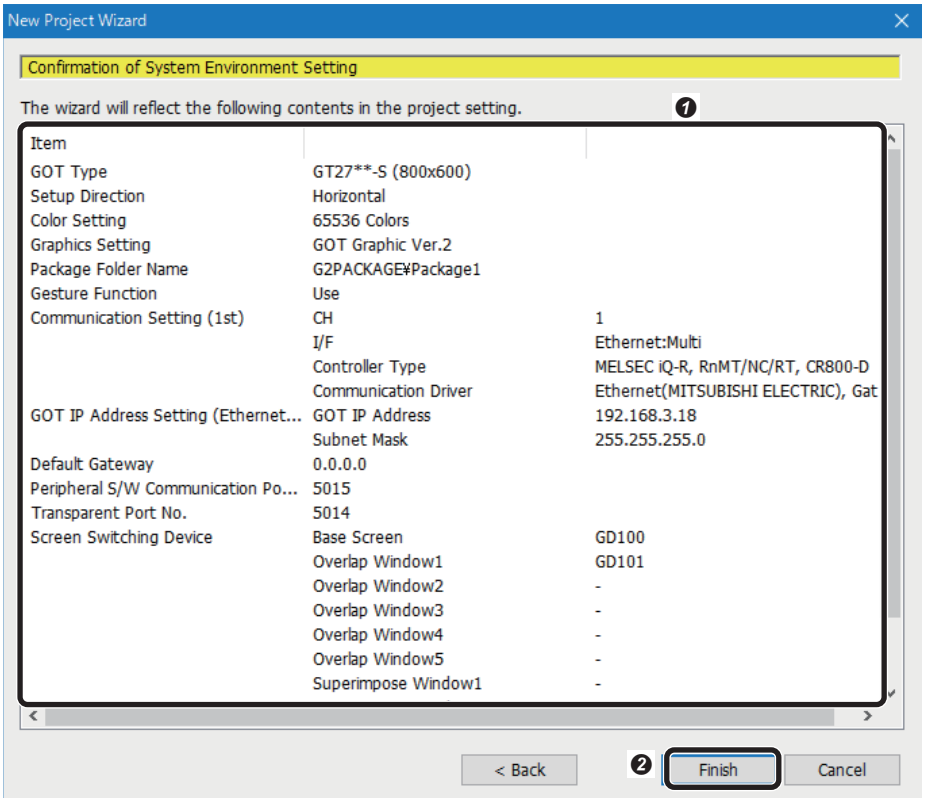
Setting a GOT

1. Create a new project in GT Designer3.



❶ Click the [New] button.

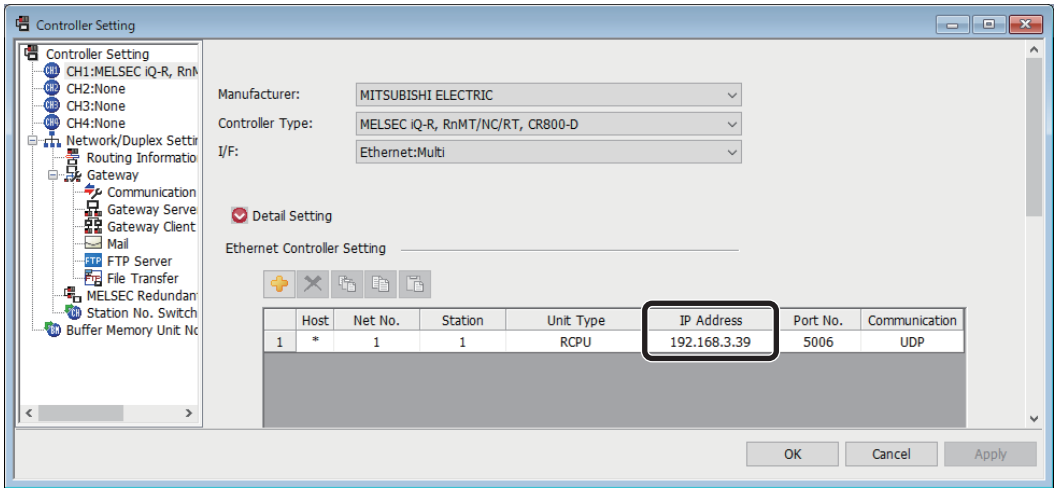
2. Configure the settings in the "New Project Wizard" screen.



❶ Set each page as follows, and click the [Next] button.
☞ Page 86 New Project Wizard
❷ Click the [Finish] button.

Point

When IP address of the programmable controller is other than the default (192.168.3.39), select [Common] ⇨ [Controller Setting] and set the IP address in the "Ethernet Controller Setting" section.



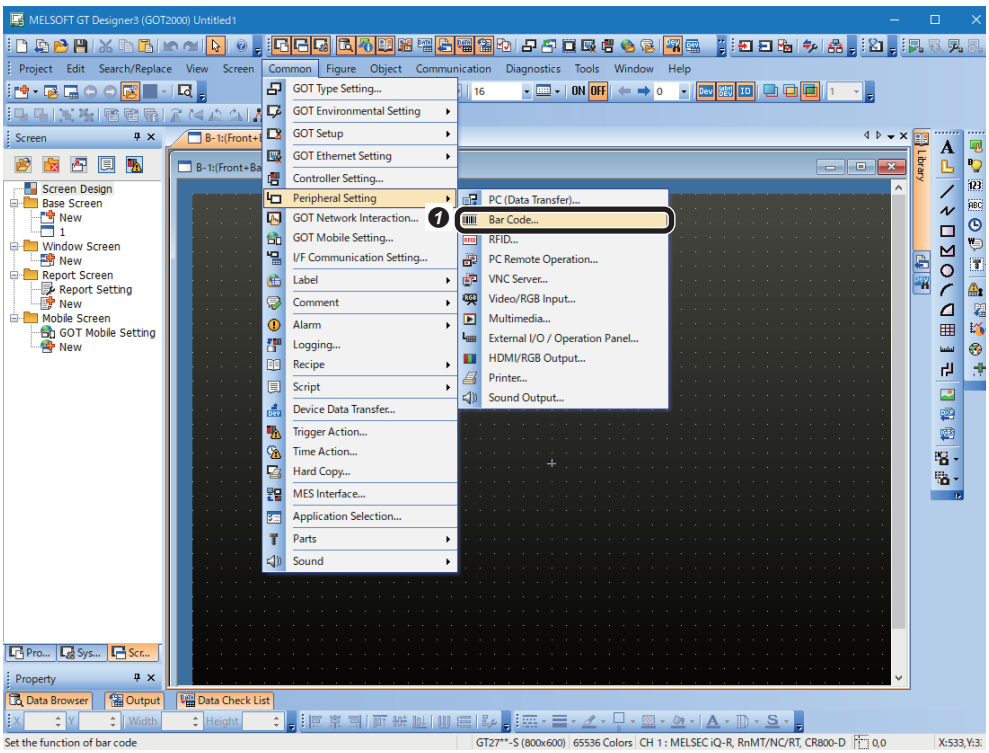
■ New Project Wizard

New project wizard		Item	Setting
System Setting		GOT Type	GT27**-S(800×600)
Setting of Controller	I/F	I/F	Ethernet: Multi
	Com. Driver	Communication Driver	Ethernet (MITSUBISHI ELECTRIC), Gateway
GOT IP Address Setting		GOT IP Address	192.168.3.18
		Subnet Mask	255.255.255.0
		Default Gateway	0.0.0.0
		Peripheral S/W Communication Port No.	5015
		Transparent Port No.	5014
Screen Switch		Base Screen	GD100
		Overlap Window	GD101
Screen Design		—	Any design

Connecting the code reader

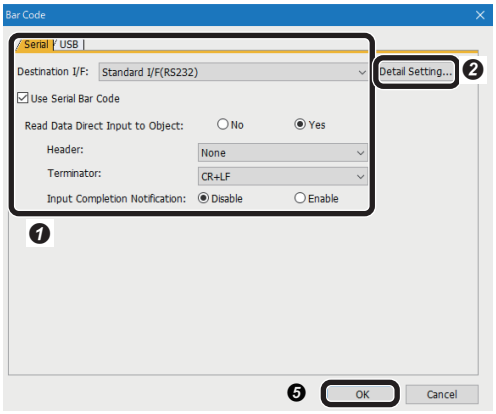
Connect the code reader to a GOT.

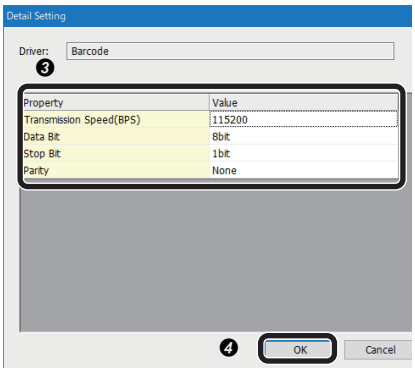
1. Display a setting screen.



❶ Select [Common] ⇨ [Peripheral Setting] ⇨ [Bar Code].

2. Set destination I/F for barcodes.



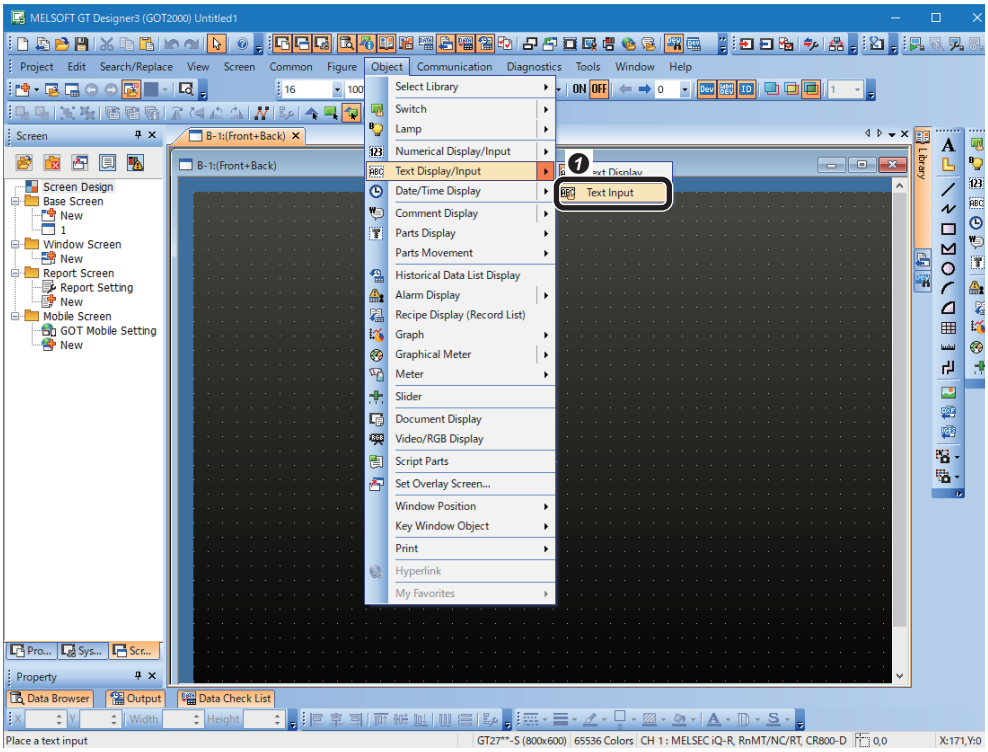


❶ Configure the settings in the [Serial] tab.
- Destination I/F: Standard I/F (RS 232)
- Select the checkbox of "Use Serial Bar Code".
- Select "Yes" for "Read Data Direct Input to Object".
- Header: None
- Terminator: CR+LF
- Input Completion Notification: Disable

❷ Click the [Detail Setting] button.
❸ Set the property of barcodes.
- Transmission Speed (BPS): 115200
- Data Bit: 8 bit
- Stop Bit: 1 bit
- Parity: None

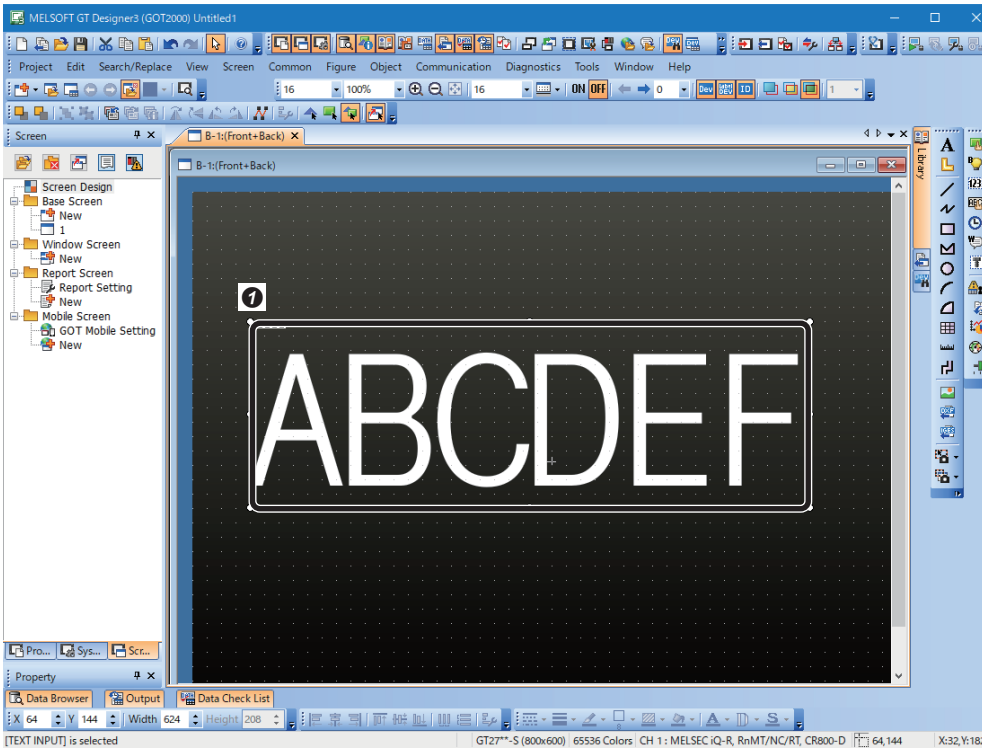
❹❺ Click the [OK] button.

3. Set a character string to be displayed in the GOT.



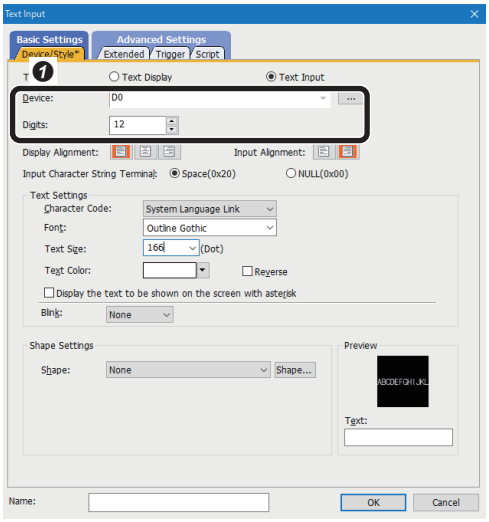
❶ Select [Object] ⇨ [Text Display/Input] ⇨ [Text Input].

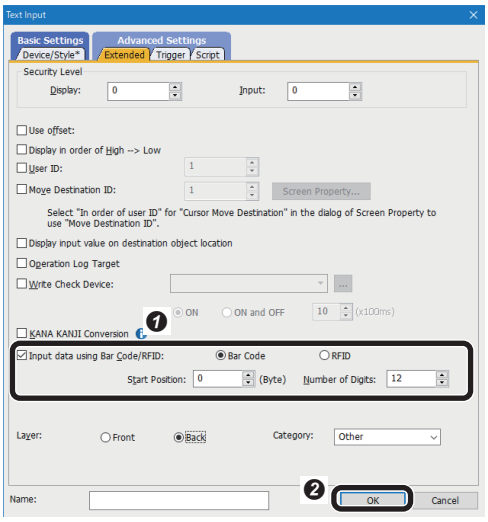
4. Place the object of an input character string.



❶ Place the character string object on the screen and double-click it.

5. Set the value of the input character string.





❶ Configure the setting of the input character string.

■The [Device/Style] tab

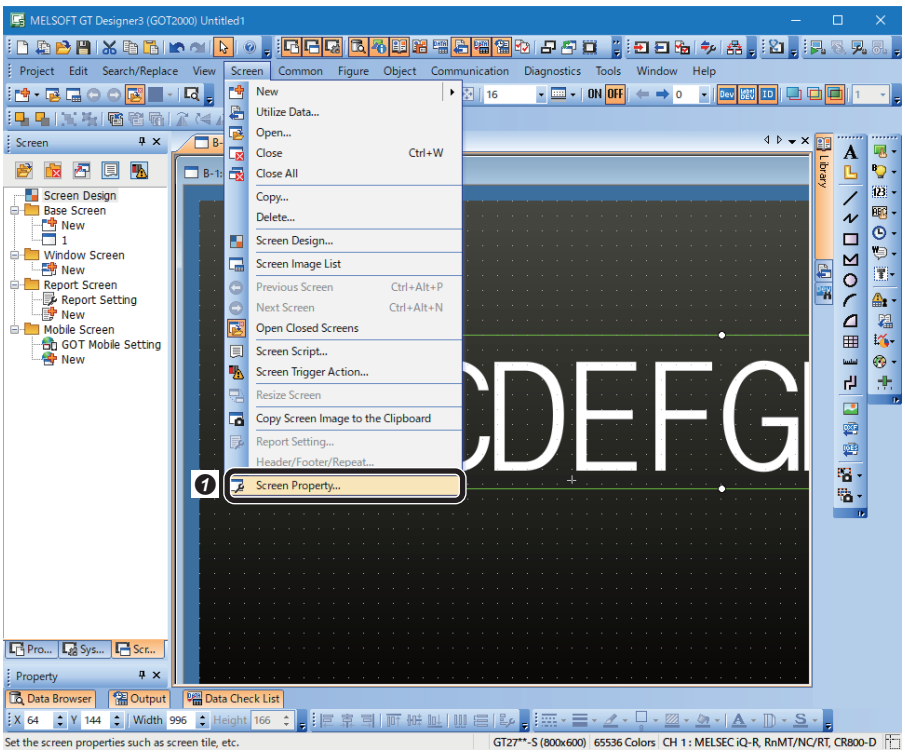
- Device: D0
- Digits: 12

■The [Extended] tab

- Select the checkbox of "Input data using Bar Code/RFID".
- Select "Bar Code".
- Number of Digits: 12

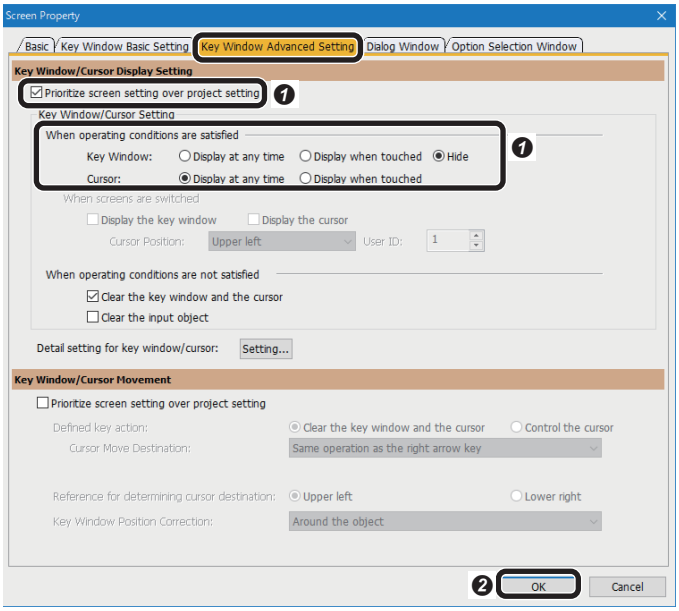
❷ Click the [OK] button.

6. Set a screen property.



❶ Select [Screen] ⇨ [Screen Property].

7. Configure the advanced settings of the key window.



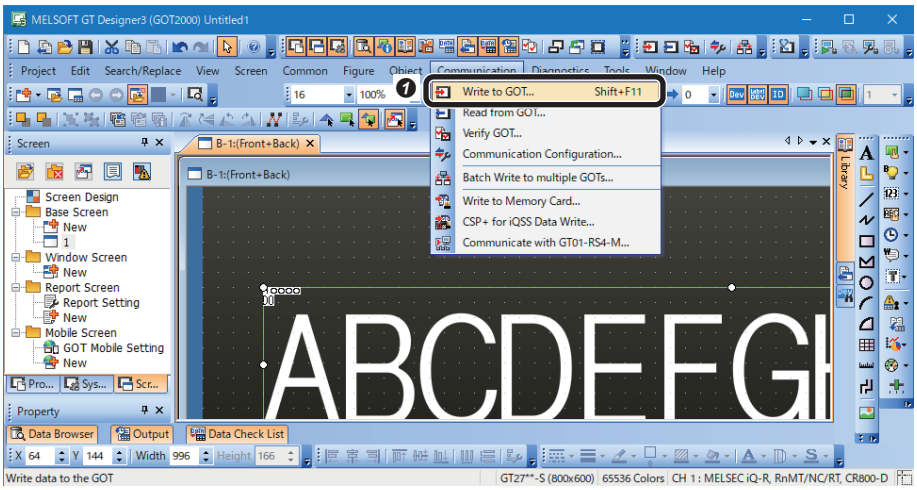
❶ Select the [Key Window Advanced Setting] tab and configure "Key Window/Cursor Display Setting".
- Select the checkbox of "Prioritize screen setting over project setting".
- Select "Hide" for "Key Window".
- Select "Display at any time" for "Cursor".

❷ Click the [OK] button.

Writing to the GOT

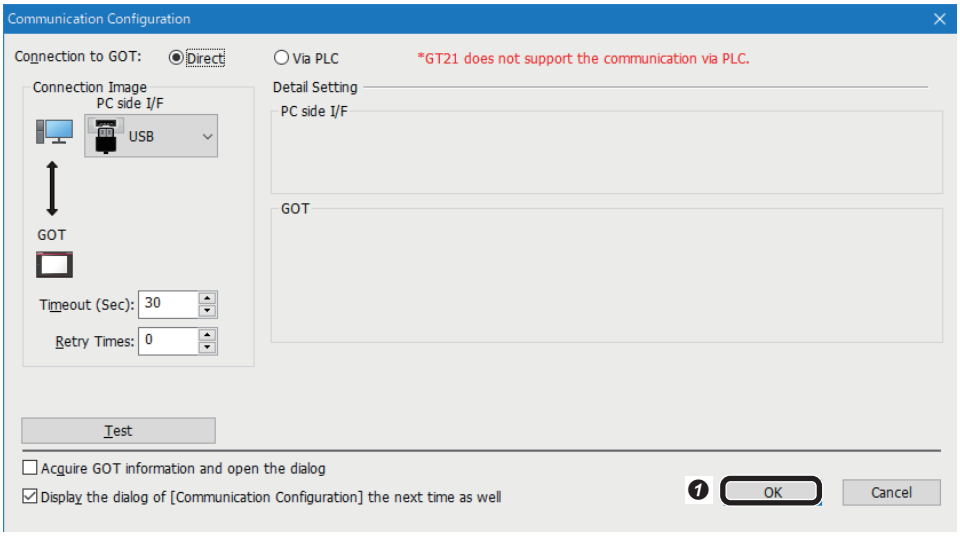
Write the settings to the GOT.

1. Display the "Communication Configuration" screen.



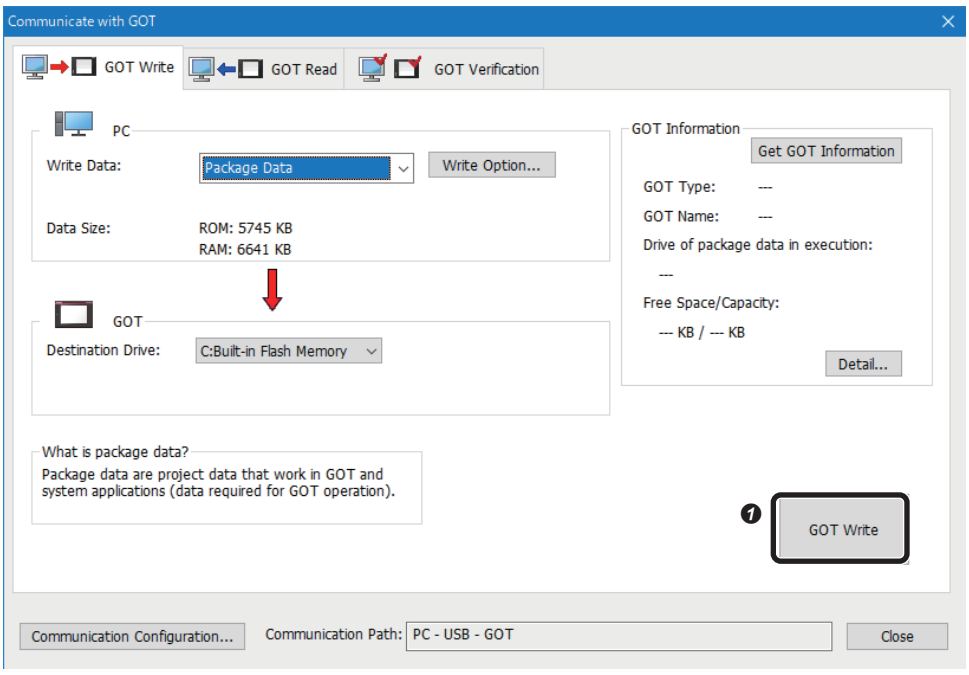
❶ Select [Communication] ⇨ [Write to GOT].

2. Check the communication configuration.



❶ Check "Direct" is selected for "Connection to GOT" and click the [OK] button.

3. Write to the GOT.



❶ Click the [GOT Write] button.

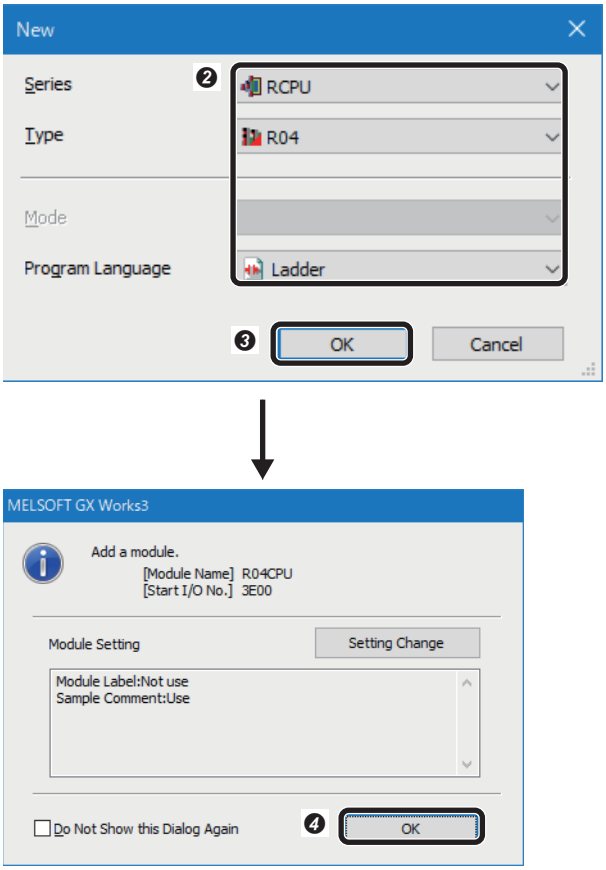
4.4 Setting a programmable controller

Set parameters of a programmable controller in an engineering tool.

Setting a programmable controller

Set parameters of a programmable controller.

1. Start an engineering tool.
2. Select a CPU module and a program language in the "New" screen.



❶ Select [Project] ⇨ [New].
The "New" screen appears.
❷ Set a CPU module and a program language.
- Series: RCPU
- Type: R04
- Program Language: Ladder

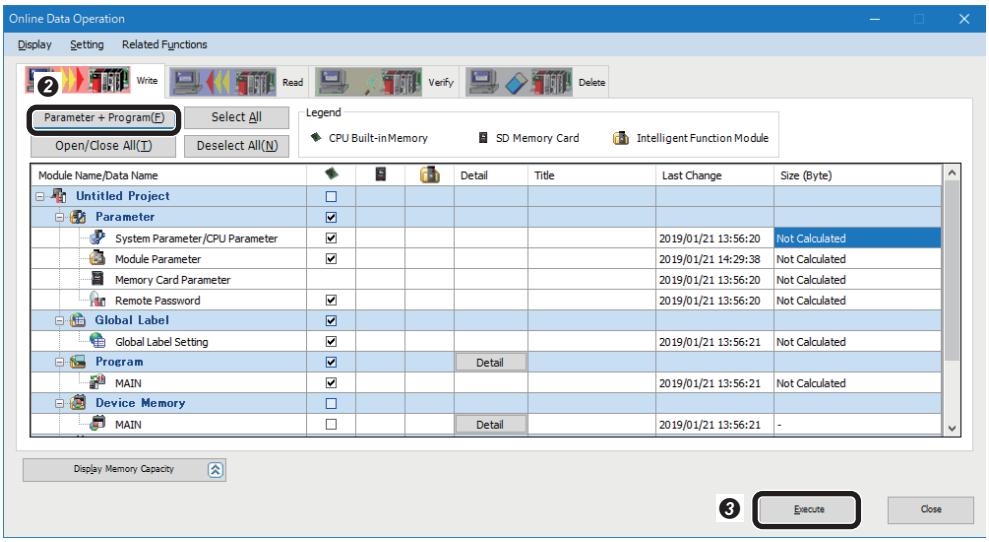
❸ Click the [OK] button.
❹ Click the [OK] button.

4.5 Writing Data to a Programmable Controller

Write the parameters set in an engineering tool to the programmable controller.

Writing to the programmable controller

1. Turn ON the programmable controller.
2. Write parameters to the programmable controller in the "Online Data Operation" screen.



❶ Select [Online] ⇨ [Write to PLC]. The "Online Data Operation" screen appears.
❷ Click the [Parameter + Program] button.
❸ Click the [Execute] button.

Restarting the programmable controller

After writing the parameters, reset the programmable controller and switch to RUN.

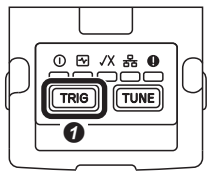
4.6 Checking Operations

Check operation by controlling the code reader using the programmable controller.

Checking read results

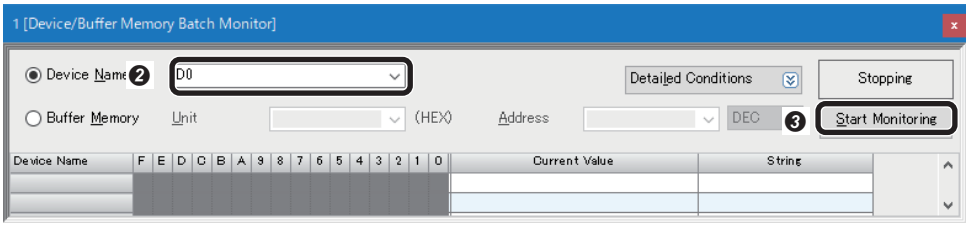
Check the read results of a QR Code in the "Device/Buffer Memory Batch Monitor" window of an engineering tool.

1. Press the [TRIG] button of the code reader.



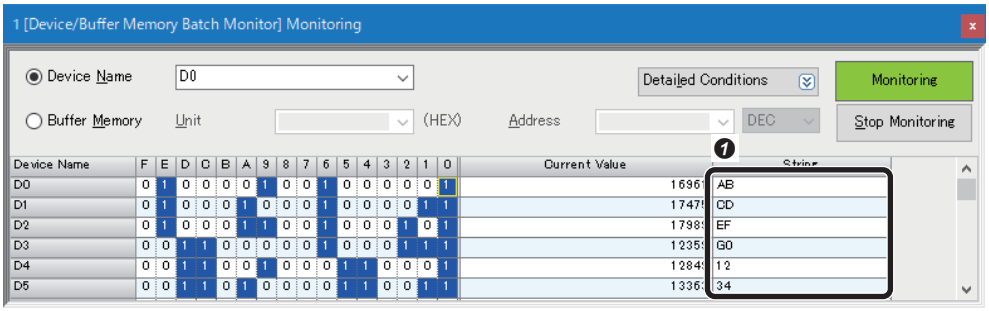
❶ Press the [TRIG] button of the code reader to read the target codes.

2. Start monitoring in the "Device/Buffer Memory Batch Monitor" window.



❶ Select [Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch Monitor]. The "Device/Buffer Memory Batch Monitor" window appears.
❷ Enter "D0" for "Device Name".
❸ Click the [Start Monitoring] button.

3. Check the read results.



❶ "D0" to "D5": Check "ABCDEFG01234" is displayed in "String".

4. Check the read results of the code reader are displayed in the GOT screen.

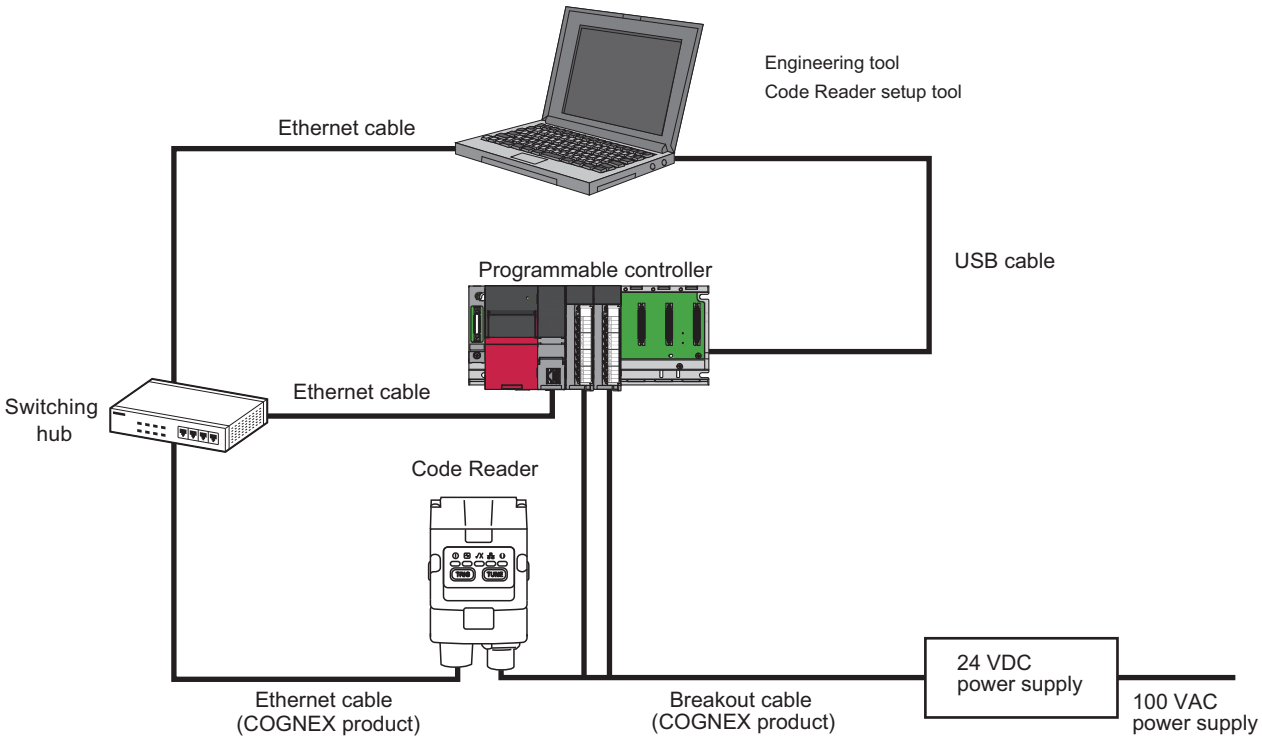
❶ Check "ABCDEFG01234" is displayed in the GOT screen.

5 I/O CONNECTION

This chapter explains the procedure for connecting a code reader to a programmable controller and controlling the code reader with an I/O connection.

5.1 System Configuration Example for Connecting a Code Reader

The following figure shows the system configuration for connecting a code reader.



Point

For details on the system configuration, refer to the following:

Code Reader CF26 User's Manual

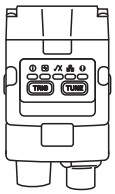
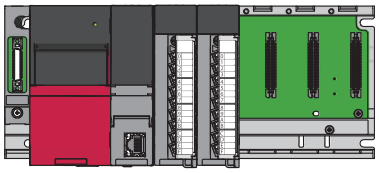
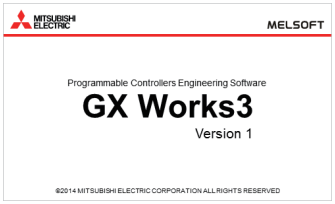
Code Reader CF37 User's Manual

Configurations

The devices used in the system configuration are as follows.

Required equipment

■ Mitsubishi Electric products

		
Code reader • CF26-SR	Programmable controller • CPU module: R04CPU • Input module: RX40C7 • Output module: RY40NT5P	Engineering tool • GX Works3

■ COGNEX products

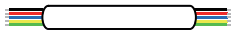
Code reader setup tool • DataMan Setup Tool for MELSENSOR*1	Ethernet cable • CCB-84901-2001-**(**: 01, 02, 05, 10, or 15)*2	Breakout cable • CCB-PWRIO-**(**: 05, 10, or 15)*3

*1 Download this product from the Mitsubishi Electric FA website.
www.MitsubishiElectric.co.jp/fa

*2 Cable length (0.6 m, 2 m, 5 m, 10 m, or 15 m), straight

*3 Cable length (5 m, 10 m, or 15 m), shielded twisted-pair cable, straight

■ Commercial products

				
Switching hub	Ethernet cable	USB cable (Type Mini-B)	24 VDC power supply	I/O wire

Connecting and wiring a code reader

The following explains the considerations and procedure for connecting a code reader to a programmable controller and connecting to an I/O connection.

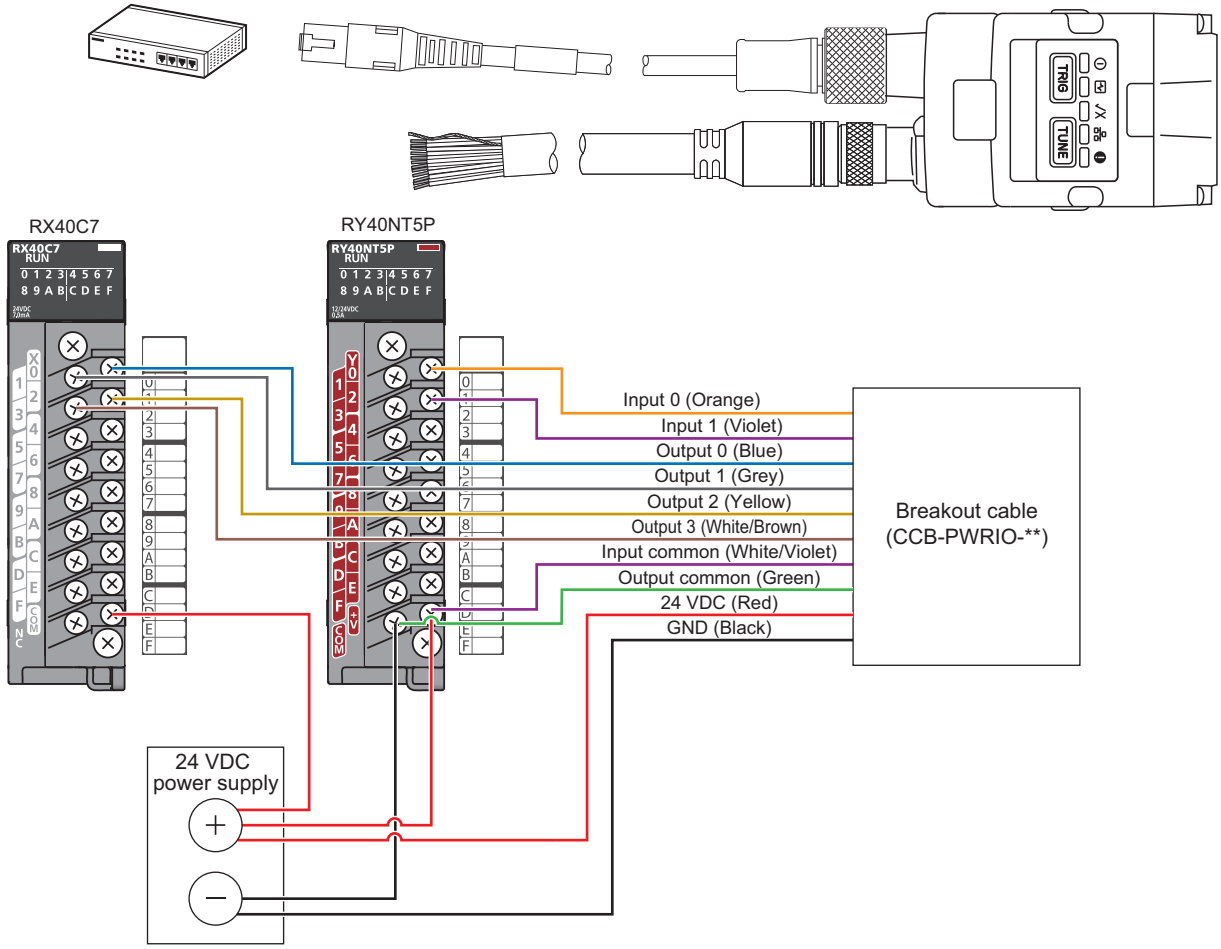
Ex.

Breakout cable: CCB-PWRIO-**(**: 05, 10, or 15)[*1]

[*1] Cable length (5 m, 10 m, or 15 m), shielded twisted-pair cable, straight

Precautions

- Check that a 24 VDC power supply is OFF when connecting a breakout cable to the power supply.
- Cut unused wires or protect them with insulating materials. Be careful not to contact with 24 VDC wires.
- A breakout cable and an Ethernet cable are designed to connect with their key aligned with the keyway of the connector on a code reader. Do not force the connections or damage may occur.
- When powering ON the system, turn ON the power of a code reader first, or at the same time as a programmable controller.



1. Connect a breakout cable to an input/output module.

For details on the connection with an input/output module, refer to the user's manual.

📖Code Reader CF26 User's Manual

📖Code Reader CF37 User's Manual

2. Connect the breakout cable to a 24 VDC power supply.

Connect the 24 VDC (red) of the cable to the positive terminal of the power supply, and the GND (black) to the negative terminal.

3. Connect the breakout cable to the power supply, I/O, and RS-232 connector of a code reader.

4. Connect an Ethernet cable to an Ethernet connector and a switching hub of the code reader.

5. Connect the code reader to a programmable controller and a personal computer via the switching hub.

6. Turn the power of the system ON.

5.2 Setting the Code Reader

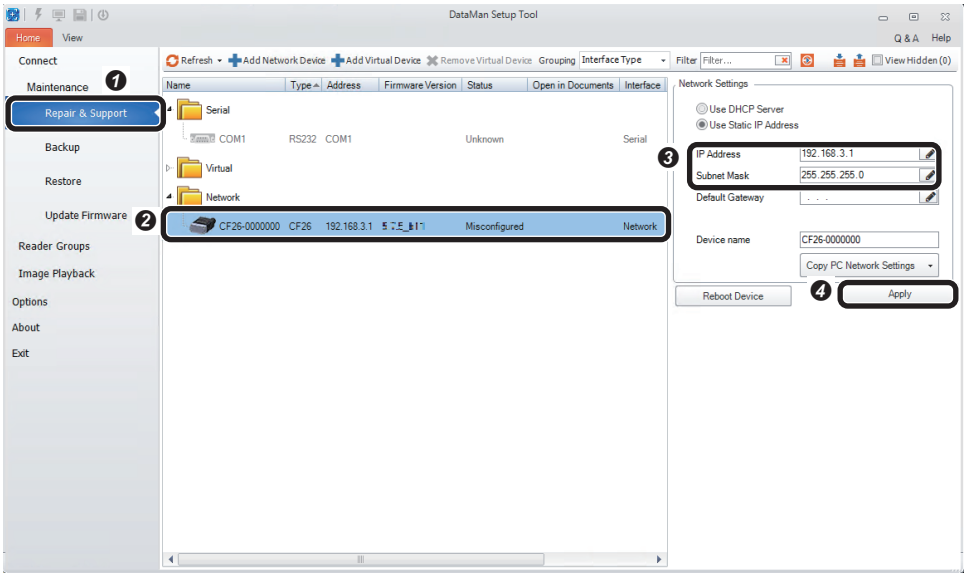
This section explains the procedures for connecting the code reader with an I/O connection and the settings for a symbol to be read and the means of communication.

Setting an IP address to a personal computer

Set the IP address (192.168.3.3) to a personal computer.

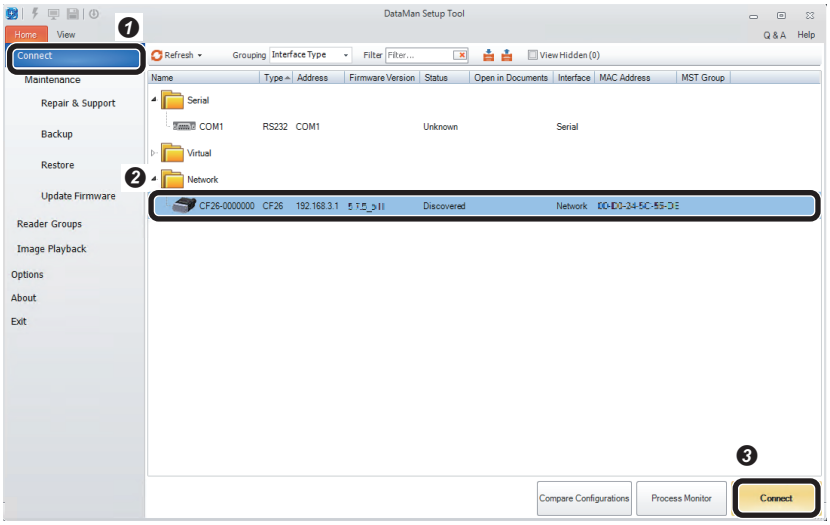
Connecting the code reader

1. Start DataMan Setup Tool for MELSENSOR.
2. Set an IP address and a subnet mask to the code reader.



❶ Select [Repair & Support].
❷ Select the code reader "CF26".
❸ Set an IP address and a subnet mask of the code reader in the "Network Settings" section.
 • IP Address: 192.168.3.1
 • Subnet Mask: 255.255.255.0
❹ Click the [Apply] button.
The code reader is restarted and the network settings are applied.

3. Connect to the code reader.

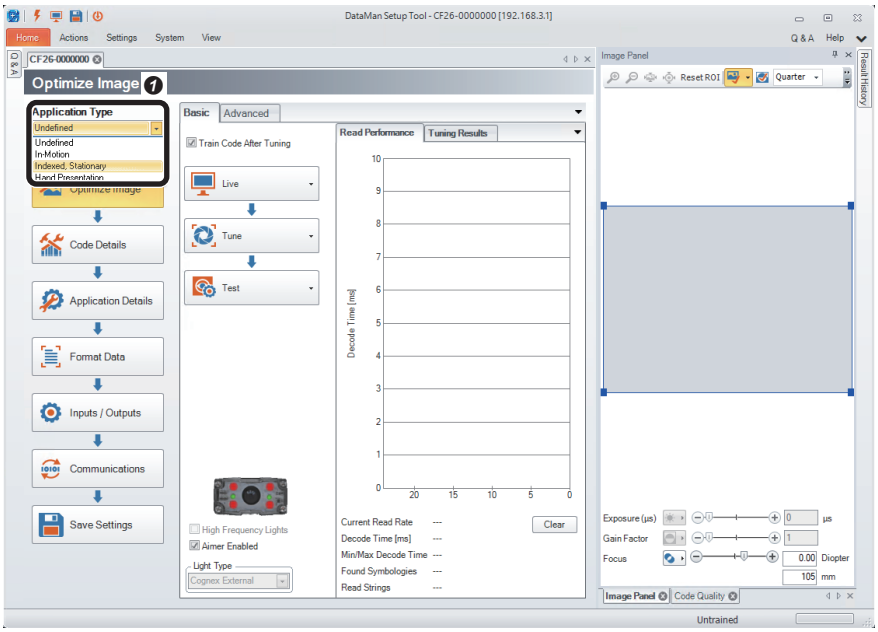


❶ Select [Connect].
❷ Select the code reader.
❸ Click the [Connect] button.

Setting the code reader

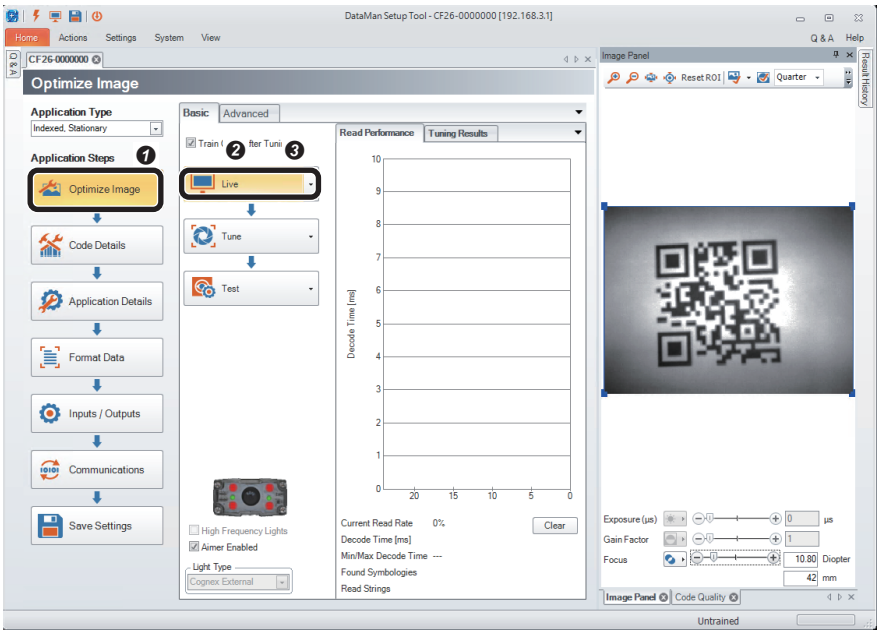
The following shows the procedure from setting to saving the code reader.

1. Set an application type.

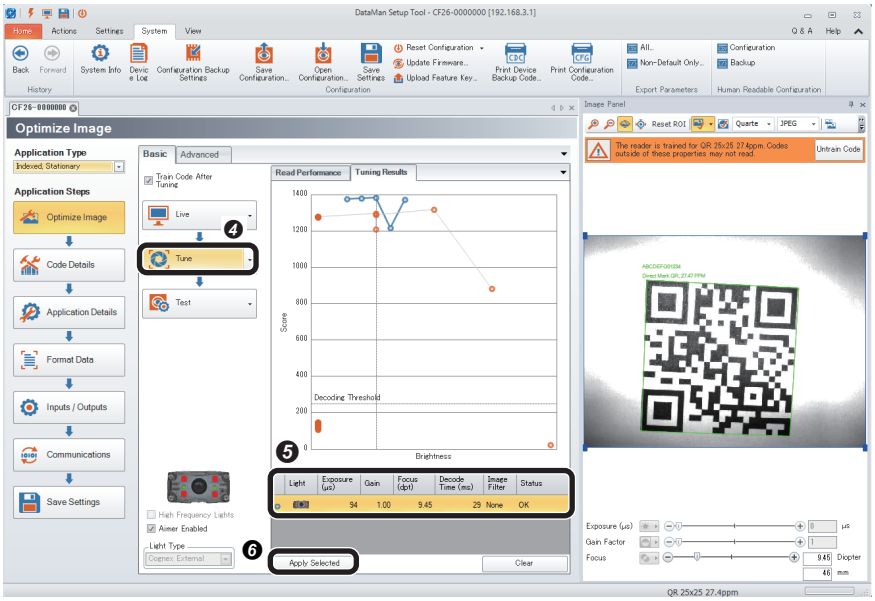


❶ Select "Indexed, Stationary".

2. Import a QR Code to be read in the "Optimize Image" step.



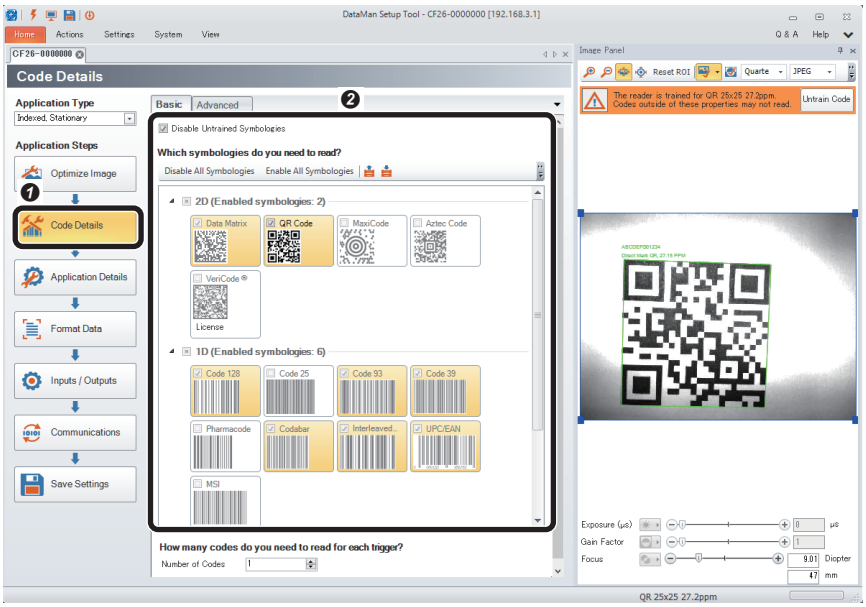
❶ Click the [Optimize Image] button.
❷ Click the [Live] button.
❸ When a QR Code to be read is displayed, click the [Live] button again.
- It is recommended to tune and optimize brightness under the environment that is similar to the actual operating environment.



❹ Click the [Tune] button.
❺ When tuning is completed, an candidate of the setting contents is displayed.
- The number of the displayed candidates varies depending on the work status or the combinations of lights.
- When clicking the candidate, the capturing condition can be checked in "Image Panel".
- If the reading target code still cannot be read even though the code is within the field of vision, the image is captured clearly, and tuning is completed, check that the symbol to be read is enabled in the "Code Details" step.

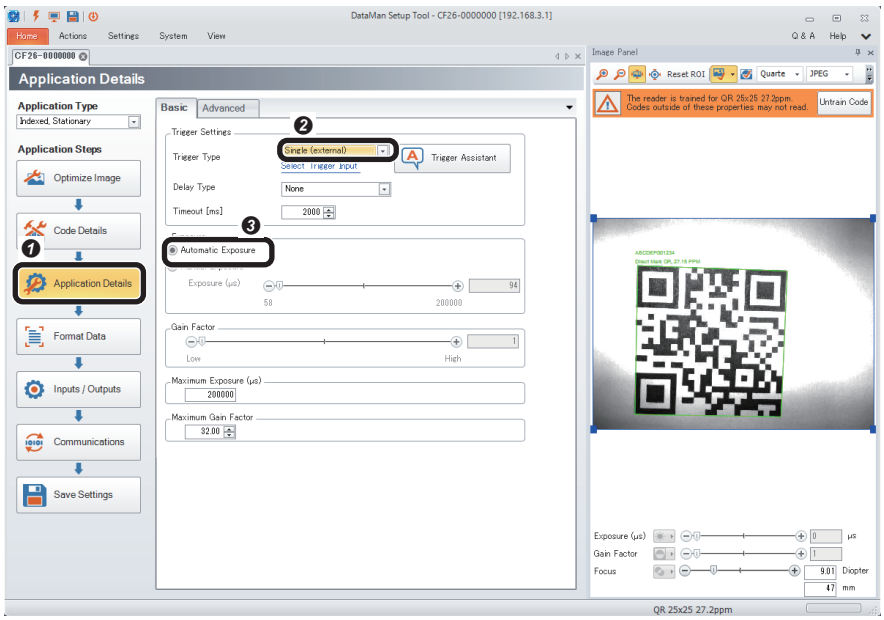
❻ By clicking the [Apply Selected] button, the selected settings are reflected to the code reader.

3. Check that symbols to be read are selected in the "Code Details" step.



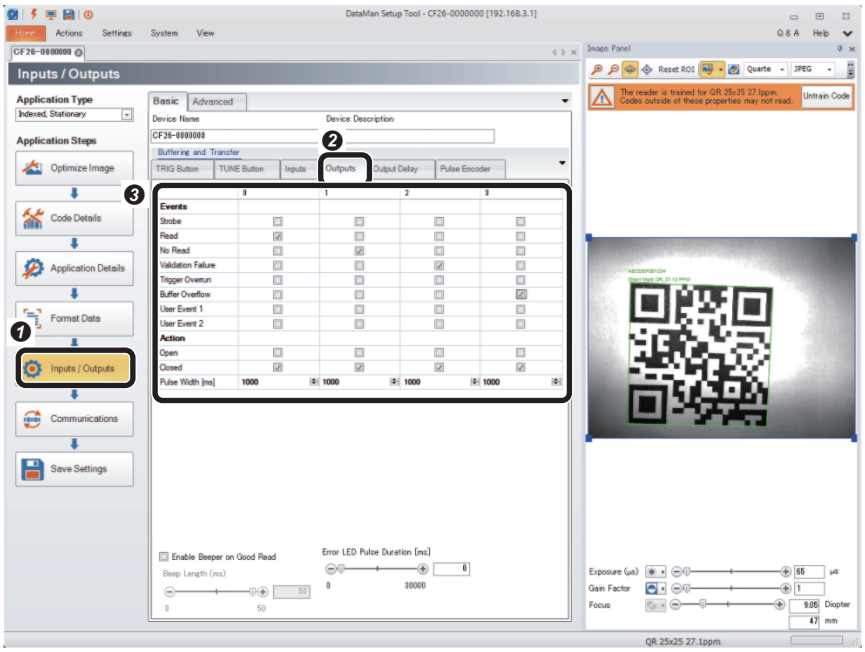
❶ Click the [Code Details] button.
❷ Check that the checkboxes of the symbols to be read are selected.
- Any symbols can be selected by unselecting the checkbox of "Disable Untrained Symbologies."
- The scanning speed can be improved when unselecting the checkboxes of symbols other than the reading target.

4. Set a trigger type and an exposure method in the "Application Details" step.



❶ Click the [Application Details] button.
❷ Select "Single (external)" for "Trigger Type" in "Trigger Settings".
❸ Select "Automatic Exposure" for "Exposure".

5. Set inputs and outputs (I/O connection) in the "Inputs/Outputs" step.



❶ Click the [Inputs/Outputs] button.

■The [Outputs] tab

❷ Select the [Outputs] tab.

❸ Set "Events" and "Action" in the table.

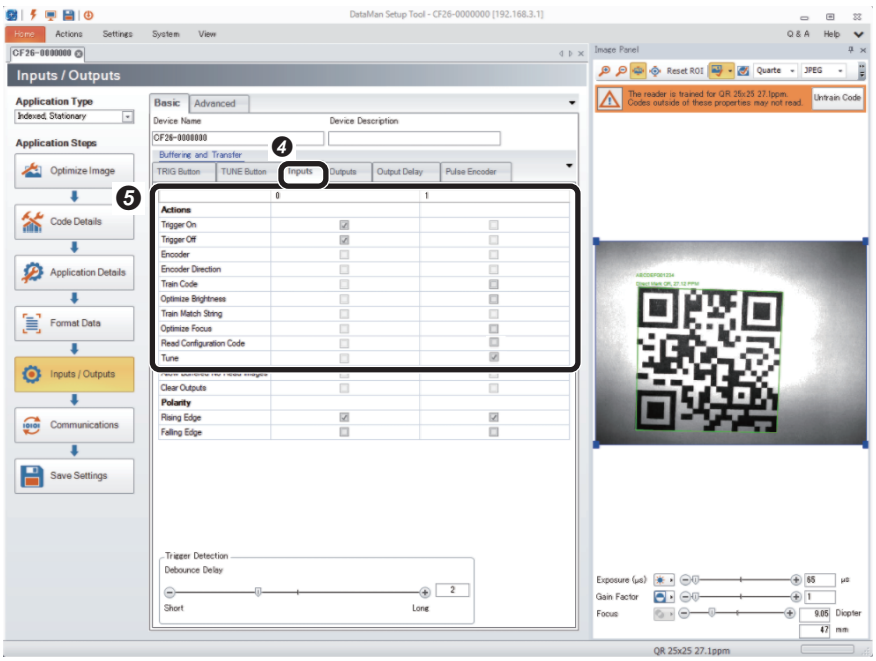
"Event"

- Read: Select the checkbox of '0'.
- No Read: Select the checkbox of '1'.
- Validation Failure: Select the checkbox of '2'.
- Buffer Overflow: Select the checkbox of '3'.

"Action"

- Closed: Select all the checkboxes from '0' to '3'.
- Pulse Width [ms]: Set all the values to '1000' in the columns from '0' to '3'.

Set the pulse width according to the scan time of a program and a programmable controller.



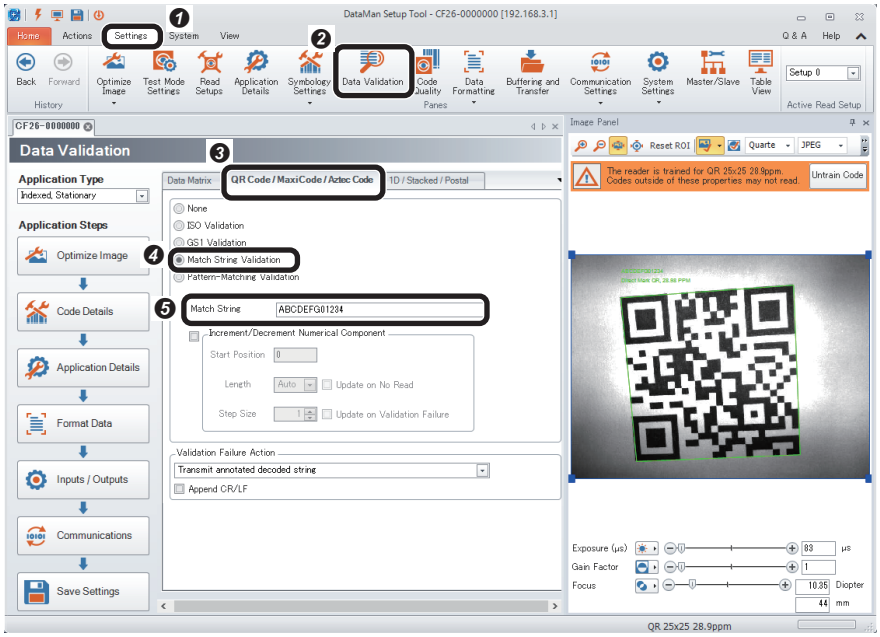
■The [Inputs] tab

❹ Select the [Inputs] tab.

❺ Set "Actions" in the table.

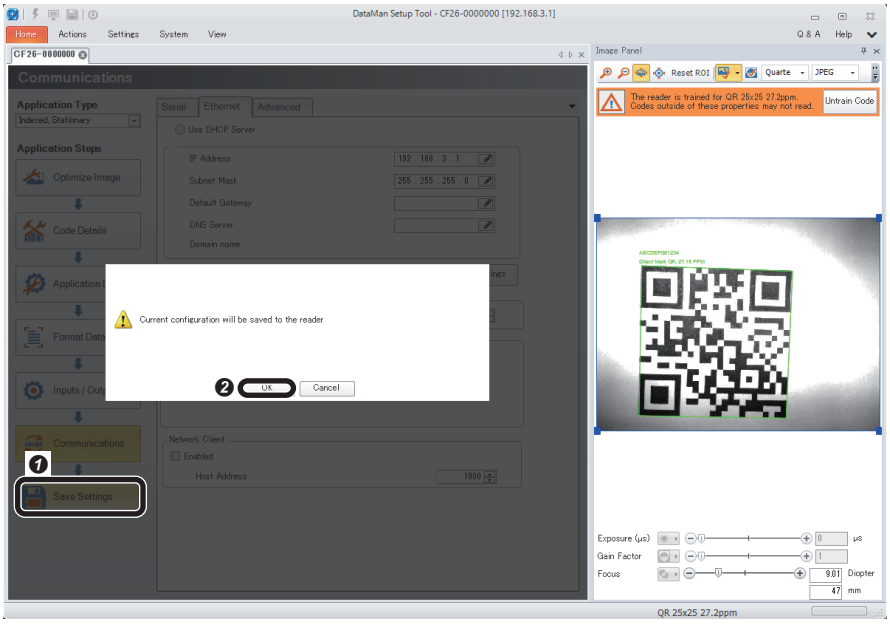
- Trigger On: Select the checkbox of '0'.
- Trigger Off: Select the checkbox of '0'.
- Tune: Select the checkbox of '1'.

6. Configure the settings for data validation



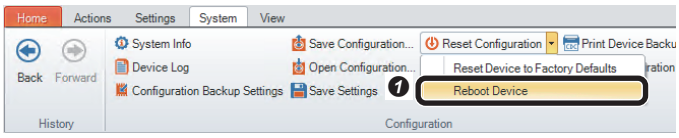
❶ Select the [Settings] tab
❷ Click the [Data Validation] button.
❸ Select the [QR Code/MaxiCode/Aztec Code] tab.
❹ Select "Match String Validation".
❺ Enter "ABCDEFG01234" in "Match String".

7. Save the settings in the code reader in the "Save Settings" step.



❶ Click the [Save Settings] button.
❷ Click the [OK] button.

8. Restart the code reader.



❶ Select [System] ⇨ [Reset Configuration] ⇨ [Reboot Device].
The code reader is restarted.

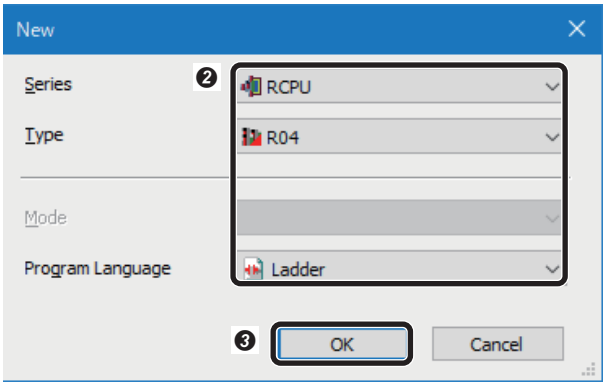
5.3 Setting a Programmable Controller

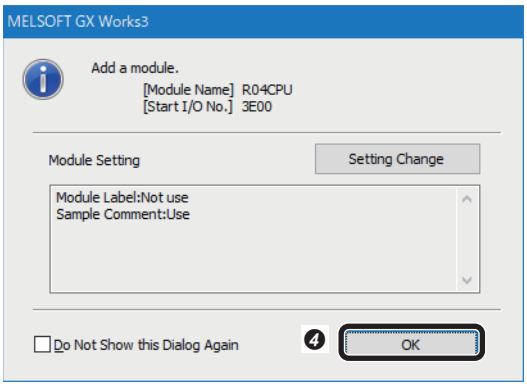
Set parameters of a programmable controller and create a program in an engineering tool.

Setting a programmable controller

Set parameters of a programmable controller.

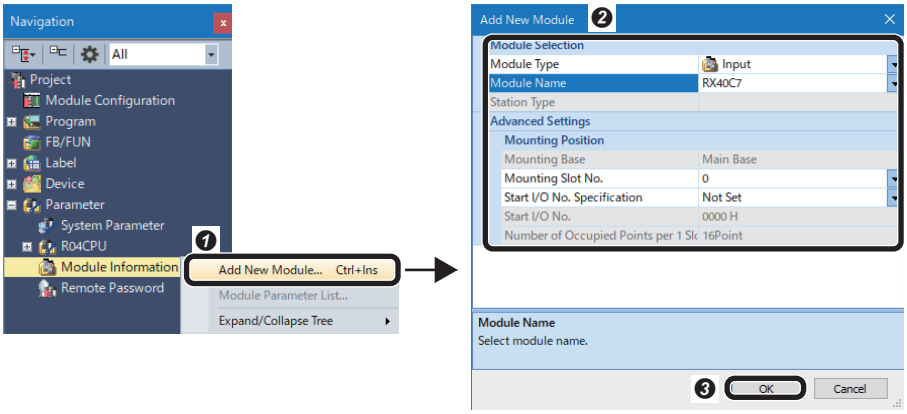
1. Start an engineering tool.
2. Select a CPU module and a program language in the "New" screen.





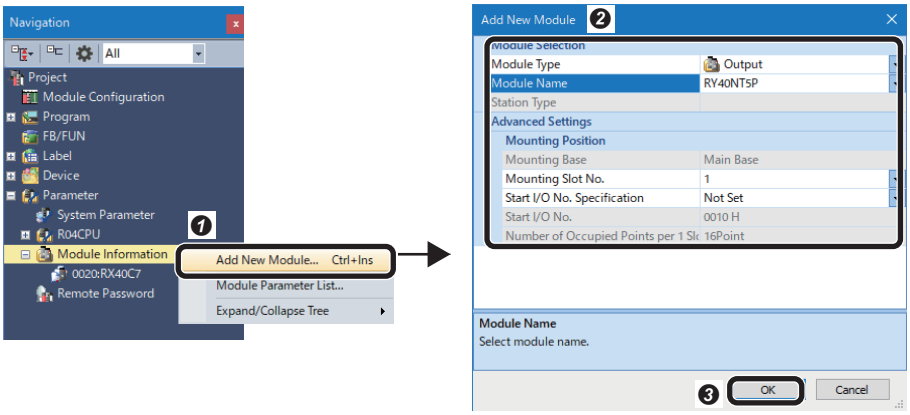
❶ Select [Project] ⇨ [New].
The "New" screen appears.
❷ Set a CPU module and a program language.
• Series: RCPU
• Type: R04
• Program Language: Ladder
❸ Click the [OK] button.
❹ Click the [OK] button.

3. Add an input module in the "Add New Module" screen.



❶ Right-click "Module Information" in the "Navigation" window, and select [Add New Module] in the shortcut menu.
❷ Set the items in "Module Selection".
• Module Type: Input
• Module Name: RX40C7
• Mounting Slot No.: 0
• Start I/O No. Specification: Not Set
❸ Click the [OK] button.

4. Add an output module.



❶ Right-click "Module Information" in the "Navigation" window, and select [Add New Module] in the shortcut menu.
❷ Set the items in "Module Selection".
- Module Type: Output
- Module Name: RX40NT5P
- Mounting Slot No.: 1
- Start I/O No. Specification: Not Set

❸ Click the [OK] button.

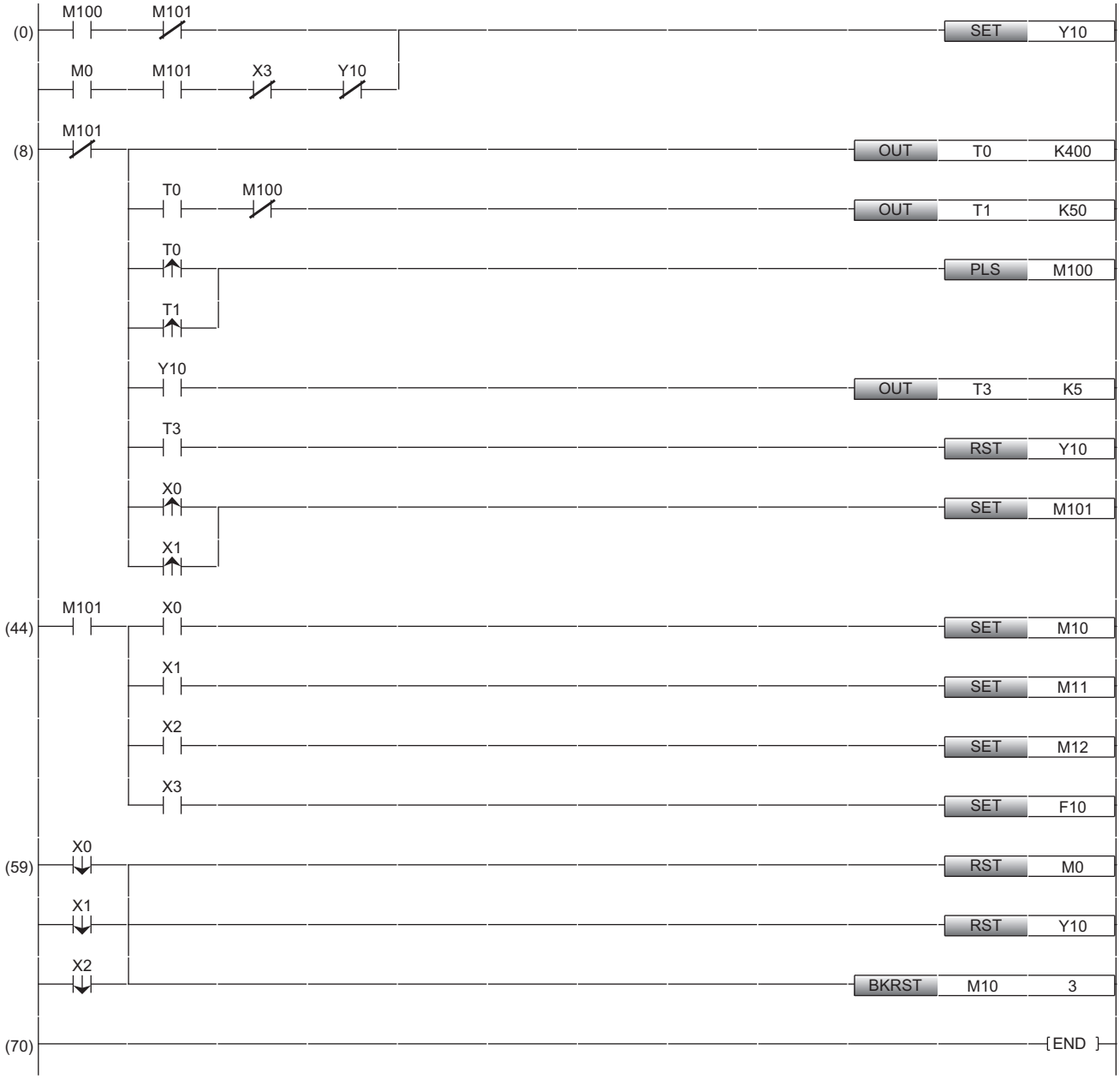
Creating a program

Create a program for controlling the code reader by using input and output devices.

Devices used in the program

Device	Device name	Description
X0	Read	This device is turned ON when a code can be read from the captured image and passed validation. • ON: Succeeded to read a code and passed validation • OFF: Failed to read a code or failed validation
X1	No Read	This device is turned ON when a code cannot be read from the captured image. • ON: Failed to read a code • OFF: Succeeded to read a code
X2	Failed Validation	This device is turned ON when a code can be read from the captured image but failed validation. • ON: Succeeded to read a code but failed validation • OFF: Failed to read a code or passed validation
X3	Buffer Overflow	This device is turned ON when a buffer overflow occurs.
Y10	Trigger	An image is captured when this device is turned ON. To capture an image again, turn the device OFF once and then turn ON.
M0	Trigger command	'Trigger'(Y10) is turned ON and an image is captured when this device is turned ON.
M10	Read flag	This device is turned ON when a code can be read from the captured image and passed validation. • ON: Succeeded to read a code and passed validation • OFF: Failed to read a code or failed validation
M11	No Read flag	This device is turned ON when a code cannot be read from the captured image. • ON: Failed to read a code • OFF: Succeeded to read a code
M12	Failed Validation flag	This device is turned ON when a code can be read from the captured image but failed validation. • ON: Succeeded to read a code but failed validation • OFF: Failed to read a code or passed validation
F10	Buffer Overflow flag	This device is turned ON when a buffer overflow occurs.
T0	Startup waiting timer	A timer for waiting for the code reader to start up.
T1	I/O connection establishment check timer	A timer used for checking I/O connection establishment.
T3	Trigger off timer	A timer used for turning OFF the trigger for capturing an image.
M100	I/O connection establishment check	This device is turned ON to check whether the I/O connection is established.
M101	I/O connection status	This device is turned ON when the I/O connection is established between the code reader and programmable controller.

Program example



(0): Request the start of the image capture to the code reader ('Trigger'(Y10) is turned ON).

(8): Monitor the I/O connection status between the code reader and programmable controller.

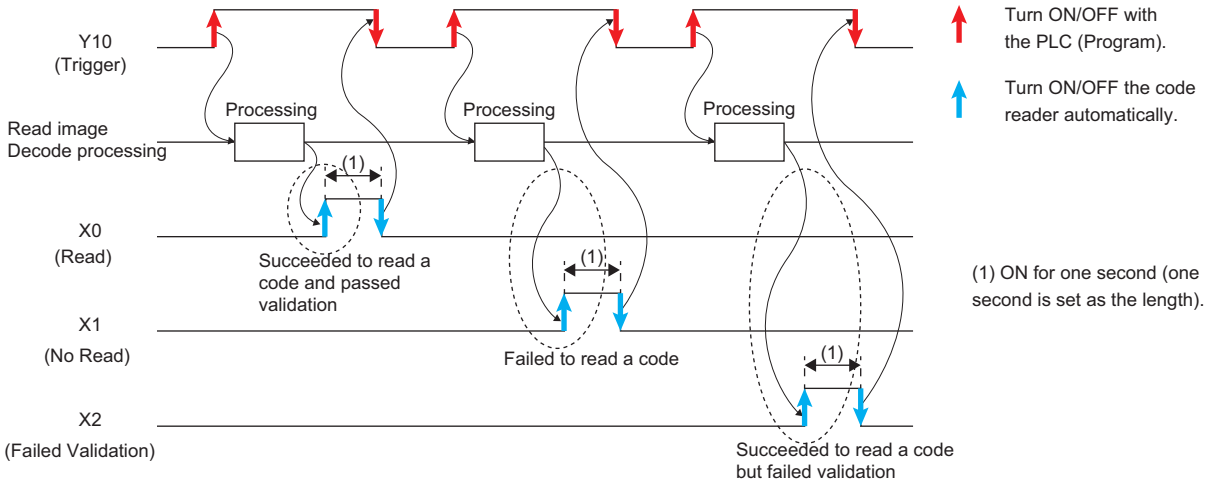
(44): Process the results from the code reader as follows:

- When a code can be read from the captured image or passed validation, 'Read flag' (M10) is turned ON.
- When codes cannot be read from the captured image, 'No Read flag' (M11) is turned ON.
- When a code can be read from the captured image but failed validation, 'Failed Validation flag' (M12) is turned ON.
- When a buffer overflow occurs, the annunciator F10 is turned ON.

(59): The processing for the completion of decoding of the code reader is performed.

Timing chart of a trigger

The following figure shows the timing chart.

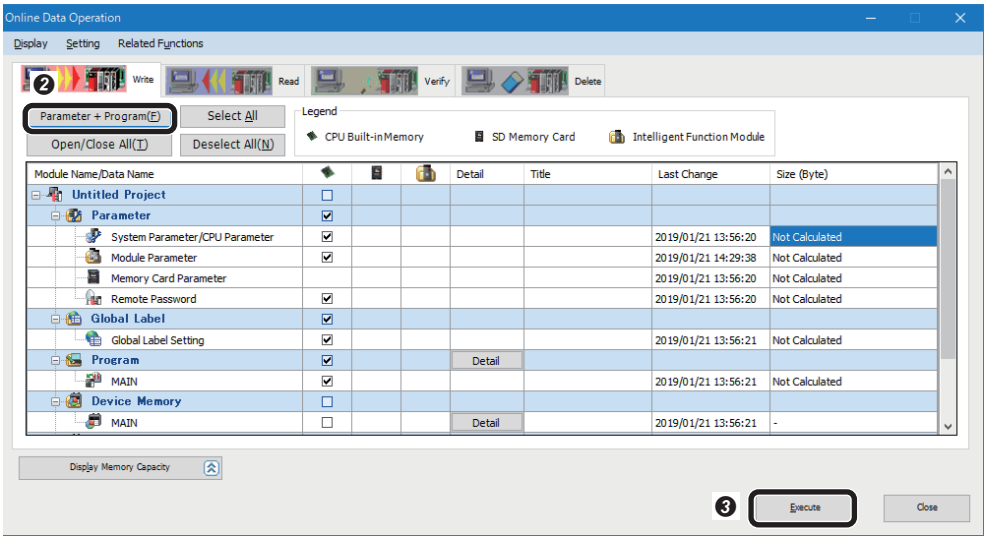


5.4 Writing Data to a Programmable Controller

Write the parameters and program set in an engineering tool to the programmable controller.

Writing to the programmable controller

1. Turn ON the programmable controller.
2. Write parameters and program to the programmable controller in the "Online Data Operation" screen.



❶ Select [Online] ⇨ [Write to PLC]. The "Online Data Operation" screen appears.
❷ Click the [Parameter + Program] button.
❸ Click the [Execute] button.

Restarting the programmable controller

After writing the parameters and program, reset the programmable controller and switch to RUN.

5.5 Checking Operations

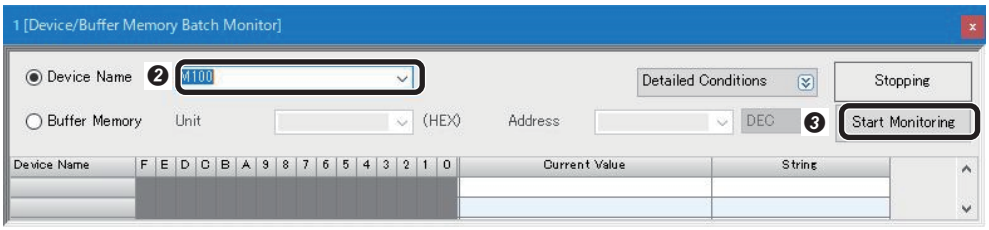
Check operation by controlling the code reader using the programmable controller.

Use a created program to check the operation. (☞ Page 106 Creating a program)

Checking the communication status

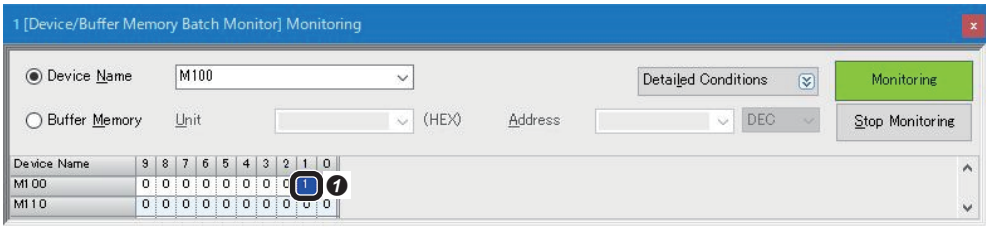
Check the communication status in the "Device/Buffer Memory Batch Monitor" window of an engineering tool.

1. Start monitoring in the "Device/Buffer Memory Batch Monitor" window.



❶ Select [Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch Monitor]. The "Device/Buffer Memory Batch Monitor" window appears.
❷ Enter "M100" for "Device Name."
❸ Click the [Start Monitoring] button.

2. Check the communication status.

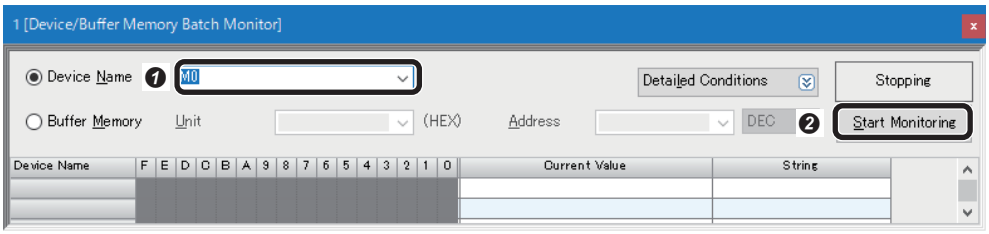


❶ Check the communication status. Check that 'I/O connection status' (M101) is turned ON.

Checking read results

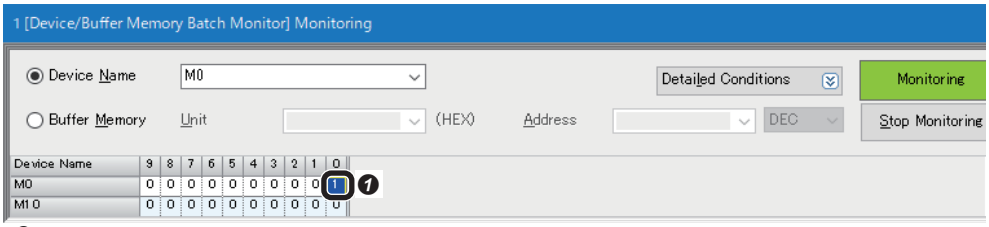
Check the read results of a QR Code.

1. Start monitoring.



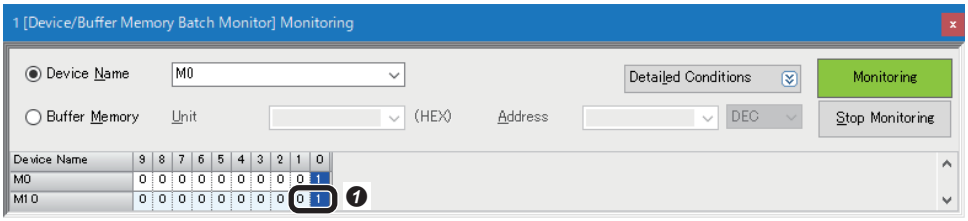
❶ Enter "M0" for "Device Name."
❷ Click the [Start Monitoring] button.

2. Turn ON a trigger.



❶ Turn 'Trigger command' (M0) ON. 'Trigger' (Y10) is turned ON.

3. Check the read results.



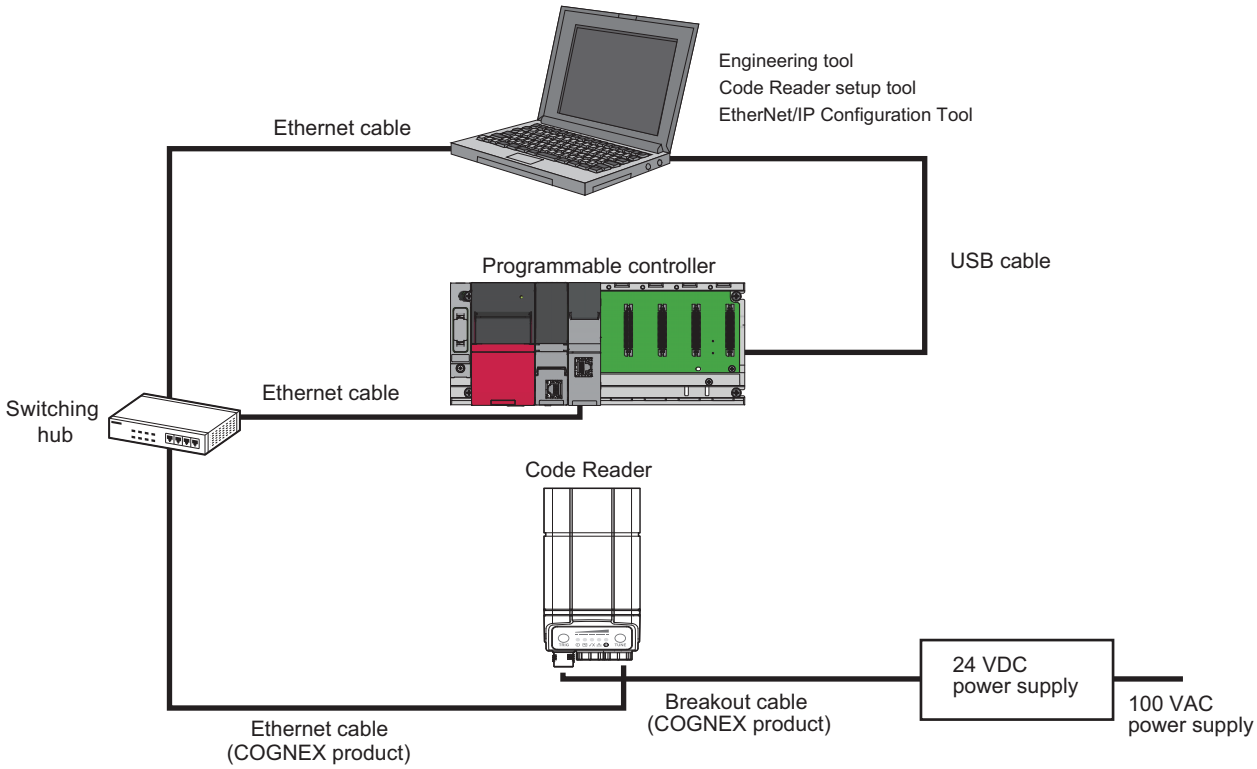
❶ Check the read results.
- 'Read flag' (M10): This device is turned ON when a code can be read from the captured image and passed validation.
- 'No Read flag' (M11): This device is turned ON when a code cannot be read from the captured image.

6 EtherNet/IP CONNECTION

This chapter explains the procedure for connecting a code reader to a programmable controller and controlling the code reader with an EtherNet/IP connection.
Only the CF37 supports an EtherNet/IP connection.

6.1 System Configuration Example for Connecting a Code Reader

The following figure shows the system configuration for connecting a code reader.



Point

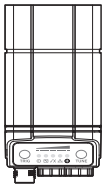
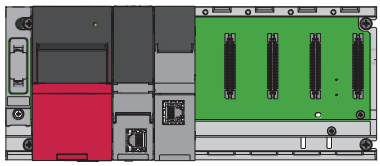
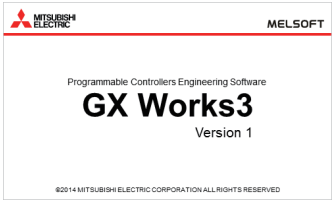
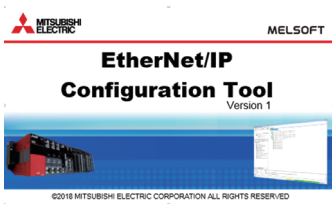
For details on the system configuration, refer to the following:
Code Reader CF37 User's Manual

Configurations

The devices used in the system configuration are as follows.

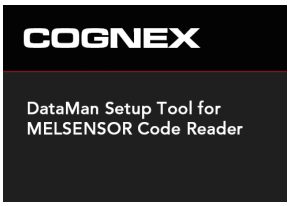
Required equipment

■ Mitsubishi Electric products

	
Code reader • CF37-SR	Programmable controller • CPU module: R04CPU • EtherNet/IP network interface module: RJ71EIP91
	
Engineering tool • GX Works3	EtherNet/IP network configuration tool*1 • EtherNet/IP Configuration Tool for RJ71EIP91 (EtherNet/IP Configuration Tool)

*1 Download this product from the Mitsubishi Electric FA website.
www.MitsubishiElectric.co.jp/fa

■ COGNEX products

			
EDS file • EDS file for a code reader CF37*1	Code reader setup tool • DataMan Setup Tool for MELSENSOR*1	Ethernet cable • CCB-84901-2001-**(**: 01, 02, 05, 10, or 15)*2	Breakout cable • CCB-PWRIO-**(**: 05, 10, or 15)*3

*1 Download this product from the Mitsubishi Electric FA website.
www.MitsubishiElectric.co.jp/fa
*2 Cable length (0.6 m, 2 m, 5 m, 10 m, or 15 m), straight
*3 Cable length (5 m, 10 m, or 15 m), shielded twisted-pair cable, straight

■ Commercial products

Switching hub	Ethernet cable	USB cable (Type Mini-B)	24 VDC power supply

Connecting and wiring a code reader

The following explains the considerations and procedure for connecting a code reader to a programmable controller and connecting to an EtherNet/IP connection.

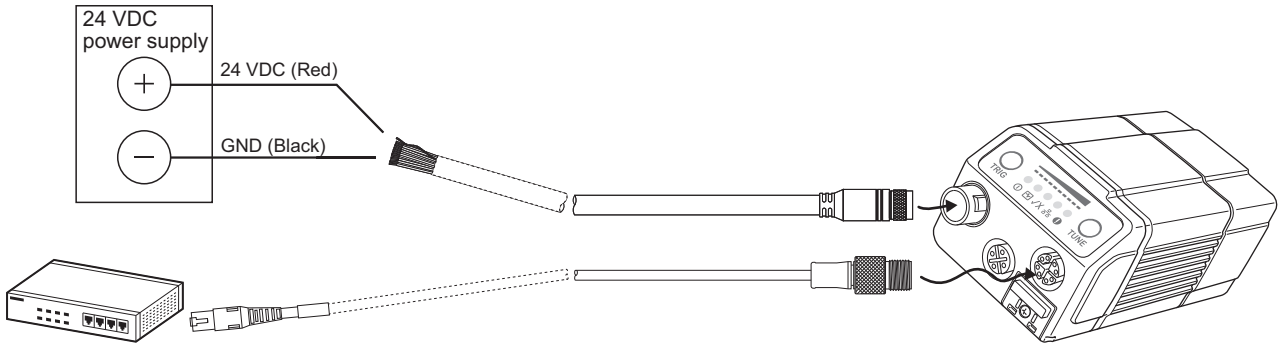
Ex.

Breakout cable: CCB-PWRIO-**(**: 05, 10, or 15)[*1]

[*1] Cable length (5 m, 10 m, or 15 m), shielded twisted-pair cable, straight

Precautions

- Check that a 24 VDC power supply is OFF when connecting a breakout cable to the power supply.
- Cut unused wires or protect them with insulating materials. Be careful not to contact with 24 VDC wires.
- A breakout cable and an Ethernet cable are designed to connect with their key aligned with the keyway of the connector on a code reader. Do not force the connections or damage may occur.
- When powering ON the system, turn ON the power of a programmable controller first, or at the same time as a code reader.



1. Connect the breakout cable to a 24 VDC power supply.

Connect the 24 VDC (red) of the cable to the positive terminal of the power supply, and the GND (black) to the negative terminal.

2. Connect the breakout cable to the power supply, I/O, and RS-232 connector of a code reader.

3. Connect an Ethernet cable to an Ethernet connector and a switching hub of the code reader.

4. Connect the code reader to a programmable controller and a personal computer via the switching hub.

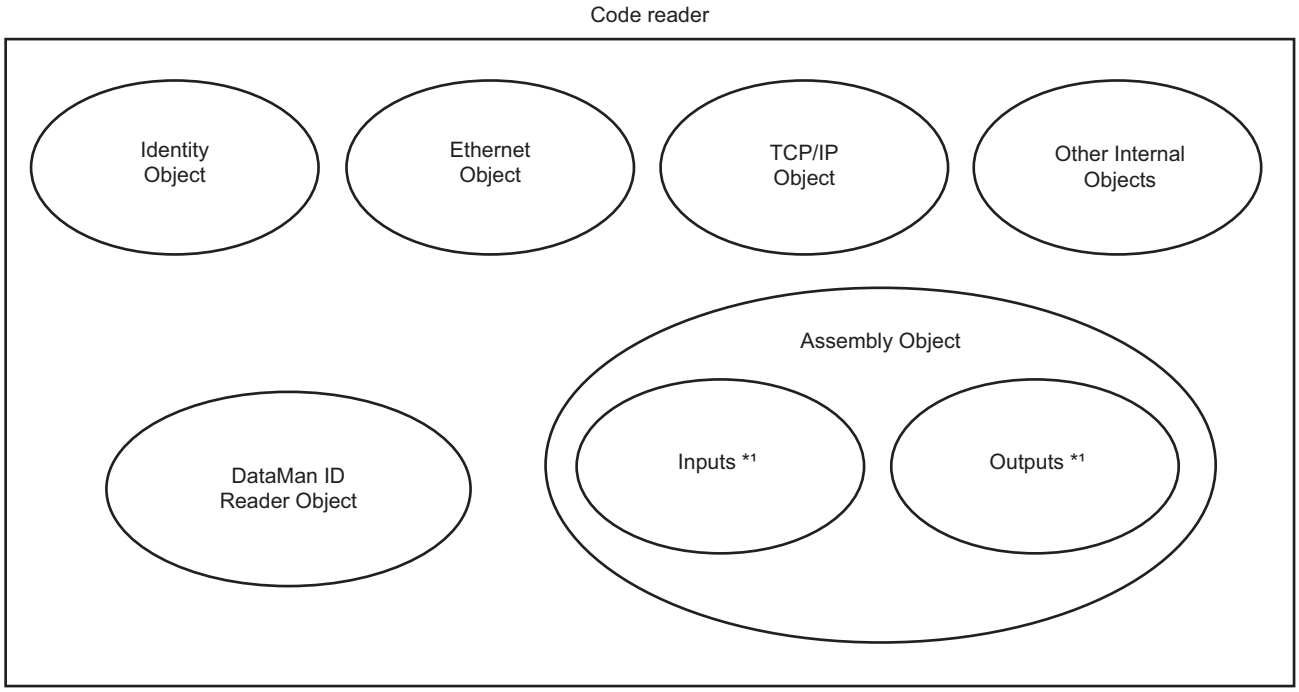
5. Turn the power of the system ON.

6.2 Basic Operations for an EtherNet/IP Connection

Overview

An EtherNet/IP connection uses the following object model.

The DataMan ID Reader Object included in this object model enables to use data such as a trigger, status, and result.



*1 For details, refer to the following:

☞ Page 117 Input/Output Assemblies used for cyclic (Implicit) communications

The DataMan ID Reader Object consists of attributes (data) and services (functions).

For details on attributes and services, refer to DataMan® Industrial Protocols Manual.

DataMan® Industrial Protocols Manual can be opened by clicking "CF Industrial Protocols Manual" in the help of DataMan Setup Tool for MELSENSOR.

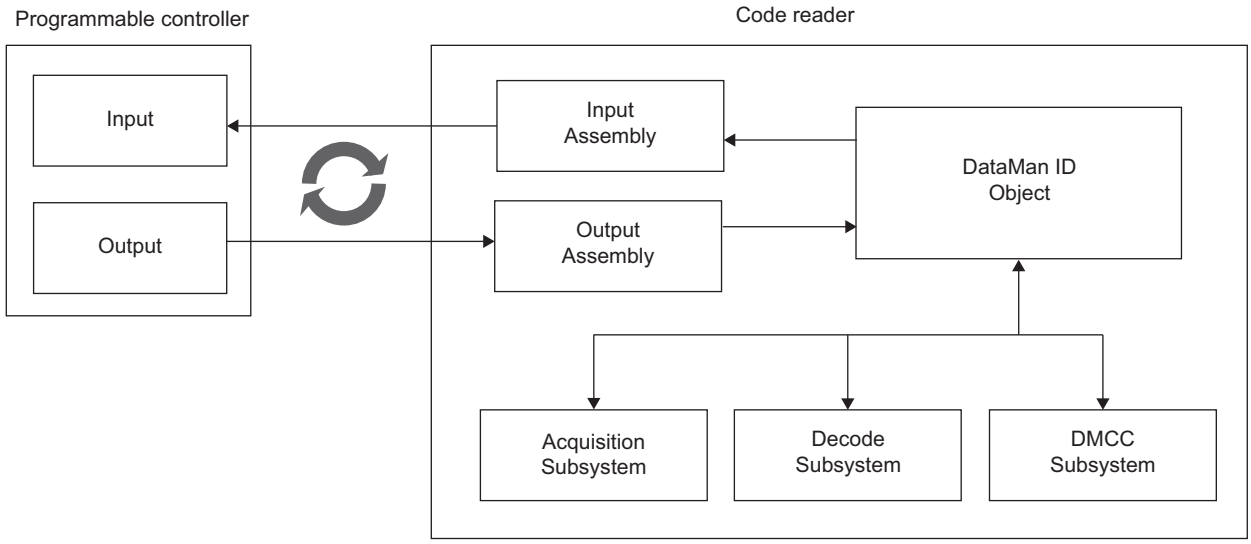
Communication methods

An EtherNet/IP connection has two types of the communication methods: cyclic (Implicit) communications and message (Explicit) communications.

■ Cyclic (Implicit) communications

Cyclic (Implicit) communications are the method where data communications are periodically performed with the set interval by using the Assembly Object.

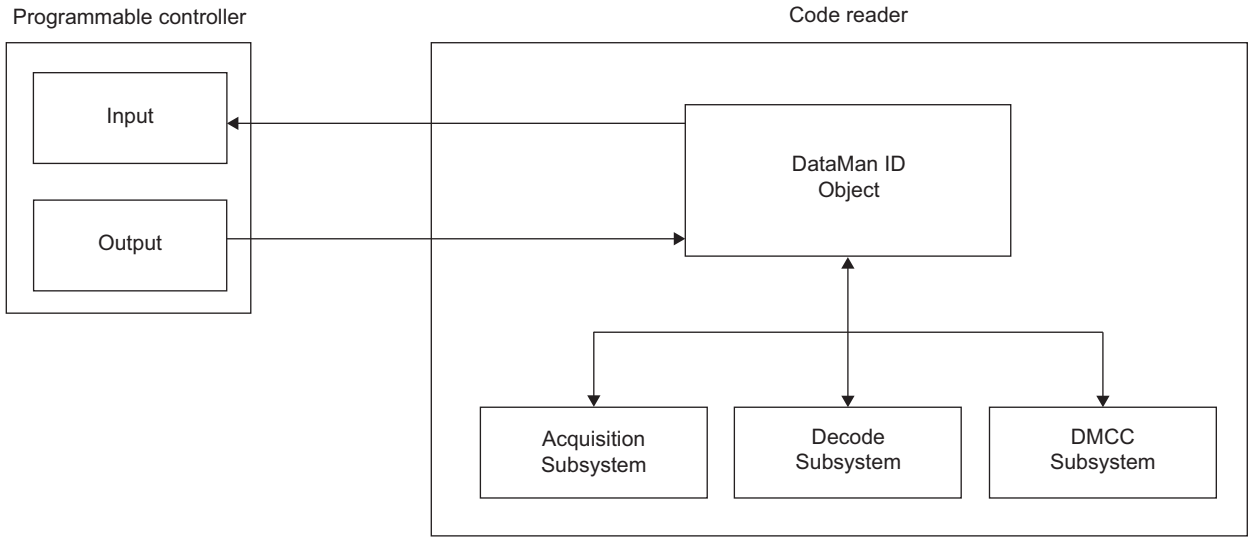
Some attributes of the DataMan ID Reader Object are exposed in the Assembly Object.



■ Message (Explicit) communications

Message (Explicit) communications are the method where a message is sent to a specific device (code reader) when desired, and the device (code reader) that received the message sends a response.

Attributes can be accessed by using the services of the DataMan ID Reader Object via message (Explicit) communications.



Point

An EtherNet/IP network interface module (RJ71EIP91) is used for an EtherNet/IP connection between a programmable controller and a code reader.

For details on an RJ71EIP91, refer to the following:

📖MELSEC iQ-R EtherNet/IP Network Interface Module User's Manual (Startup)

Basic operation process for cyclic (Implicit) communications

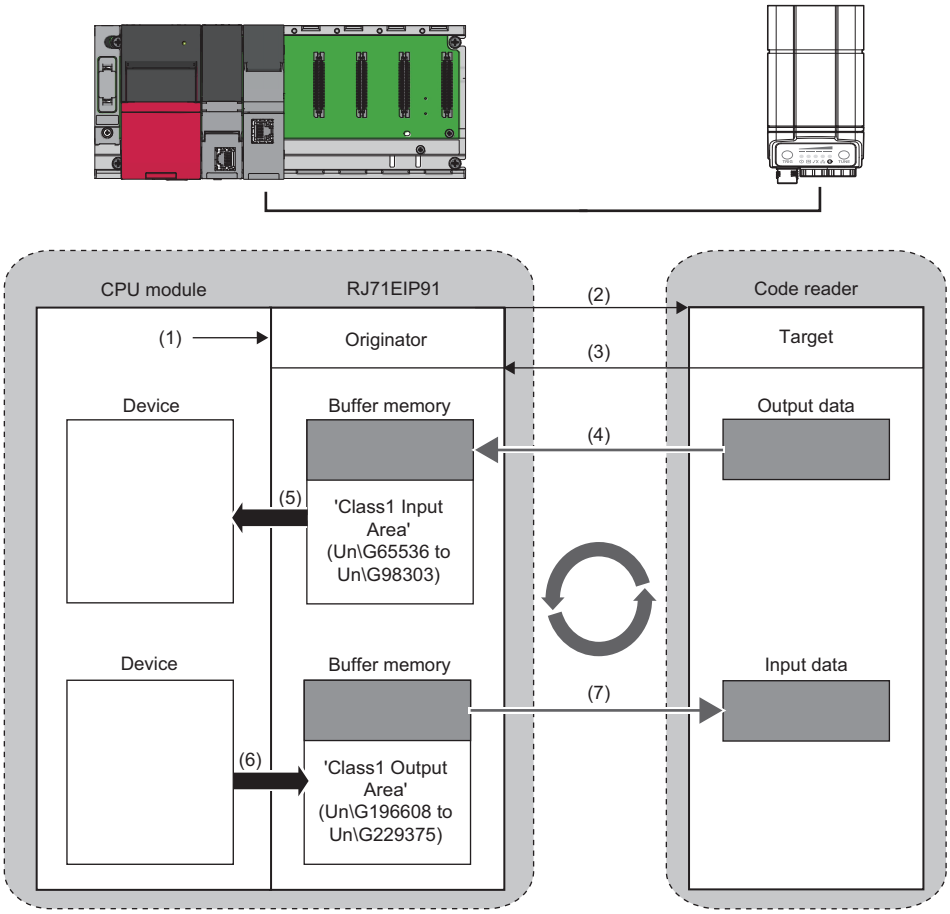
The Class 1 instance communications function of an EtherNet/IP network interface module (RJ71EIP91) is used for cyclic (Implicit) communications.

Cyclic (Implicit) communications perform data communications periodically with the Requested Packet Interval (hereafter abbreviated as RPI) set in an RJ71EIP91, and the specified buffer memory is updated.

Data communications are performed between the originator (RJ71EIP91) that sends the connection request and the target (coder reader) that receives the connection request.

In addition, defined Input/Output Assemblies are used to transmit data.

Cyclic (Implicit) communications establish a connection between an RJ71EIP91 and a code reader; therefore, it is suitable for performing operations which frequently read codes and for detecting an error early.



(1): Turn ON 'EtherNet/IP communication start request' (Y10).

(2): Connection open

(3): Response (normal)

(4): Store data in the buffer memory at the RPI interval.

(5): Acquire the stored data.

(6): Store data in the buffer memory.

(7): Send the data of the buffer memory at the RPI interval.

Input/Output Assemblies used for cyclic (Implicit) communications

The Assembly Object is used for cyclic (Implicit) communications.
For details on each assembly data, refer to DataMan® Industrial Protocols Manual.
DataMan® Industrial Protocols Manual can be opened by clicking "CF Industrial Protocols Manual" in the help of DataMan Setup Tool for MELSENSOR.

Precautions

Do not change the value of the '(Reserved)' area in the Input/Output Assemblies.
Doing so may cause an unexpected error.

Input Assembly

The Input Assembly is input signals for a programmable controller to acquire the status of a code reader.
The instance 11 of the Input Assembly contains status information, process state, and decode results.

■ Input Assembly list

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
11	0	(Reserved)				Missed Acq	Acquiring	Trigger Ack	Trigger Ready
	1	General Fault	(Reserved)			Results Available	Results Buffer Overrun	Decode Complete Toggle	Decoding
	2	SoftEvent Ack 7	SoftEvent Ack 6	SoftEvent Ack 5	SoftEvent Ack 4	SoftEvent Ack 3	SoftEvent Ack 2	SoftEvent Ack 1	SoftEvent Ack 0
	3 to 5	(Reserved)							
	6	Trigger ID (16-bit integer)							
	7								
	8	Result ID (16-bit integer)							
	9								
	10	Result Code (16-bit integer)							
	11								
	12	Result Extended (16-bit integer)							
	13								
	14	Result Data Length (16-bit integer)							
	15								
	16	Result Data 0							
	to	to							
	499	Result Data 483							

■ Details on the Input Assembly

Byte	Bit	Data name	Description (Application)	
0	0	Trigger Ready	This bit turns ON when 'Trigger Enable' is set and an image capturing trigger can be received. • ON: An image capturing trigger can be received. • OFF: An image capturing trigger cannot be received.	
	1	Trigger Ack	This bit shows that a code reader recognizes 'Trigger' is ON. Until 'Trigger' is turned OFF, this bit remains ON. • ON: An image capturing trigger is received. • OFF: —	
	2	Acquiring	This bit shows that a code reader is capturing an image.	
	3	Missed Acq	This bit shows that image capturing is failed. This bit is turned OFF if the next image capturing is succeeded. • ON: Image capturing is failed. • OFF: —	
	4	(Reserved)	—	
	5	(Reserved)	—	
	6	(Reserved)	—	
	7	(Reserved)	—	
1	0	Decoding	This bit shows that a code reader is decoding.	
	1	Decode Complete Toggle	The status of this bit is inverted every time when decoding is completed and read results become available.	
	2	Results Buffer Overrun	This bit shows that a code reader discards a series of read results after the buffer for read results becomes full. When the next read results are stored in the buffer queue properly, this bit is turned OFF. Only when 'Buffer Results Enable' is enabled, this bit is enabled. • ON: Read results are discarded. • OFF: —	
	3	Results Available	This bit shows that a series of decode results is available (the Result ID, Result Code, Result Data Length, and Result Data tags contain valid data). Until 'Results Ack' responds, this bit remains ON. • ON: With new read results • OFF: Without new read results	
	4	(Reserved)	—	
	5	(Reserved)	—	
	6	(Reserved)	—	
	7	General Fault	This bit turns ON when an error occurs in soft event operation. Until the next soft event succeeds or 'Trigger Enable' is turned OFF and then ON again, this bit remains ON. • ON: Error • OFF: No error	
2	0	Soft Event Ack*1	SoftEvent Ack 0	Code registration is completed.
	1		SoftEvent Ack 1	Match string registration is completed.
	2		SoftEvent Ack 2	Focus registration is completed.
	3		SoftEvent Ack 3	Brightness registration is completed.
	4		SoftEvent Ack 4	Cancelling registration is completed.
	5		SoftEvent Ack 5	(Reserved)
	6		SoftEvent Ack 6	DMCC command execution is completed.
	7		SoftEvent Ack 7	Match string setting is completed.

*1 These bits turn ON to show that a code reader completes soft event actions.
These bits remain ON until their corresponding 'Soft Event' bits in the Output Assembly are turned OFF.

Byte	Data name	Description (Application)
3 to 5	(Reserved)	—

Byte	Data name	Description (Application)
6 7	Trigger ID (16-bit integer)	Image capturing trigger ID. ID of an image capturing trigger to be generated next is stored. This is used to verify a generated image capturing trigger and 'Result Data' to be received later. The same value as this ID is returned as 'Result ID' of the corresponding read results.
8 9	Result ID (16-bit integer)	Results ID. ID of the read results which are corresponding to 'Trigger ID' is stored. This is used to verify an image capturing trigger ID and the corresponding read results ID.
10 11	Result Code (16-bit integer)	Result code for the current result set. • Bit 0: 1 = Read, 0 = No Read • Bit 1: 1 = Passed validation, 0 = Failed validation • Bit 2*2: 1 = Passed verification, 0 = Failed (or unexecuted) verification • Bit 3: 1 = Image capturing trigger overrun • Bit 4: 1 = Image capturing buffer overrun • Bit 5 to 15: —
12 13	Result Extended (16-bit integer)	Not used.
14 15	Result Data Length (16-bit integer)	Read results data length. The number of bytes of the result data included in the 'Result Data' field is stored.
16 to 499	Result Data 0 to Result Data 483	Read results data are stored.

*2 This bit is enabled only when using the verification function compatible models.

Output Assembly

The Output Assembly is output signals for a programmable controller to control a code reader.

The instance 21 of the Output Assembly contains control signals, software event signals, and any user data required for the trigger and decode.

■ Output Assembly list

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
21	0	(Reserved)				Results Ack	Buffer Results Enable	Trigger	Trigger Enable
	1	SoftEvent 7	SoftEvent 6	SoftEvent 5	SoftEvent 4	SoftEvent 3	SoftEvent 2	SoftEvent 1	SoftEvent 0
	2 3	(Reserved)							
	4 5	User Data Option (16-bit integer)							
	6 7	User Data Length (16-bit integer)							
	8	User Data 0							
	to	to							
	499	User Data 491							

■ Details on the Output Assembly

Byte	Bit	Data name	Description (Application)	
0	0	Trigger Enable	To enable an image capturing trigger by 'Trigger' signal for EtherNet/IP connection. • ON: An image capturing trigger is enabled. • OFF: An image capturing trigger is disabled.	
	1	Trigger	To trigger image capturing. The 'Trigger Ready' bit needs to be ON before starting the image capture. • ON: image capturing trigger is started. • OFF: —	
	2	Buffer Results Enable	To enable the buffer for read results. New read results are stored in the buffer queue of a code reader. To acquire the next read results, turn ON 'Results Ack'. • ON: The buffer for read results is enabled. • OFF: The buffer for read results is disabled.	
	3	Results Ack	To respond to receiving the latest read results. A code reader turns 'Results Available' OFF when recognizing that this bit turns ON. If 'Buffer Results Enable' is turned ON, the next read results are read out from the buffer queue when receiving a response. • ON: Read results are received. • OFF: —	
	4	(Reserved)	—	
	5	(Reserved)	—	
	6	(Reserved)	—	
	7	(Reserved)	—	
1	0	Soft Event[*1*2]	SoftEvent 0	Code registration is completed.
	1		SoftEvent 1	To register a match string
	2		SoftEvent 2	To register focus
	3		SoftEvent 3	To register brightness
	4		SoftEvent 4	To cancel registration
	5		SoftEvent 5	(Reserved)
	6		SoftEvent 6	To execute a DMCC command[*3]
	7		SoftEvent 7	To set a match string

*1 'Soft Event' is virtual discrete input of the code reader.
When the bit switched from 0 to 1, an action associated with the bit is executed.
After the execution, the code reader turns ON the corresponding 'Soft Event Ack' in the Input Assembly to show the action is completed.

*2 Do not execute 'Soft Event' that changes code reader settings while processing the trigger.
Changing settings while capturing an image or decoding may cause an unexpected result.

*3 The execution result of the DMCC command cannot be acquired.

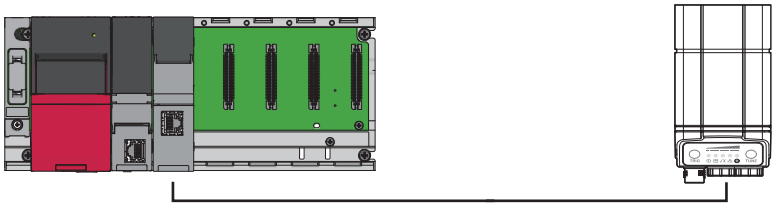
Byte	Data name	Description (Application)
2	(Reserved)	—
3		
4	User Data Option (16-bit integer)	Not used.
5		
6	User Data Length (16-bit integer)	The number of valid bytes of the 'User Data' field.
7		
8	User Data 0	User-defined data which can be used as input for capturing an image or decoding.
to	to	
499	User Data 491	

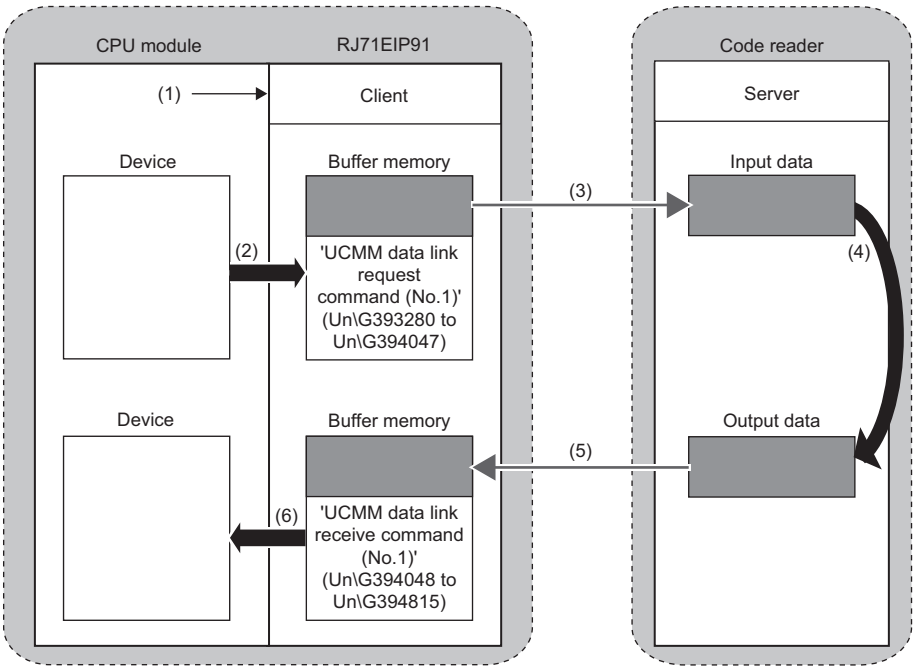
Basic operation process for message (Explicit) communications

The client function of UCMM message communications of an EtherNet/IP network interface module (RJ71EIP91) is used for message (Explicit) communications.

Message (Explicit) communications send a message to a code reader, and the code reader that received the message sends a response.

Unlike cyclic (Implicit) communications, data communications are performed without establishing a connection between an RJ71EIP91 and a code reader; therefore it is suitable for operations that are not frequently performed.





(1): Turn ON 'EtherNet/IP communication start request' (Y10).
(2): Store data in the buffer memory.
(3): Command request
(4): Command processing execution
(5): Command response
(6): Acquire the stored data.

6.3 Setting the Code Reader

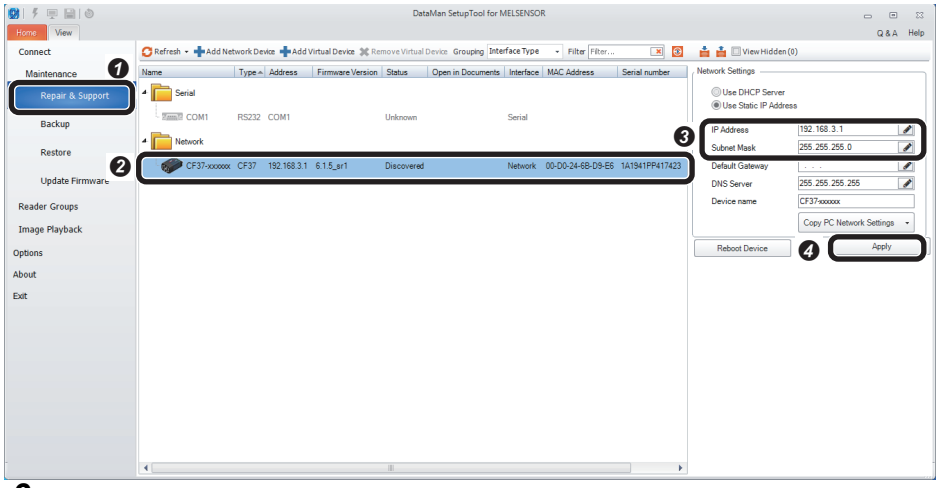
This section explains the procedures for connecting the code reader with an EtherNet/IP connection and the settings for a symbol to be read and the means of communication.

Setting an IP address to a personal computer

Set the IP address (192.168.3.3) to a personal computer.

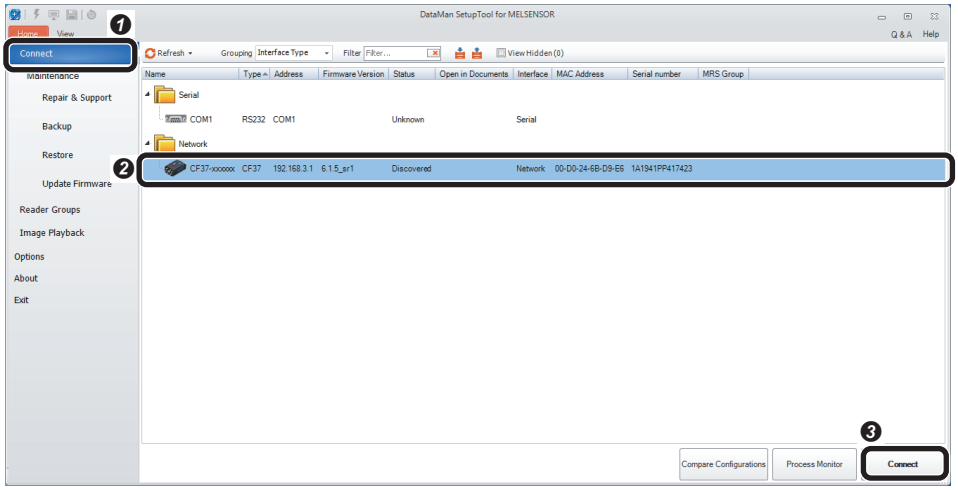
Connecting the code reader

1. Start DataMan Setup Tool for MELSENSOR.
2. Set an IP address and a subnet mask to the code reader.



❶ Select [Repair & Support].
❷ Select the code reader "CF37".
❸ Set an IP address and a subnet mask of the code reader in the "Network Settings" section.
 • IP Address: 192.168.3.1
 • Subnet Mask: 255.255.255.0
❹ Click the [Apply] button.
The code reader is restarted and the network settings are applied.

3. Connect to the code reader.

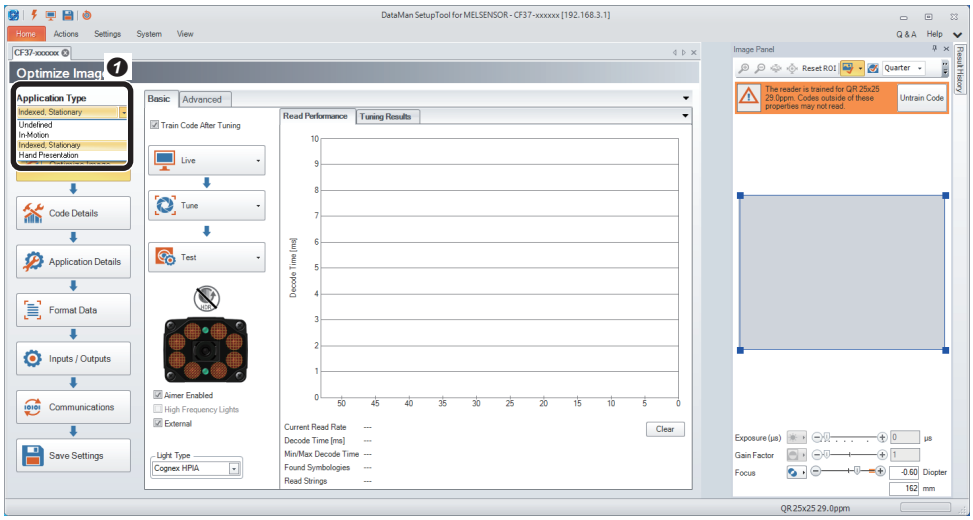


❶ Select [Connect].
❷ Select the code reader.
❸ Click the [Connect] button.

Setting the code reader

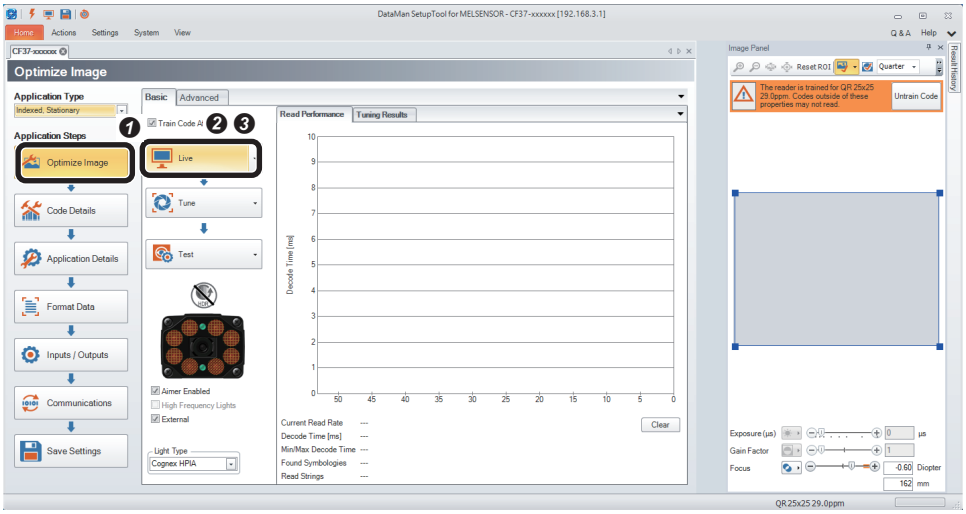
The following shows the procedure from setting to saving the code reader.

1. Select an application type.

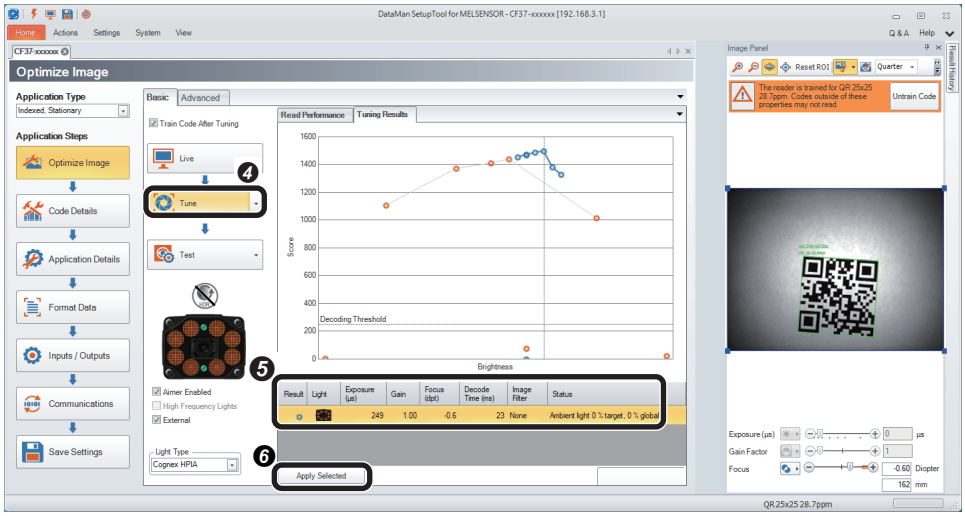


❶ Select "Indexed, Stationary".

2. Import a QR Code to be read in the "Optimize Image" step.



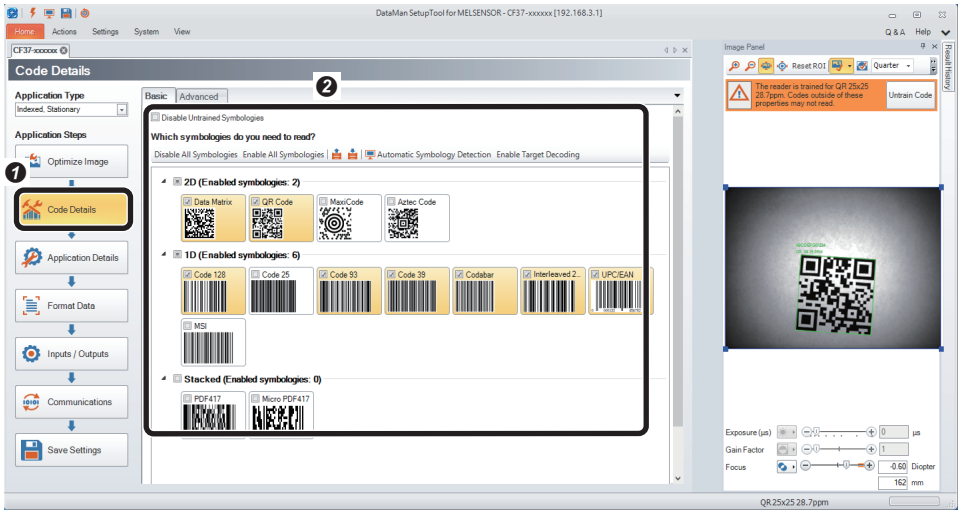
❶ Click the [Optimize Image] button.
❷ Click the [Live] button.
❸ When a QR Code to be read is displayed, click the [Live] button again.
- It is recommended to tune and optimize brightness under the environment that is similar to the actual operating environment.



❹ Click the [Tune] button.
❺ When tuning is completed, an candidate of the setting contents is displayed.
- The number of the displayed candidates varies depending on the work status or the combinations of lights.
- When clicking the candidate, the capturing condition can be checked in "Image Panel".
- If the reading target code still cannot be read even though the code is within the field of vision, the image is captured clearly, and tuning is completed, check that the symbol to be read is enabled in the "Code Details" step.

❻ By clicking the [Apply Selected] button, the selected settings are reflected to the code reader.

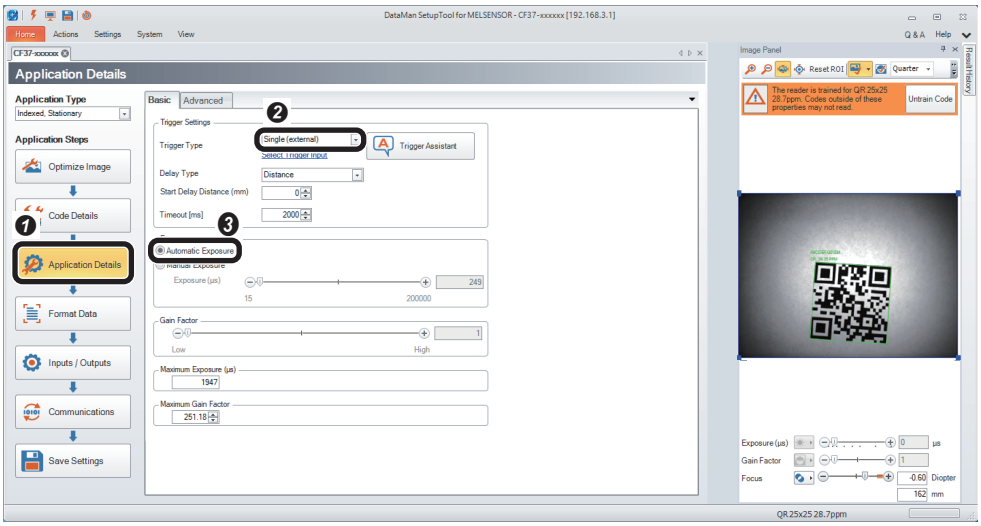
3. Check that symbols to be read are selected in the "Code Details" step.



❶ Click the [Code Details] button.
❷ Check that the checkboxes of the symbols to be read are selected.

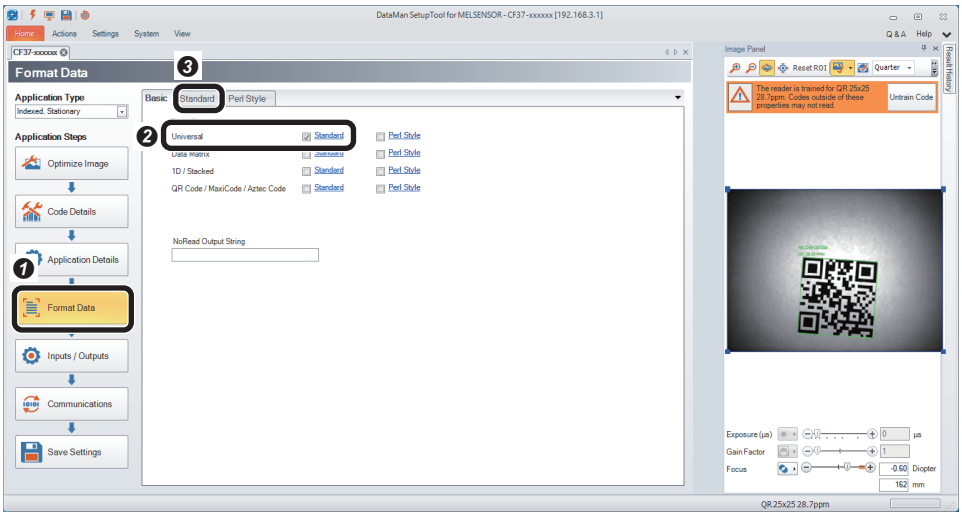
- Any symbols can be selected by unselecting the checkbox of "Disable Untrained Symbologies."
- The scanning speed can be improved when unselecting the checkboxes of symbols other than the reading target.

4. Set a trigger type and an exposure method in the "Application Details" step.

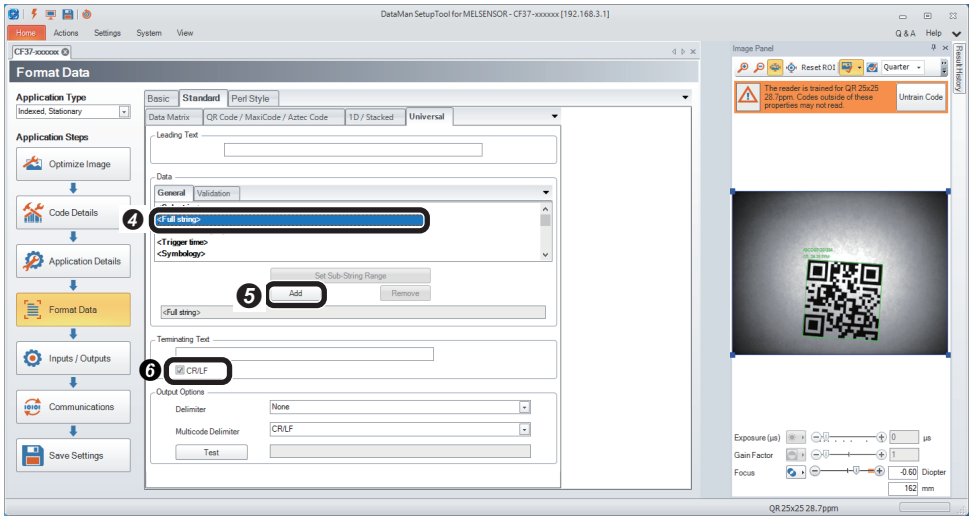


❶ Click the [Application Details] button.
❷ Select "Single (external)" for "Trigger Type" in "Trigger Settings".
❸ Select "Automatic Exposure" for "Exposure".

5. Set the output information of the QR Code in the "Format Data" step.

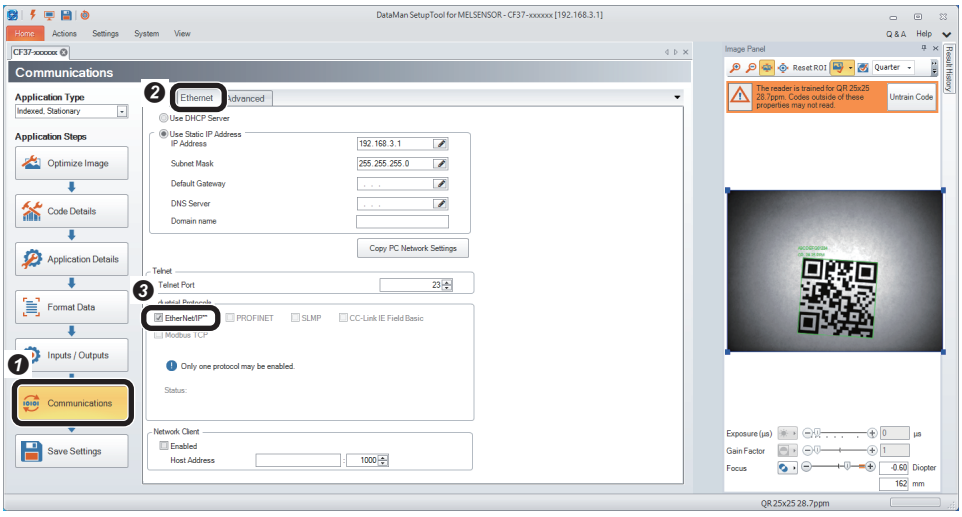


❶ Click the [Format Data] button.
❷ Select the checkbox of "Standard" for "Universal".
❸ Select the [Standard] tab.



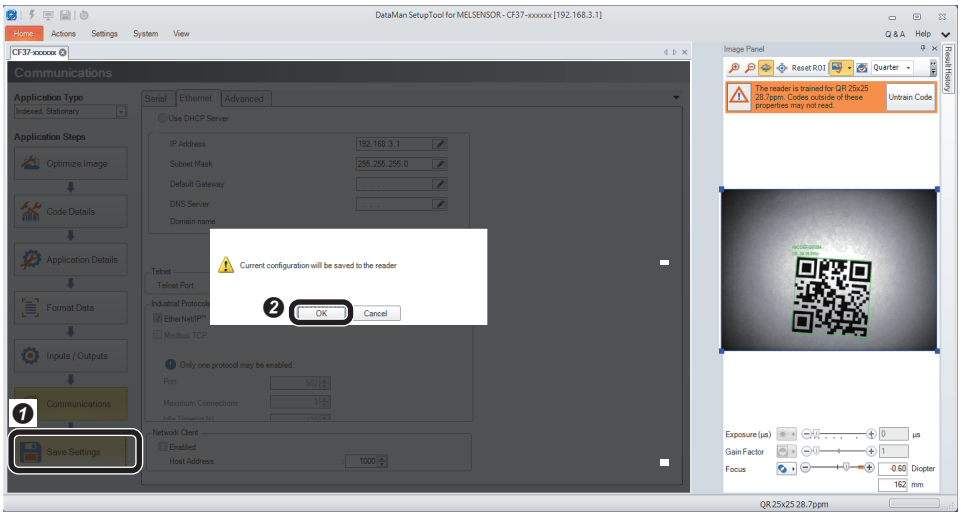
❹ Select "<Full string>" in the [General] tab in "Data."
❺ Click the [Add] button.
❻ Select the checkbox of "CR/LF" for "Terminating Text".

6. Configure the protocol to be used (EtherNet/IP) in the "Communications" step.



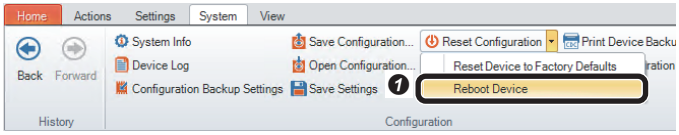
❶ Click the [Communications] button.
❷ Select the checkbox of "EtherNet/IP" for "Industrial Protocols" in the [Ethernet] tab.

7. Save the settings in the code reader in the "Save Settings" step.



❶ Click the [Save Settings] button.
❷ Click the [OK] button.

8. Restart the code reader.



❼ Select [System] ⇨ [Reset Configuration] ⇨ [Reboot Device].
The code reader is restarted.

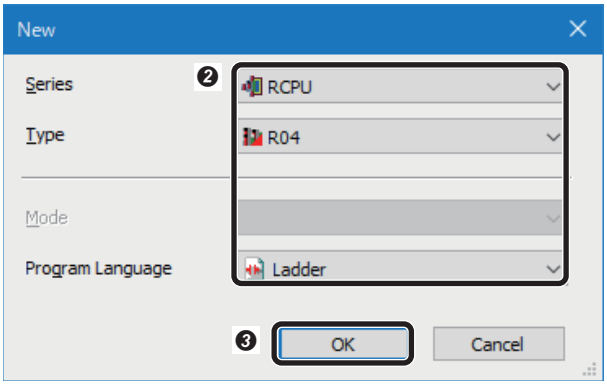
6.4 Setting a Programmable Controller

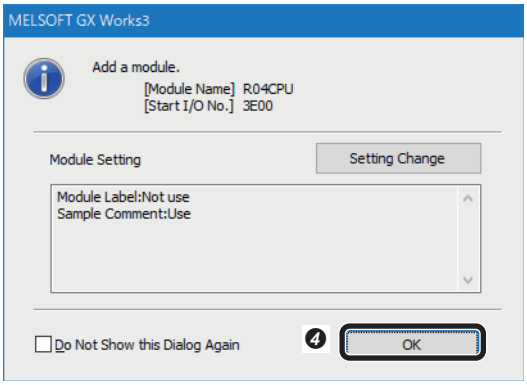
Set parameters of a programmable controller and create a program in an engineering tool.

Setting a programmable controller

Set parameters of a programmable controller.

1. Start an engineering tool.
2. Select a CPU module and a program language in the "New" screen.

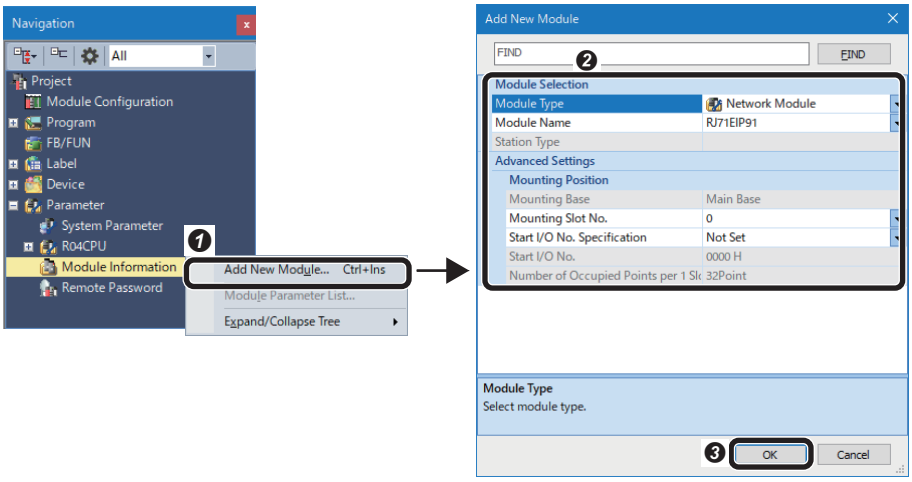




❶ Select [Project] ⇨ [New].
The "New" screen appears.
❷ Set a CPU module and a program language.
- Series: RCPU
- Type: R04
- Program Language: Ladder

❸ Click the [OK] button.
❹ Click the [OK] button.

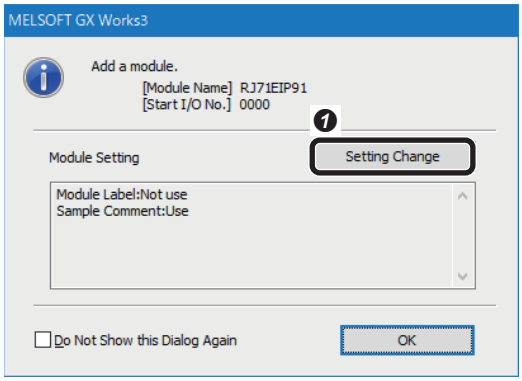
3. Add a network module in the "Add New Module" screen.



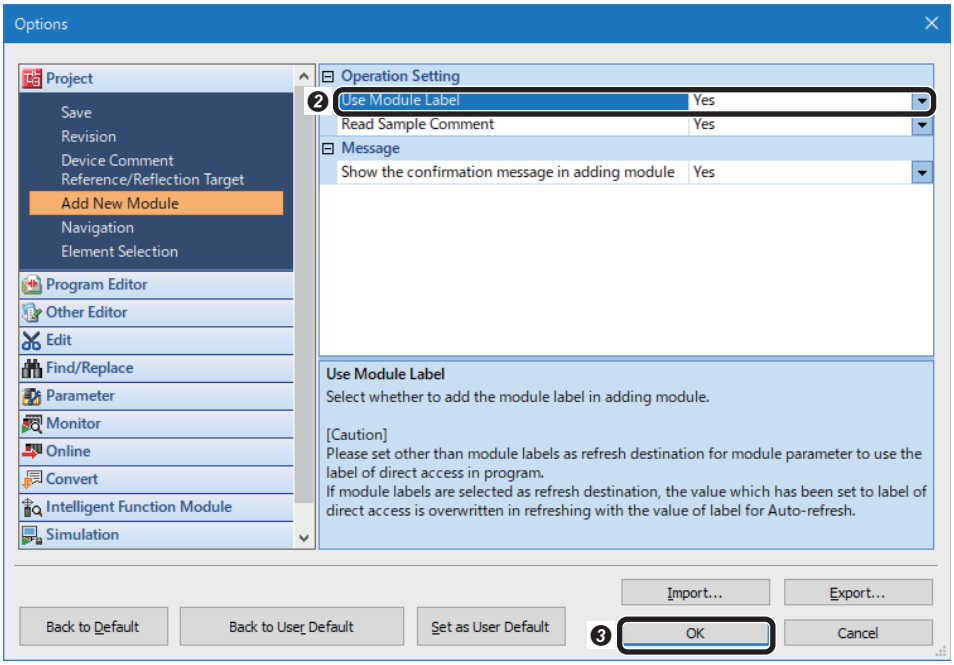
❶ Right-click "Module Information" in the "Navigation" window, and select [Add New Module] in the shortcut menu.
❷ Set the items in "Module Selection".
- Module Type: Network Module
- Module Name: RJ71EIP91
- Mounting Slot No.: 0
- Start I/O No. Specification: Not Set

If "RJ71EIP91" is not in the pull-down list of "Module Name," install EtherNet/IP Configuration Tool for RJ71EIP91 before setting a programmable controller.
❸ Click the [OK] button.

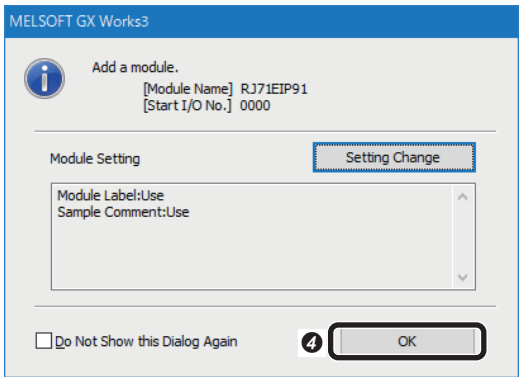
4. Set to use module labels.



❶ Click the [Setting Change] button.

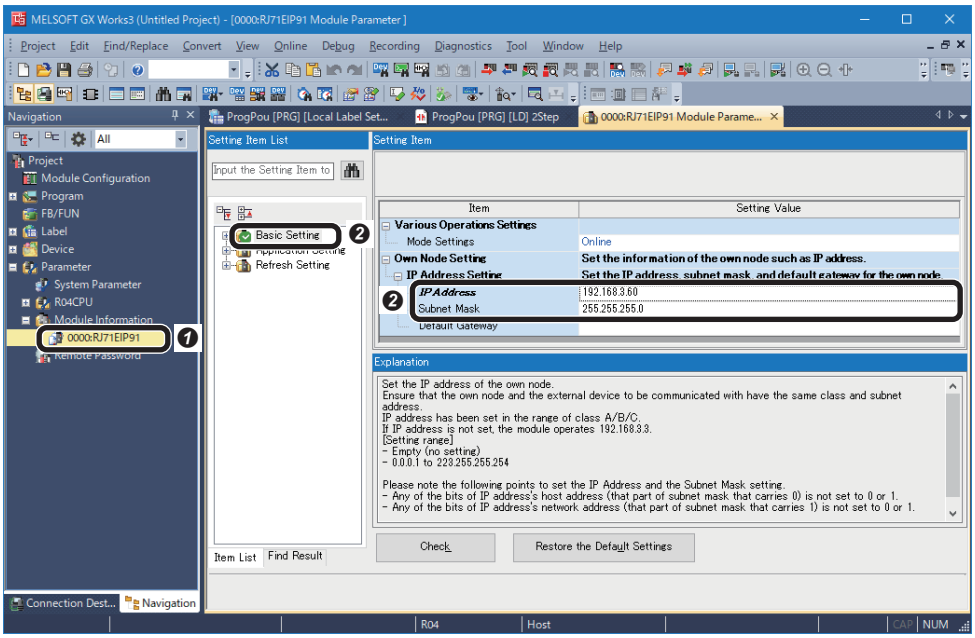


❷ Select "Yes" for "Use Module Label."
❸ Click the [OK] button.

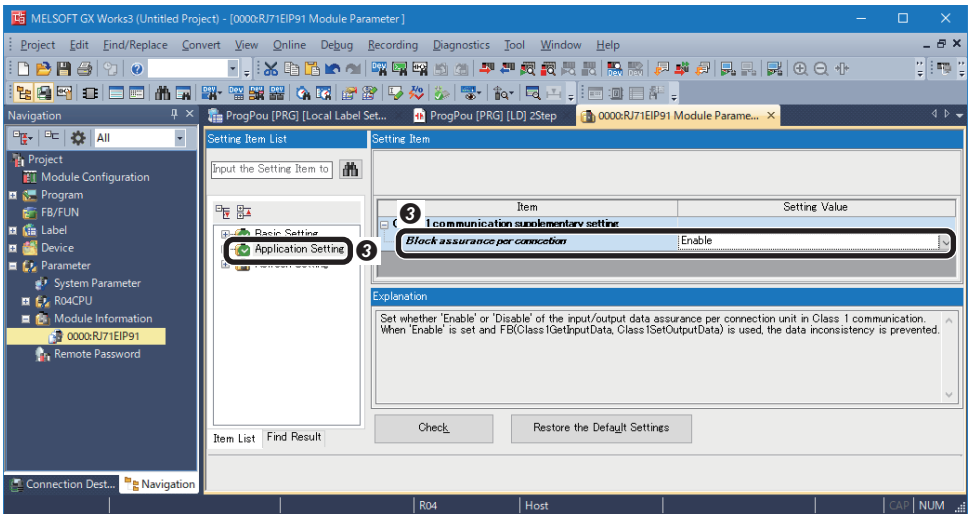


❹ Click the [OK] button.

5. Set module parameters in the module parameter setting screen of the network module.



❶ Double-click the module name (RJ71EIP91) in the "Navigation" window.
❷ Select "Basic Setting," and set "IP Address" and "Subnet Mask."
- IP Address: 192.168.3.60
- Subnet Mask: 255.255.255.0



❸ Select "Application Setting," and select "Enable" for "Block assurance per connection."

Precautions

When selecting "Disable" for "Block assurance per connection," data inconsistency may occur.
To prevent data inconsistency, use the following module FBs and select "Enable" for "Block assurance per connection."

- M+RJ71EIP91_Class1GetInputData
- M+RJ71EIP91_Class1SetOutputData

For details on the module FB, refer to the following:
MELSEC iQ-R EtherNet/IP Function Block Reference

Point

The "Block assurance per connection" setting in the module parameter is not available for FX5-ENET/IP.
'16: Perform data assurance' must be written in 'Block assurance specification per connection' (Un\G5000) of the buffer memory.
For details, refer to the following:
MELSEC iQ-F FX5-ENET/IP User's Manual

Writing parameters

Write the set parameters to a programmable controller. (☞ Page 145 Writing to the programmable controller)

Configuring Communication Settings in EtherNet/IP Configuration Tool

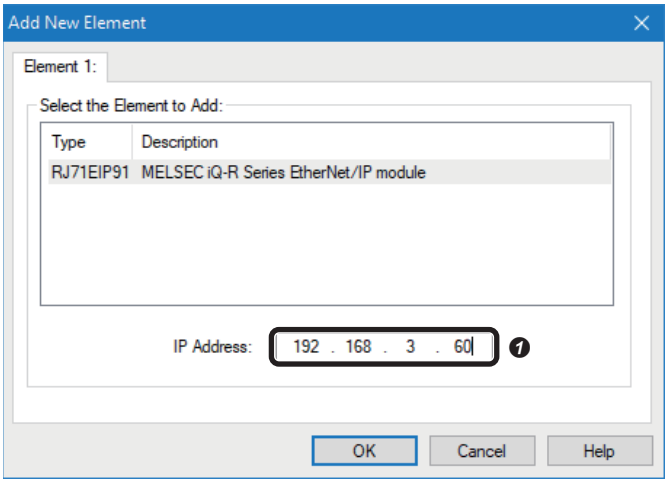
For cyclic (Implicit) communications, use EtherNet/IP Configuration Tool to set the EtherNet/IP network configuration and the trigger type, RPI, etc. for each connection in an EtherNet/IP network interface module (RJ71EIP91).

Point

For details on EtherNet/IP Configuration Tool, refer to the following:
MELSEC iQ-R EtherNet/IP Network Interface Module User's Manual (Application)

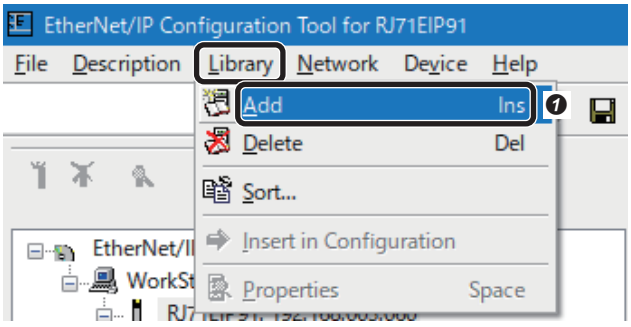
Communication settings for an EtherNet/IP connection

1. Start EtherNet/IP Configuration Tool.
2. Enter an IP address.

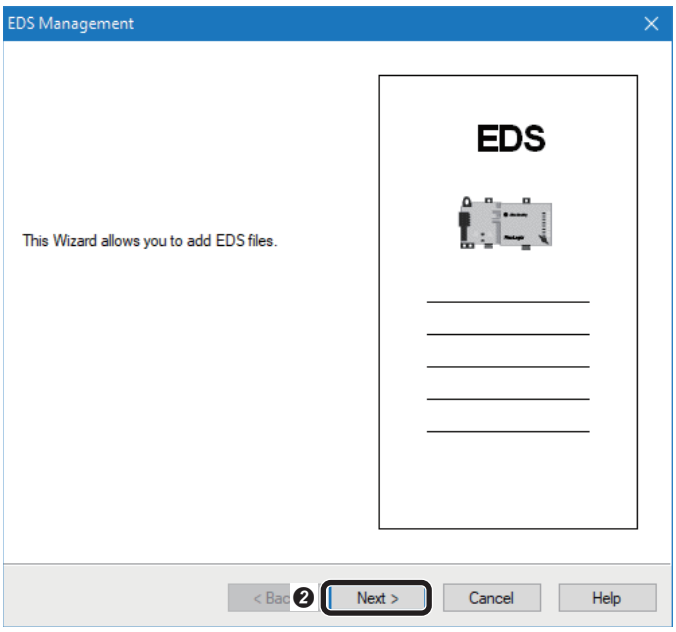


❶ In the "Add New Element" window, enter the IP address (192.168.3.60) that is set for an RJ71EIP91 in an engineering tool.

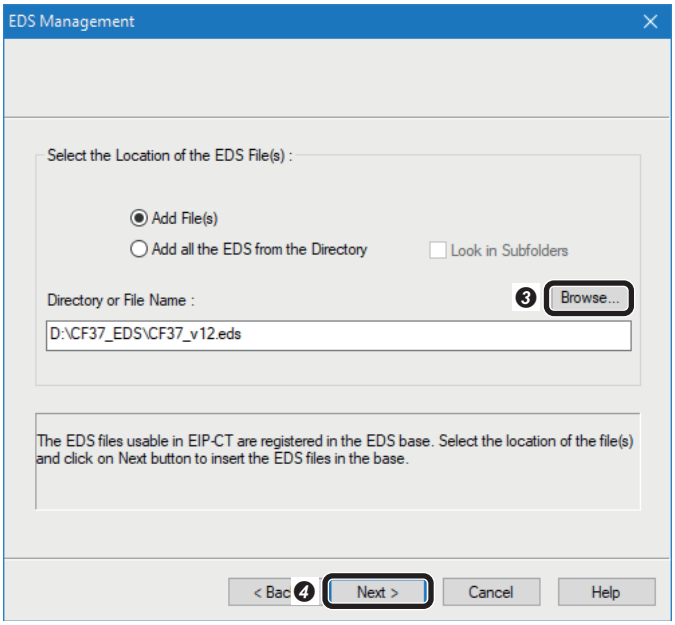
3. Add an EDS file.



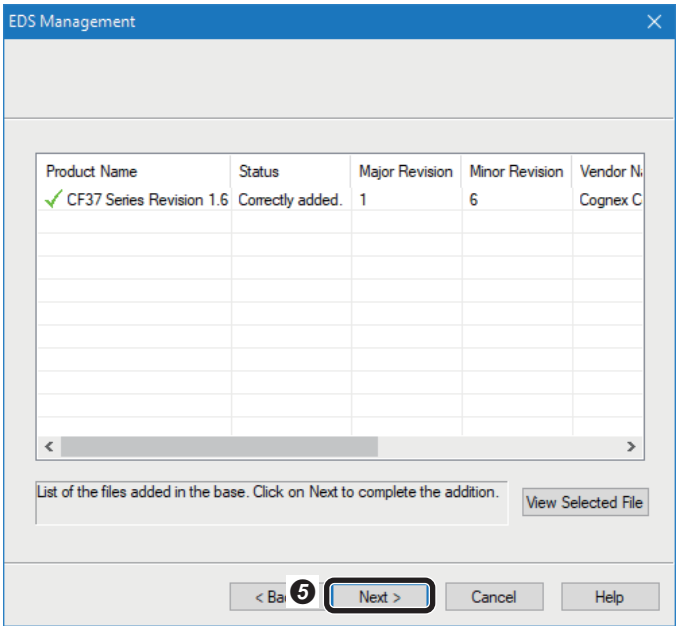
❶ Select [Library] ⇨ [Add].
The "EDS Management" screen appears.



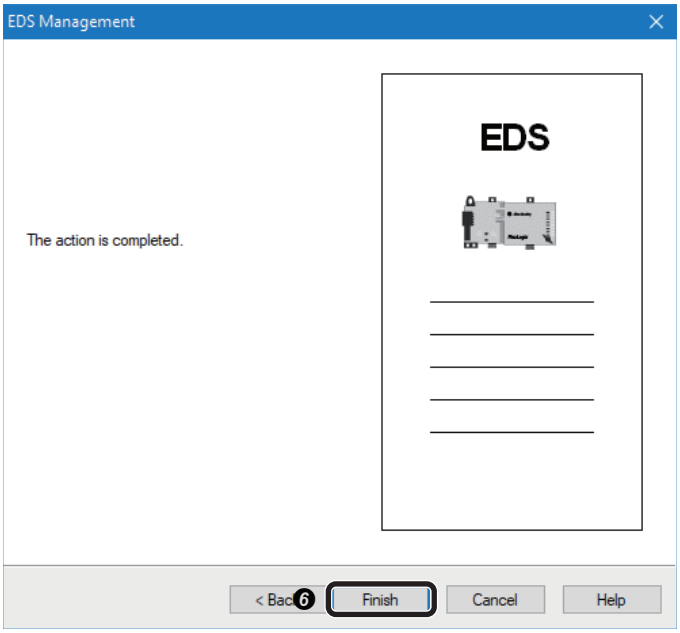
❷ Click the [Next] button.



❸ Click the [Browse] button and specify a necessary EDS file.
❹ Click the [Next] button.

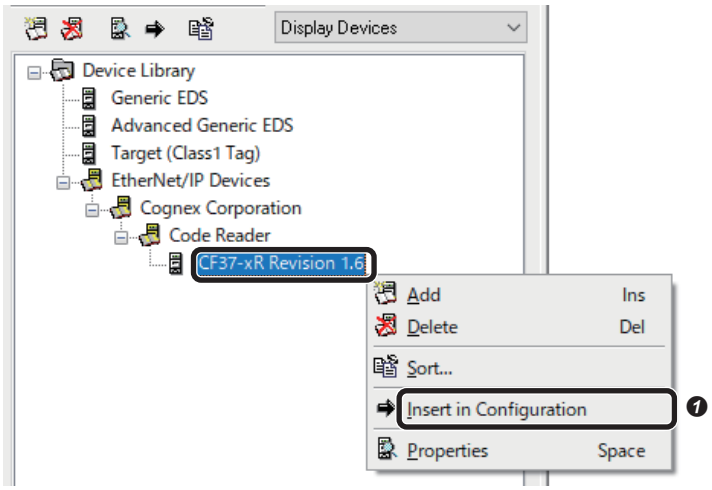


❺ Check that the EDS file is added properly and click the [Next] button.

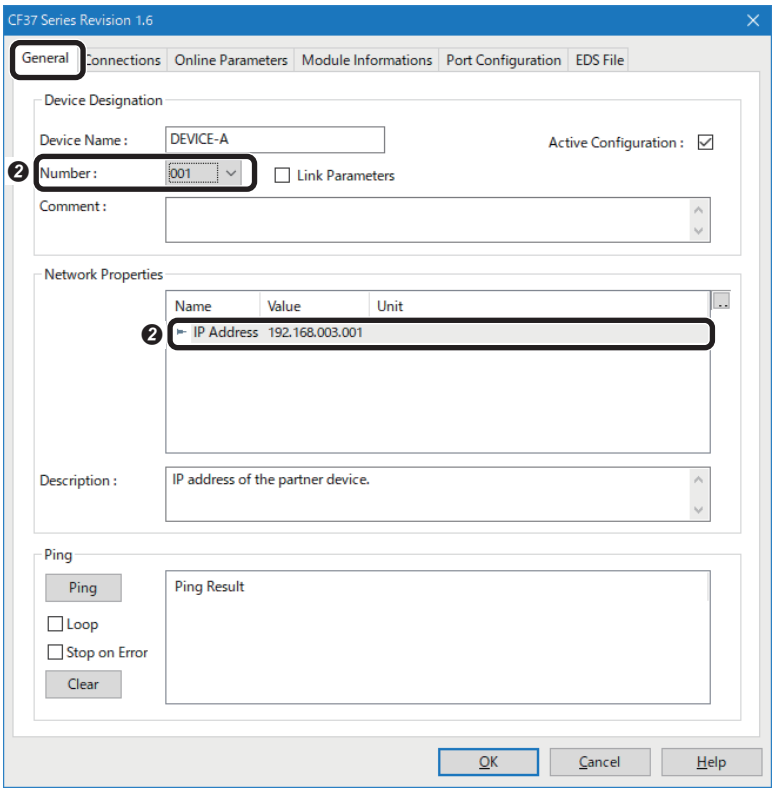


❻ Click the [Finish] button.

4. Add a code reader in the network configuration setting.

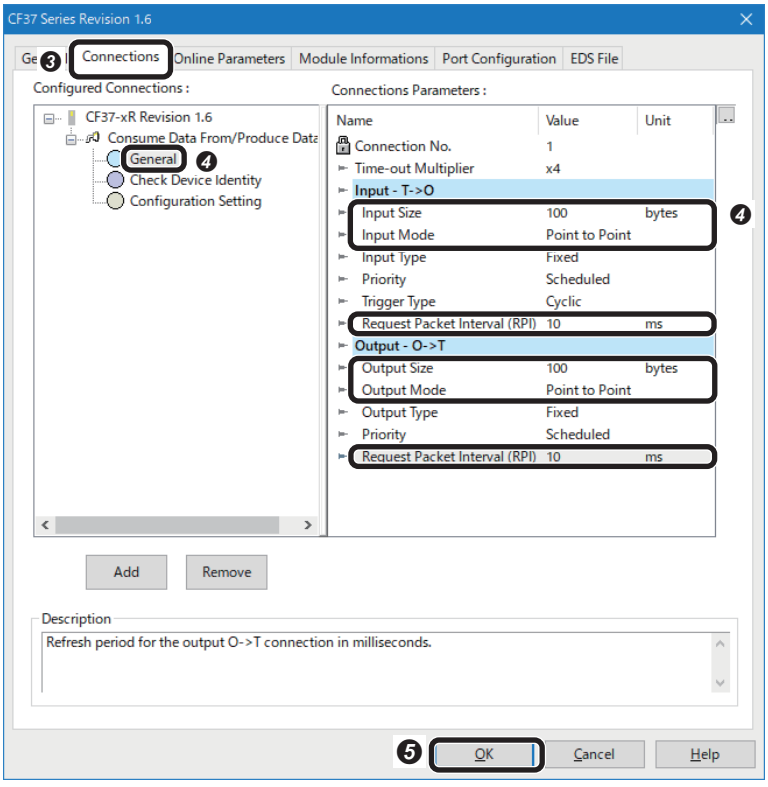


❶ In the [Device Library] tab, right-click a code reader under the tree of "EtherNet/IP Devices," and select [Insert in Configuration] from the shortcut menu.



❷ In the [General] tab, set the connection number and IP address of the device.

- Number: 001
- IP Address: 192.168.3.1 (IP address of the code reader)



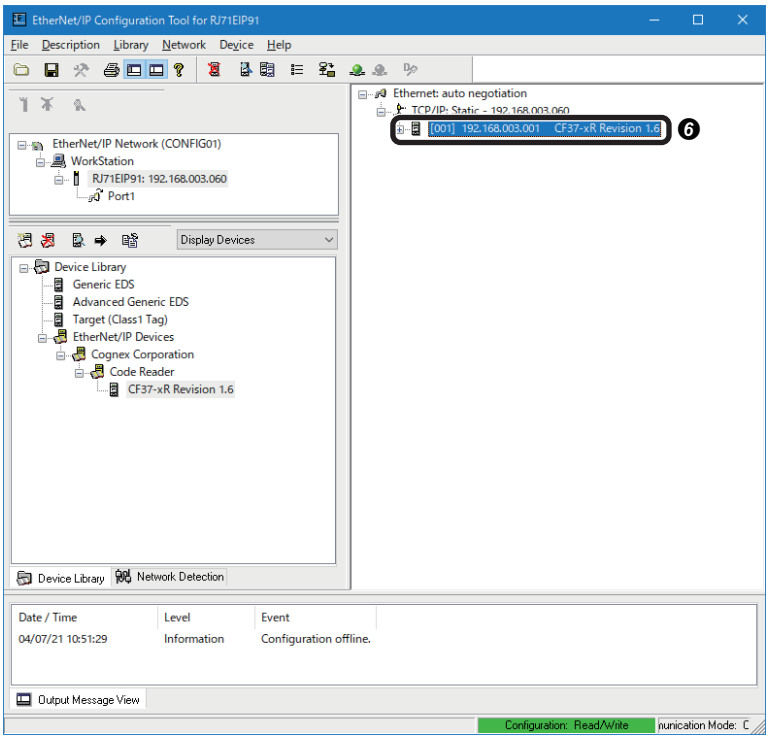
❸ Select the [Connections] tab to set Class 1 instance communications.

❹ Select "General," and set parameters as follows:

- Input Size: 100 bytes
- Input Mode: Point to Point
- Output Size: 100 bytes
- Output Mode: Point to Point
- Request Packet Interval(RPI): 10 ms

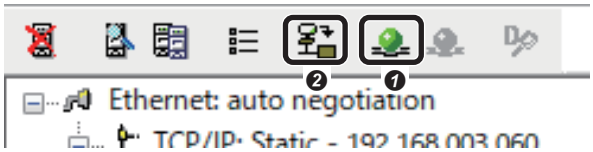
Set the packet size to be larger than the input/output data size.

❺ Click the [OK] button.

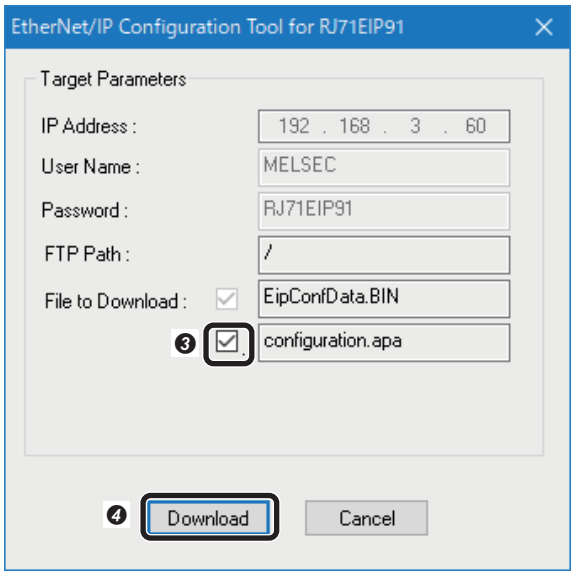


❻ Check that the code reader is added in the network configuration setting.

5. Write the settings.



❶ Click (Online command.) on the command bar.
❷ Click (Download the current configuration in the module.) on the command bar.



❸ Select the checkbox of "configuration.apa" of "File to Download."
❹ Click the [Download] button.

Precautions

Settings that are written to an EtherNet/IP network interface module (RJ71EIP91) in EtherNet/IP Configuration Tool are applied when 'EtherNet/IP communication start request' (Y10) is turned from OFF to ON.

Creating a program

Creating a program for cyclic (Implicit) communications

Create a program for controlling a code reader via cyclic (Implicit) communications.

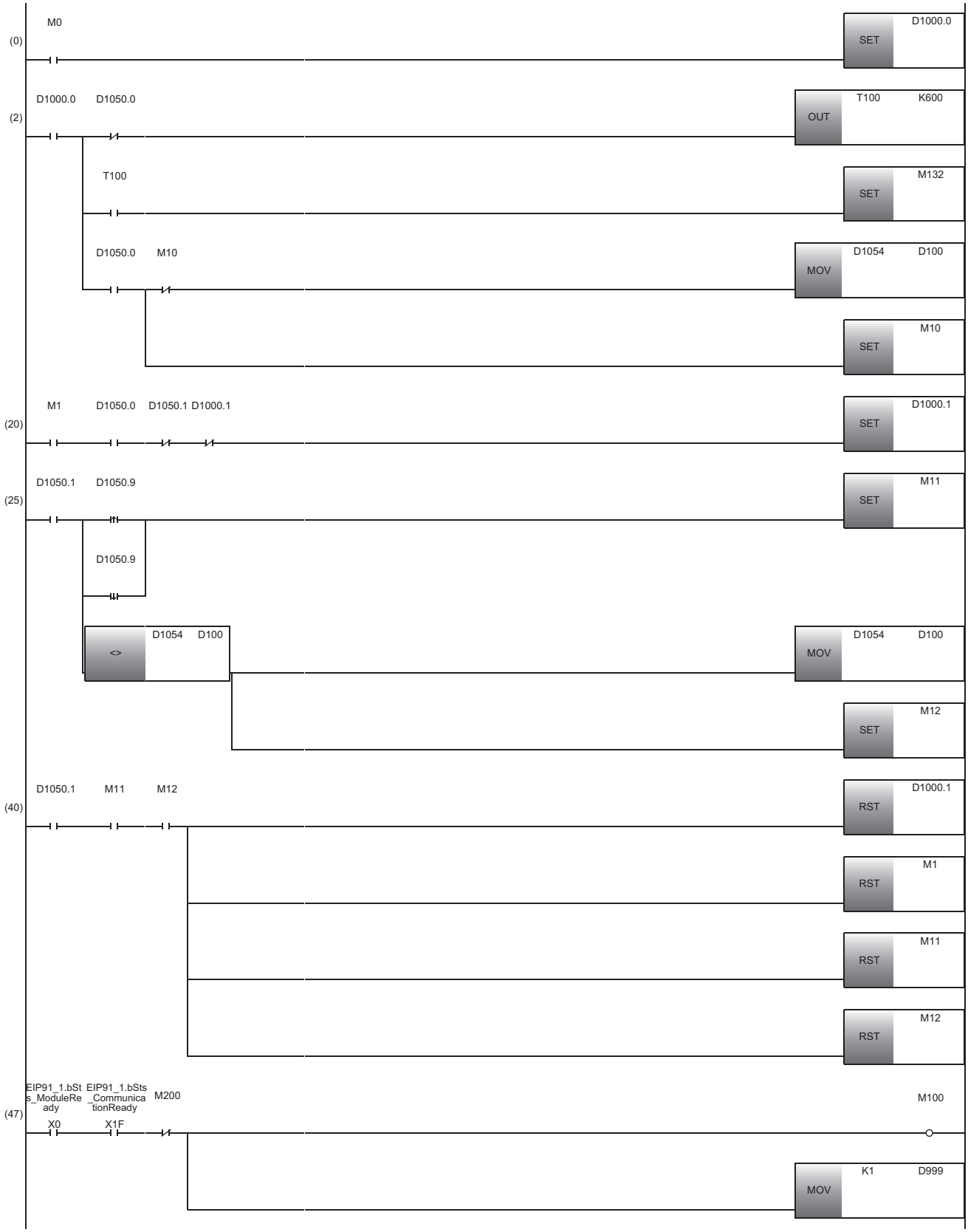
■ Devices used in the program

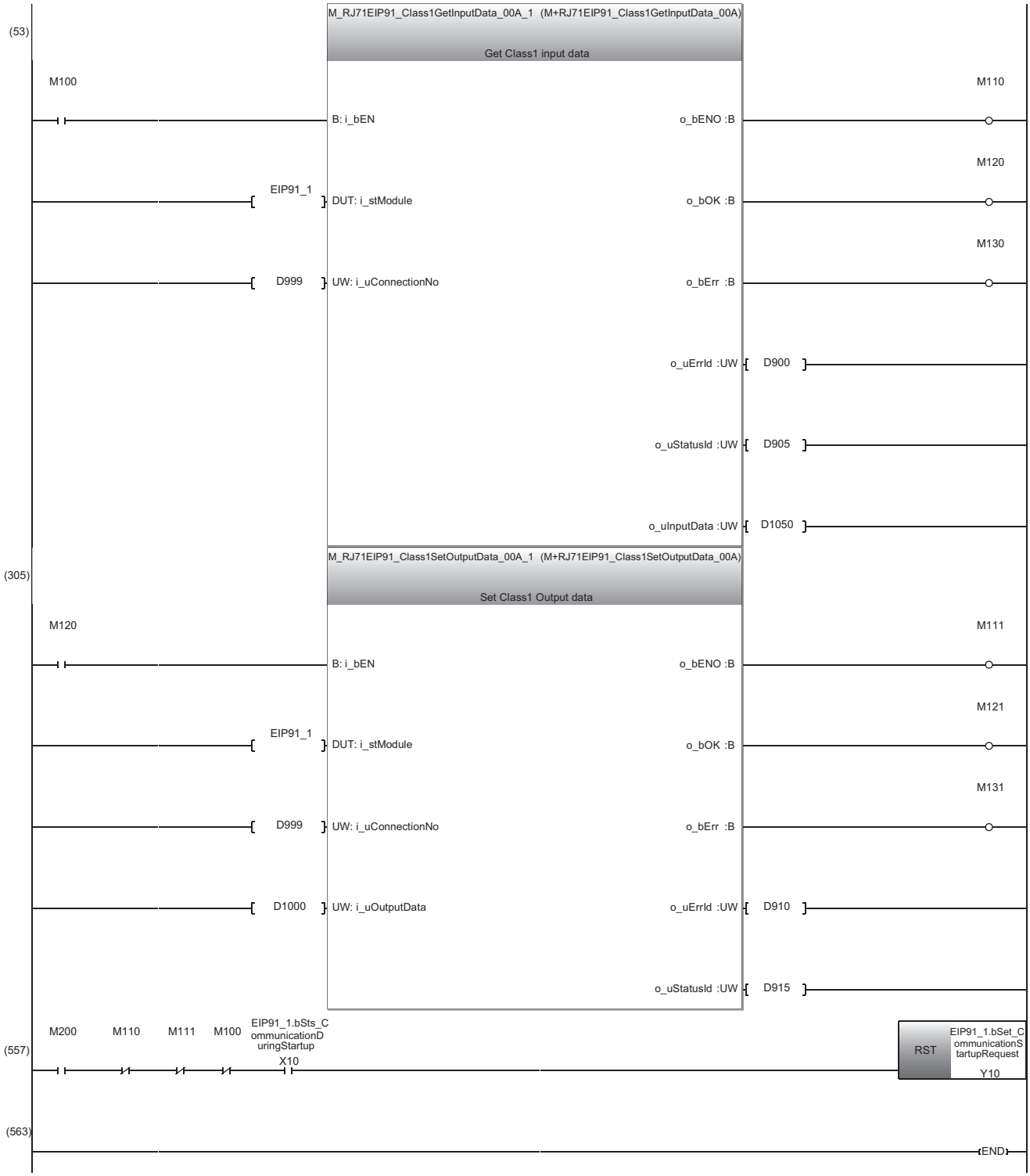
Device	Device name	Description
M0	Image Capturing Trigger Enable command	'Trigger Enable' (D1000.0) is turned ON and 'Trigger' (D1000.1) is enabled while this device is ON.
M1	Image Capturing Trigger command	'Trigger' (D1000.1) is turned ON and an image is captured when this device is turned ON.
M10	Result ID storage area initialization completion	Initializing the storage area for the result ID is completed if this device is ON.
M11	Decode Complete	Decoding is completed if this device is ON.
M12	Result ID acquisition completion	Acquiring the latest result ID is completed if this device is ON.
M100	Input execution command	Processing for acquiring data is performed when this device is turned ON.
M110	Input execution status	The execution status of processing for acquiring input data is output. • ON: Execution in progress • OFF: Not executed
M111	Output execution status	The execution status of processing for setting output data is output. • ON: Execution in progress • OFF: Not executed
M120	Input normal completion	Processing for acquiring input data is normally completed if this device is ON
M121	Output normal completion	Processing for setting output data is normally completed if this device is ON.
M130	Input error completion	Processing for acquiring input data is completed with an error if this device is ON.
M131	Output error completion	Processing for setting output data is completed with an error if this device is ON.
M132	Communication error detection	A communication error is detected if this device is ON.
M200	Communication stop command	Communication is stopped when this device is turned ON.
D100	Result ID storage area	The result ID used for internal processing is stored temporarily.
D1000.0	Trigger Enable	'Trigger' (D1000.1) is enabled while this device is ON.
D1000.1	Trigger	An image is captured when this device is turned ON.
D1050.0	Trigger Ready	The reception status of 'Trigger Enable' (D1000.0) is stored. • ON: An image capturing trigger is enabled. • OFF: An image capturing trigger is disabled.
D1050.1	Trigger Ack	The reception status of 'Trigger' (D1000.1) is stored. • ON: With an image capturing trigger • OFF: Without an image capturing trigger
D1050.9	Decode Complete Toggle	This device is inverted at the completion of decoding of a code reader.
D1054	Result ID	The ID of the read results is stored.
D900	Input error code	An error code is stored when processing for acquiring input data is completed with an error.
D905	Input connection communication error code	An error code is stored when a connection communication error occurs (when 200H is stored in 'Input error code' (D900)).
D910	Output error code	An error code is stored when processing for setting output data is completed with an error.
D915	Output connection communication error code	An error code is stored when a connection communication error occurs (when 200H is stored in 'Output error code' (D910)).
D999	EtherNet/IP connection number	The connection number of a connected device that is set in EtherNet/IP Configuration Tool is stored.
D1000 to D1049	Output data	Devices in which output data is stored.
D1050 to D1099	Input data	Devices in which input data is stored.
T100	Communication error determination timer	Device for determining a communication error.

■ Module labels used in the program

Module label	Function	Device
EIP91_1	Module label	—
EIP91_1.bSts_ModuleReady	Module Ready	X0
EIP91_1.bSts_CommunicationReady	Communication Ready	X1F
EIP91_1.bSts_CommunicationDuringStartup	EtherNet/IP communication in process	X10
EIP91_1.bSet_CommunicationStartupRequest	EtherNet/IP communication start request	Y10

■ Program example





(0): Enable an image capturing trigger on the code reader.

(2): Monitor the status of EtherNet/IP connection between the code reader and programmable controller.*1

(20): Request the start of the image capture to the code reader ('Trigger' (D1000.1) is turned ON).

(25): Monitor that the code reader completes the processing for capturing an image.

(40): Perform the processing for the completion of the image capture of the code reader.

(47): Check the communication status and turn ON the input execution command.

(53): Acquire input data by using the module FB (M+RJ71EIP91_Class1SetInputData*2) of an RJ71EIP91.*3

(305): Set output data by using the module FB (M+RJ71EIP91_Class1SetOutputData*2) of an RJ71EIP91.*3

(557): Stop communication.

*1 If 'Communication error detection' (M132) is turned ON, the EtherNet/IP communication may not have been started. Perform the following operations:

· Check if an error has occurred in an RJ71EIP91.

· Check if Ethernet cables are connected properly.

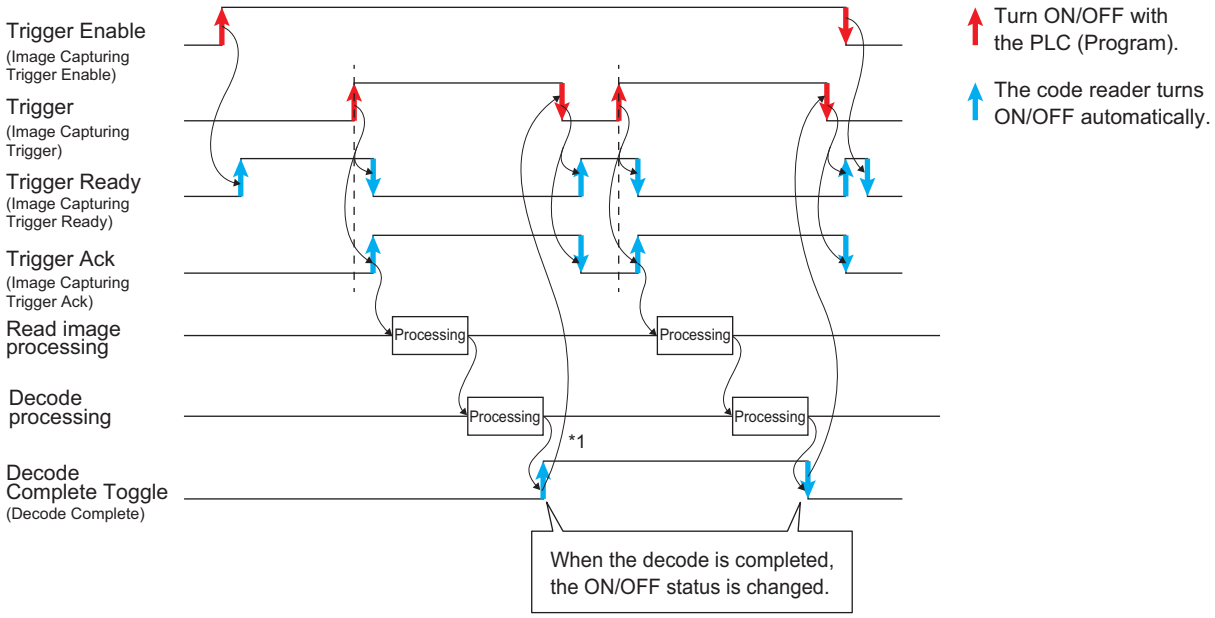
· Restart a code reader.

*2 For details on the module FB, refer to the following:
MELSEC iQ-R EtherNet/IP Function Block Reference
*3 If 'Input error completion' (M130) or 'Output error completion' (M131) is turned ON, refer to the following:
MELSEC iQ-R EtherNet/IP Function Block Reference

Timing chart of cyclic (Implicit) communications

A timing chart when 'Trigger (Image Capturing Trigger)' of the Output Assembly is turned ON by using a programmable controller via cyclic (Implicit) communications is shown below.
To enable the image capturing trigger from a programmable controller, turn ON 'Trigger Enable (Image Capturing Trigger Enable)' of the Output Assembly.
When 'Trigger (Image Capturing Trigger)' of the Output Assembly is turned ON using a programmable controller while 'Trigger Ready (Image Capturing Trigger Ready)' of the Input Assembly is ON by turning ON 'Trigger Enable (Image Capturing Trigger Enable),' the reception status of 'Trigger (Image Capturing Trigger)' of the code reader is output to 'Trigger Ack (Image Capturing Trigger Ack)' of the Input Assembly.
The status of 'Decode Complete Toggle (Decode Complete)' of the Input Assembly is inverted at the completion of decoding.
When 'Trigger Enable (Image Capturing Trigger Enable)' of the Output Assembly is turned OFF, 'Trigger Ready (Image Capturing Trigger Ready)' is also turned OFF.

■ Code reader CF37



*1 Check changes in 'Decode Complete Toggle (Decode Complete)' and 'Result ID' before acquiring the decode results (Result ID, Result Code, Result Data Length, and Result Data).

Creating a program for message (Explicit) communications

Create a program for acquiring the device name of a code reader via message (Explicit) communications by using DMCC commands.

For details on DMCC commands, refer to the command reference in the help of DataMan Setup Tool for MELSENSOR.

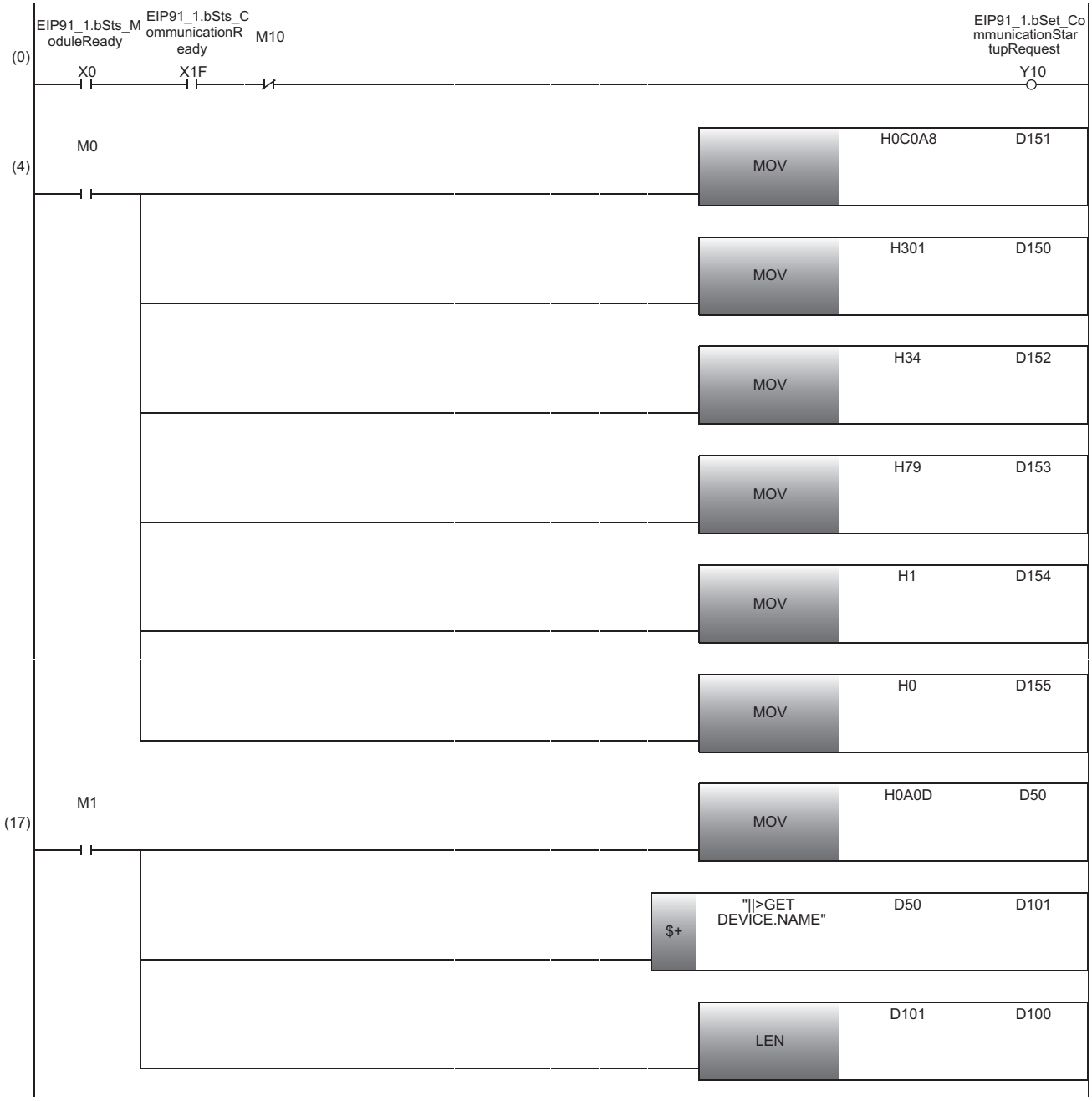
■ Devices used in the program

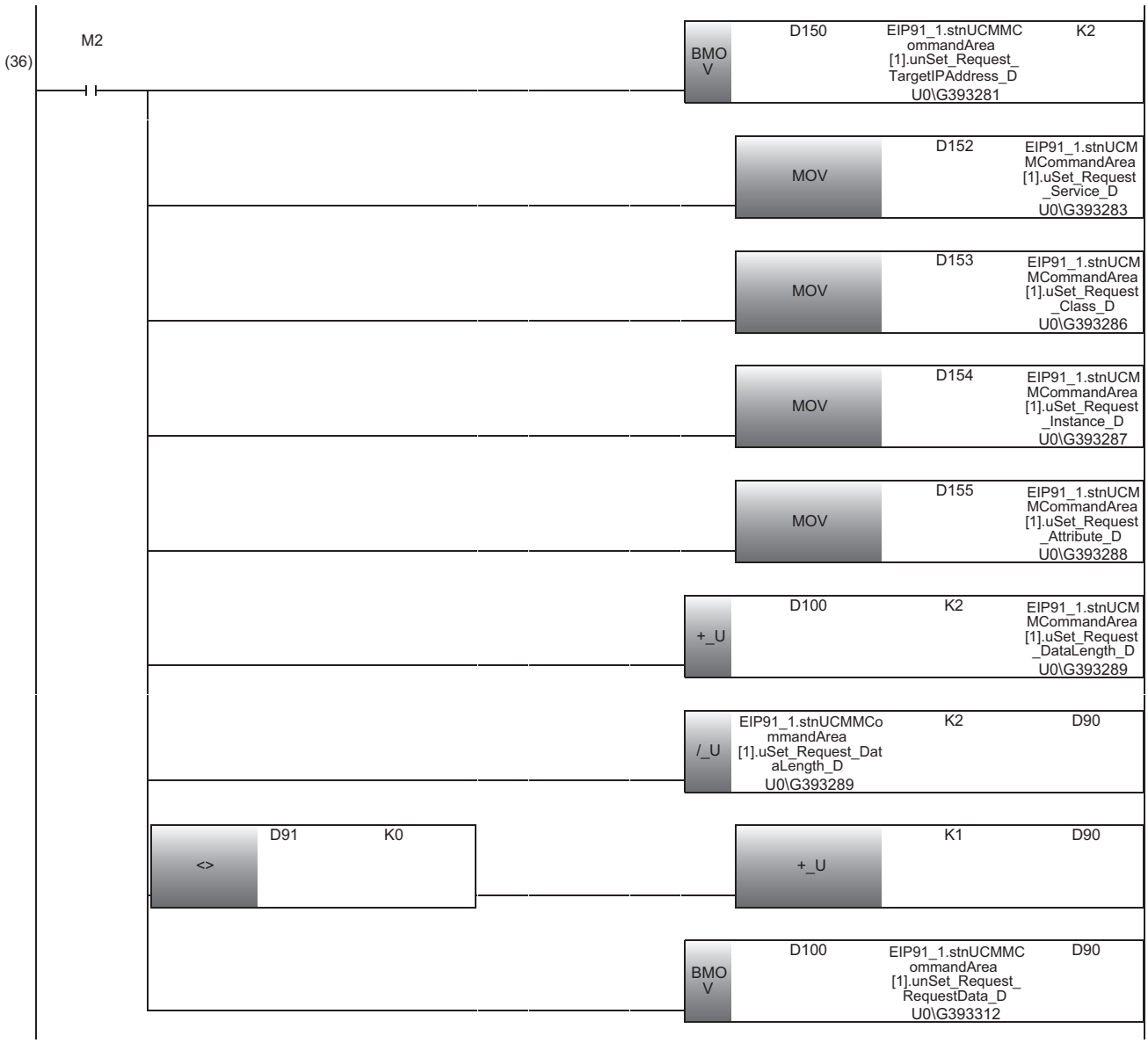
Device	Device name	Description
M0	UCMM data link request command data initialization command	Data of the UCMM data link request command is initialized when this device is turned ON.
M1	DMCC command string initialization command	The string of a DMCC command is initialized when this device is turned ON.
M2	UCMM data link request command data store command	Data of the UCMM data link request command is stored when this device is turned ON.
M3	UCMM data link request command execution command	The UCMM data link request command is executed when this device is turned ON.
M10	Communication stop command	UCMM communications are stopped when this device is turned ON.
M100	Communication error detection	A communication error is detected if this device is ON.
D50	DMCC command termination characters	The termination string 'CR/LF' is stored.
D90	Number of words in UCMM data link request data	The number of words in UCMM data link request data is stored.
D91	Remainder of dividing the number of words in UCMM data link request data	The remainder of dividing the number of words in UCMM data link request data is stored.
D100	Number of characters in a DMCC command string	The number of characters of a DMCC command is stored.
D101	DMCC command string	The string of a DMCC command is stored.
D151	UCMM data link request target IP address (upper)	"HC0A8 (192 168)" is stored as the IP address (upper) to which a UCMM data link request is sent.
D150	UCMM data link request target IP address (lower)	"H0301 (003 001)" is stored as the IP address (lower) to which a UCMM data link request is sent.
D152	UCMM data link request service number	The service code "H34 (SendDMCC)" is stored.
D153	UCMM data link request class ID	The class ID "H79 (DataMan ID Reader Object)" is stored.
D154	UCMM data link request instance ID	The instance ID "H1" is stored.
D155	UCMM data link request attribute ID	The attribute ID "H0" is stored.
D190	Number of words in UCMM data link receive data	The number of words in UCMM data link receive data is stored.
D191	Remainder of dividing the number of words in UCMM data link receive data	The remainder of dividing the number of words in UCMM data link receive data is stored.
D200	UCMM data link receive data start address	UCMM data link receive data is stored.

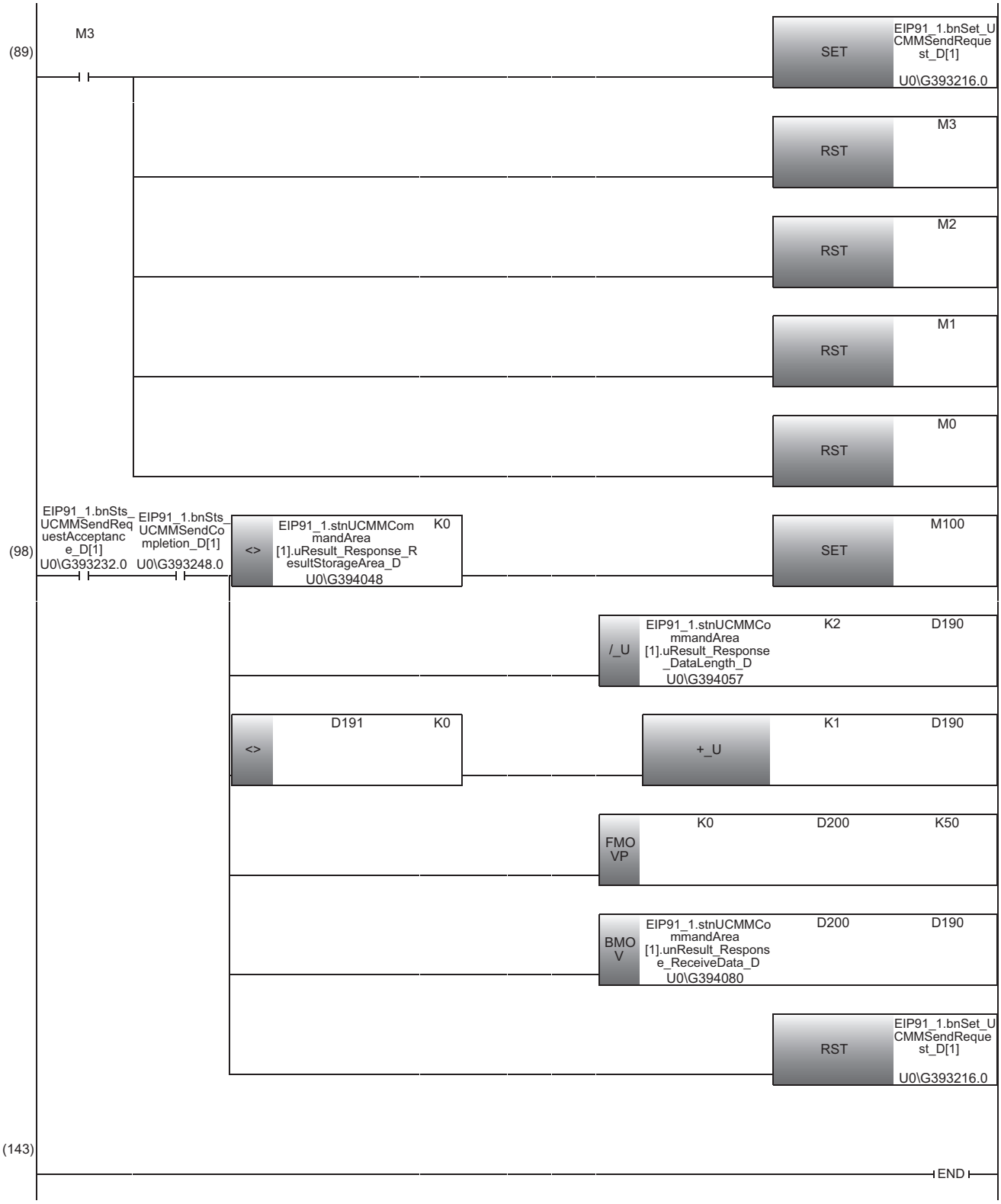
■ Module labels used in the program

Module label	Function	Device
EIP91_1.bSts_ModuleReady	Module Ready	X0
EIP91_1.bSts_CommunicationReady	Communication Ready	X1F
EIP91_1.bSet_CommunicationStartupRequest	EtherNet/IP communication start request	Y10
EIP91_1.stnUCMMCommandArea[1].unSet_Request_TargetIPAddress_D	UCMM data link request command (No.1) Target IP Address	U0\G393281
EIP91_1.stnUCMMCommandArea[1].uSet_Request_Service_D	UCMM data link request command (No.1) Service	U0\G393283
EIP91_1.stnUCMMCommandArea[1].uSet_Request_Class_D	UCMM data link request command (No.1) Class	U0\G393286
EIP91_1.stnUCMMCommandArea[1].uSet_Request_Instance_D	UCMM data link request command (No.1) Instance	U0\G393287
EIP91_1.stnUCMMCommandArea[1].uSet_Request_Attribute_D	UCMM data link request command (No.1) Attribute	U0\G393288
EIP91_1.stnUCMMCommandArea[1].uSet_Request_DataLength_D	UCMM data link request command (No.1) Data length	U0\G393289
EIP91_1.stnUCMMCommandArea[1].unSet_Request_RequestData_D	UCMM data link request command (No.1) Request data	U0\G393312
EIP91_1.bnSet_UCMMSendRequest_D[1]	UCMM data link execution request	U0\G393216.0
EIP91_1.bnSts_UCMMSendRequestAcceptance_D[1]	UCMM data link execution request acceptance	U0\G393232.0
EIP91_1.bnSts_UCMMSendCompletion_D[1]	UCMM data link execution completion	U0\G393248.0
EIP91_1.stnUCMMCommandArea[1].uResult_Response_ResultStorageArea_D	UCMM data link receive command (No.1) Result storage area	U0\G394048
EIP91_1.stnUCMMCommandArea[1].unResult_Response_ReceiveData_D	UCMM data link receive command (No.1) Receive data	U0\G394080
EIP91_1.stnUCMMCommandArea[1].uResult_Response_DataLength_D	UCMM data link receive command (No.1) Data length	U0\G394057

■ Program example




(36)
M2
BMOV
D150
EIP91_1.stnUCMMCommandArea[1].unSet_Request_TargetIPAddress_D
U0\G393281
K2
MOV
D152
EIP91_1.stnUCMMCommandArea[1].uSet_Request_Service_D
U0\G393283
MOV
D153
EIP91_1.stnUCMMCommandArea[1].uSet_Request_Class_D
U0\G393286
MOV
D154
EIP91_1.stnUCMMCommandArea[1].uSet_Request_Instance_D
U0\G393287
MOV
D155
EIP91_1.stnUCMMCommandArea[1].uSet_Request_Attribute_D
U0\G393288
+_U
D100
K2
EIP91_1.stnUCMMCommandArea[1].uSet_Request_DataLength_D
U0\G393289
/_U
EIP91_1.stnUCMMCommandArea[1].uSet_Request_DataLength_D
U0\G393289
K2
D90
<>
D91
K0
+_U
K1
D90
BMOV
D100
EIP91_1.stnUCMMCommandArea[1].unSet_Request_RequestData_D
U0\G393312
D90



(0): Perform the processing for starting communications.

(4): Initialize data of the UCMM data link request command.

(17): Initialize the DMCC command string ("||>GET DEVICE.NAME").

(36): Store data of the UCMM data link request command.

(89): Perform UCMM communications.

(98): Store response data and reset the command request.*1

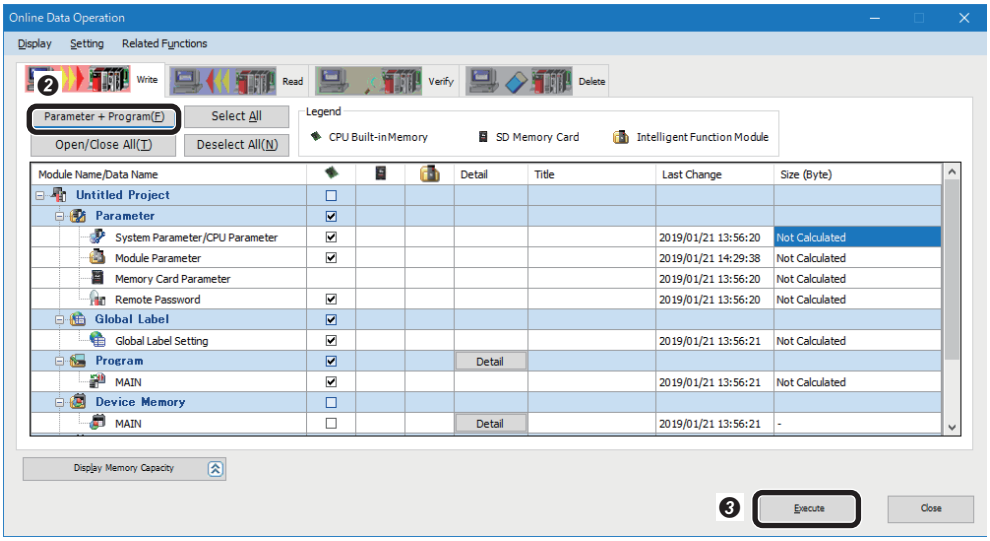
*1 If 'Communication error detection' (M100) is turned ON, refer to the following:
MELSEC iQ-R EtherNet/IP Network Interface Module User's Manual (Application)

6.5 Writing Data to a Programmable Controller

Write the parameters and program set in an engineering tool to the programmable controller.

Writing to the programmable controller

1. Turn ON the programmable controller.
2. Write parameters and program to the programmable controller in the "Online Data Operation" screen.



❶ Select [Online] ⇨ [Write to PLC]. The "Online Data Operation" screen appears.
❷ Click the [Parameter + Program] button.
❸ Click the [Execute] button.

Restarting the programmable controller

After writing the parameters and program, reset the programmable controller and switch to RUN.

6.6 Checking Operations

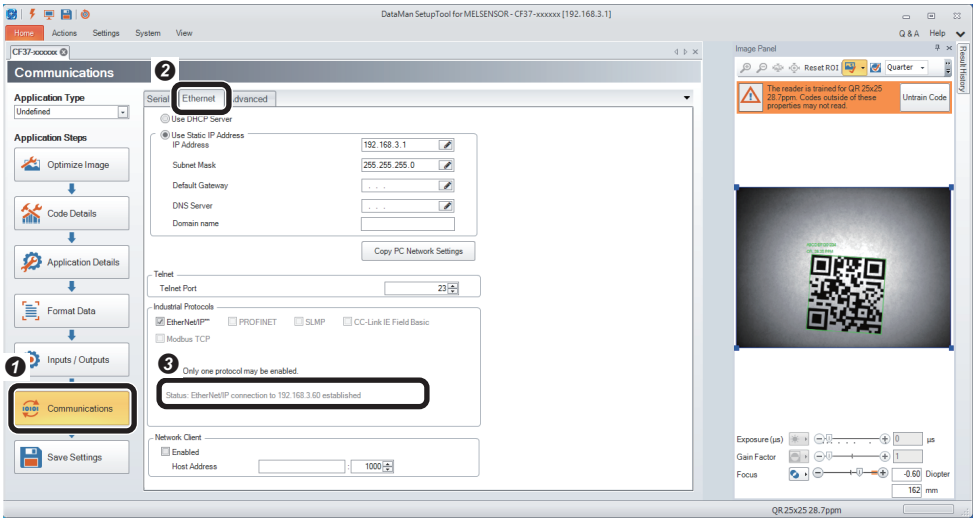
Check operation by controlling the code reader using the programmable controller.

Checking operations of cyclic (Implicit) communications

Use a created program to check the operation. (☞ Page 135 Creating a program for cyclic (Implicit) communications)

Checking the communication status

Check the communication status with an EtherNet/IP connection in DataMan Setup Tool for MELSENSOR.

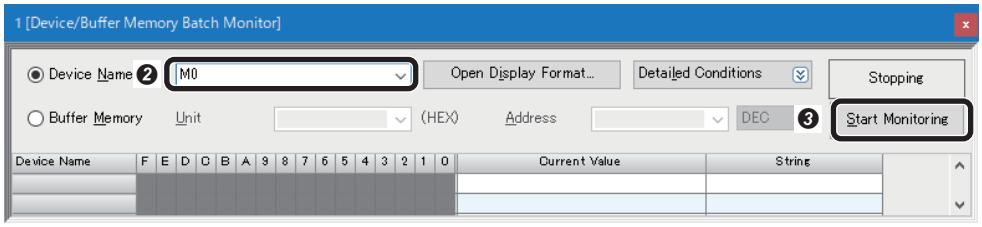


❶ Click the [Communications] button.
❷ Select the [Ethernet] tab.
❸ Check that "EtherNet/IP connection to 192.168.3.60 established" is displayed in "Status."

Checking read results

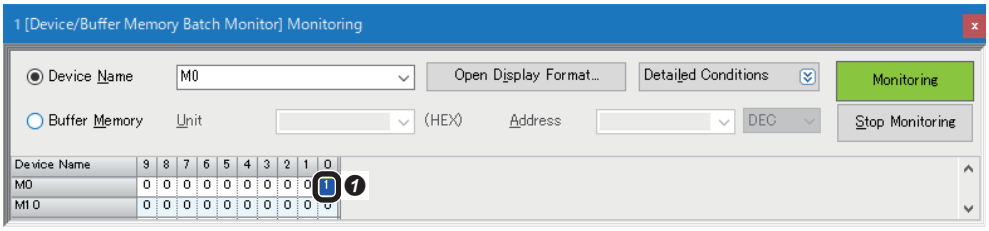
Check the read results of a QR Code in the "Device/Buffer Memory Batch Monitor" window of an engineering tool.

1. Start monitoring in the "Device/Buffer Memory Batch Monitor" window.



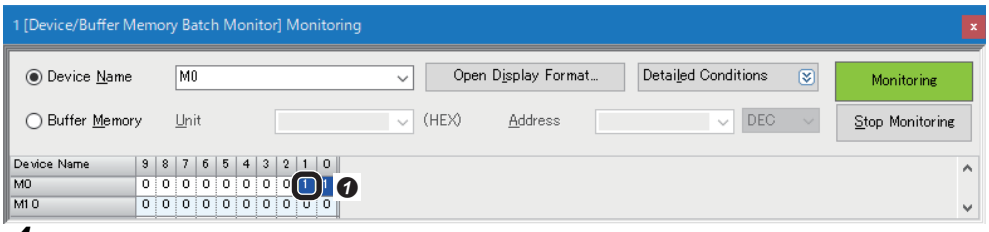
❶ Select [Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch Monitor]. The "Device/Buffer Memory Batch Monitor" window appears.
❷ Enter "M0" for "Device Name".
❸ Click the [Start Monitoring] button.

2. Enable a trigger on the code reader.



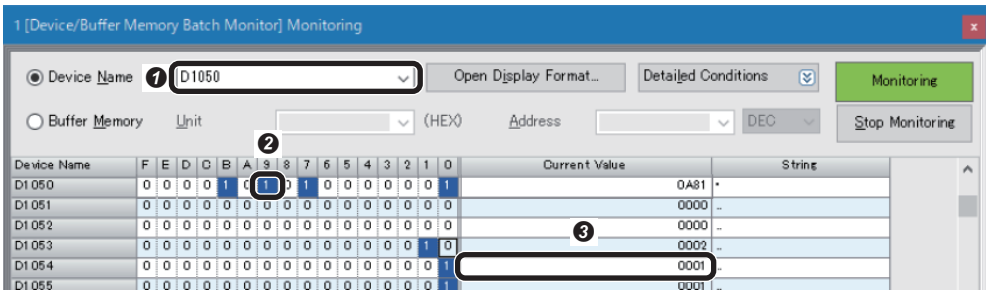
❶ Turn 'Image Capturing Trigger Enable command' (M0) ON.
'Trigger Enable' (D1000.0) is turned ON.

3. Turn ON a trigger.



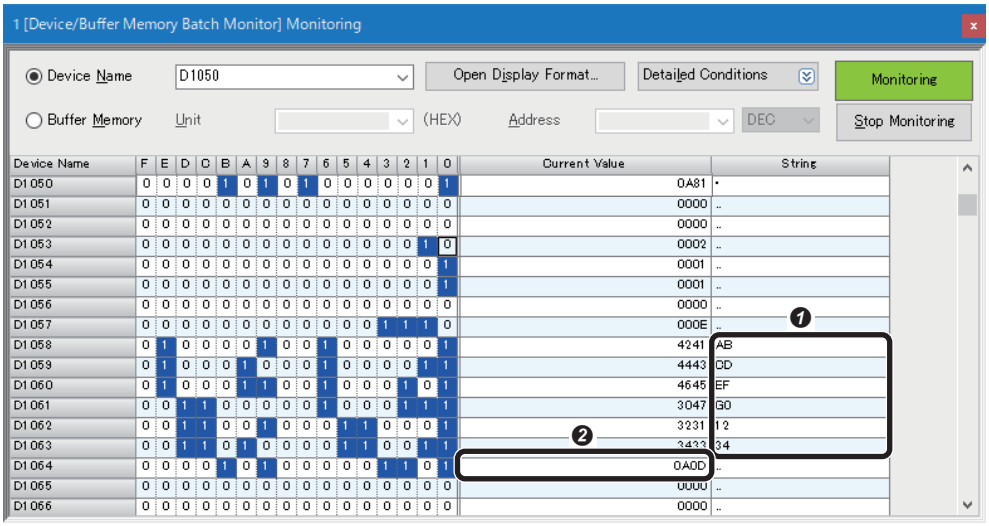
❶ Turn 'Image Capturing Trigger command' (M1) ON.
'Trigger' (D1000.1) is turned ON.

4. Check the completion of decoding.



❶ Enter "D1050" for "Device Name."
❷ Check that 'Decode Complete Toggle' (D1050.9) is inverted.
❸ Check that the value of 'Result ID' (D1054) is changed.

5. Check the read results.



❶ "D1058" to "D1063": Check "ABCDEFG01234" is displayed in "String."
❷ "D1064": Check the terminating text "0A0D" (CR/LF) is displayed in "Current Value."

Checking operations of message (Explicit) communications

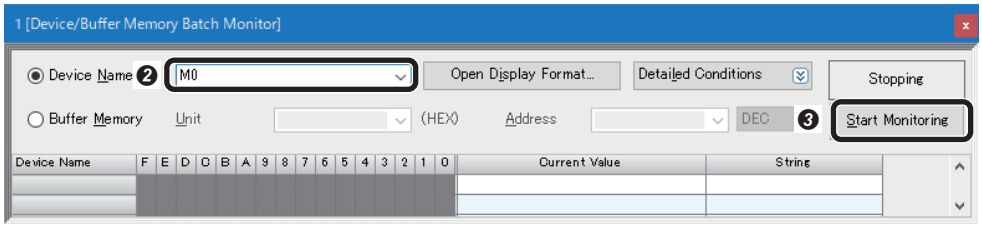
Acquire response data by sending DMCC commands to a code reader from a programmable controller.

Use a created program to check the operation. (☞ Page 140 Creating a program for message (Explicit) communications)

Checking read results

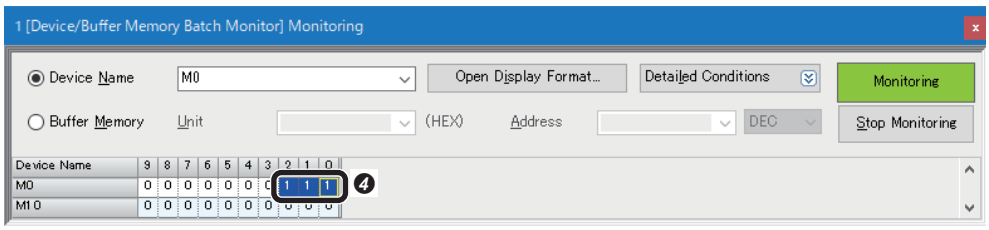
Check the execution result of DMCC commands in an engineering tool.

1. Start monitoring in the "Device/Buffer Memory Batch Monitor" window.



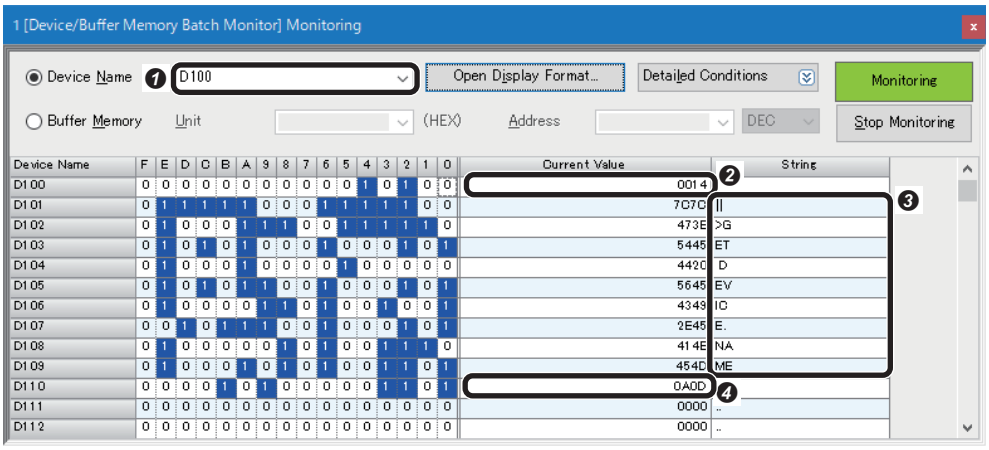
❶ Select [Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch Monitor]. The "Device/Buffer Memory Batch Monitor" window appears.
❷ Enter "M0" for "Device Name".
❸ Click the [Start Monitoring] button.

2. Prepare transmission data of the UMCC data link request command and DMCC commands.



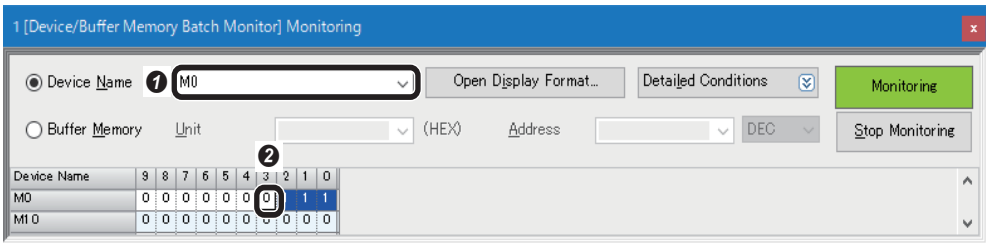
❹ Turn ON 'UCMM data link request command data initialization command' (M0), 'DMCC command string initialization command' (M1), then 'UCMM data link request command data store command' (M2).

3. Check command length and string data length.



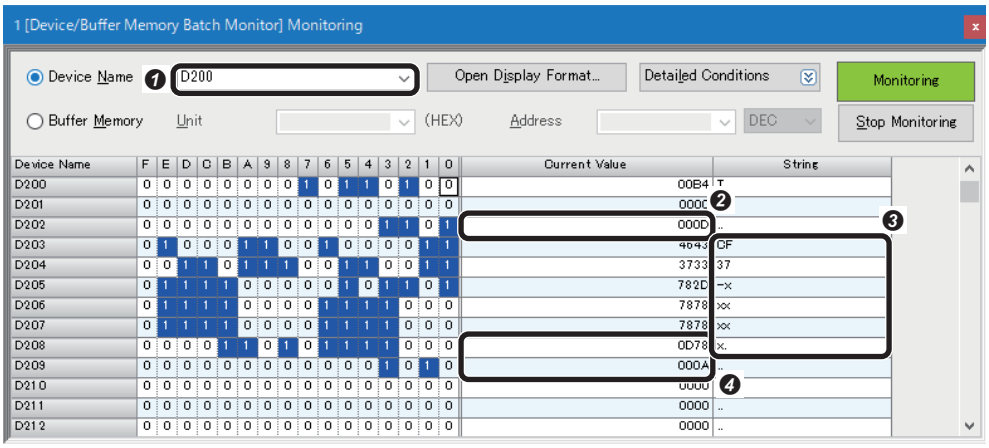
❶ Enter "D100" for "Device Name."
❷ Check the DMCC command data length "0014" is displayed in "Current Value" of "D100".
❸ Check the DMCC command "||>GET DEVICE.NAME" is displayed in "String" of "D101" to "D109."
❹ Check the terminating text "0A0D" (CR/LF) is displayed in "Current Value" of "D110."

4. Execute the DMCC command.



❶ Enter "M0" for "Device Name."
❷ Turn 'UCMM data link request command execution command' (M3) ON.

5. Check response data.



❶ Enter "D200" for "Device Name."
❷ Check the length of the device name "D" is displayed in "Current Value" of "D202."
❸ Check the device name (a name of the code reader used) "CF37-xxxxxx" is displayed in "String" of "D203" to "D208."
❹ Check the terminating text (CR/LF) is displayed in "Current Value" of "D208" and "D209."

MEMO

REVISIONS

*The manual number is given on the bottom left of the back cover.

Revision date	*Manual number	Description
June 2019	BCN-P5999-1074-A	First edition
June 2020	BCN-P5999-1074-B	■Added or modified parts Chapter 1, Chapter 2
October 2020	BCN-P5999-1074-C	■Added or modified parts SAFETY PRECAUTIONS, CONDITIONS OF USE FOR THE PRODUCT, INTRODUCTION, Section 1.1, Section 1.2, Section 1.4, Section 2.1, Section 2.2, Section 2.4, Section 3.1, Section 4.1, Section 5.1
May 2021	BCN-P5999-1074-D	■Added or modified parts INTRODUCTION, RELEVANT MANUALS, TERMS, GENERIC TERMS AND ABBREVIATIONS, Section 1.1, Section 1.2, Section 1.4, Section 1.5, Section 1.6, Section 2.1, Section 2.2, Section 2.4, Section 2.5, Section 2.6, Section 3.1, Section 3.2, Section 3.3, Section 3.4, Section 3.5, Section 4.1, Section 4.2, Section 4.4, Section 4.5, Section 4.6, Section 5.1, Section 5.3, Section 5.4, Section 5.5, Chapter 6, Section 6.1, Section 6.2, Section 6.3, Section 6.4, Section 6.5, Section 6.6
September 2022	BCN-P5999-1074-E	■Added or modified parts CONDITIONS OF USE FOR THE PRODUCT, Section 2.3, Section 6.4

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