

FA Sensor



Vision Sensor VS20 Connection Guide

-VS20M-11F310 -VS20M-12F410 -VS20M-13F410 -VS20C-12F410 -VS20C-13F410

Powered by

COGNEX

This product was manufactured by Cognex Corporation. *Note that the warranty on this product differs from that on other programmable controller products.



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 of the programmable controller system, refer to the user's manual for the CPU module used.

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

Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
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 " A 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]

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

[Installation Precautions]

- 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. It may be damaged if you try to connect it forcibly.

[Wiring Precautions]

- Use only 24 V DC 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 system and peripheral devices such as sequencer via cables. For safe operation, it is recommended to connect all the ground connections securely.

 Do not clean the Vision Sensor VS20 with highly irritating or corrosive solvent such as caustic alkali solution, methyl ethyl ketone (MEK), and gasoline. Doing so may cause a fault.

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CHAPTER 2 I/O CONNECTION

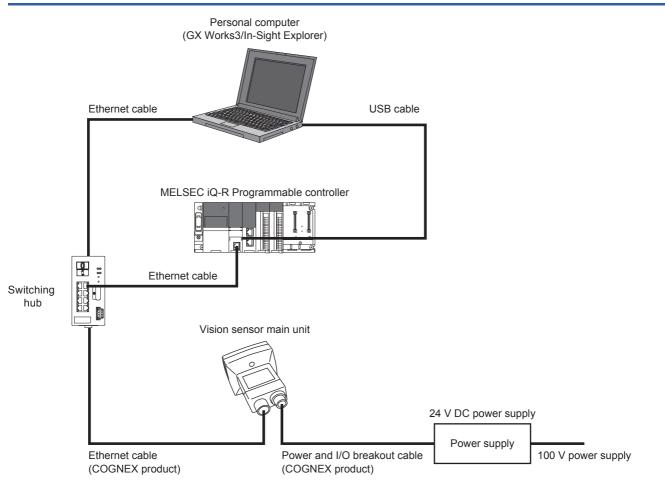
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1 THE SLMP SCANNER CONNECTION

1.1 Introduction

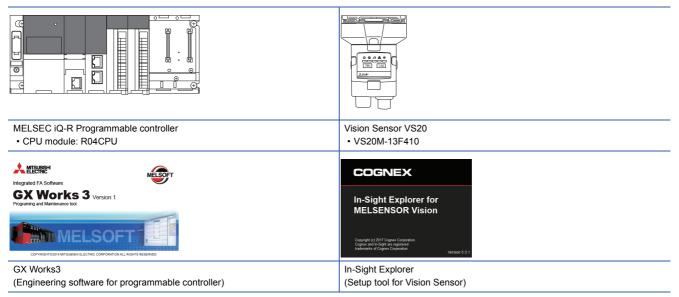
This chapter describes the procedures for connecting the Vision Sensor VS20 to a MELSEC programmable controller and controlling the vision sensor with a SLMP Scanner Connection.

Example of system configuration for connecting the vision sensor



Required modules and devices

Mitsubishi Electric products



■COGNEX products

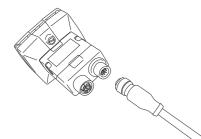


■Commercial products

<u></u>			
Switching hub	Ethernet cable	USB cable	24 V DC power supply

Connecting and wiring of the vision sensor

- **1.** Verify that the 24 V DC power supply being used is unplugged and not receiving power.
- 2. Optionally, connect the I/O or serial wires to an appropriate device (for example, a programmable controller).
- **3.** Attach the power and I/O breakout cable's [24 V DC] (Red wire) and [GND] (Black wire) to the corresponding terminals on the power supply.
- 4. Connect the power and I/O breakout cable's M12 connector to the vision sensor's power, I/O and RS-232 connector.



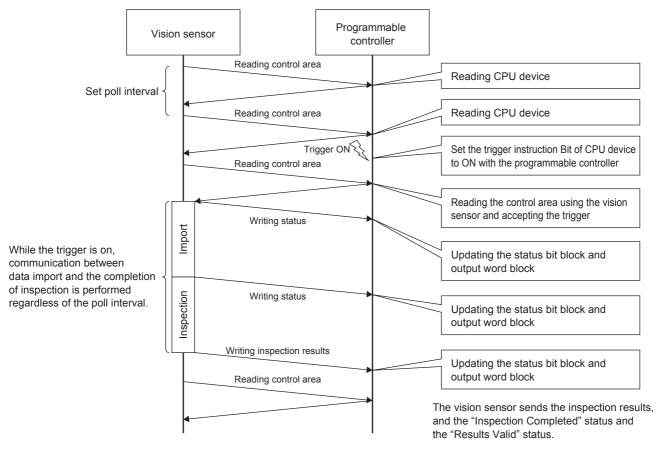
5. Turn on the 24 V DC power supply switch.

Precautions

- When connecting the vision sensor and programmable controller, simultaneously turn on the vision sensor and programmable controller, or first turn on the programmable controller.
- Cut unused wires or protect them with insulating materials. Keep all bare wires separated from the 24 V DC wire.
- All cable connectors are "keyed" to fit the connectors on the vision sensor. Do not force the connections or damage may occur.

1.2 Basic Operations of the SLMP Scanner Connection

Basic operation flow of the SLMP scanner connection



Basic operations of the SLMP scanner connection

In the SLMP Scanner Connection, the vision sensor reads control bit blocks from the programmable controller at the poll interval set with In-Sight Explorer, and the processing is performed responding to the change of the bit information in the control bit blocks.

The processing status is written to the corresponding bit in the status bit block.

To control the vision sensor, assign the devices of the programmable controller to each of the defined data blocks (including control bit blocks) and use them.

The following shows the functions of six data blocks.

Data Blocks	Contents
Control bit block	This block is used to perform control instructions (such as trigger) to the vision sensor, using bit information. The vision sensor is controlled by turning on and off the devices set to the control bit block using the programmable controller.
Status bit block	This block indicates the status of the vision sensor, and can be checked with bit information.
Input word block	This block is used to input application data (including parameters for inspection) from the programmable controller, and uses word information.
Output word block	The vision sensor uses this block to output application data (including inspection results) to the programmable controller. This block uses word information.
String command word block	This block is used to set commands (string commands) to control the vision sensor. This block uses word information.
String command result word block	This block is used to output the results controlled by the commands. This block uses word information.

The next section shows the data blocks and the timing chart of the SLMP Scanner Connection.

Data blocks

The following shows the six data blocks defined to control the vision sensor. Control Bit Blocks

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 4	Soft Event 3	Soft Event 2	Soft Event 1	Soft Event 0	

Status Bit Blocks

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Online	nline Offline Reason			Missed Acq	Reserved	Trigger Ack	Trigger Ready
Bit 15	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

Input Word Blocks

Word 0	Word 1	Word 2N
Command	Reserved	User Data

Output Word Blocks

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

String Command Word Blocks

Word 0	Word 1N
String Command Length	String Command

String Command Result Word Blocks

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

For details of the data block functions to control the vision sensor, refer to In-Sight Explorer's HELP. Set "SLMP" as a keyword in HELP and refer to the explanation of data blocks.

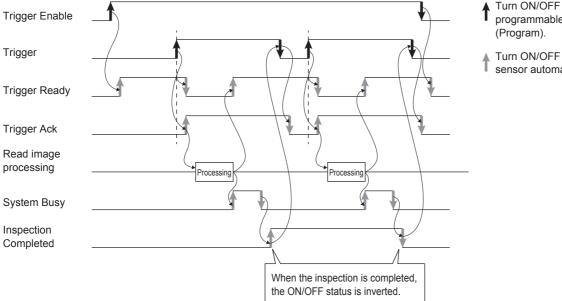


Timing chart of the SLMP scanner connection

The following shows a timing chart when [Trigger] of the control bit block is turned on from the programmable controller. To enable the trigger from the programmable controller, turn on [Trigger Enable] of the control bit block.

When [Trigger] of the control bit block is turned on from the programmable controller while [Trigger Ready] of the status bit block is on, the status of the vision sensor is output to [Trigger Ack], [Acquiring], [System Busy], and [Inspection Completed] by the status bit block.

[Inspection Completed] changes (toggles) the status at every completion.



- Turn ON/OFF with the programmable controller
- Turn ON/OFF the vision
- sensor automatically.

· Program example

Program example is shown below.

D1002.7						D1000.0
(0) _{Online}						Network Trigger Enable
(2) Trigger ON Execution Command	Trigger	D1002.1 Trigger ON Acknowledg ment	D1000.1		SET	D 1000.1 Trigger
(7) Trigger	D1002.9				RST	D1000.1 Trigger
	D1002.9				RST	M0 Trigger O Executior Command
15)						[END]

1.3 Vision Sensor Setting

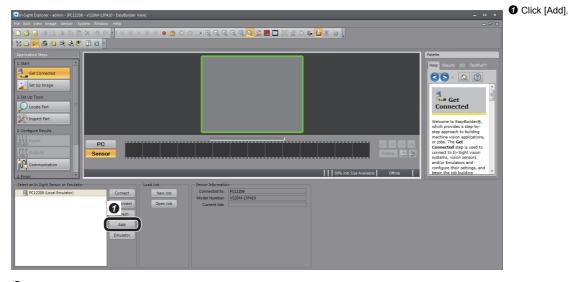
Setting an IP address to the personal computer

Set the IP address 192.168.3.3 to the personal computer.

Connecting of the vision sensor

Start In-Sight Explorer to set the vision sensor.

1. Start the In-Sight Explorer software.

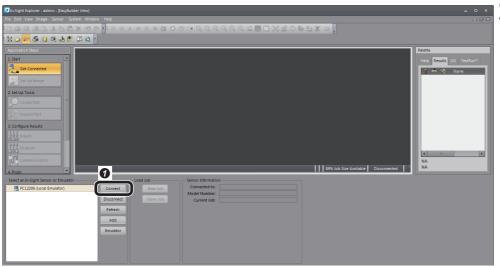


2. Add the vision sensor to the network.

📮 Add Sensor/Device to Netwo	ork				×
Select an In-Sight sensor or o	device to add to your ne	twork. If the desired sen	isor/device i	s not listed, you can ad	d it by cycling its power. Devices
Host Name	Туре МАС	IP		<u>H</u> ost Name:	VS20M-13F410_xxxxxxx
VS20M-13F410 VS2	0M-13F410 00-d0-24	192.168.0.1		Obtain IP Address A	utomatically (DHCP)
				O <u>U</u> se The Following N Section Secti	etwork Settings
			0	IP Address:	192.168.3.1
				<u>S</u> ubnet Mask:	255 . 255 . 255 . 0
				Default <u>G</u> ateway:	
				DNS Server:	
				D <u>o</u> main Name:	
				C <u>o</u> py F	PC Network Settings
				Reset <u>A</u> dmin Passwo	rd
				Reset Sensor Setting	s to Factory Defaults
<u>F</u> lash Lights <u>R</u> efresh	r			0	<u>Apply</u> <u>C</u> lose

- Set the sensor and device to the network as shown left.
- IP Address: 192.168.3.1
- Subnet Mask: 255.255.255.0
- Olick [Apply].

3. Connect to the vision sensor.

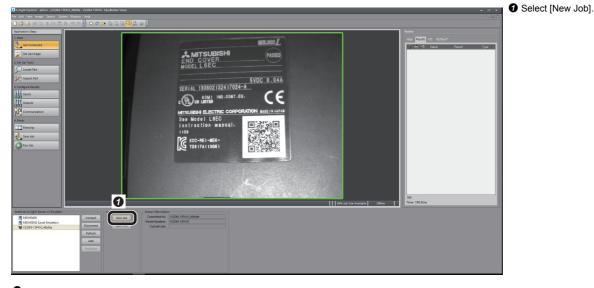


O Click [Connect] to connect to the vision sensor.

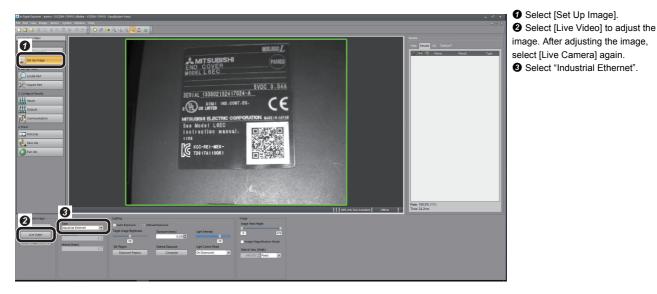
Creating a new job

1. Create a new job.

As an example, configure the setting of an inspection to see if there is a "CE" mark on the inspection object.



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



3. Set a tool.

In Sight Explorer - admin - (VS20M	137410_48bible - V\$2014-137410 - EasyBuilder View]		- d ×	Select [Locate Part].
ile Edit View Image Sensor S			- 18 X	
	X 9 0 0 0 = Q Q Q Q Q U			Select "Pattern".
Application Steps			Palette	
1. Start		WELASS L	Help Results UD TestRun ^{te}	
Get Connected		MEASEL	👔 🗢 🛠 Name Result Type	
1 Up Image		A MITSUBISHI PASSED		
		END COVER NO COVER		
Locate Part		MODELLGEC		
N. morenner	10.050.05	SVDC 0.04A		
3. Configure Results	- 1000000	SERIAL 130802132417024-A		
Inputs	- 1 (1993) (1993)	CHue Learner CE		
Consults				
Communication		MITSUBISHI ELECTRIC CORPORATION MADE IN ANA MI		
4. finish		See Model L6EC		
Filmstrip		instruction manual.		
Save Job				
Run Job	1.553.05688	KCC-REI-MEK-		
	1 00000000			
	1 1000000000			
	1 100000000			
	- 0.00000000			
	200000000		Bate: 100.0% (1/1)	
	Pixel Value @ (459,293) = 249	1 89% Job Size Analiable Offine	Time: 24.2ms	
0	Description			
9	Add Locates a single pattern feature; reports the pass fail result. Outputs a Tool Podure that can			
af Pattern	be referenced by other tools. Click the Add button to begin.			
4.0	For more information, please see the EasyBuilder			
武 Edge Intersection 命 Circle	Help.			

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



Set the model. (Select "CE" mark)Click [OK].

Communication setting

1. Configure the communication setting (SLMP scanner).



2. Add the SLMP Scanner to the communication.



3. Set the SLMP Scanner.

an Sight tuberer - anner - (2008-1940) 44046 - V006-1940) - Englisher Vong = d' X	Configure the settings as shown
	left.
An and the second of the secon	 Controller Type: iQ-R/Q/L Series (3E Frame) IP Address: 192.168.3.2 Host Port: 12289 (Port No. of the Ethernet parameter set in GX Works3) Timeout (ms): 1000 Poll interval (ms): 100
Contractions For example, increasing	
Jorden January De La Tan Connection	

Point P

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

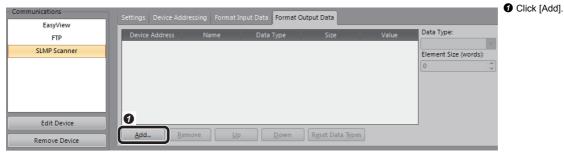
Assigning devices

0					
Settings Device A	ddressing Format I	nput Data			th
Name	Selected Device	Offset	Number of Devices	2 Description	si
Control	D - Data Register	1000	2	Starting PLC address of the vision control block.	F
Status	D - Data Register	1002	2	Starting PLC address of the vision status block.	d
Input Block	None	0	2	Starting PLC address of the user data block.	re
Output Block	D - Data Register	1010	8	Starting PLC address of the inspection results block.	
Command	None	0	0	Starting PLC address of the command string.	bl
Command Result	None	0	0	Starting PLC address of the command result data.	

 Select [Device Addressing].
 Set a selected device, offset, and the number of devices to each of the six data blocks as shown left.
 For control contents of when the device is assigned to each data block, refer to Page 25 Contents in data blocks.

1

1. Set data to be output from the vision sensor to the programmable controller. As an example, set PASS, FAIL, and the number of inspection to the output word block (D1015 to D1017).



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

Outputting to the programmable controller

	Name	Data Type
v	Acquisition	
Ŷ	FOV	
~	Inputs	
^	dof	
	Job.External_Reset_Counters	Integer
	Job.Fail	Integer
	Job.Fail_Count	Integer
	Job.Inspection_Completed	Integer
	Job.Inspection_Count	Integer
	Job.Pass	Integer
	Job.Pass_Count	Integer
	Job.Status	Integer
^	Pattern 1	
	Pattern_1.Fail	Integer
	Pattern_1.Pass	Integer

3. Display the output result to the programmable controller.



Device Address: D1015 to D1017

Ø Message size (words): 3

Items corresponding to the device address can be changed by using the [Up] and [Down]. As an example, sort as above for easy viewing.

Select "Pattern_1 inspection result (PASS/FAIL)".

Select "Job.Inspection_Count".

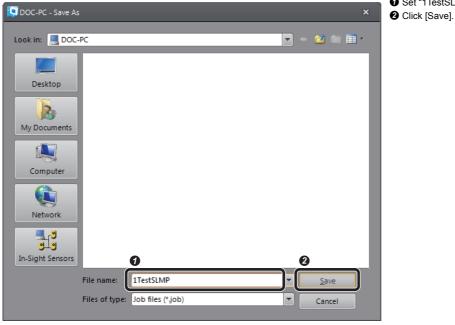
Click [OK].

Saving the job

1. Name the created job.



2. Input the file name and save the job.



Ø Set "1TestSLMP" in "File name".Ø Click [Save].

1.4 Setting the Programmable Controller

Setting the programmable controller

Start GX Works3 to set the programmable controller.

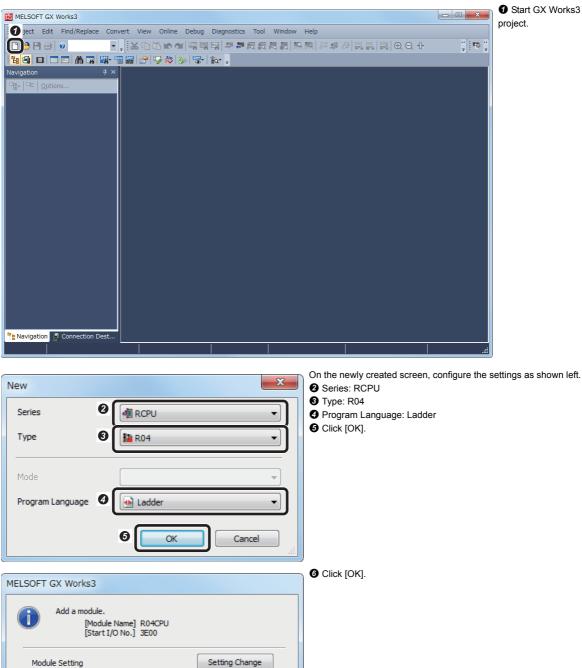
1. Start GX Works3.

Module Label:Not use

Do Not Show this Dialog Again

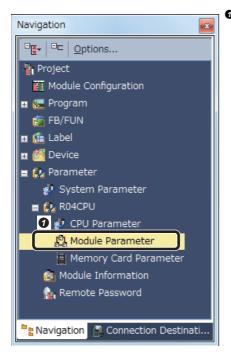
6

OK



• Start GX Works3 and create a new project.

2. Configure the parameter settings.



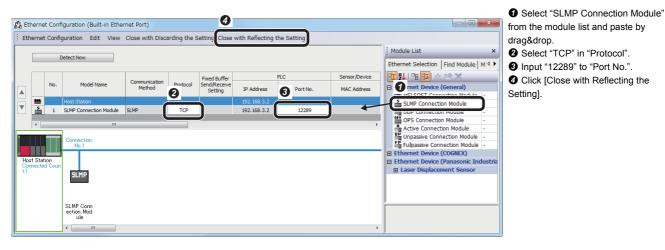
1 Double-click [Module Parameter] in the Navigation window.

Setting Item List	Setting Item	
Input the Setting Item to Search	Item	Setting
	Parameter Setting Method	Parameter Editor
⊟-√ Teasic Settings	IP Address	192.168.3.2
🖉 😋 Own Node Settings	Subnet Mask	and the second s
External Device Configuration	3 Default Gateway	
Application Settings	Enable/Disable Online Change	Enable All (SLMP)
	Communication Data Code	Binary
	Opening Method	Do Not Open by Program
	External Device Configuration	
	External Device Configuration	<detailed setting=""></detailed>
	Explanation Set the IP address of the own node. Ensure that the own node and the external device : and subnet address. If IP address is not set, the module operates with f RJ71EN71 PORTI: 92.168.340 RJ71EN71 PORT2: 192.168.440 CPU built-in Ethernet port: 192.168.3.39	=
	Check Restore the Defa	ult Cattings

Set [Module Parameter] of R04CPU as shown left. 2 IP Address: 192.168.3.2

 Enable/Disable Online Change: Enable All (SLMP)
 Communication Data Code: Binary
 Click [External Device
 Configuration].

3. Configure the Open setting.



20 1 THE SLMP SCANNER CONNECTION 1.4 Setting the Programmable Controller

4. End Setting.

R04CPU Module Parameter			O Click [Apply] and end the settings.
Setting Item List	Setting Item		
Input the Setting Item to Search	Item	Setting	
	😑 Own Node Settings		
	Parameter Setting Method	Parameter Editor	
□ □ □ □ · (Basic Settings	JPAddress	192.168.3.2	
Own Node Settings	Subnet Mask		
External Device Configuration	Default Gateway		
	Enable/Disable Online Change	Enable All (SLMP)	
	Communication Data Code	Binary	
	Opening Method	Do Not Open by Program	
	😑 External Device Configuration		
	External Device Configuration	<detailed setting=""></detailed>	
	Explanation		
	Set the IP address of the own node.		
	Ensure that the own node and the external device to be c	ommunicated with have the same class 🛛 –	
	and subnet address. If IP address is not set, the module operates with followin	a TP addresse	
	B.I71EN71 PORT1: 192 168 3 40	g ir dudress.	
	RJ71EN71 PORT2: 192.168.4.40 CPU built-in Ethernet port: 192.168.3.39		
	or o built in Ethernet port 132,100,0,00	T	
	Check Restore the Default Sett	ines	
Item List Find Result			
		Apply	

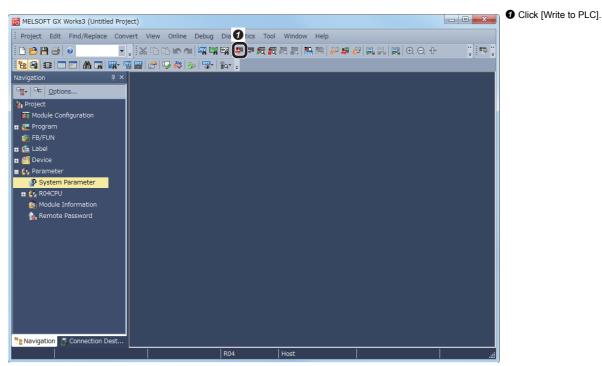
Point P

The user has to set parameters for communication for the programmable controller, and does not need to create a program for communication.

1.5 Execute Programmable Controller and Vision Sensor

Execute the programmable controller

1. Start the programmable controller.



2. Write the parameters.

ine Data Operation								X	Select [Parameter + Progr
isplay Setting Related Functions									2 Click [Execute].
Write Write Read		1	Verif	· 🖳 🎸	Delete				
Parameter + Program(F) Select All Open/Close All(T) Deselect All(N)	Legend	Built-in Me	mory	SD N	lemory Card 🛛 🚦	Intelligent Function Module]		
Module Name/Data Name	*			Detail	Title	Last Change	Size (Byte)	<u>^</u>	
= 🌆 Untitled Project									
🖶 🚱 Parameter									
System Parameter/CPU Parameter	•					2017/04/10 10:01:58	Not Calculated		
- 🙆 Module Parameter	•					2017/04/10 10:01:58	Not Calculated		
Memory Card Parameter						2017/04/10 10:01:58	Not Calculated	=	
Remote Password	•					2017/04/10 10:01:58	Not Calculated		
😑 🏦 Global Label									
Global Label Setting						2017/04/10 10:02:13	Not Calculated		
😑 🄙 Program				Detail					
MAIN MAIN	•					2017/04/10 10:02:15	Not Calculated		
🖨 🙆 Device Memory									
an main	•			Detail		2017/04/10 10:02:13	-	-	
Display Memory Capacity						(3		
							Execute	Close	

After writing the parameters is completed, reset and run the programmable controller.

Execute the vision sensor

Turn OFF \rightarrow ON the power supply of the vision sensor and restart it.

1.6 Checking Operations

Control the vision sensor using the programmable controller and check the operations.

Make the vision sensor online

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



- Select [Communication].
- Select [Online].
- Oheck that "Connected." is
- displayed for the SLMP Scanner.

Set the trigger to the vision sensor

Set the trigger to the vision sensor, and acquire inspection results.

Open [Online]⇔[Monitor]⇔[Device/Buffer Memory Batch Monitor] in GX Works3 to display devices.

1. Display devices.

Device Na	me		D	100	0								- 2	~				Detailed	d Cor	nditions 😨	Mon	itoring
O Buffer Mer	nory		Un	it										~	()-	IEX	0	Address		- DEC -	Stop M	lonitoring
Device Name	F	E	D	0	в	A	9	8	7	6	5	4	3	2	1	0	I	Current Value		String		
D1 000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0.			
D1 001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0.			
D1 002	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0		1	28 .			
D1 003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0.			
D1 004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0.			
D1 005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0.			
D1 006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0.			
D1 007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0.			
D1 008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0.	0		
D1 009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0.			
D1 01 0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6	8	-1 [
D1 01 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0.			
D1 01 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0.			
D1 01 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0.			
D1 01 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0.			
D1 01 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0.			
D1 01 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0.			
D1 01 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0.			
D1 01 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0.			
D1 01 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0.			
D1 020	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0.			

Input "D1000" in [Device Name] and monitor the contents of the data block.

2. Set the trigger.

Device Na	me		C	10	000	l)	_	_	_	_	_	_	_	_	~					Detailed Conditions 🛛 😵		8	Monitoring			
O Buffer Me	mory		U	nit											\sim] (HEX		Address		~	DEC	-	Stop	o Monito	ring
Device Name	F	E	C		С	в	A	9	8	7	6	5	4	3	2	1	0		Current Value			Stri	ne			
D1 000	0	C	0)	0	0	0	0	0	0	0	0	0	0	0	C	0	◄		1				_	-0	
D1 001	0	C	0)	0	0	0	0	0	0	0	0	0	0	0	C	0			0					-	
D1 002	0	C	0)	0	0	0	0	0	1	0	0	0	0	0	C	1			129	•				-	
D1 003	0	C	0)	0	0	0	0	0	0	0	0	0	0	0	C	0 0			0						
D1 004	0	C	0)	0	0	0	0	0	0	0	0	0	0	0	C	0 0			0					-	
D1 005	0	C	0)	0	0	0	0	0	0	0	0	0	0	0	0	0 0			0						
D1 006	0	C	0)	0	0	0	0	0	0	0	0	0	0	0	0	0 0			0					-	
D1 007	0	C) ()	0	0	0	0	0	0	0	0	0	0	0	0	0 0			0						
D1 008	0	C	0)	0	0	0	0	0	0	0	0	0	0	0	C	0 0			0					-	
D1 009	0	C	0)	0	0	0	0	0	0	0	0	0	0	0	C	0 0			0						
D1 01 0	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1			-1					-	
D1 01 1	0	C	0)	0	0	0	0	0	0	0	0	0	0	0	C	0 0	1		0						
D1 01 2	0	C	0)	0	0	0	0	0	0	0	0	0	0	0	C	0 0			0					-	
D1 01 3	0	C	0)	0	0	0	0	0	0	0	0	0	0	0	C	0 0			0						
D1 01 4	0	C	0)	0	0	0	0	0	0	0	0	0	0	0	C	0 0			0					1	
D1 01 5	0	C	0)	0	0	0	0	0	0	0	0	0	0	0	C	0 0			0						
D1 01 6	0	C	0)	0	0	0	0	0	0	0	0	0	0	0	0	0 0			0			_		1	
D1 01 7	0	C	0)	0	0	0	0	0	0	0	0	0	0	0	0	0 0			0						
D1 01 8	0	C	0)	0	0	0	0	0	0	0	0	0	0	0	0	0 0			0			_		1	
D1 01 9	0	C	0)	0	0	0	0	0	0	0	0	0	0	0	0	0 0			0						
D1 020	0	C	1 0)	0	0	0	0	0	0	0	0	0	0	0	10	0 0			0			_		1	

• To enable the trigger from the programmable controller, turn "ON" the "Network Trigger Enable" bit (D1000.0) of the control bit block. When the "Network Trigger Enable" bit (D1000.0) is "OFF", the vision sensor does not operate even though the trigger is ON.

Check inspection results

Check inspection results.

Device Nar	ne		D	101	00										~				Detailed Co	onditions 🛛 👿	Mor	nitoring
O Buffer Men	ory		Ur	hit											\sim]	(HI	EX)	Address	V DEC V	Stop I	Monitoring
Device Name	F	E	D	C		в	A	9	8	7	6	5	4	3	2		1	0	Current Value	String		,
D1 000	0	0	0	C)	0	0	0	0	0	0	0	0	Τ(0	Г	1	1	3	-		
D1 001	0	0	0	C		0	0	0	0	0	0	0	0	0	0		0 [0	0		2	5
D1 002	0	0	0	C)	(a)	1	0	1	0	0	0	0	0	Ĩ.	1	1	2691	•	-	5
D1 003	0	0	0	C	7	ò	0	U	0	0	0	0	0	1	0		0	0	8		2	
D1 004	0	0	0	C)	0	0	0	0	0	0	0	0	0	0		0	0	0		-	
D1 005	0	0	0	C)	0	0	0	0	0	0	0	0	0	0	T	0	0	0		7	
D1 006	0	0	0	C)	0	0	0	0	0	0	0	0	0	0		0	0	0		-	
D1 007	0	0	0	C)	0	0	0	0	0	0	0	0	0	0	1	0	0	0			
D1 008	0	0	0	C)	0	0	0	0	0	0	0	0	0	0	1	0	0	0			
D1 009	0	0	0	C)	0	0	0	0	0	0	0	0	0	0		0	0	0			
D1 01 0	0	0	0	C)	0	0	0	0	0	0	0	0	0	0	1	0	0	0			
D1 01 1	0	0	0	C)	0	0	0	0	0	0	0	0	0	0		0	0	0		1	
D1 01 2	0	0	0	C)	0	0	0	0	0	0	0	0	1	0		0	0	8		-	
D1 01 3	0	0	0	C)	0	0	0	0	0	0	0	0	1	0	1	0	0	8		2	
D1 01 4	1	1	1	1		1	1	1	1	1	1	1	1	1	1	le l	ŧ.	1	-1			
D1 01 5	0	0	0	C)	0	0	0	0	0	0	0	0	0	(b)	0	0			
D1 01 6	0	0	0	C)	0	0	0	0	0	0	0	0	0	11.		5	1	1		-	
D1 01 7	0	0	0	C)	0	0	0	0	0	0	0	0	0	+(C)	τī	3	(d)	7	
D1 01 8	0	0	0	C)	0	0	0	0	0	0	0	0	0	0		0	0	0		-	
D1 01 9	0	0	0	C)	0	0	0	0	0	0	0	0	0	0	Th	0	0	0			
D1 020	0	0	0	10		0	0	0	0	0	0	0	0	0	0	t i	0	0	0		-	8

• Turn "ON" the "Trigger" bit (D1000.1) of the control bit block. (a) Inspection Completed: The vision sensor is triggered and an search result is output. As the inspection result, the format output data set with the SLMP Scanner of In-Sight Explorer is output.

(b) D1015 = Pattern_1 PASS
(c) D1016 = Pattern_1 FAIL
(d) D1017 = Inspection count
When the inspection is completed, the "Inspection Completed" bit (D1002.9) of the status bit block changes (toggles).

To set the trigger to the vision sensor again, turn "ON" D1000.1.

1.7 Contents in Data Blocks

Contents in data blocks

Set a start device and the number of devices to each data block with In-Sight Explorer.

The start device types (such as D, M, and X) and the start devices can be changed. The number of devices, excluding the ones for the control bit block and status bit block, can be changed. The control details set to each data block are fixed in the system.

The following shows the control details of the six data blocks where devices have been assigned.

Function	Start device	Number of devices
Control bit block (Control)	D1000	2
Status bit block (Status)	D1002	2
Input word block (Input block)	_	—
Output word block (Output block)	D1010	8
String command word block (Command)	_	—
String command result word block (Command result)	_	_

■Device assign	nment to be use	d control bit block
----------------	-----------------	---------------------

Classification	Device	Control details (Application)	Supplement
Control bit block D1000.0	D1000.0	Network Trigger Enable	The trigger is enabled by turning on this "trigger" bit and is disabled by clearing this bit.
	Trigger	 The following conditions need to be satisfied to enable the trigger. The vision sensor is online when the Network Trigger Enable bit is on. In the setting of In-Sight Explorer, "Industrial Ethernet is set for the [Trigger] parameter. 	
	D1000.2	Buffer Result Enable	
	D1000.3	Inspection Result ON Acknowledgment	
D	D1000.4	Job Load Trigger	Store an ID of the job to be loaded to the Job Load ID o the input word block and turn it on.
	D1000.5	Reserved	
	D1000.6		
	D1000.7	SetOffline	The vision sensor goes offline when this bit is turned or
	D1000.8	Reserved	
D1000	D1000.9		
	D1000.A		
	D1000.B		
	D1000.C		
D	D1000.D		
	D1000.E		
	D1000.F		
D10	D1001.0	Set User Data	This bit turns off→on when the user data of the input word block is updated.
	D1001.1	Send Native Mode Command	
D1001.2	D1001.2	Clear Error	The error code of the output word block is cleared when this bit turns ON.
	D1001.3	Clear Image Complete Signal	
D1001.6	D1001.4	Reserved	
	D1001.5		
	D1001.6		
	D1001.7		
	D1001.8	Soft Event 0 Trigger	It cannot be used with this model.
	D1001.9	Soft Event 1 Trigger	It cannot be used with this model.
	D1001.A	Soft Event 2 Trigger	It cannot be used with this model.
	D1001.B	Soft Event 3 Trigger	It cannot be used with this model.
	D1001.C	Soft Event 4 Trigger	It cannot be used with this model.
	D1001.D	Soft Event 5 Trigger	It cannot be used with this model.
-	D1001.E	Soft Event 6 Trigger	It cannot be used with this model.
	D1001.F	Soft Event 7 Trigger	It cannot be used with this model.

Classification	Device	Control Details (Application)	Supplement
Status Bit Blocks D1002.0 D1002.1 D1002.2 D1002.3 D1002.3	D1002.0	Network Trigger Ready	This bit turns on when the trigger can be input.
	D1002.1	Trigger ON Acknowledgment	This bit notifies that the trigger ON is acknowledged. This bit remains ON until the "trigger" bit is cleared.
	D1002.2	Reserved	
	D1002.3	Importing Failed	This bit turns on when importing an image failed. This bit is cleared when importing an image is properly completed.
	D1002.4	Offline Reason	0: Online status
	D1002.5		1: Offline operation from the program
	D1002.6		2: Offline operation from the discrete signal input3: Offline operation from the communication
	D1002.7	Online	This bit turns on when the vision sensor is online.
	D1002.8	System Busy	This bit turns on during inspection processing.
	D1002.9	Inspection Completed	This bit changes (toggles) the status when inspection is completed.
	D1002.A	Result Buffer Overrun	
	D1002.B	Results Valid	
	D1002.C	Job Loading	
	D1002.D	Job Load Complete	
	D1002.E	Job Load Failed	
D D D D D D D D D D D D D D D D D D D	D1002.F	Fault	It cannot be used with this model.
	D1003.0	Set User Data Trigger Acknowledgment	
	D1003.1	Send Native Mode Command Trigger Acknowledgment	
	D1003.2	Native Mode Command Error	
	D1003.3	Imaging Completed	
	D1003.4	Job Pass	It cannot be used with this model.
	D1003.5		
	D1003.6		
	D1003.7		
	D1003.8	Soft Event 0 Trigger Acknowledgment	It cannot be used with this model.
	D1003.9	Soft Event 1 Trigger Acknowledgment	It cannot be used with this model.
	D1003.A	Soft Event 2 Trigger Acknowledgment	It cannot be used with this model.
	D1003.B	Soft Event 3 Trigger Acknowledgment	It cannot be used with this model.
	D1003.C	Soft Event 4 Trigger Acknowledgment	It cannot be used with this model.
	D1003.D	Soft Event 5 Trigger Acknowledgment	It cannot be used with this model.
	D1003.E	Soft Event 6 Trigger Acknowledgment	It cannot be used with this model.
	D1003.F	Soft Event 7 Trigger Acknowledgment	It cannot be used with this model.

Device assignment to be used status bit block

Device Assignment to be Used Output Word Blocks

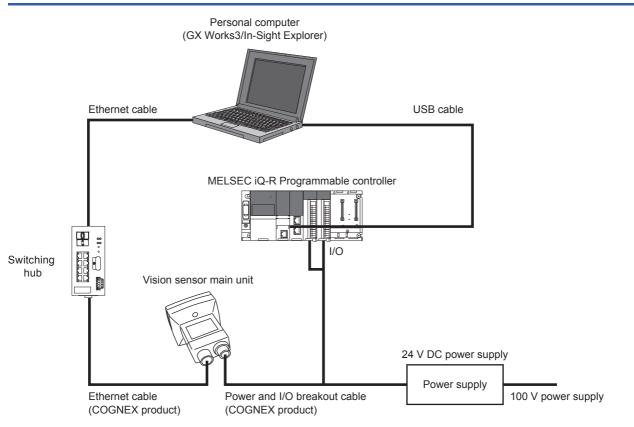
Classification	Device	Control Details (Application)	Supplement
Output Word Blocks	D1010	Loaded Job ID	
	D1011	Error Code	
	D1012	Image Import ID	
	D1013	Inspection Result ID	
	D1014	Image Inspection Result Code	
	D1015 to D1021	Inspection Result	These devices store the data that has been specified with the format output data and is to be output from the vision sensor. In this example these are as shown below. • D1015: Pattern_1.PASS • D1016: Pattern_1.FAIL • D1017: Job Inspection Count

2 I/O CONNECTION

2.1 Introduction

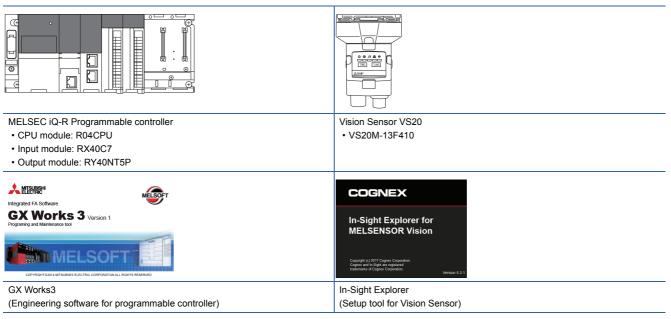
This chapter describes the procedures for connecting the Vision Sensor VS20 to a MELSEC programmable controller and controlling the vision sensor with I/O.

Example of system configuration for connecting the vision sensor



Required modules and devices

Mitsubishi Electric products



■COGNEX products



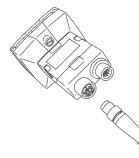
Ethernet cable

■Commercial products

Switching hub	Ethernet cable	USB cable	24 V DC power supply

Ethernet cable connection

1. Connect the Ethernet cable's M12 connector to the vision sensor's Ethernet connector.

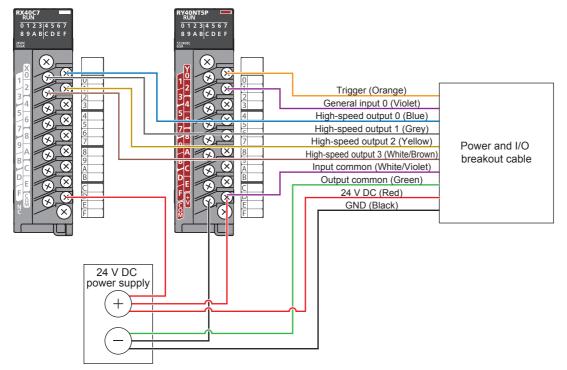


2. Connect the Ethernet cable's RJ-45 connector to the switching hub or personal computer, as applicable.

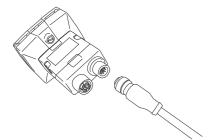
Connect the power and I/O breakout cable

Precautions

- When connecting the vision sensor and programmable controller, simultaneously turn on the vision sensor and programmable controller, or first turn on the programmable controller.
- Cut unused wires or protect them with insulating materials. Keep all bare wires separated from the 24 V DC wire.
- **1.** Verify that the 24 V DC power supply being used is unplugged and not receiving power.
- 2. Connect the wires of the power and I/O breakout cable, I/O module and power supply as shown below.



3. Connect the power and I/O breakout cable's M12 connector to the vision sensor's Power, I/O and RS-232 connector.



4. Turn on the 24 V DC power supply switch.

2.2 Vision Sensor Setting

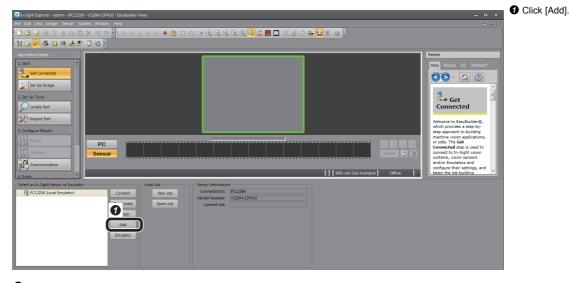
Setting an IP address to the personal computer

Set the IP address 192.168.3.3 to the personal computer.

Connecting of the vision sensor

Start In-Sight Explorer to set the vision sensor.

1. Start the In-Sight Explorer software.



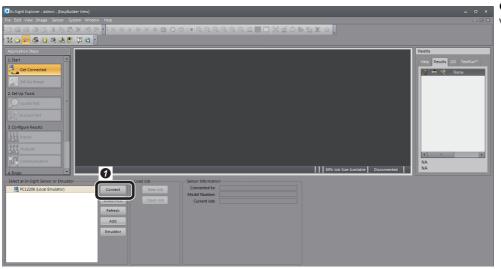
2. Add the vision sensor to the network.

Add Sensor/Device to Network ×			
Select an In-Sight sensor or device to add to your ne	ork. If the desired sensor/device is not listed, you ca	n add it by cycling its power. Devices	
Host Name Type MAC	IP <u>H</u> ost Name:	VS20M-13F410_xxxxxxx	
VS20M-13F410 VS20M-13F410 00-d0-24	192.168.0.1 Obtain IP Addre 	ss Automatically (DHCP)	
	⊙ <u>U</u> se The Followir	Use The Following Network Settings	
	IP Address:	192 . 168 . 3 . 1	
	<u>S</u> ubnet Mask:	255 . 255 . 255 . 0	
	Default <u>G</u> ateway:		
	DNS Server:		
	D <u>o</u> main Name:		
	23	Copy PC Network Settings	
	Reset <u>A</u> dmin Pas	ssword	
Elash Lights <u>R</u> efresh	Reset Sensor Set	ttings to Factory Defaults	

• Add the sensor and device to the network as shown left.

- IP Address: 192.168.3.1
- Subnet Mask: 255.255.255.0
- Olick [Apply].

3. Connect to the vision sensor.

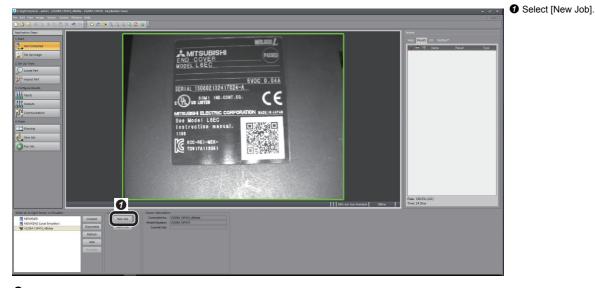


O Click [Connect] to connect to the vision sensor.

Creating a new job

1. Create a new job.

As an example, configure the setting of an inspection to see if there is a "CE" mark on the inspection object.



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



3. Set a tool.

📮 in Sight Explorer - admin - [VS20M-135410_48	bilde - VS20M-137410 - Easytkulider View)		- đ ×	Select [Locate Part].
file Edit View Image Sensor System Wir			= (∂ ×	
🗋 🗳 😹 🖉 🗋 🛝 🖻 🛅 🗙 🤊	ା ଜ • <mark>ା ୦ ଥ ୦</mark> କ୍ କ୍ କ୍ କ୍ କ୍ କ୍ କ୍ କ୍ କ୍			Select [Pattern].
Application Steps	_		Falette	
1.Start		WELADO	Help Results UD TesRun ^{te}	
Get Connected			👔 🐢 🗞 Name Result Type	
1 Up Image		MITSUBISHI (PASSED		
		ANTSUBISHI (NISE) END COVER WODEL L GEC		
O Locate Part		MODELLOEG		
		5VDC 0.04A		
3. Configure Results		SERIAL 130802132417024-A		
Inputs		COU uS LISTES CONT.EQ. CE		
ttt Outputs				
A compute values Inputs Communication	1000000	MITSUBISHI ELECTRIC CORPORATION MADE IN FARM		
4. Firsh		See Model L6EC		
Rinstrip	10000000	instruction manual.		
		1108		
Save Job				
Run Job		CC-REI-MEK-		
			Bate: 100.0% (22)	
		0 89% Job Size Available 0	Time: 24.5ms	
	Description			
2	Locates a single pattern feature: reports the pass/fail result. Outputs a Tool Fedure that can			
(be referenced by other tools.			
at Pattern	Click the Add button to begin.			
at tage Intersection	For more information, please see the EasyBuilder Help.			
Cirde				

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



Set the model. (Select "CE" mark)Click [OK].

5. Set the name of the set pattern.



• Input an arbitrary name in the tool name. (In this guide it will remain the default "Pattern_1".)

Inputting from the programmable controller

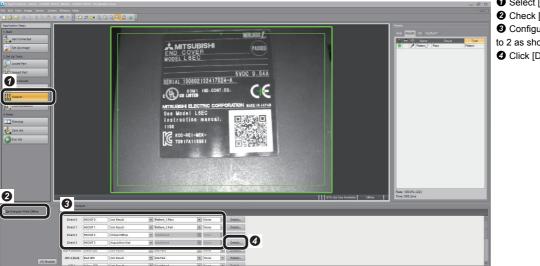
Set the input data from the programmable controller.



Select [Inputs].Set the Direct 0 signal type to "Online/Offline".

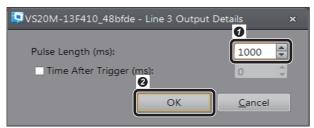
Outputting to the programmable controller

1. Set the data to be output to the programmable controller.



- Select [Outputs].
- Ocheck [De-Energize While Offline].
- Ocnfigure the settings for Direct 0
- to 2 as shown left.
- Olick [Details] of Direct 3.

2. Set output details.



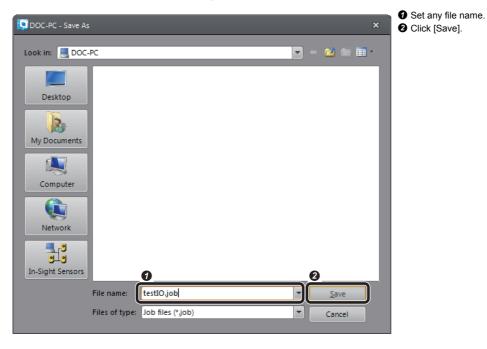
- Set the ON time of the signal to turn ON when processing is completed.
- Range: 1-1000 ms 2 Click [OK].

Saving the job

1. Name the created job and save it.

Con Sign Fugierer - Annin : D12004 19410, 4804 - 12204 19410 - Estybuder Verij Na Esti Veri Inage Senar System Wolsen Net 1 3 3 3 100 11 5 10 × 9 10 10 00 00 00 00 00 00 00 00 00 00 00		 Select [Save Job]. Check [Start the Sensor in Online
Augunation frage.	AMTSUBISH (NSEE) WODELLBEC SYDC 0.04A SERIAL 190002132417024-A CE Om buff IND.CONT.62 Om buff CE MISSING ELECTROPATION INSTITUTE CE	Mode]. Click [Save As].
	Texes (hanned)	

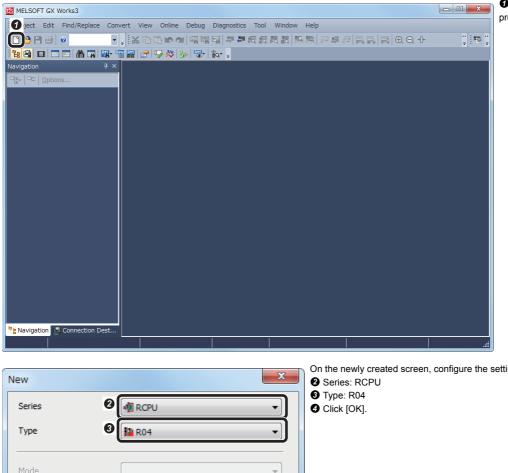
2. Input the file name and save the job.



Setting the programmable controller

Start GX Works3 to set the programmable controller.

1. Start GX Works3.



Start GX Works3 and create a new project.

New	×	On the newly created screen, configure the settings as shown left Series: RCPU
Series	RCPU V	Type: R04 Click [OK].
Туре	O R04 V	
Mode	Ţ	
Program Langua	ige 🕢 Ladder 🔻	
	OK Cancel	
MELSOFT GX Wo		G Click [OK].
Add a	module. [Module Name] R04CPU [Start I/O No.] 3E00	
Module Settin	g Setting Change	
Module Labe	el:Not use	
Do Not Show	this Dialog Again	

2. Configure the parameter settings.



3. Set I/O module.

System Parameter						X	 Select [I/O Assignment Setting]. Set "RX40C7" for slot 0 and
I/O Assignment Multiple CPU Setting Inter-	nadula Sumahuaninat	ian Satting					"RY40NT5P" for slot 1.
		ion setting					
Setting Item List	Setting Item					_	Click [OK].
	Read Mounting Status	Display Setting (V)	Change CPU Order	Up Down B	ase ode:Automatic		
	Slot	Module Name	Module Status Setting	Points	Start XY		
Base /Power /Evtension Cable Sett			module ordras ocraine	Tonta	Otdireven		
J/O Assignment Setting Setting of Points Occupied by Emp	CPU	2 DPU(Host Station)	_		3E00		
	0(*-0)	RX40C7	lo Setting	16 Points	0000		
		RY40NT5P	No Setting	16 Points	0010		
	2(*-2)						
	3(*-3)					_	
	4(*-4) 5(*-5)					_	
	6(*-6)					_	
	7(*-7)						
	8(*-8)					-	
	∢ [III			Þ	•	
	Explanation						
	Set the module na						
						^	
	Module configuration the base model na	on diagram is not shown if me has not been set in 'Ba	a module name other than ho: se/Power/Extension Cable Se	st CPU is set a etting'.	although	=	
			er-module synchronization fun				
	Assignment Settin	rns setting when using inte s.	s-module synchronization fun	ction to fix the	. 10	-	
< III >>							
Item List Find Result	Check	Restore the	Default Settings				
Item List Find result							
			0				
			Č				
System Parameter Diversion				ОК	Cancel		

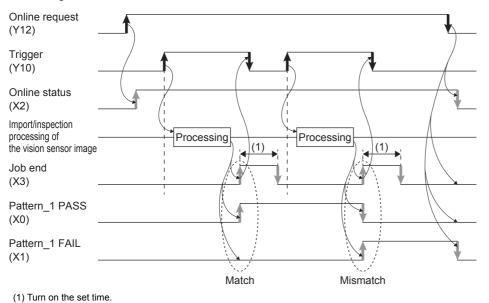
O Double-click "System Parameter" in the Navigation window.

Creating program

Signal	Signal Name	Contents	Remarks
X0	Pattern_1 PASS	It turns on when the captured image matches the model (feature) set in Pattern_1. 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	It turns on when the captured image differs from the model (feature) set in Pattern_1. 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	It turns on when the vision sensor is online. ON: Online OFF: Offline, or discrete online	_
Х3	Job completion	It turns ON for the set time when image capture processing is completed.	For the setting of ON time, refer to Page 37 Outputting to the programmable controller.
Y10	Trigger	When the trigger setting of the vision sensor is set to [Camera], image capture is executed with OFF \rightarrow ON. To execute again, please set it to ON \rightarrow OFF once, then OFF \rightarrow ON.	It becomes enabled only when the vision sensor is online.
Y12	Online request	Turn on when making the vision sensor online in discrete online status. Turn off when making the vision sensor the discrete online status.	If the vision sensor is in the offline status, it will not go online even if it is turned on.

As applicable, create a program using the following I/O signals.

The timing chart is shown below.



Turn ON/OFF with the programmable controller (Program).

Turn ON/OFF the vision sensor automatically.

Program example

Program example is shown below.

(0)									V12
(2)		×2 	X3 /T	¥10 ↓/				SET	Y10
(7)									M10
(9)									M11
(11)	X3 							RST	Y10
								RST	M1
(14)									[END]

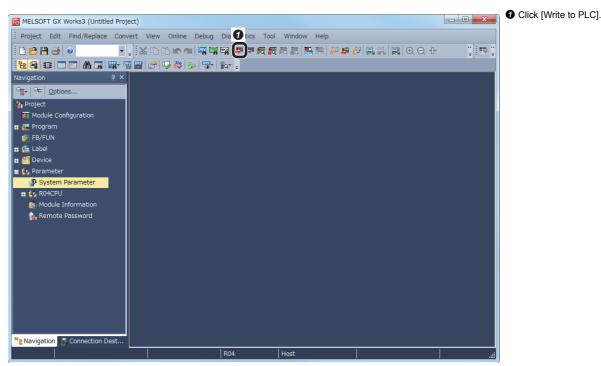
The CPU devices used in the program example are as follows. For the I/O signals, refer to the previous page.

Signal	Signal Name	Contents	Remarks
M0	Online command	During the on status, Y12 turns on, becoming the online status.	_
M1	Trigger directive	At OFF→ON, Y10 is turned ON, and image capture is executed.	_
M10	Pattern_1 PASS	It turns on when the captured image matches the model (feature) set in Pattern_1. ON: Pattern match OFF: Pattern mismatch, or capture not implemented	It becomes the same status as X0.
M11	Pattern_1 FAIL	It turns on when the captured image differs from the model (feature) set in Pattern_1. ON: Pattern match OFF: Pattern mismatch, or capture not implemented	It becomes the same status as X1.

2.4 Execute Programmable Controller and Vision Sensor

Execute the programmable controller

1. Start the programmable controller.



2. Write the parameters.

nline Data Operation								O Select [Parameter + Program
Display Setting Related Functions								Olick [Execute].
Parameter + Program(F) Select All		Ver	fy 🖳 🄇	Delete		7		
Open/Close All(T) Deselect All(N)	CPU Built-ir	Memory	SD N	Memory Card 👔	Intelligent Function Module			
Module Name/Data Name			Detail	Title	Last Change	Size (Byte)	<u>^</u>	
🖃 📲 Untitled Project								
🗆 🐼 Parameter 🔽	2							
- System Parameter / CPU Parameter	-				2017/04/10 10:01:58	Not Calculated		
- 🙆 Module Parameter 🔽	2				2017/04/10 10:01:58	Not Calculated		
Memory Card Parameter					2017/04/10 10:01:58	Not Calculated	=	
Remote Password	7				2017/04/10 10:01:58	Not Calculated		
🗆 🏦 Global Label 🛛 🔽	2							
Global Label Setting	2				2017/04/10 10:02:13	Not Calculated		
🕂 🏎 Program 🛛 🔽	2		Detail					
MAIN 🗹	7				2017/04/10 10:02:15	Not Calculated		
🗆 🙆 Device Memory 🔽	2							
main 🗹	7		Detail		2017/04/10 10:02:13	-	-	

After writing the parameters is completed, reset and run the programmable controller.

Execute the vision sensor

Turn OFF→ON the power supply of the vision sensor and restart it.

2.5 Checking Operations

Control the vision sensor using the programmable controller and check the operations.

Make the vision sensor online

Turn on the programmable controller online command (M0) and shift the vision sensor from the discrete online status to the online status.

Set the trigger to the vision sensor

Turn on the trigger command (M1) of the programmable controller and trigger it to the vision sensor.

Check inspection results

Pattern_1 PASS (M10) turns on if the inspection subject matches the model set in Pattern_1, and Pattern_1 FAIL (M11) turns on if the inspection subject does not match.

Open [Online]⇔[Monitor]⇔[Device/Buffer Memory Batch Monitor] in GX Works3 to display devices.

1 [Device/Buffe	er Memory Ratch M	 Input "M0" in [Device Name] Check M10 and M11. 					
Device Na	Č		~		Detailed Conditions	Monitoring	
O Buffer Me	mory Unit	-	(HEX)	Address	V DEC V	Stop Monitoring	
Device Name	9 8 7 6 5	4 3 2 0				^	
MO	0 0 0 0						
M10	0 0 0 0 0	0000					
M20	0 0 0 0	0 0 0 0 0					
M30	0 0 0 0 0	0 0 0 0 0					

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