MITSUBISHI ELECTRIC

FA Sensor

MELSENSOR

Vision Sensor Connection Guide

-VS20M-11F310
-VS20M-12F410
-VS20M-13F410
-VS20C-12F410
-VS20C-13F410
-VS70M-600-E
-VS70M-600-ER
-VS70M-600
-VS70M-600-R
-VS70M-800-E
-VS70M-800-ER
-VS70M-800
-VS70M-800-R
-VS70M-802-E
-VS70M-802-ER
-VS70M-802
-VS70M-802-R
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-VS70C-800-R
-VS70C-802-R

-VS80M-100-E
-VS80M-100
-VS80M-200-E
-VS80M-200-ER
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-VS80M-400-E
-VS80M-400-ER
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-VS80M-202-E
-VS80M-202-ER
-VS80M-202
-VS80M-202-R
-VS80M-402-E
-VS80M-402-ER
-VS80M-402
-VS80M-402-R
-VS80C-100
-VS80C-200-R
-VS80C-400-R
-VS80C-202-R
-VS80C-402-R

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 handling the product, touch a conducting object such as a grounded metal to discharge the static electricity from your body. Failure to do so may cause the vision sensor to fail or malfunction.
- 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 Vision Sensor. 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.
- The frame ground terminal of the I/O module and the shield ground of each connector (RS232 OUT port and SENSOR port) are internally conducting. The system ground is designed on the condition that a ground connection is provided. The ground potential may affect the vision sensor and peripheral devices such as programmable controllers via cables. For safe operation, it is recommended to connect all the ground connections securely.

[Startup and Maintenance Precautions]

⚠CAUTION

- Do not clean the Vision Sensor 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.

CONDITIONS OF USE FOR THE PRODUCT

(1)This vision sensor shall be used in conditions;
i) where any problem, fault or failure occurring in the vision sensor, 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 vision sensor for the case of any problem, fault or failure occurring in the vision sensor.

(2)This vision sensor 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 VISION SENSOR 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 VISION SENSOR.
("Prohibited Application")
Prohibited Applications include, but not limited to, the use of the vision sensor 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 vision sensor.
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 vision sensor in one or more of the Prohibited Applications, provided that the usage of the vision sensor 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 vision sensors 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 programmable controller 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 vision sensors listed below.
Before using the product, please read this manual and relevant manuals carefully, and develop familiarity with the functions and performance of the MELSENSOR vision sensor to handle the product correctly.
Please make sure that the end users read this manual.

Available vision sensors

Product name	Model
VS20	VS20M-11F310, VS20M-12F410, VS20M-13F410, VS20C-12F410, VS20C-13F410
VS70	VS70M-600-E, VS70M-600-ER, VS70M-600, VS70M-600-R, VS70M-800-E, VS70M-800-ER, VS70M-800, VS70M-800-R, VS70M-802-E, VS70M-802-ER, VS70M-802, VS70M-802-R, VS70C-600-R, VS70C-800-R, VS70C-802-R
VS80	VS80M-100-E, VS80M-100, VS80M-200-E, VS80M-200-ER, VS80M-200, VS80M-200-R, VS80M-400-E, VS80M-400-ER, VS80M-400, VS80M-400-R, VS80M-202-E, VS80M-202-ER, VS80M-202, VS80M-202-R, VS80M-402-E, VS80M-402-ER, VS80M-402, VS80M-402-R, VS80C-100, VS80C-200-R, VS80C-400-R, VS80C-202-R, VS80C-402-R

INSTALLATION

To connect a vision sensor, the following must be installed on a networked personal computer.

■ In-Sight Explorer

Download In-Sight Explorer 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 between a programmable controller and a vision sensor with an engineering tool, a profile of the vision sensor needs to be registered to the engineering tool.
A profile is data that stores information of a connected device (such as a model name.)
By registering the profile to an engineering tool, vision sensors are added to "Module List" in the "Ethernet Configuration" window and 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 vision sensor from the Mitsubishi Electric FA website.
www.MitsubishiElectric.co.jp/fa

■ EtherNet/IP Configuration Tool for RJ71EIP91

For the EtherNet/IP connection, network settings are required by using EtherNet/IP Configuration Tool for RJ71EIP91.
Download EtherNet/IP Configuration Tool for RJ71EIP91 from the Mitsubishi Electric FA website.
www.MitsubishiElectric.co.jp/fa

■ EDS file

To configure communication between an RJ71EIP91 or FX5-ENET/IP and a vision sensor with EtherNet/IP Configuration Tool, registering an EDS file to EtherNet/IP Configuration Tool is required.
An EDS file is data that stores information of a connected device (such as a model name).
For details on how to register an EDS file, refer to the following:
📖MELSEC iQ-R EtherNet/IP Network Interface Module User's Manual (Application)
📖MELSEC iQ-F FX5-ENET/IP User's Manual
The EDS file for a vision sensor can be downloaded from the Mitsubishi Electric FA website.

CONTENTS

RELEVANT MANUALS

Manual name [manual number]	Description	Available form
Vision Sensor Connection Guide [BCN-P5999-0861](this manual)	Procedures for connecting a vision sensor to a MELSEC programmable controller to control a vision system through a CC-Link IE Field Network Basic connection, an SLMP connection, an I/O connection, or an EtherNet/IP connection	e-Manual PDF
Vision Sensor VS20 User's Manual [SH-081769ENG]	Functions, installation methods, system configuration, and required hardware components, etc. of the vision sensor VS20	Print book
		e-Manual PDF
Vision Sensor VS70 User's Manual [SH-081889ENG]	Functions, installation methods, system configuration, and required hardware components, etc. of the vision sensor VS70	Print book
		e-Manual PDF
Vision Sensor VS80 User's Manual [SH-081891ENG]	Functions, installation methods, system configuration, and required hardware components, etc. of the vision sensor VS80	Print book
		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.

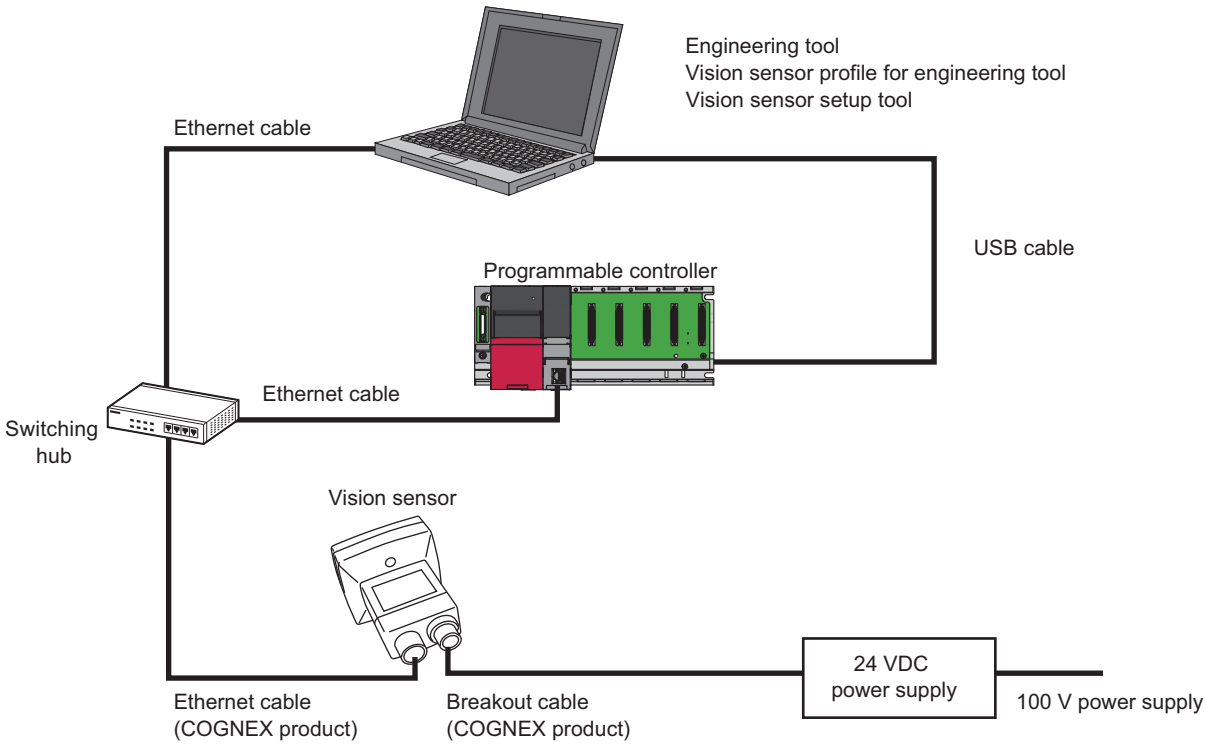
Term	Description
Buffer memory	Memory in an intelligent function module to store data such as setting values and monitor values. For CPU modules, it refers to memory to store data such as setting values and monitor values of the Ethernet function, or data used for data communication of the multiple CPU system function.
CC-Link IE Field Network Basic	A factory automation network using standard Ethernet. Data is periodically exchanged between a master station and slave stations using link devices (cyclic transmission).
Cyclic transmission	A function by which data are periodically exchanged among stations on the same network
Discrete online	Online status set to a vision sensor by a user interface
EDS file	Data that stores information of an EtherNet/IP connection device (such as a model name)
Engineering tool	GX Works3. A tool used for setting up programmable controllers, programming, debugging, and maintenance.
EtherNet/IP	An industrial network protocol that adapts CIP (Common Industrial Protocol) to standard Ethernet
EtherNet/IP Configuration Tool	EtherNet/IP Configuration Tool for RJ71EIP91. A tool for setting the EtherNet/IP network configuration.
GX Works2	A generic product name for SWnDND-GXW2 and SWnDNC-GXW2. ('n' indicates its version.) GX Works2 corresponding to MELSOFT Navigator is the product later than GX Works2 Version 1.11M.
GX Works3	A generic product name for SWnDND-GXW3 ('n' indicates its version.)
Job	A file created with the vision sensor setup tool to control a vision sensor. The file extension is 'Job.' (*.Job)
Job ID	A number used to identify the job. The number is added to the front of a file name.
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.
Native mode command	A command to control a vision sensor
Poll interval	An interval to periodically send a read request to external devices (such as programmable controllers, robot controllers)
Profile	Data that stores information of a connected device (such as a model name)
Refresh	Processing to transfer data between link devices in a network module and devices in a CPU module
Remote I/O (RX/RY)	RX: Bit data input from a slave station to the master station. RY: Bit data output from the master station to a slave station.
Remote register (RW/RWw)	RWr: Word data input from a slave station to the master station. RWw: Word data output from the master station to a slave station.
Rotation tolerance	A parameter for specifying the angle of detected pattern rotating
RPI	An abbreviation for Requested Packet Interval. A communication cycle that is decided by the originator during communications between EtherNet/IP devices.
SLMP	An abbreviation for SeamLess Message Protocol. The protocol to access the programmable controller connected from the external device to the SLMP corresponding device, or connected to the SLMP corresponding device.
SLMP scanner	A function to periodically read from and write to external devices (such as programmable controllers, robot controllers) by using the SLMP protocol
Soft event	A function to assign an operation set in a spreadsheet as an event, and to trigger a specific operation of a job by using an execution bit of SoftEvent
Spreadsheet	A programming interface of In-Sight Explorer for programming by using image processing functions and control functions
Vision sensor setup tool	In-Sight Explorer. A tool for setting a vision sensor.
Vision sensor VS20	A generic term for VS20M-11F310, VS20M-12F410, VS20M-13F410, VS20C-12F410, and VS20C-13F410
Vision sensor VS70	A generic term for VS70M-600-E, VS70M-600-ER, VS70M-600, VS70M-600-R, VS70M-800-E, VS70M-800-ER, VS70M-800, VS70M-800-R, VS70M-802-E, VS70M-802-ER, VS70M-802, VS70M-802-R, VS70C-600-R, VS70C-800-R, and VS70C-802-R
Vision sensor VS80	A generic term for VS80M-100-E, VS80M-100, VS80M-200-E, VS80M-200-ER, VS80M-200, VS80M-200-R, VS80M-400-E, VS80M-400-ER, VS80M-400, VS80M-400-R, VS80M-202-E, VS80M-202-ER, VS80M-202, VS80M-202-R, VS80M-402-E, VS80M-402-ER, VS80M-402, VS80M-402-R, VS80C-100, VS80C-200-R, VS80C-400-R, VS80C-202-R, and VS80C-402-R

1 CC-Link IE Field Network Basic CONNECTION

This chapter explains the procedure for connecting a vision sensor VS20 to a programmable controller and controlling the vision sensor with CC-Link IE Field Network Basic connection.
For details on CC-Link IE Field Network Basic, refer to the following manual.
CC-Link IE Field Network Basic Reference Manual

1.1 System Configuration Example for Connecting a Vision Sensor

The following figure shows the system configuration for connecting a vision sensor VS20.



Point

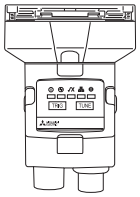
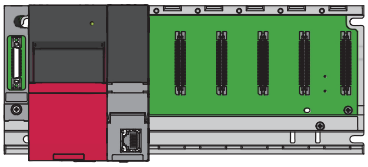
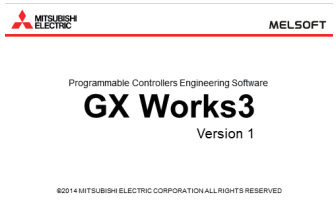
CC-Link IE Field Network Basic connection is available for other vision sensors (VS70 and VS80).
For details on the system configuration, refer to the user's manual of the vision sensor used.

Configurations

The devices used in the system configuration are as follows.

Required equipment

■ Mitsubishi Electric products

		
Vision sensor • VS20M-13F410	Programmable controller • Power supply: R62P • CPU module: R08CPU • Base: R35B	Engineering tool • GX Works3

■ COGNEX products

			
Vision sensor profile for engineering tool*1	Vision sensor setup tool • In-Sight Explorer	Ethernet cable	Breakout cable

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

■ Commercial products

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

Point

For available devices for the system configuration, refer to the user's manual of the vision sensor used.

Connection and wiring of a vision sensor

This section shows the procedure for connecting and wiring a vision sensor.

Operating procedure

1. Check that the 24 VDC power supply is OFF.
2. Connect an I/O wire or a serial wire of a breakout cable to an appropriate device (such as a programmable controller).
3. Connect the 24 VDC (red wire) and GND (black wire) of a breakout cable to the corresponding terminals on the power supply.
4. Connect the M12 connector of the breakout cable to the Power, I/O and RS-232 connector of the vision sensor.
5. Connect the Ethernet cable's M12 connector to the vision sensor's Ethernet connector.
6. Turn ON the 24 VDC power supply.

Precautions

- When connecting a vision sensor and a programmable controller, simultaneously turn ON the power of the vision sensor and programmable controller, or first turn ON the power of the programmable controller.
- Cut unused wires or protect them with insulating materials. Be careful not to short-circuit with 24 VDC wires.
- The cable is designed to connect with its key aligned with the keyway of the connector on the Vision Sensor. Do not force the connections or damage may occur.

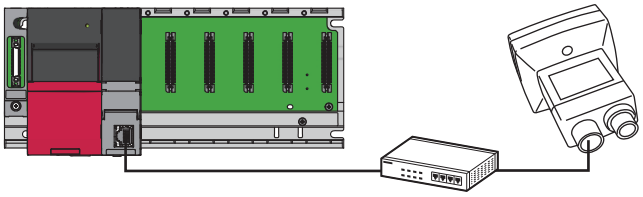
Point

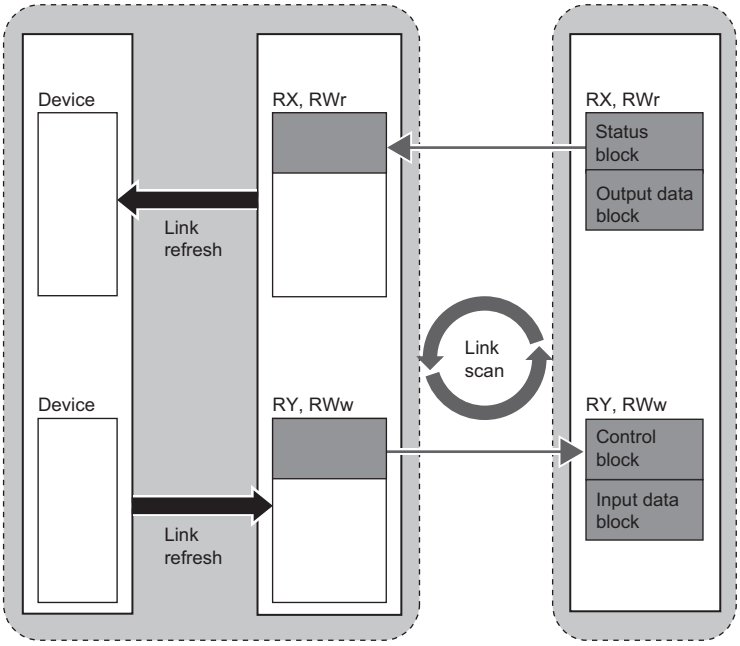
For details on the connection with a vision sensor, refer to the user's manual of the vision sensor used.

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 (vision sensor) using link devices.
Remote input and output (RY and RX), 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 vision sensor 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 vision sensor.





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

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

For details on each data, refer to the help of vision sensor setup tool.

Precautions

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

Remote I/O signals (RX/RY)

■ Control blocks (RY)

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

• Control block list

RY7	RY6	RY5	RY4	RY3	RY2	RY1	RY0
Set Offline	(Reserved)		Execute Command	Inspection Results Ack	Buffer Results Enable	Trigger	Trigger Enable
RYF	**RYE**	**RYD**	**RYC**	**RYB**	**RYA**	**RY9**	**RY8**
(Reserved)							
RY17	**RY16**	**RY15**	**RY14**	**RY13**	**RY12**	**RY11**	**RY10**
(Reserved)				Clear Exposure Complete	Clear Error	(Reserved)	Set User Data
RY1F	**RY1E**	**RY1D**	**RY1C**	**RY1B**	**RY1A**	**RY19**	**RY18**
Soft Event 7	Soft Event 6	Soft Event 5	Soft Event 4	Soft Event 3	Soft Event 2	Soft Event 1	Soft Event 0
RY20..RY3F							
User Data (Bit Area)							

• Control block details

Bit	Data name	Description (Application)
0	Trigger Enable	To enable an image capturing trigger by 'Trigger.' • ON: An image capturing trigger is enabled. • OFF: An image capturing trigger is disabled.
1	Trigger	To start (trigger) image capturing. • ON: Image capturing is started. • OFF: — The following conditions must be satisfied to start image capturing properly: • "Industrial Ethernet" is selected in the [Set Up Image] ⇨ [Trigger] tab in the vision sensor setup tool. (☞ Page 20 Creating a new job) • The vision sensor is online. • 'Trigger Enable' and 'Trigger Ready' are turned ON.
2	Buffer Results Enable	To enable the buffer for read results. New read results are stored in the buffer queue of a vision sensor. To acquire the next read results, turn ON 'Inspection Results Ack'. • ON: The buffer for read results is enabled. • OFF: The buffer for read results is disabled.
3	Inspection Results Ack	To respond to receiving the latest read results. A vision sensor turns 'Results Valid' 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	Execute Command	To load a job of the job ID specified to 'Command.' • ON: Job load is executed. • OFF: — Until 'Command Completed' is turned ON, the ON state for this bit must be retained. The following conditions must be satisfied to start job load properly: • A vision sensor is set to offline by 'Set Offline.' • A job of the job ID specified to 'Command' exists.
5 to 6	(Reserved)	—

Bit	Data name	Description (Application)
7	Set Offline	To make a vision sensor offline while this bit is ON. • ON: A vision sensor is set to offline. • OFF: —
8 to 15	(Reserved)	—
16	Set User Data	To notify a vision sensor that the 'User Data' field was updated. • ON: 'User Data' field update is notified. • OFF: — A vision sensor updates data defined in the [Format Input Data] tab of a communication setting with the vision sensor setup tool when this bit is turned ON. The timing of contents in the 'User Data' field to be applied depends on whether "Enable User Data Bypass" is selected or not; that can be selected from [Sensor] ⇨ [Network Settings] ⇨ "Industrial Ethernet Protocols" ⇨ "CC-Link IE Field Basic" ⇨ the [Settings] button ⇨ "Enable User Data Bypass." • Selected: Applied when 'Set User Data' is turned ON • Unselected: Applied when 'Set User Data' is turned ON and a trigger is input
17	(Reserved)	—
18	Clear Error	To clear an error and error code signal. When multiple errors occur, the next error and error code are set by turning this bit OFF. • ON: Error clear is executed. • OFF: —
19	Clear Exposure Complete	To turn 'Exposure Complete' OFF. 'Exposure Complete' does not turn ON while this bit is ON. • ON: Exposure completion is cleared. • OFF: —
20 to 23	(Reserved)	—
24 to 31	Soft Event	To enable a soft event trigger in a spreadsheet. A related software event in a spreadsheet is executed by turning this bit ON.
32 to 63	(Reserved)	—

■ Status blocks (RX)

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

• Status block list

RX7	RX6	RX5	RX4	RX3	RX2	RX1	RX0
Online	Offline Reason			Missed Acq	(Reserved)	Trigger Ack	Trigger Ready

RXF	RXE	RXD	RXC	RXB	RXA	RX9	RX8
Error	Command Failed	Command Completed	Command Executing	Results Valid	Results Buffer Overrun	Inspection Completed	System Busy

RX17	RX16	RX15	RX14	RX13	RX12	RX11	RX10
(Reserved)			Job Pass	Exposure Complete	(Reserved)	(Reserved)	Set User Data Ack

RX1F	RX1E	RX1D	RX1C	RX1B	RX1A	RX19	RX18
Soft Event Ack 7	Soft Event Ack 6	Soft Event Ack 5	Soft Event Ack 4	Soft Event Ack 3	Soft Event Ack 2	Soft Event Ack 1	Soft Event Ack 0

RX20..RX3F
Inspection Results (Bit Area)

• Status block details

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 vision sensor recognizes 'Trigger' is ON, and an image capturing trigger is received. Until 'Trigger' is turned OFF, the ON state for this bit is retained. • ON: An image capturing trigger is received. • OFF: —
2	(Reserved)	—

Bit	Data name	Description (Application)
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 to 6	Offline Reason	This bit shows the cause of a vision sensor being offline by three bits. 0: Online 1: Job is being edited. 2: Offline is set by a discrete signal. 3: Offline is set by a predefined protocol.
7	Online	This bit shows the online/offline status. When a vision sensor is offline, the reason is shown in the 'Offline Reason' field. • ON: Online • OFF: Offline
8	System Busy	This bit shows that a vision sensor is executing or loading a job, or responding to user inputs. • ON: System busy • OFF: —
9	Inspection Completed	This bit is inverted every time when an inspection is completed and a series of inspection results ('Inspection ID,' 'Inspection Result Code,' 'Inspection Results,' and 'Job Pass') is sent to a programmable controller.
10	Results Buffer Overrun	This bit shows that a vision sensor 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 Valid	This bit shows that a series of inspection results is available ('Inspection ID,' 'Inspection Result Code,' 'Inspection Results,' and 'Job Pass' fields contain valid data). Until 'Inspection Results Ack' responds, this bit remains ON. • ON: With new read results • OFF: Without new read results
12	Command Executing	This bit shows that job load is executed. • ON: Job load is being executed. • OFF: —
13	Command Completed	This bit is turned ON when job load is completed. When a job load command is not completed properly, 'Command Failed' is also turned ON. • ON: Job load is completed. • OFF: —
14	Command Failed	This bit is turned ON when job load is not completed properly. It is turned OFF when a new job is loaded by a programmable controller. When changing a job by using the vision sensor setup tool, this bit is not changed. • ON: Job load is failed. • OFF: —
15	Error	This bit is turned ON when an error occurred. • ON: Error occurred. • OFF: —
16	Set User Data Ack	This bit is turned ON when 'Set User Data' command execution is completed. • ON: 'Set User Data' command execution is completed. • OFF: —
17 to 18	(Reserved)	—
19	Exposure Complete	This bit is turned ON when an exposure for a vision sensor is completed. It is turned OFF by 'Clear Exposure Complete.' When 'Clear Exposure Complete' is set to ON, the OFF state of this bit is retained. • ON: Exposure is completed. • OFF: —
20	Job Pass	This bit is turned ON when the latest job is passed. It is turned OFF when a job is failed. • ON: Inspection result is passed. • OFF: —
21 to 23	(Reserved)	—
24 to 31	Soft Event Ack	This bit shows that a vision sensor received a soft event command.
32 to 63	(Reserved)	—

Remote registers (RWr and RWw)

■ Output data blocks (RWr)

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

• Output data block list

RWr0	RWr1	RWr2	RWr3	RWr4	RWr5..
Current Job ID	Error Code	Acquisition ID	Inspection ID	Inspection Result Code	Inspection Results

• Output data block details

Word	Data name	Description (Application)
0	Current Job ID	Job ID of a job being executed is stored. If no job ID is specified for the job, '65535 (0xFFFF)' is stored.
1	Error Code	This shows an error occurred in 16-bit integer. • 0x0000: No error • 0x0100: An image capturing trigger is generated when the image capturing trigger is disabled. • 0x0101: An image capturing trigger is generated when a vision sensor is offline. • 0x0400: Another command execution command is generated when a command is being executed. • 0x0401: Job load is requested when a vision sensor is online.
2	Acquisition ID	Image capturing ID associated with the image capturing is stored. This can be used to synchronize image capturing and inspection results.
3	Inspection ID	Inspection ID associated with a series of inspection results ('Inspection ID,' 'Inspection Result Code,' 'Inspection Results,' and 'Job Pass') is stored.
4	Inspection Result Code	Any inspection result code specified for "Result code" of the WriteResultsBuffer function in the vision sensor setup tool (spreadsheet) is stored.
5 or later	Inspection Results	The data defined in the [Format Output Data] tab of a communication setting with the vision sensor setup tool is stored.

■ Input data blocks (RWw)

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

• Input data block list

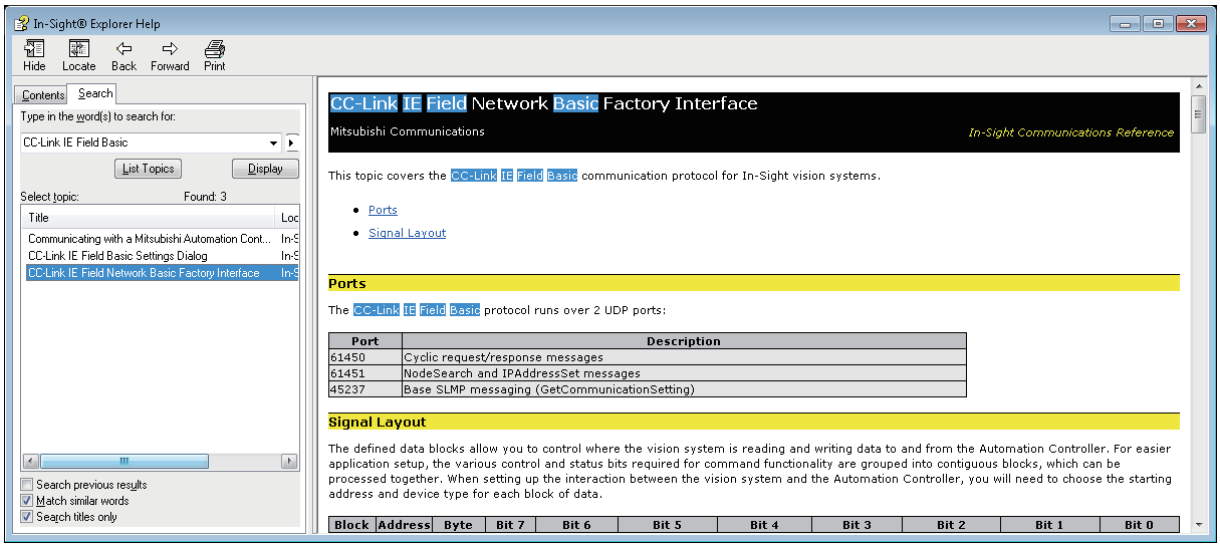
RWw0	RWw1..
Command	User Data

• Input data block details

Word	Data name	Description (Application)
0	Command	To specify job IDs (0 to 999).
1 or later	User Data	Data buffer to transfer data from a programmable controller to a vision sensor. This can be used for the following application: To update the data defined in the [Format Input Data] tab of a communication setting with the vision sensor setup tool: Store data to be updated in the data format defined in the [Format Input Data] tab.

For details on each data to control a vision sensor, refer to the help of vision sensor setup tool.

Enter "CC-Link IE Field Network Basic" as a keyword in the [Search] tab of Help, and refer to the explanation of the data.



1.3 Setting the Vision Sensor

Start the vision sensor setup tool to set the vision sensor.

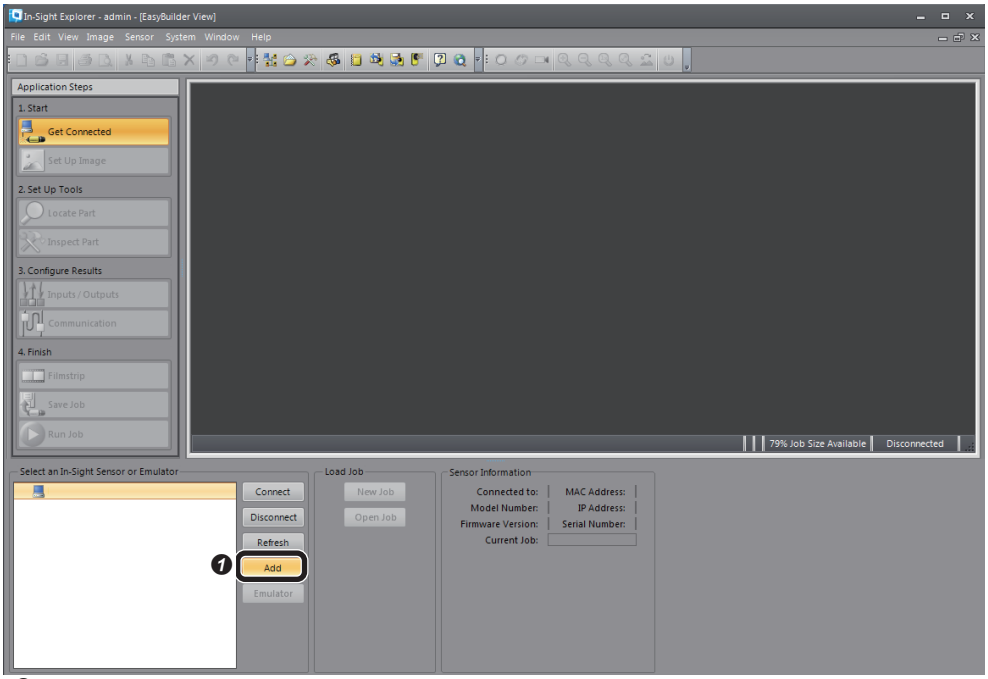
Setting an IP address to a personal computer

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

Connecting the vision sensor

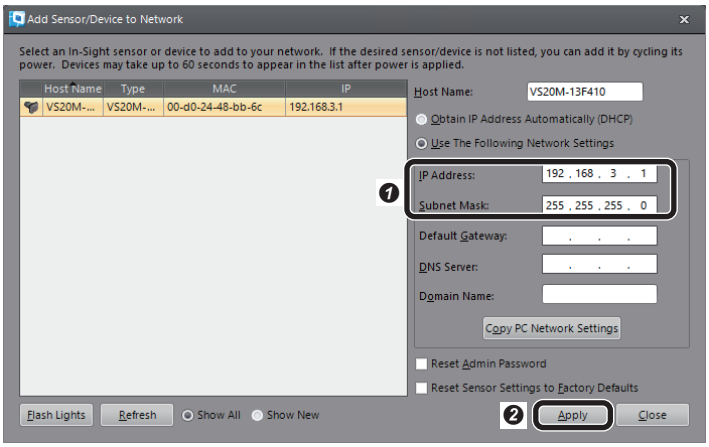
Start the vision sensor setup tool to set the vision sensor.

1. Start the vision sensor setup tool.



❶ Click the [Add] button.

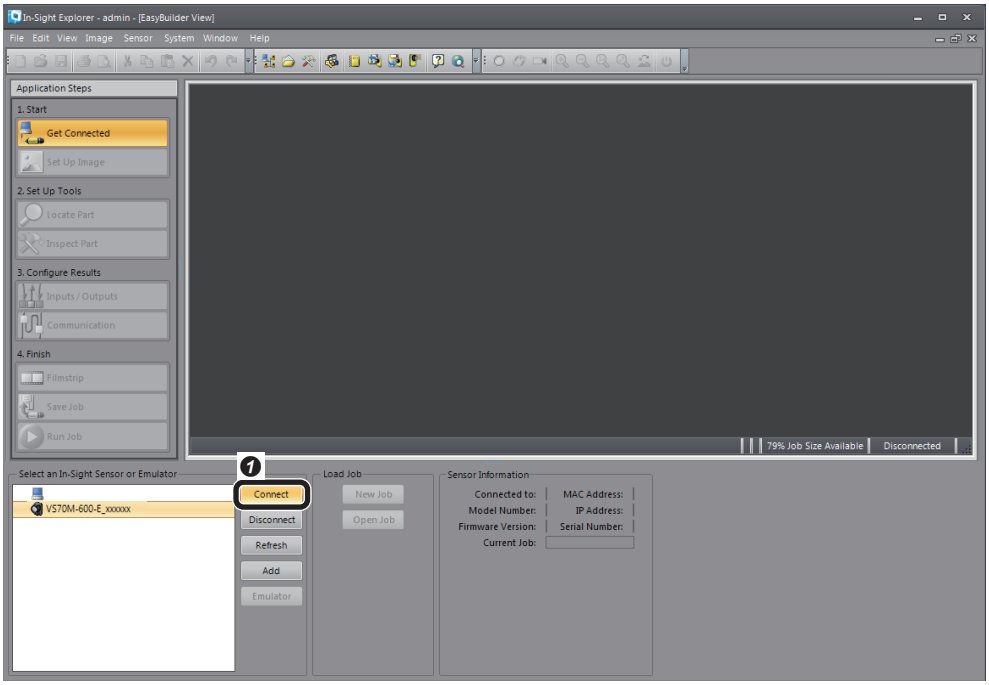
2. Add the vision sensor to the network.



❶ Add the vision sensor to the network.
- IP Address: 192.168.3.1
- Subnet Mask: 255.255.255.0

❷ Click the [Apply] button.

3. Connect to the vision sensor.

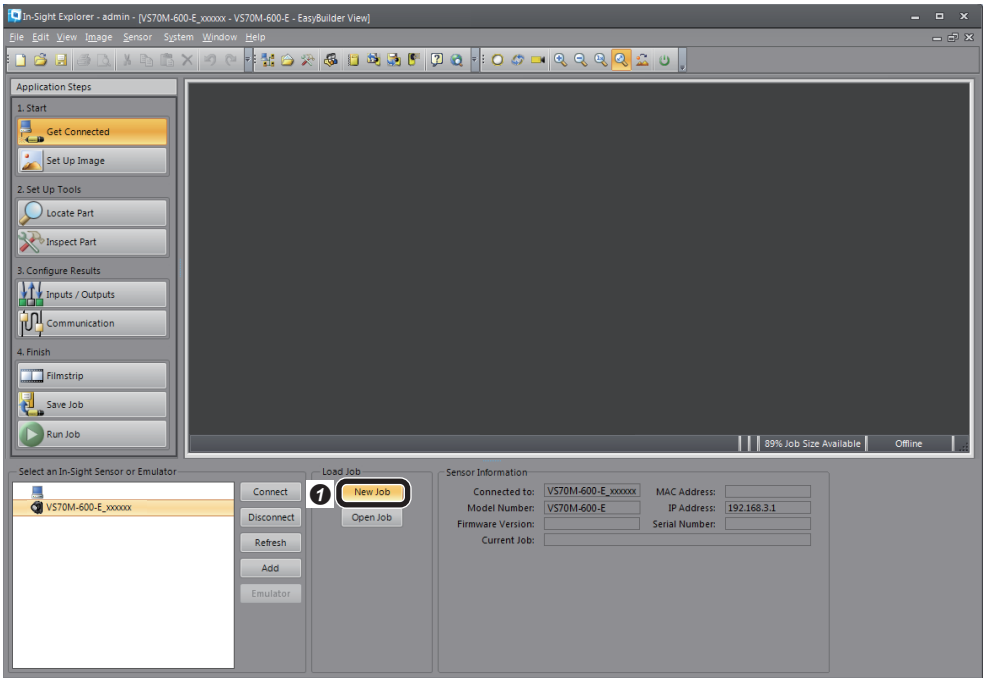


❶ Click the [Connect] button to connect to the vision sensor.

Creating a new job

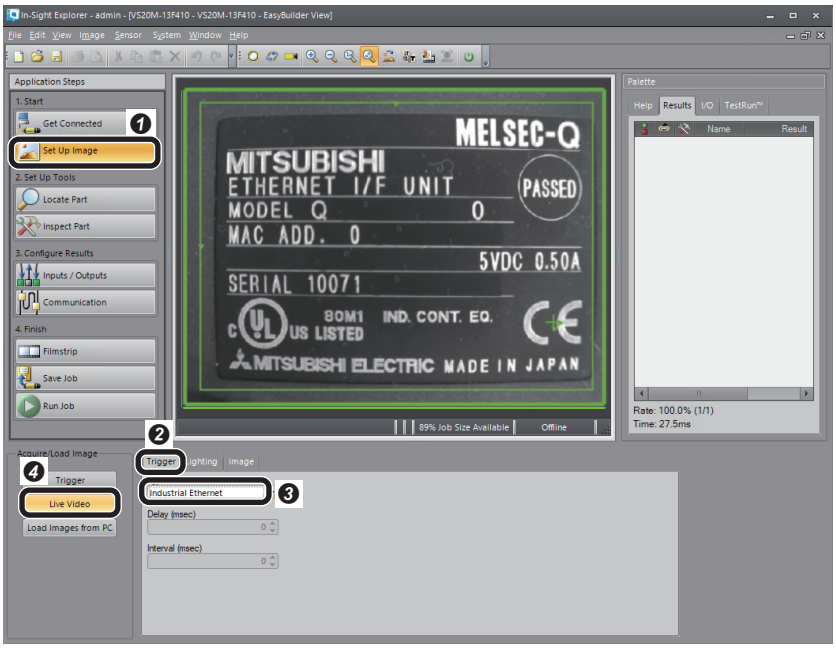
As an example, set a CE mark for inspection target.

1. Create a new job.



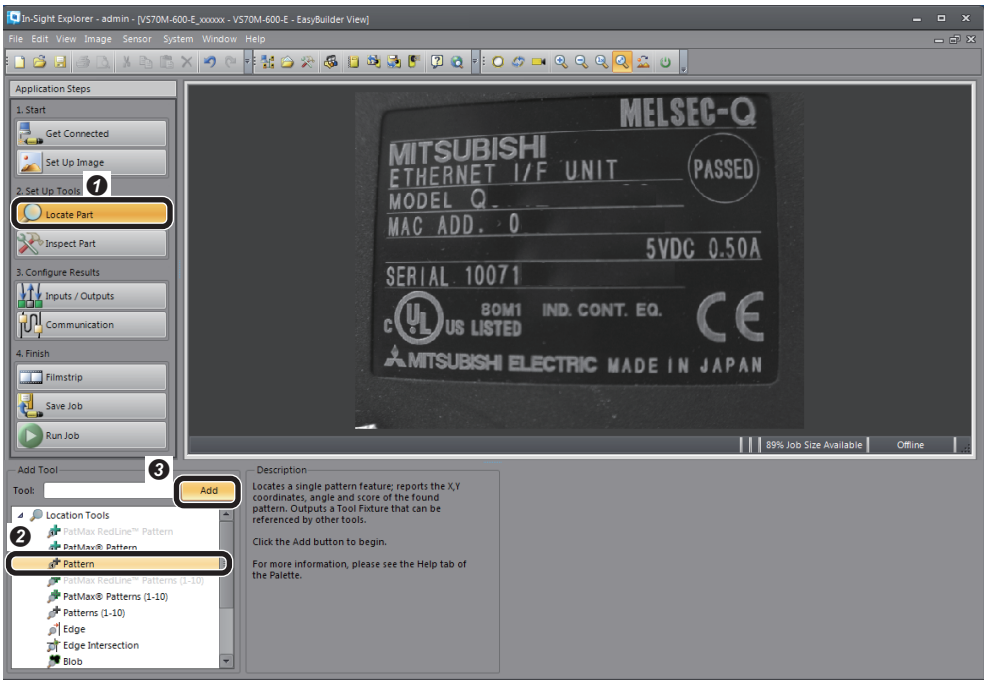
❶ Click the [New Job] button.

2. Adjust so that the lens captures an inspection target in [Set Up Image], and configure the settings to acquire the image.



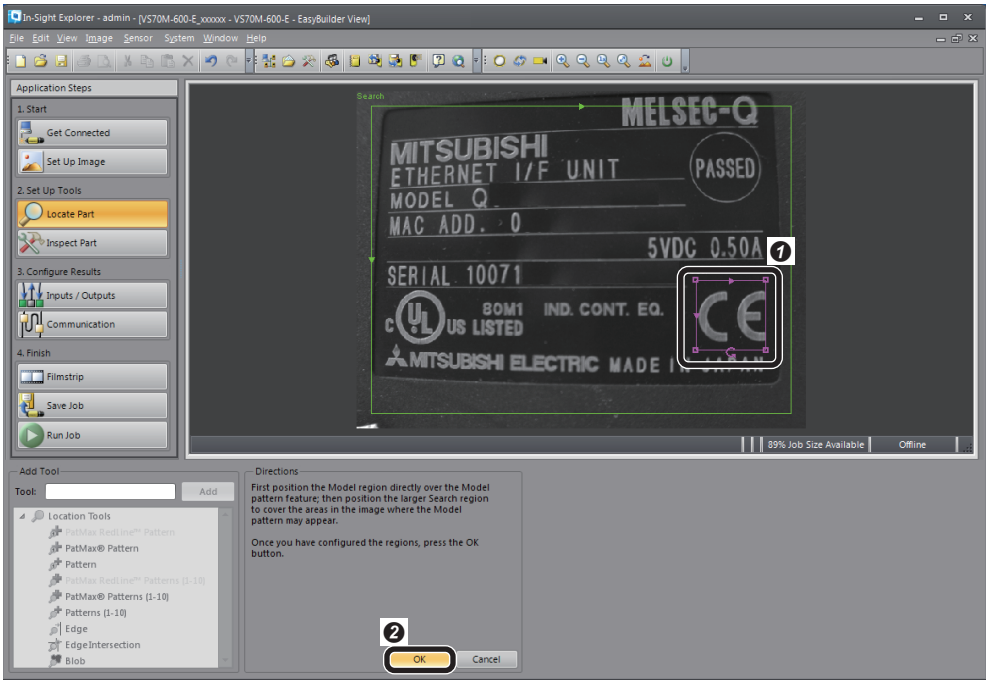
❶ Click the [Set Up Image] button.
❷ Select the [Trigger] tab.
❸ Select "Industrial Ethernet".
❹ Click the [Live Video] button to adjust the image. After adjusting the image, click the [Live Video] button again.

3. Set a tool.



❶ Click the [Locate Part] button.
❷ Select "Pattern".
❸ Click the [Add] button.

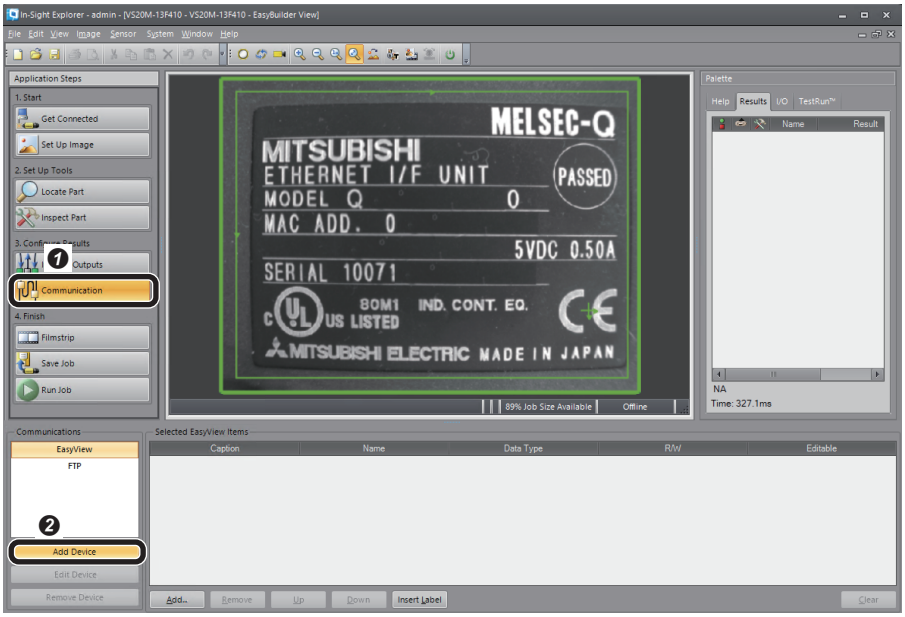
4. Set a model on the position to be detected.



❶ Set a model. (CE mark is selected.)
❷ Click the [OK] button.
❸ Check that Name is "Pattern_1".

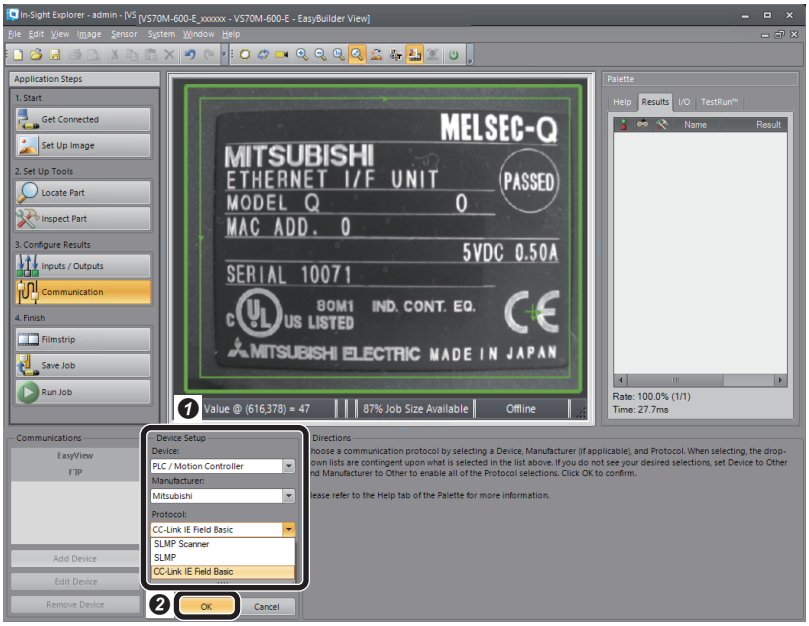
Configuring a communication setting

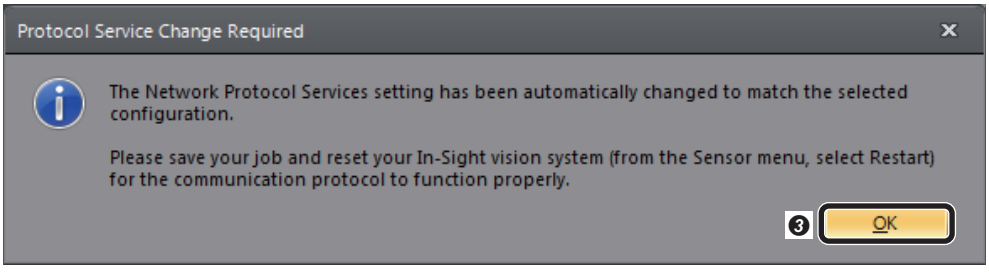
1. Configure the communication setting (CC-Link IE Field Network Basic).



❶ Click the [Communication] button.
❷ Click the [Add Device] button.

2. Add the CC-Link IE Field Network Basic.

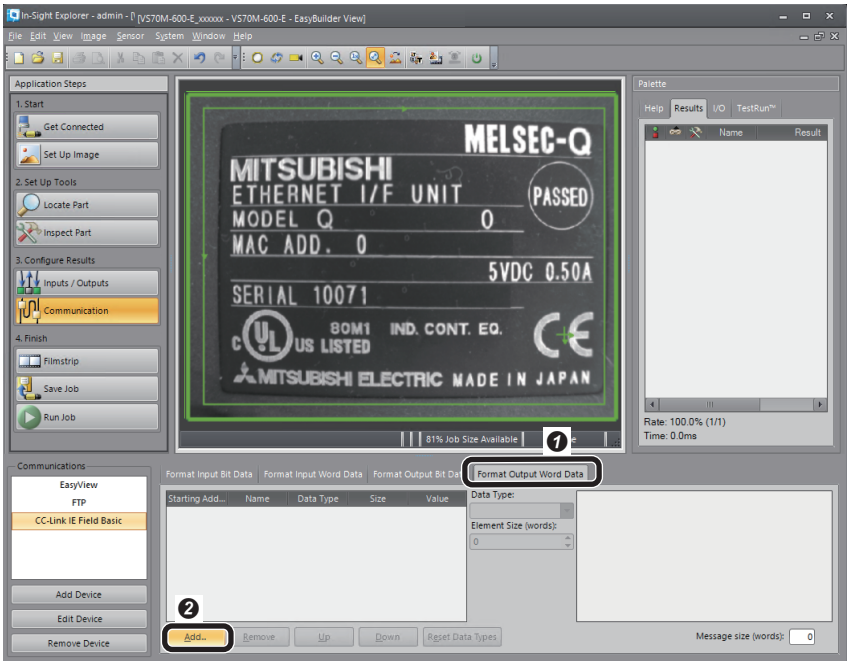


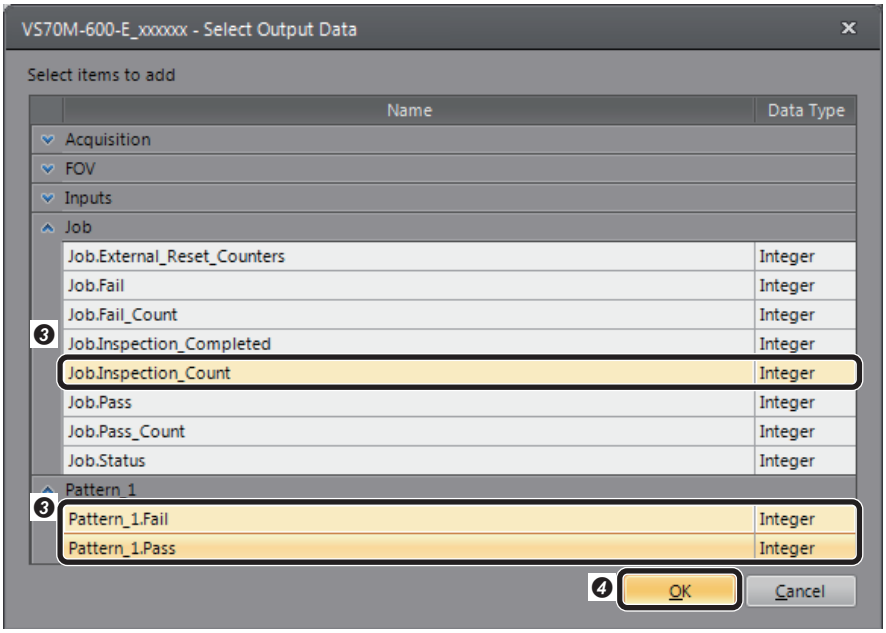


❶ Configure a device setting.
- Device: PLC/Motion Controller
- Manufacturer: Mitsubishi
- Protocol: CC-Link IE Field Basic

❷ Click the [OK] button.
❸ When the message "Protocol Service Change Required" appears, click the [OK] button.

3. Add the data to be transmitted in the cyclic transmission of the CC-Link IE Field Network Basic.



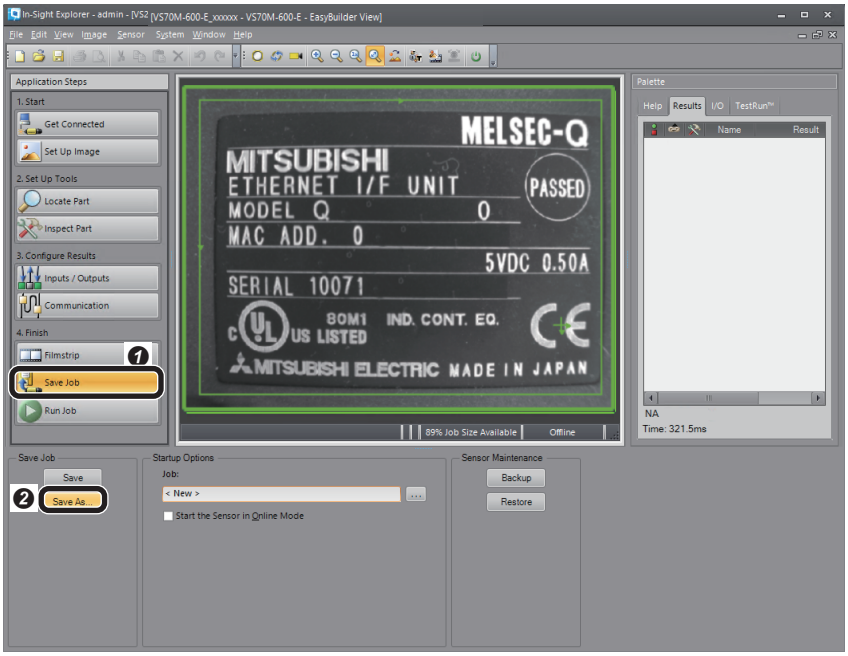


❶ Select the [Format Output Word Data] tab.
❷ Click the [Add] button.
❸ Select the data to add in the following order.
- Pattern_1.Pass
- Pattern_1.Fail
- Job.Inspection_Count

❹ Click the [OK] button.

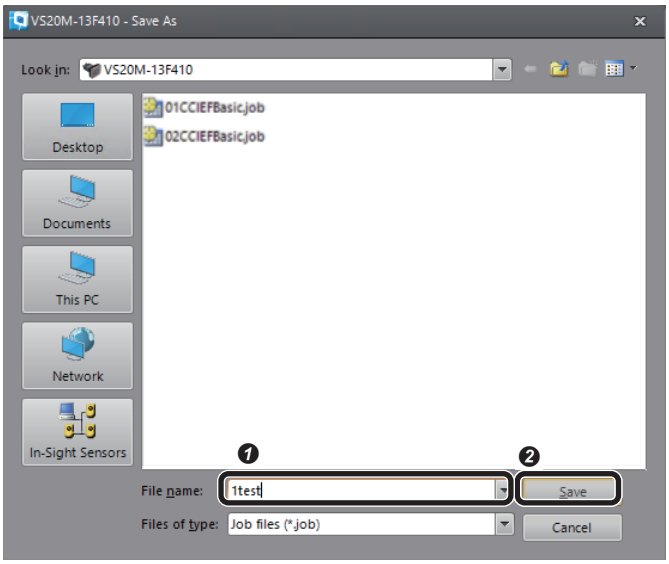
Saving the job

1. Name the created job.



❶ Click the [Save Job] button.
❷ Click the [Save As] button.

2. Enter a file name and save the job.

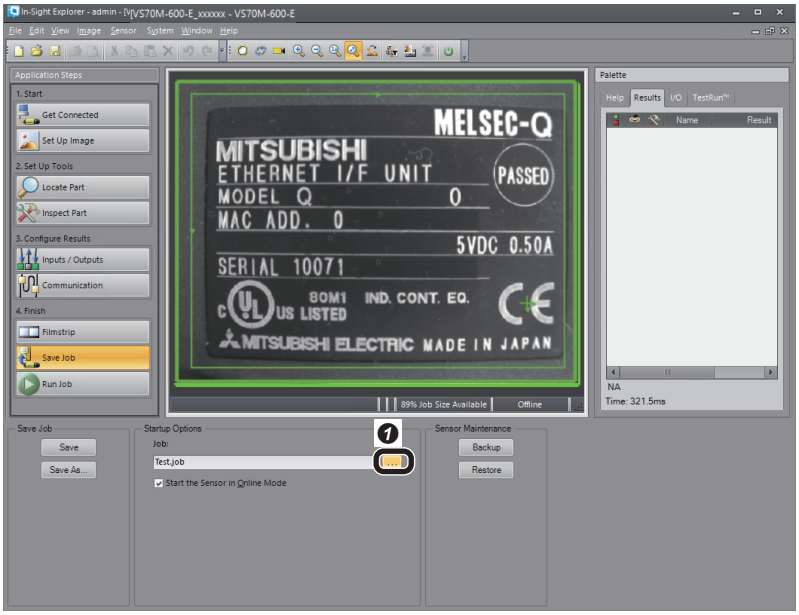


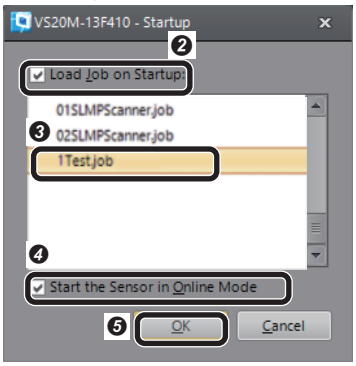
❶ Enter an arbitrary file name.
❷ Click the [Save] button.

Point

The running job can be changed (loaded) to another job by prefixing a numeric value to a file name.
For the procedure to change jobs, refer to the following section.
☞ Page 36 Changing jobs (loading another job)

3. Set startup options for the vision sensor.





❶ Click the [...] button under "Job".
❷Select the checkbox of "Load Job on Startup".
❸ Select the file name saved in step 2.
❹ Select the checkbox of "Start the Sensor in Online Mode".
❺ Click the [OK] button.

Restarting the vision sensor

Turn the power of the vision sensor OFF and ON to restart.

1.4 Setting a Programmable Controller

Set parameters of a programmable controller in an engineering tool.

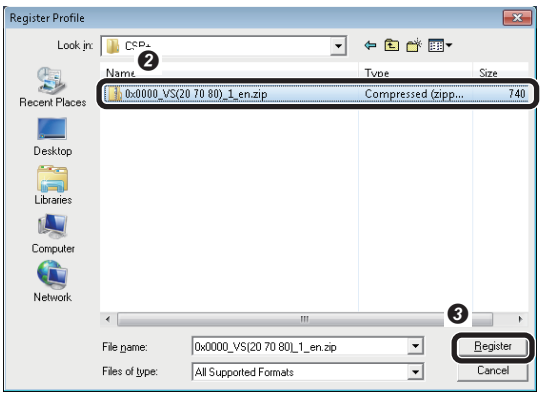
Registering a profile

Register a profile of the vision sensor in an engineering tool.

Point

Profiles need to be registered when an engineering tool project is closed.

1. Start an engineering tool.
2. Resister a profile.

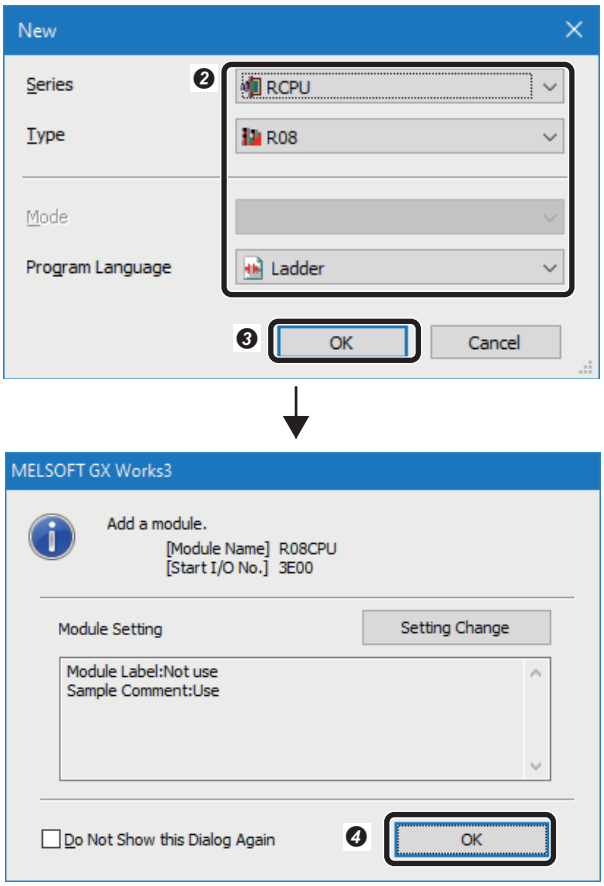


❶ Select [Tool] ⇨ [Profile Management] ⇨ [Register].
❷ Select the profile obtained previously.
❸ Click the [Register] button.

Setting a programmable controller

Set parameters of a programmable controller.

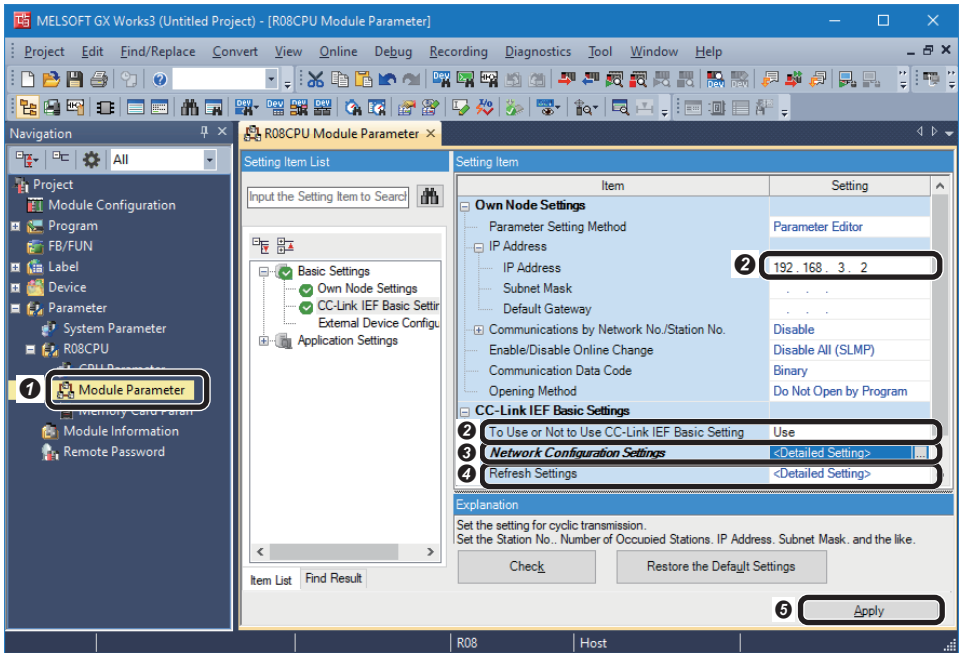
1. Select a CPU module and a program language in the "New" screen.



❶ Select [Project] ⇨ [New].
The "New" screen appears.
❷ Set a CPU module and a program language.
- Series: RCPU
- Type: R08
- Program Language: Ladder

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

2. Set the module parameter.

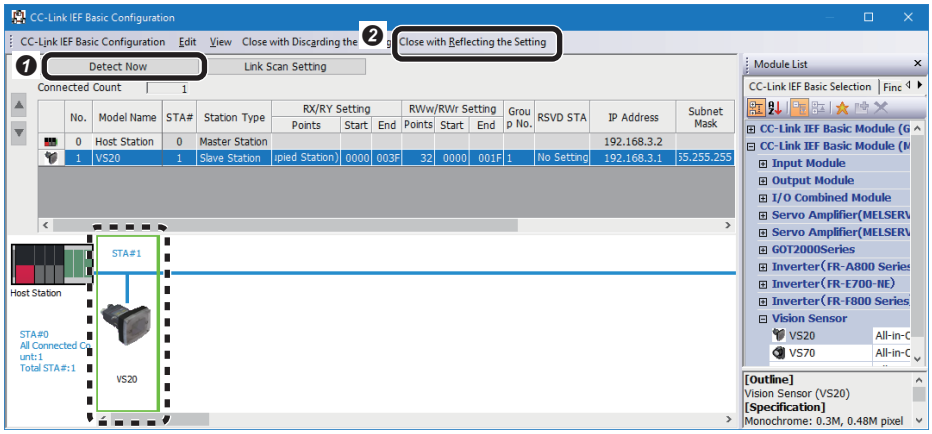


❶ Double-click "Module Parameter" in the "Navigation" window.
The "R08CPU Module Parameter" screen appears.
❷ Set "IP Address" and "To Use or Not to Use CC-Link IEF Basic Setting."
- IP Address: 192.168.3.2
- To Use or Not to Use CC-Link IEF Basic Setting: Use

❸ Double-click the "<Detailed Setting>" of "Network Configuration Settings."
The "CC-Link IEF Basic Configuration" screen appears. (☞ Page 28 "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 28 Refresh settings)
❺ Click the [Apply] button to end the parameter settings.

"CC-Link IEF Basic Configuration" screen

Detect the connected vision sensor. 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 vision sensor 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

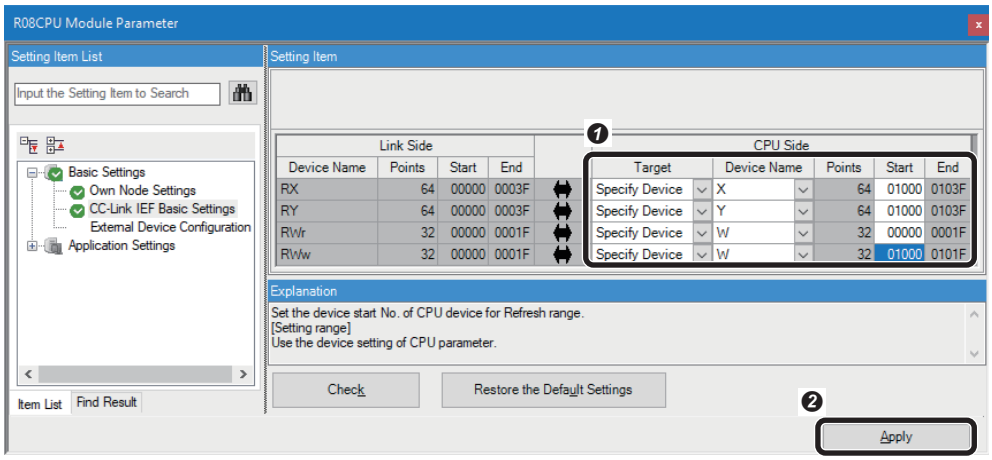
Point

For the system configuration in which the automatic detection function of connected devices is not supported, a vision sensor can be added by dragging and dropping a corresponding device in "Vision Sensor" from "CC-Link IEF Basic Module (Mitsubishi Electric Corporation)" in "Module List."

The parameter settings are as follows:

- "RX/RY Setting" - "Points": 64 (1 Occupied Station)
- "IP Address": 192.168.3.1 (IP address of a vision sensor set in the vision sensor setup tool)

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

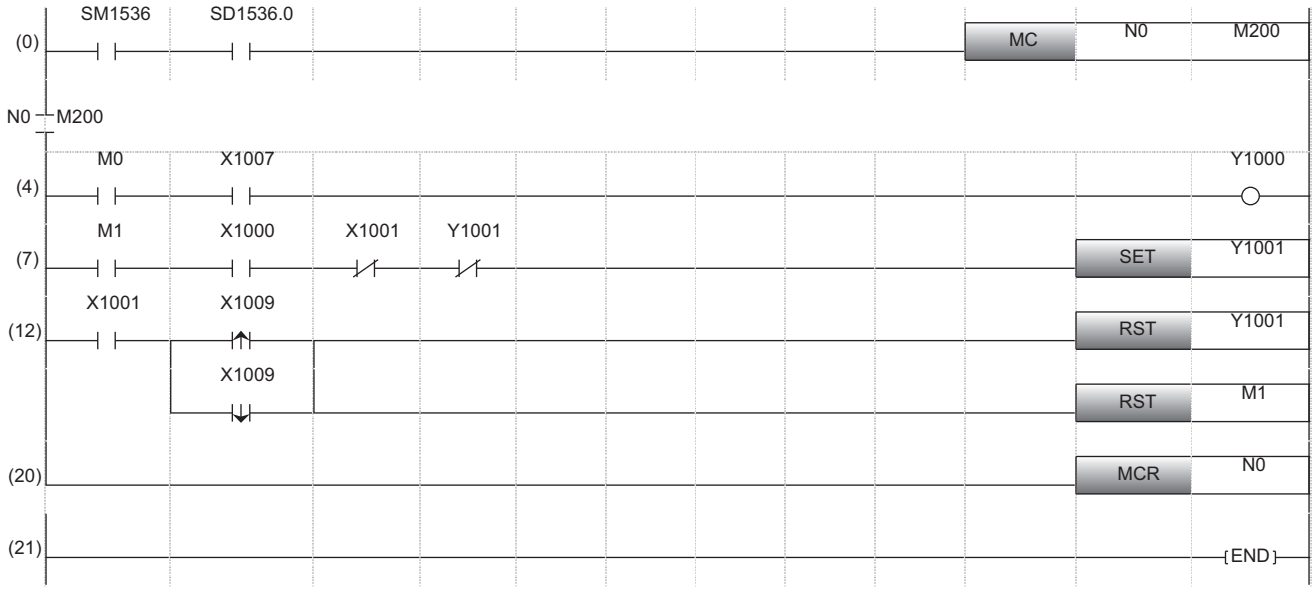
Creating a program

Create a program using the devices set in the refresh settings.

Devices used in the program

Signal	Signal name	Description	Remarks
SM1536	Cyclic transmission status	This signal turns ON when the cyclic transmission starts.	CC-Link IE Field Network Basic Reference Manual
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	Trigger Ready	The reception status of 'Trigger Enable' (Y1000) is stored. • ON: Trigger is enabled. • OFF: Trigger is disabled.	Refresh device for RX0
X1001	Trigger Ack	The reception status of 'Trigger' (Y1001) is stored. • ON: With trigger • OFF: Without trigger	Refresh device for RX1
X1007	Online	The online status of a vision sensor is stored. • ON: Online • OFF: Offline	Refresh device for RX7
X1009	Inspection Completed	This signal is changed (toggled) at the completion of an inspection of a vision sensor.	Refresh device for RX9
Y1000	Trigger Enable	'Trigger' (Y1001) is enabled while this signal is ON.	Refresh device for RY0
Y1001	Trigger	By turning this signal OFF and ON, an image capture is started.	Refresh device for RY1
M0	Online command	'Trigger Enable' (Y1000) turns ON to make a vision sensor online while this signal is ON.	—
M1	Trigger directive	By turning this signal OFF and ON, 'Trigger' (Y1001) is turned ON, and an image capture is performed.	
M200	Communication condition satisfied flag (station No.1)	This signal turns ON while the cyclic transmission with the station No.1 is performed.	

Program example



(0): Check that the cyclic transmission is normally performed between the master station (programmable controller) and the station No.1 (vision sensor). When the cyclic transmission is normally performed, the program in line (4) and later are executed.

(4): Enable a trigger on the vision sensor.

(7): Request the start of the image capture to the vision sensor. ('Trigger' (Y1001) turns ON.)

(12): The processing for the completion of the image capture of the vision sensor is performed.

Precautions

Use 'Trigger Ack' (X1001) to set an interlock when checking 'Inspection Completed' (X1009).

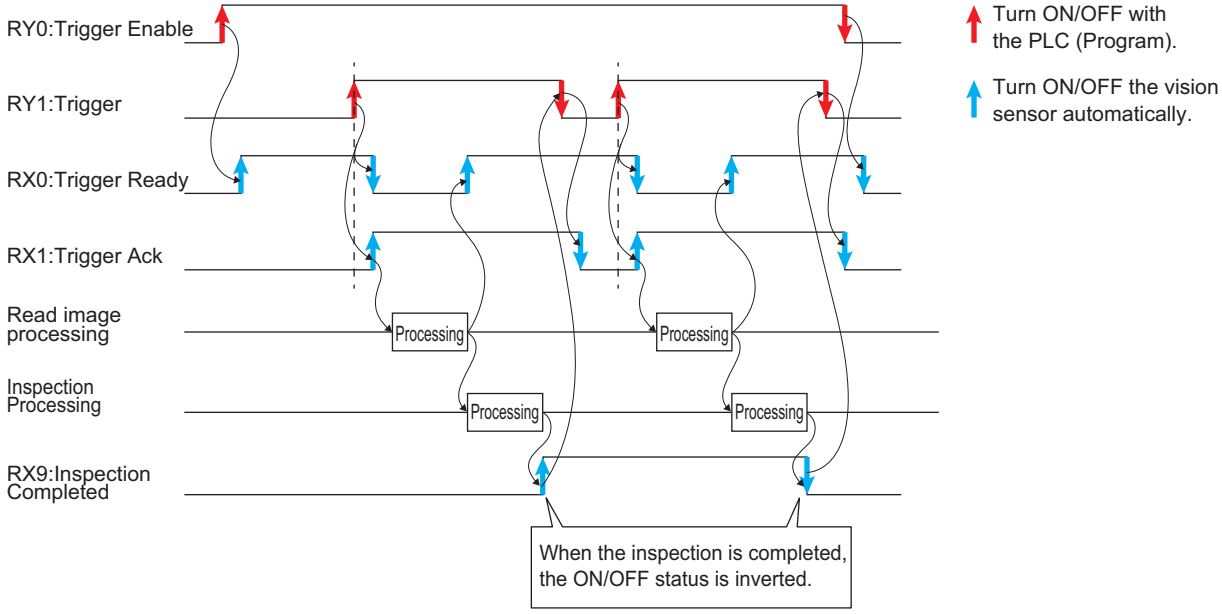
Timing chart of a CC-Link IE Field Network Basic connection

A timing chart when controlling a vision sensor using a programmable controller is shown below.

To enable a trigger from a programmable controller, turn ON 'Trigger Enable' (RY0).

When 'Trigger' (RY1) is turned ON while 'Trigger Ready' (RX0) is ON by turning ON 'Trigger Enable' (RY0), the status of the vision sensor is output to 'Trigger Ack' (RX1) and 'Inspection Completed' (RX9).

The status of 'Inspection Completed' (RY9) is changed (toggled) at the completion of an inspection.

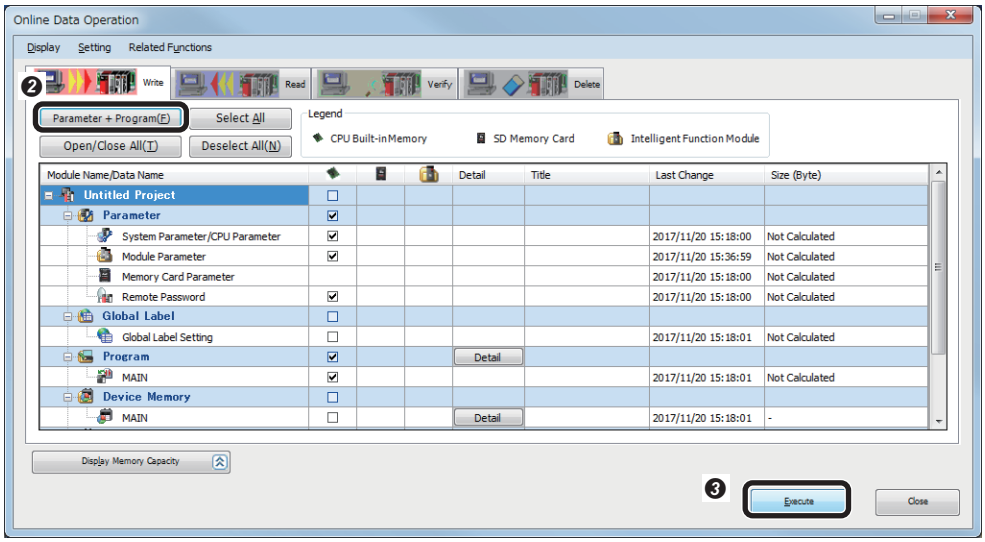


1.5 Writing Data to a Programmable Controller

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].
❷ Click the [Parameter + Program] button.
❸ Click the [Execute] button.

Restarting the programmable controller

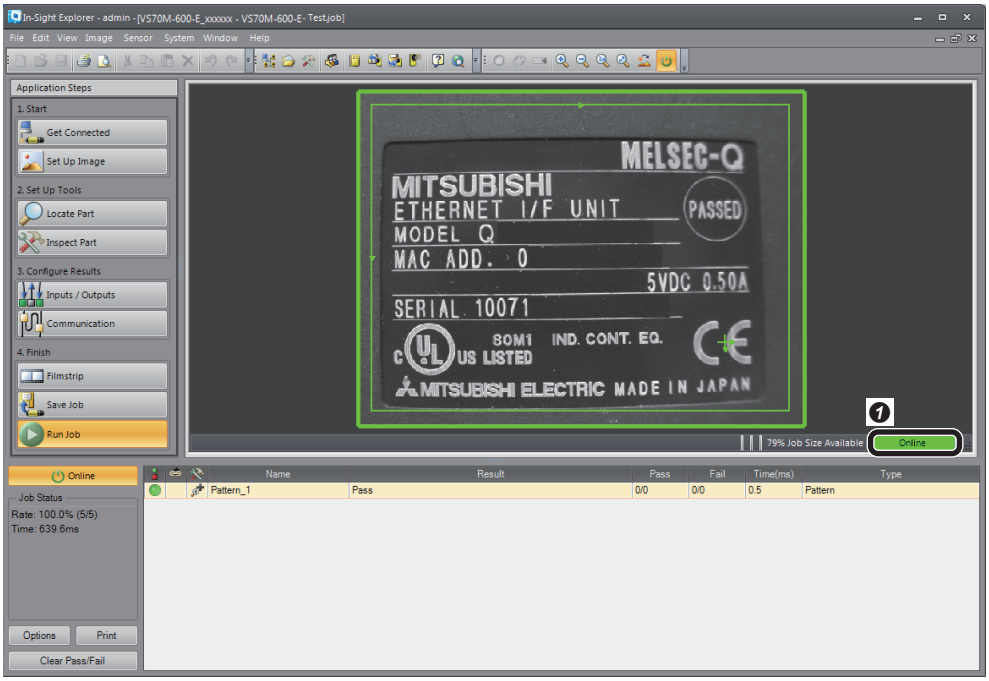
After writing the parameters and program, reset the programmable controller to RUN.

1.6 Checking Operations

Check the operation by controlling the vision sensor using the programmable controller.

Making the vision sensor online

Make the vision sensor online and start the communication with the programmable controller.

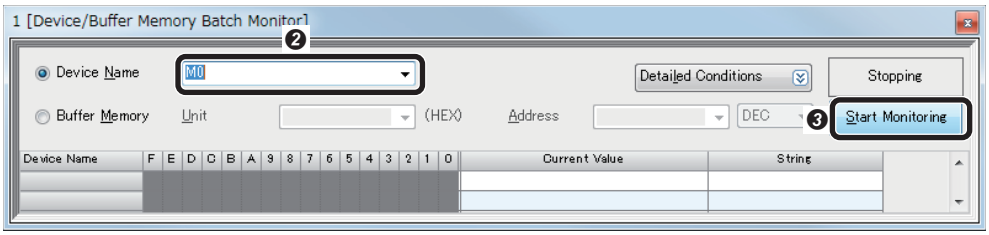


❶ Check that the operating status is "Online".

Enabling a trigger on the vision sensor

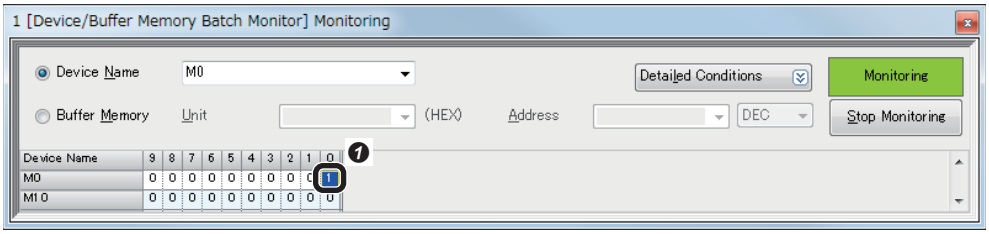
Enable a trigger on the vision sensor to acquire the inspection results.

1. Display device values.



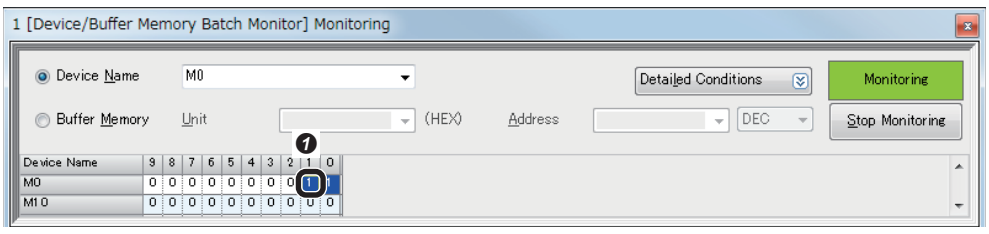
❶ Select [Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch Monitor] with an engineering tool.
The "Device/Buffer Memory Batch Monitor" window appears.
❷ Enter "M0" for "Device Name".
❸ Click the [Start Monitoring] button.

2. Enable a trigger on the vision sensor.



❶ Turn "M0" ON to turn 'Trigger Enable' (Y1000) ON.

3. Trigger a device.

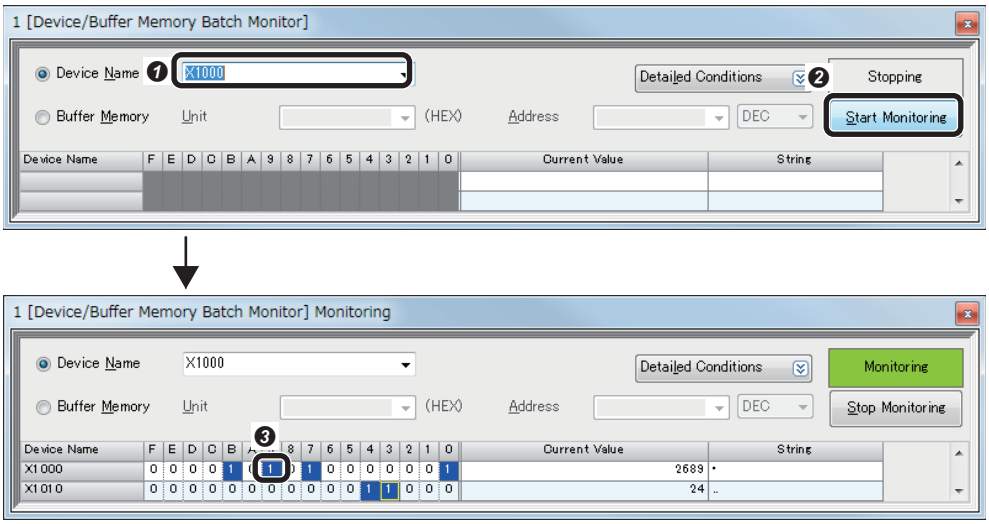


❶ Turn "M1" ON to turn 'Trigger' (Y1001) ON.

Checking inspection results

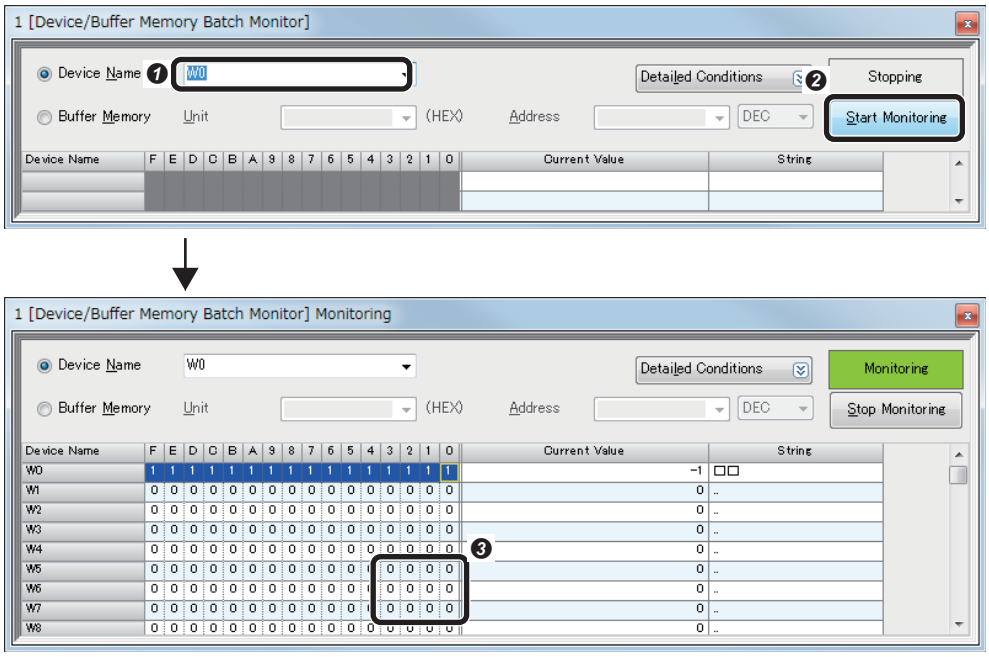
Check the inspection results.

1. Check the completion of the inspection.



❶ Input "X1000" in "Device Name".
❷ Click the [Start Monitoring] button.
❸ Check that the bit of 'Inspection Completed' (X1009) is changed (toggled).

2. Check the inspection results.

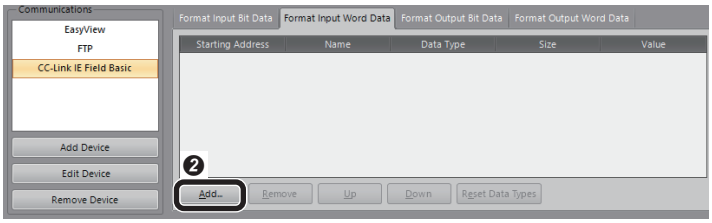


❶ Enter "W0" for "Device Name".
❷ Click the [Start Monitoring] button.
❸ Check the following information.
- 'Job PASS' (W5.0): This bit turns ON when the set inspection target is detected in the captured image.
- 'Job FAIL' (W6.0): This bit turns ON when the set inspection target is not detected in the captured image.
- 'Number of jobs inspected' (W7): The number of times the device is triggered is stored.

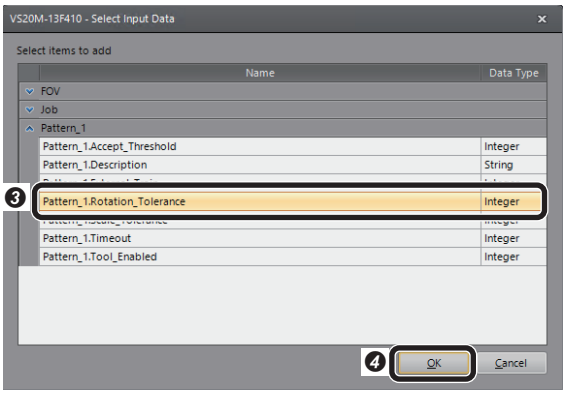
Changing a recognition parameter

When locating a target object using the pattern in the location tool, the rotation tolerance of the target object can be changed to ±90°.

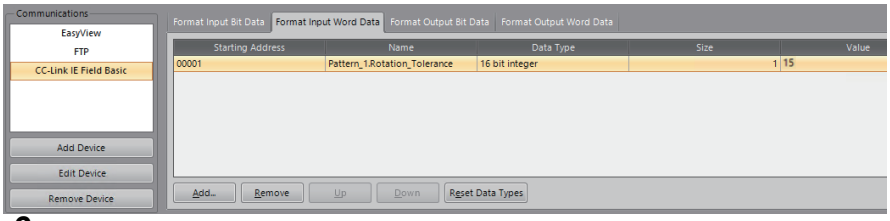
1. Make the vision sensor offline with the vision sensor setup tool.
2. Add parameter items to the list in the [Format Input Word Data] tab.



❶ Click the [Add] button.
❷ Select the [Format Input Word Data] tab and click the [Add] button.



❸ Select "Pattern_1.Rotation Tolerance".
❹ Click the [OK] button.

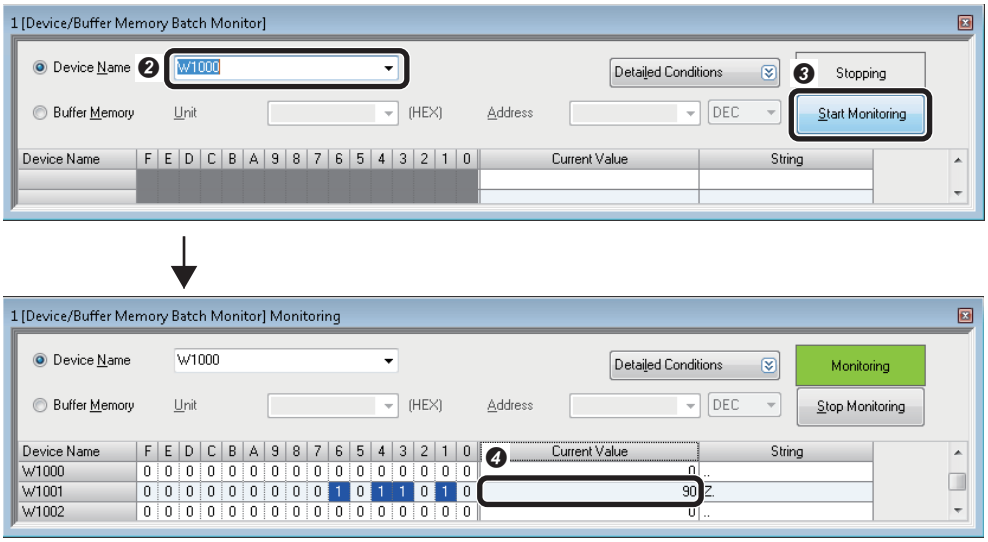


3. Save the job and make the vision sensor online. (☞ Page 24 Saving the job)

Point

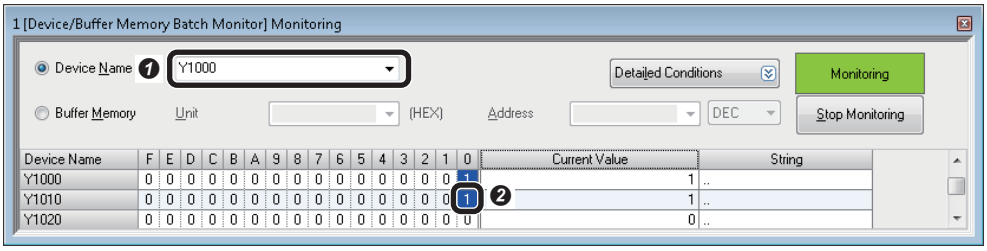
Parameter items need to be added to the list in the [Format Input Word Data] tab in advance to change parameter values.
More than one parameter item can be selected.

4. Set "Pattern_1.Rotation Tolerance" as a parameter to be changed.

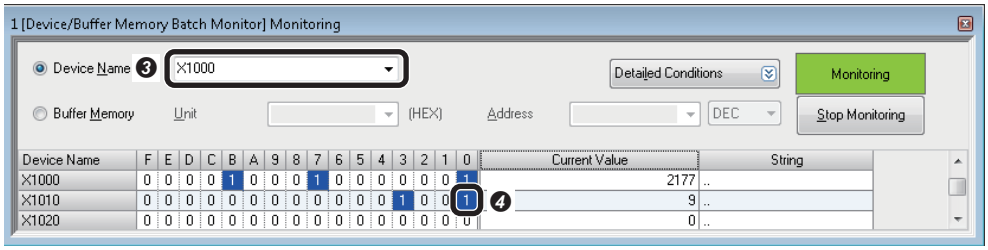


❶ Select [Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch Monitor] with an engineering tool.
The "Device/Buffer Memory Batch Monitor" window appears.
❷ Enter 'W1000' for "Device Name".
❸ Click the [Start Monitoring] button.
❹ Enter '90' for 'User Data' (W1001) of a remote register (RWw).

5. Change parameter values.

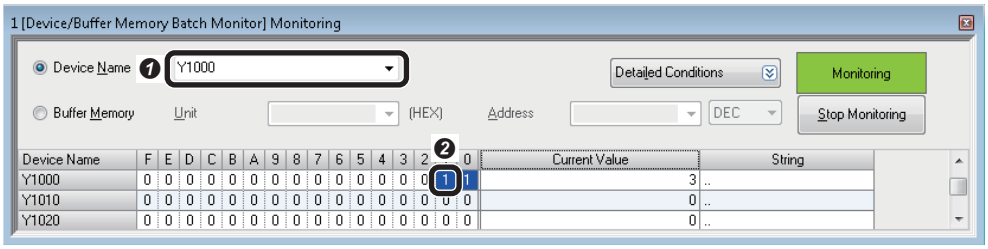


❶ Enter 'Y1000' for "Device Name".
❷ Turn ON 'Set User Data' (Y1010) of a remote output.



❸ Enter 'X1000' for "Device Name".
❹ By completing the settings, 'Set User Data Ack' (X1010) of a remote input turns ON. After that, turn OFF 'Set User Data' (Y1010).

6. Trigger a device.



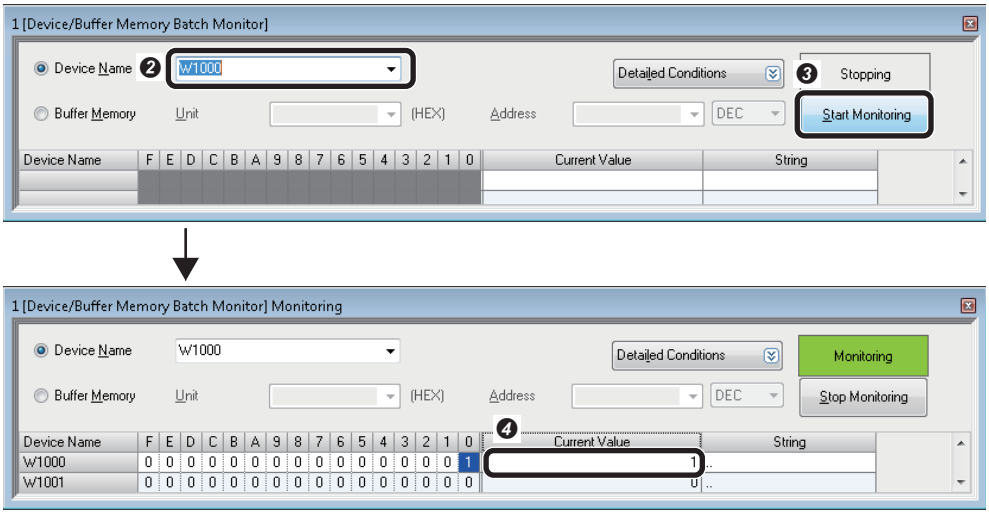
❶ Enter 'Y1000' for "Device Name".
❷ Turn ON 'Trigger' (Y1001) of a remote output.

Changing jobs (loading another job)

The following shows the procedure to load the job file "1Test".

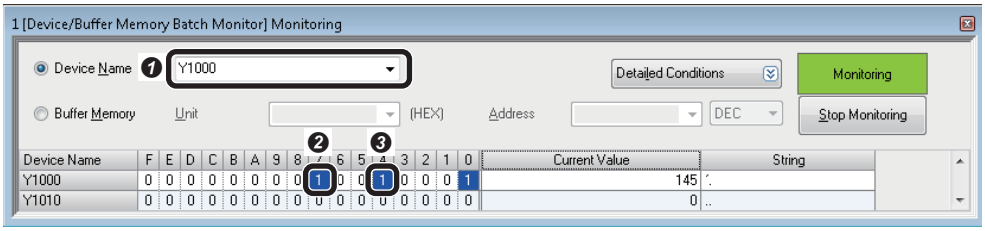
The number '1' prefixed to the file name indicates an ID. By setting this ID number to 'Command' (W1000) of a remote resister (RWw), the job ("1Test") can be loaded.

1. Set an ID number of a job.

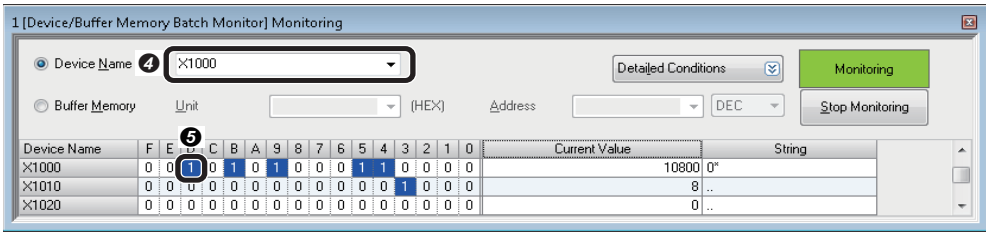


❶ Select [Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch Monitor] with an engineering tool.
The "Device/Buffer Memory Batch Monitor" window appears.
❷ Enter 'W1000' for "Device Name".
❸ Click the [Start Monitoring] button.
❹ Enter '1' for 'Command' (W1000) of a remote register (RWw).

2. Change jobs (load another job).



❶ Enter 'Y1000' for "Device Name".
❷ Turn ON 'Set Offline' (Y1007) of a remote output to make the vision sensor offline.
❸ Turn ON 'Execute Command' (Y1004) of a remote output to load a job.



❹ Enter 'X1000' for "Device Name".
❺ When the loading of the job is completed, 'Command Completed' (X100D) of a remote input is turned ON. After that, turn OFF 'Execute Command' (Y1004) and 'Set Offline' (Y1007).

Point

To load a job, the file name of the job need to begin with an ID number.

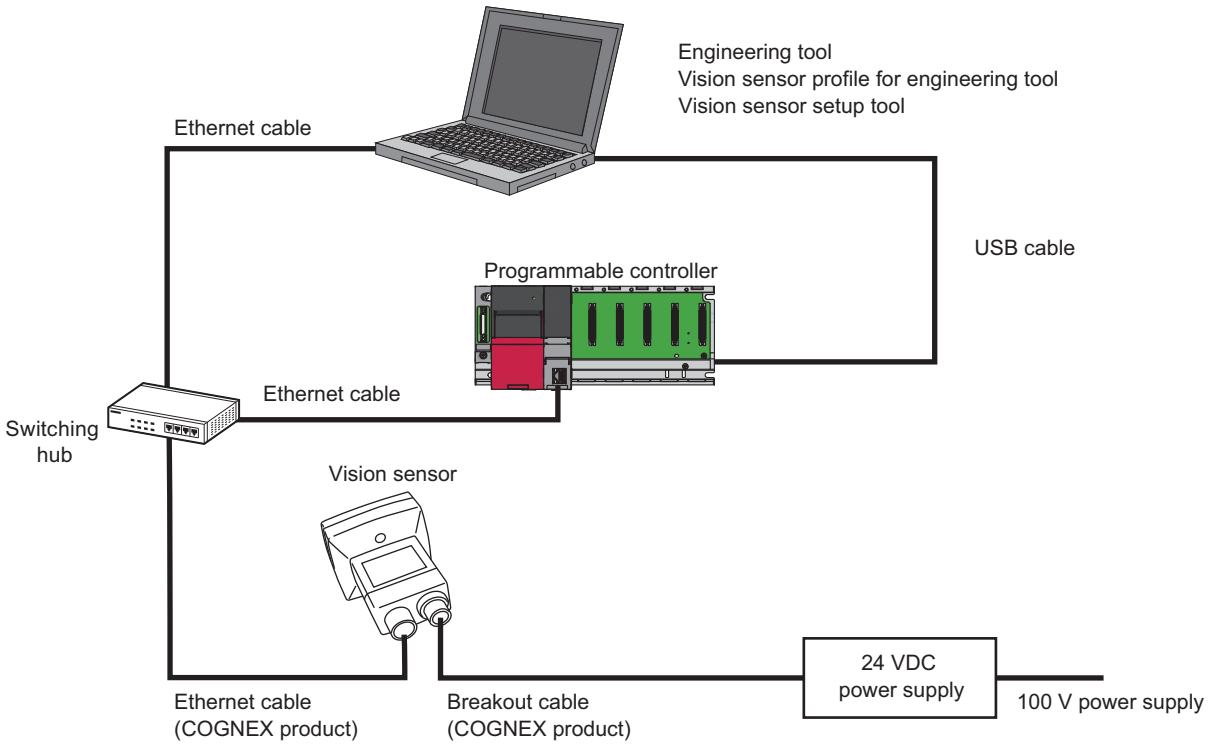
When loading a job, make a vision sensor offline.

2 SLMP SCANNER CONNECTION

This chapter explains the procedure for connecting a vision sensor VS20 to a programmable controller and controlling the vision sensor with SLMP scanner connection.

2.1 System Configuration Example for Connecting a Vision Sensor

The following figure shows the system configuration for connecting a vision sensor VS20.



Point

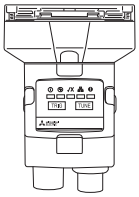
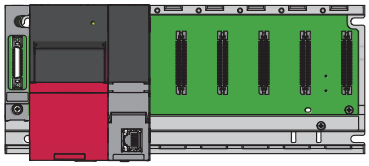
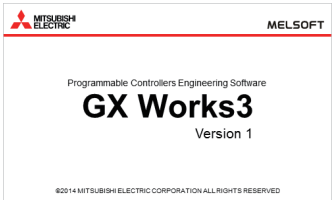
SLMP scanner connection is available for other vision sensors (VS70 and VS80).
For details on the system configuration, refer to the user's manual of the vision sensor used.

Configurations

The devices used in the system configuration are as follows.

Required equipment

■ Mitsubishi Electric products

		
Vision sensor • VS20M-13F410	Programmable controller • Power supply: R62P • CPU module: R08CPU • Base: R35B	Engineering tool • GX Works3

■ COGNEX products

			
Vision sensor profile for engineering tool*1	Vision sensor setup tool • In-Sight Explorer	Ethernet cable	Breakout cable

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

■ Commercial products

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

Point

For available devices for the system configuration, refer to the user's manual of the vision sensor used.

Connection and wiring of a vision sensor

This section shows the procedure for connecting and wiring a vision sensor.

Operating procedure

1. Check that the 24 VDC power supply is OFF.
2. Connect an I/O wire or a serial wire of a breakout cable to an appropriate device (such as a programmable controller).
3. Connect the 24 VDC (red wire) and GND (black wire) of a breakout cable to the corresponding terminals on the power supply.
4. Connect the M12 connector of the breakout cable to the Power, I/O and RS-232 connector of the vision sensor.
5. Connect the Ethernet cable's M12 connector to the vision sensor's Ethernet connector.
6. Turn ON the 24 VDC power supply.

Precautions

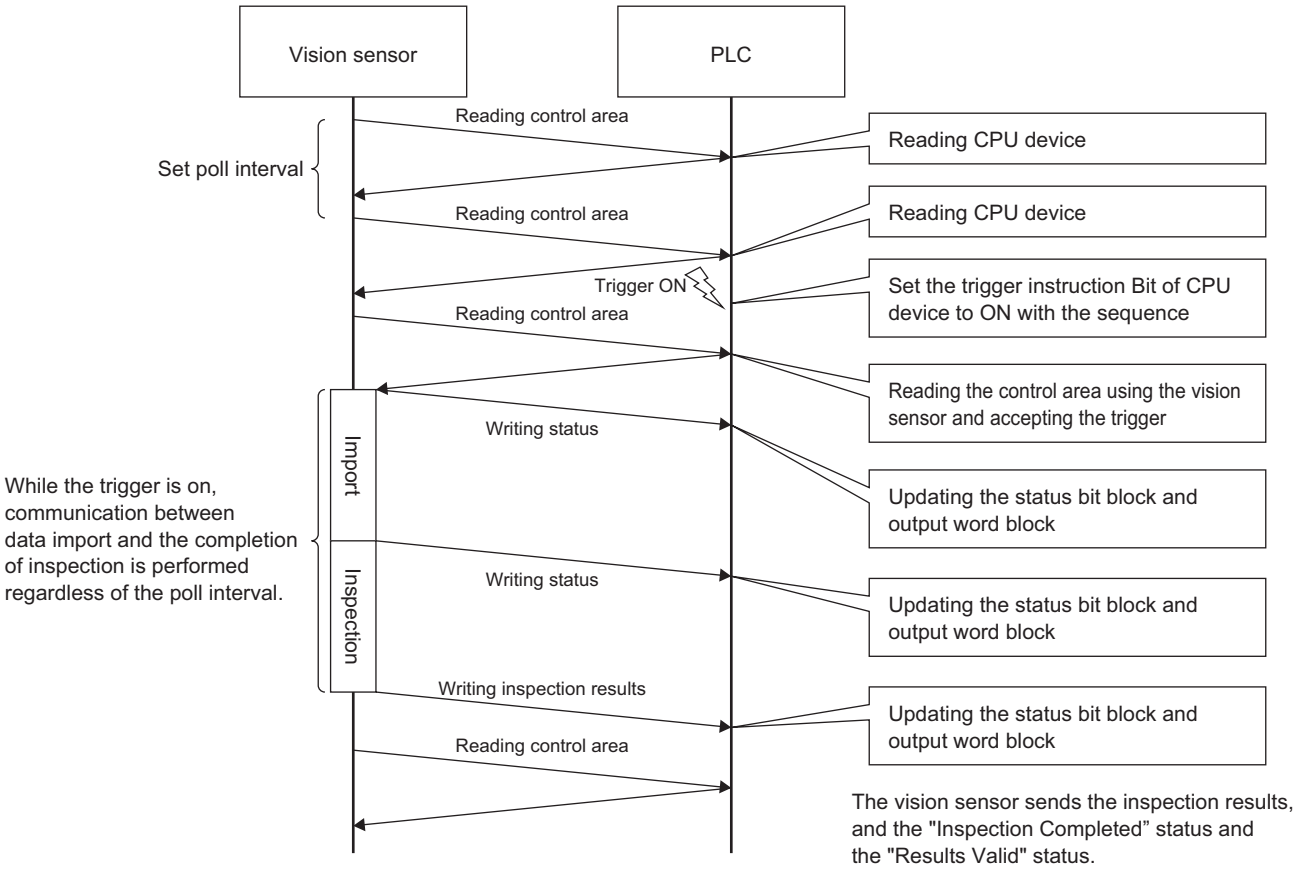
- When connecting a vision sensor and a programmable controller, simultaneously turn ON the power of the vision sensor and programmable controller, or first turn ON the power of the programmable controller.
- Cut unused wires or protect them with insulating materials. Be careful not to short-circuit with 24 VDC wires.
- The cable is designed to connect with its key aligned with the keyway of the connector on the Vision Sensor. Do not force the connections or damage may occur.

Point

For details on the connection with a vision sensor, refer to the user's manual of the vision sensor used.

2.2 Basic Operations for an SLMP Scanner Connection

Basic operation process for an SLMP scanner connection



Basic operations for an SLMP scanner connection

In SLMP scanner connection, a vision sensor reads a control block from a programmable controller in the poll interval set with the vision sensor setup tool, and processing according to the change of the bit information in the control block is performed. 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 block), a vision sensor 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 vision sensor. Bit information is used for the control instructions. The vision sensor is controlled by turning ON and OFF the devices set to the control block.
Status block	This block indicates the status of a vision sensor. The status can be checked with bit information.
Input data block	This block is used to input application data (including parameters for inspection) from a programmable controller. The application data is input with word information.
Output data block	This block is used by a vision sensor to output application data (including inspection results) to a programmable controller. The application data is output as word data.
String command block	This block is used to set commands (string commands) to control a vision sensor. The commands are set with word information.
String command result block	This block is used to output the results controlled by commands. The results are output as word information.

Signals used for an SLMP scanner connection

The following shows the details of six data blocks defined to control a vision sensor.

Precautions

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

Data blocks

■ Control blocks

• Control block list

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Set Offline	(Reserved)		Execute Command	Inspection Results Ack	Buffer Results Enable	Trigger	Trigger Enable
Bit 15	**Bit 14**	**Bit 13**	**Bit 12**	**Bit 11**	**Bit 10**	**Bit 9**	**Bit 8**
(Reserved)							
Bit 23	**Bit 22**	**Bit 21**	**Bit 20**	**Bit 19**	**Bit 18**	**Bit 17**	**Bit 16**
(Reserved)				Clear Exposure Complete	Clear Error	Initiate String Command	Set User Data
Bit 31	**Bit 30**	**Bit 29**	**Bit 28**	**Bit 27**	**Bit 26**	**Bit 25**	**Bit 24**
Soft Event 7	Soft Event 6	Soft Event 5	Soft Event 4	Soft Event 3	Soft Event 2	Soft Event 1	Soft Event 0

• Control block details

Bit	Data name	Description (Application)
0	Trigger Enable	To enable an image capturing trigger by 'Trigger.' • ON: An image capturing trigger is enabled. • OFF: An image capturing trigger is disabled.
1	Trigger	To start (trigger) image capturing. • ON: Image capturing is started. • OFF: — The following conditions must be satisfied to start image capturing properly: • "Industrial Ethernet" is selected in the [Set Up Image] ⇨ [Trigger] tab in the vision sensor setup tool. (☞ Page 49 Creating a new job) • The vision sensor is online. • 'Trigger Enable' and 'Trigger Ready' are turned ON.
2	Buffer Results Enable	To enable the buffer for read results. New read results are stored in the buffer queue of a vision sensor. To acquire the next read results, turn ON 'Inspection Results Ack.' • ON: The buffer for read results is enabled. • OFF: The buffer for read results is disabled.
3	Inspection Results Ack	To respond to receiving the latest read results. A vision sensor turns 'Results Valid' 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	Execute Command	To load a job of the job ID specified to 'Command.' • ON: Job load is executed. • OFF: — Until 'Command Completed' is turned ON, the ON state for this bit must be retained. The following conditions must be satisfied to start job load properly: • A vision sensor is set to offline by 'Set Offline.' • A job of the job ID specified to 'Command' exists.
5 to 6	(Reserved)	—
7	Set Offline	To make a vision sensor offline while this bit is ON. • ON: A vision sensor is set to offline. • OFF: —
8 to 15	(Reserved)	—

Bit	Data name	Description (Application)
16	Set User Data	To notify a vision sensor that the 'User Data' field was updated. • ON: 'User Data' field update is notified. • OFF: — A vision sensor updates data defined in the [Format Input Data] tab of a communication setting with the vision sensor setup tool when this bit is turned ON.
17	Initiate String Command	To read data from the 'String Command' field and execute a command. • ON: Native mode command is executed. • OFF: —
18	Clear Error	To clear an error and error code signal. When multiple errors occur, the next error and error code are set by turning this bit OFF. • ON: Error clear is executed. • OFF: —
19	Clear Exposure Complete	To turn 'Exposure Complete' OFF. 'Exposure Complete' does not turn ON while this bit is ON. • ON: Exposure completion is cleared. • OFF: —
20 to 23	(Reserved)	—
24 to 31	Soft Event	To enable a soft event trigger in a spreadsheet. A related software event in a spreadsheet is executed by turning this bit ON.

■ Status blocks

• Status block list

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Online	Offline Reason			Missed Acq	(Reserved)	Trigger Ack	Trigger Ready
Bit 15	**Bit 14**	**Bit 13**	**Bit 12**	**Bit 11**	**Bit 10**	**Bit 9**	**Bit 8**
Error	Command Failed	Command Completed	Command Executing	Results Valid	Results Buffer Overrun	Inspection Completed	System Busy
Bit 23	**Bit 22**	**Bit 21**	**Bit 20**	**Bit 19**	**Bit 18**	**Bit 17**	**Bit 16**
(Reserved)			Job Pass	Exposure Complete	String Command Error	String Command Ack	Set User Data Ack
Bit 31	**Bit 30**	**Bit 29**	**Bit 28**	**Bit 27**	**Bit 26**	**Bit 25**	**Bit 24**
Soft Event Ack 7	Soft Event Ack 6	Soft Event Ack 5	Soft Event Ack 4	Soft Event Ack 3	Soft Event Ack 2	Soft Event Ack 1	Soft Event Ack 0

• Status block details

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 vision sensor recognizes 'Trigger' is ON, and an image capturing trigger is received. Until 'Trigger' is turned OFF, the ON state for this bit is retained. • ON: An image capturing trigger is received. • OFF: —
2	(Reserved)	—
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 to 6	Offline Reason	This bit shows the cause of a vision sensor being offline by three bits. 0: Online 1: Job is being edited. 2: Offline is set by a discrete signal. 3: Offline is set by a predefined protocol.
7	Online	This bit shows the online/offline status. When a vision sensor is offline, the reason is shown in the 'Offline Reason' field. • ON: Online • OFF: Offline
8	System Busy	This bit shows that a vision sensor is executing or loading a job, or responding to user inputs. • ON: System busy • OFF: —

Bit	Data name	Description (Application)
9	Inspection Completed	This bit is inverted every time when an inspection is completed and a series of inspection results ('Inspection ID,' 'Inspection Result Code,' 'Inspection Results,' and 'Job Pass') is sent to a programmable controller.
10	Results Buffer Overrun	This bit shows that a vision sensor 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 Valid	This bit shows that a series of inspection results is available ('Inspection ID,' 'Inspection Result Code,' 'Inspection Results,' and 'Job Pass' fields contain valid data). Until 'Inspection Results Ack' responds, this bit remains ON. • ON: With new read results • OFF: Without new read results
12	Command Executing	This bit shows that job load is executed. • ON: Job load is being executed. • OFF: —
13	Command Completed	This bit is turned ON when job load is completed. When a job load command is not completed properly, 'Command Failed' is also turned ON. • ON: Job load is completed. • OFF: —
14	Command Failed	This bit is turned ON when job load is not completed properly. It is turned OFF when a new job is loaded by a programmable controller. When changing a job by using the vision sensor setup tool, this bit is not changed. • ON: Job load is failed. • OFF: —
15	Error	This bit is turned ON when an error occurred. • ON: Error occurred. • OFF: —
16	Set User Data Ack	This bit is turned ON when 'Set User Data' command execution is completed. • ON: 'Set User Data' command execution is completed. • OFF: —
17	String Command Ack	This bit is turned ON when a native mode command execution is completed. • ON: Native mode command execution is completed. • OFF: —
18	String Command Error	This bit is turned ON when a native mode command execution is failed. • ON: Native mode command execution is failed. • OFF: —
19	Exposure Complete	This bit is turned ON when an exposure for a vision sensor is completed. It is turned OFF by 'Clear Exposure Complete.' When 'Clear Exposure Complete' is set to ON, the OFF state of this bit is retained. • ON: Exposure is completed. • OFF: —
20	Job Pass	This bit is turned ON when the latest job is passed. It is turned OFF when a job is failed. • ON: Inspection result is passed. • OFF: —
21 to 23	(Reserved)	—
24 to 31	Soft Event Ack	This bit shows that a vision sensor received a soft event command.

■ Input data blocks

• Input data block list

Word 0	Word 1	Word 2..
Command	(Reserved)	User Data

• Input data block details

Word	Data name	Description (Application)
0	Command	To specify job IDs (0 to 999).
1	(Reserved)	—
2 or later	User Data	Data buffer to transfer data from a programmable controller to a vision sensor. This can be used for the following application: • To update the data defined in the [Format Input Data] tab of a communication setting with the vision sensor setup tool: Store data to be updated in the data format defined in the [Format Input Data] tab.

■ Output data blocks

• Output data block list

Word 0	Word 1	Word 2	Word 3	Word 4	Word 5..
Current Job ID	Error Code	Acquisition ID	Inspection ID	Inspection Result Code	Inspection Results

• Output data block details

Word	Data name	Description (Application)
0	Current Job ID	Job ID of a job being executed is stored. If no job ID is specified for the job, '65535 (0xFFFF)' is stored.
1	Error Code	This shows an error occurred in 16-bit integer. • 0x0000: No error • 0x0100: An image capturing trigger is generated when the image capturing trigger is disabled. • 0x0101: An image capturing trigger is generated when a vision sensor is offline. • 0x0400: Another command execution command is generated when a command is being executed. • 0x0401: Job load is requested when a vision sensor is online. • 0x0402: Job ID that does not exist is specified in the 'Command' field for the execution.
2	Acquisition ID	Image capturing ID associated with the image capturing is stored. This can be used to synchronize image capturing and inspection results.
3	Inspection ID	Inspection ID associated with a series of inspection results ('Inspection ID,' 'Inspection Result Code,' 'Inspection Results,' and 'Job Pass') is stored.
4	Inspection Result Code	Any inspection result code specified for "Result code" of the WriteResultsBuffer function in the vision sensor setup tool (spreadsheet) is stored.
5 or later	Inspection Results	The data defined in the [Format Output Data] tab of a communication setting with the vision sensor setup tool is stored.

■ String command blocks

• String command block list

Word 0	Word 1..
String Command Length	String Command

• String command block details

Word	Data name	Description (Application)
0	String Command Length	Data length of native mode command stored in 'String Command' field is saved in bytes.
1 or later	String Command	Native mode command and the terminator are stored.

■ String command result blocks

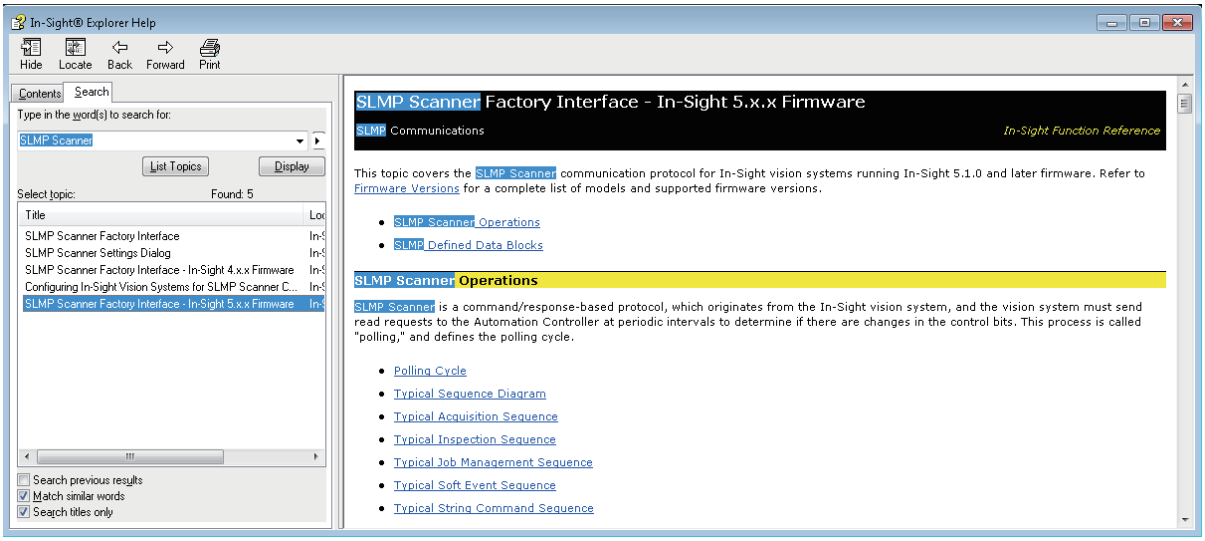
• String command result block list

Word 0	Word 1	Word 2..
Result Code	String Command Result Length	String Command Result

• String command result block details

Word	Data name	Description (Application)
0	String Command Result Code	The execution result of a native mode command is stored. '1' is returned when the execution is succeeded; however, a different failure code is returned depending on the native mode command when it is failed. For details of the failure code, refer to the topic of each native mode command.
1	String Command Result Length	Data length of data stored in 'String Command Result' field is saved in bytes.
2 or later	String Command Result	The result string of a native mode command is stored in ASCII text.

For details on the data block functions to control a vision sensor, refer to the help of vision sensor setup tool.
Enter "SLMP scanner" as a keyword in the [Search] tab of Help, and refer to the explanation of the data block.


In-Sight® Explorer Help
Hide
Locate
Back
Forward
Print
Contents
Search
Type in the word(s) to search for:
SLMP Scanner
List Topics
Display
Select topic:
Found: 5
Title
SLMP Scanner Factory Interface
SLMP Scanner Settings Dialog
SLMP Scanner Factory Interface - In-Sight 4.x.x Firmware
Configuring In-Sight Vision Systems for SLMP Scanner C...
SLMP Scanner Factory Interface - In-Sight 5.x.x Firmware
Search previous results
Match similar words
Search titles only
SLMP Scanner Factory Interface - In-Sight 5.x.x Firmware
SLMP Communications
In-Sight Function Reference
This topic covers the SLMP Scanner communication protocol for In-Sight vision systems running In-Sight 5.1.0 and later firmware. Refer to Firmware Versions for a complete list of models and supported firmware versions.
SLMP Scanner Operations
SLMP Defined Data Blocks
SLMP Scanner Operations
SLMP Scanner is a command/response-based protocol, which originates from the In-Sight vision system, and the vision system must send read requests to the Automation Controller at periodic intervals to determine if there are changes in the control bits. This process is called "polling," and defines the polling cycle.
Polling Cycle
Typical Sequence Diagram
Typical Acquisition Sequence
Typical Inspection Sequence
Typical Job Management Sequence
Typical Soft Event Sequence
Typical String Command Sequence

2.3 Setting the Vision Sensor

Start the vision sensor setup tool to set the vision sensor.

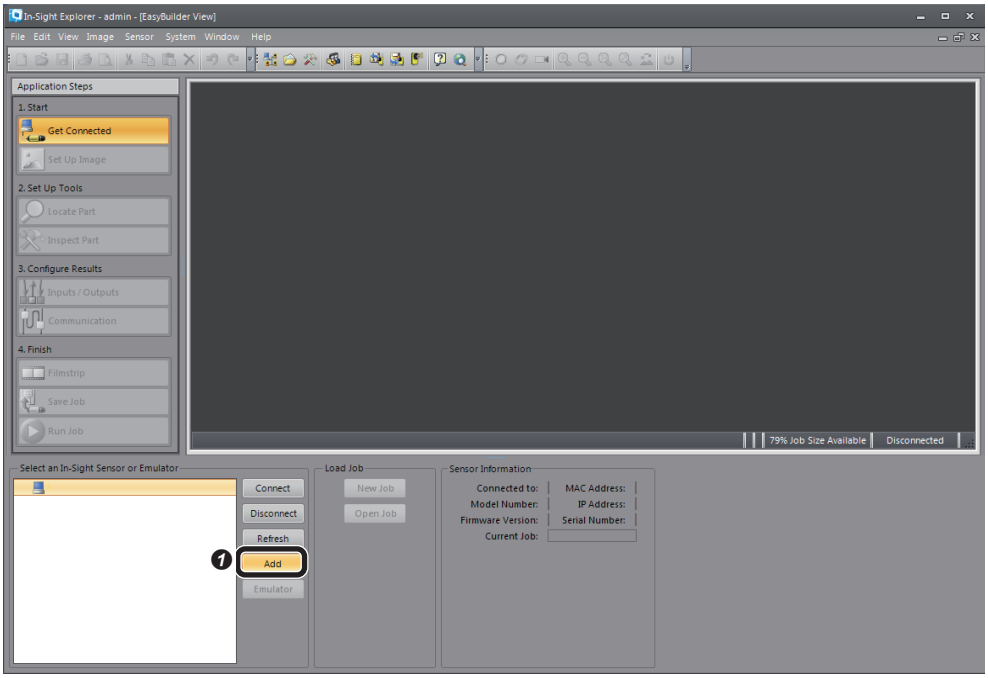
Setting an IP address to a personal computer

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

Connecting the vision sensor

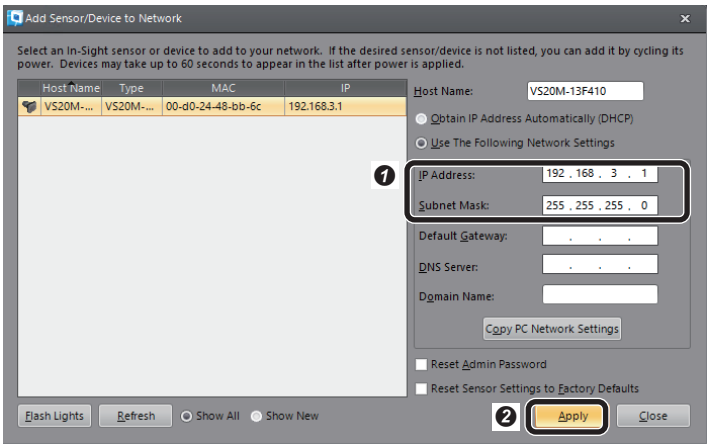
Start the vision sensor setup tool to set the vision sensor.

1. Start the vision sensor setup tool.



❶ Click the [Add] button.

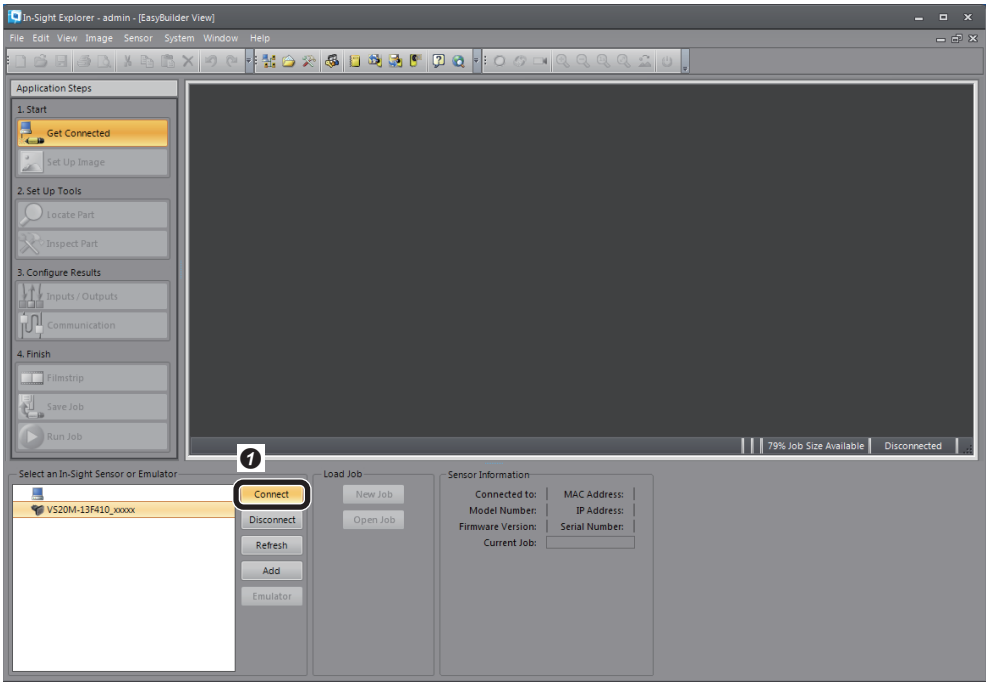
2. Add the vision sensor to the network.



❶ Add the vision sensor to the network.
- IP Address: 192.168.3.1
- Subnet Mask: 255.255.255.0

❷ Click the [Apply] button.

3. Connect to the vision sensor.

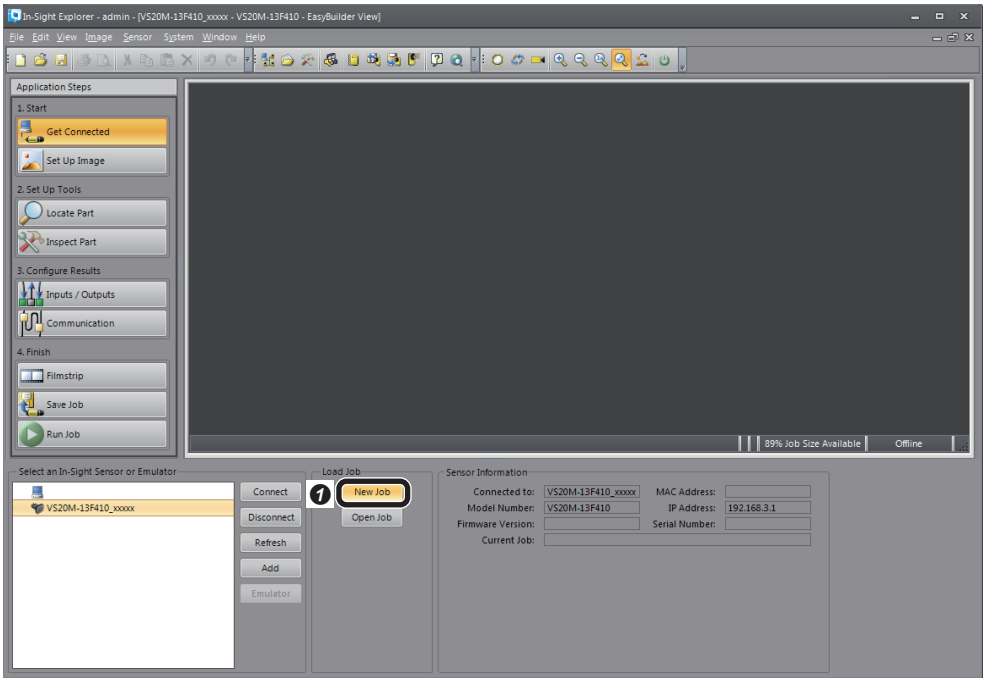


❶ Click the [Connect] button to connect to the vision sensor.

Creating a new job

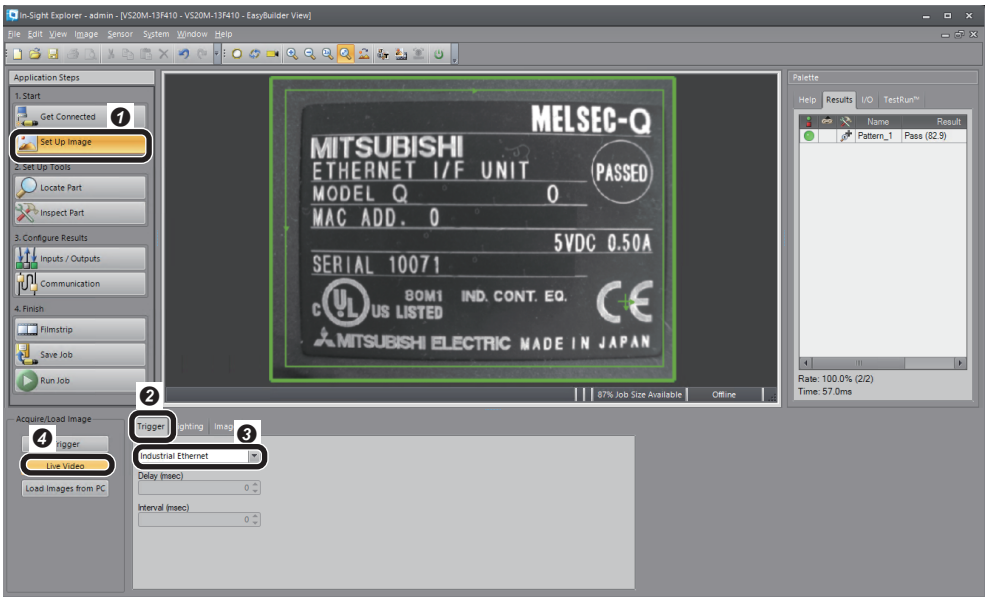
As an example, set a CE mark for inspection target.

1. Create a new job.



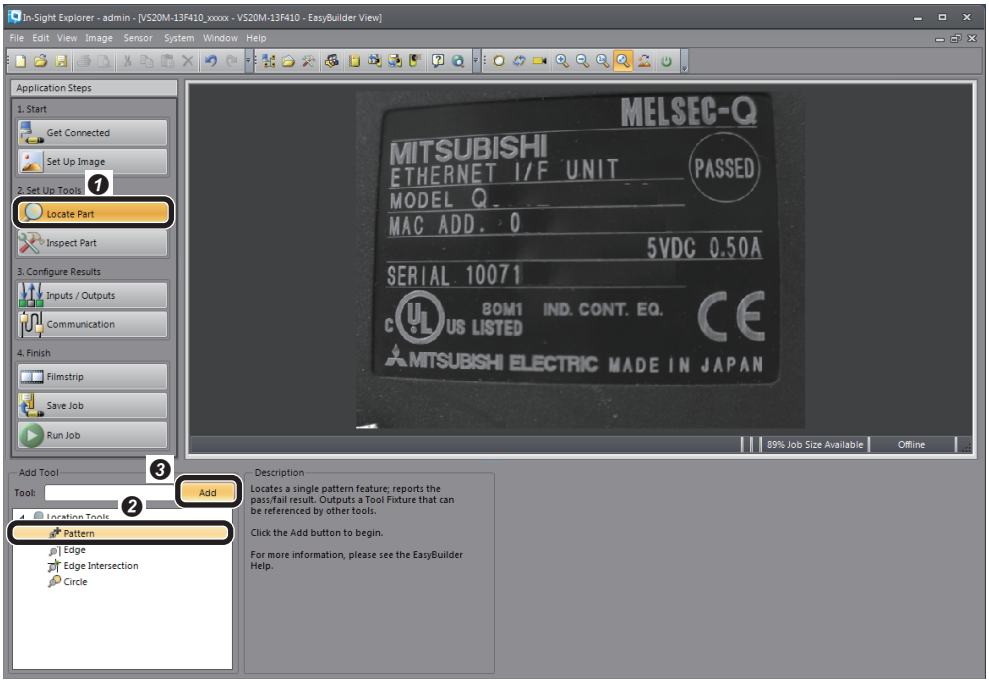
❶ Click the [New Job] button.

2. Adjust so that the lens captures an inspection target in [Set Up Image], and configure the settings to acquire the image.



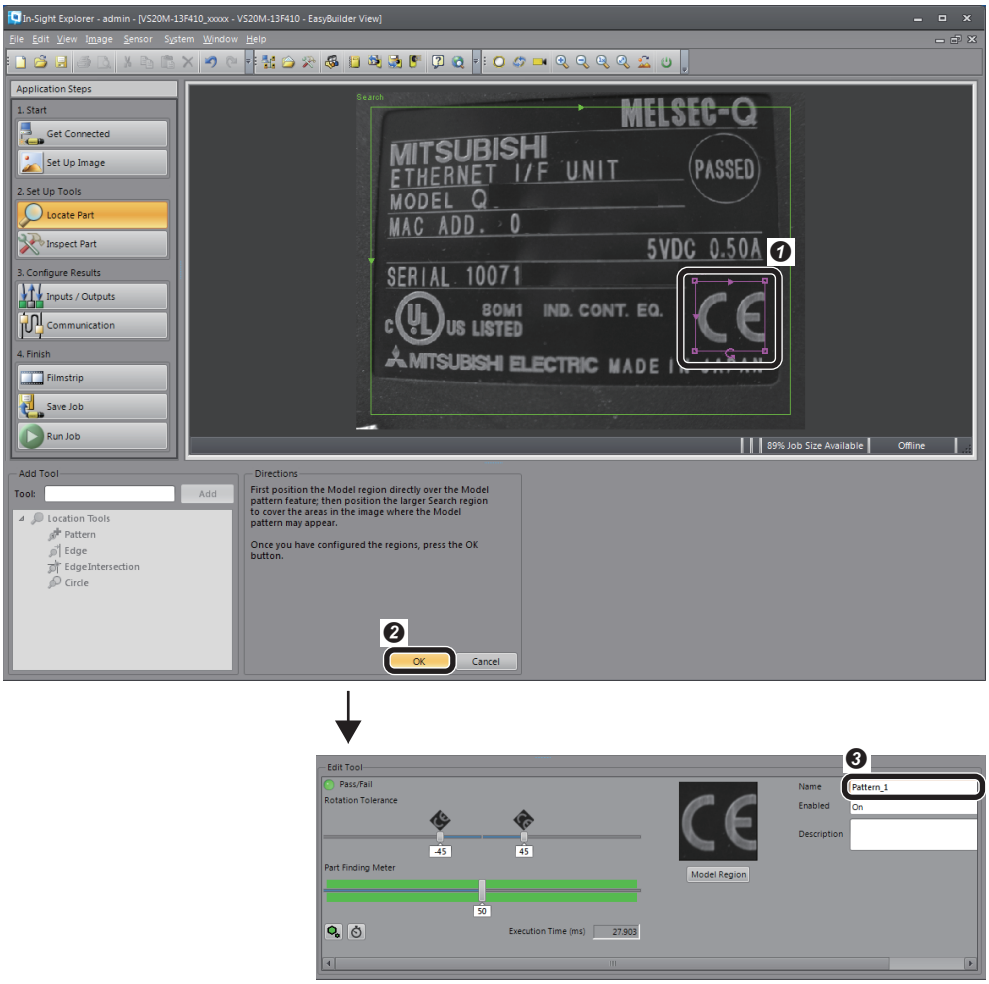
❶ Click the [Set Up Image] button.
❷ Select the [Trigger] tab.
❸ Select "Industrial Ethernet."
❹ Click the [Live Video] button to adjust the image. After adjusting the image, click the [Live Video] button again.

3. Set a tool.



❶ Click the [Locate Part] button.
❷ Select "Pattern".
❸ Click the [Add] button.

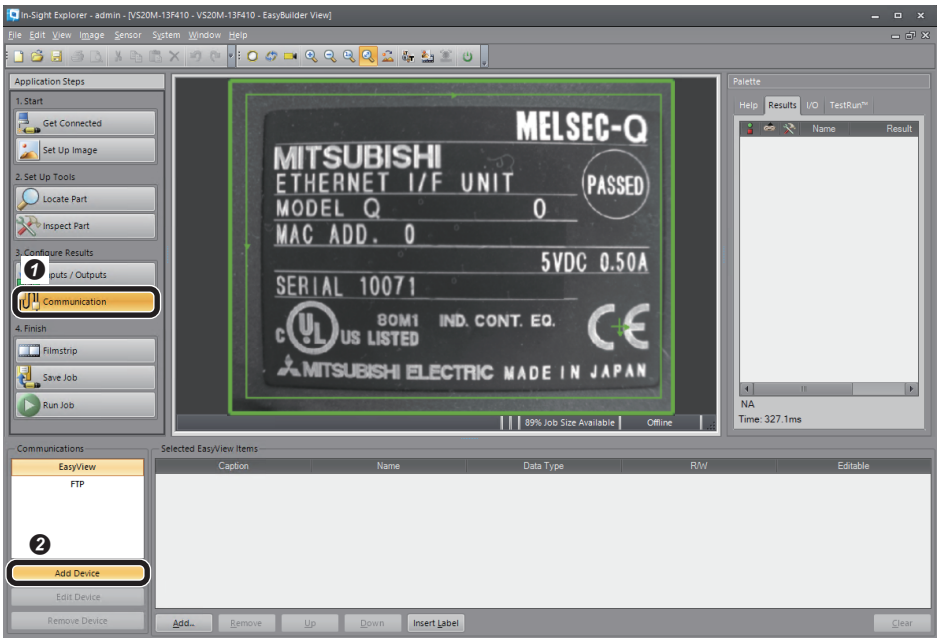
4. Set a model on the position to be detected.



❶ Set a model. (CE mark is selected.)
❷ Click the [OK] button.
❸ Check that Name is "Pattern_1".

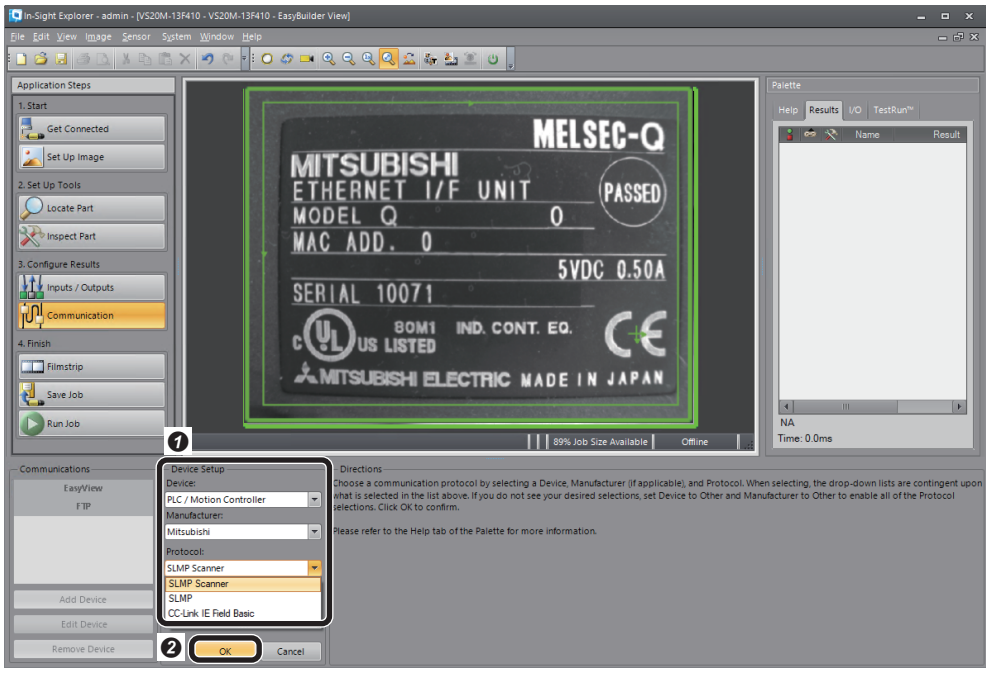
Configuring a communication setting

1. Configure the communication setting (SLMP scanner).

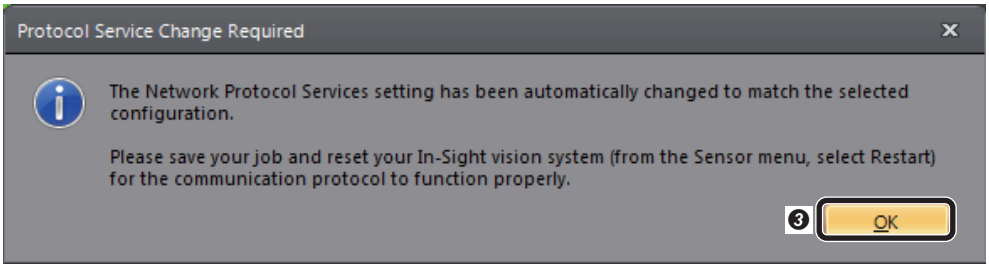


❶ Click the [Communication] button.
❷ Click the [Add Device] button.

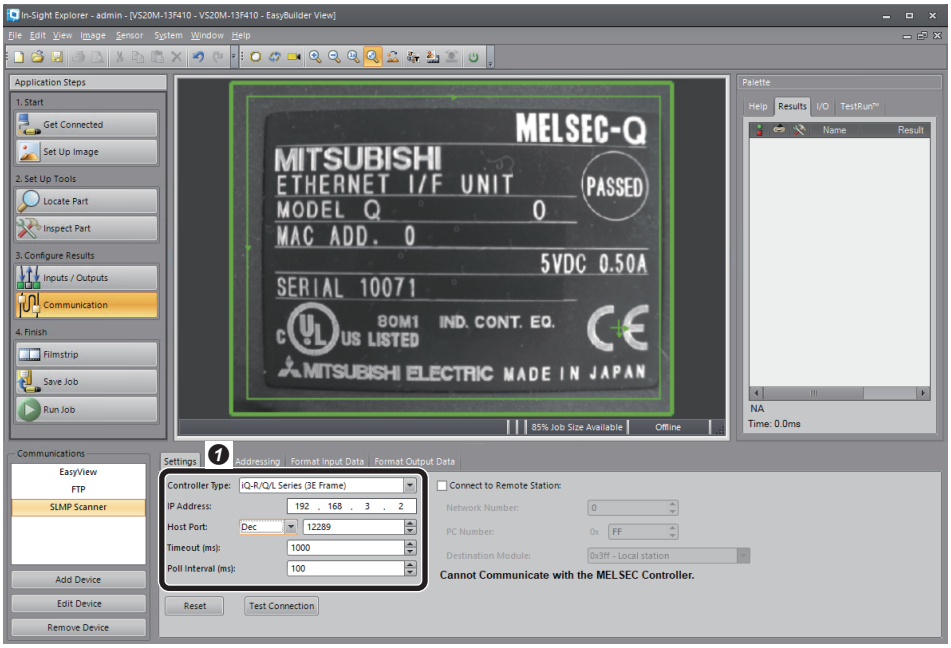
2. Add the SLMP scanner.



❶ Configure a device setting.
• Device: PLC/Motion Controller
• Manufacturer: Mitsubishi
• Protocol: SLMP Scanner
❷ Click the [OK] button.
❸ When the message "Protocol Service Change Required" appears, click the [OK] button.



3. Set the SLMP Scanner.

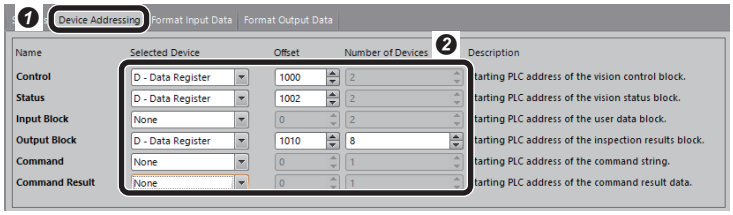


❶ Setting contents are as follows.
- Controller Type: iQ-R/Q/L Series (3E Frame)
- IP Address: 192.168.3.2
- Host Port: 12289 (Port number set for the Ethernet parameter in an engineering tool)
- Timeout (ms): 1000
- Poll interval (ms): 100

Point

- SLMP response from a programmable controller may be delayed due to online operation to the programmable controller, etc., making connections disconnected in some cases. Ensure a sufficient margin for the timeout time.
- Shortening the poll interval also shortens the interval to monitor the programmable controller status.

Assigning devices



❶ Select the [Device Addressing] tab.
❷ Set a selected device, offset, and the number of devices to each of the six data blocks as shown left.
(☞ Page 52 Device addressing)

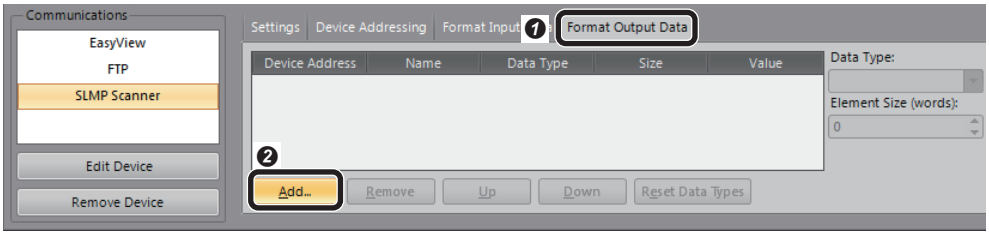
■ Device addressing

Name	Selected Device	Offset	Number of Devices
Control	D-Data Register	1000	2
Status	D-Data Register	1002	2
Output Block	D-Data Register	1010	8

Outputting to the programmable controller

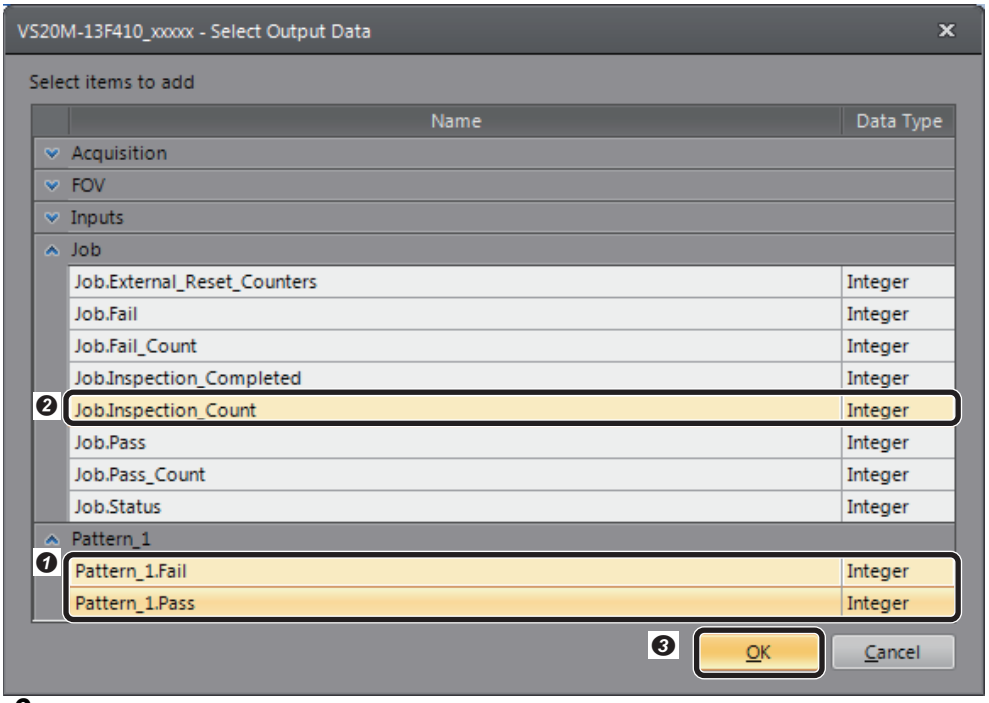
As an example, set "Pass," "Fail," and "Inspection_Count" to the output data block (D1015 to D1017).

1. Set data to be output from the vision sensor to the programmable controller.



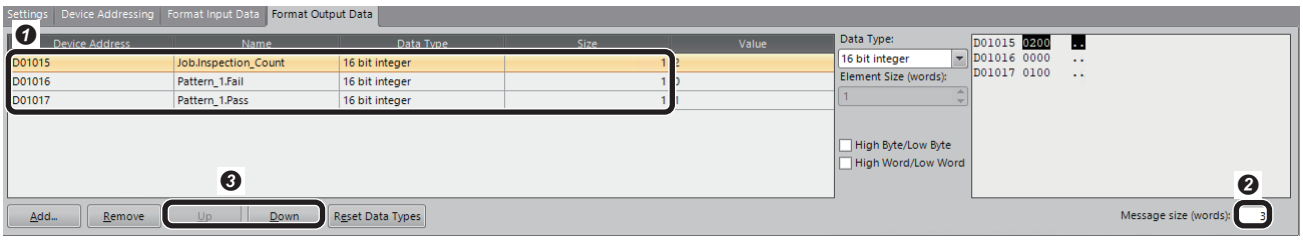
❶ Select the [Format Output Data] tab.
❷ Click the [Add] button.

2. Select the data to be output to the programmable controller.



❶ Select "Pattern_1 inspection result (PASS/FAIL)".
❷ Select "Job.Inspection_Count".
❸ Click the [OK] button.

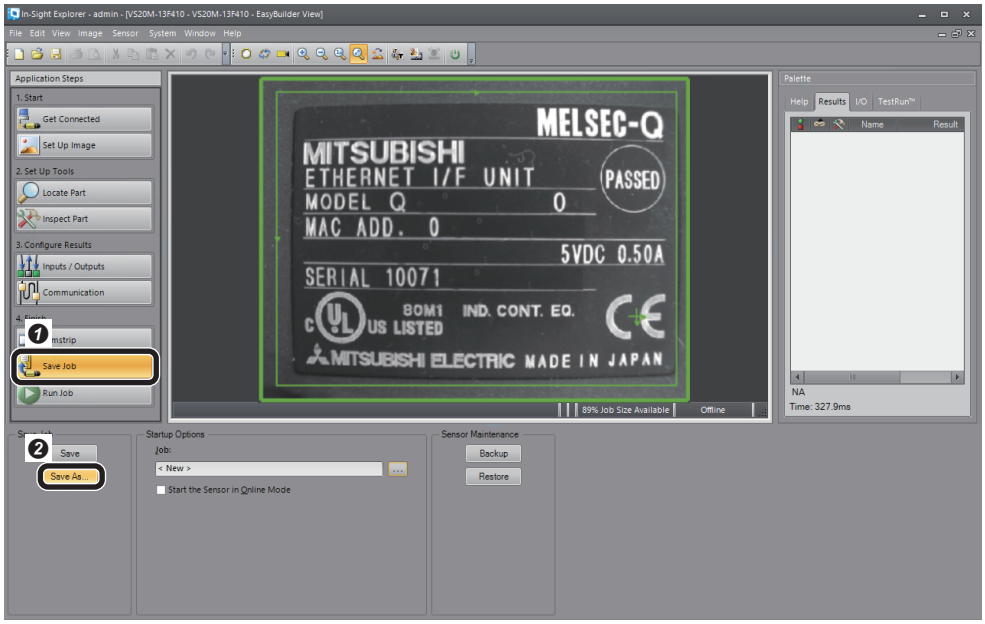
3. The output result to the programmable controller is displayed.



❶ Device Address: D1015 to D1017
❷ Message size (words): 3
❸ Items corresponding to the device address can be changed by using the [Up] and [Down] buttons. As an example, sort as above.
- D01015: Pattern_1.Pass
- D01016: Pattern_1.Fail
- D01017: Job.Inspection_Count

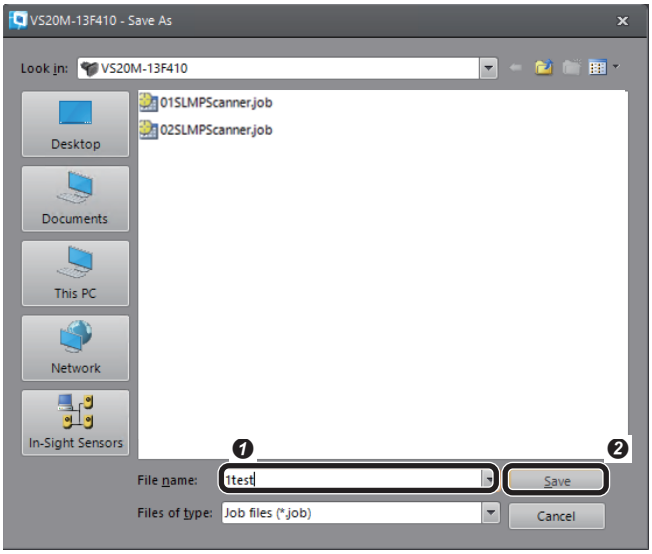
Saving the job

1. Name the created job.



❶ Click the [Save Job] button.
❷ Click the [Save As] button.

2. Enter a file name and save the job.

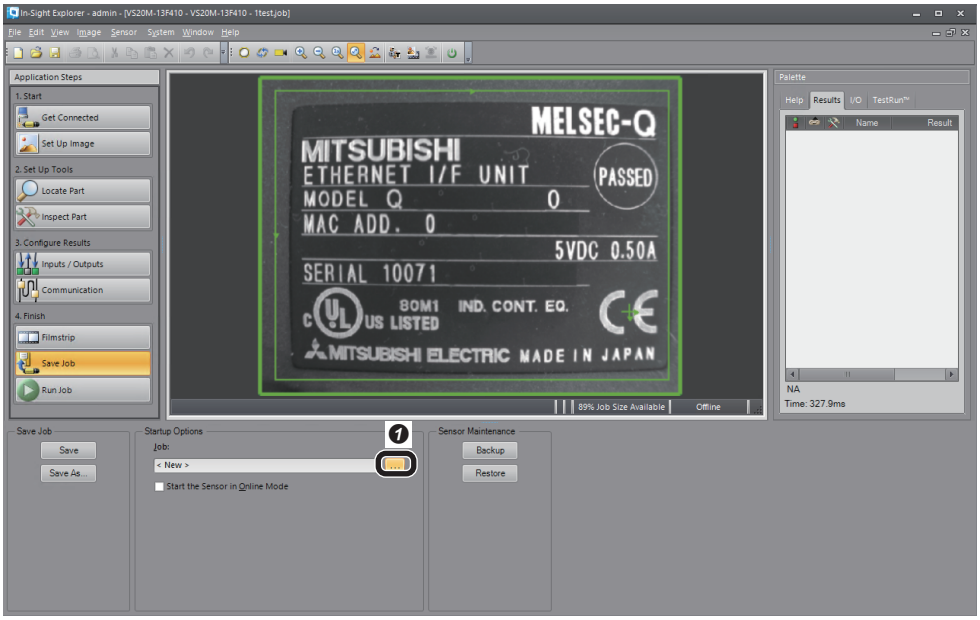


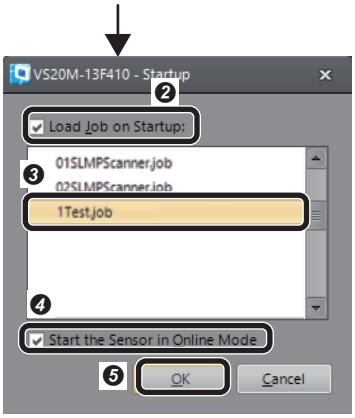
❶ Enter an arbitrary file name.
❷ Click the [Save] button.

Point

The running job can be changed (loaded) to another job by prefixing a numeric value to a file name.
For the procedure to change jobs, refer to the following section.
☞ Page 67 Changing jobs (loading another job)

3. Set startup options for the vision sensor.





❶ Click the [...] button under "Job".
❷Select the checkbox of "Load Job on Startup".
❸ Select the file name saved in step 2.
❹ Select the checkbox of "Start the Sensor in Online Mode".
❺ Click the [OK] button.

Restarting the vision sensor

Turn the power of the vision sensor OFF and ON to restart.

2.4 Setting a Programmable Controller

Set parameters of a programmable controller in an engineering tool.

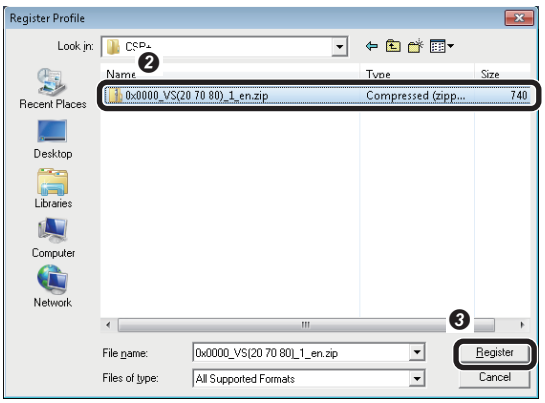
Registering a profile

Register a profile of the vision sensor in an engineering tool.

Point

Profiles need to be registered when an engineering tool project is closed.

1. Start an engineering tool.
2. Resister a profile.

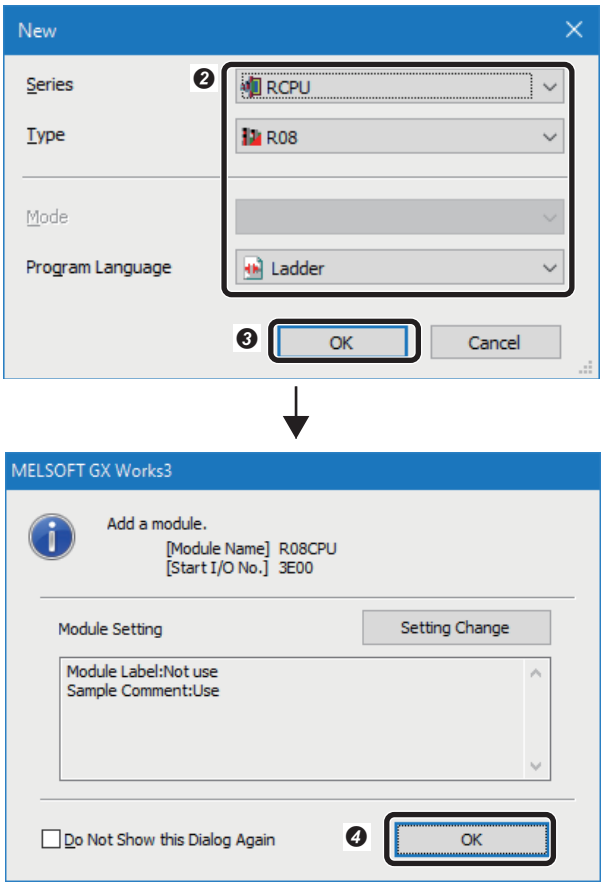


❶ Select [Tool] ⇨ [Profile Management] ⇨ [Register].
❷ Select the profile obtained previously.
❸ Click the [Register] button.

Setting a programmable controller

Set parameters of a programmable controller.

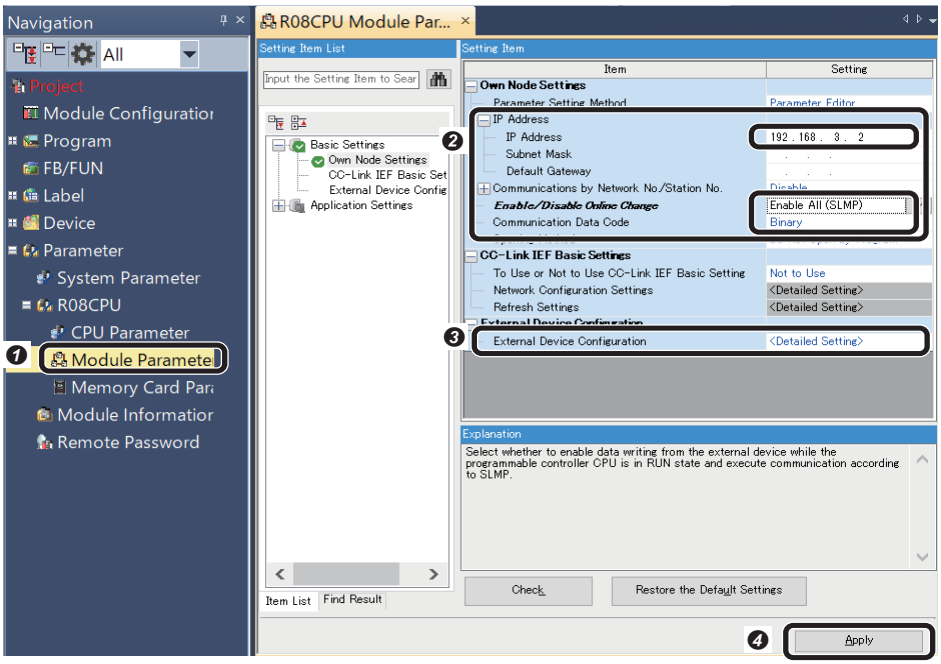
1. Select a CPU module and a program language in the "New" screen.



❶ Select [Project] ⇨ [New].
The "New" screen appears.
❷ Set a CPU module and a program language.
- Series: RCPU
- Type: R08
- Program Language: Ladder

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

2. Set the module parameter.

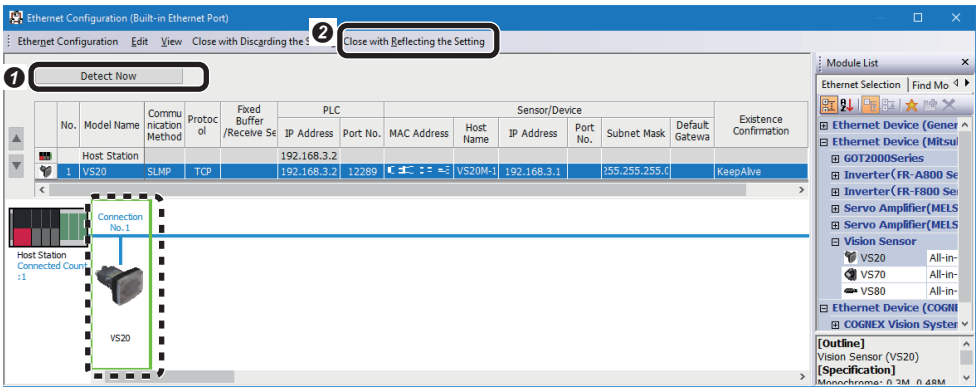


❶ Double-click "Module Parameter" in the "Navigation" window.
The "R08CPU Module Parameter" screen appears.
❷ Set "IP Address," "Enable/Disable Online Change," and "Communication Data Code."
- IP Address: 192.168.3.2
- Enable/Disable Online Change: Enable All (SLMP)
- Communication Data Code: Binary

❸ Double-click [External Device Configuration].
The "Ethernet Configuration" screen appears.
(☞ Page 58 "Ethernet Configuration" screen)
❹ Click the [Apply] button to end the settings.

"Ethernet Configuration" screen

Detect the connected vision sensor. 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 vision sensor 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 vision sensor can be added by dragging and dropping a corresponding device in "Vision Sensor" from "Ethernet Device (Mitsubishi Electric Corporation)" in "Module List."

The parameter settings are as follows:

- "Protocol": TCP
- "PLC" - "Port No.": 12289 (SLMP port number set in the vision sensor setup tool)
- "Sensor/Device" - "IP Address": 192.168.3.1 (IP address of a vision sensor set in the vision sensor setup tool)

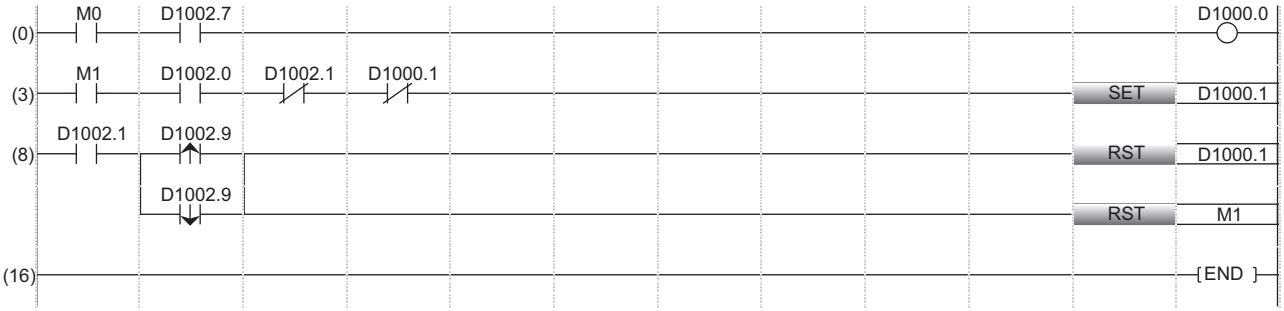
Creating a program

Create a program to control a vision sensor using the devices set in the vision sensor setup tool.

Devices used in the program

Signal	Signal name	Description
D1002.0	Trigger Ready	The reception status of 'Trigger Enable' (D1000.0) is stored. • ON: Trigger is enabled. • OFF: Trigger is disabled.
D1002.1	Trigger Ack	The reception status of 'Trigger' (D1000.1) is stored. • ON: With trigger • OFF: Without trigger
D1002.7	Online	The online status of a vision sensor is stored. • ON: Online • OFF: Offline
D1002.9	Inspection Completed	This signal is changed (toggled) at the completion of an inspection of a vision sensor.
D1000.0	Trigger Enable	'Trigger' (D1000.1) is enabled while this signal is ON.
D1000.1	Trigger	By turning this signal OFF and ON, an image capture is started.
M0	Online command	'Trigger Enable' (D1000.0) turns ON to make a vision sensor online while this signal is ON.
M1	Trigger directive	By turning this signal OFF and ON, 'Trigger' (D1000.1) is turned ON, and an image capture is performed.

Program example



(0): Enable a trigger on the vision sensor.

(3): Request the start of the image capture to the vision sensor. ('Trigger' (D1000.1) turns ON.)

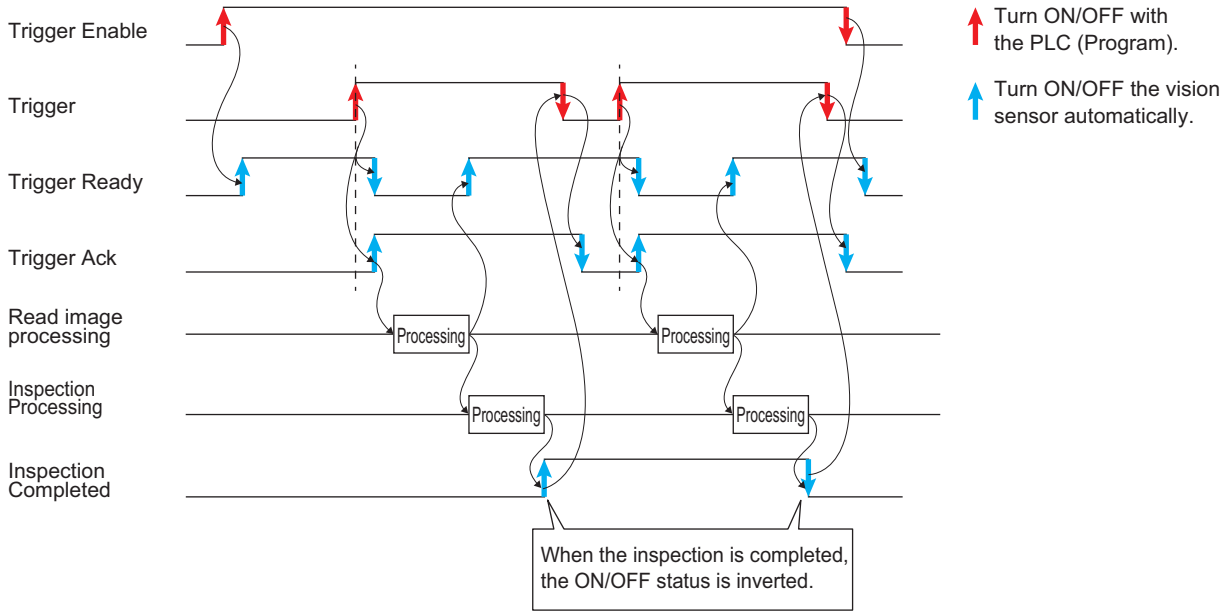
(8): The processing for the completion of the image capture of the vision sensor is performed.

Precautions

Use 'Trigger Ack' (D1002.1) to set an interlock when checking 'Inspection Completed' (D1002.9).

Timing chart of SLMP scanner connection

A timing chart when controlling a vision sensor using a programmable controller is shown below.
To enable the trigger from a programmable controller, turn ON 'Trigger Enable' of the control block.
When 'Trigger' of the control block is turned ON while 'Trigger Ready' of the status block is ON by turning ON 'Trigger Enable,' the status of the vision sensor is output to 'Trigger Ack' and 'Inspection Completed' of the status block.
The status of 'Inspection Completed' is changed (toggled) at the completion of an inspection.

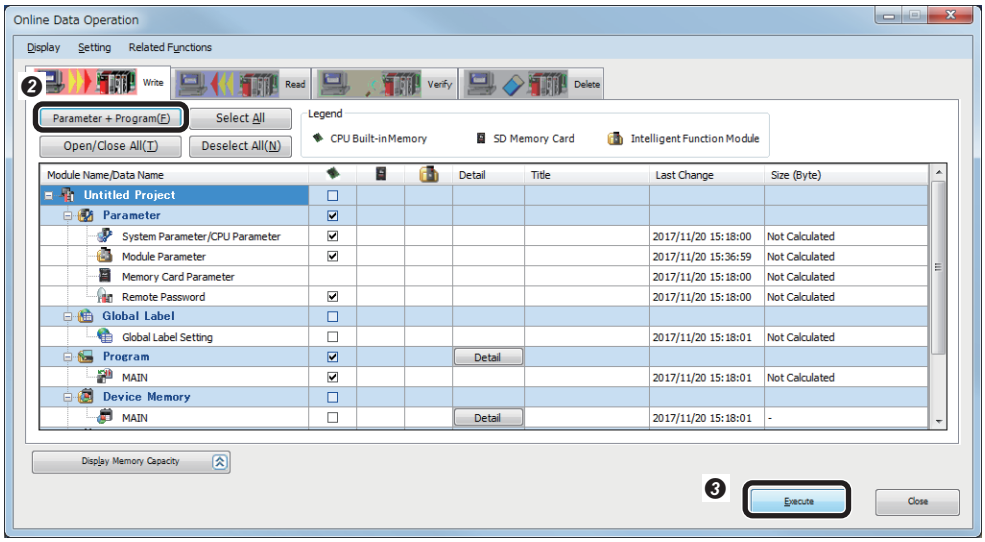


2.5 Writing Data to a Programmable Controller

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

Restarting the programmable controller

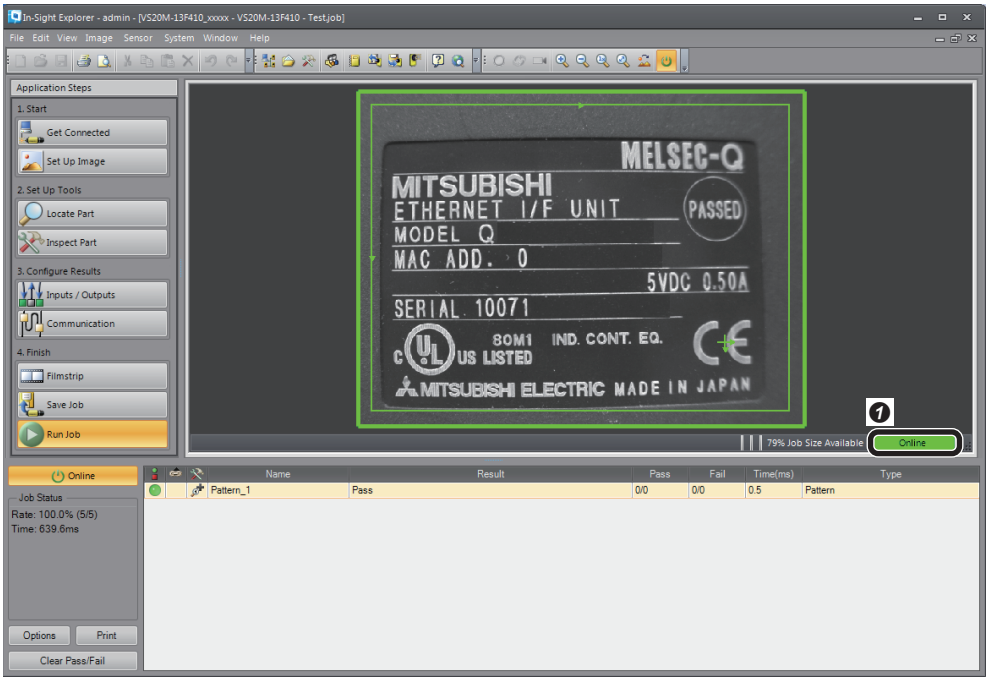
After writing the parameters and program, reset the programmable controller to RUN.

2.6 Checking Operations

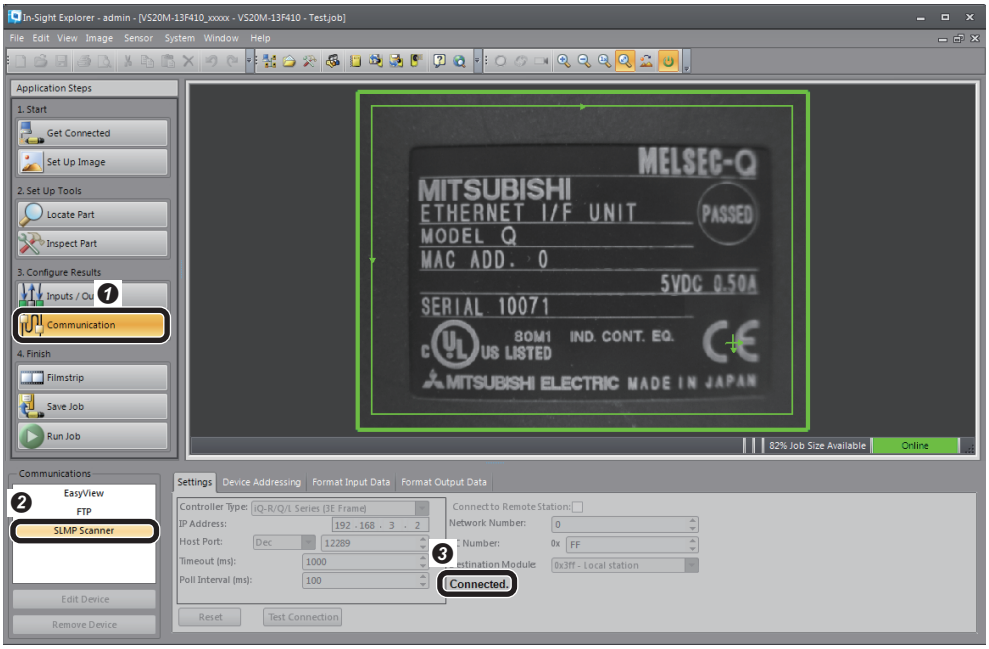
Check the operation by controlling the vision sensor using the programmable controller.

Making the vision sensor online

Make the vision sensor online and start the communication with the programmable controller.



❶ Check that the operating status is "Online".

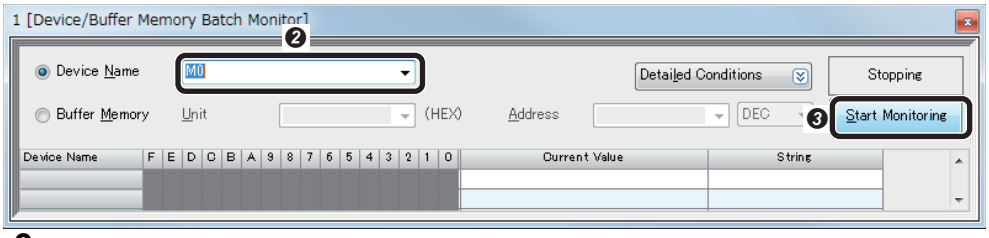


❶ Select the [Communication] button.
❷ Click "SLMP Scanner".
❸ Check that "Connected." is displayed.

Enabling a trigger on the vision sensor

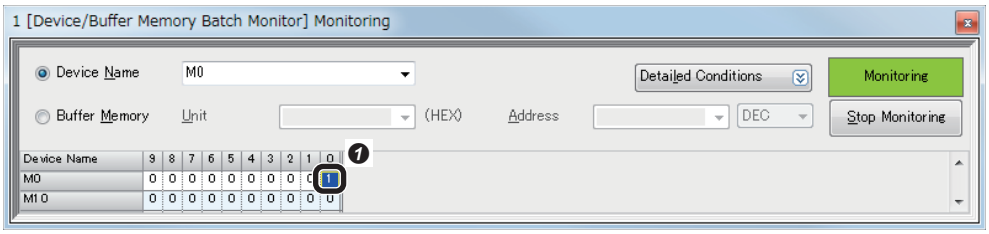
Enable a trigger on the vision sensor to acquire the inspection results.

1. Display device values.



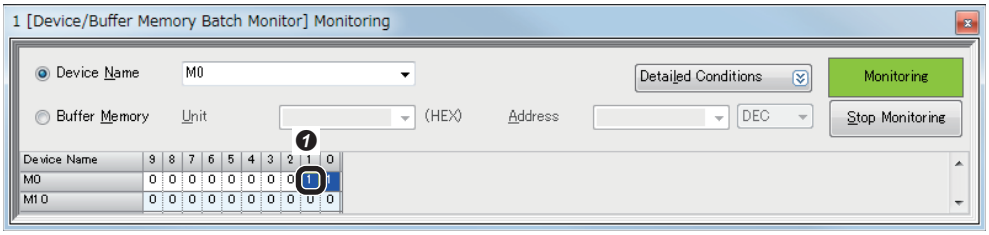
❶ Select [Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch Monitor] with an engineering tool.
The "Device/Buffer Memory Batch Monitor" window appears.
❷ Enter "M0" for "Device Name".
❸ Click the [Start Monitoring] button.

2. Enable a trigger on the vision sensor.



❶ Turn "M0" ON to turn 'Trigger Enable' (D1000.0) ON.

3. Trigger a device.

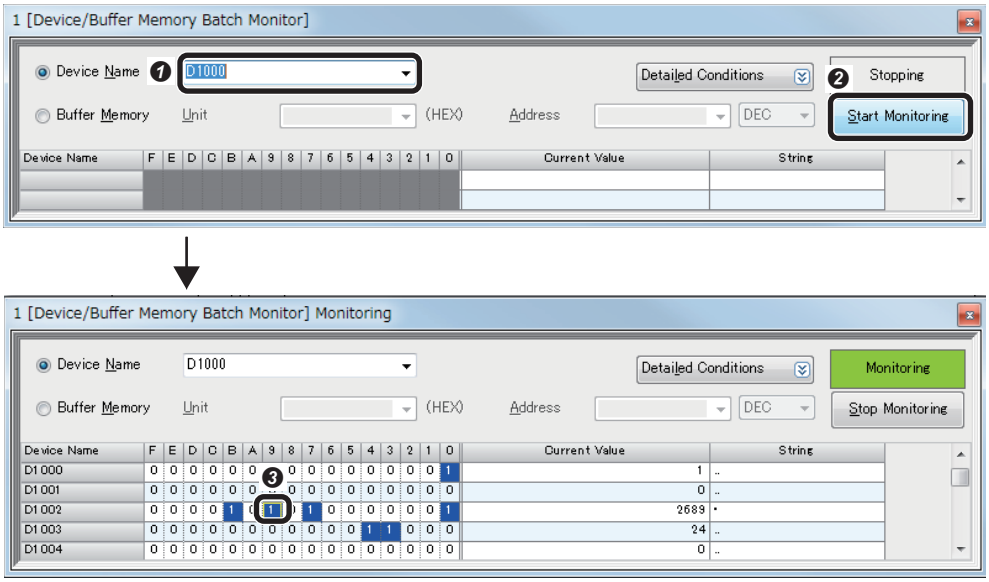


❶ Turn "M1" ON to turn 'Trigger' (D1000.1) ON.

Checking inspection results

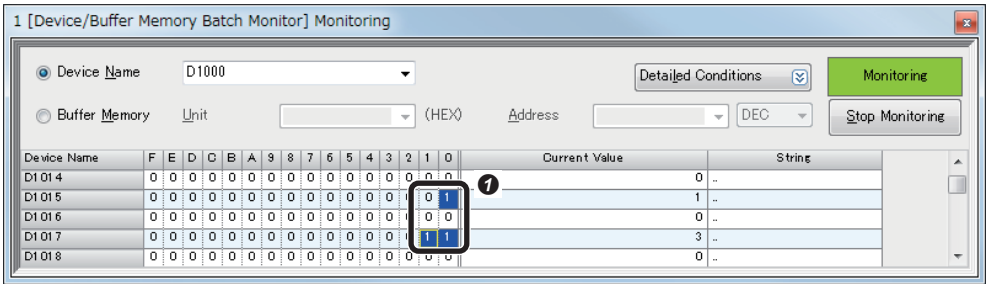
Check the inspection results.

1. Check the completion of the inspection.



❶ Enter "D1000" for "Device Name".
❷ Click the [Start Monitoring] button.
❸ Check that the bit of 'Inspection Completed' (D1002.9) is changed (toggled).

2. Check the inspection results.



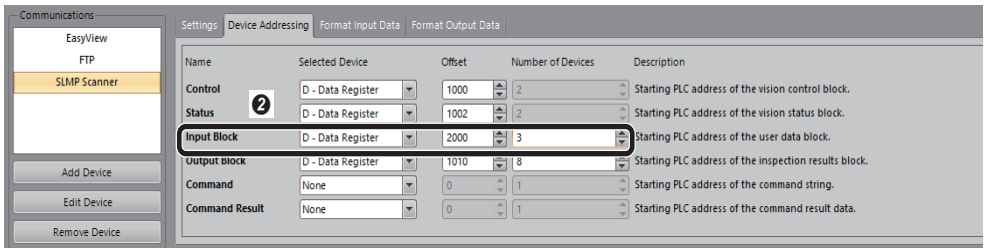
❶ Check the following information.
- 'Job PASS' (D1015.0): This bit turns ON when the set inspection target is detected in the captured image.
- 'Job FAIL' (D1016.0): This bit turns ON when the set inspection target is not detected in the captured image.
- 'Number of jobs inspected' (D1017): The number of times the device is triggered is stored.

Changing a recognition parameter

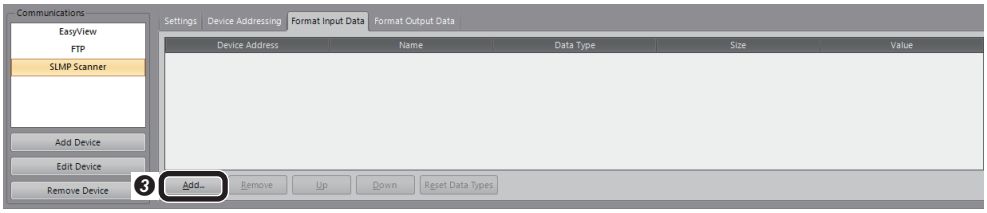
When locating a target object using the pattern in the location tool, the rotation tolerance of the target object can be changed to ±90°.

1. Make the vision sensor offline with the vision sensor setup tool.

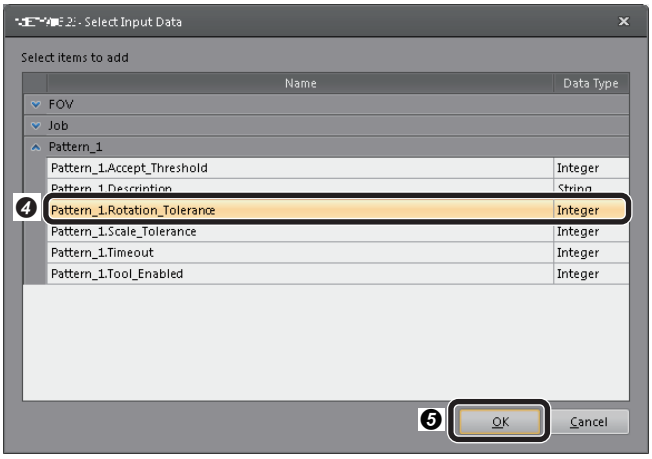
2. Add parameter items to the list in the [Format Input Data] tab.



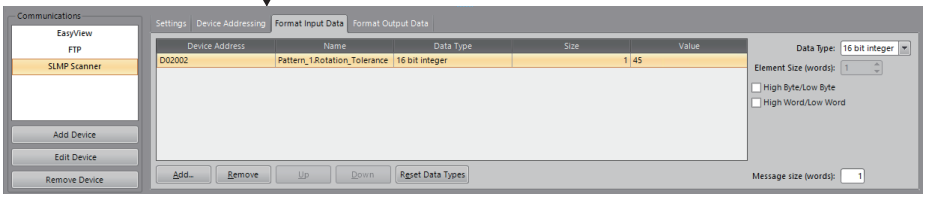
❶ Click the [Communication] button.
❷ Enter the following information to the cells in the "Input Block" row in the [Device Addressing] tab.
- Selected Device: D - Data Register
- Offset: 2000
- Number of Devices: 3



❸ Select the [Format Input Data] tab and click the [Add] button.



❹ Select "Pattern_1.Rotation Tolerance".
❺ Click the [OK] button.



3. Save the job and make the vision sensor online. (☞ Page 54 Saving the job)

Point

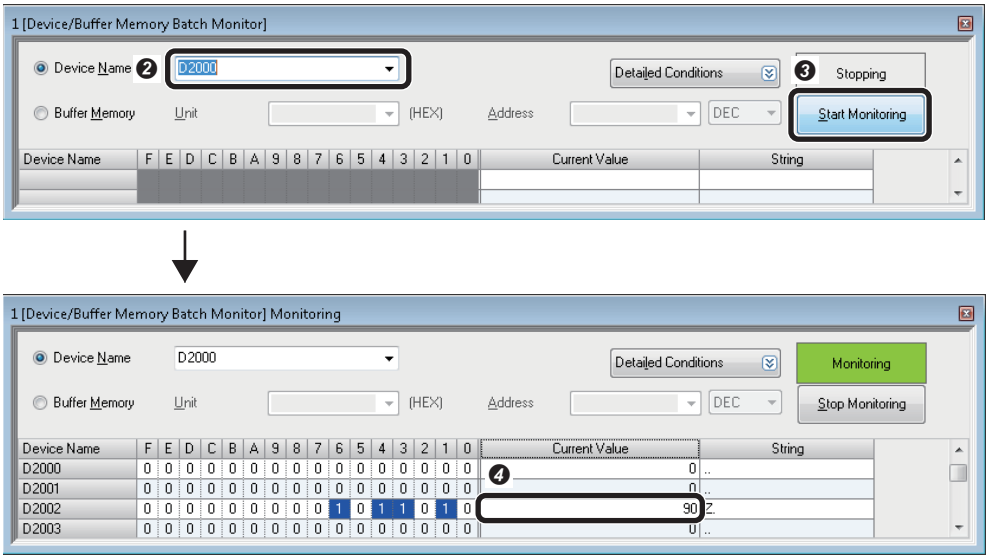
Parameter items need to be added to the list in the [Format Input Data] tab in advance to change parameter values.

More than one parameter item can be selected.

Set the number of devices of "Input Block," depending on the number and size of parameters.

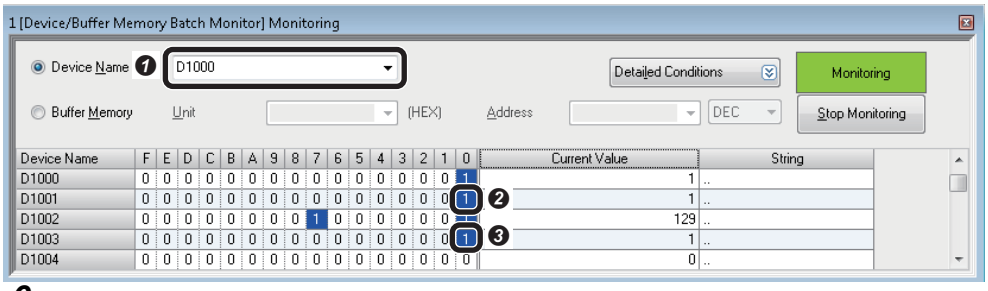
When the number entered in "Number of devices" is smaller than the total size of the parameter items added to the list in the [Format Input Data] tab, a warning mark is displayed next to "Message size (words)".

4. Set "Pattern_1.Rotation Tolerance" as a parameter to be changed.



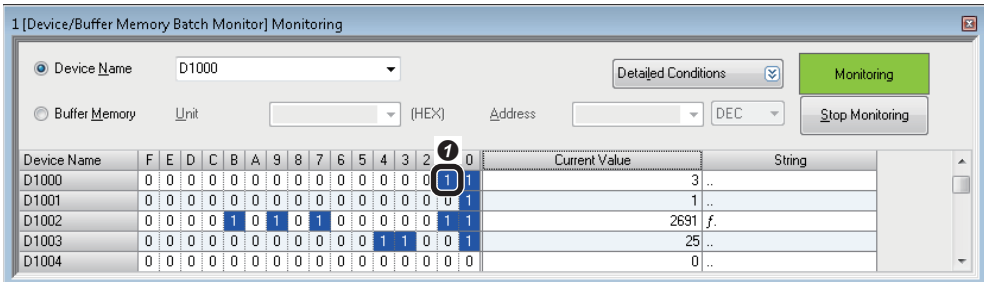
❶ Select [Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch Monitor] with an engineering tool.
The "Device/Buffer Memory Batch Monitor" window appears.
❷ Enter 'D2000' for "Device Name".
❸ Click the [Start Monitoring] button.
❹ Enter '90' for 'User Data' (D2002) of an input data block.

5. Change parameter values.



❶ Enter 'D1000' for "Device Name".
❷ Turn ON 'Set User Data' (D1001.0) of a control block.
❸ By completing the settings, 'Set User Data Ack' (D1003.0) of a status block turns ON. After that, turn OFF 'Set User Data' (D1001.0).

6. Trigger a device.



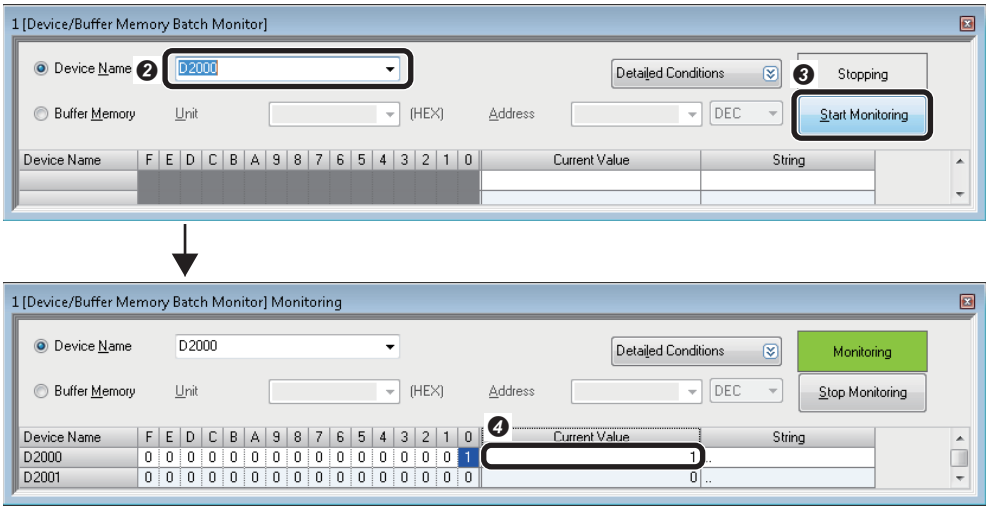
❶ Turn ON 'Trigger' (D1000.1) of a control block.

Changing jobs (loading another job)

The following shows the procedure to load the job file "1Test".

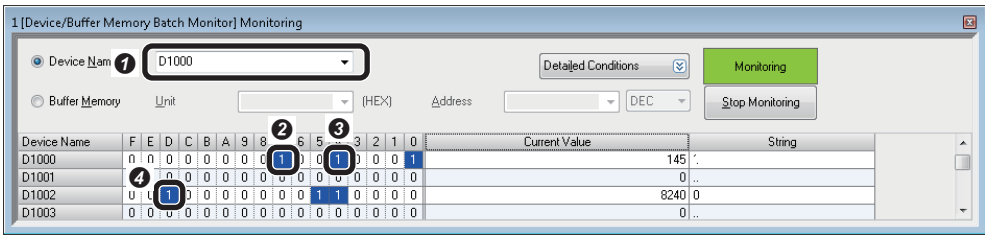
The number '1' prefixed to the file name indicates an ID. By setting this ID number to 'Command' (D2000) of an input data block, the job ("1Test") can be loaded.

1. Set an ID number of a job.



❶ Select [Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch Monitor] with an engineering tool.
The "Device/Buffer Memory Batch Monitor" window appears.
❷ Enter 'D2000' for "Device Name".
❸ Click the [Start Monitoring] button.
❹ Enter '1' for 'Command' (D2000) of an input data block.

2. Change jobs (load another job).



❶ Enter 'D1000' for "Device Name".
❷ Turn ON 'Set Offline' (D1000.7) of a control block to make the vision sensor offline.
❸ Turn ON 'Execute Command' (D1000.4) of a control block to load a job.
❹ When the loading of the job is completed, 'Command Completed' (D1002.D) of a status block is turned ON. After that, turn OFF 'Execute Command' (D1000.4) and 'Set Offline' (D1000.7).

Point

To load a job, the file name of the job need to begin with an ID number.
When loading a job, make a vision sensor offline.

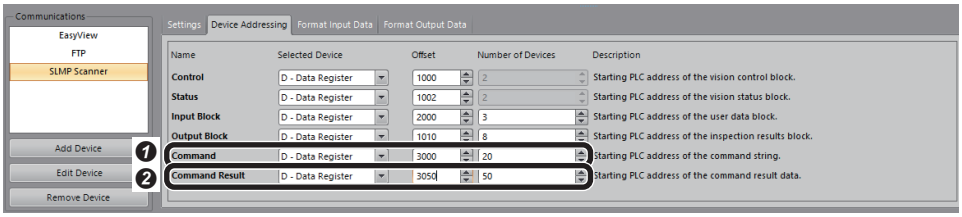
Controlling the vision sensor by using native mode commands

The vision sensor can be controlled by using native mode commands.

As an example, send the native mode command "GF (Get File)" to acquire the file name of the job in use.

Setting the vision sensor

1. Make the vision sensor offline with the vision sensor setup tool.
2. Set devices in the [Device Addressing] tab.
3. Save the job and make the vision sensor online. (☞ Page 54 Saving the job)



❶ Enter the following information to the cells in the "Command" row.
- Selected Device: D - Data Register
- Offset: 3000
- Number of Devices: 20

❷ Enter the following information to the cells in the "Command Result" row.
- Selected Device: D - Data Register
- Offset: 3050
- Number of Devices: 50

Point

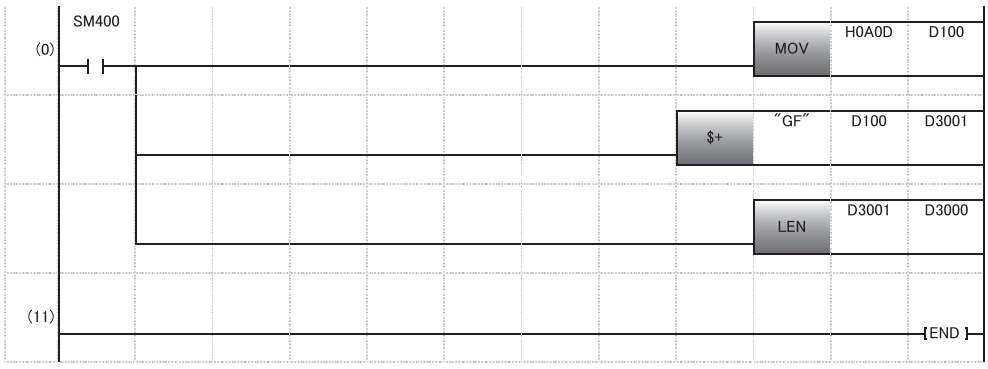
Set an appropriate number of devices in the "Command" row for command length (size).

Set an appropriate number of devices in the "Command Result" row for the size of the data to be acquired.

Acquiring a file name

Send the native mode command "GF" to acquire a file name.

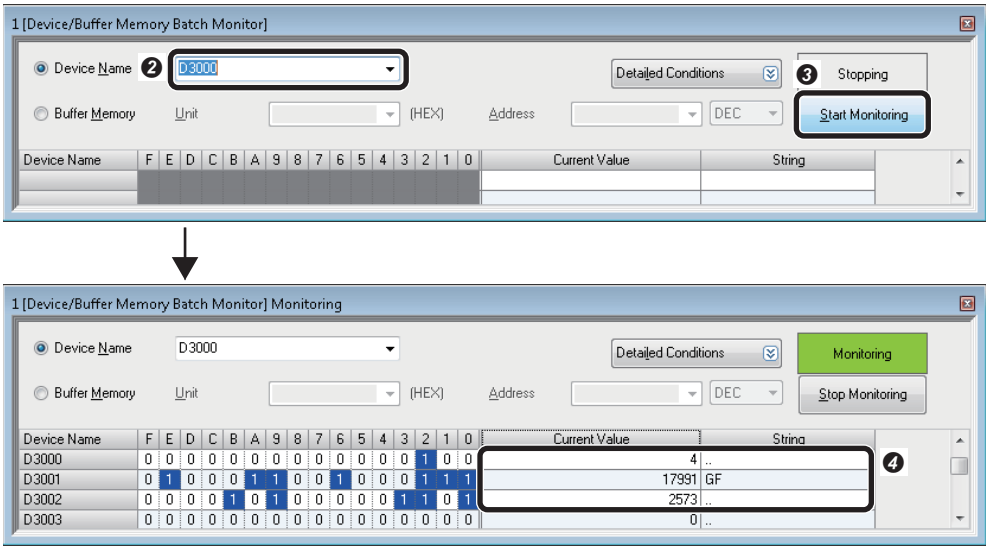
1. Set a native command and a command length.



❶ Create a ladder program as shown left with an engineering tool.
- Set the native command "GF" and the line feed code of terminator "CR/LF" for 'String Command' (D3001) of a string command block.
- Set the native command length for 'String Command Length' (D3000) of a string command block.

❷ Perform the online program change function.

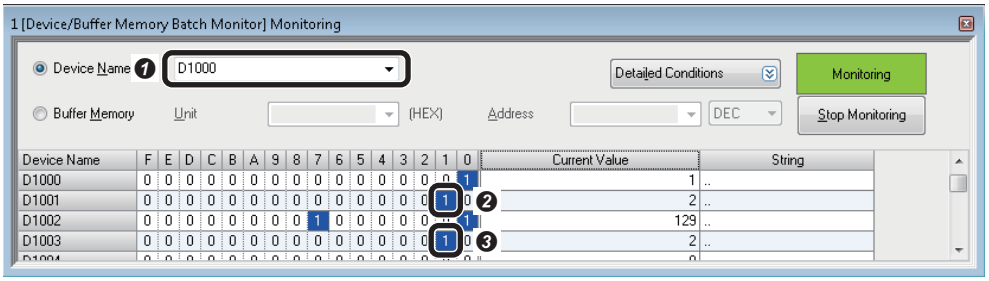
2. Check that the command and the command length are set correctly.



❶ Select [Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch Monitor] with an engineering tool.
The "Device/Buffer Memory Batch Monitor" window appears.
❷ Enter 'D3000' for "Device Name".
❸ Click the [Start Monitoring] button.
❹ Check that the following information is set.

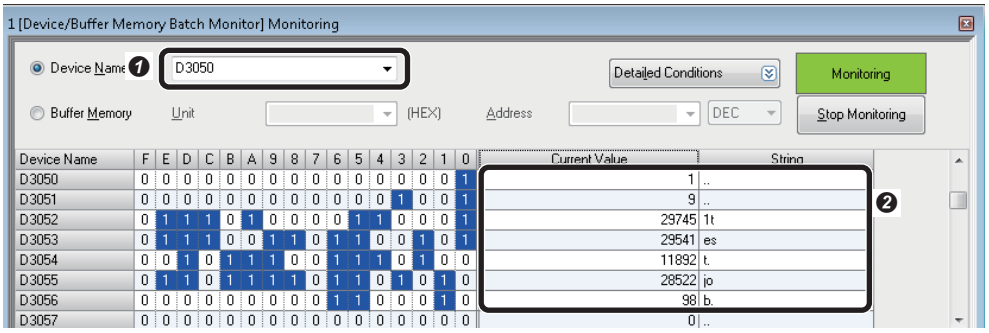
- D3000: 4 (character length)
- D3001: "GF" (native mode command)
- D3002: 2573 (line feed code of terminator: (CR/LF))

3. Send the native mode command.



❶ Enter 'D1000' for "Device Name".
❷ Turn ON 'Initiate String Command' (D1001.1) of a control block.
❸ 'String Command Ack' (D1003.1) of a status block turns ON. After that, turn OFF 'Initiate String Command' (D1001.1).

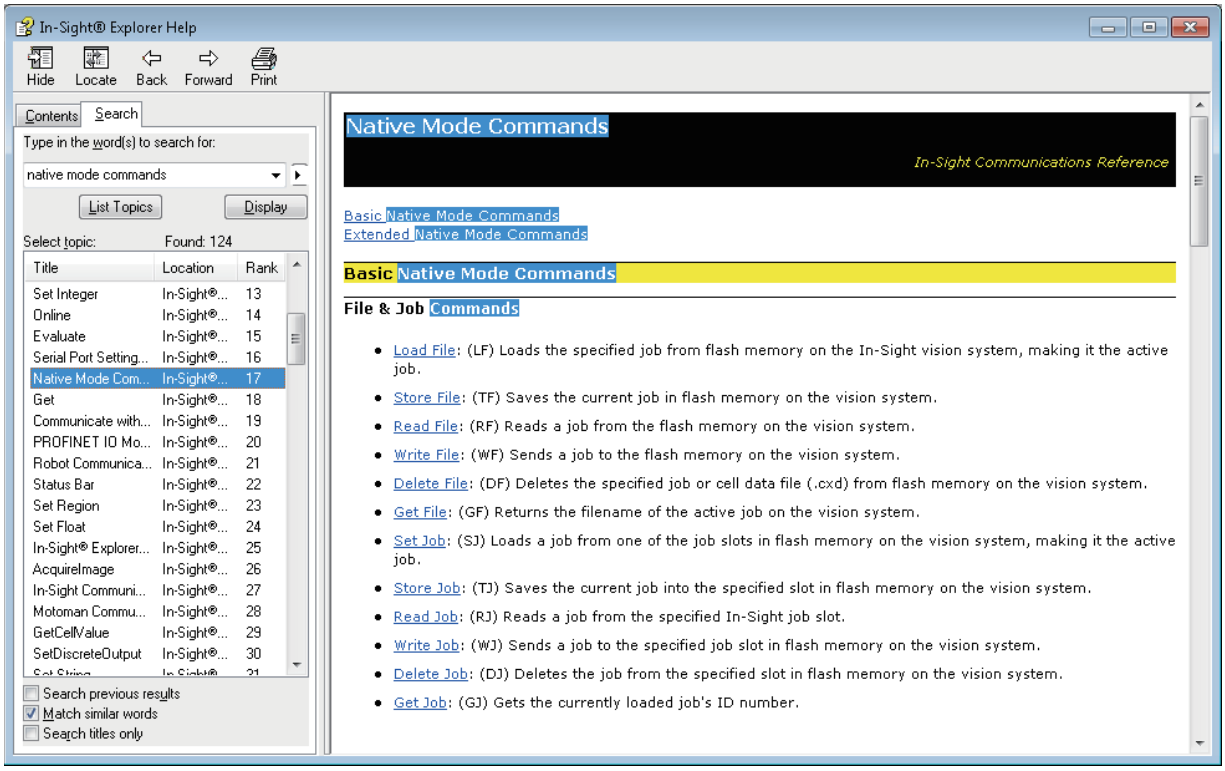
4. Check the acquired data.



❶ Enter 'D3050' for "Device Name".
❷ The information in the following string command result blocks can be acquired.

- 'Result Code' (D3050): '1' (successfully completed)
- 'String Command Result Length' (D3051): 9 (file name length)
- 'String Command Result' (from D3052 to D3056): "1test.job" (file name)

For details on the native mode commands to control a vision sensor, refer to the help of vision sensor setup tool.
Enter "Native Mode Commands" as a keyword in the [Search] tab of Help, and refer to the explanation of Native Mode Commands.

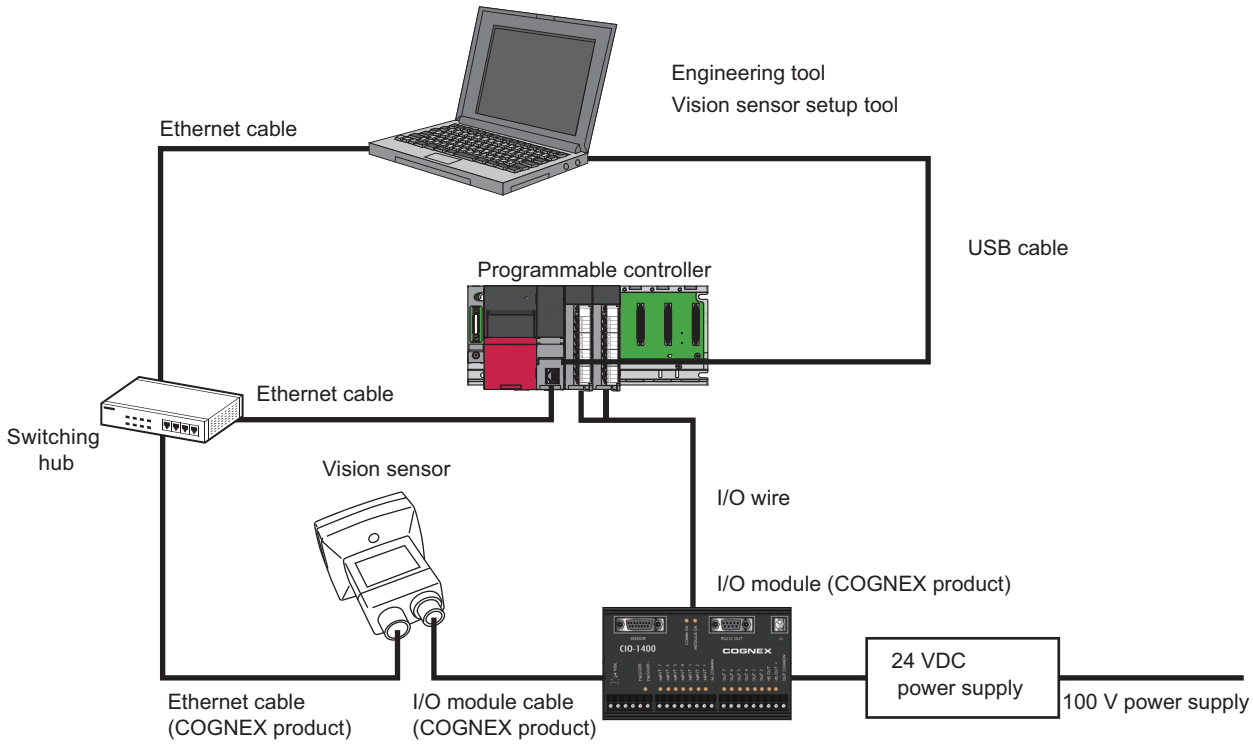


3 I/O CONNECTION

This chapter explains the procedure for connecting a vision sensor VS20 to a programmable controller and controlling the vision sensor with I/O connection.

3.1 System Configuration Example for Connecting a Vision Sensor

The following figure shows the system configuration for connecting a vision sensor VS20.



Point

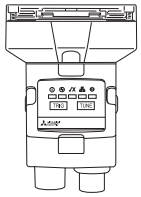
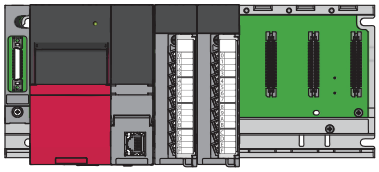
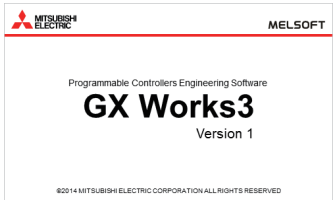
I/O connection is available for other vision sensors (VS70 and VS80).
For details on the system configuration, refer to the user's manual of the vision sensor used.

Configurations

The devices used in the system configuration are as follows.

Required equipment

■ Mitsubishi Electric products

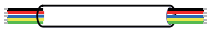
		
Vision sensor • VS20M-13F410	Programmable controller • Power supply: R62P • CPU module: R08CPU • Base: R35B • Input module: RX40C7 • Output module: RY40NT5P	Engineering tool • GX Works3

■ COGNEX products

			
Vision sensor setup tool • In-Sight Explorer*1	Ethernet cable	I/O module cable	I/O module • CIO-1400 I/O extension module

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

■ Commercial products

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

Point

For available devices for the system configuration, refer to the user's manual of the vision sensor used.

Connection and wiring of a vision sensor

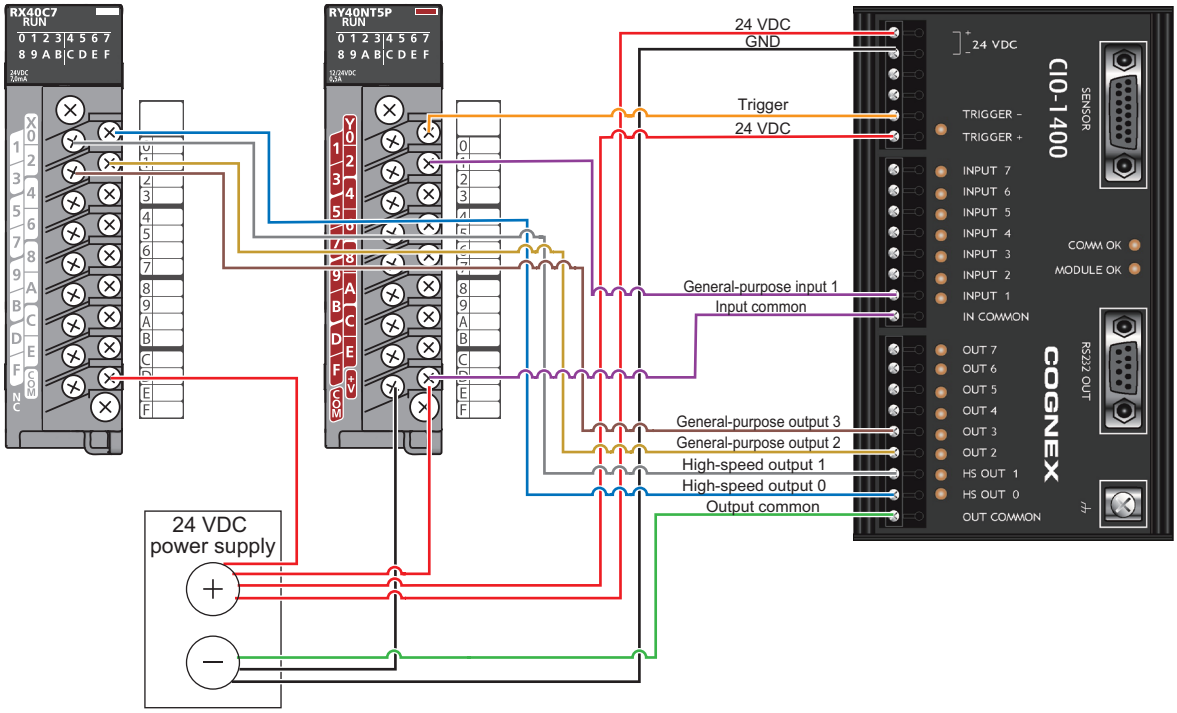
This section shows the procedure for connecting and wiring a vision sensor.

Ethernet cable connection

1. Connect the Ethernet cable's M12 connector to the vision sensor's Ethernet connector.
2. Connect the Ethernet cable's RJ-45 connector to the switching hub or personal computer, as applicable.

Connecting an I/O module (CIO-1400 I/O extension module) and an input/output module

1. Check that the 24 VDC power supply is OFF.
2. Connect a CIO-1400 I/O extension module and an input/output module as shown in the following figure.



Precautions

- Use only 24 VDC and observe the indicated polarity.
- When connecting a vision sensor and a programmable controller, simultaneously turn ON the power of the vision sensor and programmable controller, or first turn ON the power of the programmable controller.
- Cut unused wires or protect them with insulating materials. Be careful not to short-circuit with 24 VDC wires.
- The cable is designed to connect with its key aligned with the keyway of the connector on the Vision Sensor. Do not force the connections or damage may occur.

Point

For details on the connection with a vision sensor, refer to the user's manual of the vision sensor used.

3.2 Setting the Vision Sensor

Start the vision sensor setup tool to set the vision sensor.

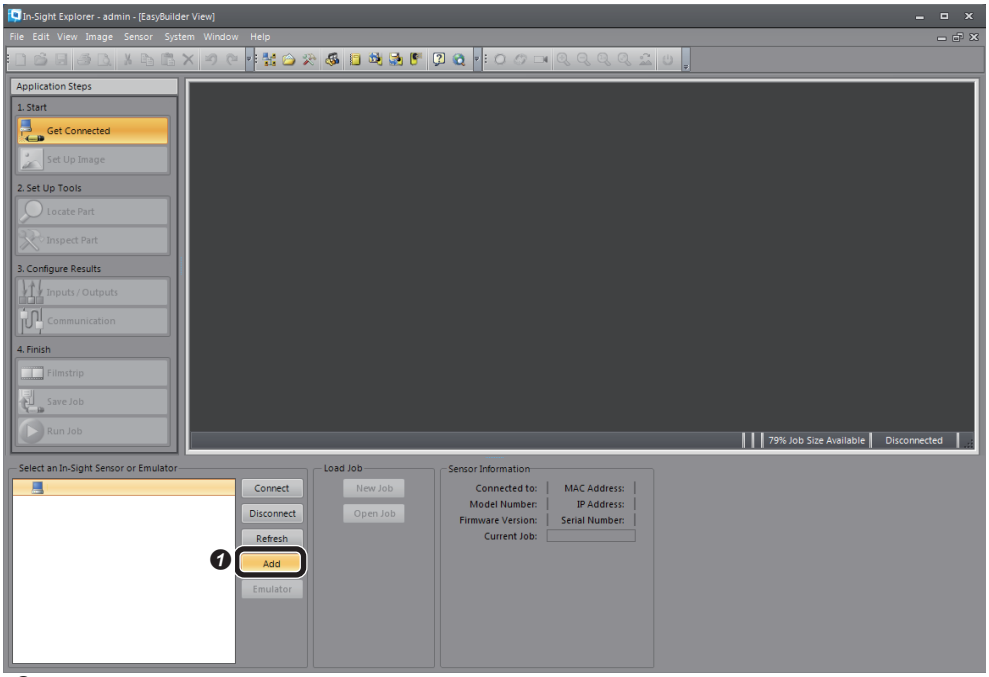
Setting an IP address to a personal computer

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

Connecting the vision sensor

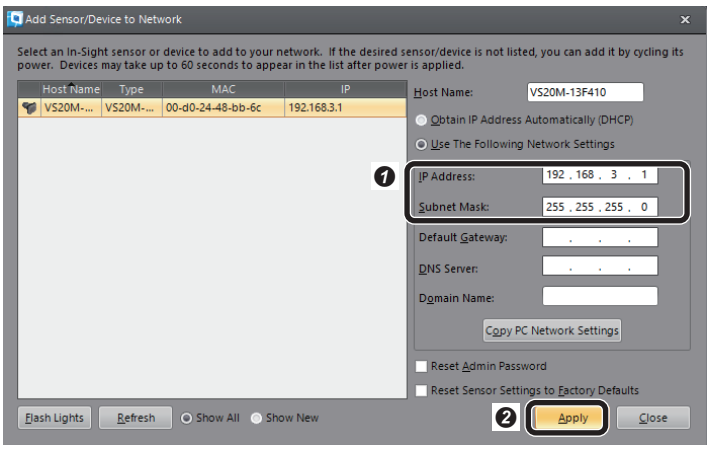
Start the vision sensor setup tool to set the vision sensor.

1. Start the vision sensor setup tool.



❶ Click the [Add] button.

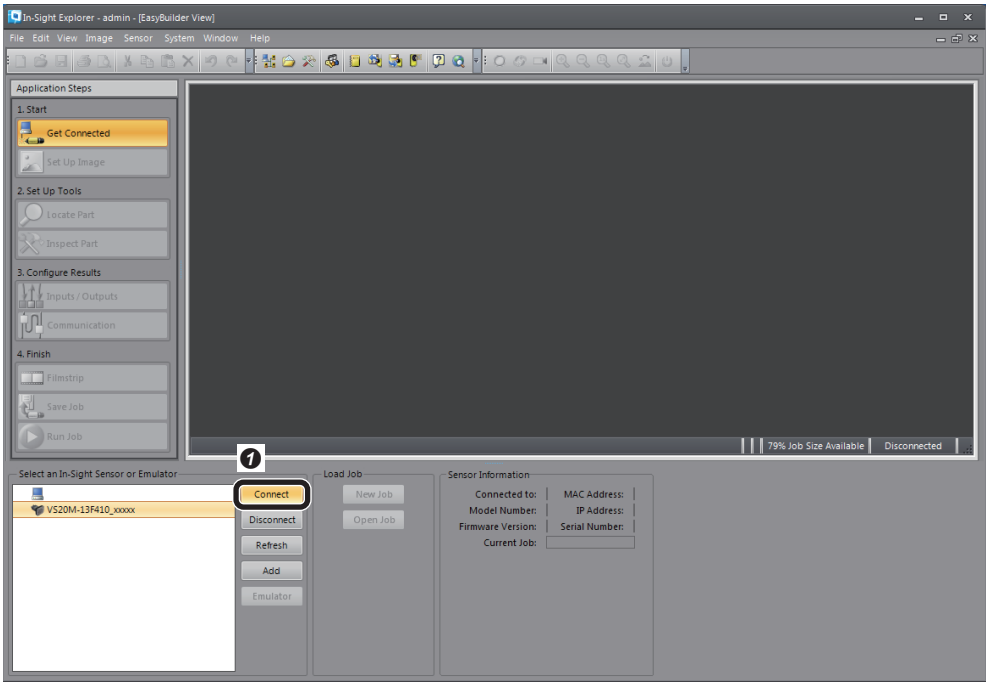
2. Add the vision sensor to the network.



❶ Add the vision sensor to the network.
- IP Address: 192.168.3.1
- Subnet Mask: 255.255.255.0

❷ Click the [Apply] button.

3. Connect to the vision sensor.

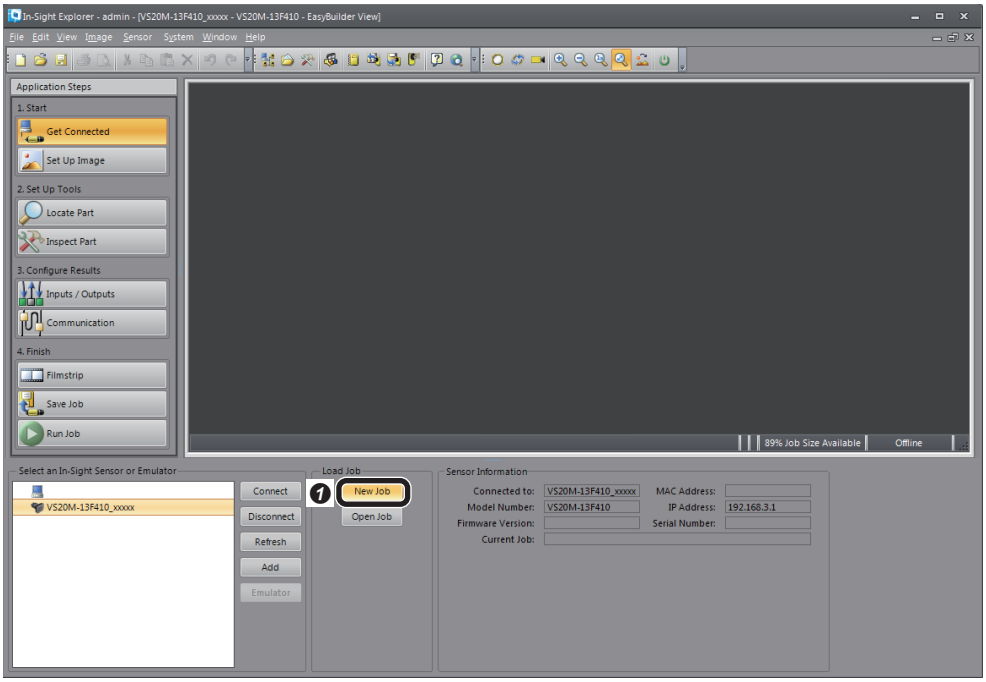


❶ Click the [Connect] button to connect to the vision sensor.

Creating a new job

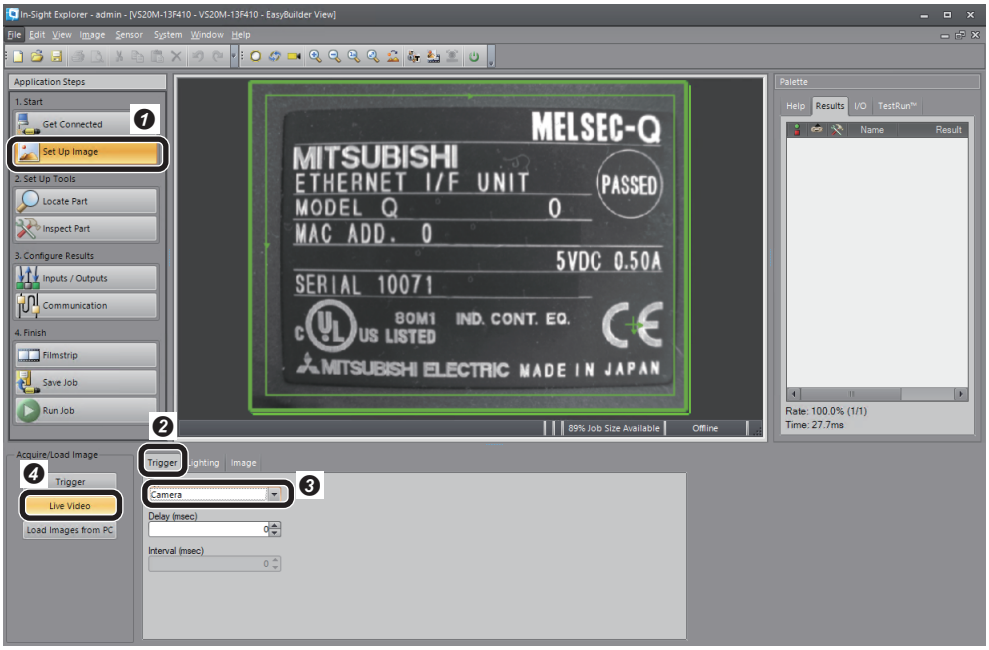
As an example, set a CE mark for inspection target.

1. Create a new job.



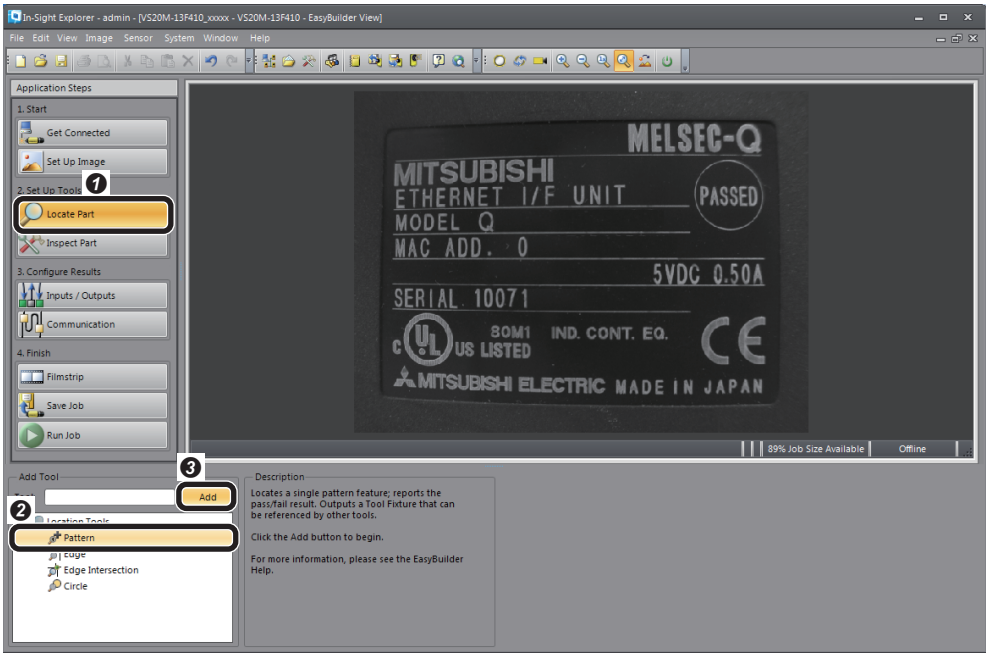
❶ Click the [New Job] button.

2. Adjust so that the lens captures an inspection target in [Set Up Image], and configure the settings to acquire the image.



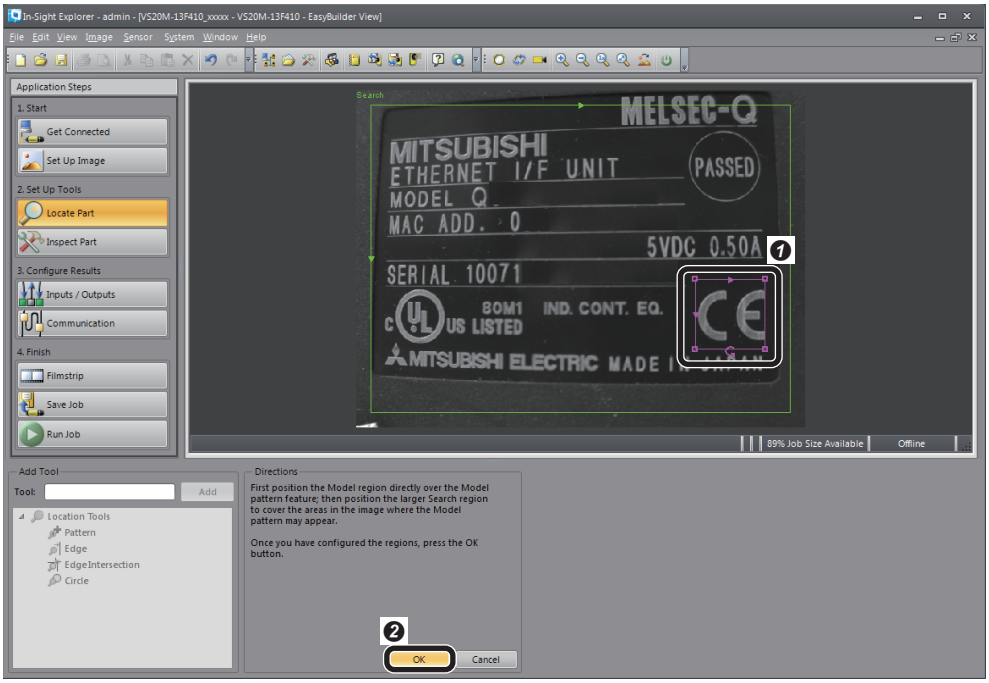
❶ Click the [Set Up Image] button.
❷ Select the [Trigger] tab.
❸ Select "Camera".
❹ Click the [Live Video] button to adjust the image. After adjusting the image, click the [Live Video] button again.

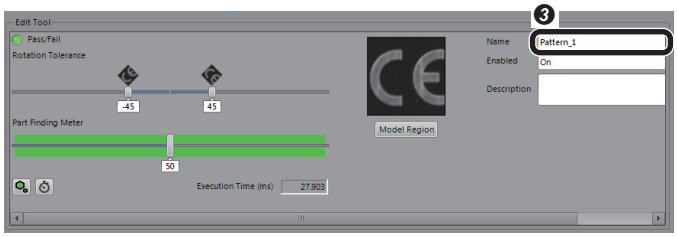
3. Set a tool.



❶ Click the [Locate Part] button.
❷ Select "Pattern".
❸ Click the [Add] button.

4. Set a model on the position to be detected.

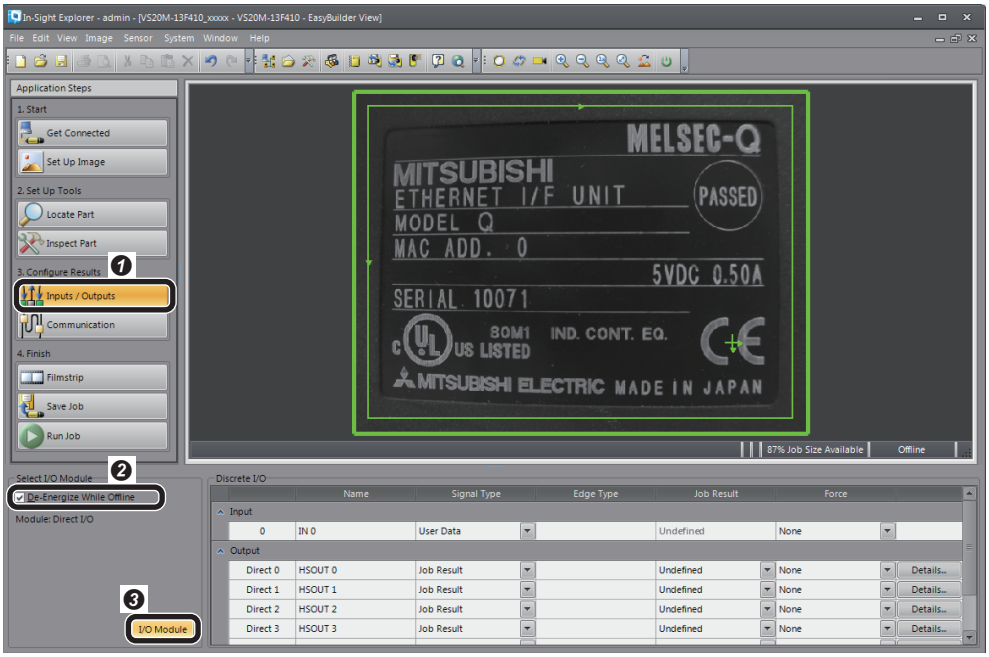




❶ Set a model. (CE mark is selected.)
❷ Click the [OK] button.
❸ Check that Name is "Pattern_1".

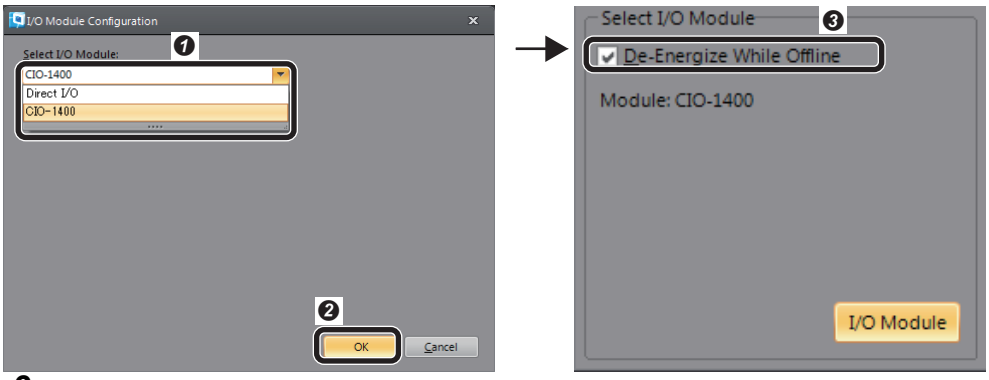
I/O settings

1. Set inputs and outputs (I/O connection).



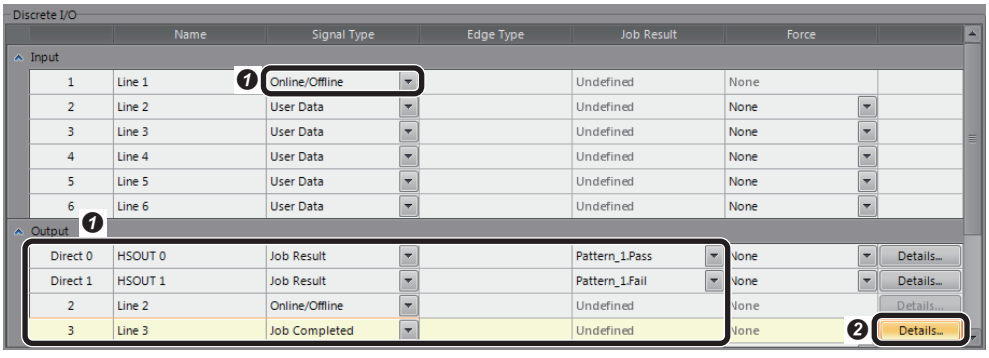
❶ Click the [Inputs/Outputs] button.
❷ Select "De-Energize While Offline".
❸ Click the [I/O Module] button.

2. Select an I/O module.



❶ Set "CIO-1400" in "Select I/O Module".
❷ Click the [OK] button.
❸ Check "De-Energize While Offline".

3. Set I/O signals.



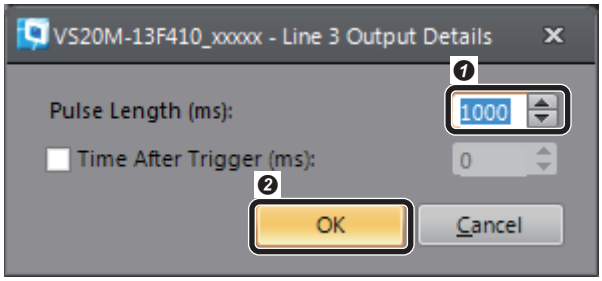
❶ Set inputs and outputs.
❷ Click the [Details] button in the row of '3'.

■Setting I/O signals

Input	Signal Type	Job Result
1	Online/Offline	Undefined

Output	Signal Type	Job Result
Direct 0	Job Result	Pattern_1.Pass
Direct 1	Job Result	Pattern_1.Fail
2	Online/Offline	Undefined
3	Job completion	Undefined

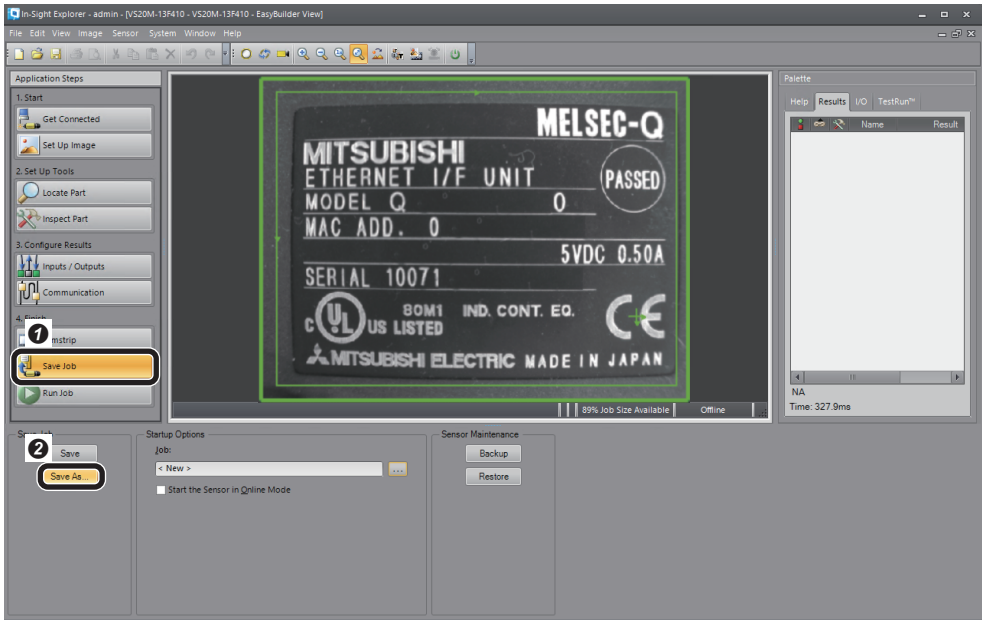
4. Set output details.



❶ Set "1000" (1 second) in pulse length.
❷ Click the [OK] button.

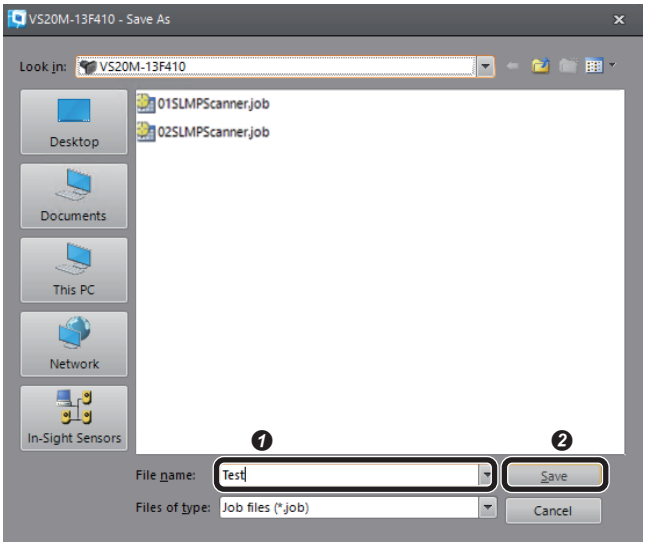
Saving the job

1. Name the created job and save it.



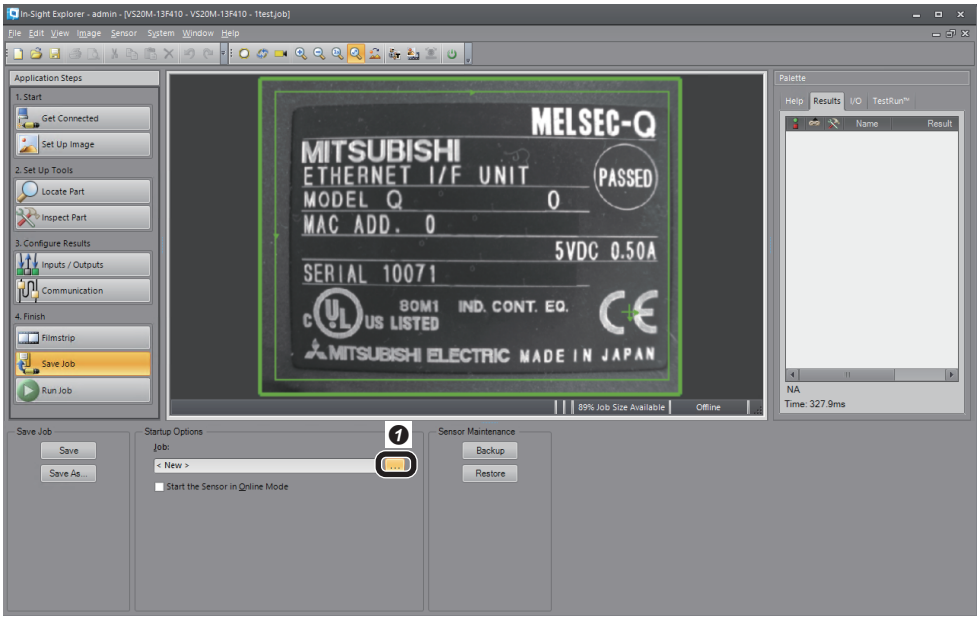
❶ Click the [Save Job] button.
❷ Click the [Save As] button.
Select the file name saved in "Startup Job" after saving the job.

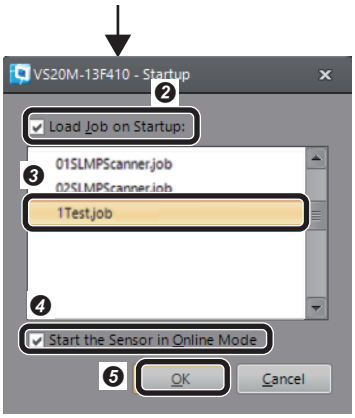
2. Enter a file name and save the job.



❶ Enter an arbitrary file name.
❷ Click the [Save] button.

3. Set startup options for the vision sensor.





❶ Click the [...] button under "Job".
❷Select the checkbox of "Load Job on Startup".
❸ Select the file name saved in step 2.
❹ Select the checkbox of "Start the Sensor in Online Mode".
❺ Click the [OK] button.

Restarting the vision sensor

Turn the power of the vision sensor OFF and ON to restart.

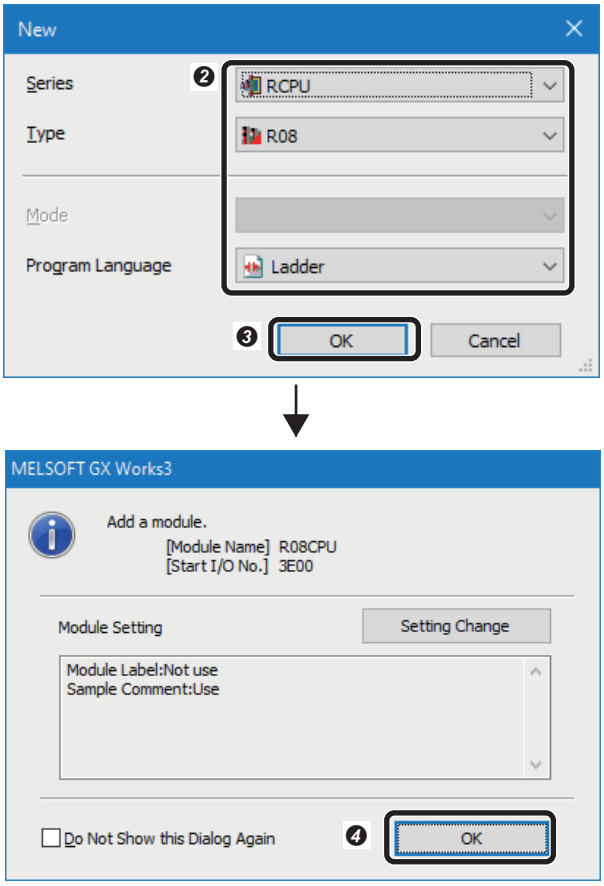
3.3 Setting a Programmable Controller

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

Setting a programmable controller

Set parameters of a programmable controller.

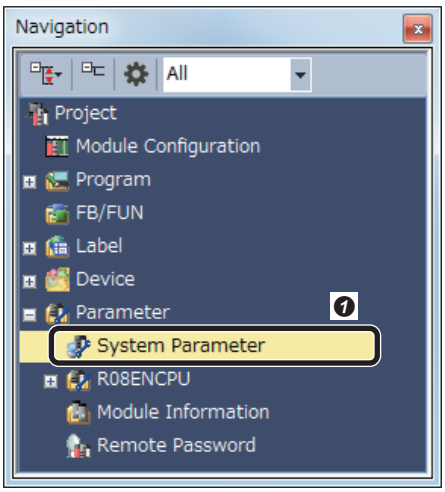
1. Start an engineering tool.
2. Select a CPU module and a program language in the "New" screen.

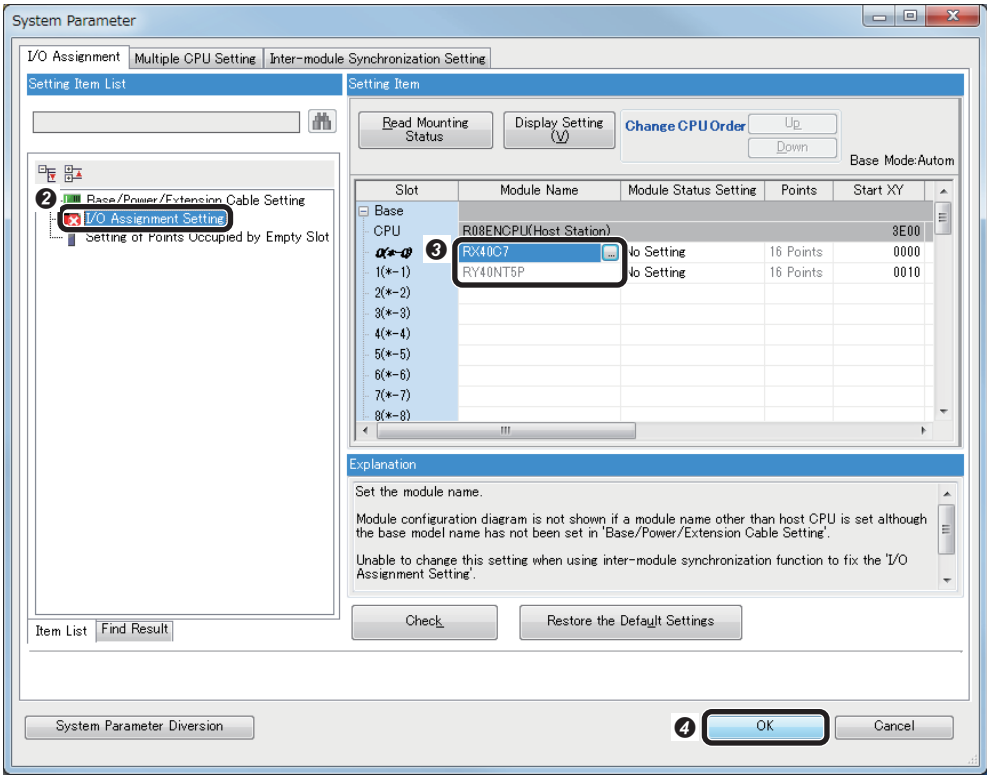


❶ Select [Project] ⇨ [New].
The "New" screen appears.
❷ Set a CPU module and a program language.
- Series: RCPU
- Type: R08
- Program Language: Ladder

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

3. Set the system parameter.





❶ Double-click [System Parameter] in the "Navigation" window to set input/output modules.
❷ Select [I/O Assignment Setting].
❸ Set "RX40C7" for slot 0 and "RY40NT5P" for slot 1.
❹ Click the [OK] button.

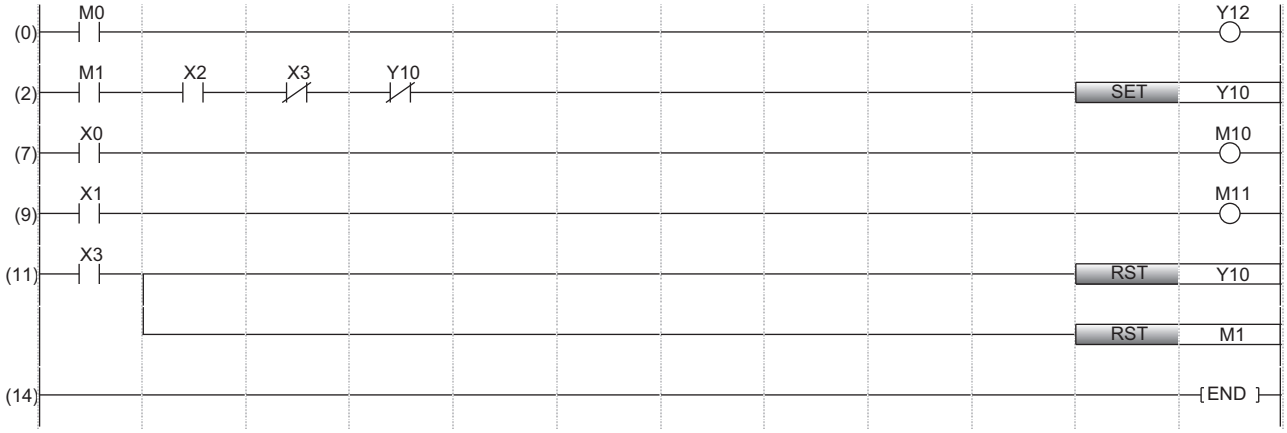
Creating a program

Create a program to control a vision sensor using I/O signals set in the vision sensor setup tool.

Devices used in the program

Signal	Signal name	Description	Remarks
X0	Pattern_1.Pass	This signal turns ON when the inspection target set in Pattern_1 is detected in the captured image. • ON: Pattern match • OFF: Pattern mismatch or capture not implemented	When the vision sensor is not in the online status, this signal turns OFF.
X1	Pattern_1.Fail	This signal turns ON when the inspection target set in Pattern_1 is detected in the captured image. • ON: Pattern mismatch • OFF: Pattern match or capture not implemented	When the vision sensor is not in the online status, this signal turns OFF.
X2	Online	This signal turns ON when a vision sensor is online. • ON: Online • OFF: Offline, or discrete online	—
X3	Job completion	This signal turns ON for the set time when the image capture processing is completed.	For the settings of ON time, refer to I/O settings. (☞ Page 78 I/O settings)
Y10	Trigger	When the trigger setting of the vision sensor is set to "Camera," an image capture is performed by turning this signal OFF and ON. To perform the image capture again, turn the signal ON and OFF, and then turn it OFF and ON.	It becomes enabled only when the vision sensor is online.
Y12	Online request	Turn this signal ON to change the vision sensor in discrete online status to online. Turn this signal OFF to change the vision sensor to discrete online status.	If the vision sensor is offline, it will not go online even if it is turned ON.
M0	Online command	'Online Request' (Y12) turns ON to make a vision sensor online while this signal is ON.	—
M1	Trigger directive	By turning this signal OFF and ON, 'Trigger' (Y10) is turned ON, and an image capture is performed.	—
M10	Pattern_1.Pass	This signal turns ON when the inspection target set in Pattern_1 is detected in the captured image. • ON: Pattern match • OFF: Pattern mismatch or capture not implemented	It becomes the same status as X0.
M11	Pattern_1.Fail	This signal turns ON when the inspection target set in Pattern_1 is detected in the captured image. • ON: Pattern match • OFF: Pattern mismatch or capture not implemented	It becomes the same status as X1.

Program example



(0): Enable a trigger on the vision sensor.

(2): Request the start of the image capture to the vision sensor. ('Trigger' (Y10) turns ON.)

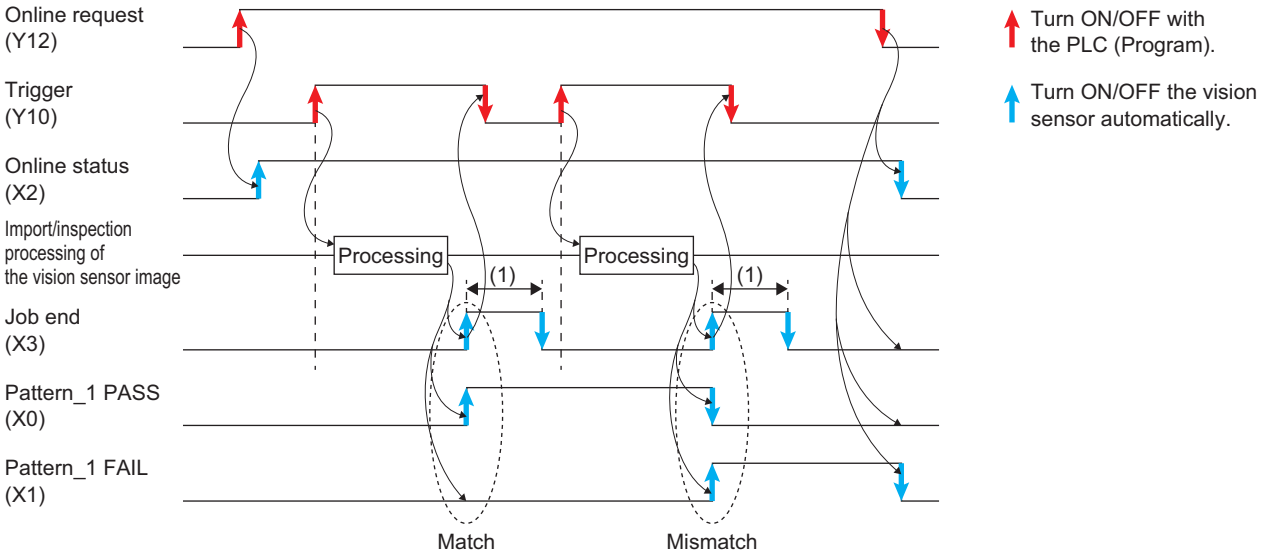
(7): "M0" turns ON when the inspection target set in Pattern_1 is detected in the captured image.

(9): "M1" turns ON when the inspection target set in Pattern_1 is not detected in the captured image.

(11): The processing for the completion of the image capture of the vision sensor is performed.

Timing chart of an I/O connection

The following shows a timing chart.



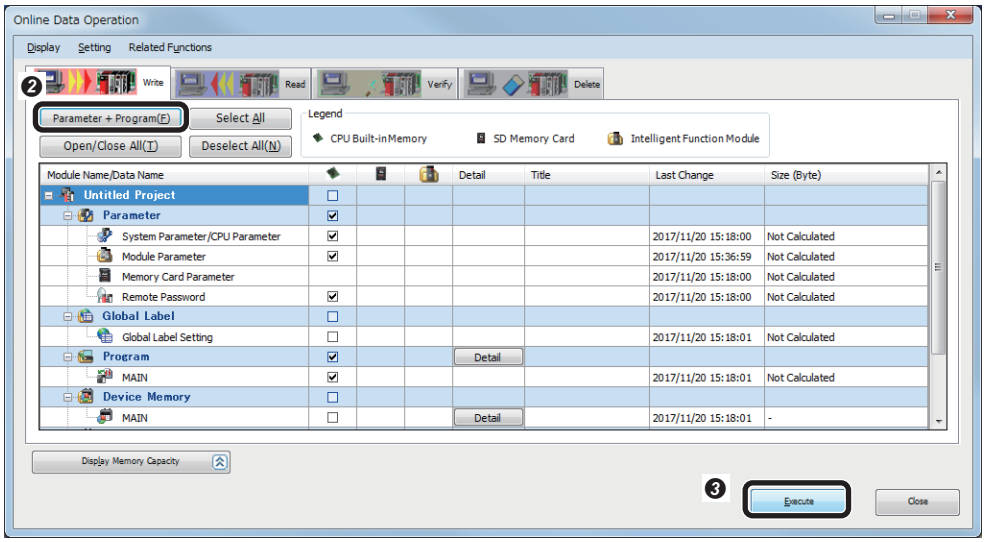
(1) The bit turns ON for one second (set time period).

3.4 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. Start 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

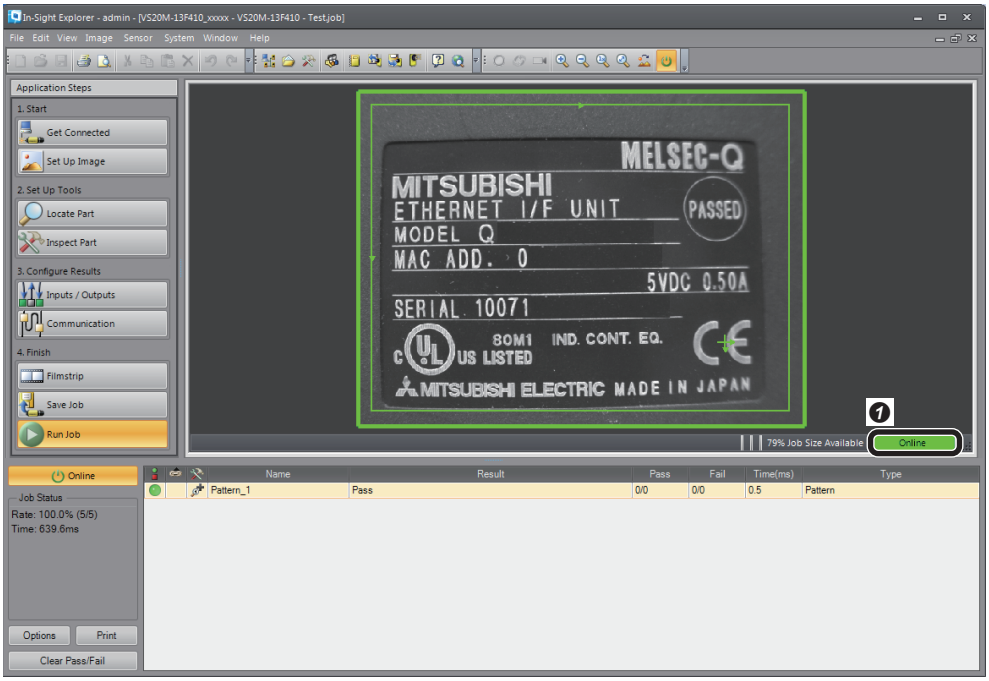
After writing the parameters and program, reset the programmable controller to RUN.

3.5 Checking Operations

Check the operation by controlling the vision sensor using the programmable controller.

Making the vision sensor online

Make the vision sensor online and start the communication with the programmable controller.

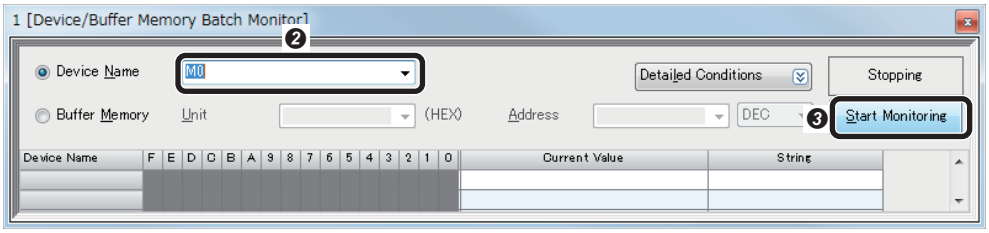


❶ Check that the operating status is "Online".

Enabling a trigger on the vision sensor

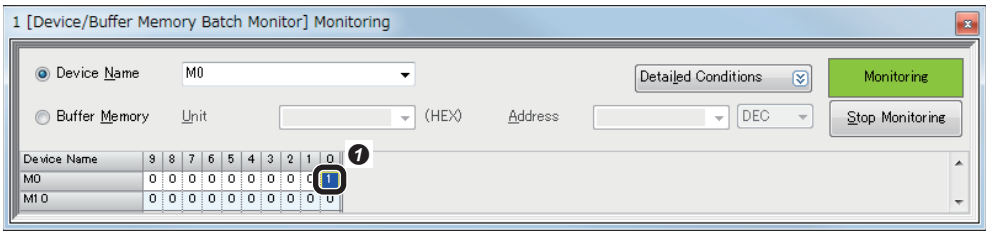
Enable a trigger on the vision sensor to acquire the inspection results.

1. Display device values.



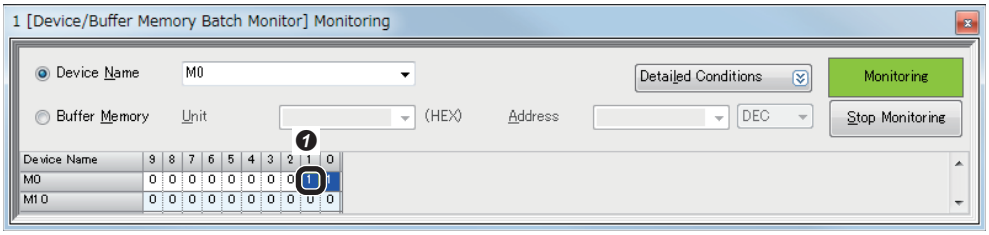
❶ Select [Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch Monitor] with an engineering tool.
The "Device/Buffer Memory Batch Monitor" window appears.
❷ Enter "M0" for "Device Name".
❸ Click the [Start Monitoring] button.

2. Make the vision sensor online.



❶ Turn "M0" ON to turn 'Online Request' (Y12) ON.

3. Trigger a device.

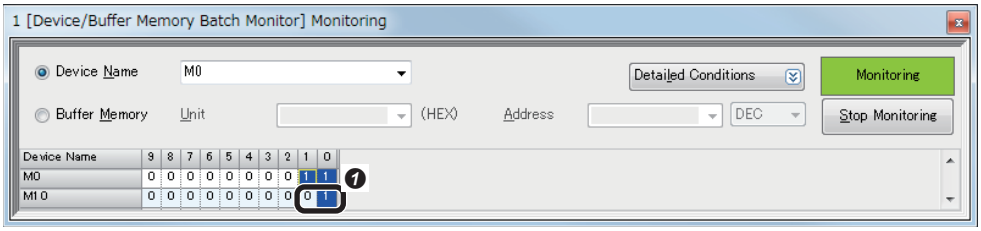


❶ Turn "M1" ON to turn 'Trigger' (Y10) ON.

Checking inspection results

Check the inspection results.

1. Check the inspection results.



❶ Check the following information.

- 'Pattern_1.Pass' (M10): This bit turns ON when the set inspection target is detected in the captured image.
- 'Pattern_1.Fail' (M11): This bit turns ON when the set inspection target is not detected in the captured image.

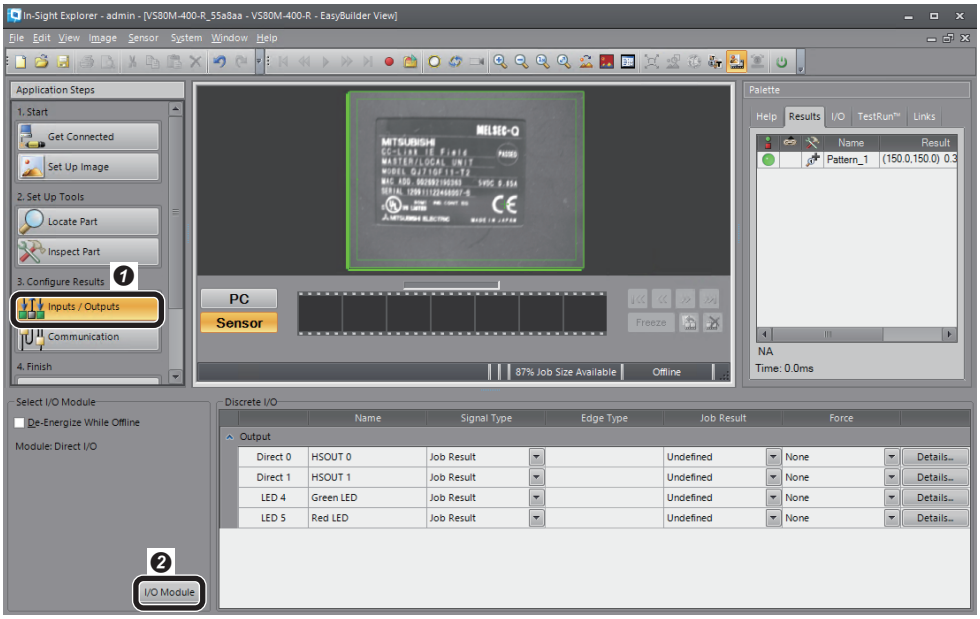
3.6 Using CIO-MICRO I/O module

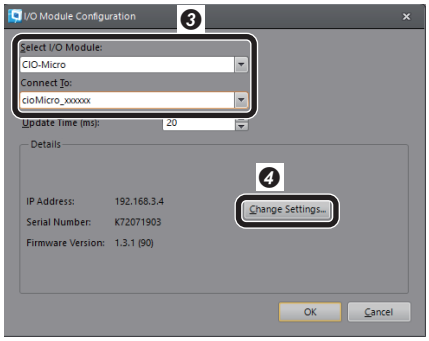
An IP address needs to be set to use a CIO-MICRO I/O module.
This section shows the procedure to set an IP address to a CIO-MICRO I/O module.

Point

For the vision sensors that can be connected to a CIO-MICRO I/O module, refer to the user's manuals of vision sensors.

1. Set inputs and outputs (I/O connection).

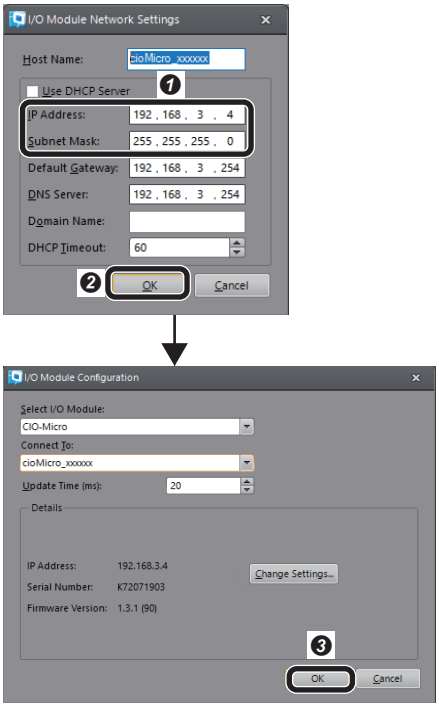




❶ Click the [Inputs/Outputs] button.
❷ Click the [I/O Module] button.
❸ Set items as follows.
- Select I/O Module: CIO-Micro
- Connect To: cioMicro_xxxxxx

❹ Select the [Change Settings] button.

2. Set the network of the I/O module.



❶ Set items as follows.
- IP Address: 192.168.3.4
- Subnet Mask: 255.255.255.0

❷ Click the [OK] button.

❸ Click the [OK] button.

3. Select the I/O module.

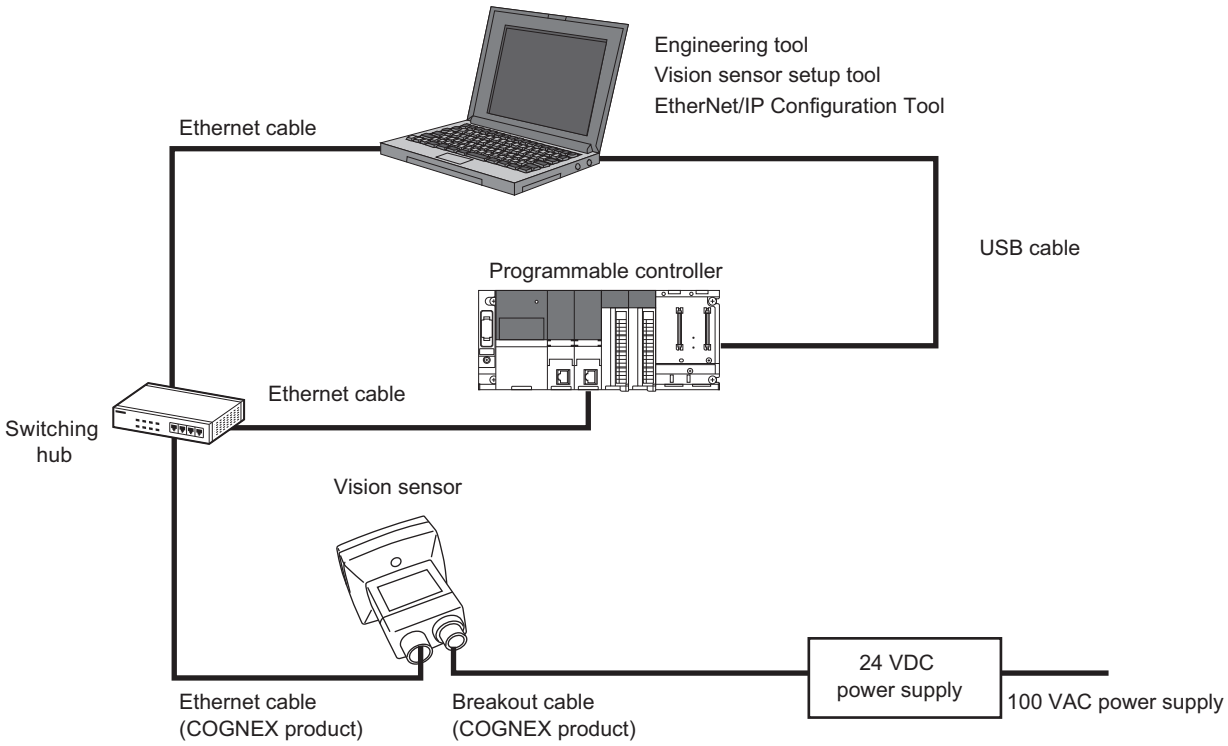
❶ Select the checkbox of [De-Energize While Offline].

4 EtherNet/IP CONNECTION

This chapter explains the procedure for connecting a vision sensor VS20 to a programmable controller and controlling the vision sensor with an EtherNet/IP connection.

4.1 System Configuration Example for Connecting a Vision Sensor

The following figure shows the system configuration for connecting a vision sensor.



Point

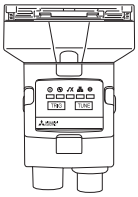
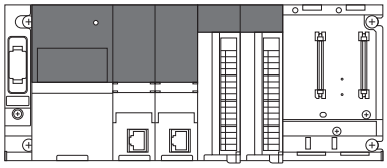
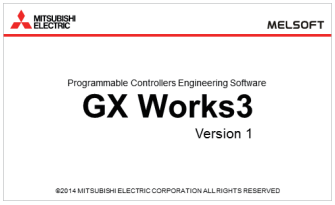
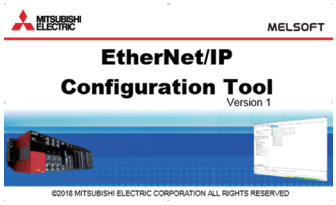
EtherNet/IP connection is available for other vision sensors (VS70 and VS80).
For details on the system configuration, refer to the user's manual of the vision sensor used.

Configurations

The devices used in the system configuration are as follows.

Required equipment

■ Mitsubishi Electric products

	
Vision sensor • VS20M-13F410	Programmable controller • Power supply: R62P • CPU module: R08CPU • Base: R35B • 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 vision sensor*1	Vision sensor setup tool • In-Sight Explorer*1	Ethernet cable	Breakout cable

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

■ Commercial products

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

Point

For available devices for the system configuration, refer to the user's manual of the vision sensor used.

Connection and wiring of a vision sensor

This section shows the procedure for connecting and wiring a vision sensor.

Operating procedure

1. Check that the 24 VDC power supply is OFF.
2. Connect an I/O wire or a serial wire of a breakout cable to an appropriate device (such as a programmable controller).
3. Connect the 24 VDC (red wire) and GND (black wire) of a breakout cable to the corresponding terminals on the power supply.
4. Connect the M12 connector of the breakout cable to the Power, I/O and RS-232 connector of the vision sensor.
5. Connect the Ethernet cable's M12 connector to the vision sensor's Ethernet connector.
6. Turn ON the 24 VDC power supply.

Precautions

- When connecting a vision sensor and a programmable controller, simultaneously turn ON the power of the vision sensor and programmable controller, or first turn ON the power of the programmable controller.
- Cut unused wires or protect them with insulating materials. Be careful not to short-circuit with 24 VDC wires.
- The cable is designed to connect with its key aligned with the keyway of the connector on the Vision Sensor. Do not force the connections or damage may occur.

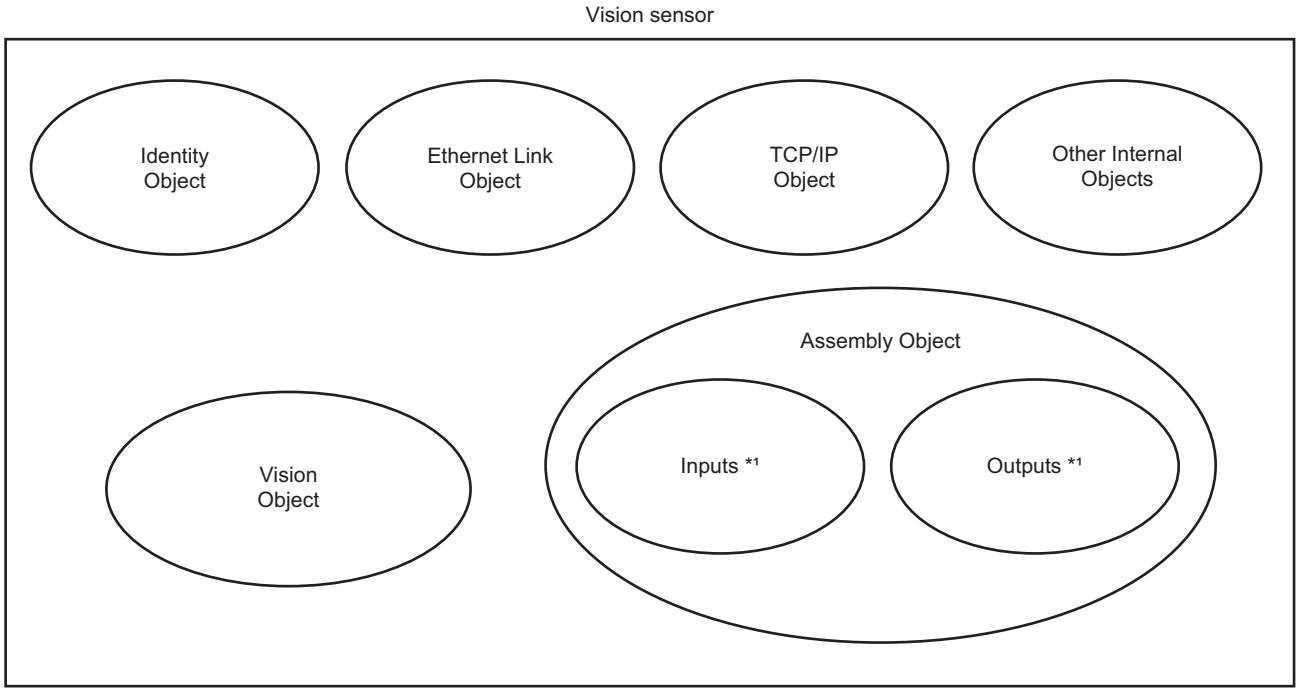
Point

For details on the connection with a vision sensor, refer to the user's manual of the vision sensor used.

4.2 Basic Operations for an EtherNet/IP Connection

Overview

An EtherNet/IP connection uses the following object model.
The Vision 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 97 Input/Output Assemblies used for cyclic (Implicit) communications

The Vision Object consists of attributes (data) and services (functions).
For details on attributes and services, refer to the help of vision sensor setup tool.

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 Vision 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 (vision sensor) when desired, and the device (vision sensor) that received the message sends a response.
Attributes can be accessed by using the services of the Vision 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 vision sensor.
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

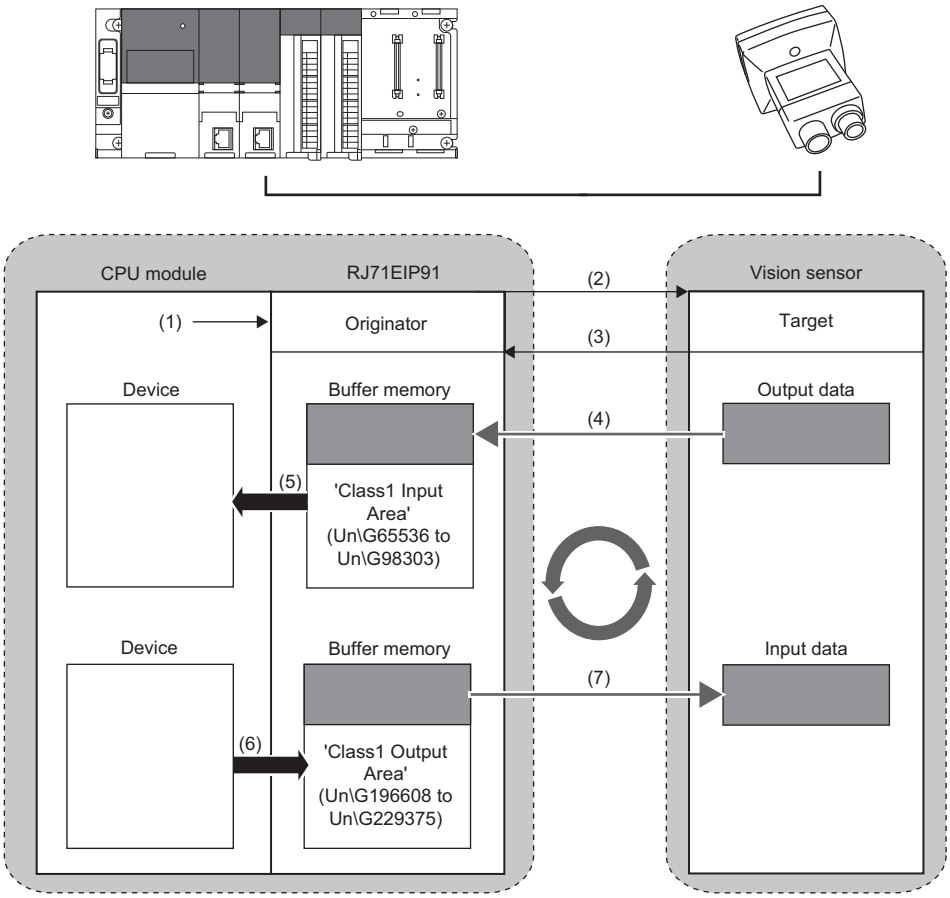
The Class 1 instance communications function of an EtherNet/IP network interface module (RJ71EIP91) is used for cyclic (Implicit) communications.

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 (vision sensor) 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 vision sensor; therefore, it is suitable for receiving measured data from inspection tools 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 the help of vision sensor setup tool.

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 vision sensor.
The instance 13 of the Input Assembly contains status information and inspection results.

■ Input Assembly list

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
13	0	Online	Offline Reason			Missed Acq	(Reserved)	Trigger Ack	Trigger Ready
	1	Error	Command Failed	Command Completed	Command Executing	Results Valid	Results Buffer Overrun	Inspection Completed	System Busy
	2	(Reserved)	(Reserved)	(Reserved)	Job Pass	Exposure Complete	(Reserved)	(Reserved)	Set User Data Ack
	3	SoftEvent Ack 7	SoftEvent Ack 6	SoftEvent Ack 5	SoftEvent Ack 4	SoftEvent Ack 3	SoftEvent Ack 2	SoftEvent Ack 1	SoftEvent Ack 0
	4	Error Code (16-bit integer)							
	5								
	6	(Reserved)							
	7								
	8	Current Job ID (16-bit integer)							
	9								
	10	Acquisition ID (16-bit integer)							
	11								
	12	Inspection ID (16-bit integer)							
	13								
	14	Inspection Result Code (16-bit integer)							
	15								
	16	Inspection Results 0							
	to	to							
	499	Inspection Results 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 vision sensor recognizes 'Trigger' is ON, and an image capturing trigger is received. Until 'Trigger' is turned OFF, the ON state for this bit is retained. • ON: An image capturing trigger is received. • OFF: —
	2	(Reserved)	—
	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	Offline Reason	This bit shows the cause of a vision sensor being offline by three bits. • 0: Online • 1: Job is being edited. • 2: Offline is set by a discrete signal. • 3: Offline is set by a predefined protocol.
	5		
	6		
	7	Online	This bit shows the online/offline status. When a vision sensor is offline, the reason is shown in the 'Offline Reason' field. • ON: Online • OFF: Offline
1	0	System Busy	This bit shows that a vision sensor is executing or loading a job, or responding to user inputs. • ON: System busy • OFF: —
	1	Inspection Completed	This bit is inverted every time when an inspection is completed and a series of inspection results ('Inspection ID,' 'Inspection Result Code,' 'Inspection Results,' and 'Job Pass') is sent to a programmable controller.
	2	Results Buffer Overrun	This bit shows that a vision sensor 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 Valid	This bit shows that a series of inspection results is available ('Inspection ID,' 'Inspection Result Code,' 'Inspection Results,' and 'Job Pass' fields contain valid data). Until 'Inspection Results Ack' responds, this bit remains ON. • ON: With new read results • OFF: Without new read results
	4	Command Executing	This bit shows that job load is executed. • ON: Job load is being executed. • OFF: —
	5	Command Completed	This bit is turned ON when job load is completed. When a job load command is not completed properly, 'Command Failed' is also turned ON. • ON: Job load is completed. • OFF: —
	6	Command Failed	This bit is turned ON when job load is not completed properly. It is turned OFF when a new job is loaded by a programmable controller. When changing a job by using the vision sensor setup tool, this bit is not changed. • ON: Job load is failed. • OFF: —
	7	Error	This bit is turned ON when an error occurred. • ON: Error occurred. • OFF: —

Byte	Bit	Data name	Description (Application)
2	0	Set User Data Ack	This bit is turned ON when 'Set User Data' command execution is completed. • ON: 'Set User Data' command execution is completed. • OFF: —
	1	(Reserved)	—
	2	(Reserved)	—
	3	Exposure Complete	This bit is turned ON when an exposure for a vision sensor is completed. It is turned OFF by 'Clear Exposure Complete.' When 'Clear Exposure Complete' is set to ON, the OFF state of this bit is retained. • ON: Exposure is completed. • OFF: —
	4	Job Pass	This bit is turned ON when the latest job is passed. It is turned OFF when a job is failed. • ON: Inspection result is passed. • OFF: —
	5	(Reserved)	—
	6	(Reserved)	—
	7	(Reserved)	—
3	0	Soft Event Ack	This bit shows that a vision sensor received a soft event command.
	1		
	2		
	3		
	4		
	5		
	6		
	7		

Byte	Data name	Description (Application)
4	Error Code (16-bit integer)	This shows an error occurred in 16-bit integer. • 0x0000: No error • 0x0100: An image capturing trigger is generated when the image capturing trigger is disabled. • 0x0101: An image capturing trigger is generated when a vision sensor is offline. • 0x0400: Another command execution command is generated when a command is being executed. • 0x0401: Job load is requested when a vision sensor is online. • 0x0402: Job ID that does not exist is specified in the 'Command' field for the execution.
5		
6	(Reserved)	—
7		
8	Current Job ID (16-bit integer)	Job ID of a job being executed is stored. If no job ID is specified for the job, '65535 (0xFFFF)' is stored.
9		
10	Acquisition ID (16-bit integer)	Image capturing ID associated with the image capturing is stored. This can be used to synchronize image capturing and inspection results.
11		
12	Inspection ID (16-bit integer)	Inspection ID associated with a series of inspection results ('Inspection ID,' 'Inspection Result Code,' 'Inspection Results,' and 'Job Pass') is stored.
13		
14	Inspection Result Code (16-bit integer)	Any inspection result code specified for "Result code" of the WriteResultsBuffer function in the vision sensor setup tool (spreadsheet) is stored.
15		
16	Inspection Results 0	The data defined in the [Format Output Data] tab of a communication setting with the vision sensor setup tool is stored.
to	to	
499	Inspection Results 483	

Output Assembly

The Output Assembly is output signals for a programmable controller to control a vision sensor.
The instance 22 of the Output Assembly contains control signals, software event signals, and any user data required for the trigger and inspection.

■ Output Assembly list

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
22	0	Set Offline	(Reserved)		Execute Command	Inspection Results Ack	Buffer Results Enable	Trigger	Trigger Enable
	1	(Reserved)							
	2	(Reserved)				Clear Exposure Complete	Clear Error	(Reserved)	Set User Data
	3	SoftEvent 7	SoftEvent 6	SoftEvent 5	SoftEvent 4	SoftEvent 3	SoftEvent 2	SoftEvent 1	SoftEvent 0
	4	Command							
	5								
	6	(Reserved)							
	7								
	8	User Data 0							
	to	to							
	495	User Data 487							

■ Details on the Output Assembly

Byte	Bit	Data name	Description (Application)
0	0	Trigger Enable	To enable an image capturing trigger by 'Trigger.' • ON: An image capturing trigger is enabled. • OFF: An image capturing trigger is disabled.
	1	Trigger	To start (trigger) image capturing. • ON: Image capturing is started. • OFF: — The following conditions must be satisfied to start image capturing properly: • "Industrial Ethernet" is selected in the [Set Up Image] ⇨ [Trigger] tab in the vision sensor setup tool. (☞ Page 105 Creating a new job) • The vision sensor is online. • 'Trigger Enable' and 'Trigger Ready' are turned ON.
	2	Buffer Results Enable	To enable the buffer for read results. New read results are stored in the buffer queue of a vision sensor. To acquire the next read results, turn ON 'Inspection Results Ack'. • ON: The buffer for read results is enabled. • OFF: The buffer for read results is disabled.
	3	Inspection Results Ack	To respond to receiving the latest read results. A vision sensor turns 'Results Valid' 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	Execute Command	To load a job of the job ID specified to 'Command.' Until 'Command Completed' is turned ON, the ON state for this bit must be retained. • ON: Job load is executed. • OFF: — The following conditions must be satisfied to start job load properly: • A vision sensor is set to offline by 'Set Offline.' • A job of the job ID specified to 'Command' exists.
	5	(Reserved)	—
	6	(Reserved)	—
	7	Set Offline	To make a vision sensor offline while this bit is ON. • ON: A vision sensor is set to offline. • OFF: —

Byte	Bit	Data name	Description (Application)
1	0	(Reserved)	—
	1		
	2		
	3		
	4		
	5		
	6		
	7		
2	0	Set User Data	To notify a vision sensor that the 'User Data' field was updated. A vision sensor updates data defined in the [Format Input Data] tab of a communication setting with the vision sensor setup tool when this bit is turned ON. • ON: 'User Data' field update is notified. • OFF: —
	1	(Reserved)	—
	2	Clear Error	To clear an error and error code signal. When multiple errors occur, the next error and error code are set by turning this bit OFF. ON: Error clear is executed. OFF: —
	3	Clear Exposure Complete	To turn 'Exposure Complete' OFF. 'Exposure Complete' does not turn ON while this bit is ON. • ON: Exposure completion is cleared. • OFF: —
	4	(Reserved)	—
	5	(Reserved)	—
	6	(Reserved)	—
	7	(Reserved)	—
3	0	SoftEvent	To enable a soft event trigger in a spreadsheet. A related software event in a spreadsheet is executed by turning this bit ON.
	1		
	2		
	3		
	4		
	5		
	6		
	7		

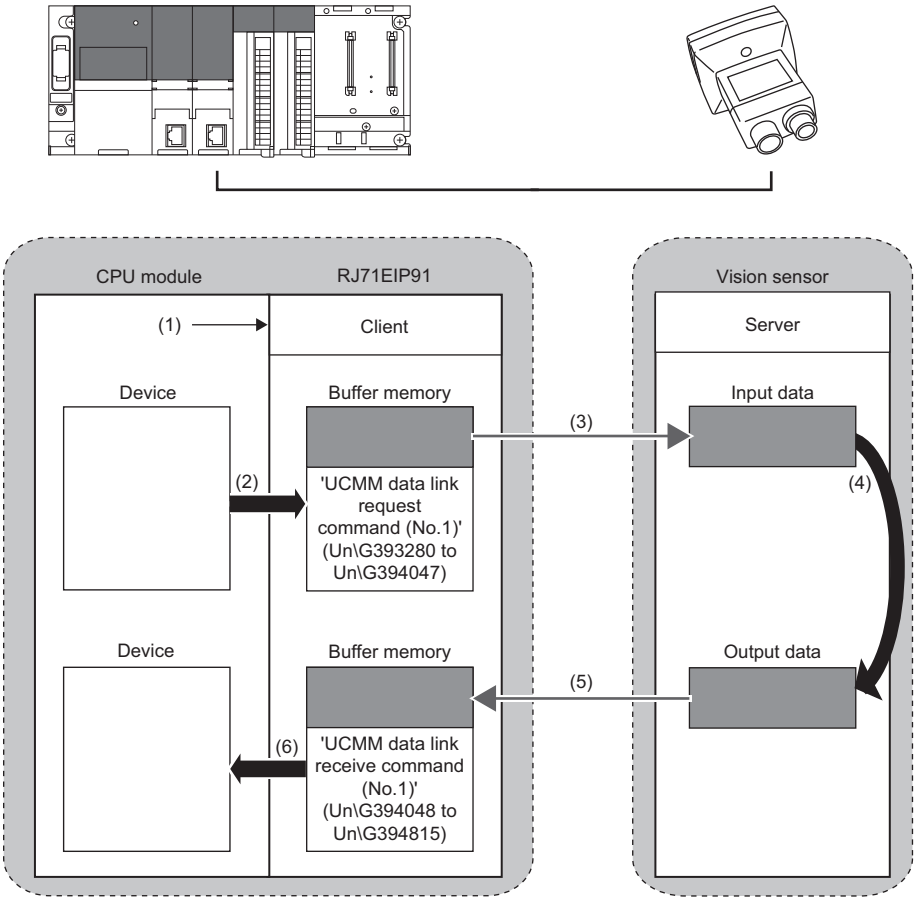
Byte	Data name	Description (Application)
4	Command	To specify job IDs (0 to 999).
5		
6	(Reserved)	—
7		
8	User Data 0	Data buffer to transfer data from a programmable controller to a vision sensor. This can be used for the following application: • To update the data defined in the [Format Input Data] tab of a communication setting with the vision sensor setup tool: Store data to be updated in the data format defined in the [Format Input Data] tab.
to	to	
495	User Data 487	

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 vision sensor, and the vision sensor that received the message sends a response.

Unlike cyclic (Implicit) communications, data communications are performed without establishing a connection between an RJ71EIP91 and a vision sensor; 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.

4.3 Setting the Vision Sensor

Start the vision sensor setup tool to set the vision sensor.

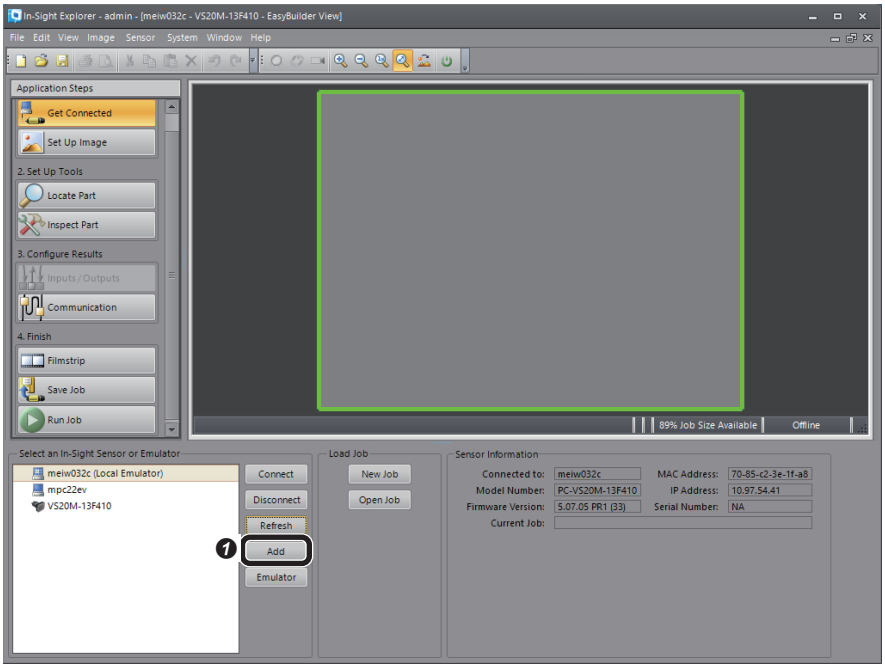
Setting an IP address to a personal computer

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

Connecting the vision sensor

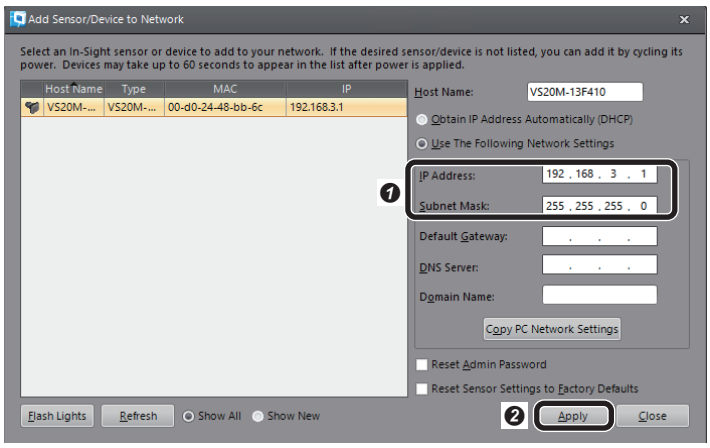
Start the vision sensor setup tool to set the vision sensor.

1. Start the vision sensor setup tool.



❶ Click the [Add] button.

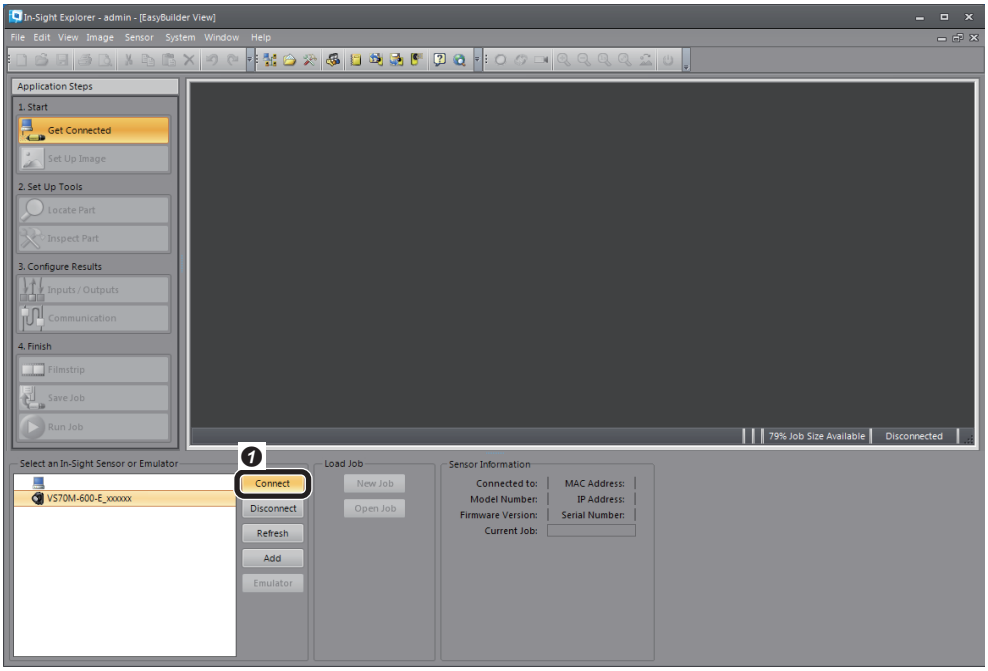
2. Add the vision sensor to the network.



❶ Add the vision sensor to the network.
- IP Address: 192.168.3.1
- Subnet Mask: 255.255.255.0

❷ Click the [Apply] button.

3. Connect to the vision sensor.

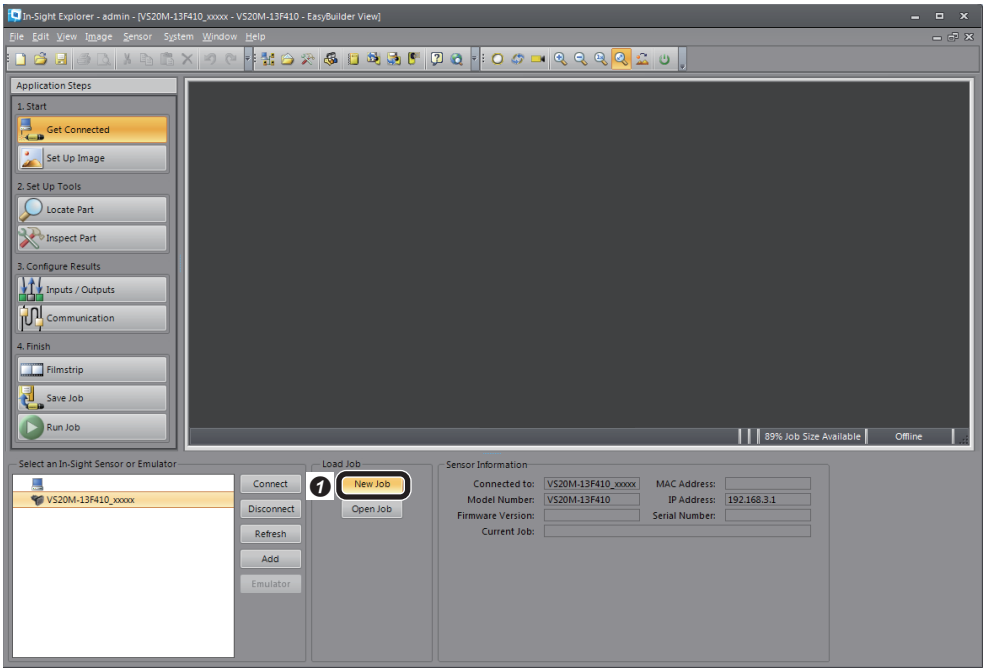


❶ Click the [Connect] button to connect to the vision sensor.

Creating a new job

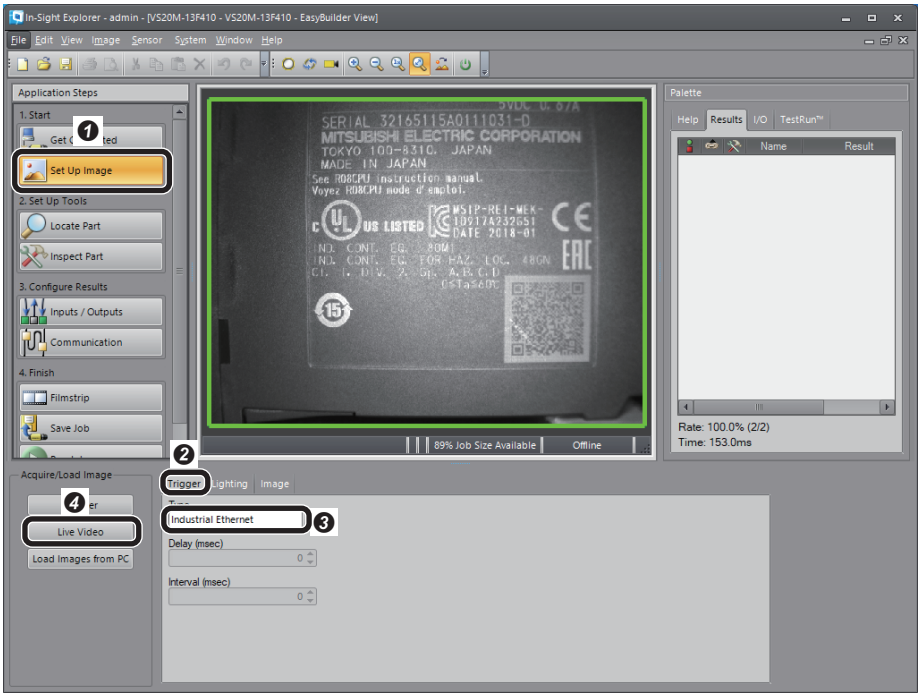
As an example, set a CE mark for inspection target.

1. Create a new job.



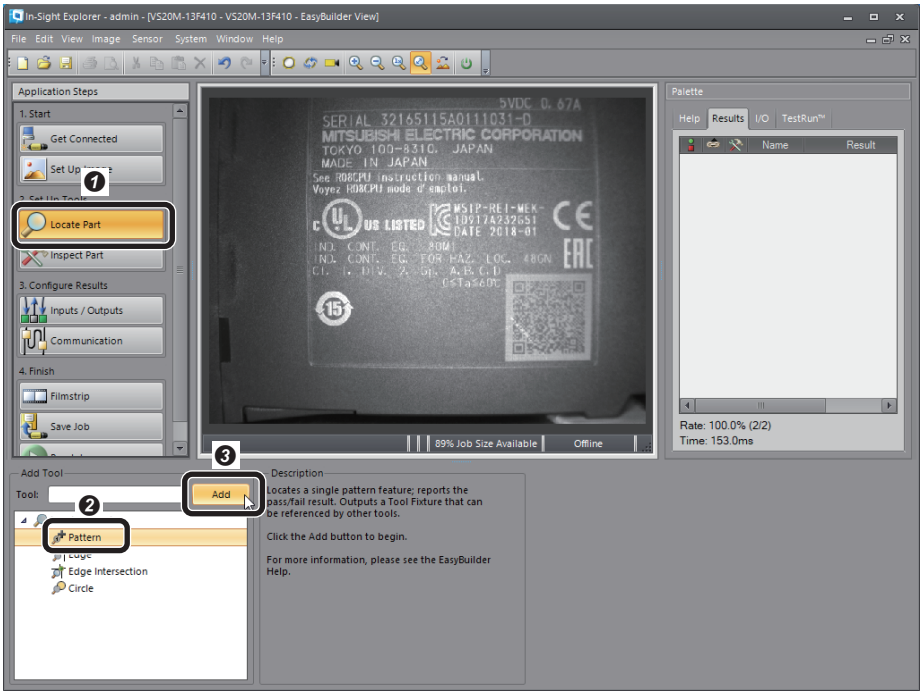
❶ Click the [New Job] button.

2. Adjust so that the lens captures an inspection target in [Set Up Image], and configure the settings to acquire the image.



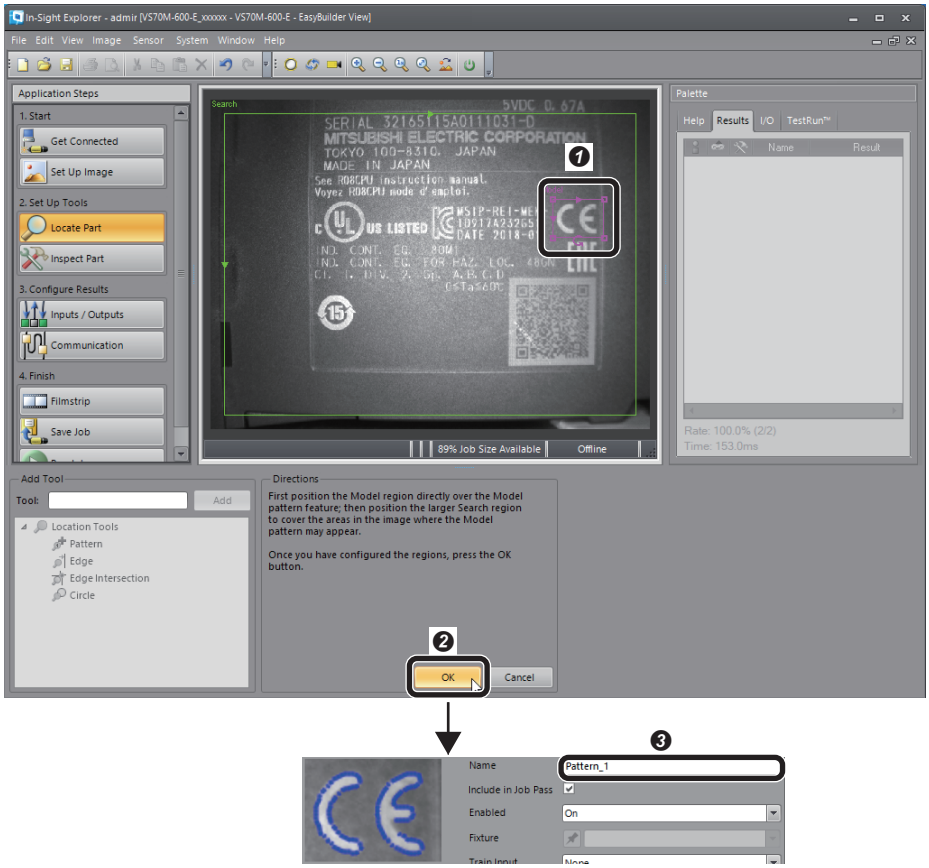
❶ Click the [Set Up Image] button.
❷ Select the [Trigger] tab.
❸ Select "Industrial Ethernet."
❹ Click the [Live Video] button to adjust the image. After adjusting the image, click the [Live Video] button again.

3. Set a tool.



❶ Click the [Locate Part] button.
❷ Select "Pattern."
❸ Click the [Add] button.

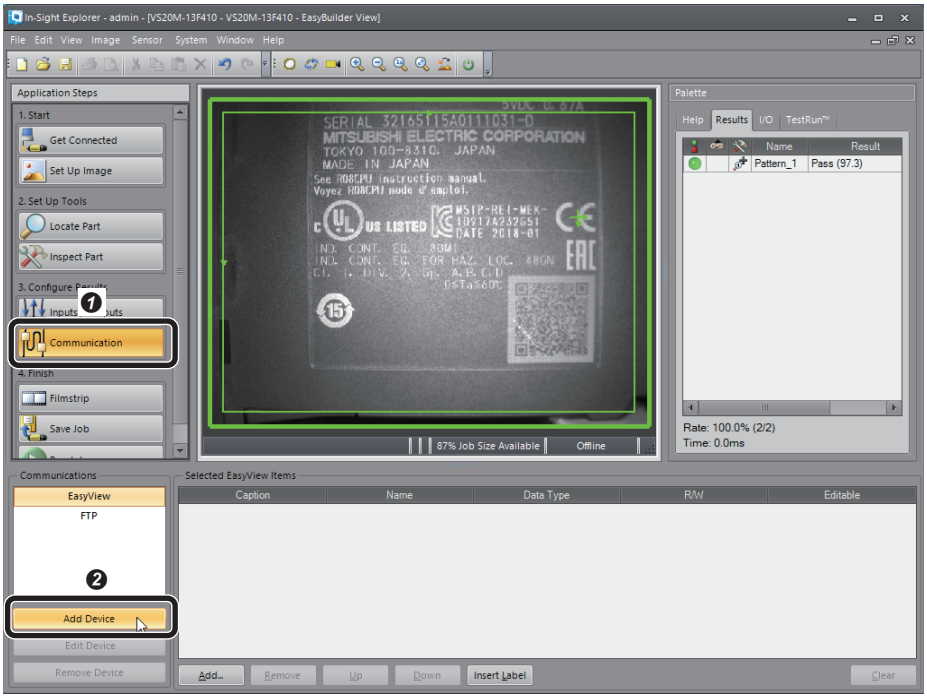
4. Set a model on the position to be detected.



❶ Set a model. (CE mark is selected.)
❷ Click the [OK] button.
❸ Check that Name is "Pattern_1."

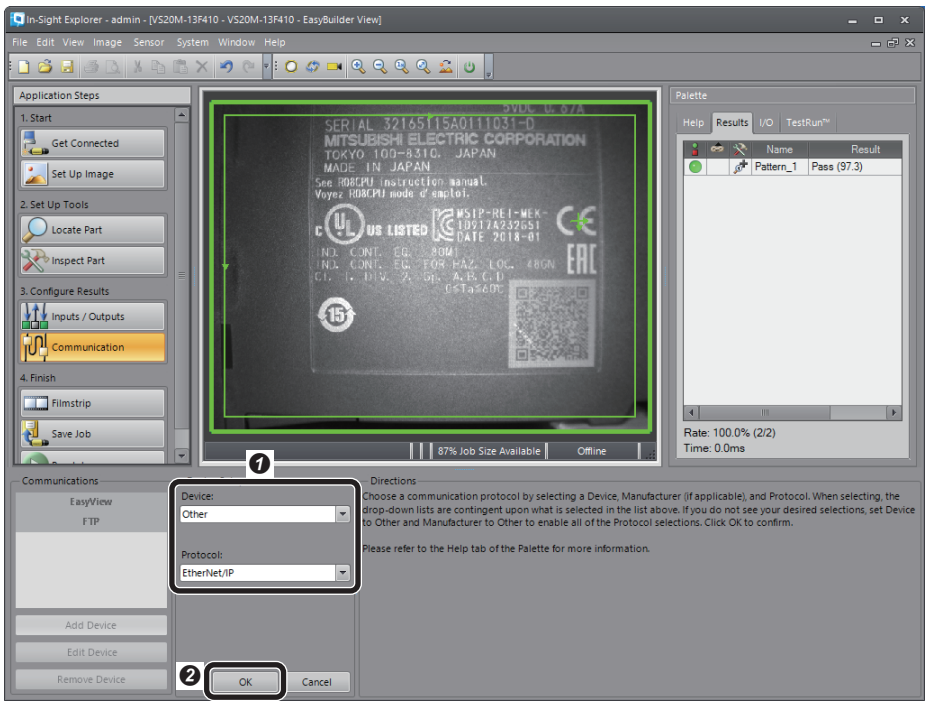
Configuring a communication setting

1. Configure the communication setting (EtherNet/IP).

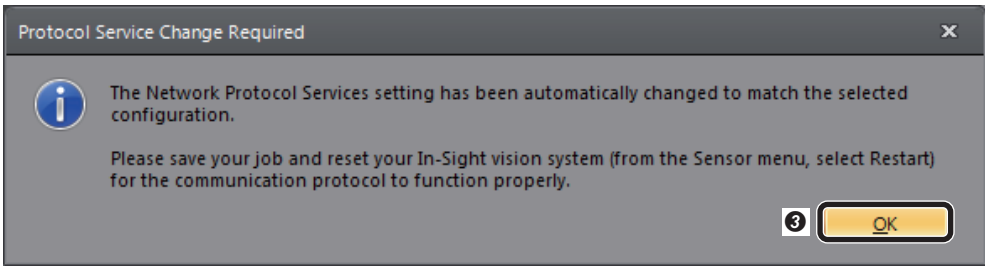


❶ Click the [Communication] button.
❷ Click the [Add Device] button.

2. Add the EtherNet/IP.



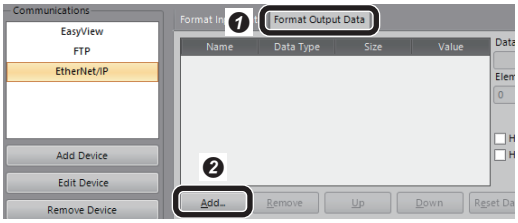
❶ Configure a device setting.
• Device: Other
• Protocol: EtherNet/IP
❷ Click the [OK] button.
When the message "Protocol Service Change Required" appears, click the [OK] button.



Outputting to the programmable controller

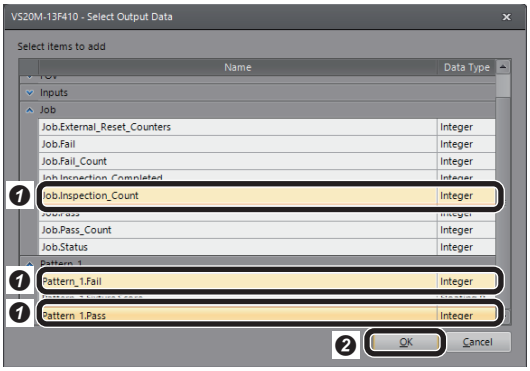
As an example, set PASS, FAIL, and the number of inspections to the output data.

1. Set data to be output from the vision sensor to the programmable controller.



❶ Select the [Format Output Data] tab.
❷ Click the [Add] button.

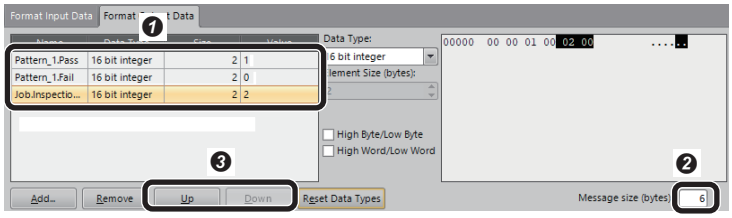
2. Select the data to be output to the programmable controller.



❶ Select the following data.
- Pattern_1.Pass
- Pattern_1.Fail
- Job.Inspection_Count

❷ Click the [OK] button.

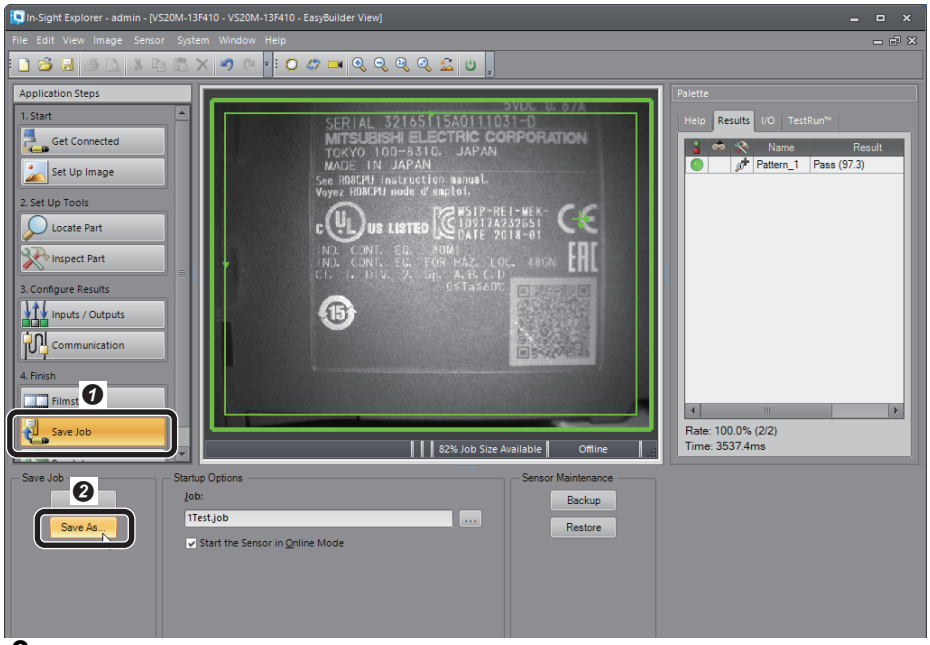
3. The output result to the programmable controller is displayed.



❶ Output data to the programmable controller
❷ Message size (bytes): 6
❸ The order to output can be changed by using the [Up] and [Down] buttons. As an example, sort as above.
- Pattern_1.Pass
- Pattern_1.Fail
- Job.Inspection_Count

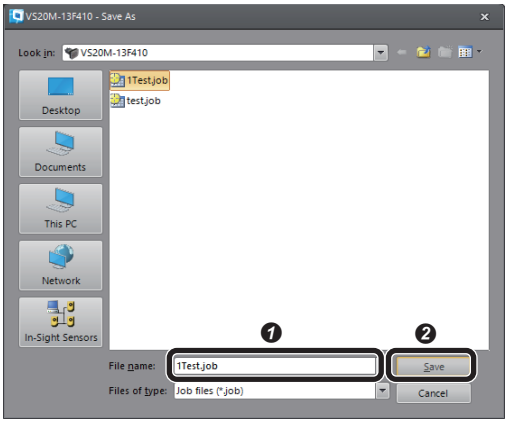
Saving the job

1. Name the created job.



❶ Click the [Save Job] button.
❷ Click the [Save As] button.

2. Enter a file name and save the job.

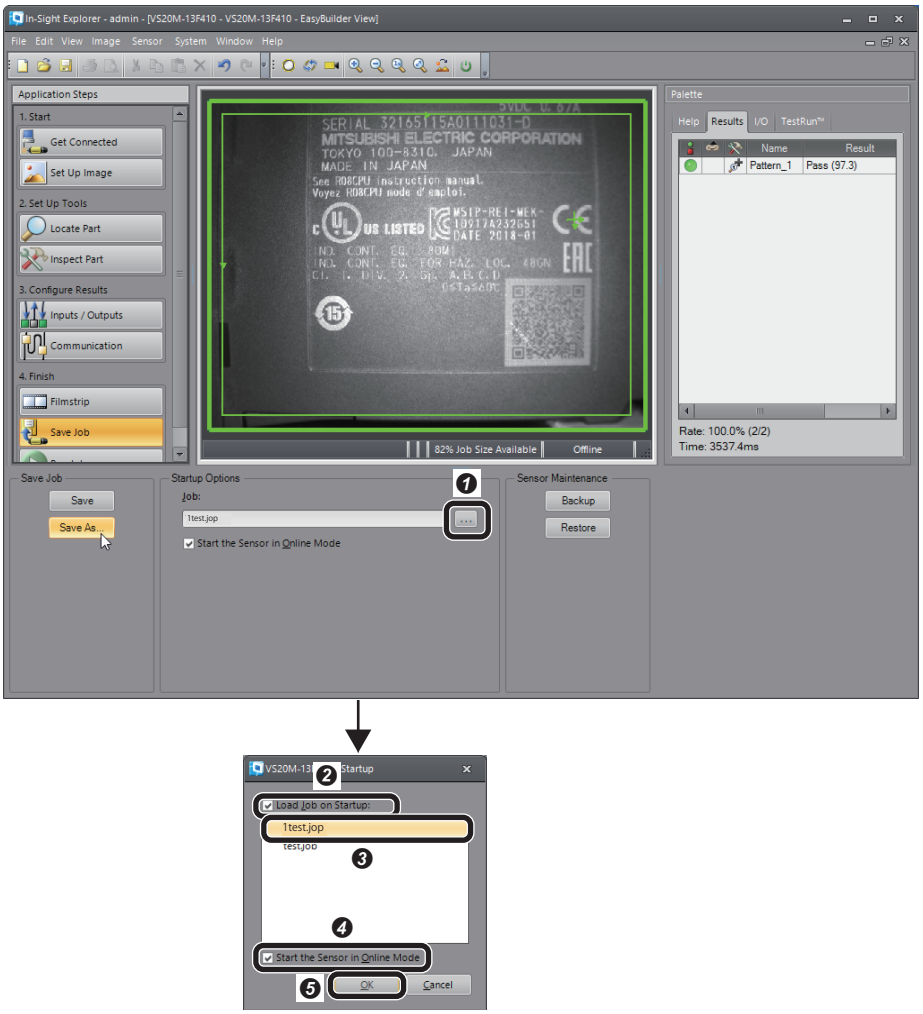


❶ Enter an arbitrary file name.
❷ Click the [Save] button.

Point

The running job can be changed (loaded) to another job by prefixing a numeric value to a file name.
For the procedure to change jobs, refer to the following section.
☞ Page 135 Changing jobs (loading another job)

3. Set startup options for the vision sensor.



❶ Click the [...] button under "Job."
❷Select the checkbox of "Load Job on Startup."
❸ Select the file name saved in step 2.
❹ Select the checkbox of "Start the Sensor in Online Mode."
❺ Click the [OK] button.

Restarting the vision sensor

Turn the power of the vision sensor OFF and ON to restart.

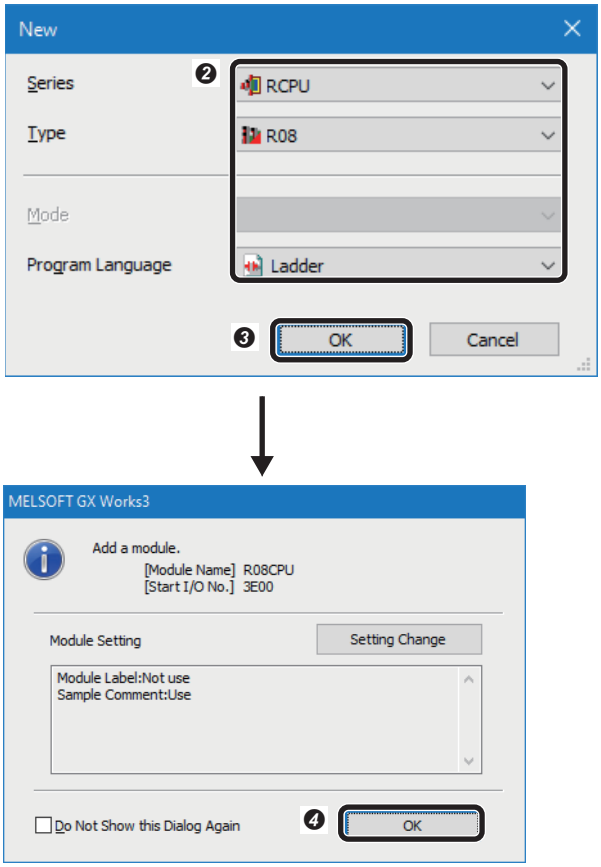
4.4 Setting a Programmable Controller

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

Setting a programmable controller

Set parameters of a programmable controller.

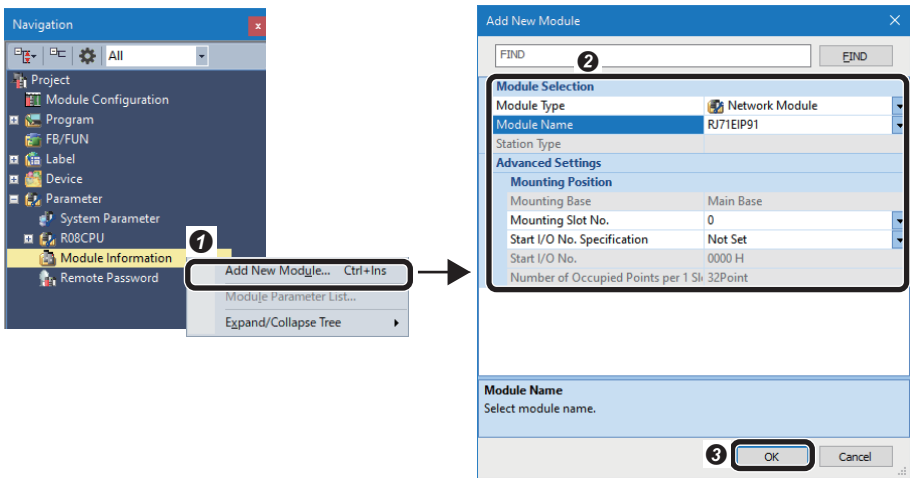
1. Start an engineering tool.
2. Select a CPU module and a program language in the "New" screen.



❶ Select [Project] ⇨ [New].
The "New" screen appears.
❷ Set a CPU module and a program language.
- Series: RCPU
- Type: R08
- Program Language: Ladder

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

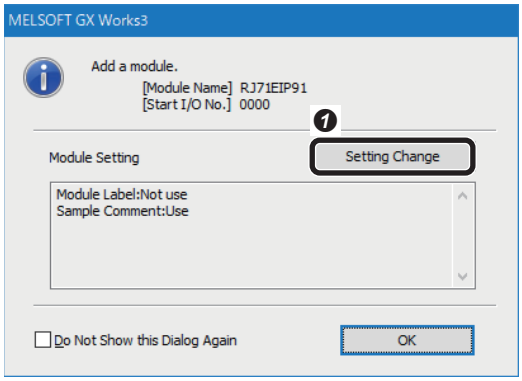
3. Add a network module in the "Add New Module" screen.



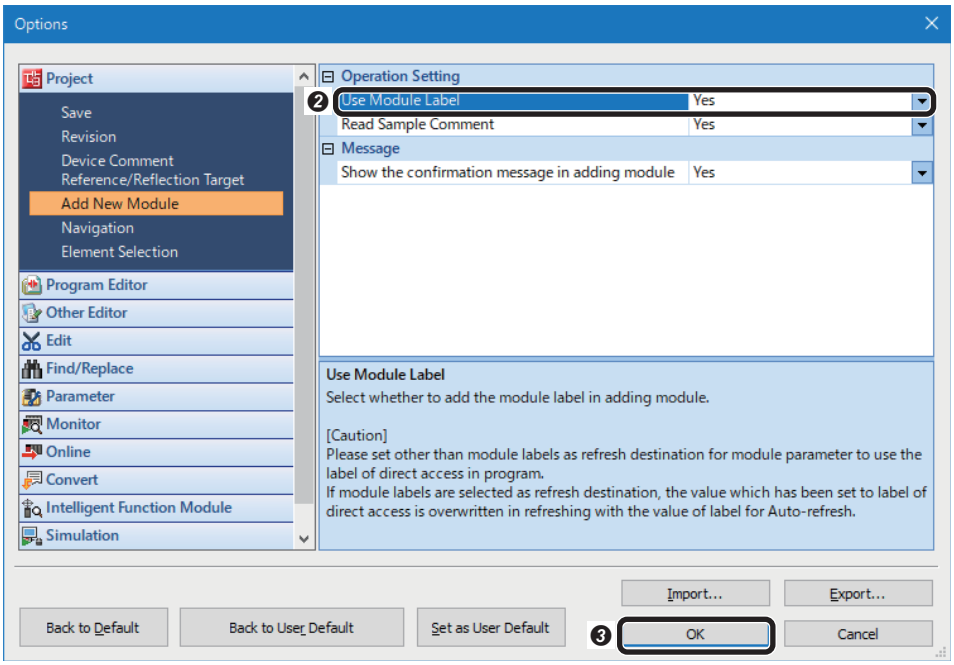
❶ Right-click "Module Information" in the "Navigation" window, and select [Add New Module] in the shortcut menu.
❷ Set the items in "Module Selection."
- Module Type: Network Module
- Module Name: RJ71EIP91
- Mounting Slot No.: 0
- Start I/O No. Specification: Not Set

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.

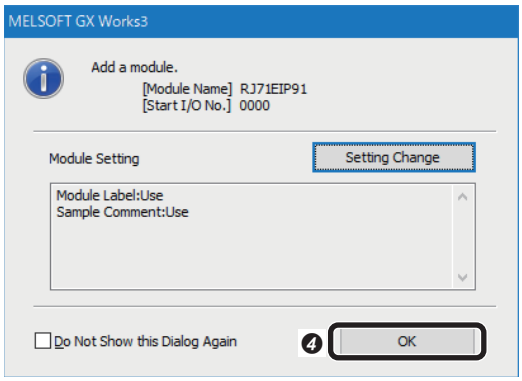
4. Set to use module labels.



❶ Click the [Setting Change] button.

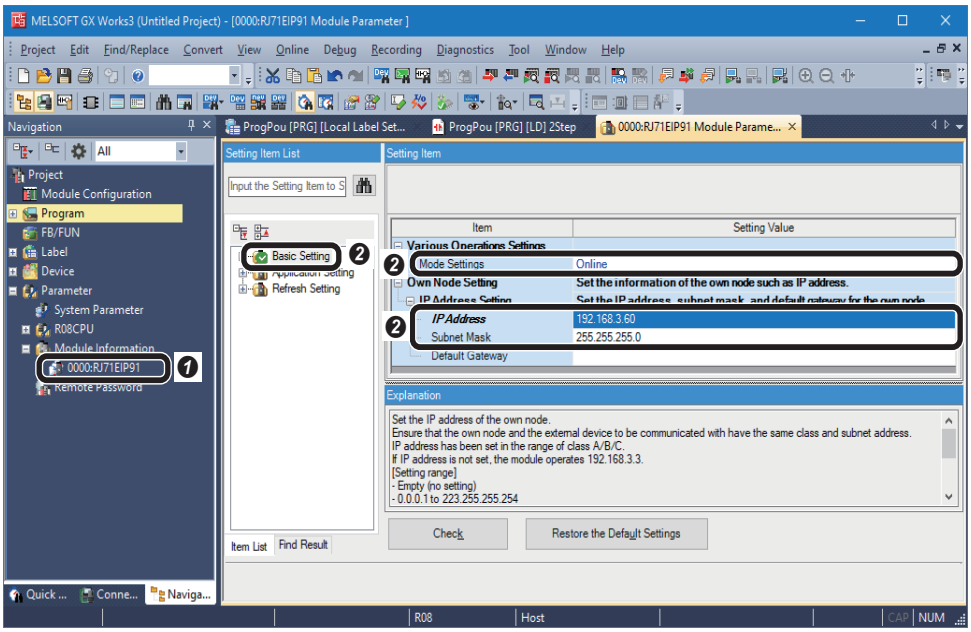


❷ Select "Yes" for "Use Module Label."
❸ Click the [OK] button.

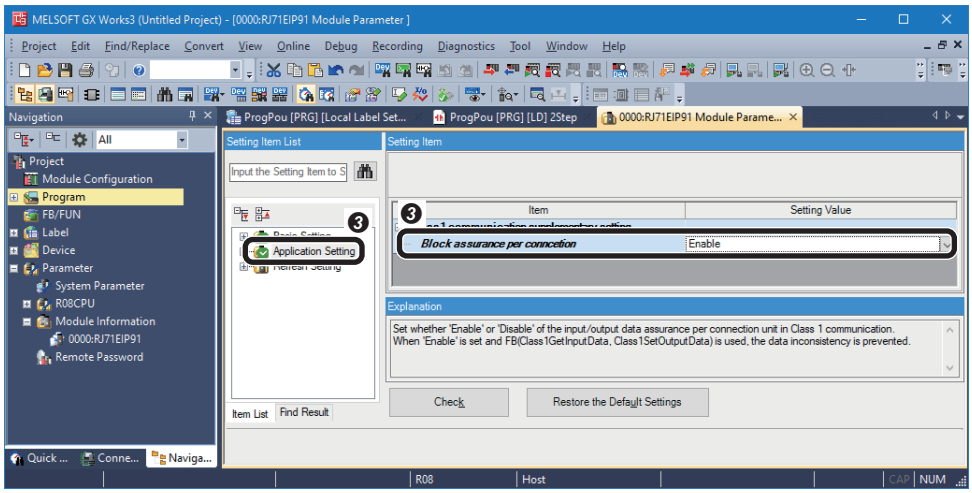


❹ Click the [OK] button.

5. Set module parameters of the network module.



❶ Double-click the module name (RJ71EIP91) in the "Navigation" window.
❷ Select "Basic Setting," and set "Mode Settings," "IP Address," and "Subnet Mask."
- Mode Settings: Online
- 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 Network Interface Module 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 129 Writing to the programmable controller)

Configuring communication settings in EtherNet/IP Configuration Tool

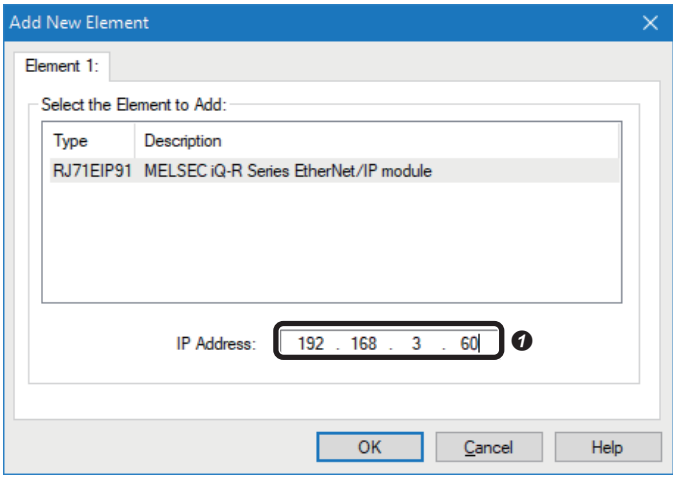
For cyclic (Implicit) communications, use EtherNet/IP Configuration Tool to set the EtherNet/IP network configuration and the trigger type, RPI, etc. for each connection in an EtherNet/IP network interface module (RJ71EIP91).

Point

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

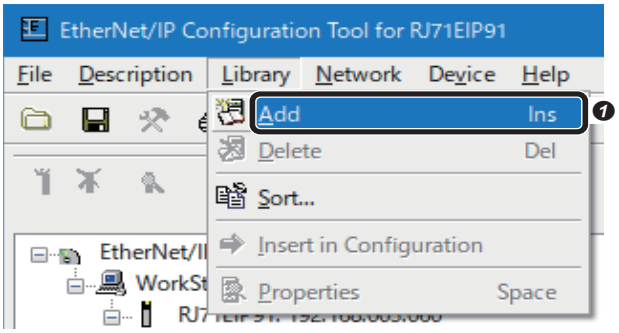
Communication settings for an EtherNet/IP connection

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

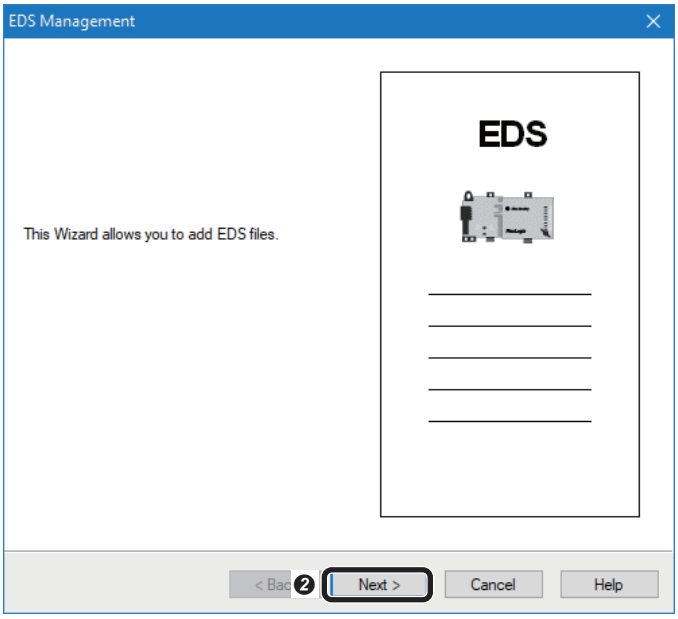


❶ In the "Add New Element" window, enter the IP address (192.168.3.60) that is set for an RJ71EIP91 in an engineering tool.

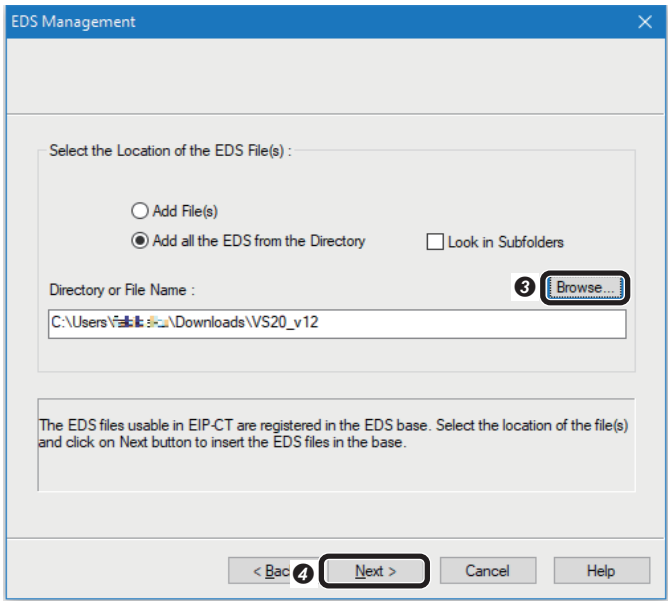
3. Add an EDS file.



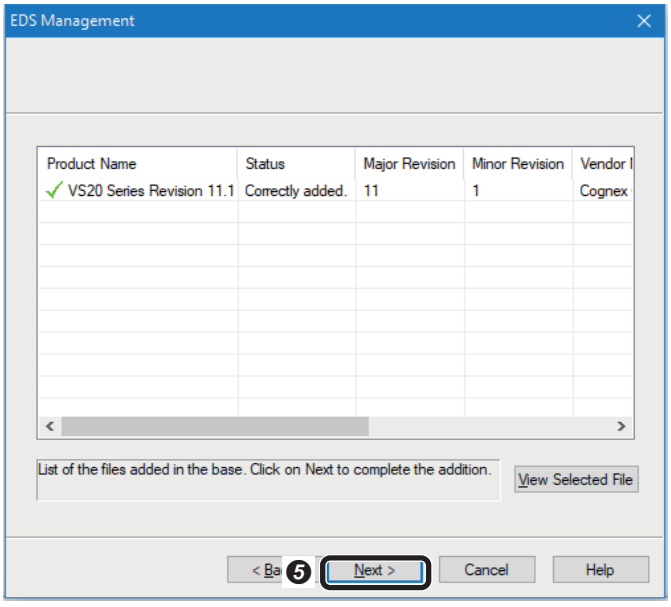
❶ Select [Library] ⇨ [Add].
The "EDS Management" screen appears.



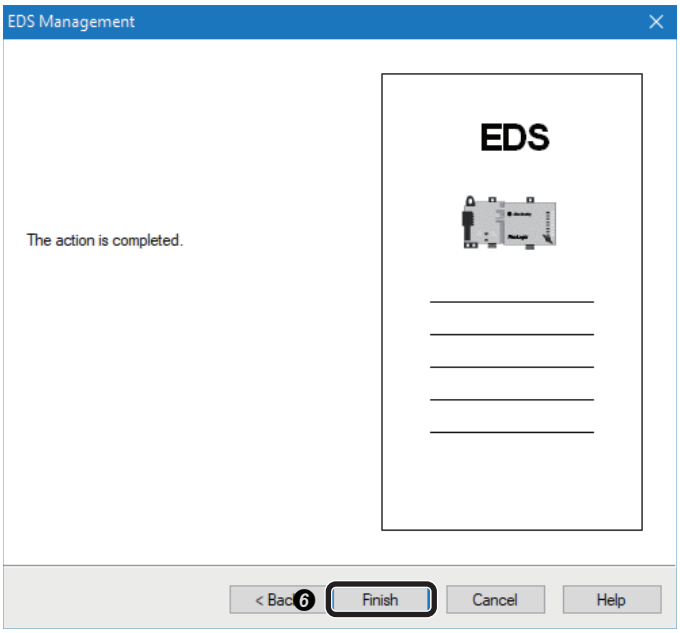
❷ Click the [Next] button.



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

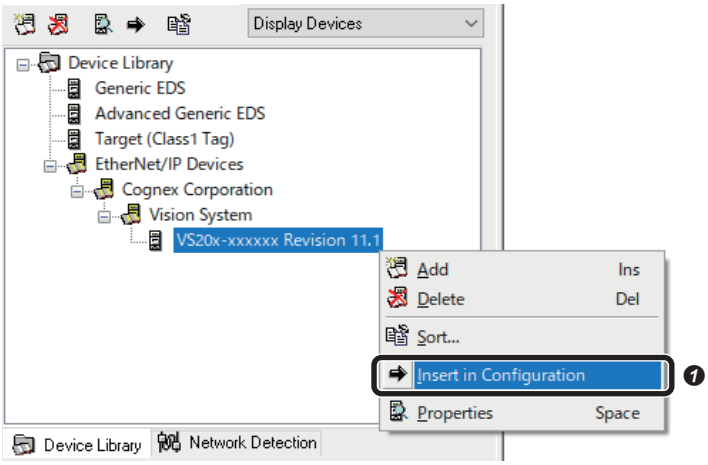


❺ Check that the EDS file is added properly and click the [Next] button.

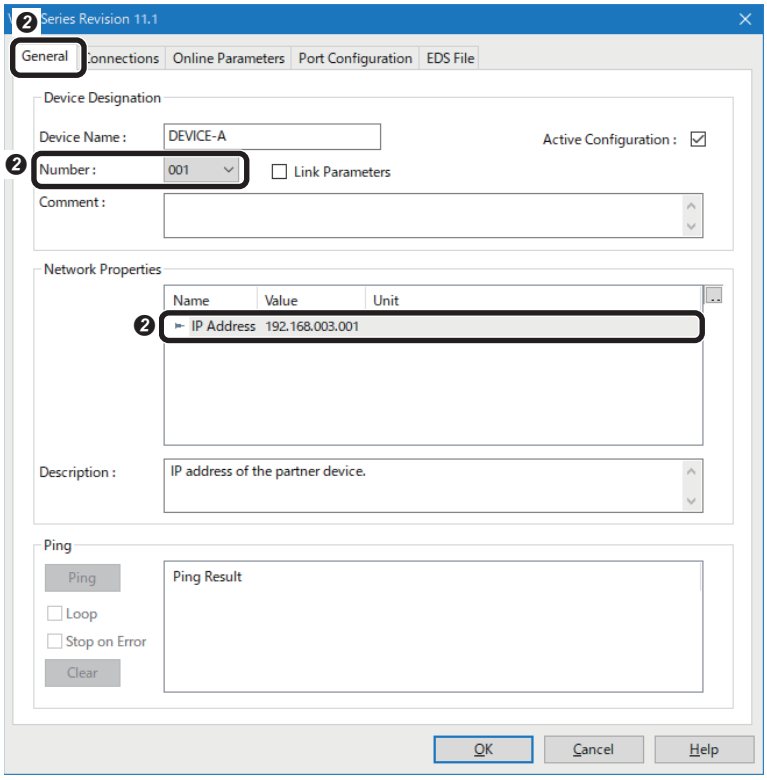


❻ Click the [Finish] button.

4. Add a vision sensor in the network configuration setting.

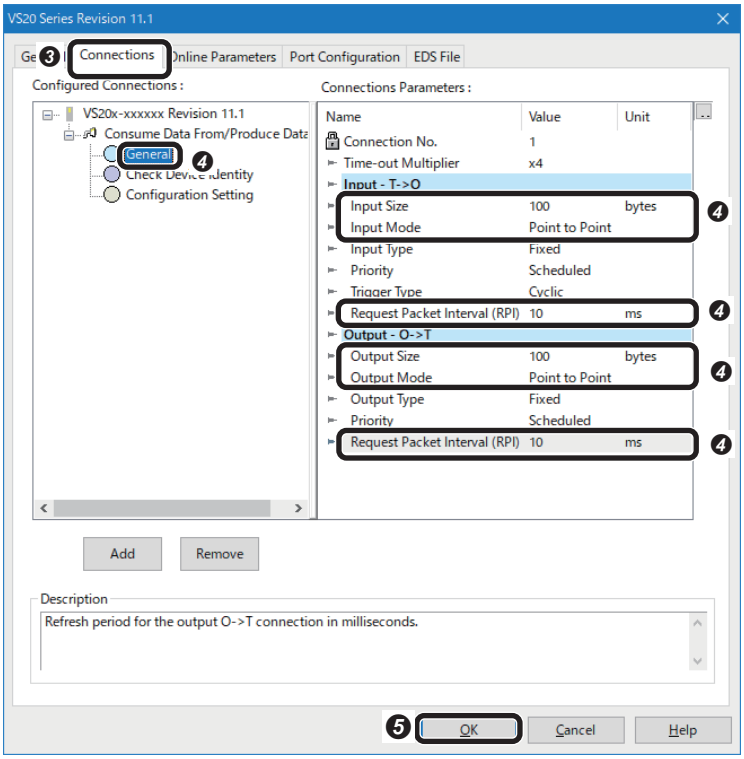


❼ In the [Device Library] tab, right-click a vision sensor under the tree of "EtherNet/IP Devices," and select [Insert in Configuration] from the shortcut menu.



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 vision sensor)



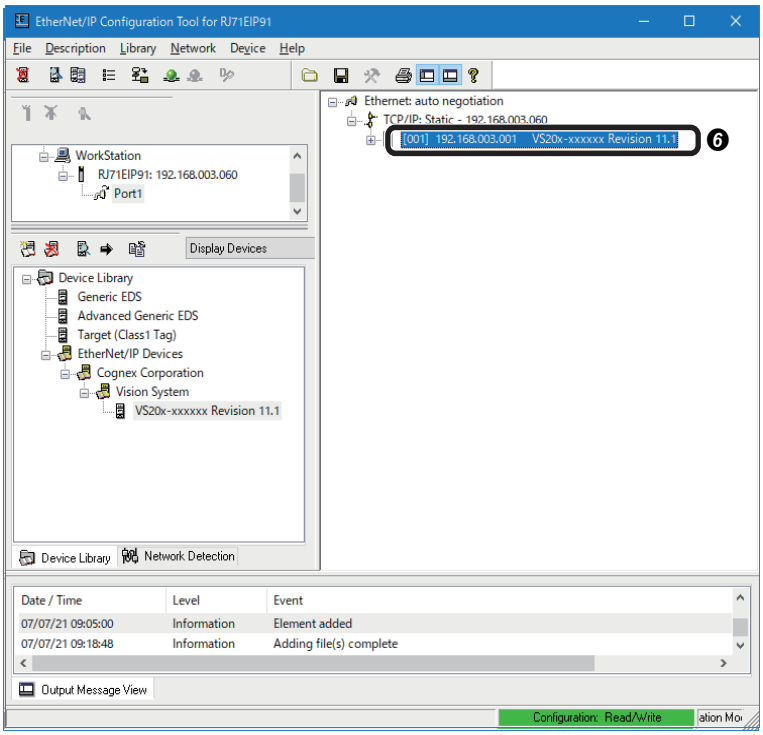
❸ Select the [Connections] tab to set Class 1 instance communications.

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

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

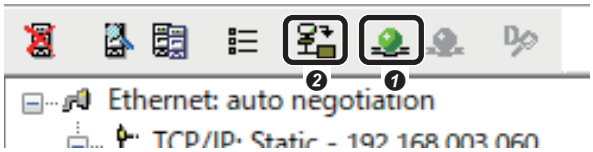
Set the packet size to be larger than the input/output data size.

❺ Click the [OK] button.

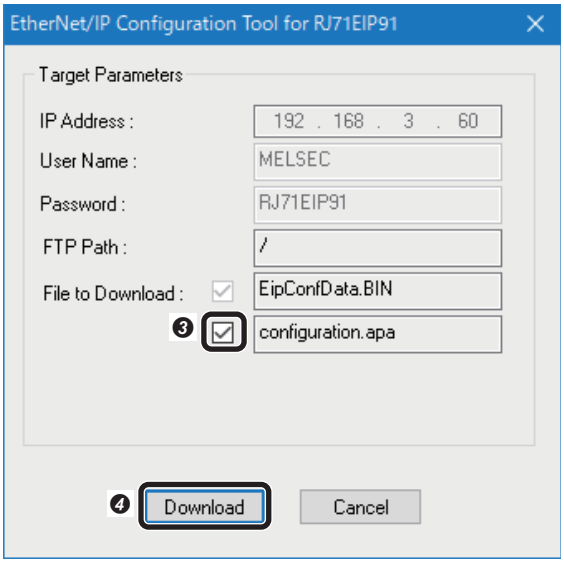


❻ Check that the vision sensor is added in the network configuration setting.

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 at either of the following timings:

- 'EtherNet/IP communication start request' (Y10) is turned from OFF to ON.
- An execution command of a module FB is turned from OFF to ON.

Creating a program

The following shows the procedure to create a program.

☞ Page 120 Creating a program for cyclic (Implicit) communications

☞ Page 125 Creating a program for message (Explicit) communications

Creating a program for cyclic (Implicit) communications

Create a program for controlling a vision sensor via cyclic (Implicit) communications.

■ Devices used in the program

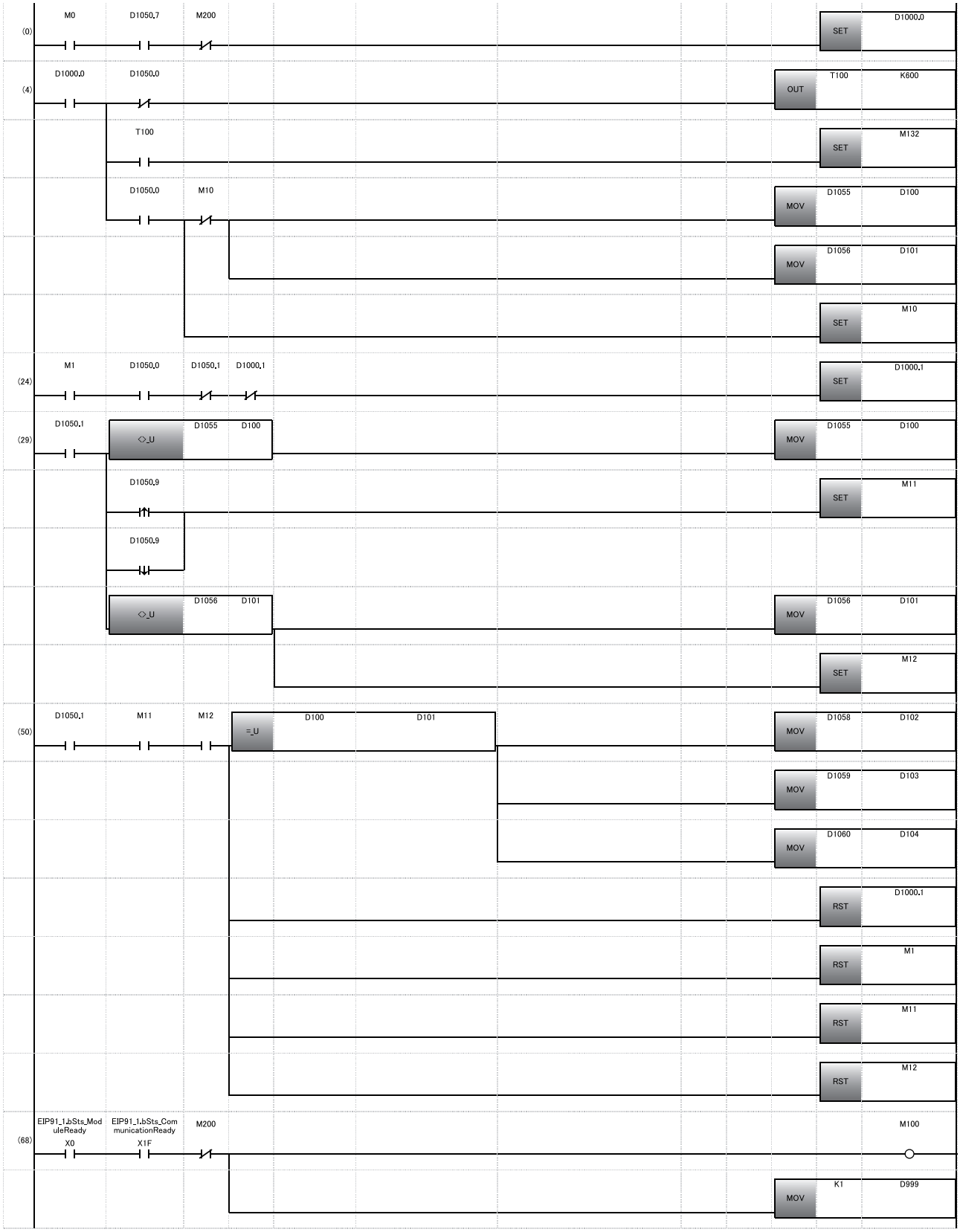
Device	Device name	Description
M0	Image Capturing Trigger Enable command	'Trigger Enable' (D1000.0) is turned ON and an image capturing trigger is enabled.
M1	Image Capturing Trigger command	'Trigger' (D1000.1) is turned ON and an image is captured when this device is turned ON.
M10	ID storage area initialization completion	Initializing the storage area for the ID is completed.
M11	Inspection Completed	Inspection is completed.
M12	Inspection ID acquisition completion	Acquiring the latest inspection ID is completed.
M100	Input execution command	Processing for acquiring input 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	Image capturing ID storage area	The image capturing ID used for verification is stored temporarily.
D101	Inspection ID storage area	The inspection ID used for verification is stored temporarily.
D102	Inspection result of "Pattern_1" (Pass)	The inspection result of "Pattern_1" (Pass) is stored.
D103	Inspection result of "Pattern_1" (Fail)	The inspection result of "Pattern_1" (Fail) is stored.
D104	Job.Inspection_Count	The job inspection count is stored.
D1000.0	Trigger Enable	An image capturing trigger 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 availability status of an image capturing trigger is stored. • ON: An image capturing trigger is enabled. • OFF: An image capturing trigger is disabled.
D1050.1	Trigger Ack	The reception status of an image capturing trigger is stored. • ON: With an image capturing trigger • OFF: Without an image capturing trigger
D1050.7	Online	The online status of a vision sensor is stored. • ON: Online • OFF: Offline
D1050.9	Inspection Completed	The status of this device is inverted every time when an inspection of a vision sensor is completed and the result is sent to a programmable controller.
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.

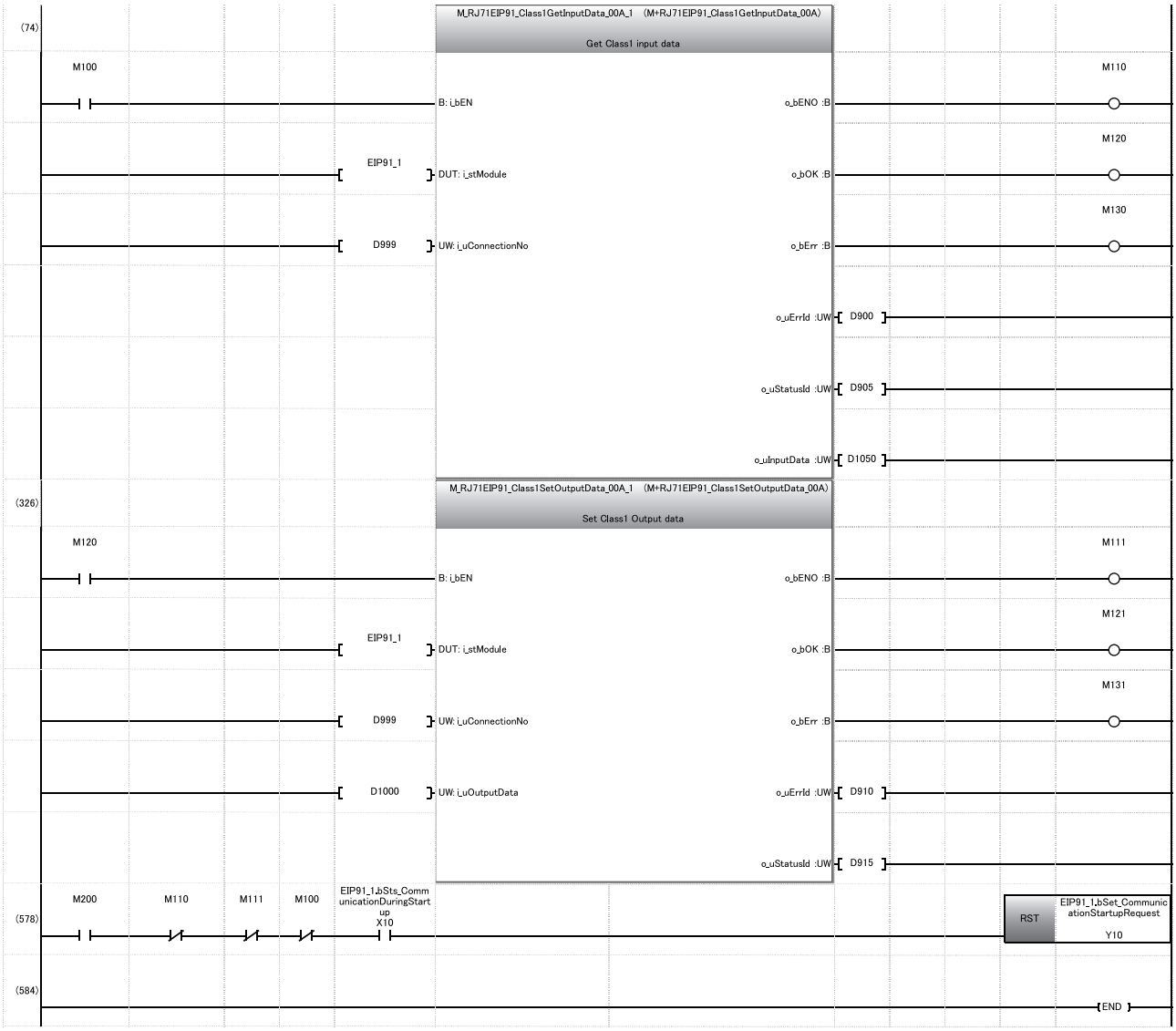
Device	Device name	Description
D1000 to D1049	Output data	Devices in which output data is stored.
D1050 to D1099	Input data	Devices in which input data is stored.

■ 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 vision sensor.

(24): Request the start of the image capture to the vision sensor. (Turn 'Trigger Enable' (D1000.1) ON.)

(29): Perform the processing for the completion of the image capture of the vision sensor.

(50): Verify the image capturing ID and the inspection ID, and acquire the inspection result.

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

(74): Acquire input data by using the module FB (M+RJ71EIP91_Class1GetInputData*1) of an RJ71EIP91.

(326): Set output data by using the module FB (M+RJ71EIP91_Class1SetOutputData*1) of an RJ71EIP91.

(578): Stop communication.

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

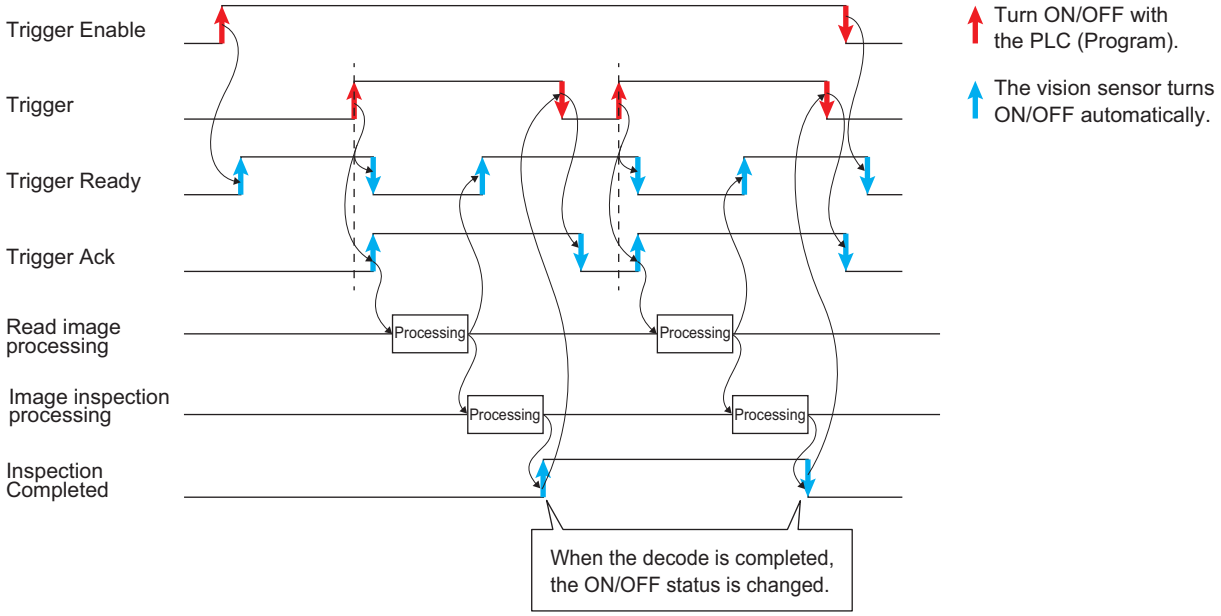
Timing chart of cyclic (Implicit) communications

A timing chart when controlling a vision sensor by using a program of the program example via cyclic (Implicit) communications is shown below.

To enable a trigger from a programmable controller, turn ON 'Trigger Enable' (RY0) of the Output Assembly.

When 'Trigger' of the Output Assembly is turned ON while 'Trigger Ready' of the Input Assembly is ON, the status of the vision sensor is output to 'Trigger Ack' and 'Inspection Completed' of the Input Assembly.

The status of 'Inspection Completed' of the Input Assembly is inverted at the completion of inspection.



Creating a program for message (Explicit) communications

Create a program for acquiring the job file name of a vision sensor via message (Explicit) communications by using native mode commands.

■ Devices used in the program

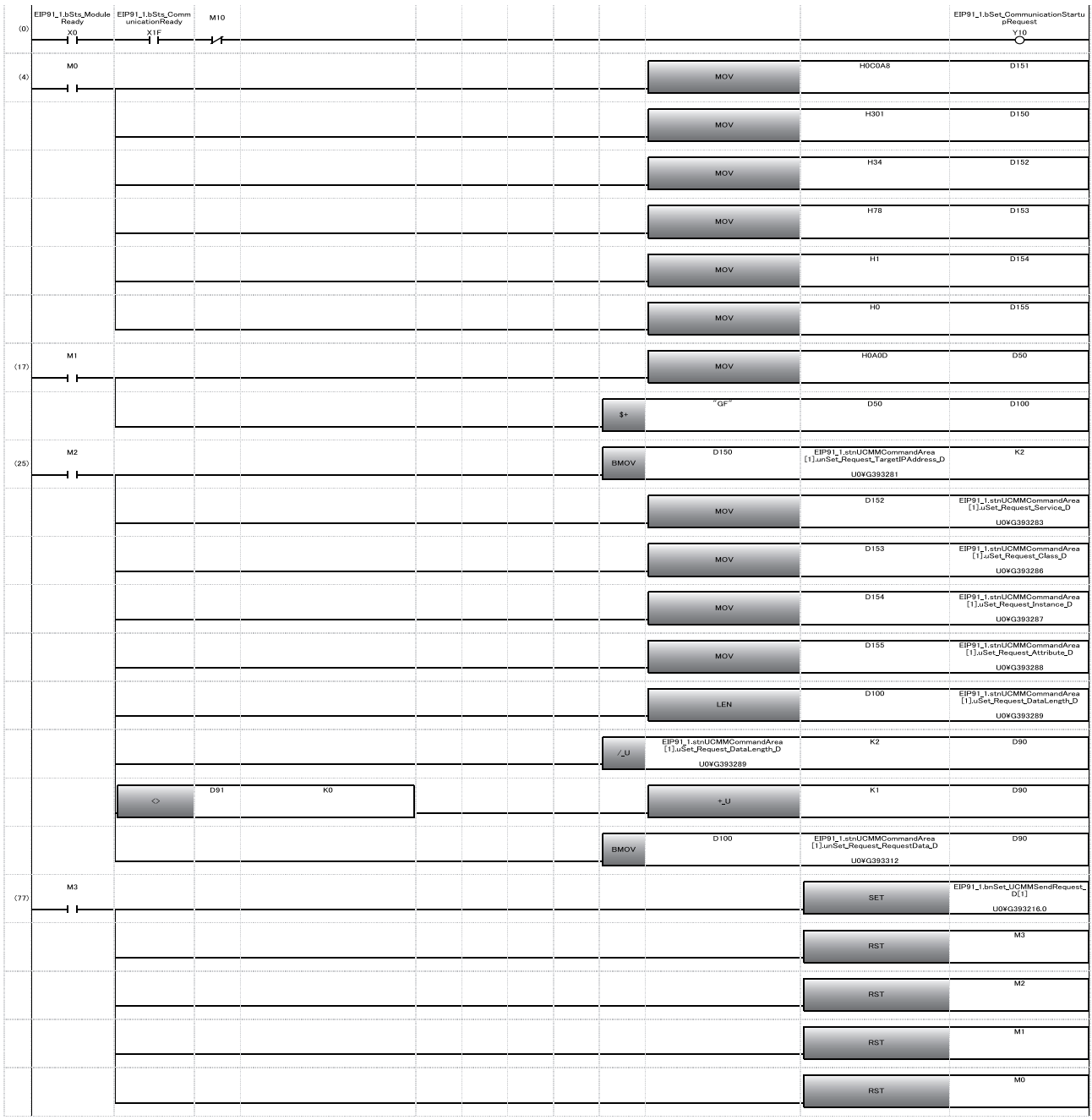
Device	Device name	Description
M0	UCMM data link request command data initialization command	Data of the UCMM data link request command is initialized when this device is turned ON.
M1	Native mode command string initialization command	The string of a native mode command is initialized when this device 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	Native mode command terminator	The line feed code of terminator '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	Native mode command string	The string of a native mode 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 (SendNativeCmd)" is stored.
D153	UCMM data link request class ID	The class ID "H78 (Vision 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.

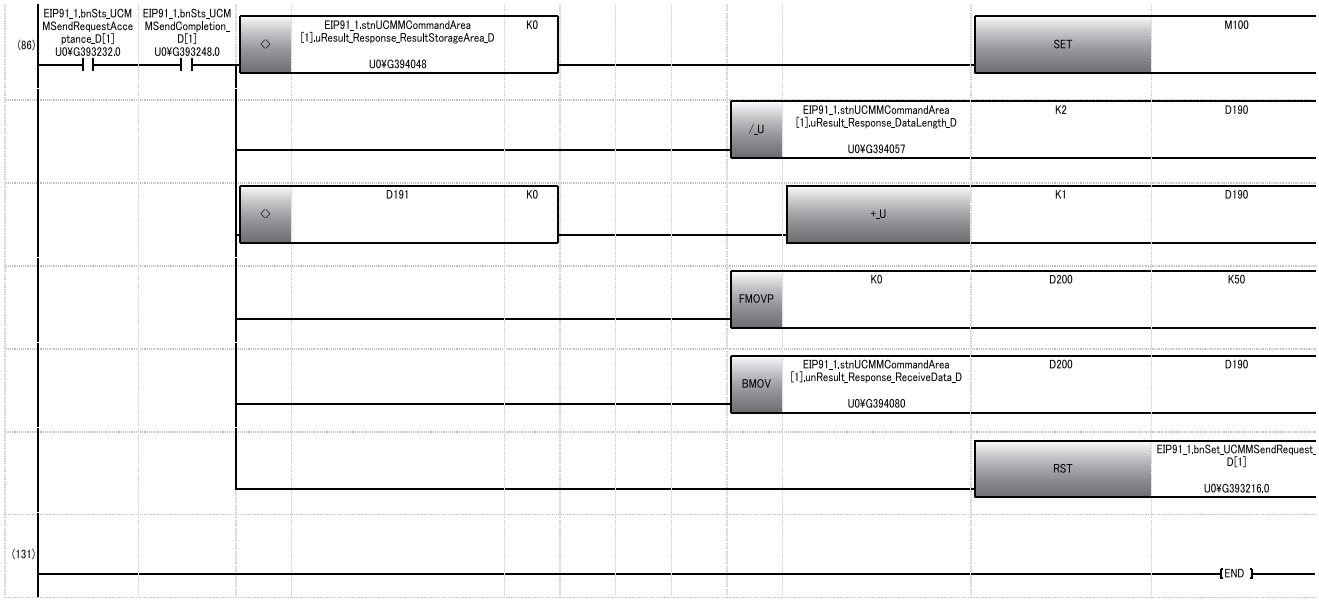
■ Module labels used in the program

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

Module label	Function	Device
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





(0): Perform the processing for starting communications.

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

(17): Initialize the native mode command string ("GF").

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

(77): Perform UCMM communications.

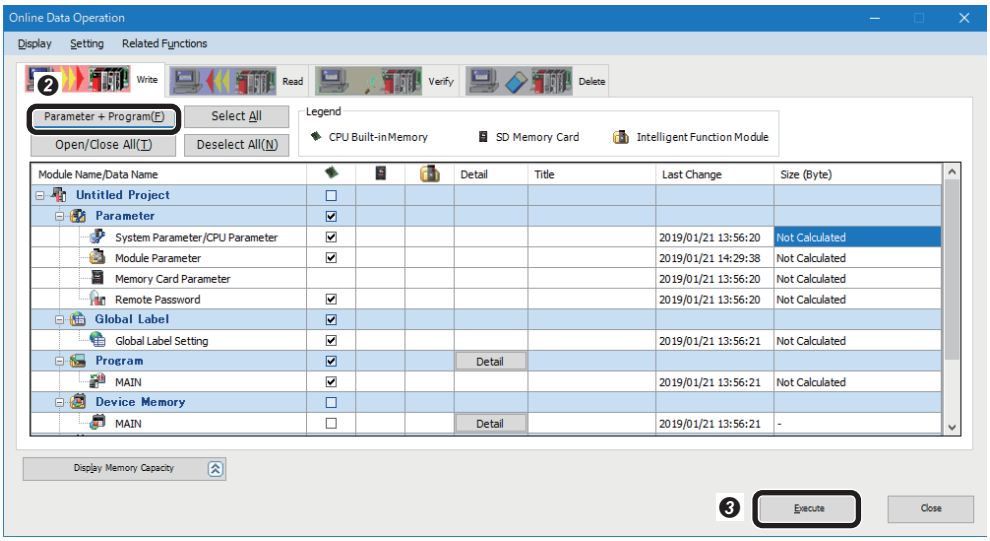
(86): Store response data and reset the command request.

4.5 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.

4.6 Checking Operations

Check the operation by controlling the vision sensor using the programmable controller.

☞ Page 130 Checking operations of cyclic (Implicit) communications

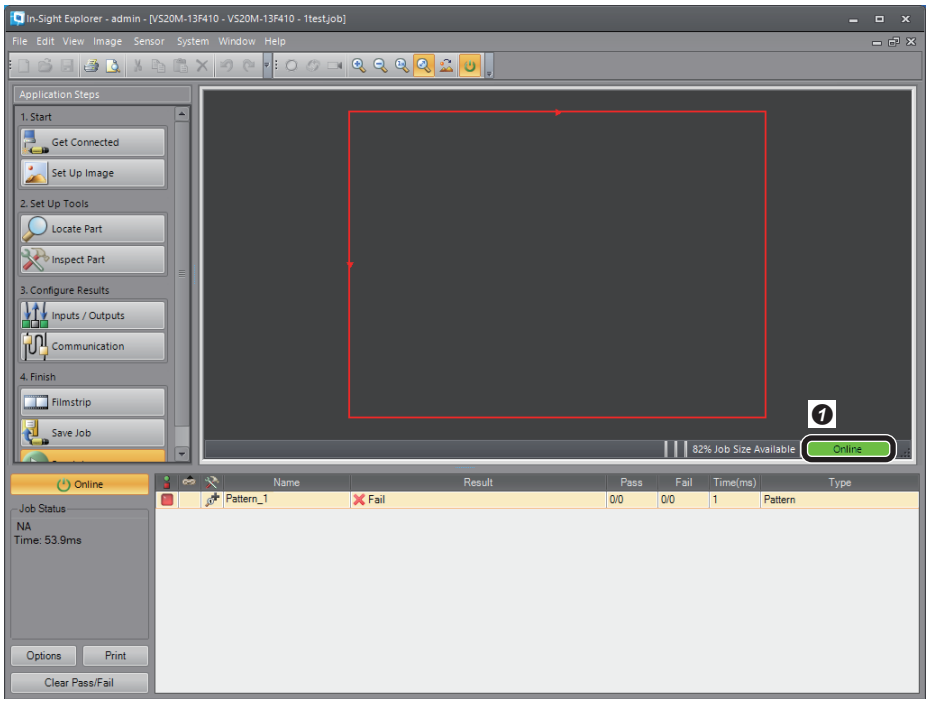
☞ Page 136 Checking operations of message (Explicit) communications

Checking operations of cyclic (Implicit) communications

Use a created program to check the operation. (☞ Page 120 Creating a program for cyclic (Implicit) communications)

Making the vision sensor online

Make the vision sensor online and start the communication with the programmable controller.

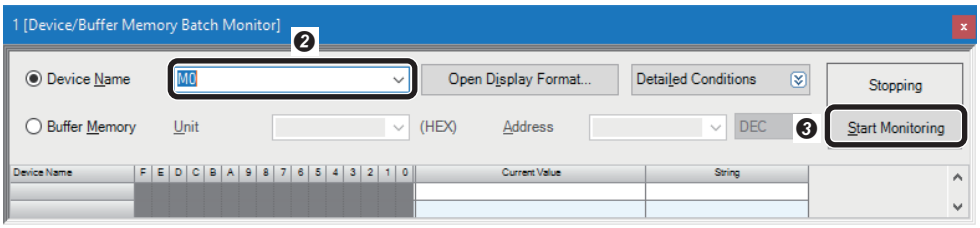


❶ Check that the operating status is "Online."

Enabling a trigger on the vision sensor

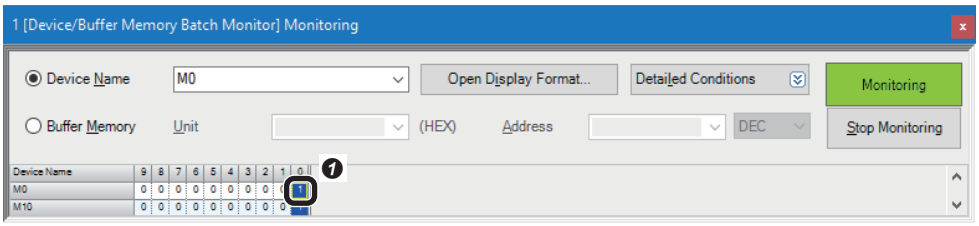
Enable a trigger on the vision sensor to acquire the inspection results.

1. Display device values.



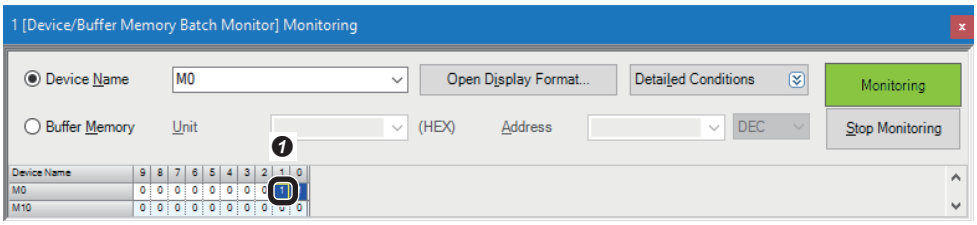
❶ Select [Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch Monitor] with an engineering tool.
The "Device/Buffer Memory Batch Monitor" window appears.
❷ Enter "M0" for "Device Name".
❸ Click the [Start Monitoring] button.

2. Enable a trigger on the vision sensor.



❶ Turn "M0" ON to turn 'Trigger Enable' (D1000.0) ON.

3. Trigger a device.

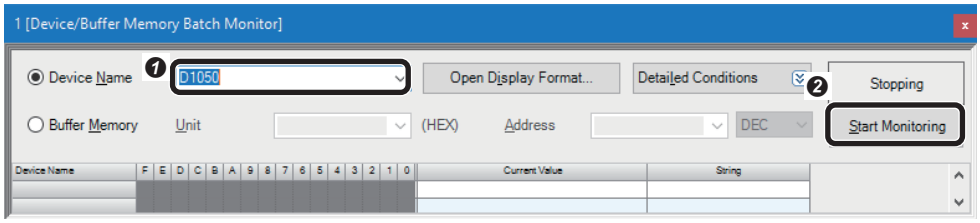


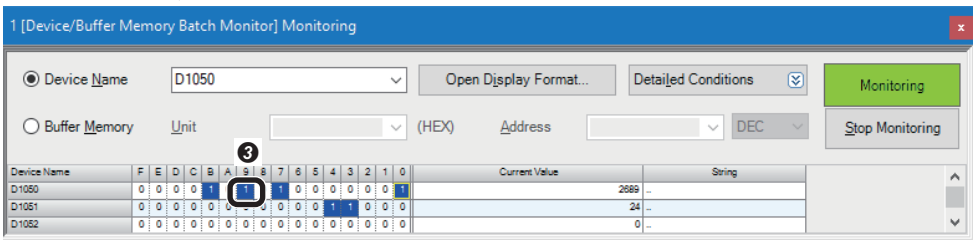
❶ Turn "M1" ON to turn 'Trigger' (D1000.1) ON.

Checking inspection results

Check the inspection results.

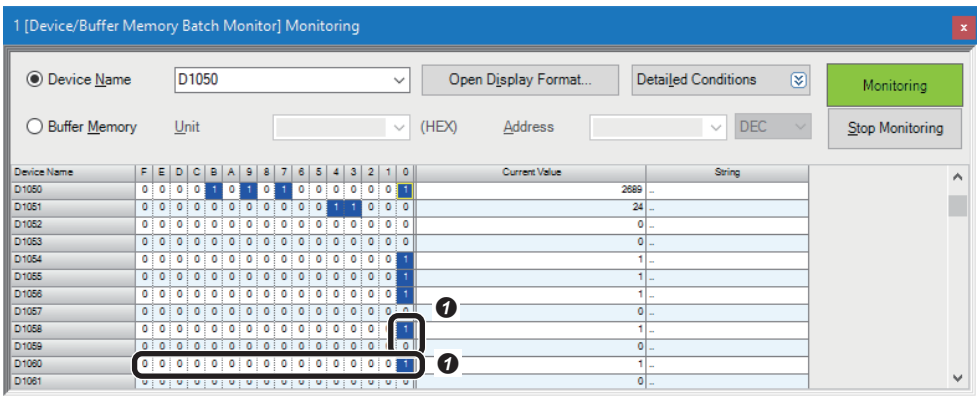
1. Check the completion of the inspection.





❶ Enter 'D1050' for "Device Name."
❷ Click the [Start Monitoring] button.
❸ Check that the bit of 'Inspection Completed' (D1050.9) is changed (toggled).

2. Check the inspection results.

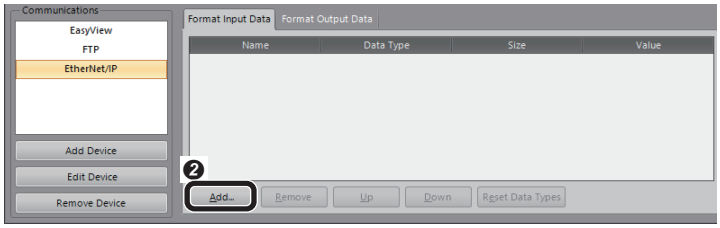


❶ Check the following information.
- 'Job PASS' (D1058.0): This bit turns ON when the set inspection target is detected in the captured image.
- 'Job FAIL' (D1059.0): This bit turns ON when the set inspection target is not detected in the captured image.
- 'Number of jobs inspected' (D1060): The number of times the device is triggered is stored.

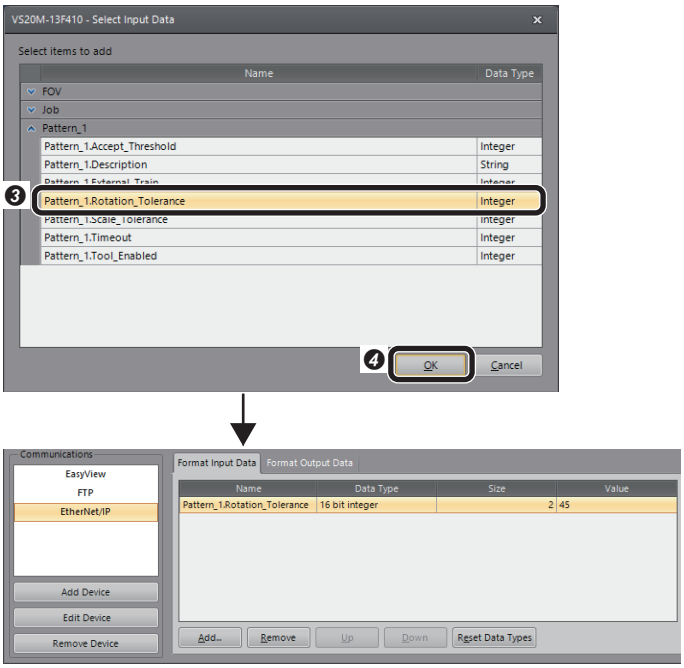
Changing a recognition parameter

When locating a target object using the pattern in the location tool, the rotation tolerance of the target object can be changed to ±90°.

1. Make the vision sensor offline with the vision sensor setup tool.
2. Add parameter items to the list in the [Format Input Data] tab.



❶ Click the [Communication] button.
❷ Select the [Format Input Data] tab and click the [Add] button.



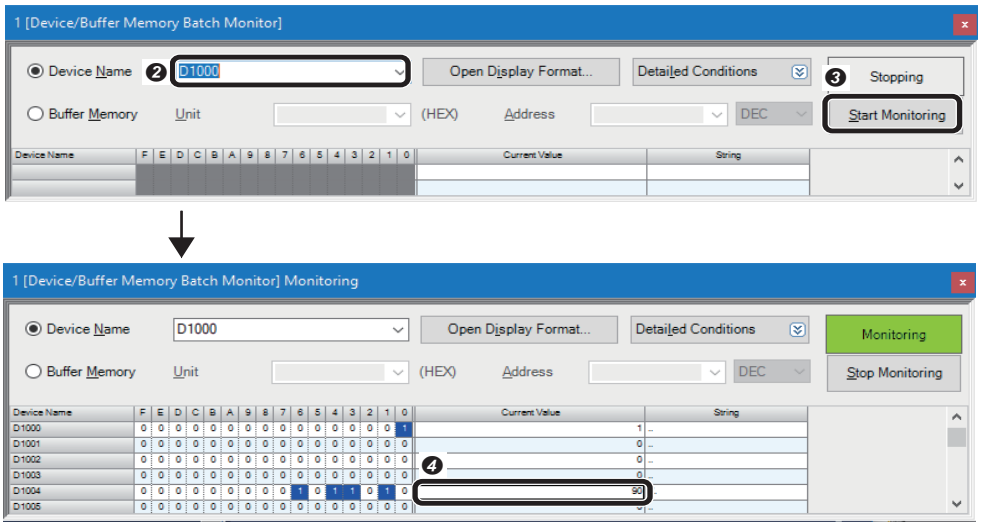
❸ Select "Pattern_1.Rotation Tolerance."
❹ Click the [OK] button.

3. Save the job and make the vision sensor online. (☞ Page 109 Saving the job)

Point

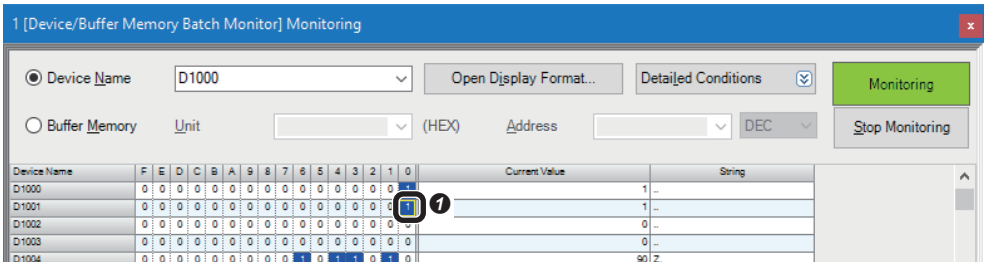
Parameter items need to be added to the list in the [Format Input Data] tab in advance to change parameter values.
More than one parameter item can be selected.

4. Set "Pattern_1.Rotation Tolerance" as a parameter to be changed.

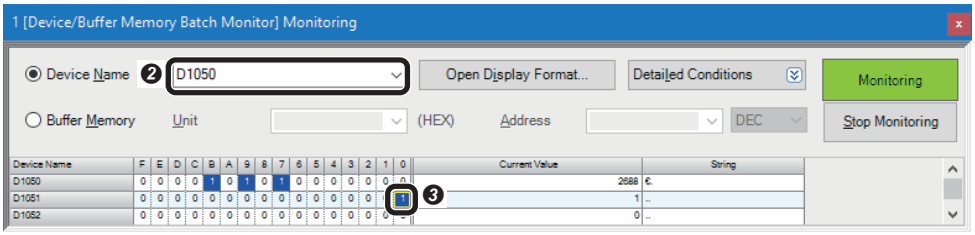


❶ Select [Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch Monitor] with an engineering tool.
The "Device/Buffer Memory Batch Monitor" window appears.
❷ Enter 'D1000' for "Device Name."
❸ Click the [Start Monitoring] button.
❹ Enter '90' for 'User Data' (D1004) of the Output Assembly.

5. Change parameter values.

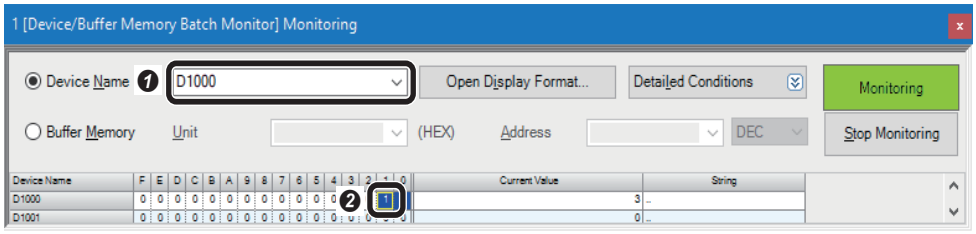


❶ Turn 'Set User Data' (D1001.0) of the Output Assembly ON.



❷ Enter 'D1050' for "Device Name."
❸ By completing the settings, 'Set User Data Ack' (D1051.0) of the Input Assembly turns ON. After that, turn OFF 'Set User Data' (D1001.0).

6. Trigger a device.



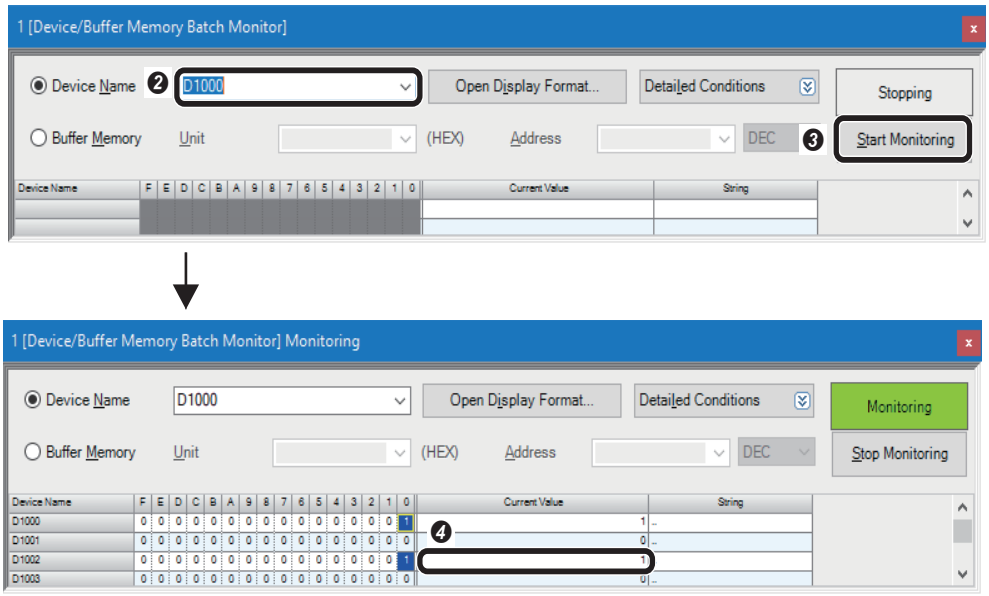
❶ Enter 'D1000' for "Device Name."
❷ Turn 'Trigger' (D1000.1) of the Output Assembly ON.

Changing jobs (loading another job)

The following shows the procedure to load the job file "1Test."

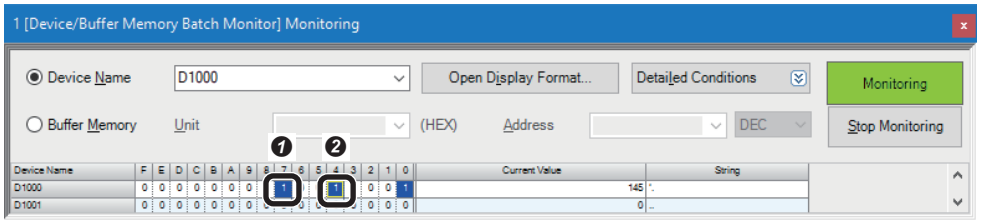
The number '1' prefixed to the file name indicates an ID. By setting this ID number to 'Command' (D1002) of the Output Assembly, the job ("1Test") can be loaded.

1. Set an ID number of a job.

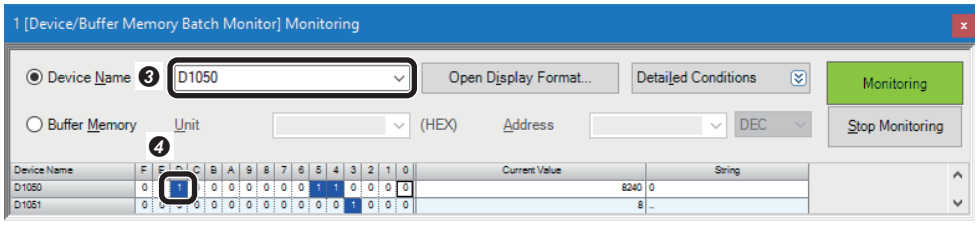


❶ Select [Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch Monitor] with an engineering tool.
The "Device/Buffer Memory Batch Monitor" window appears.
❷ Enter 'D1000' for "Device Name."
❸ Click the [Start Monitoring] button.
❹ Enter '1' for 'Command' (D1002) of the Output Assembly.

2. Change jobs (load another job).



❶ Turn ON 'Set Offline' (D1000.7) of the Output Assembly to make the vision sensor offline.
❷ Turn ON 'Execute Command' (D1000.4) of the Output Assembly to load a job.



❸ Enter 'D1050' for "Device Name."
❹ When the loading of the job is completed, 'Command Completed' (D1050.D) of the Input Assembly is turned ON. After that, turn OFF 'Execute Command' (D1000.4) and 'Set Offline' (D1000.7).

Point

To load a job, the file name of the job need to begin with an ID number.

When loading a job, make a vision sensor offline.

Checking operations of message (Explicit) communications

Acquire response data by sending native mode commands to a vision sensor from a programmable controller.
Use a created program to check the operation. (☞ Page 125 Creating a program for message (Explicit) communications)

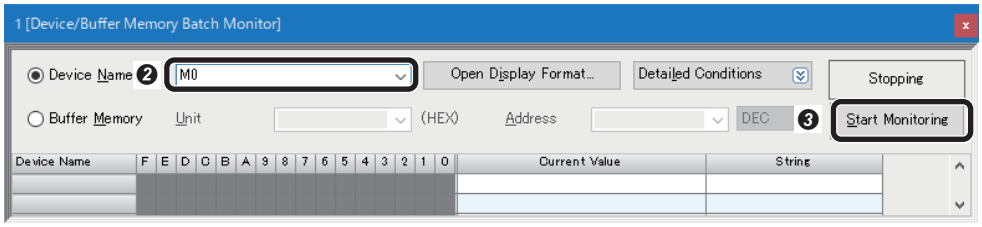
Making the vision sensor offline

Select [Sensor] ⇨ [Online] in the vision sensor setup tool to set the online status to offline.

Checking read results

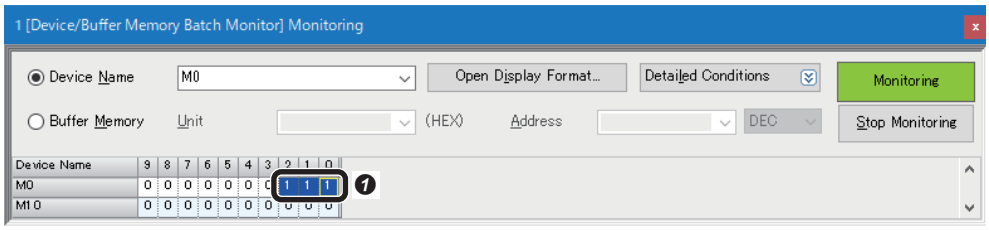
Check the execution result of native mode commands in an engineering tool.

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



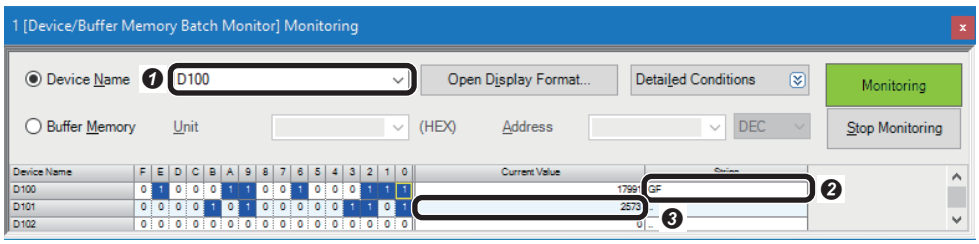
❶ Select [Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch Monitor] with an engineering tool.
The "Device/Buffer Memory Batch Monitor" window appears.
❷ Enter "M0" for "Device Name."
❸ Click the [Start Monitoring] button.

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



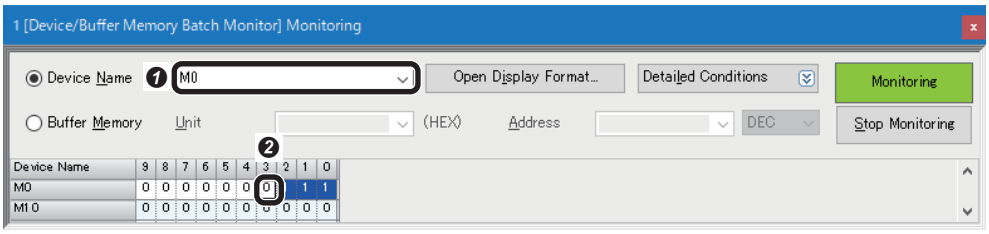
❶ Turn ON 'UCMM data link request command data initialization command' (M0), 'Native mode command string initialization command' (M1), then 'UCMM data link request command data store command' (M2).

3. Check command length.



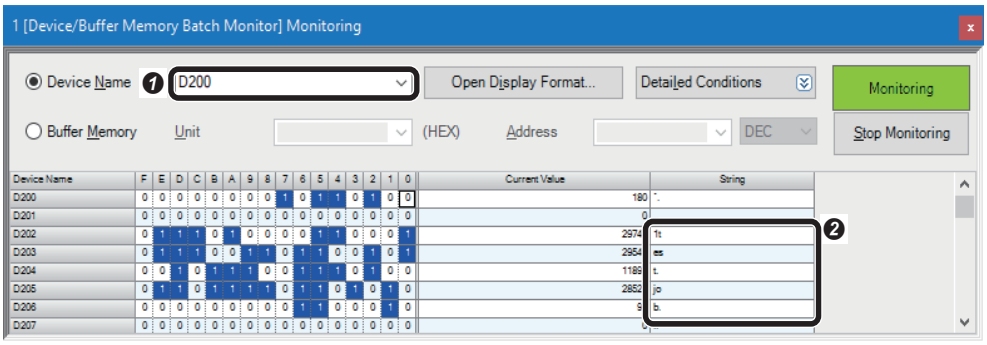
❶ Enter "D100" for "Device Name."
❷ Check that the native mode command "GF" is displayed in "String" of "D100."
❸ Check that the line feed code of terminator "2573" (CR/LF) is displayed in "Current Value" of "D101."

4. Execute the native mode 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 that the file name "1test.job" is displayed in "String" of "D202" to "D206."

REVISIONS

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

Revision date	*Manual number	Description
May 2017	BCN-P5999-0861-A	First edition
February 2018	BCN-P5999-0861-B	■Added or modified parts Chapter 1, Chapter 2, Chapter 3
June 2018	BCN-P5999-0861-C	■Added or modified parts Section 1.3, Section 1.6, Section 2.3, Section 2.6
March 2019	BCN-P5999-0861-D	■Added or modified parts Section 1.6, Section 2.6, Section 3.6
January 2020	BCN-P5999-0861-E	■Added or modified parts INTRODUCTION, RELEVANT MANUALS
July 2021	BCN-P5999-0861-F	■Added or modified parts SAFETY PRECAUTIONS, CONDITIONS OF USE FOR THE PRODUCT, INTRODUCTION, RELEVANT MANUALS, TERMS, Section 1.2, Section 1.4, Section 2.2, Section 2.4, Chapter 4

Japanese manual number: BCN-P5999-0860-F

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