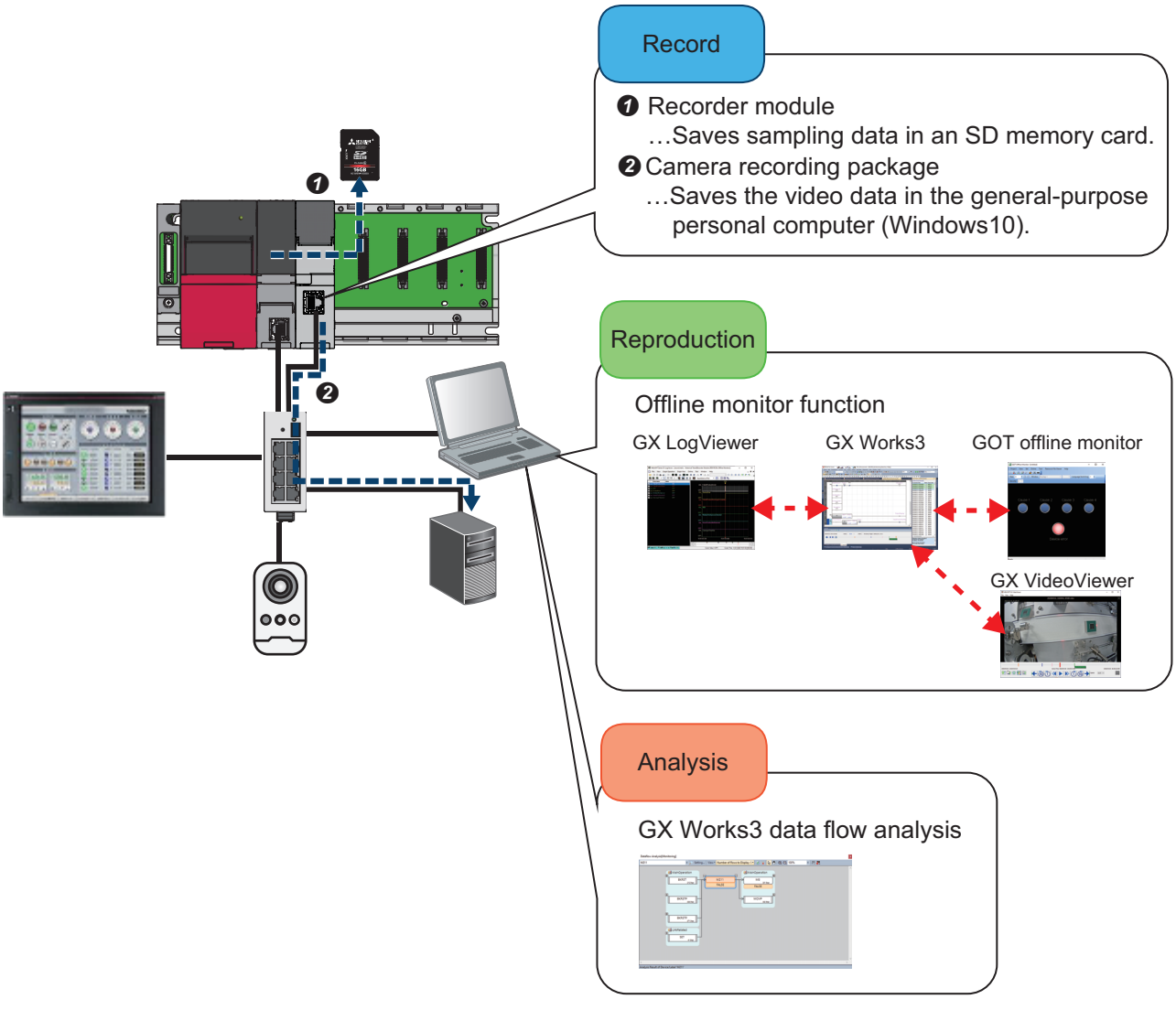
MITSUBISHI ELECTRIC

Programmable Controller

MELSEC iQ-R series

MELSEC iQ-R System Recorder Introduction Guide (Recorder Module)

This guide describes the procedure for introducing a system recorder, which is one of our maintenance solutions. The system recorder records the operation of the program data and error/event occurrences during the system operation using the recorder module. By replaying the record in GX Works3, the past system operation can be checked. To determine and analyze the trouble cause, reproduce the status of the site where the trouble has occurred by using the GOT offline monitor or use the video recorded by a camera together.



CONTENTS

1 OVERVIEW

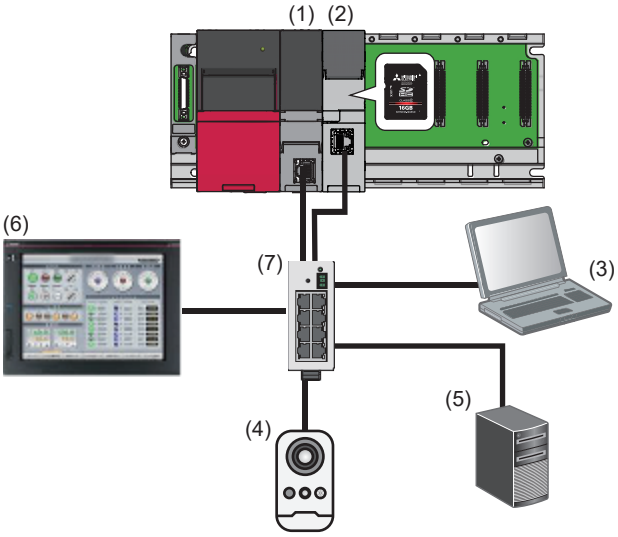
The system recorder is a solution in which the following three steps performed in the breakdown maintenance phase are integrated.

Step	Corresponding function	Description	Required module or engineering tool
Record	Recording function	In addition to all the devices of the programmable controller CPU, labels and camera videos are sampled and recorded with timestamps. The recording function outputs the data of the CPU module to a recording file when a file saving trigger is established and saves it in the SD memory card of the recorder module. The camera recording function uses a network camera connected to the built-in Ethernet of the CPU module to record the video of the camera synchronized with the CPU module.	• CPU module • Recorder module • GX Works3
	Camera recording function		• Camera recording package • GX VideoViewer
Reproduction	Offline monitor function	The timing of the error occurrence can be easily determined by synchronizing and replaying the various recorded data. The offline monitor function replays the recording files saved in the SD memory card of the recorder module on the offline monitor. In addition, starting the GOT offline monitor replays the monitor screen of the GOT.	• GX Works3 • GT Designer3
Analysis	Data flow analysis function	The time taken to determine the root cause of the error can be reduced by tracing the sequence program. The data flow analysis function searches for event histories of devices, labels, parameters, and current value changes in the program that cause the selected device or label to change and displays the related items in a flowchart.	GX Works3

This document describes the procedures for setting the MELSEC iQ-R series recorder module RD81RC96 and network camera and functions of GX Works3 for implementing these three steps.
In addition, procedure examples for determining the trouble cause by monitoring the data recorded by the recording module and using the video of the network camera, analysis function of GX Works3, and GX LogViewer are described.

System configuration

In this document, the following system configuration is used as an example.

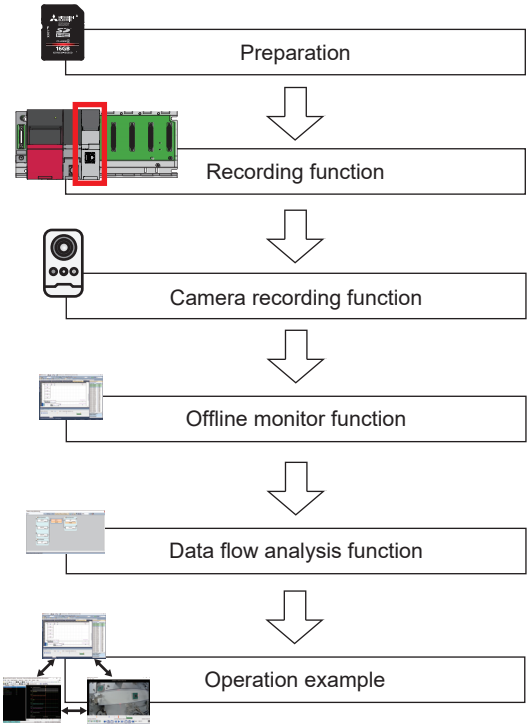


Device/software			Model	IP address
(1)	CPU module		R16CPU	192.168.3.39 (default)
(2)	Recorder module (For the recorder module, an SD memory card must be inserted.)		RD81RC96	—
(3)	Personal computer for setting	GX Works3*1	—	192.168.3.100
		GX LogViewer*2	—	
		GT Designer3*3	—	
		GX VideoViewer*4	—	
(4)	Network camera		M1065-L	192.168.3.42
(5)	General-purpose personal computer (Windows10)		—	192.168.3.30
(6)	GOT		GT2715-XTBA	192.168.3.18 (default)
(7)	PoE switching hub		GS108PE	—

*1 The version 1.070Y is used in this document.
*2 The version 1.112R is used in this document.
*3 The version 1.241B is used in this document.
*4 The version 1.006G is used in this document.

1.1 Introduction Flowchart

Configure the settings and check the operation with the following procedures. For details, refer to Chapter 2 and subsequent chapters in this document.



Do preparation such as wiring devices and inserting an SD memory card.
☞ Chapter 2

Configure the recording settings to use the recording function.
☞ Chapter 3

Connect the network camera and personal computer,
and configure the settings for recording and saving videos.
In addition, programs required for video recording are described.
☞ Chapter 4

Open the recording file saved with the recording function,
and monitor the operation of the program offline.
☞ Chapter 5

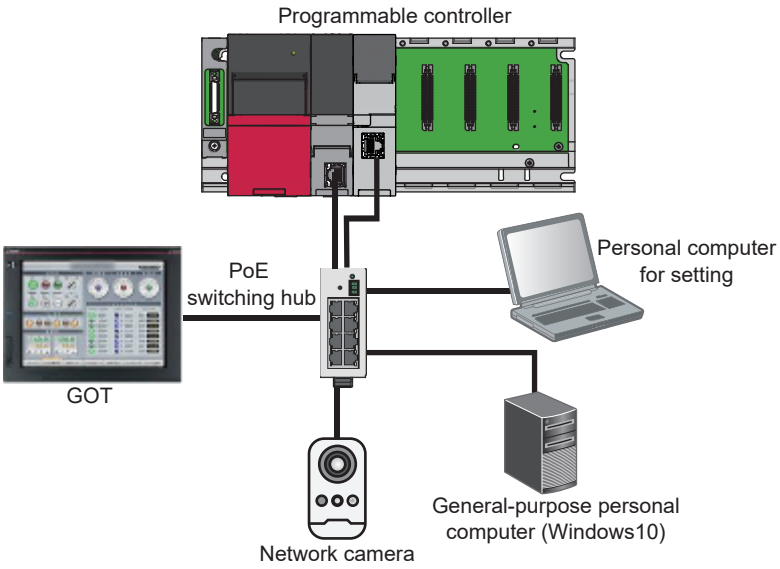
Check which devices affect the operation of specific devices
throughout the program.
☞ Chapter 6

By using the caputred videos of the camera, the offline monitor function of GX Works3, data flow analysis and GX LogView can be used to inspect/analyse the cause of the error.
☞ Chapter 7

2 PREPARATION

2.1 Wiring

The following shows the wiring described in this document.
Connect the personal computer, CPU module, recorder module, network camera, general-purpose personal computer (Windows10), and GOT to the PoE switching hub using Ethernet cable.

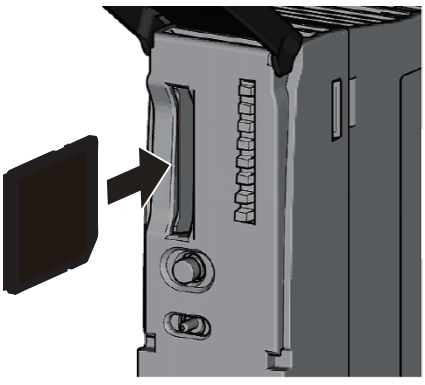


Point

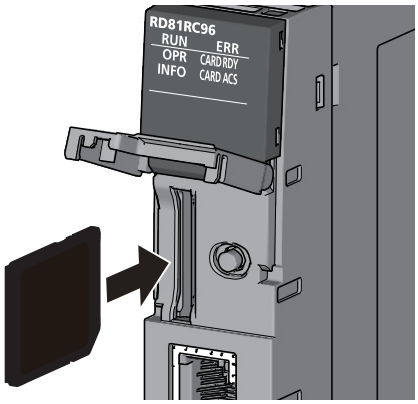
For the programmable controller, network camera, general-purpose personal computer (Windows10), personal computer for setting, and GOT, set the IP addresses. The IP addresses must be in the same segment.

2.2 Inserting an SD Memory Card

Insert SD memory cards to the CPU module and recorder module.
Inserting an SD memory card to the CPU module is not necessary. However, the lifetime of the CPU module is shortened due to the limited number of writing if the save destination of event logging is ROM. Therefore, inserting an SD memory card is recommended.
The SD memory card in the recorder module is required for saving recording files.



CPU module



Recorder module

2.3 IP Settings of Personal Computers

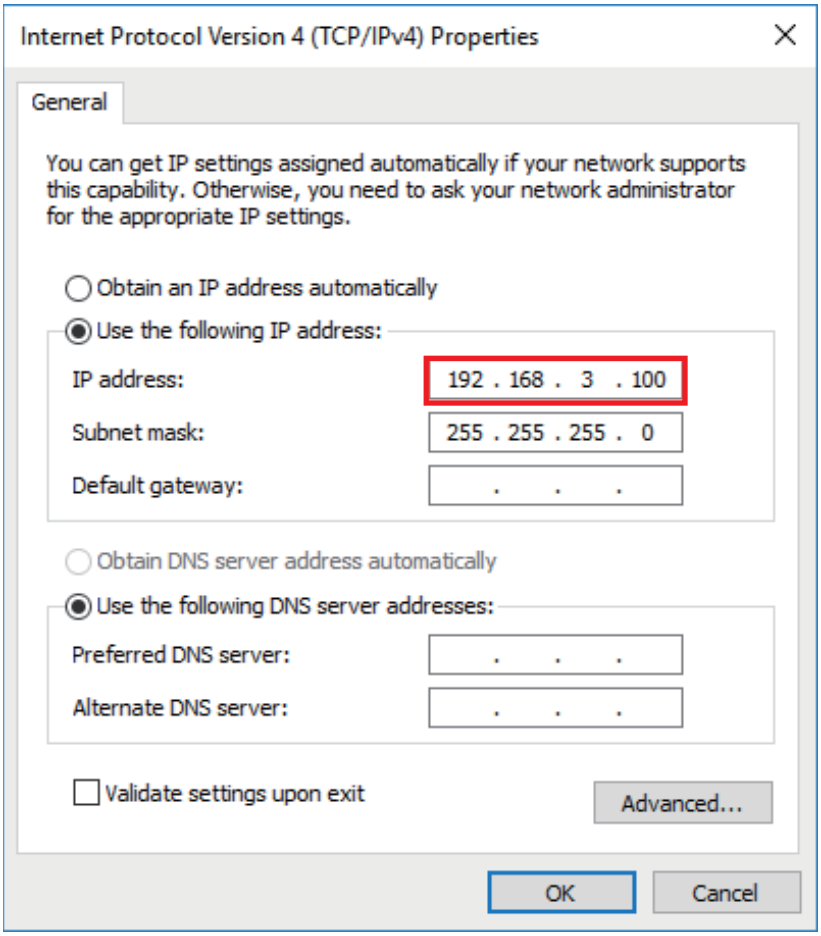
Set the IP addresses of the personal computer for setting and general-purpose personal computer (Windows10).

Operating procedure

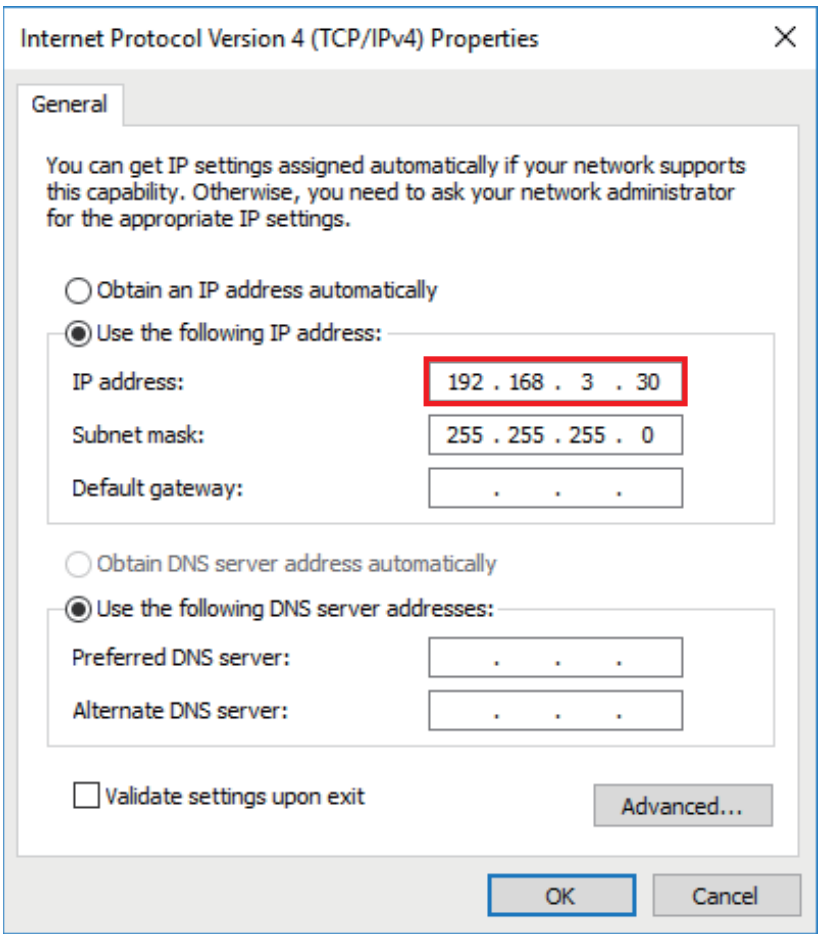
1. Set the IP address of the personal computer in "Internet Protocol Version 4 (TCP/IPv4)".

Ex.

Personal computer for Setting: 192.168.3.100



General-purpose personal computer (Windows10): 192.168.3.30



Point

- Set the IP address so that it is in the same segment as the ones of the devices to be connected.
- For setting IP addresses of the other devices, refer to the following.

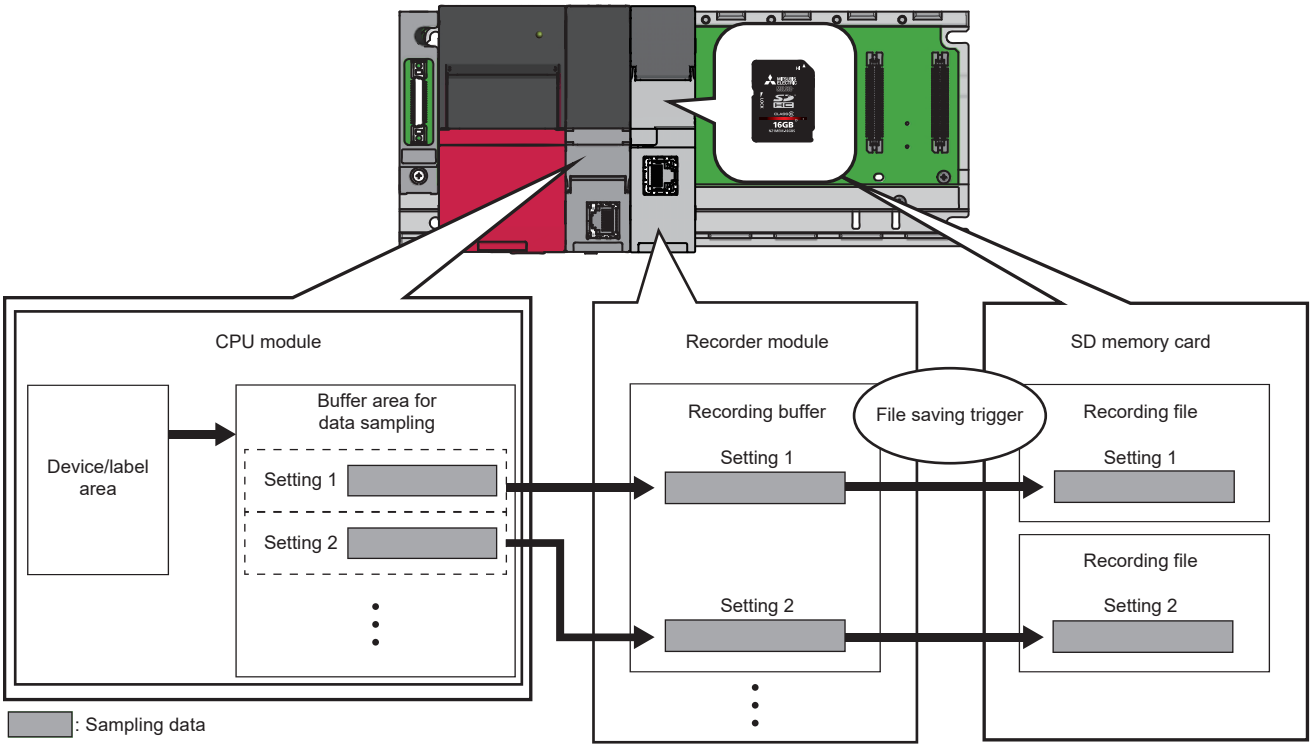
Programmable controller: ☞ Page 38 Programmable Controller Setting

Network camera: ☞ Page 25 Network Camera Setting

GOT: 🕮GT Designer3 (GOT2000) Screen Design Manual

3 RECORDING FUNCTION

The recording function stores the devices, labels, and event histories of the CPU module in the recorder module, outputs the data within the saving period in a recording file when a file saving trigger is established, and saves it in the SD memory card.



To use the recording function, set the following.

Two recording methods are provided: "File Saving Trigger Only" and "Recording Startup Trigger + File Saving Trigger".

The following table lists the setting example in the recording method using only the file saving trigger for recording data within the period between 30 seconds before and 5 seconds after the device M0 turns on.

Setting item	Description
Recording setting	Configure the settings required for recording. ■Settings • Recording Method: File Saving Trigger Only • Specify Device/Label in batch: Selected • Device: M0

3.1 Creating a New Project

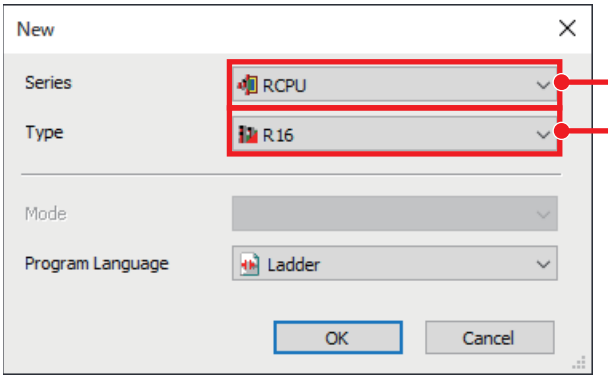
Create projects for the CPU module and GOT.

CPU module

Set the following in GX Works3.

Operating procedure

1. Create a new project.



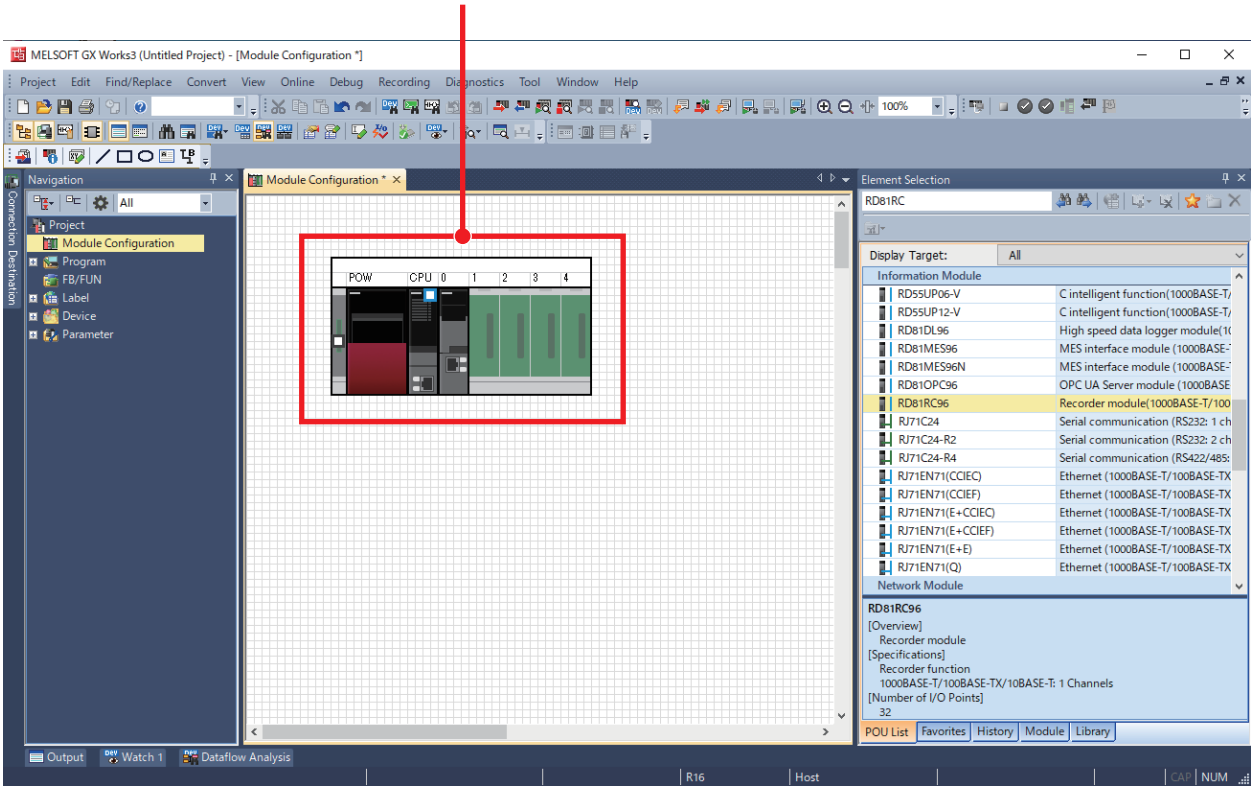
Set the series to RCPU.

Set the type according to the system configuration.

2. Set the module configuration diagram.

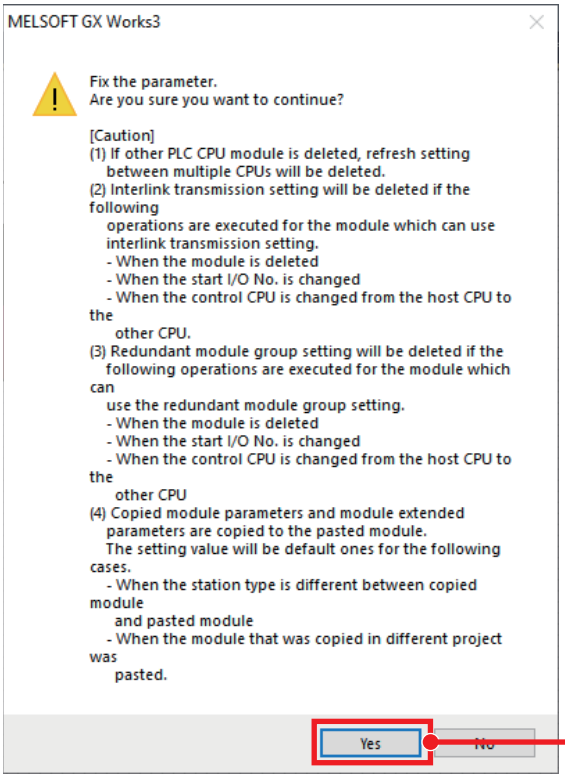
[Navigation] ⇨ [Module Configuration]

Set the required modules (base unit, power supply module, CPU module, and information module "RD81RC96") according to the system configuration.

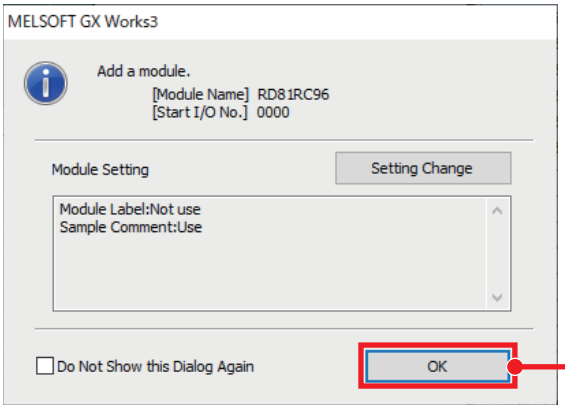


3. Confirm the parameters.

Right-click the module configuration diagram ⇨ [Parameter] ⇨ [Fix]



4. The recorder module is added.

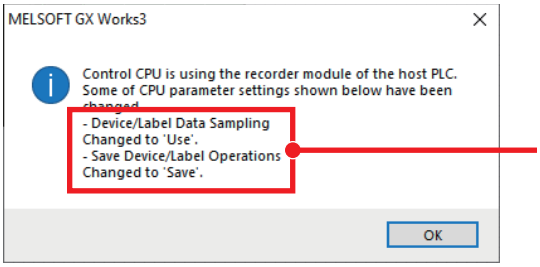


Point

When the recorder module is added, the CPU parameters are automatically set.

They are related to the following settings.

☞ Page 15 When configuring multiple recording settings,Page 79 Event History Function (Saving Device/Label Operations)

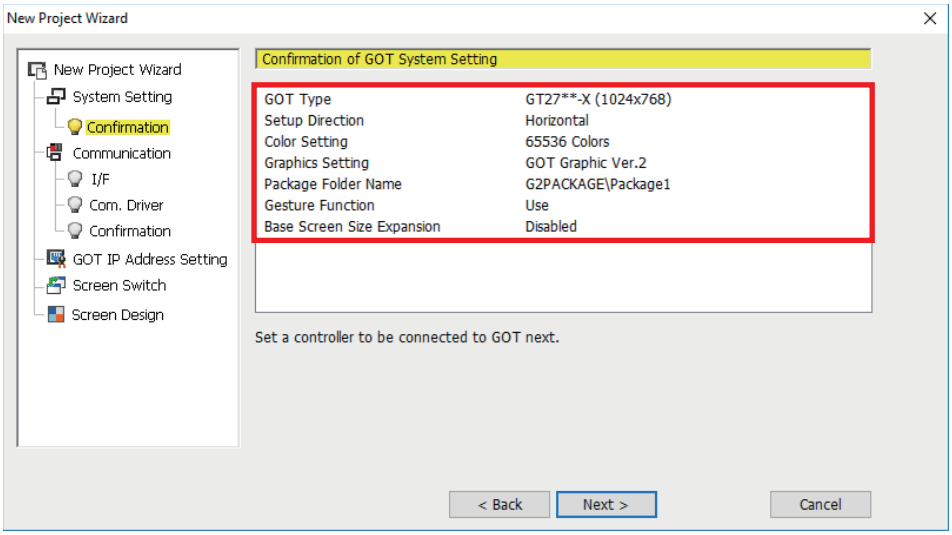


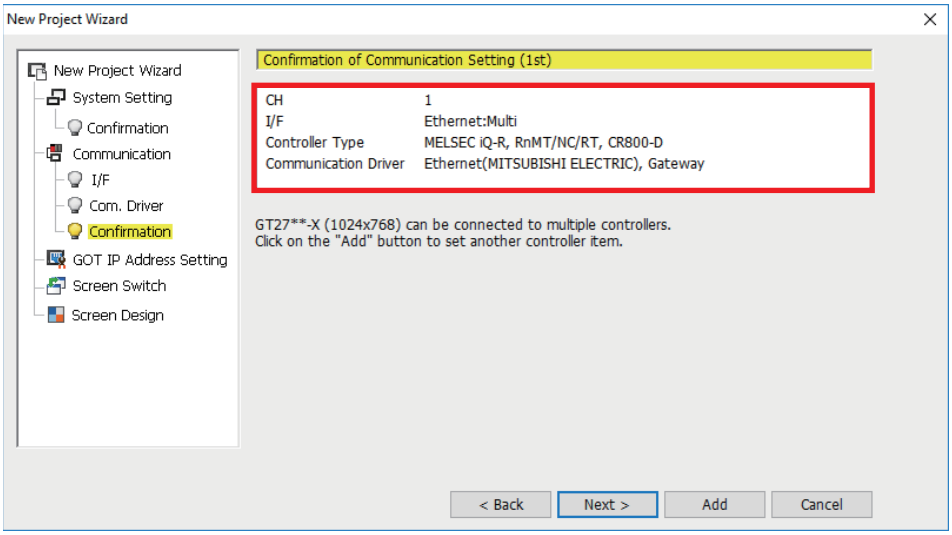
GOT

Set the following in GT Designer3.

Operating procedure

1. Start GT Designer3.
2. In New Project Wizard, configure the following settings to create a project.





3.2 Recording Setting

Use GX Works3 to configure the recording setting of the recorder module.

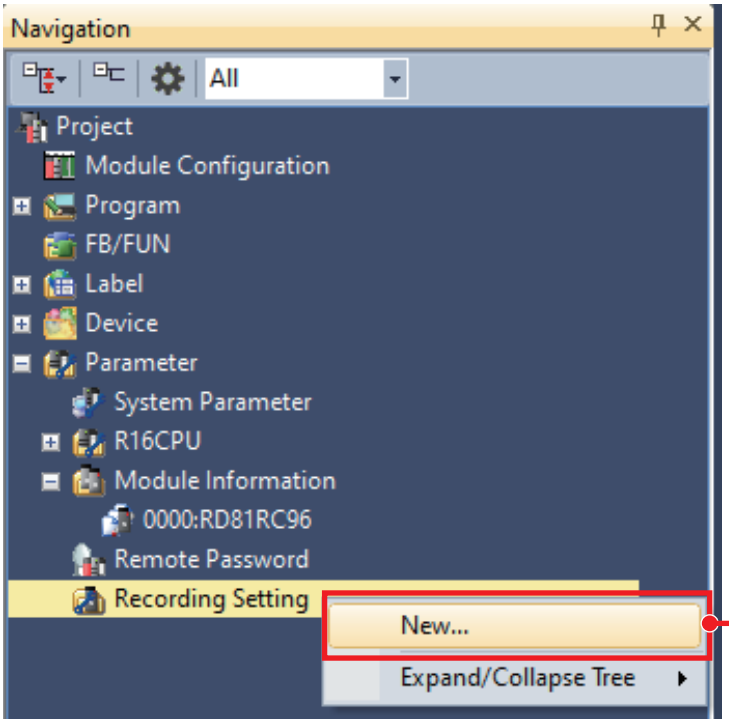
For details on the recording setting screen, refer to the following.

MELSEC iQ-R System Recorder User's Manual (Application)

Operating procedure

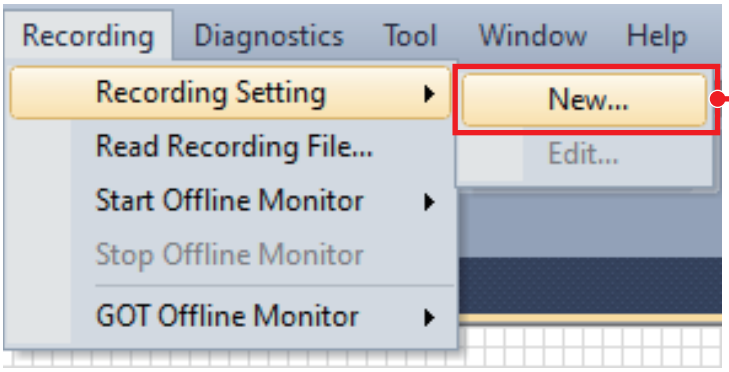
1. Add a new recording setting.

[Navigation] window ⇨ [Parameter] ⇨ [Recording Setting] ⇨ Right-click ⇨ [New]*1



Click here to configure the recording setting.

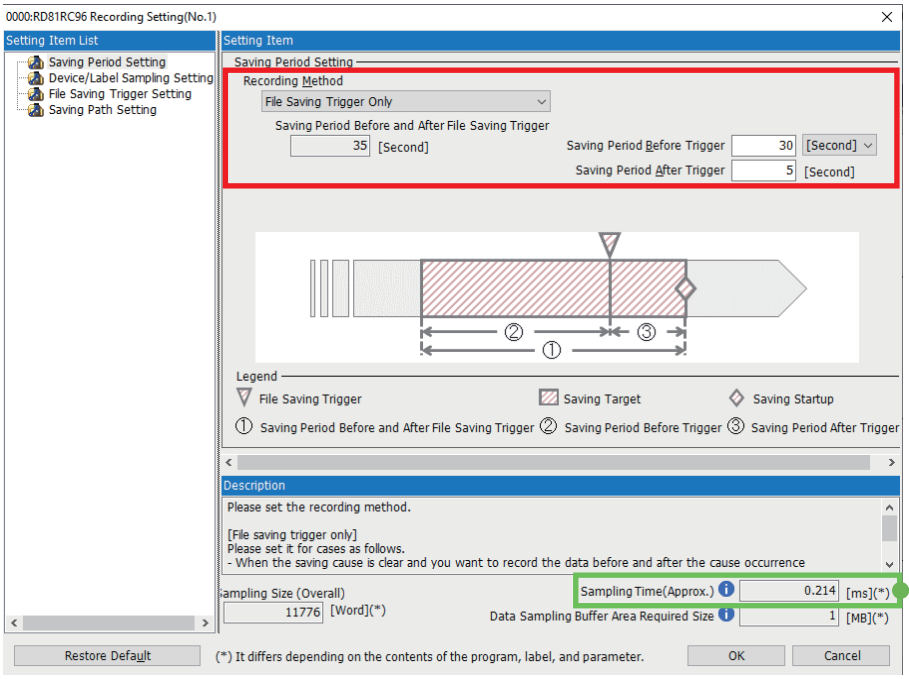
*1 A new setting can also be created from the recording menu.



Click here.

2. Select a recording method in the saving period setting.

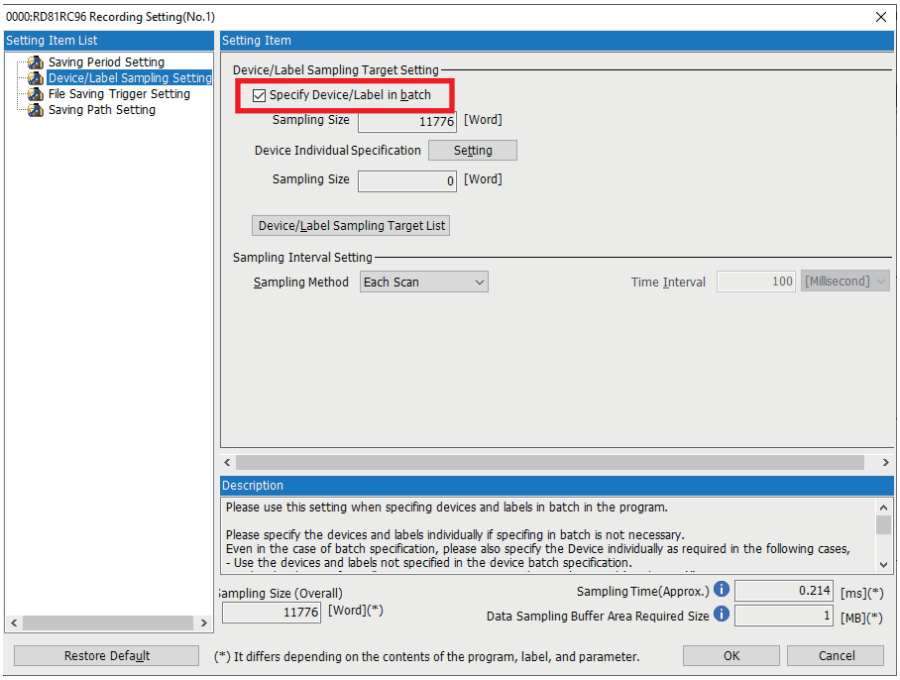
Ex. Recording Method: File Saving Trigger Only, Saving Period Before Trigger: 30 seconds, Saving Period After Trigger: 5 seconds



Displays the approximate value of the processing time for sampling the devices/labels.

3. Configure the device/label sampling setting.

Ex. Specify Device/Label in batch: Selected (default)

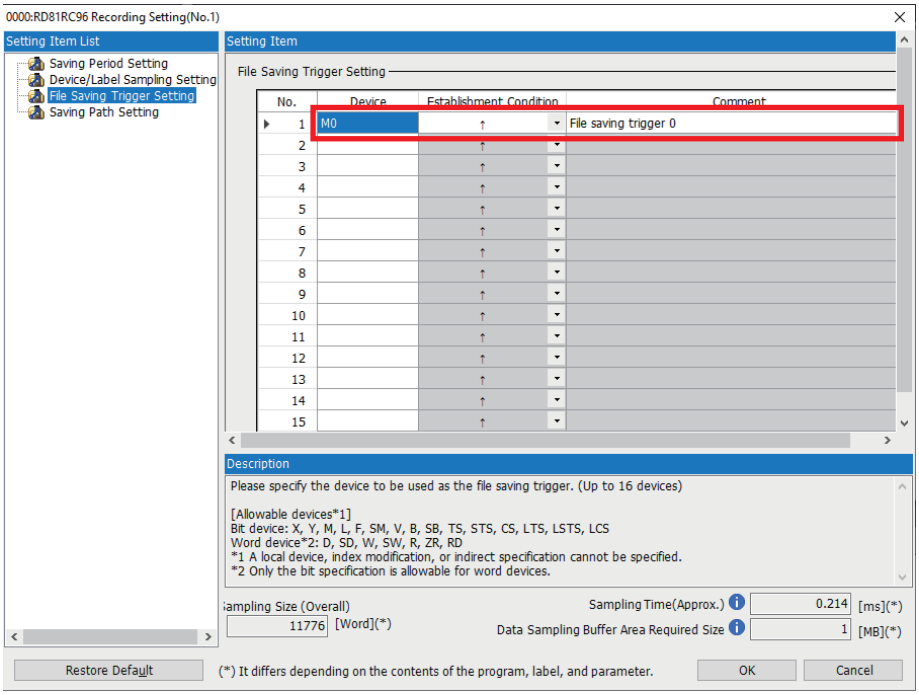


Point

When Specify Device/Label in batch is selected, the devices and labels in the created program are automatically set as the sampling targets.

4. Set the device to be used as the file saving trigger in the file saving trigger setting.

Ex. Device: M0 (turning ON)

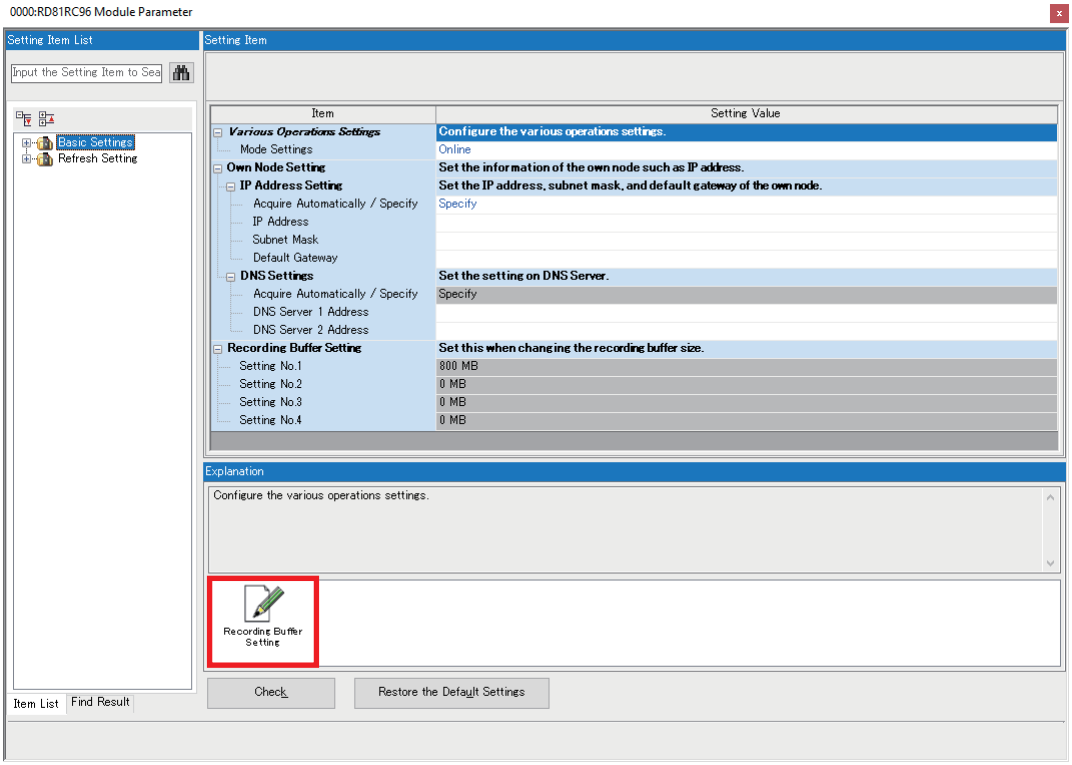


When configuring multiple recording settings

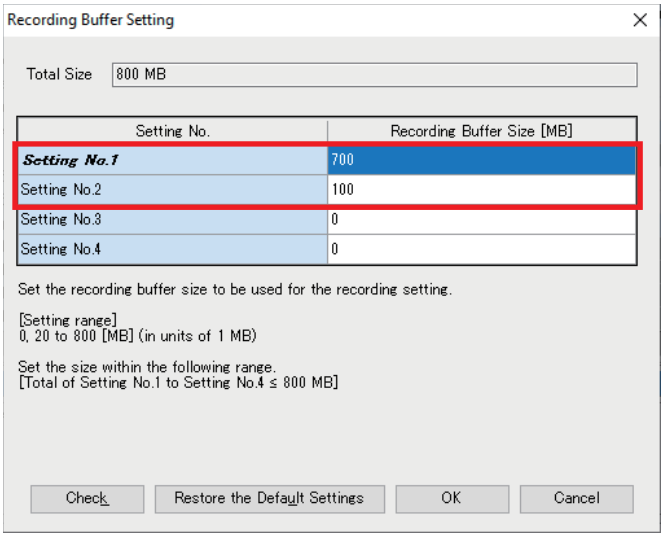
Up to four recording settings can be configured. The buffer area setting for data sampling of the CPU parameter in setting 2 to 4 and recording buffer setting of the module parameter in the recorder module are set to 0 by default. Therefore, set the capacity for each setting.

Operating procedure

1. Double-click [Recording Buffer Setting] at the lower part of the module parameter window.

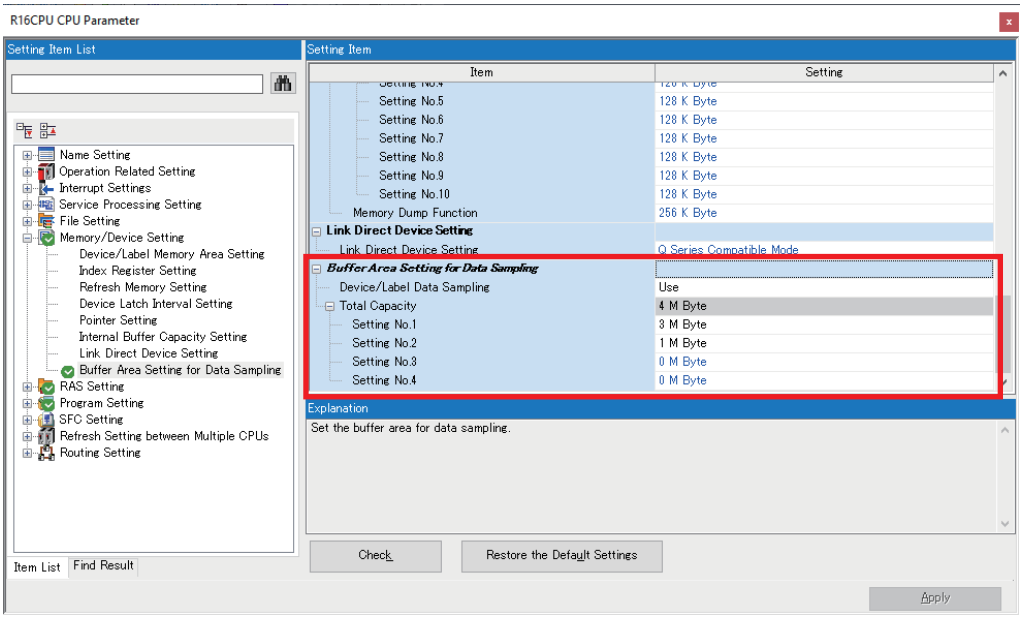


2. Change the capacity of the recording buffer to be used for the recording setting.



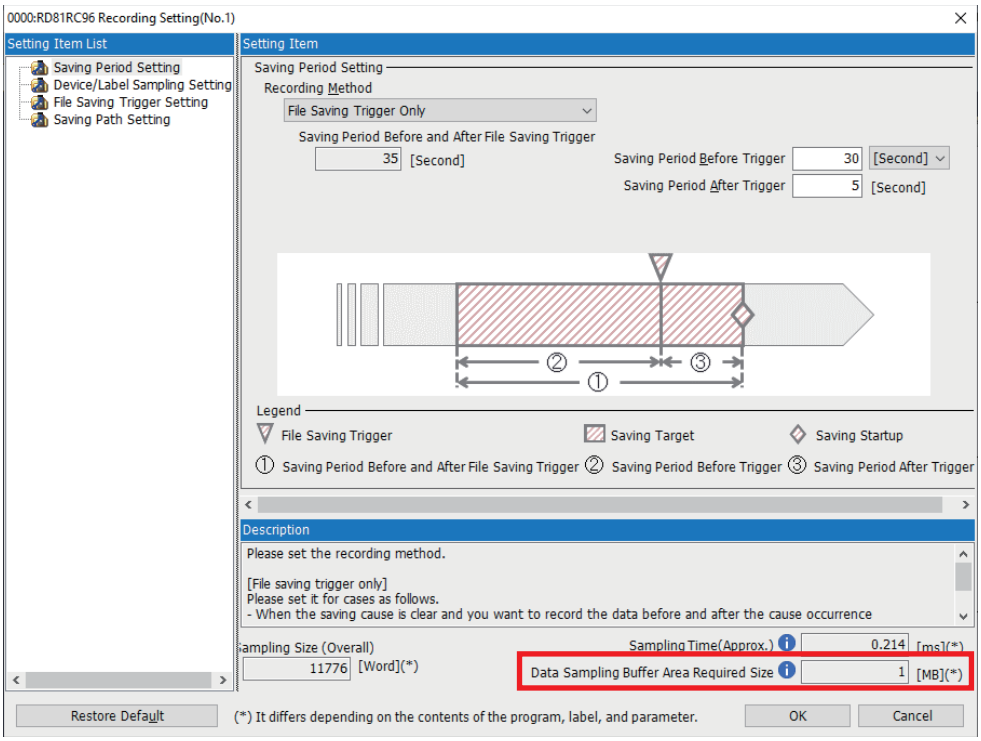
3. Configure the buffer area setting for data sampling in the CPU parameter.

[Navigation] window ⇨ [Parameter] ⇨ CPU module to be used ⇨ [CPU Parameter]



Point

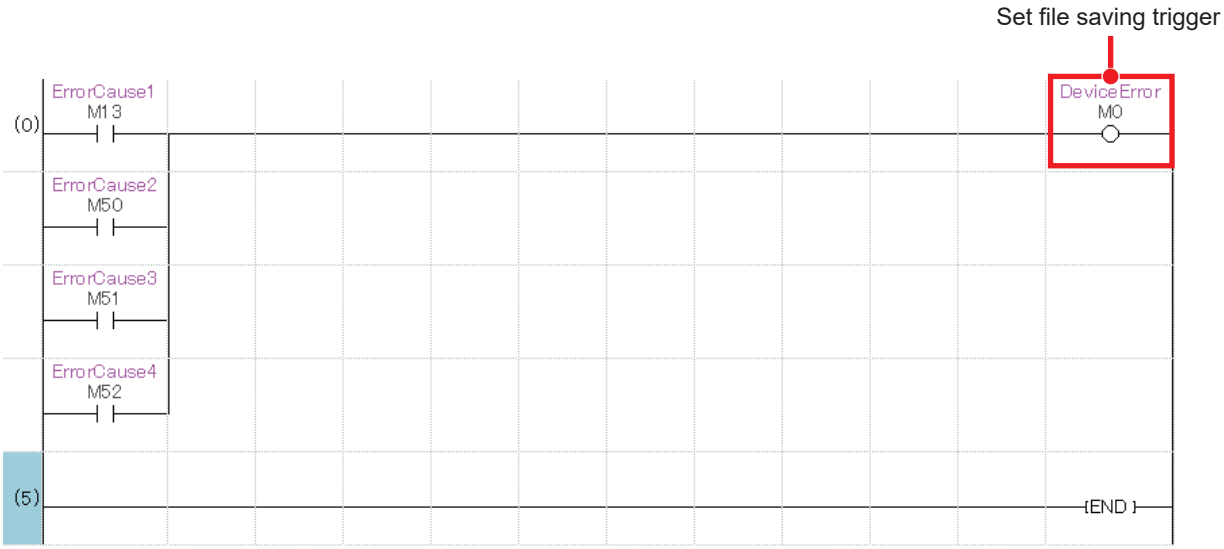
For the capacity to be specified in the buffer area setting for data sampling in the CPU parameter, the required size can be checked in the recording setting screen.



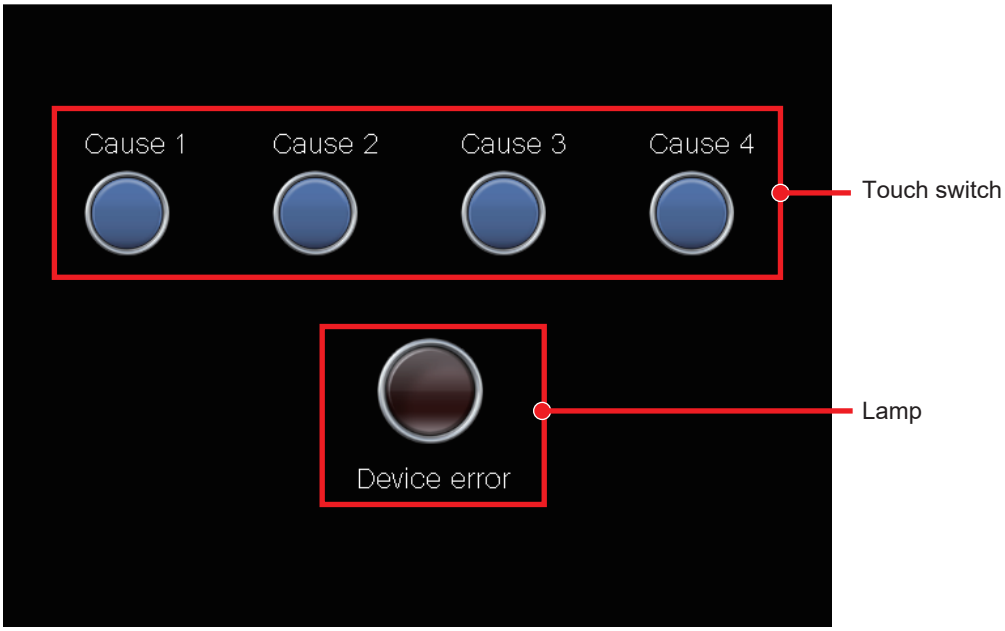
3.3 Creating a Program

The following program is used as a recording example.

Ex.



Create a GOT screen supporting the above program, and use it.



3.4 Writing

Write the parameters, program, and recording setting to the CPU module, and write the project data to the GOT.
Then, reset the CPU module and GOT, or turn off and on the power of them.

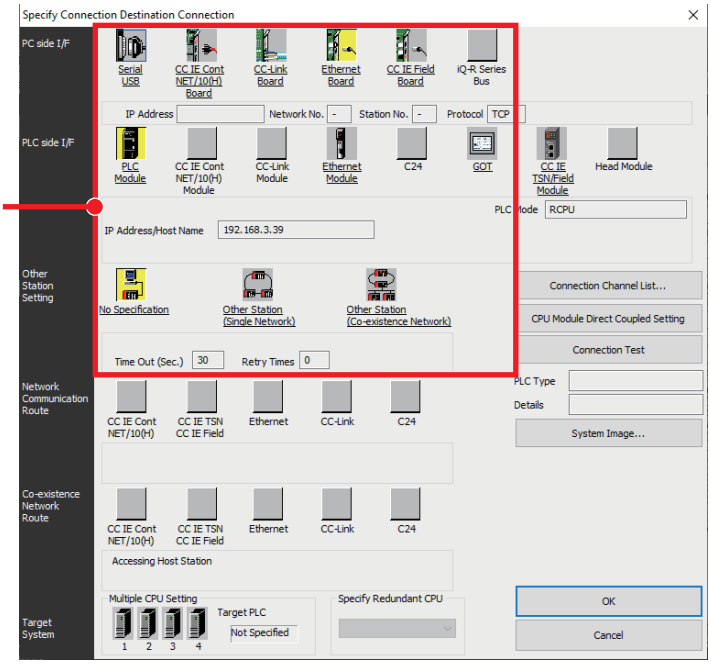
CPU module

Operating procedure

1. Start GX Works3 and connect to the personal computer.

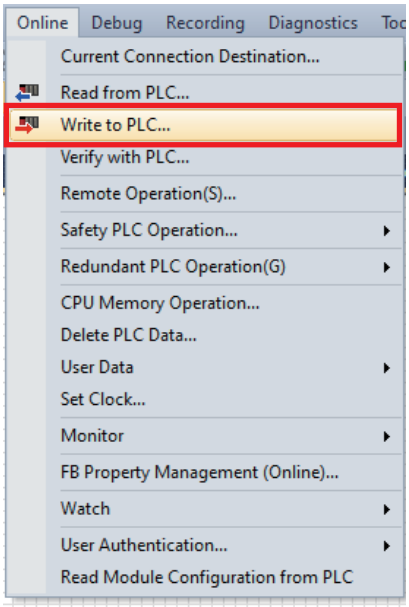
[Online] ⇨ [Current Connection Destination]

Configure the settings as shown on the right.



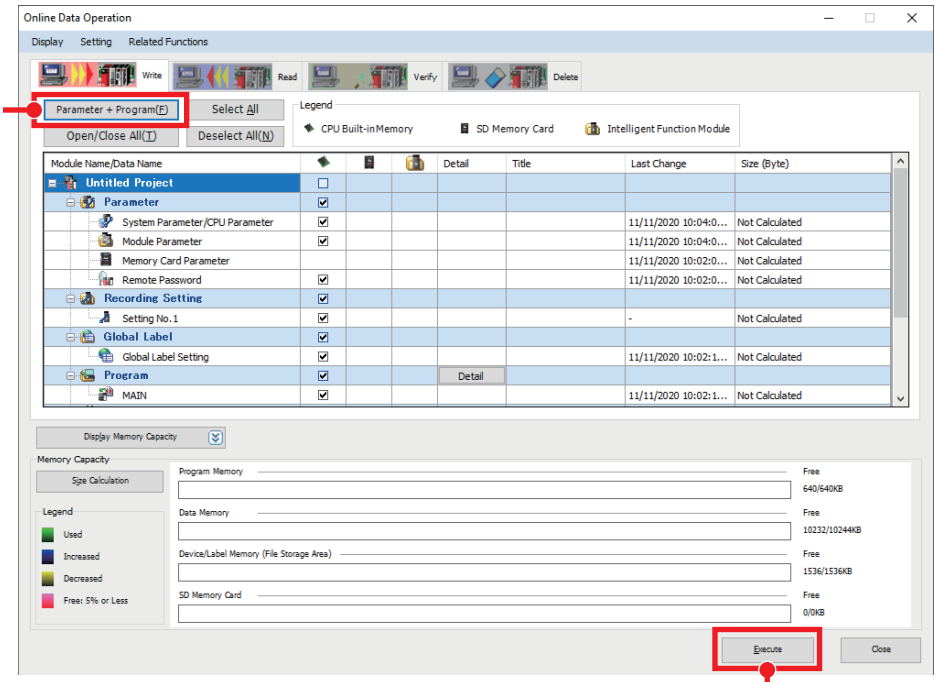
2. Write the data to the programmable controller.

[Online] ⇨ [Write to PLC] from the menu



3. Select [Parameter + Program], and then click the [Execute] button.

Click here.



Click here to write the data.

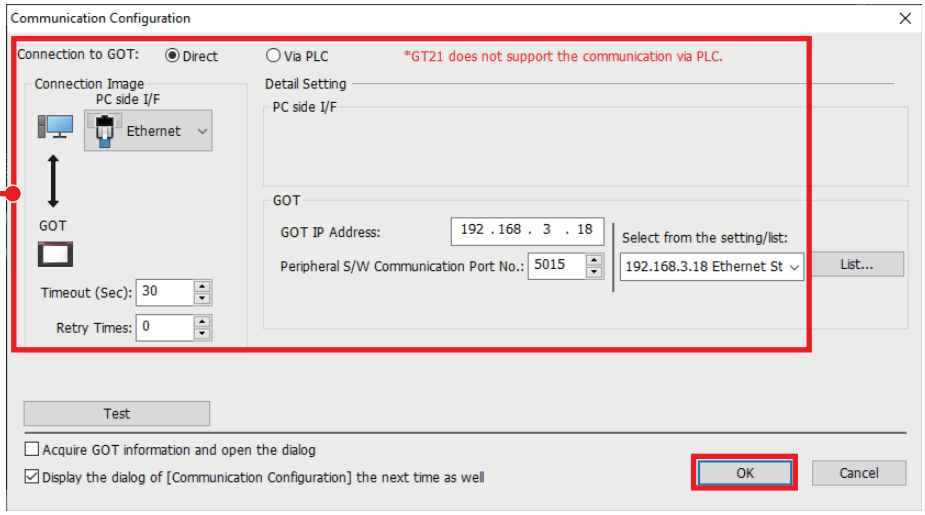
GOT

Operating procedure

1. Start GT Designer3, configure the connection setting with the personal computer, and then click the [OK] button.

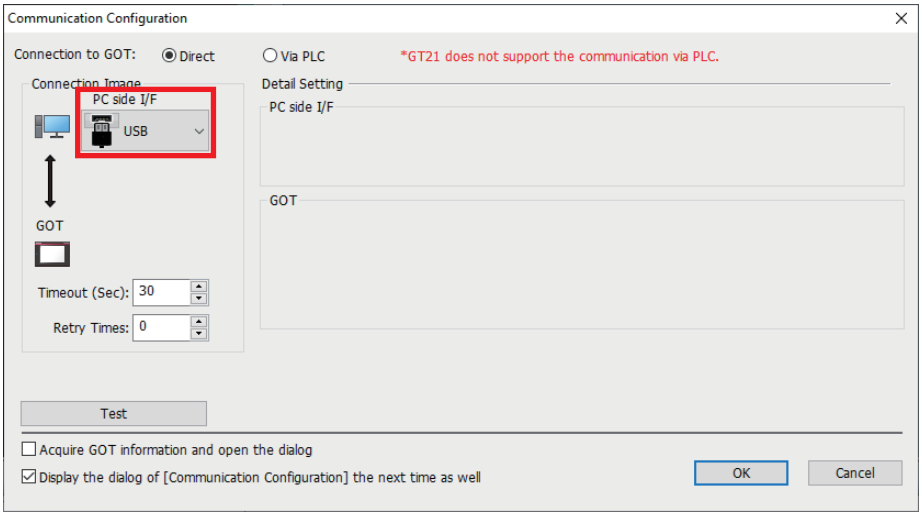
[Communication] ⇨ [Write to GOT] from the menu

Configure the settings as shown on the right.



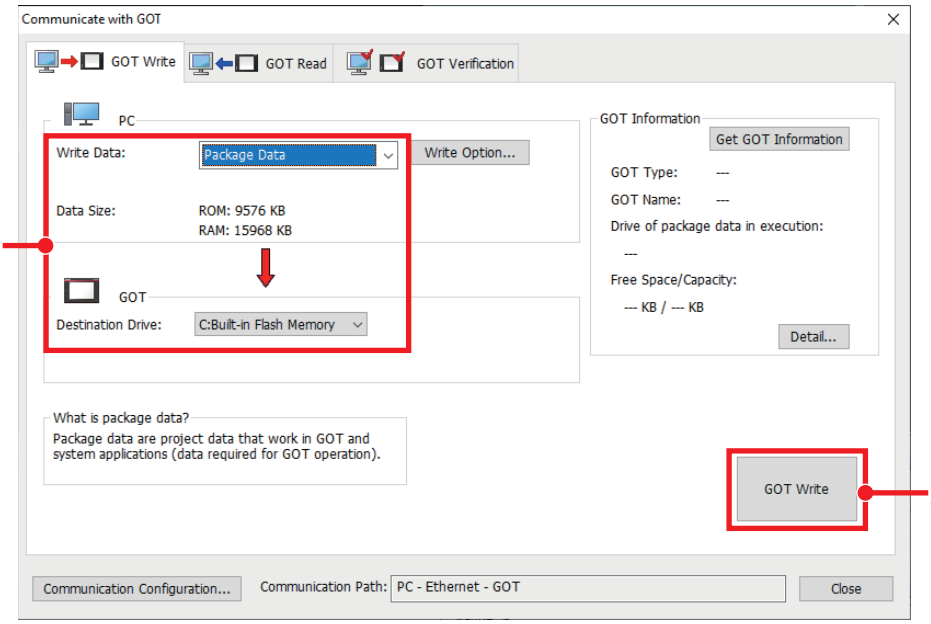
Point

When the data cannot be written via Ethernet, connect the GOT and personal computer with a USB cable to write it via USB.



2. Set the data to be written and writing destination, and then click the [GOT Write] button.

Configure the settings as shown on the right.



Click here to write the data.

3.5 Recording

Operate the program described in "☞ Page 17 Creating a Program" to perform recording, and read the record data from the recorder module.

Operating procedure

1. Switch the CPU module to the RUN state. Check that the RUN LED and OPR LED of the recorder module turn on.

Point

The recording function automatically starts when the CPU module is switched to the RUN state.

2. Open the program and intelligent function module monitor in GX Works3.

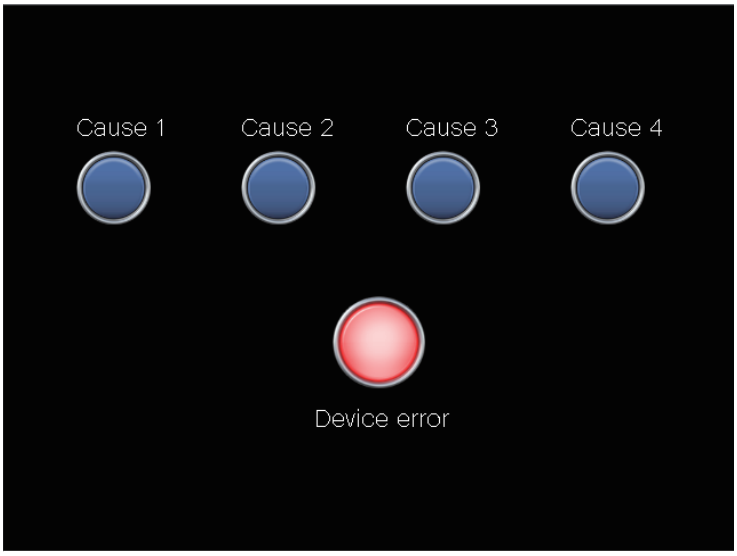
Right-click 0000:RD81RC96 ⇨ [Register to Intelligent Function Module Monitor]

3. Start monitoring (all the windows).

4. Check if the recording function operates normally on the intelligent function module monitor.

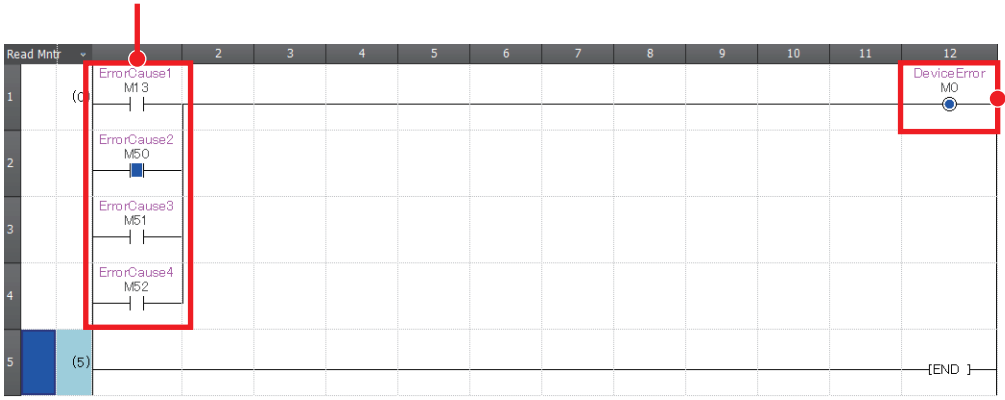
Recording status area		
Recording setting 1		
In recording operation	Operating	U0¥G1501
Recording start error	No error	U0¥G1502
Recording start error cause	H0000	U0¥G1503
File saving trigger monitor	Unsatisfied	U0¥G1504
Recording files saving	Not saving	U0¥G1505
Data sampling	Sampling	U0¥G1506
Recording buffer storing status	Data exists	U0¥G1507
Recording files saving completion	Completed	U0¥G1508
Recording files saving error	No error	U0¥G1509
Recording files saving completion code	H0000	U0¥G1510

5. Turn on the switch (Cause 2) on the GOT.



6. M0 (file saving trigger) turns on.

Error cause 2 (M50) turns on.



Check that M0 (File saving trigger) is on.

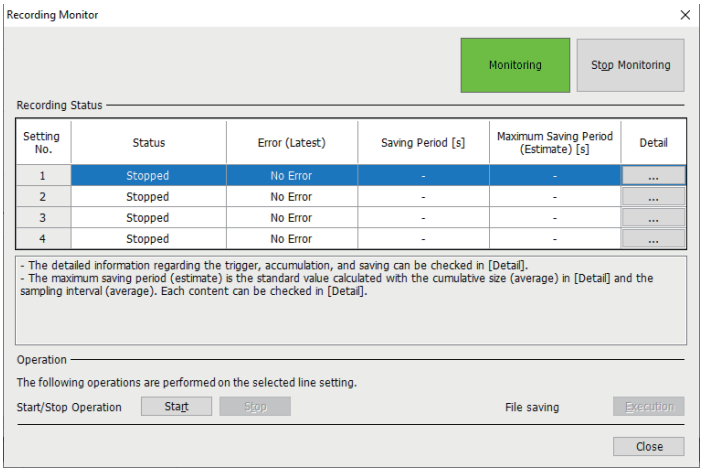
7. When the file saving trigger is established, the recording file is saved in the SD memory card of the recorder module.

Recording status area		
Recording setting 1		
In recording operation	Operating	U0¥G1501
Recording start error	No error	U0¥G1502
Recording start error cause	H0000	U0¥G1503
File saving trigger monitor	Satisfied	U0¥G1504
Recording files saving	Saving	U0¥G1505
Data sampling	Not sampling	U0¥G1506
Recording buffer storing status	No data	U0¥G1507
Recording files saving completion	Not completed	U0¥G1508
Recording files saving error	No error	U0¥G1509
Recording files saving completion code	H0000	U0¥G1510

Point

With the recording monitor, the operation of the recording function can be stopped and restarted, and the status can be checked.

[Diagnostics] ⇨ [Recording Monitor]

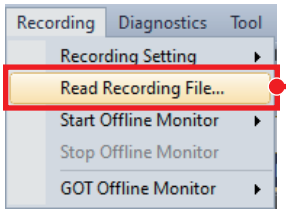


For details on the recording monitor, refer to the following.

MELSEC iQ-R System Recorder User's Manual (Application)

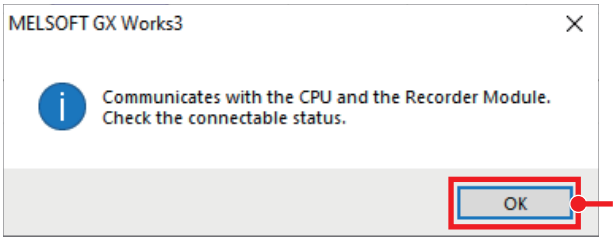
8. Read the recording file from the recorder module.

[Recording] ⇨ [Read Recording File]



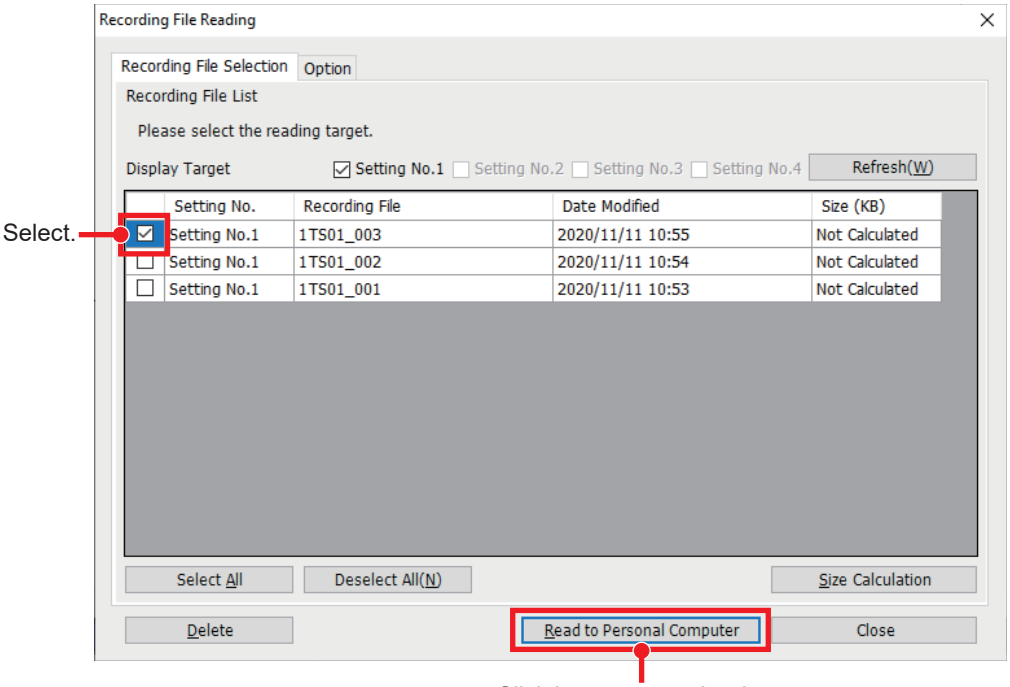
Click here to open the read screen.

9. When a window for checking the communication status appears, click the [OK] button.



Click here.

10. Select the recording file to be read, and click the [Read to Personal Computer] button to save it in the personal computer.



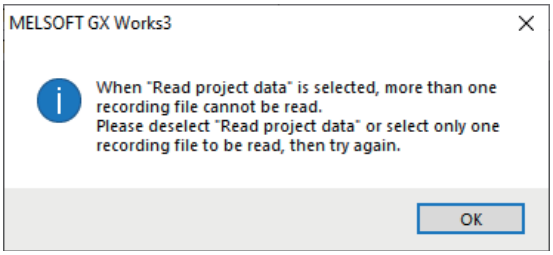
Select.

Click here to save the data in the personal computer.

Point

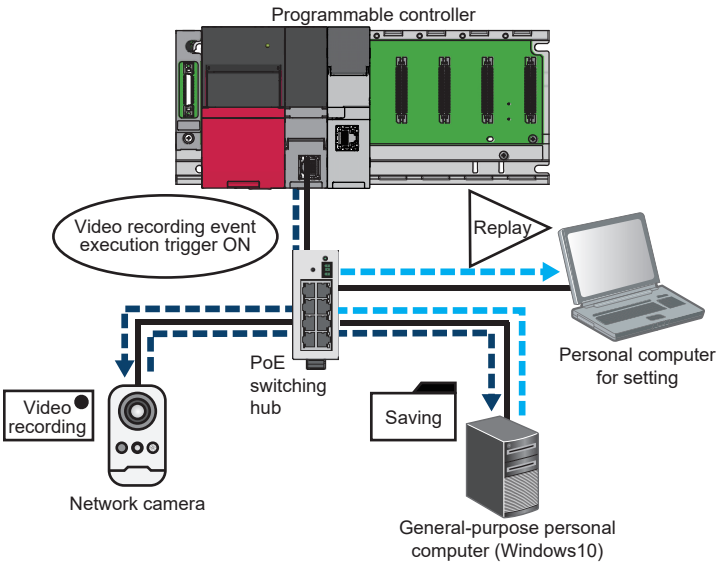
Multiple recording files cannot be read.

When multiple recording files are selected, the following window appears.



4 CAMERA RECORDING FUNCTION

The camera recording function records the captured footage of the network camera connected directly to the built-in Ethernet port of the CPU Module.
The camera video is recorded when a trigger for executing the video recording event of the network camera is turned on in the CPU module, and the video recording file is saved in the general-purpose personal computer (Windows10).
The video recording file can be replayed in GX VideoViewer.



To use the camera recording function, set the following.

Setting item	Description
Network camera setting	Connect the network camera to the personal computer for setting and general-purpose personal computer (Windows10), and configure the settings for video recording.
Programmable controller setting	Set the parameters of the CPU module, and create a program using FBs.

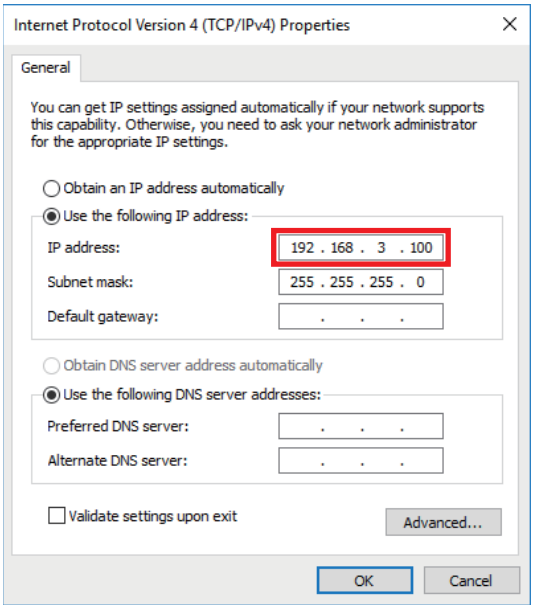
4.1 Network Camera Setting

Use a web browser to configure the network camera setting. When the network camera is started up for the first time, network settings such as the IP address setting are required. At the second and subsequent start-up, the camera can be accessed by entering the password.

Initial start-up setting

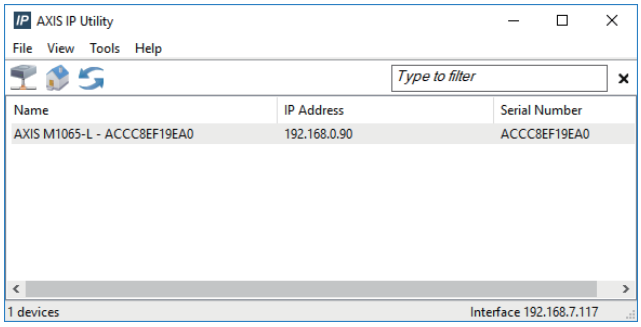
Operating procedure

1. Set the IP address of the personal computer for setting so that it is in the same segment as the IP address of the network camera to be connected.



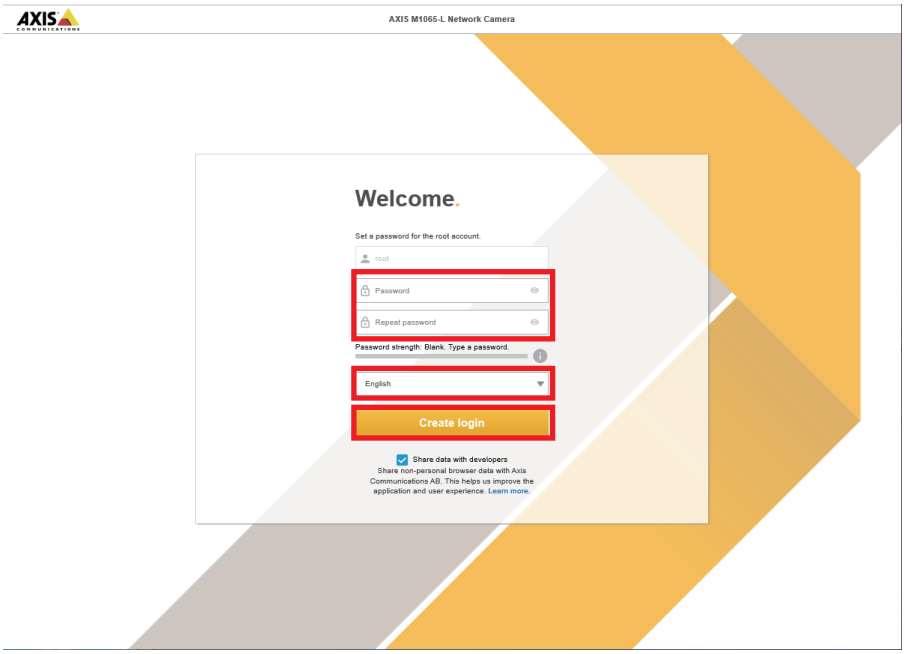
Point

The IP address of the network camera can be checked on the network by using AXIS IP Utility.
AXIS IP Utility can be downloaded from the following URL.
www.axis.com/en



2. Enter the IP address of the network camera in the web browser.

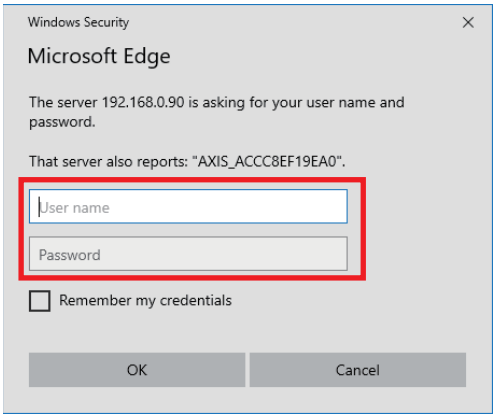
3. When the web server is accessed, the administrator password setting window appears.
Set a password and the language, and click the [Create login] button.



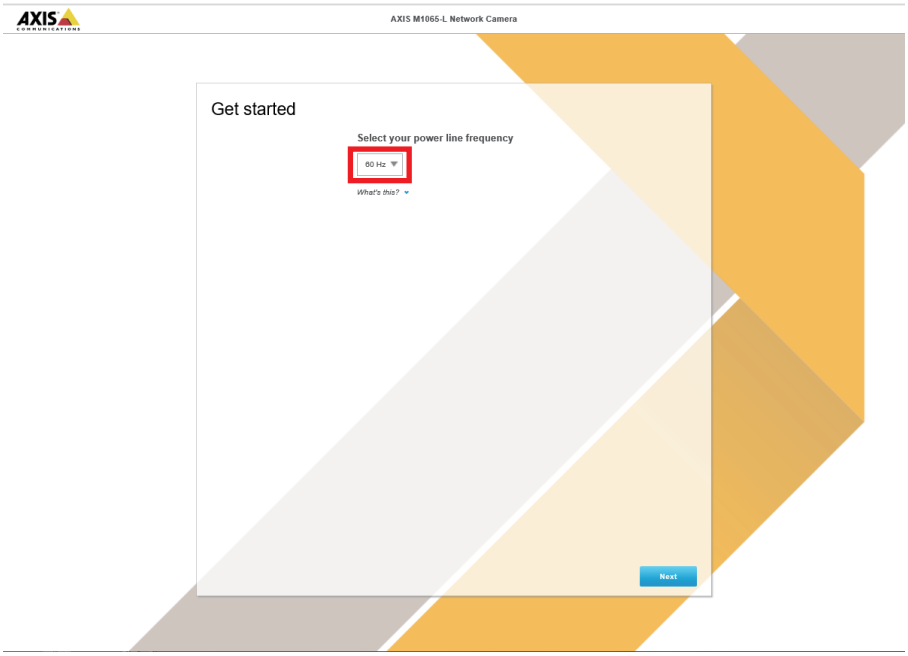
Restriction

- Set the password within 4 to 64 characters.
- Do not use "$" in the password.

4. Log in to the network camera.
Enter the user name and password set in step 3 to log in to the network camera. The user name and password are required for subsequent login to the network camera.



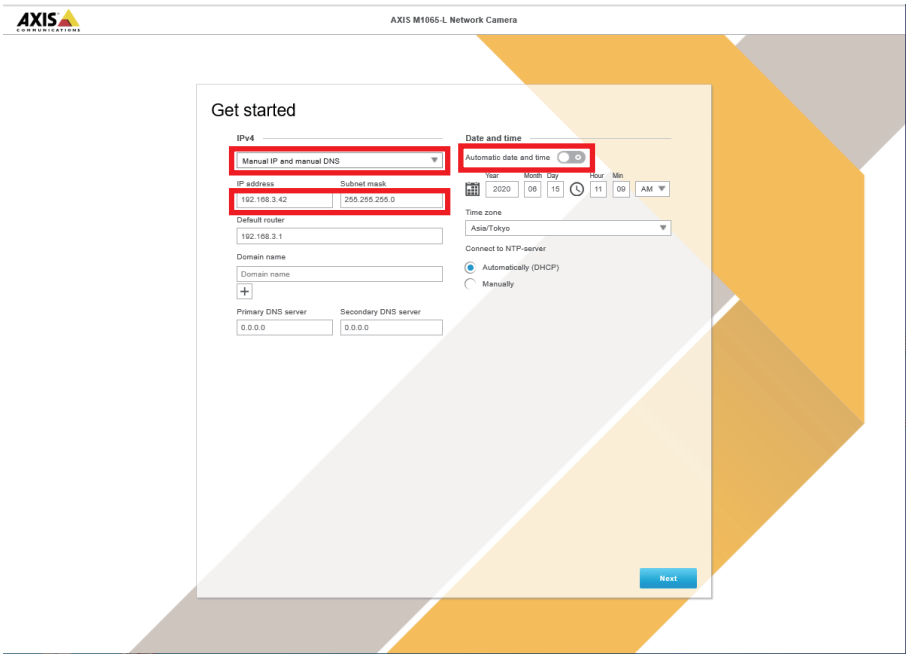
5. Select the power line frequency.



6. Set IPv4 to "Manual IP and manual DNS", and set network parameters.

Ex. IP address: 192.168.3.42

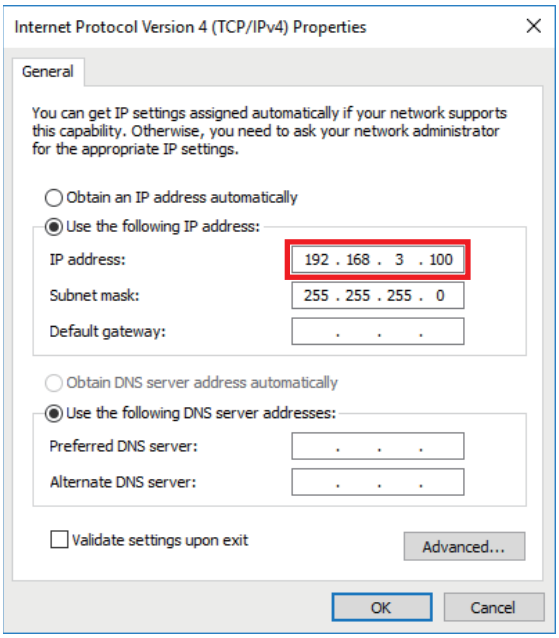
7. Turn off "Automatic date and time" and set the time manually.



Point

- Set the IP address and subnet mask in the same segment as the IP addresses of the CPU and general-purpose personal computer (Windows10).
- When the NTP server is in the same segment as the programmable controller, turn on "Automatic date and time" and configure the time synchronization setting from the NTP server. In this case, the time setting FB is not required.
- If the setting section for "Date and time" does not appear, set it after completing the initial start-up settings.

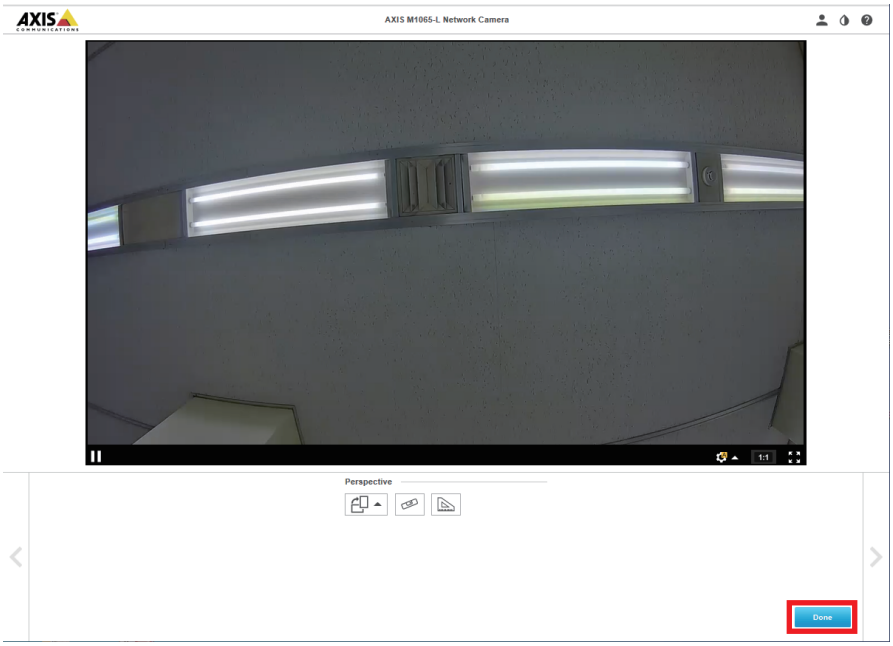
8. Set the IP address of the personal computer for setting again in the same segment as the network camera set in step 6.



9. Enter the IP address of the network camera in the web browser, and access the web server again.

10. After the setting is completed, the live view window appears.

11. Click the [Done] button.



Date and time settings

Set the date and time of the network camera.

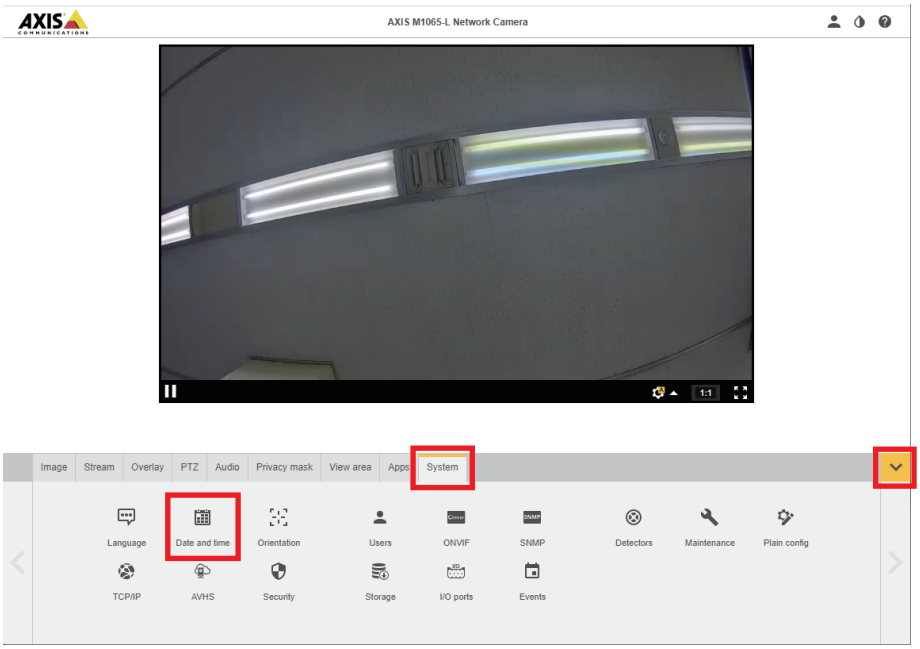
These settings are not required if they have already been set in the initial start-up setting.

Operating procedure

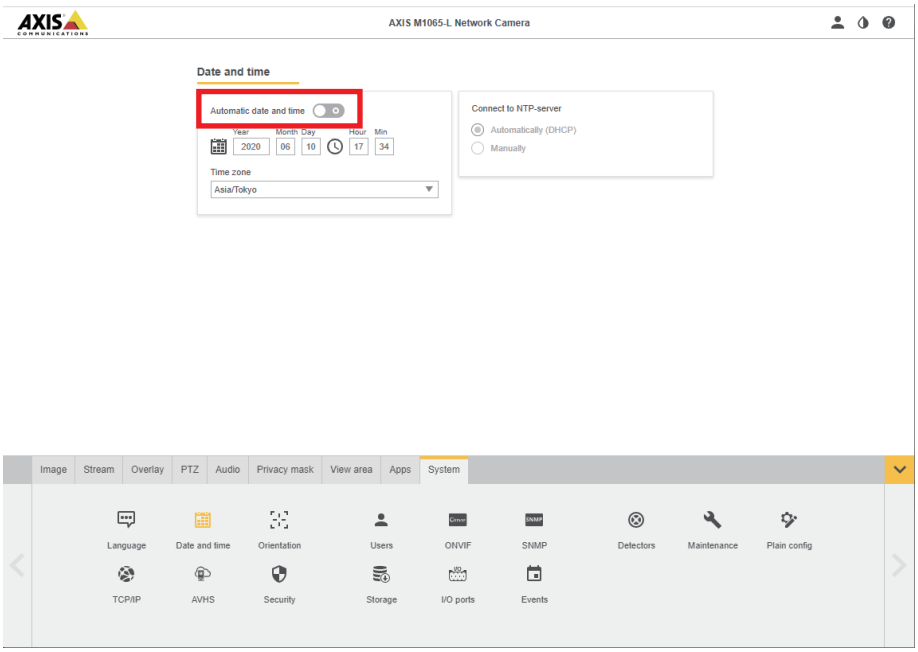
1. Log in to the network camera.

2. Display the date and time setting window.

[Settings] ⇨ [System] ⇨ [Date and time]



3. Turn off "Automatic date and time" and set the time manually.



Video recording event settings

Configure the video recording event settings. These settings use a virtual input as a trigger to save generated video files in the general-purpose personal computer (Windows10).

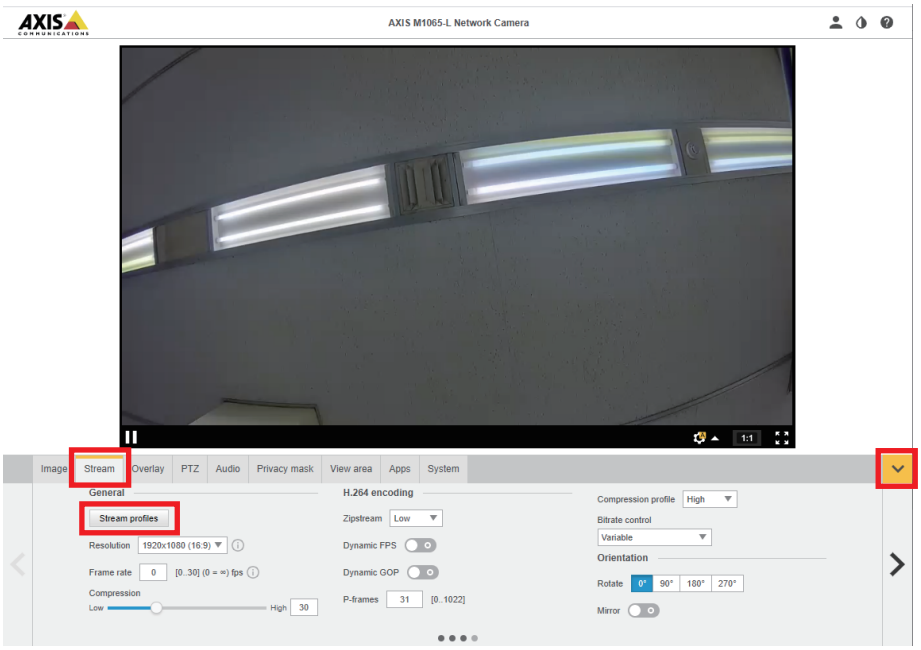
Profile settings

Operating procedure

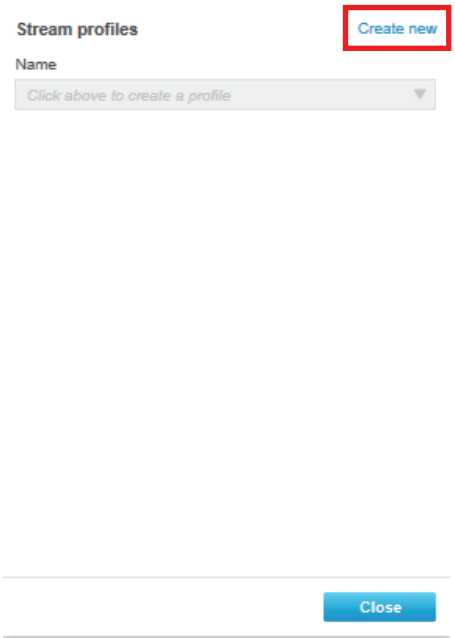
1. Log in to the network camera.

2. Display the stream profile window.

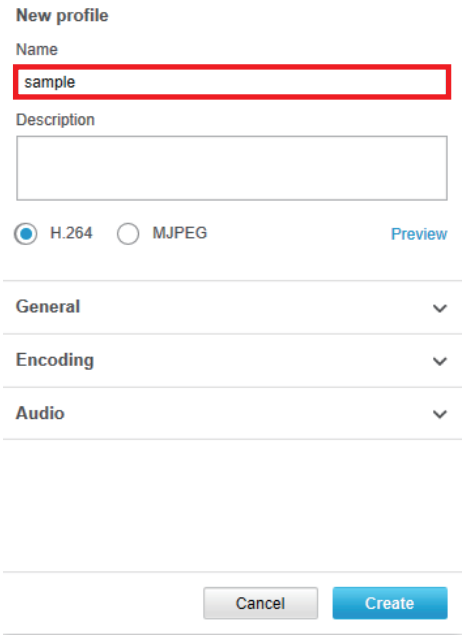
[Settings] ⇨ [Stream] ⇨ [Stream profiles]



3. Click the [Create new] button.



4. Enter a profile name in "Name", and set items such as resolution.



Set each item of the profile to any of the following.

Compression format	Resolution	Frame rate*1
• H.264 • MJPEG	• 1920×1080(16:9) • 1280×720(16:9) • 640×480(4:3) • 320×240(4:3)	120, 100, 60, 50, 30, 25, 15, 10

*1 The maximum frame rate varies depending on the network camera model. For details, refer to the datasheet of the network camera used.

Point

When the video is recorded at a high frame rate or a high resolution, the "Prebuffer" (video recording time before trigger) video may not be recorded on time. In such a case, adjust the items as follows.

- Set the compression format to "H.264".
- Decrease the resolution.
- Decrease the frame rate.
- Decrease the maximum bit rate.
- Shorten the pre-buffer time.

5. Click the [Create] button.

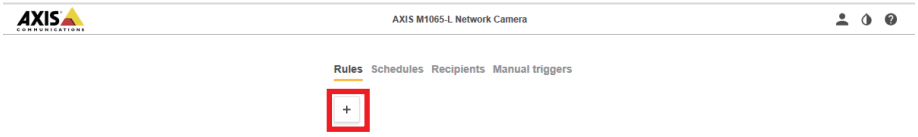
Rule settings

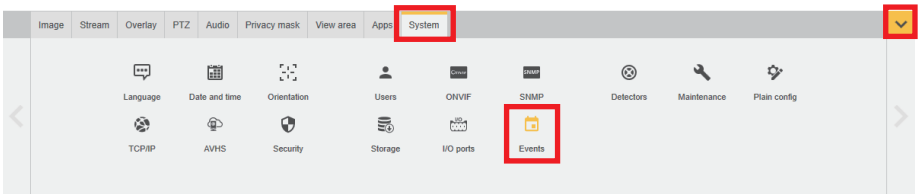
Operating procedure

1. Display the event window.

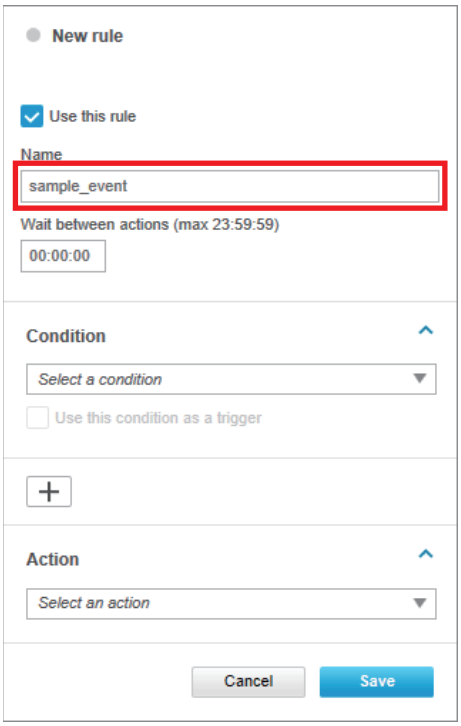
[Settings] ⇨ [System] ⇨ [Events]

2. Click the [+] button.



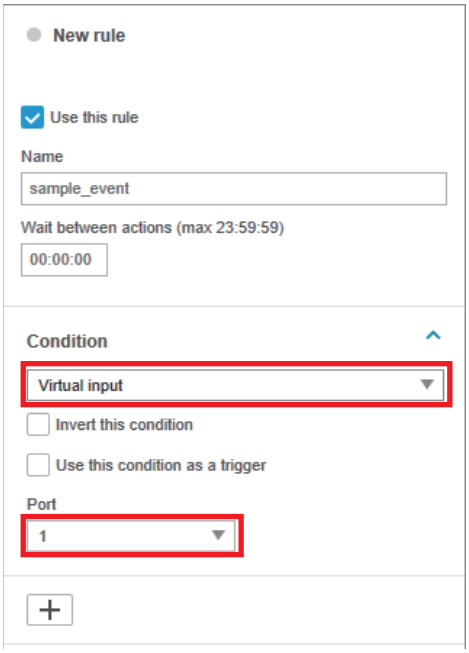


3. Set a rule name in "Name".

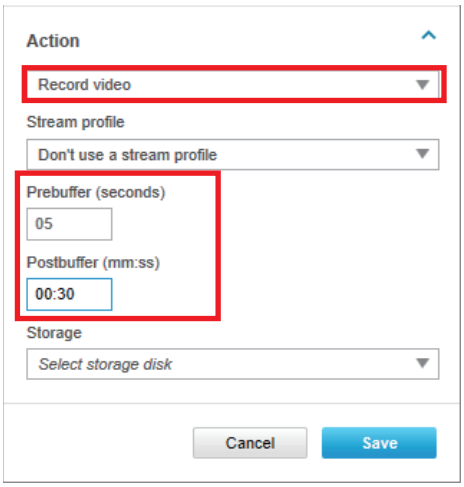


4. Set "Condition" to "Virtual input".

For the virtual input port No., select a number within 1 to 32.



5. Set the video recording period of the camera video.

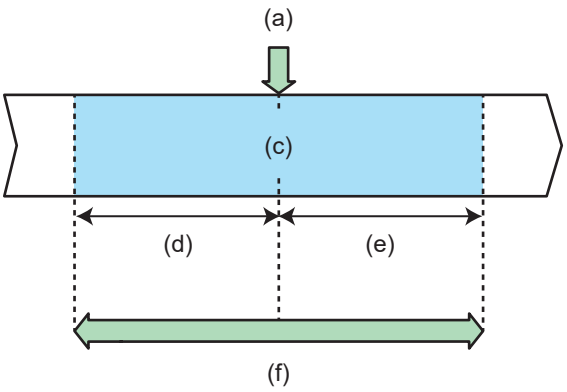


The video recording period can be selected from two settings.

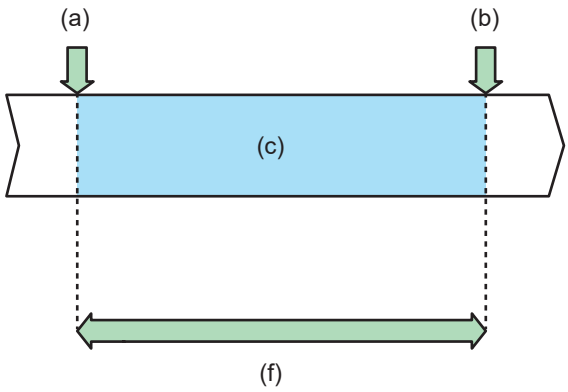
Setting	Description
(1) Recording the camera video before and after the video recording trigger	Configure the following three settings. • Select "Record video". • Set the video recording time (second) before event occurrence in "Prebuffer". • Set the video recording time (mm:ss) after event occurrence in "Postbuffer".
(2) Recording the camera video while the video recording trigger is ON	Select "Record video while the rule is active".

The following shows the images of the video recording period by each setting.

(1) Recording the video before and after the video recording trigger



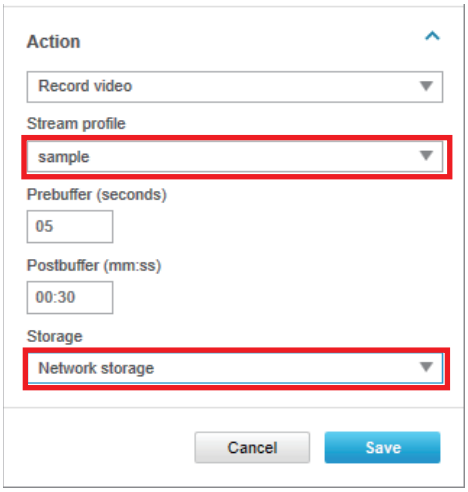
(2) Recording the video while the video recording trigger is on



(a) Video recording trigger ON
(b) Video recording trigger OFF
(c) Video data to be recorded
(d) Video recording time before trigger
(e) Video recording time after trigger
(f) Video recording period

6. Select the created "Stream profile", and select "Network storage" for "Storage".

7. Click the [Save] button.



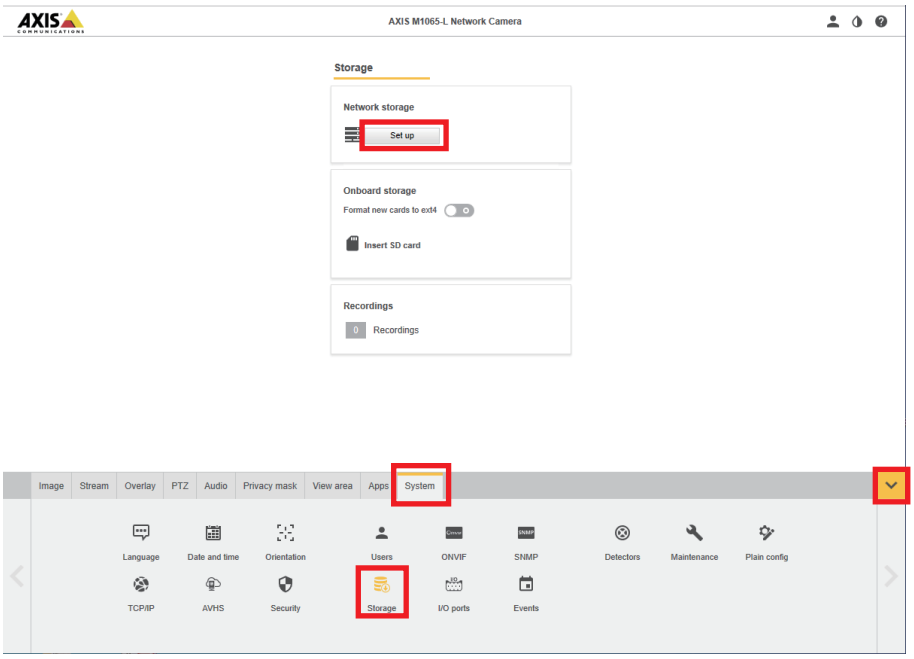
Video file save destination settings

Operating procedure

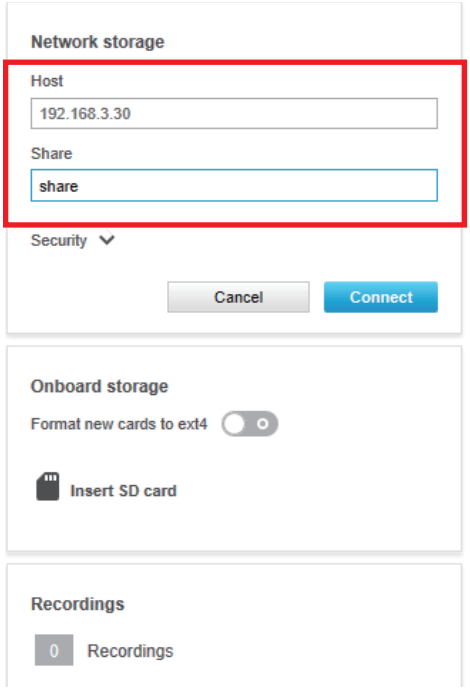
1. Set the save destination of video files.

[Settings] ⇨ [System] ⇨ [Storage]

2. Click the [Set up] button under "Network storage".



3. Set the IP address of the storage destination of the video data (general-purpose personal computer (Windows10)) in "Host", and set the name of the folder to "Share", where the video data will be saved (within the general-purpose personal computer (Windows10)).

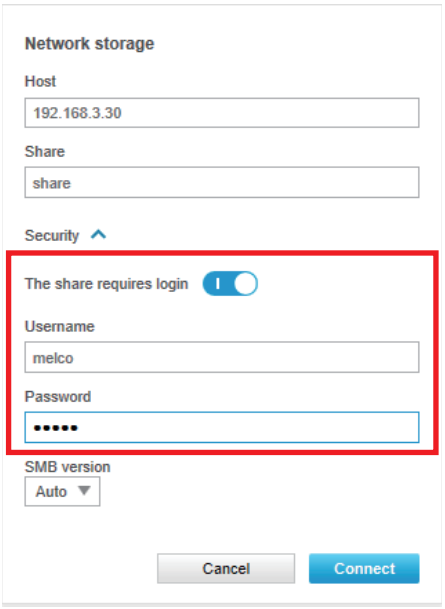


Point

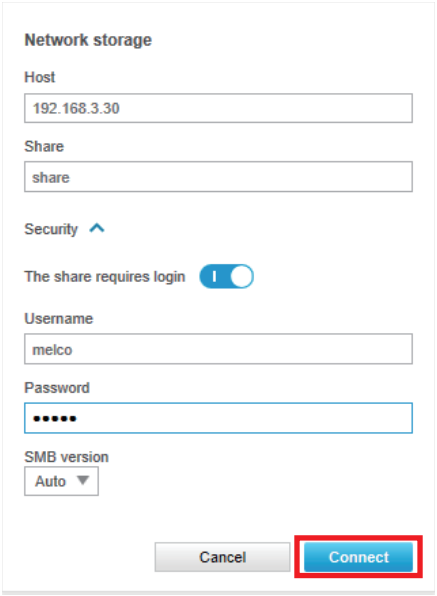
- Create a shared folder in the general-purpose personal computer (Windows10) in advance.
- Set the IP address to the value set in the following.

☞ Page 6 IP Settings of Personal Computers

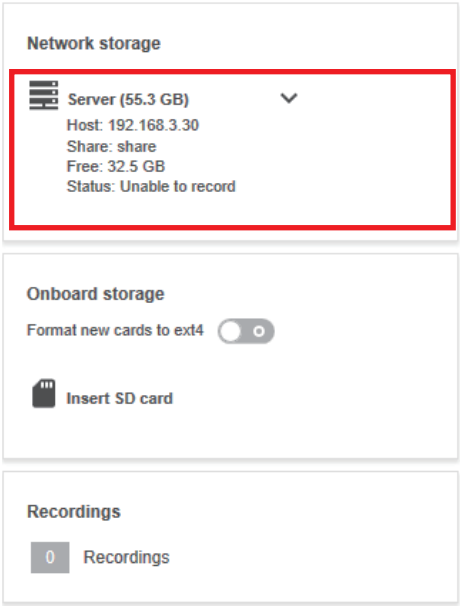
4. When login to the general-purpose personal computer (Windows10) is required, select "The share requires login" and enter the login ID and password of the general-purpose personal computer (Windows10) in "Username" and "Password" respectively.



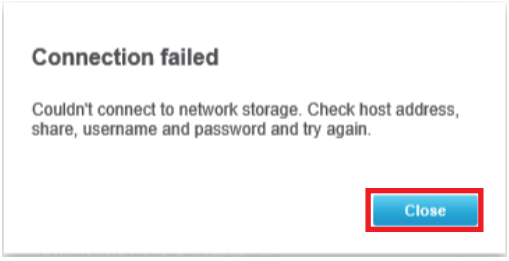
5. Click the [Connect] button.



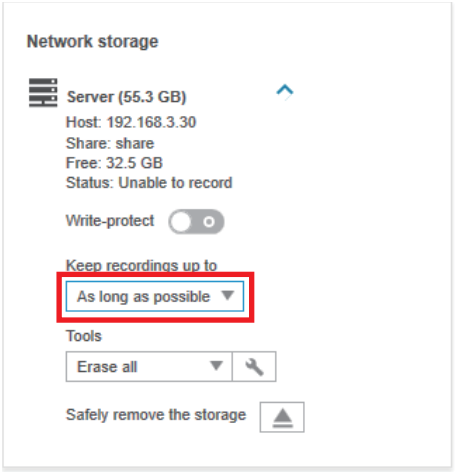
6. When the connection is succeeded, the status of the general-purpose personal computer (Windows10) is displayed.



7. When the connection fails, the following window appears. Return to step 4 to correct the settings.



8. Set the saving period of the video files in "Keep recordings up to".



Point

When the general-purpose personal computer (Windows10) runs out of space, the old recording files will be deleted regardless of the specified saving period.

4.2 Programmable Controller Setting

Parameter settings of the CPU module

Start GX Works3, set the IP address and subnet mask of the CPU module, and configure the event history, external device configuration, and clock settings.

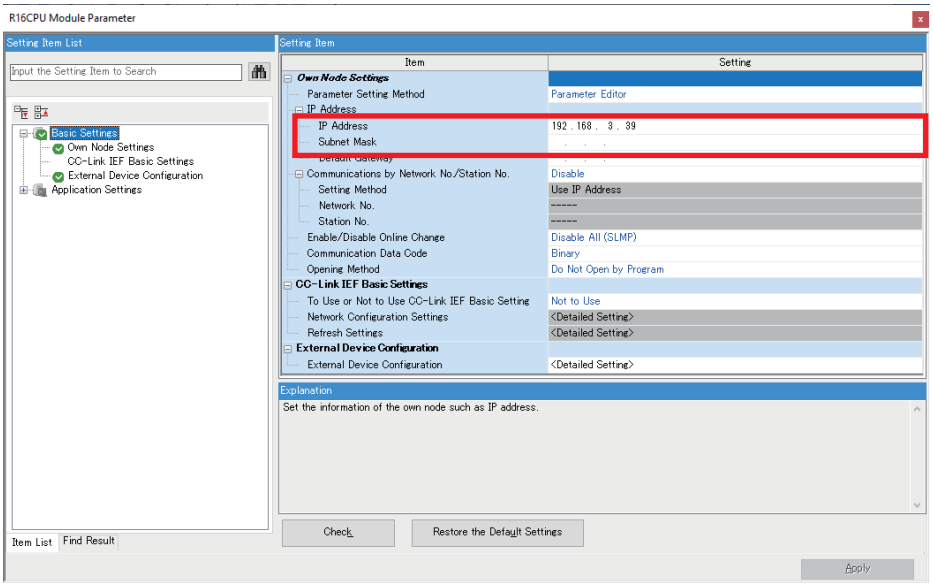
Own node settings

Operating procedure

1. Display the own node setting window.

[Navigation] window ⇨ [Parameter] ⇨ Module to be used ⇨ [Module Parameter] ⇨ [Basic Settings] ⇨ [Own Node Settings]

2. Set the IP address and subnet mask of the module to be used.



Point

- If the IP address is blank, it is automatically set to 192.168.3.39.
- Set the IP address of the CPU in the same segment as the IP address of the network camera set in the following.

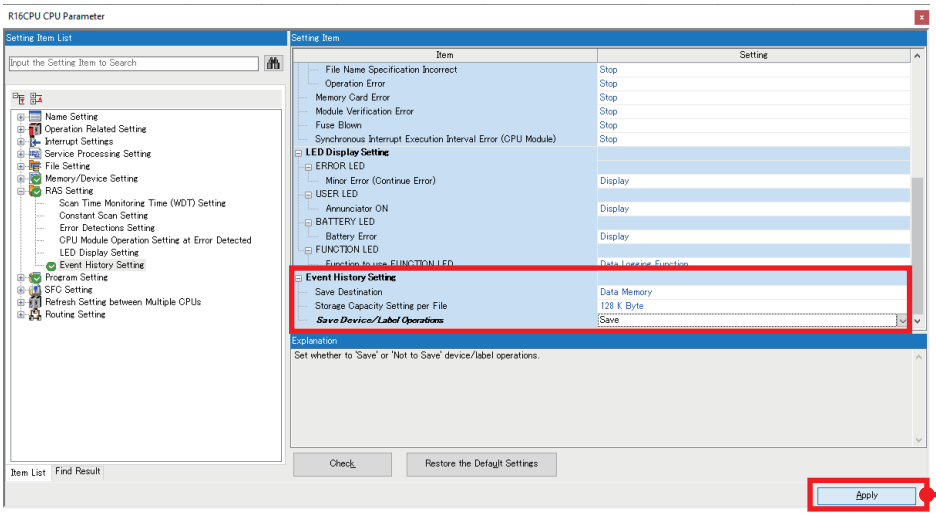
☞ Page 25 Network Camera Setting

Event history setting

Operating procedure

1. To save device/label operations in the event history, set the following item to "Save".

[Navigation] window ⇨ [Parameter] ⇨ CPU module to be used ⇨ [CPU Parameter] ⇨ [RAS Setting] ⇨ [Event History Setting]



After the setting, click here.

Point

For details on the event history setting, refer to the following.

☞ Page 79 Event History Function (Saving Device/Label Operations)

External device configuration

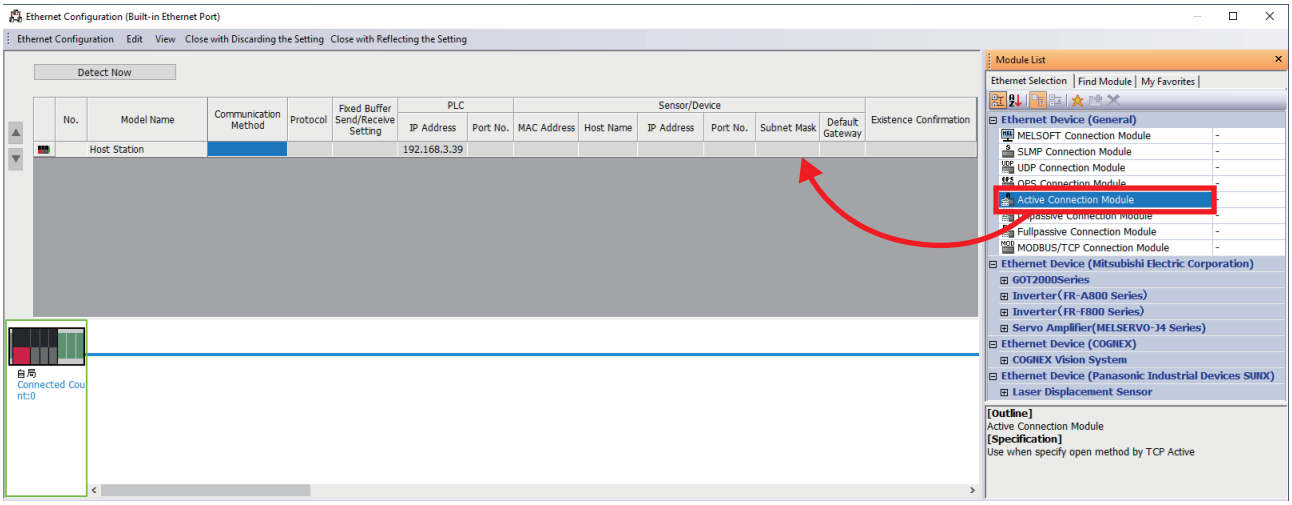
Configure the settings of the network camera to be connected to the programmable controller.

Operating procedure

1. Display the Ethernet configuration window.

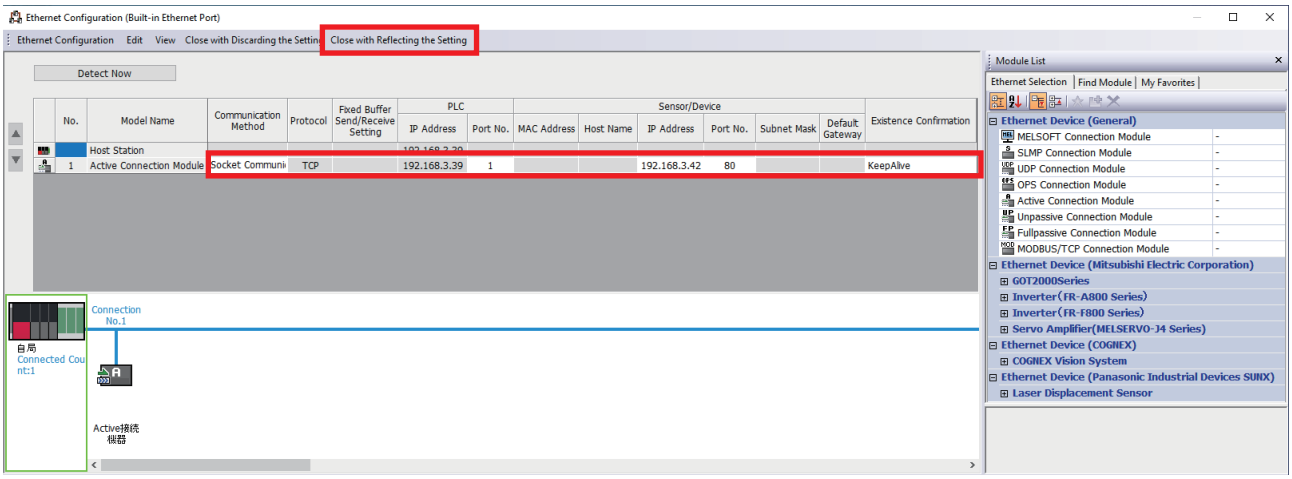
[Navigation] window ⇨ [Parameter] ⇨ [RCPU] ⇨ [Module Parameter] ⇨ [Basic Settings] ⇨ [External Device Configuration]

2. Select "Active Connection Module" in the module list, and drag and drop it to "List of devices" or "Device map area".



3. Set "Communication Method" of the set "Active Connection Module", "Port No." of "PLC", "IP Address" and "Port No." of "Sensor/Device", and "Existence Confirmation".

4. Click the [Close with Reflecting the Setting] button.

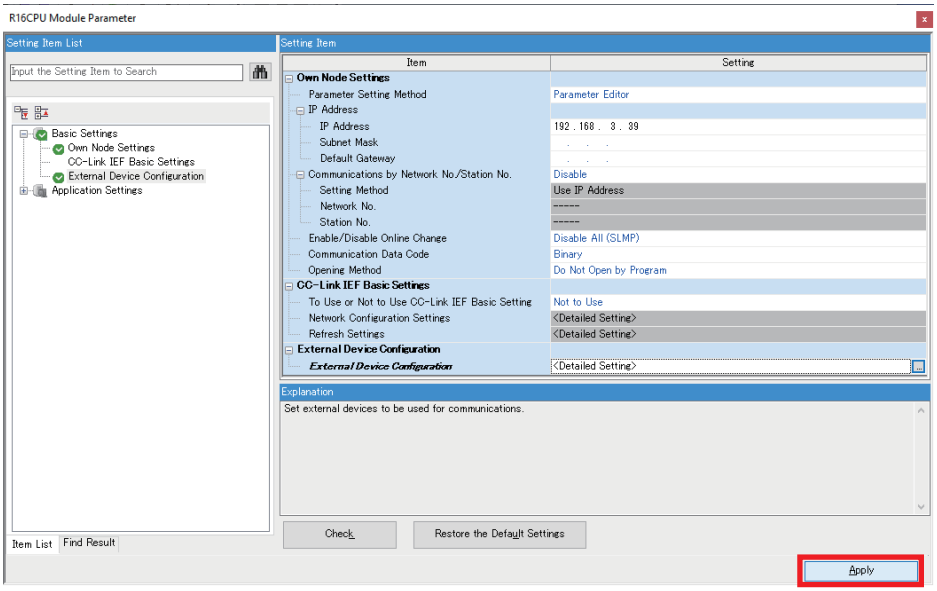


Point

Match the IP address and port No. of the sensor/device with the setting of the network camera set in the following.

☞ Page 25 Network Camera Setting

5. Click the [Apply] button of the module parameter.



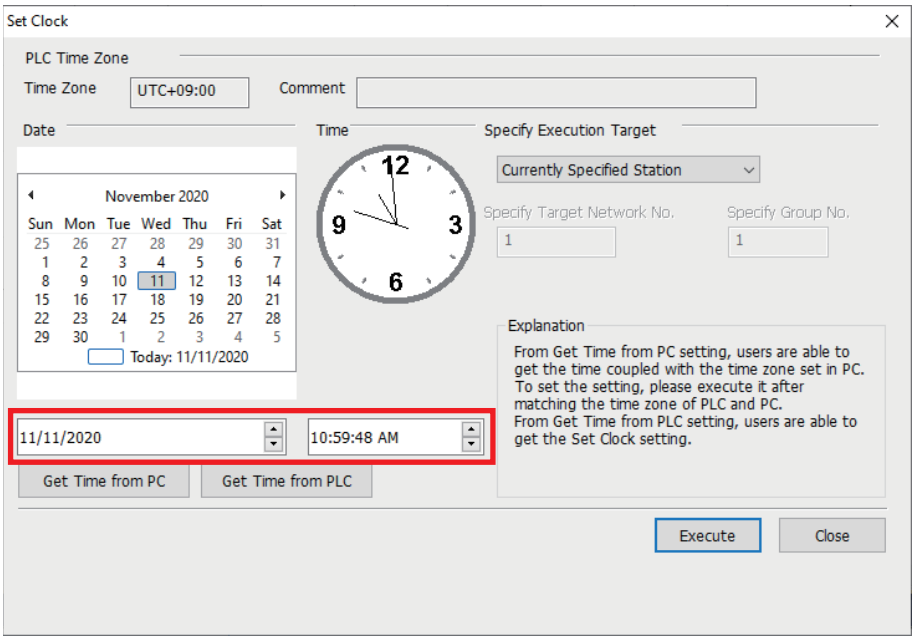
Clock settings

Set the clock data of the programmable controller.

1. Display the clock setting window.

[Online] ⇨ [Set Clock]

2. Check and enter the time, and click the [Execute] button.



Point

This setting is not required if the time synchronization setting by the NTP server is configured on the network camera side. For details on the time setting function (SNTP client) of the MELSEC iQ-R series CPU modules, refer to the following.

MELSEC iQ-R Ethernet User's Manual (Application)

Creating a program

To record videos with the camera, creating the following two programs are required: one for setting the clock data of the CPU module in the network camera and another for executing the video recording event set in the network camera. Using the FBs of the camera recording package makes creating the sequence programs easy.
Three types of FBs are provided. The following table lists the purpose of each FB.

Name	Description
M+CameraRecord_AXIS_SetTime_R (Clock setting)	Sets the clock data of the CPU module to the network camera connected to the CPU module.
M+CameraRecord_AXIS_EventTrigger_R (Video recording before and after trigger)	Records the video before and after the video recording trigger is turned on in the network camera connected to the CPU module.
M+CameraRecord_AXIS_VirtualInputControl_R (Video recording during trigger ON)	Controls the virtual input port status of the network camera connected to the CPU module to record video while the video recording trigger is on or before and after the video recording trigger is turned on. (Use this function mainly when recording video while the video recording trigger is on.)

For details on the FBs, refer to the following.
Camera Recording Package User's Manual

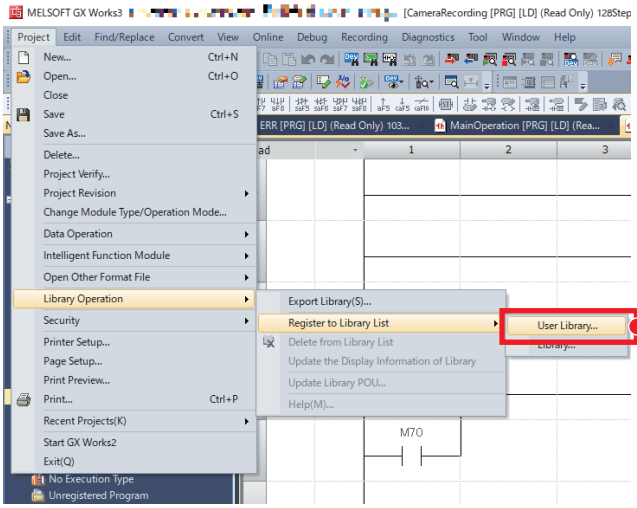
Registering the FB library

Register the FB library to be used to the program.

Operating procedure

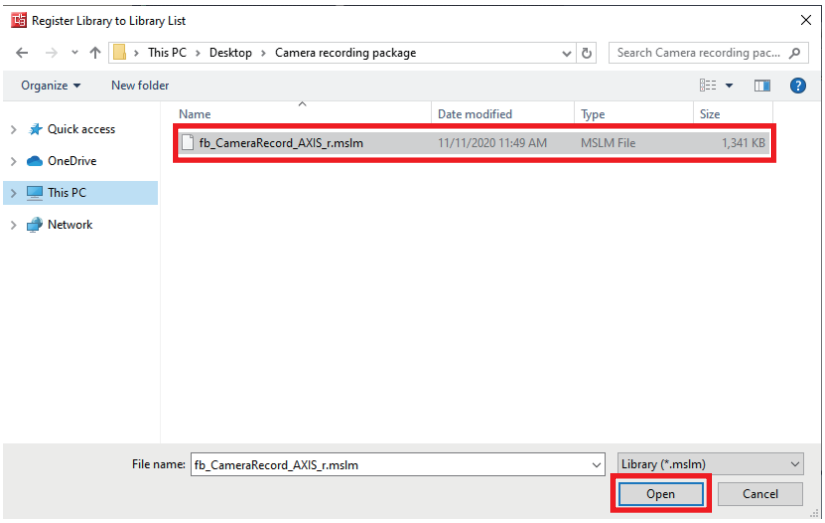
1. Display the "Register Library to Library List" window.

[Project] ⇨ [Library Operation] ⇨ [Register to Library List] ⇨ [Library]

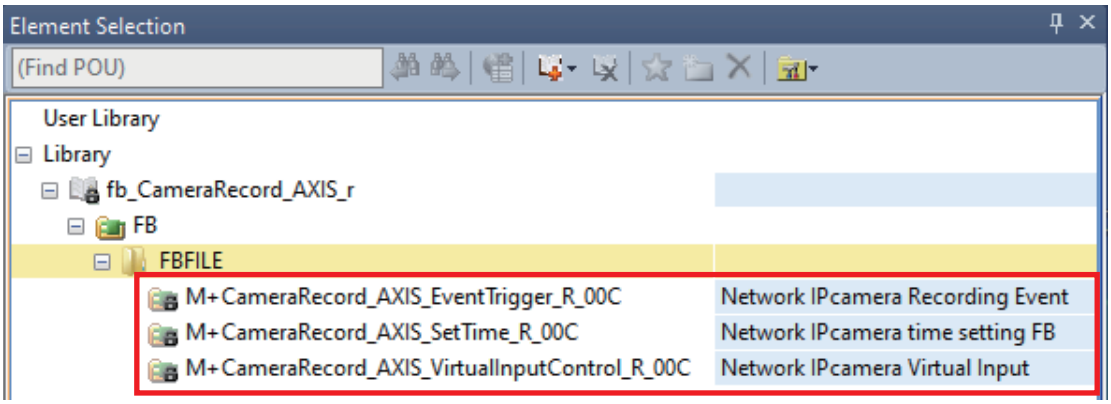


Click here to register the FB library.

2. Select the library (mslm file) of the camera recording package, and then click the [Open] button.



3. The FBs are registered to the library.



Program example

■Global label list

Define the global labels as follows.

	Label Name	Data Type		Class	Assign (Device/Label)	Initial Value
1	bSetTime_EN	Bit	...	VAR_GLOBAL		
2	uSetTime_ConnectionNo	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL		1
3	sSetTime_UserName	String(255)	...	VAR_GLOBAL		'root'
4	sSetTime_PassWord	String(255)	...	VAR_GLOBAL		'MELSEC0000'
5	bSerTime_END	Bit	...	VAR_GLOBAL		
6	bSerTime_OK	Bit	...	VAR_GLOBAL		
7	bSerTime_Err	Bit	...	VAR_GLOBAL		
8	uSetTime_ErrID	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL		
9	bEventTrigger_EN	Bit	...	VAR_GLOBAL		
10	uEventTrigger_ConnectionN	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL		1
11	sEventTrigger_UserName	String(255)	...	VAR_GLOBAL		'root'
12	sEventTrigger_PassWord	String(255)	...	VAR_GLOBAL		'MELSEC0000'
13	uEventTrigger_VirtualInputP	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL		
14	bEventTrigger_END	Bit	...	VAR_GLOBAL		
15	bEventTrigger_OK	Bit	...	VAR_GLOBAL		
16	bEventTrigger_Err	Bit	...	VAR_GLOBAL		
17	uEventTrigger_ErrID	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL		

*1 *2

*1 The initial value is the connection No. of the active connection module set in the external device configuration.
☞ Page 39 External device configuration

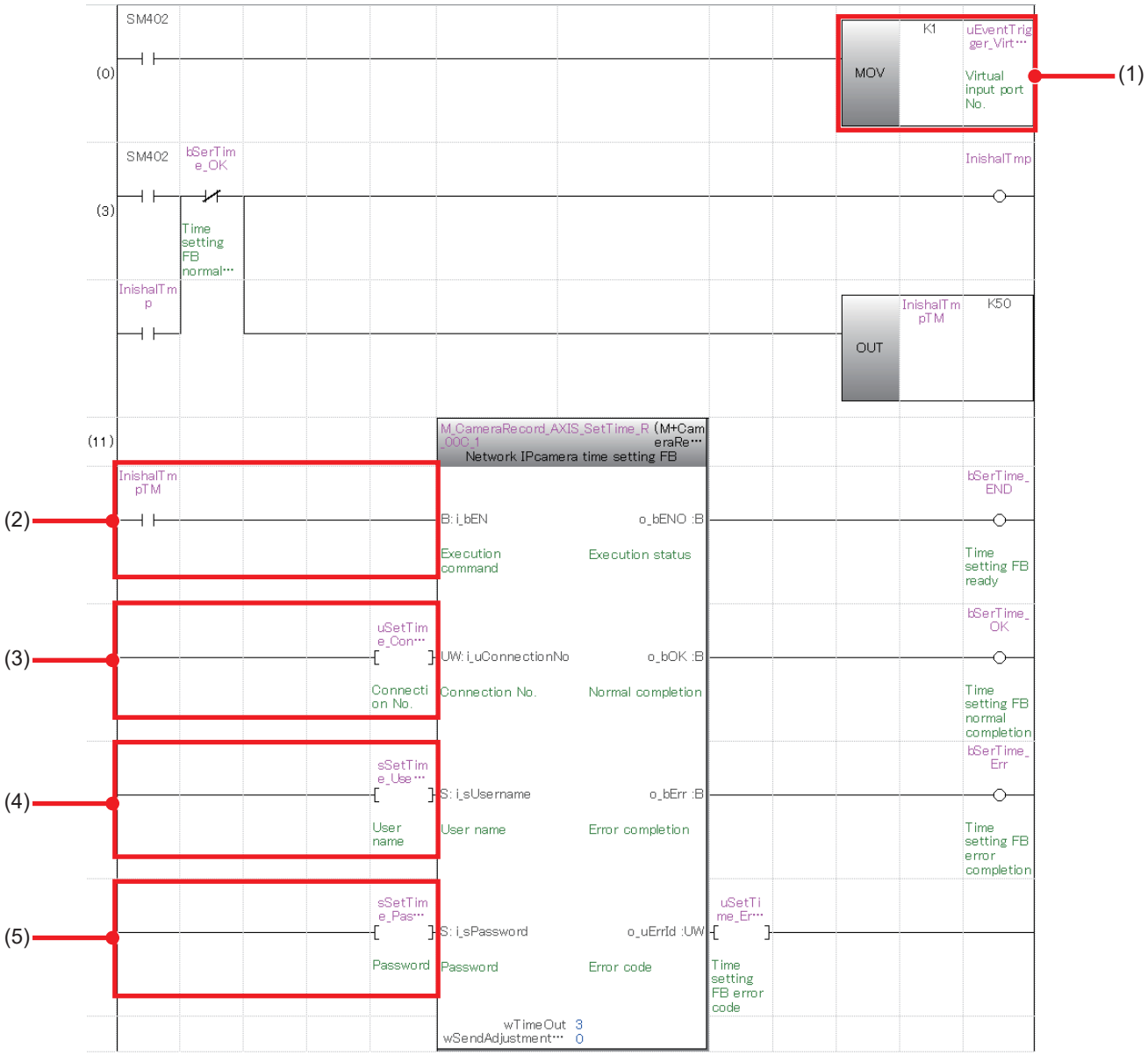
*2 The initial values are the user name and password set when the network camera is started up for the first time.
☞ Page 25 Initial start-up setting

Point

Although labels are used in this sample program, devices can be created as well.

■M+CameraRecord_AXIS_SetTime_R

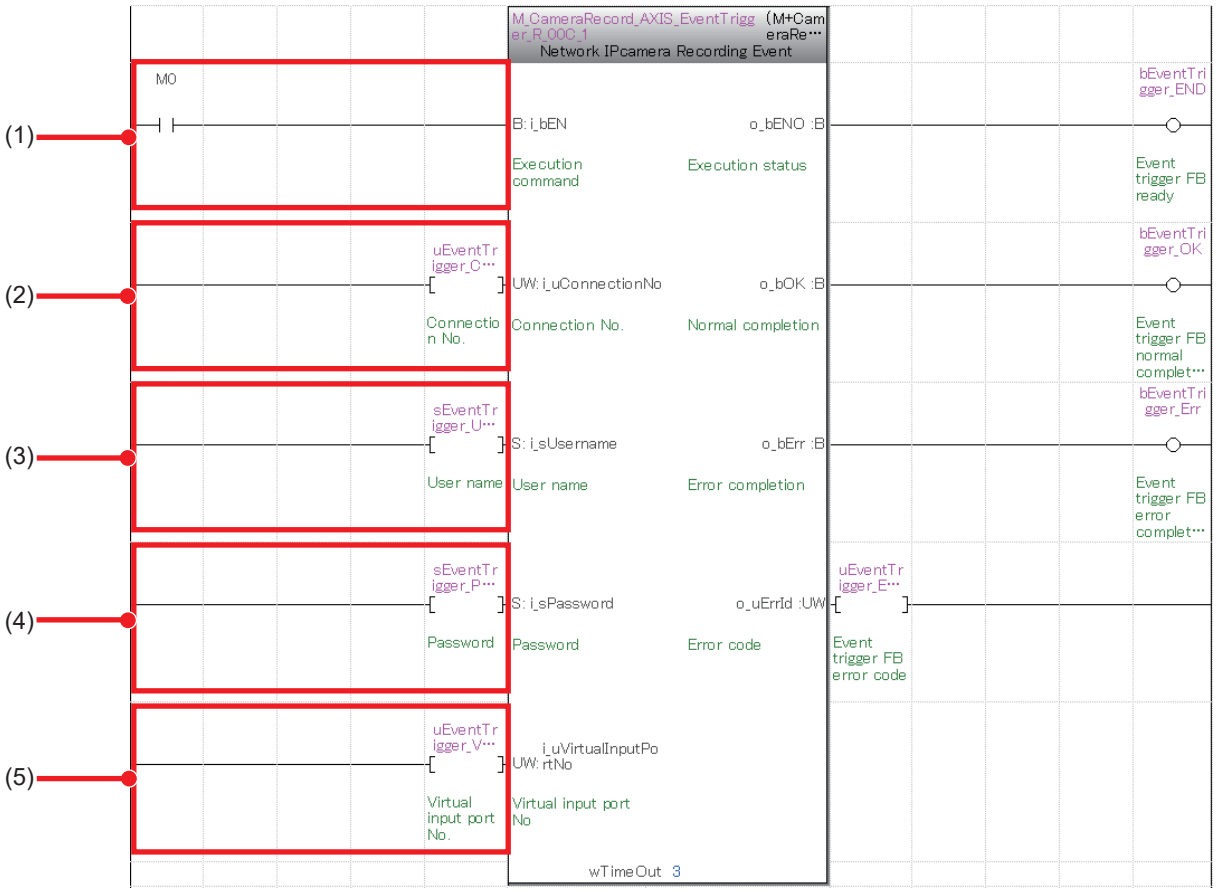
The clock data of the CPU module is synchronized with the network camera five seconds after the program is run.



No.	Description
(1)	For the virtual input port No., specify the port No. set in the event window of the network camera. ☞ Page 32 Rule settings
(2)	Set the device to execute the FB. If the FB is executed before the network camera starts up, it may not be function as expected. Create processing in which the FB is executed after the network camera starts up. In the sample program, the FB is executed approximately five seconds after the program is run.
(3)	Specify the connection No. of the network camera. ☞ Page 39 External device configuration
(4)	Set the user name of the network camera set in the following. ☞ Page 25 Initial start-up setting
(5)	Set the password of the network camera set in the following. ☞ Page 25 Initial start-up setting

■M+CameraRecord_AXIS_EventTrigger_R

Turning on the file saving trigger device executes the video recording event set in the network camera.



No.	Description
(1)	Set the device to be the trigger for executing the video recording event. In the sample program, the device used for the file saving trigger (M0) is set.
(2) (3) (4)	Set these items in the same manner as the example of M+CameraRecord_AXIS_SetTime_R. ☞ Page 45 M+CameraRecord_AXIS_SetTime_R
(5)	For the virtual input port No., specify the port No. set in the event window of the network camera. ☞ Page 32 Rule settings

Writing

Write the project to the programmable controller.

☞ Page 18 Writing

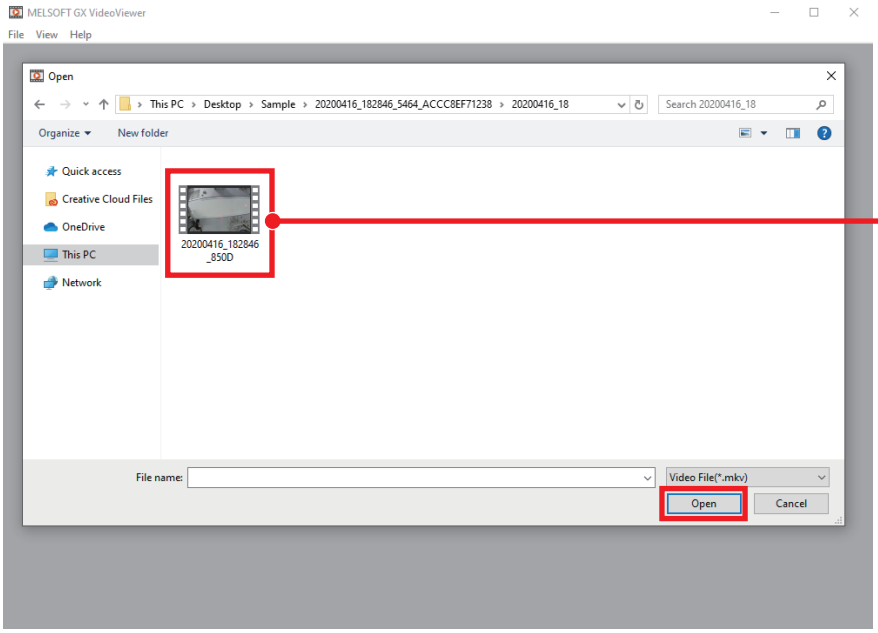
4.3 GX VideoViewer

The video recorded with the network camera can be replayed in GX VideoViewer by Mitsubishi Electric. This section describes how to use GX VideoViewer.

Add log markers to positions assumed to be the causes of the device error occurrence, and read the log marker information file (*.vms) in GX Works3. This adds the log markers added in GX VideoViewer to the seek bar of the offline monitoring in GX Works3 and allows the program operation to be checked in synchronization.

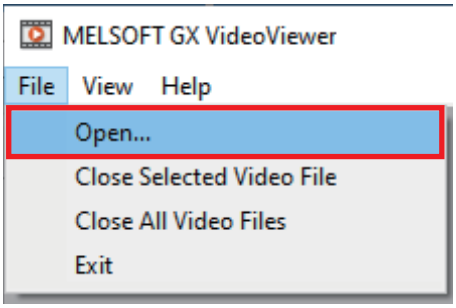
Operating procedure

1. When GX VideoViewer (GVViewer.exe) is executed, a window for selecting a video to be opened appears.*1

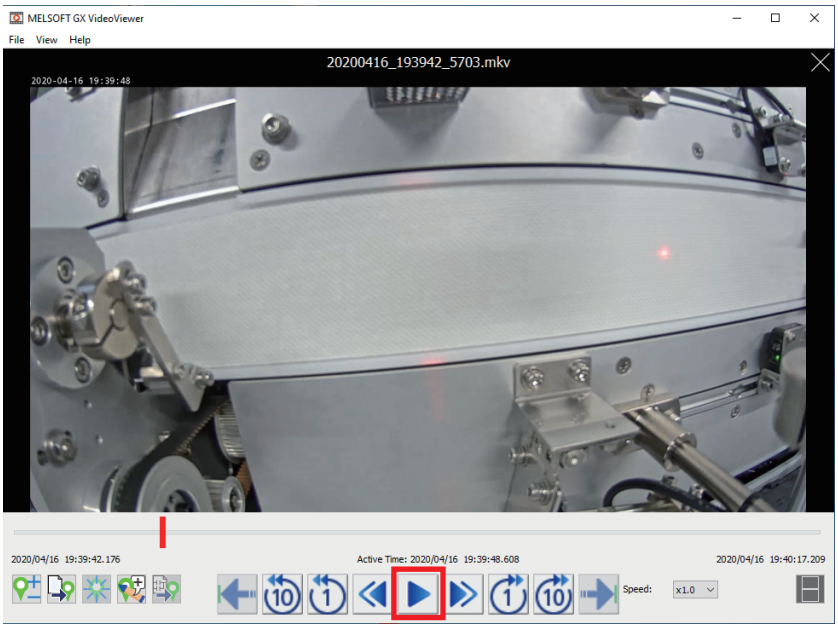


*1 Video can be opened by selecting the following items.

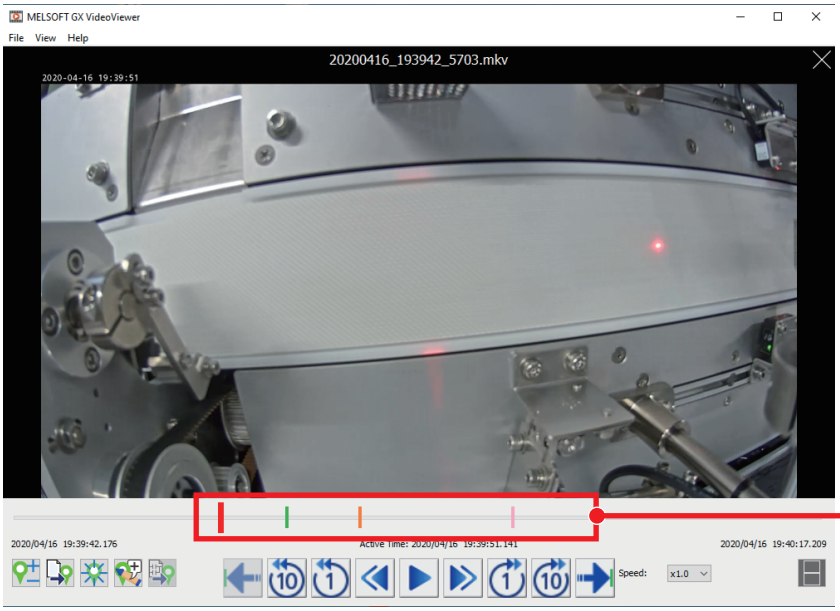
[File] ⇨ [Open]



2. Replay the video with the button.



3. Make a log marker at any position in the video with the button.



A bar in a color other than red indicates the position where the log mark is made.

Point

The frame-by-frame playback can be performed in the positions where the log markers have been made with the and buttons.

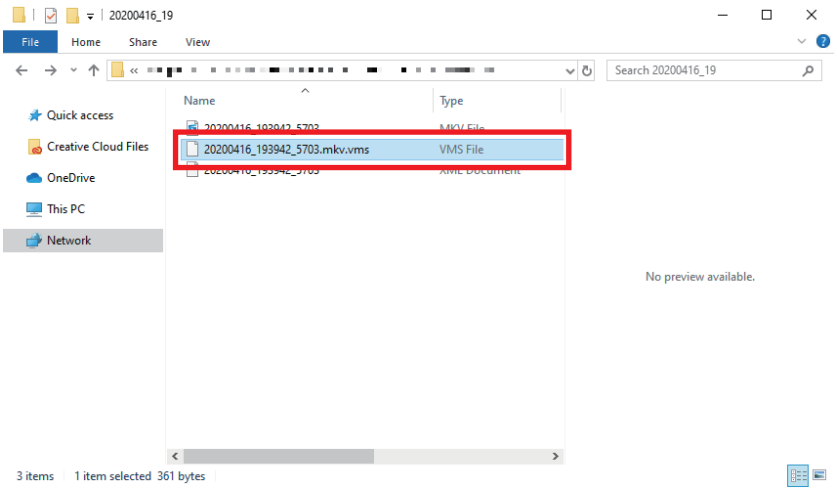
When using two or more cameras

When using multiple cameras, use the log marker information read function to check the video of each camera at the same time.

The following describes an example. By reading the log marker added in the video of Camera A to the video of Camera B, a log marker is added to the position at the same time to check.

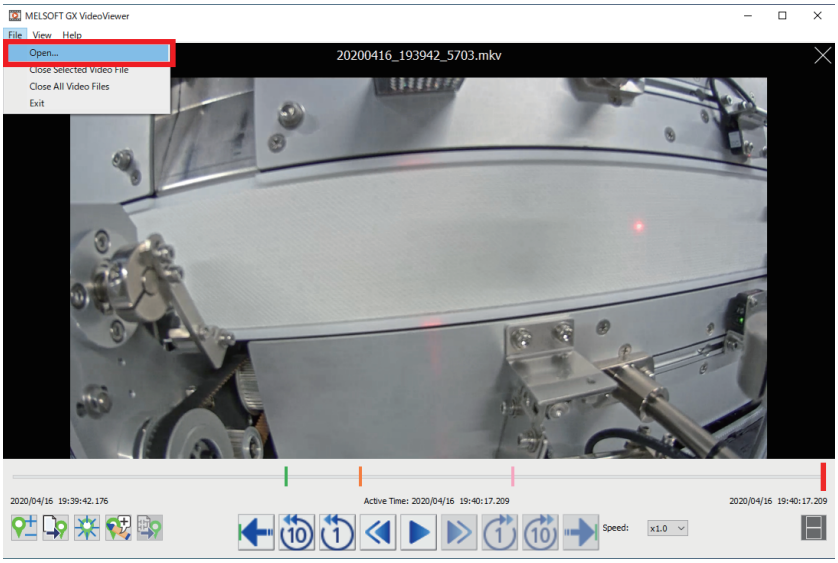
Operating procedure

1. Adding a log marker to the video of Camera A creates a log marker information file (*.vms) in the same folder as the video recording file.

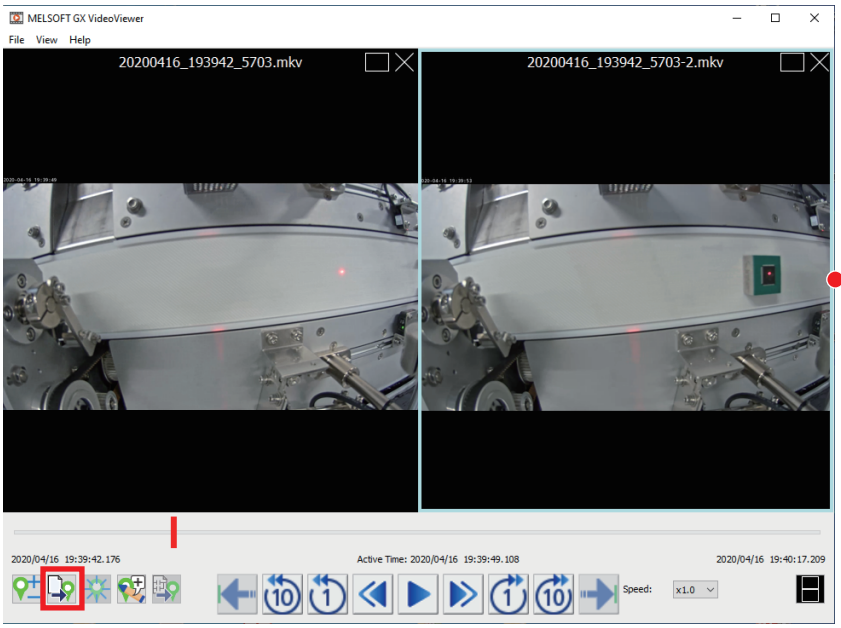


2. Open the video of Camera B with the one of Camera A opened.

[File] ⇨ [Open]



3. Select the replay window for the video of Camera B, click the [Read Log Marker information] button.



The selected window is surrounded by a light blue frame.

4. Open the log marker information file (*.vms) described in step 1.

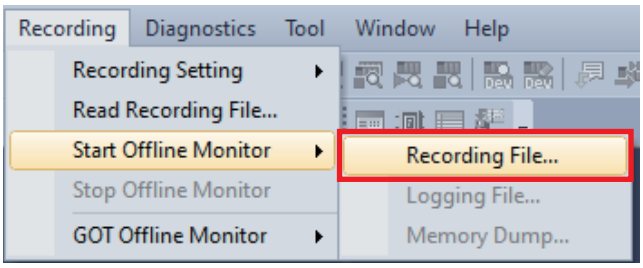
5 OFFLINE MONITOR FUNCTION

This chapter describes the offline monitor function for monitoring the data recorded by the system recorder offline.
This function reproduces the status at the during the error on the engineering tool by using the device/label data and event histories saved in the programmable controller (recorder module) to replay the trouble on the offline monitor.
The following describes how to start the offline monitoring.

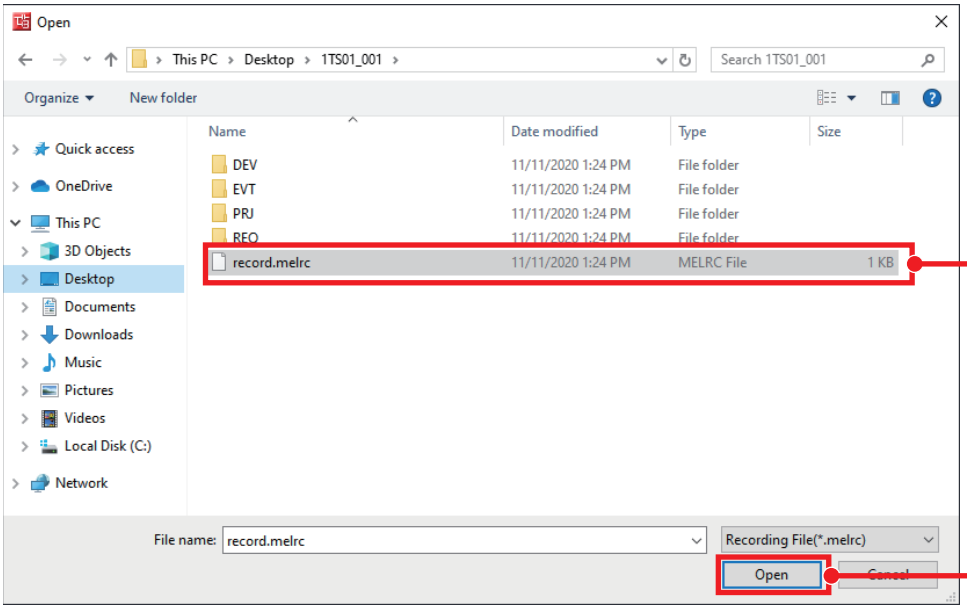
Operating procedure

1. Use the recording file saved in "☞ Page 21 Recording" to perform the offline monitoring.

[Recording] ⇨ [Start Offline Monitor] ⇨ [Recording File]



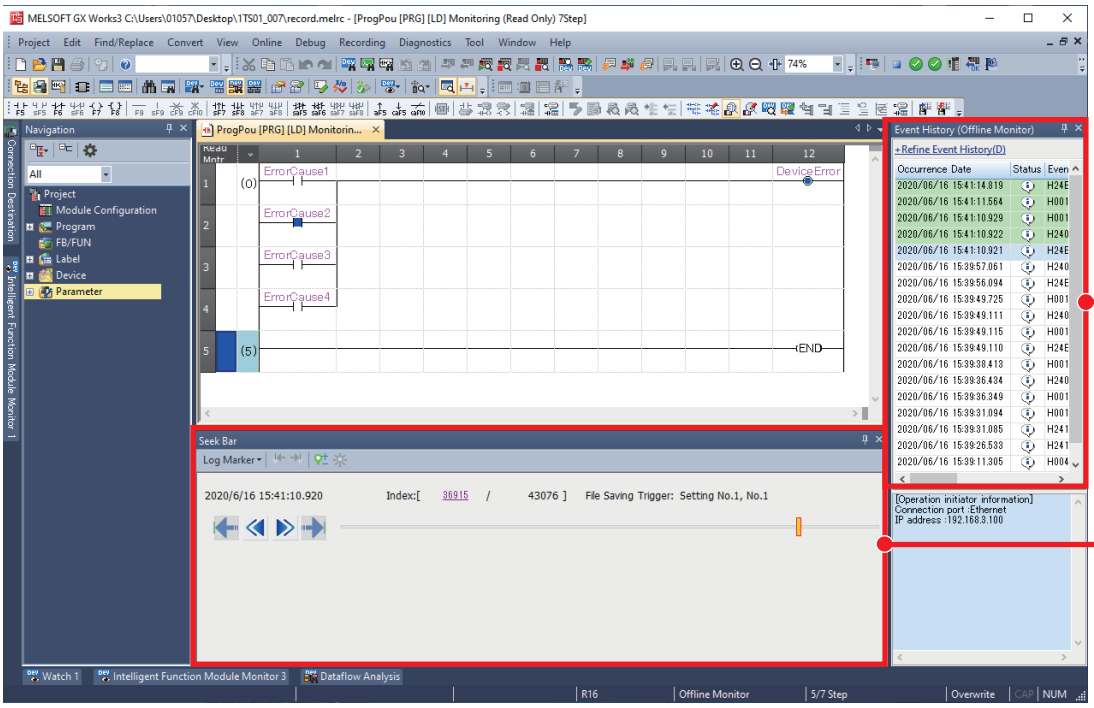
2. Select the recording file to open.



Select the MELRC file.

Click the [Open] button.

3. The offline monitoring starts.



■Seek bar

The seek bar is a function for specifying the index (serial number to be recorded in the recording file per scan) of the data to be monitored.

The seek bar can apply the specified index or the monitor value of the index to the linked monitor screen, "Event History (Offline Monitor)" window, and GX LogViewer.

■Event history (offline monitor)

The event information (error information, operation history, system information, and current value change history) stored in the recording file being monitored can be checked.

Point

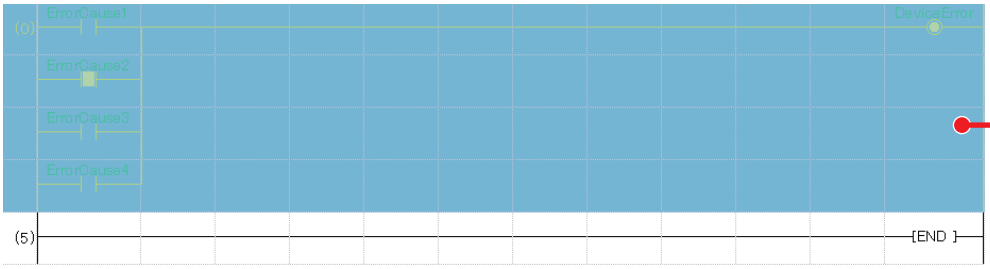
By operating the slider of the seek bar, the event information of the specified index can be checked.
In addition, selecting the event information whose background color is light green moves the slider of the seek bar to the corresponding index and applies the monitor value of the index to the monitor screen.

Displaying waveform data

Display the devices/labels selected in the monitor screen of the offline monitor function in a graph in GX LogViewer.

Operating procedure

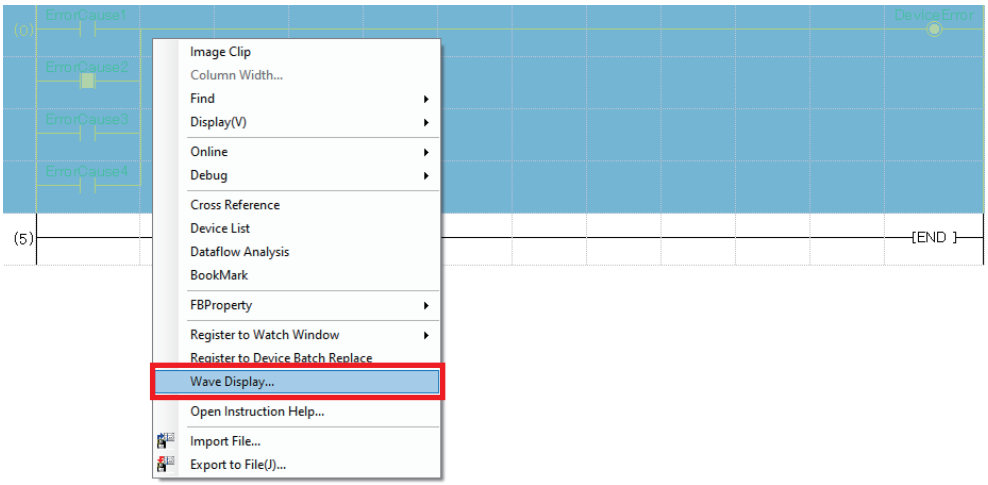
1. Select a device in the program editor or watch window.



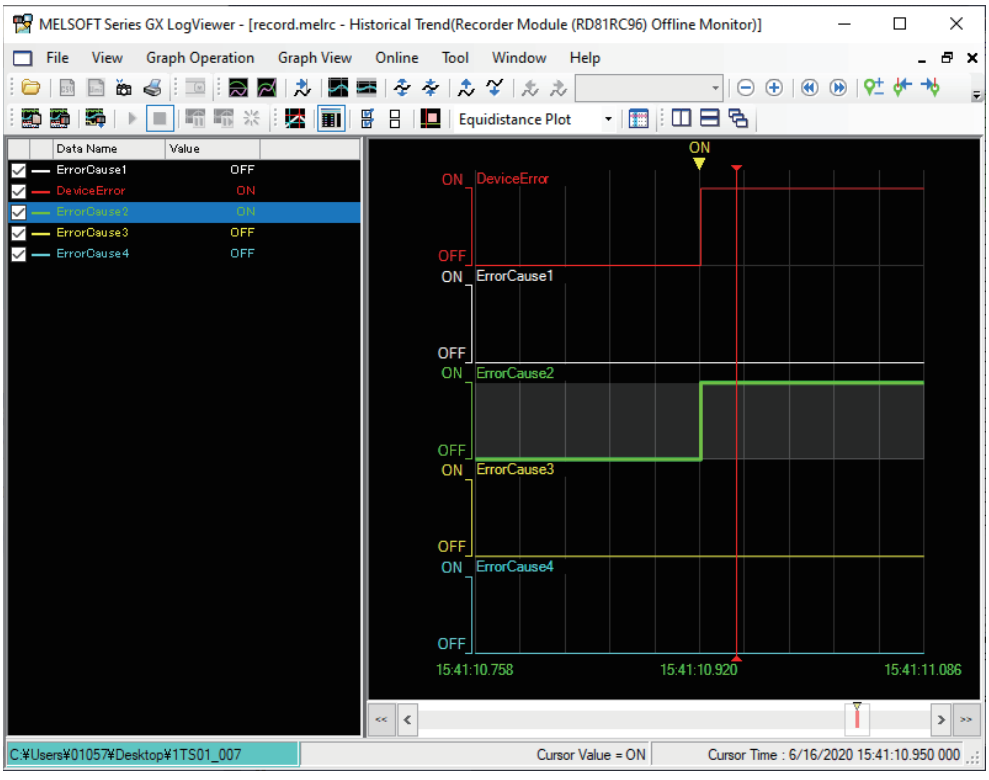
Select the device.

2. Select the waveform display.

Shortcut menu displayed by right-clicking ⇨ [Wave Display]



3. The "Historical Trend" window of GX LogViewer is displayed.



Precautions

Up to 32 devices/labels can be registered to GX LogViewer.

Point

The seek bar in GX Works3 and the red cursor in GX LogViewer are linked.
Moving the slider on the seek bar in GX Works3 moves the red cursor in GX LogViewer, and moving the red cursor in GX LogViewer moves the slider on the seek bar in GX Works3 in synchronization.

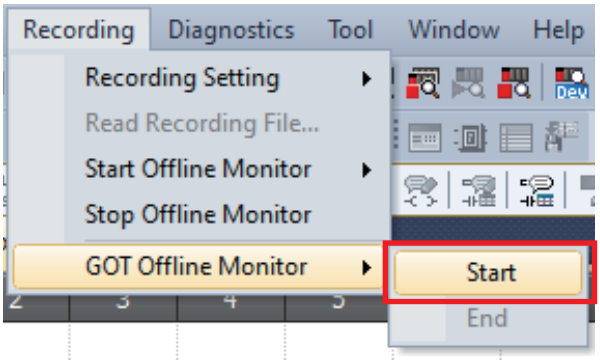
GOT offline monitor

The same monitor screen of the GOT as the one at the error occurrence can be displayed and checked.

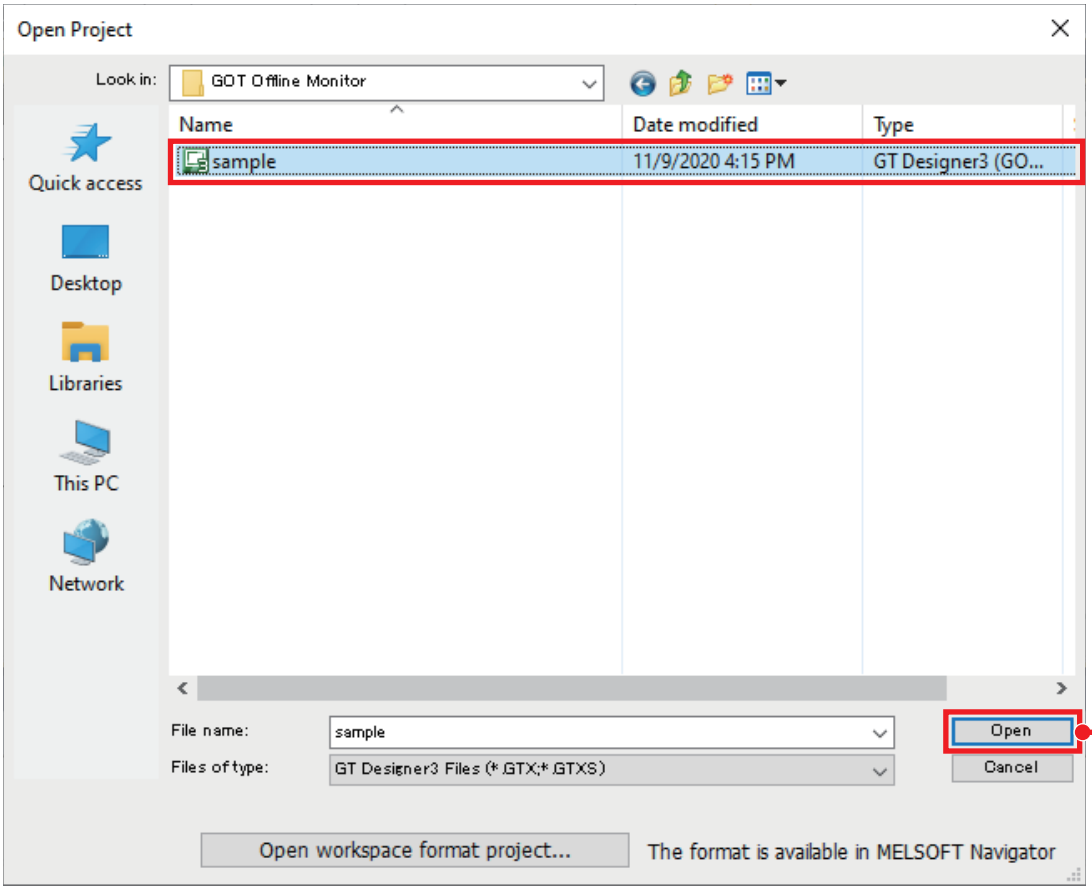
Operating procedure

1. Start the offline monitoring. (☞ Page 51 OFFLINE MONITOR FUNCTION)
2. Start the GOT offline monitor.

[Recording] ⇨ [GOT Offline Monitor] ⇨ [Start]

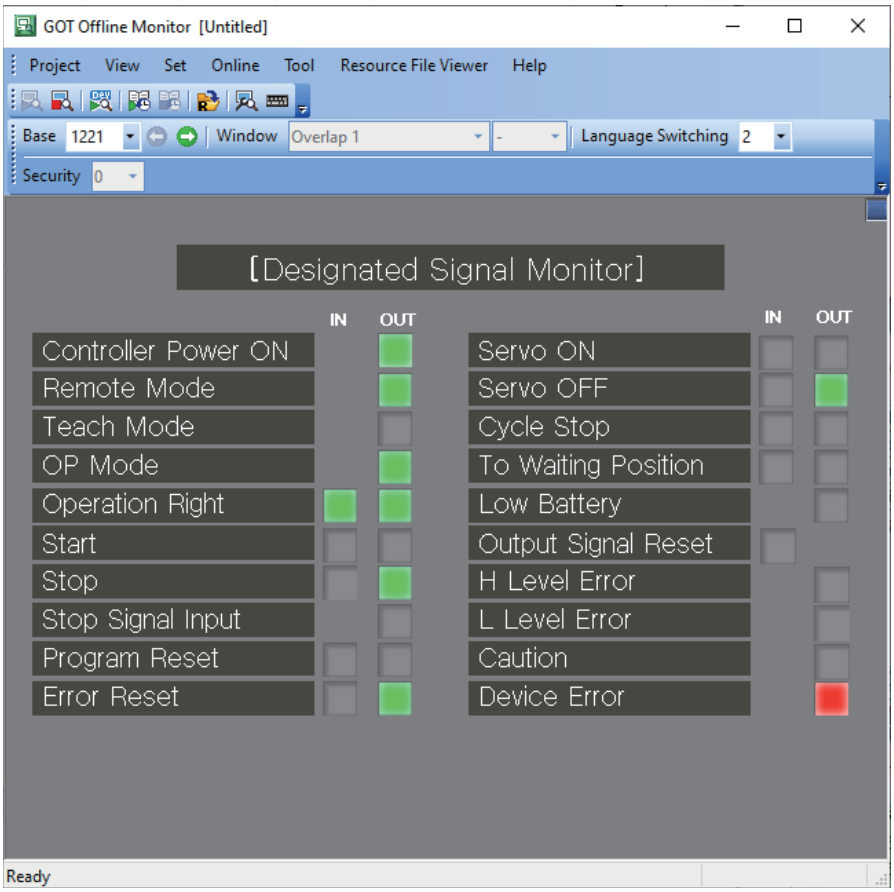


3. Select the project file of GT Designer3 to open.



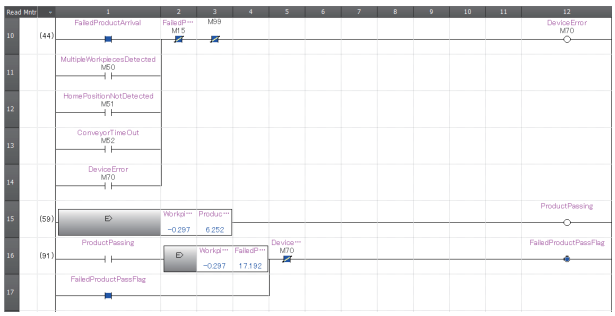
Click the [Open] button.

4. The GOT offline monitor is displayed.

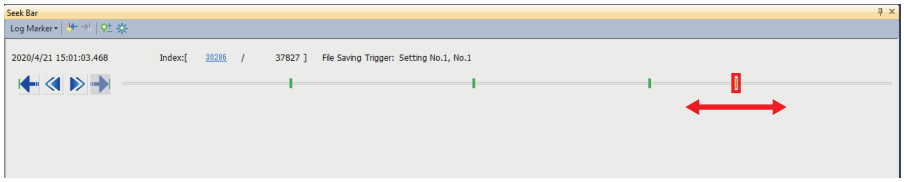


Replay Function is synchronized with the seek bar (editor, event hirstory and GX LogViewer)

In synchronization with the movement of the slider on the seek bar, the editor being monitored offline, Event History (Offline Monitor) window, and red cursor in GX LogViewer move.



The movement of the slider on the seek bar is applied to the editor being monitored offline.

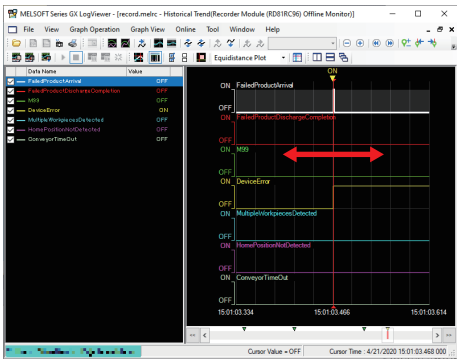


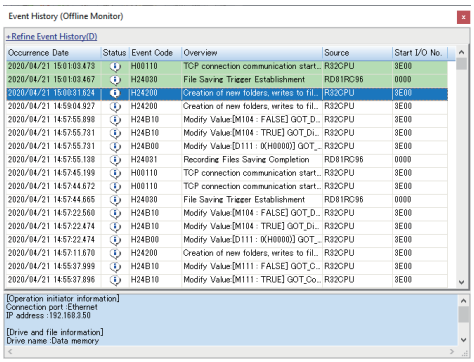
Moving the slider moves the red cursor.

Moving the red cursor moves the slider.

Moving the slider moves the cursor to the event of the specified index.

Selecting an event moves the slider to the corresponding index.

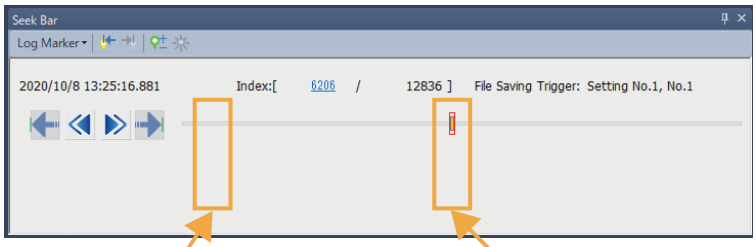




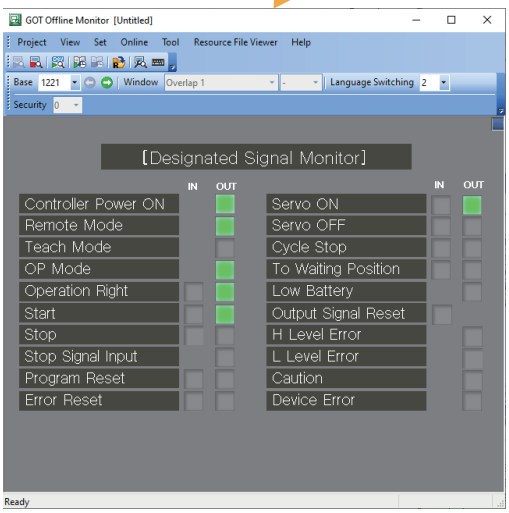
Replay Function is synchronized with the seek bar (GOT offline monitor)

The monitor screen of the GOT synchronized with the movement of the slider on the seek bar can be displayed and checked.

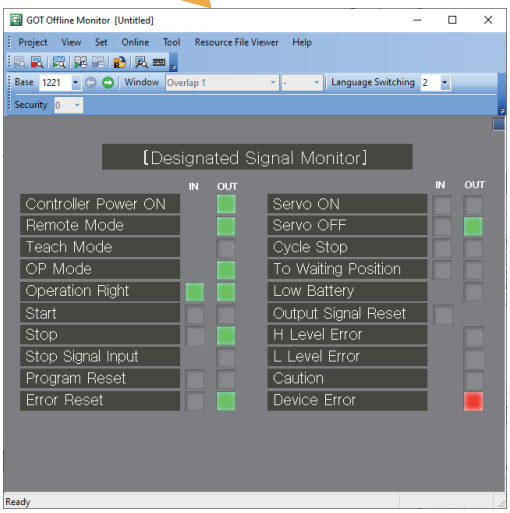
Offline monitor (GX Works3)



GOT offline monitor (GT Designer3)



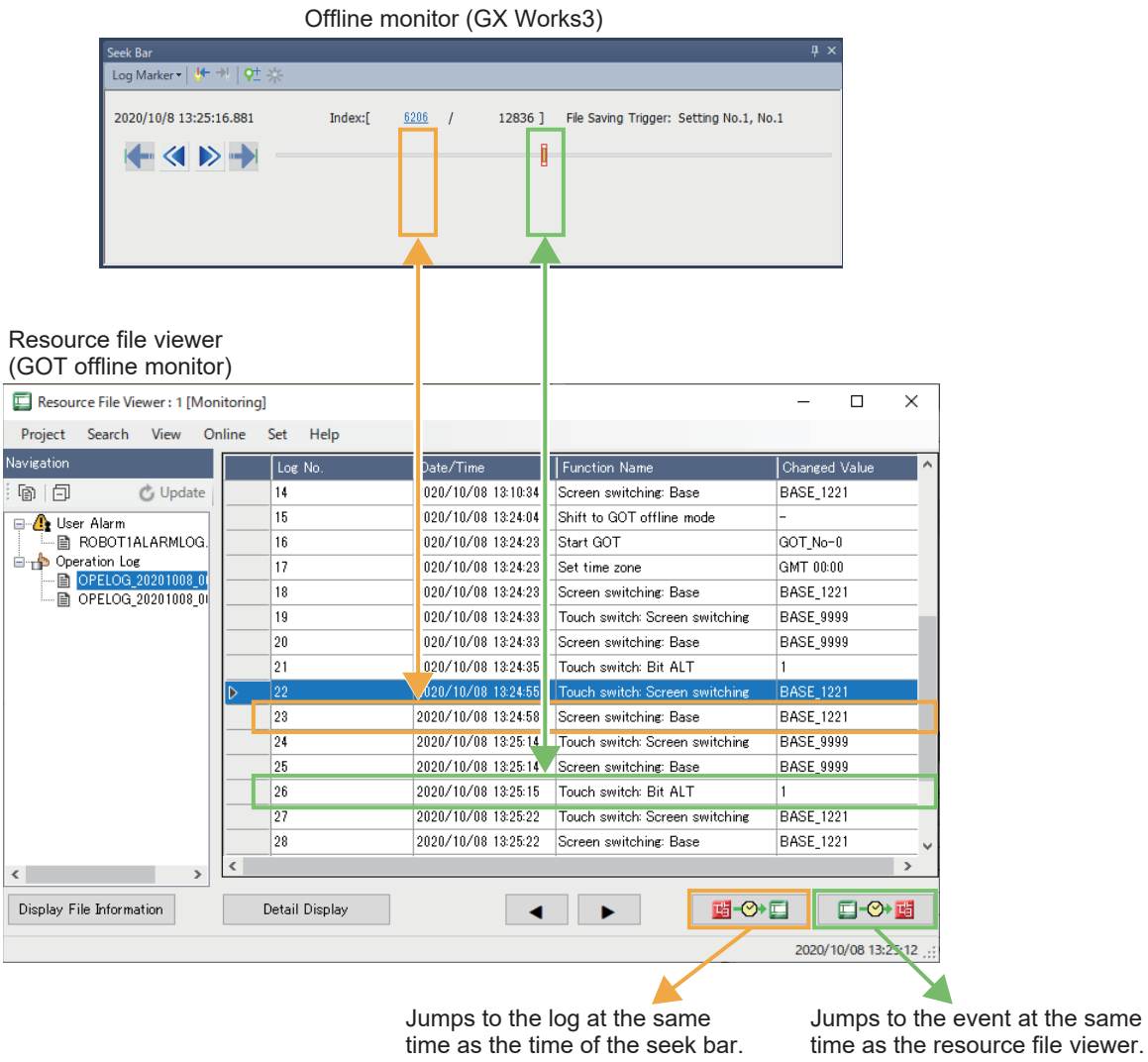
At normal operation



At device error

Replay Function is synchronized with the seek bar (resource file biewer of the GOT offline monitor)

The time of the seek bar and events of the GOT (operation history and alarm history) can be synchronized mutually to replay the status of the site.



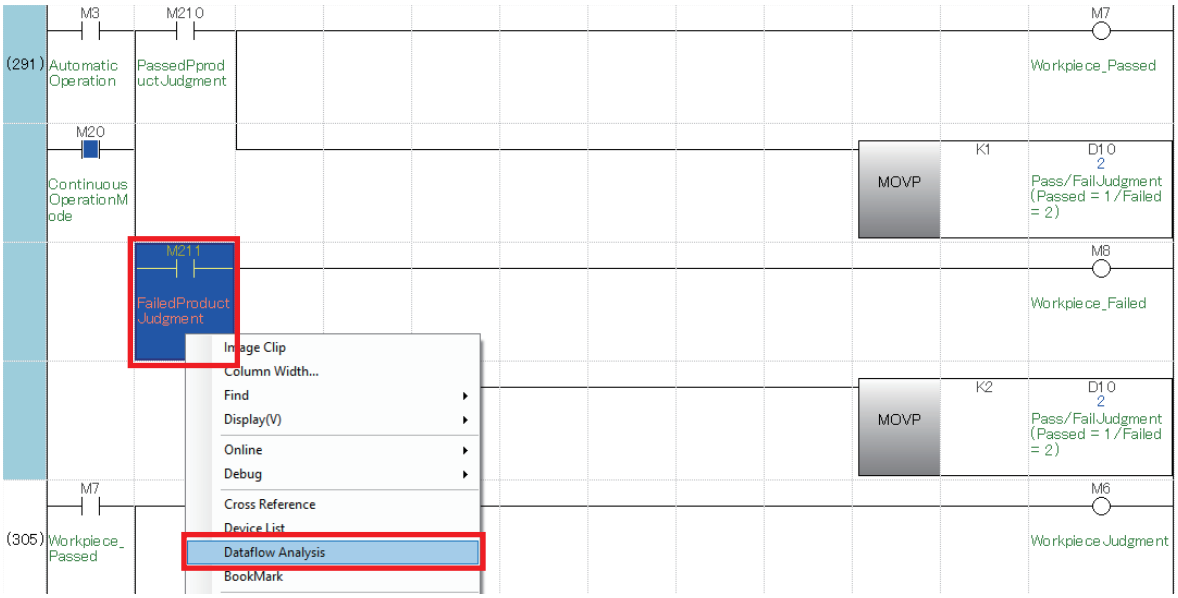
6 DATA FLOW ANALYSIS FUNCTION

The data flow analysis function automatically creates a data flowchart from the GX Works3 program to visually display the execution conditions of a specific Device/Label.
The following describes the procedure for starting the operation of the data flow analysis function.

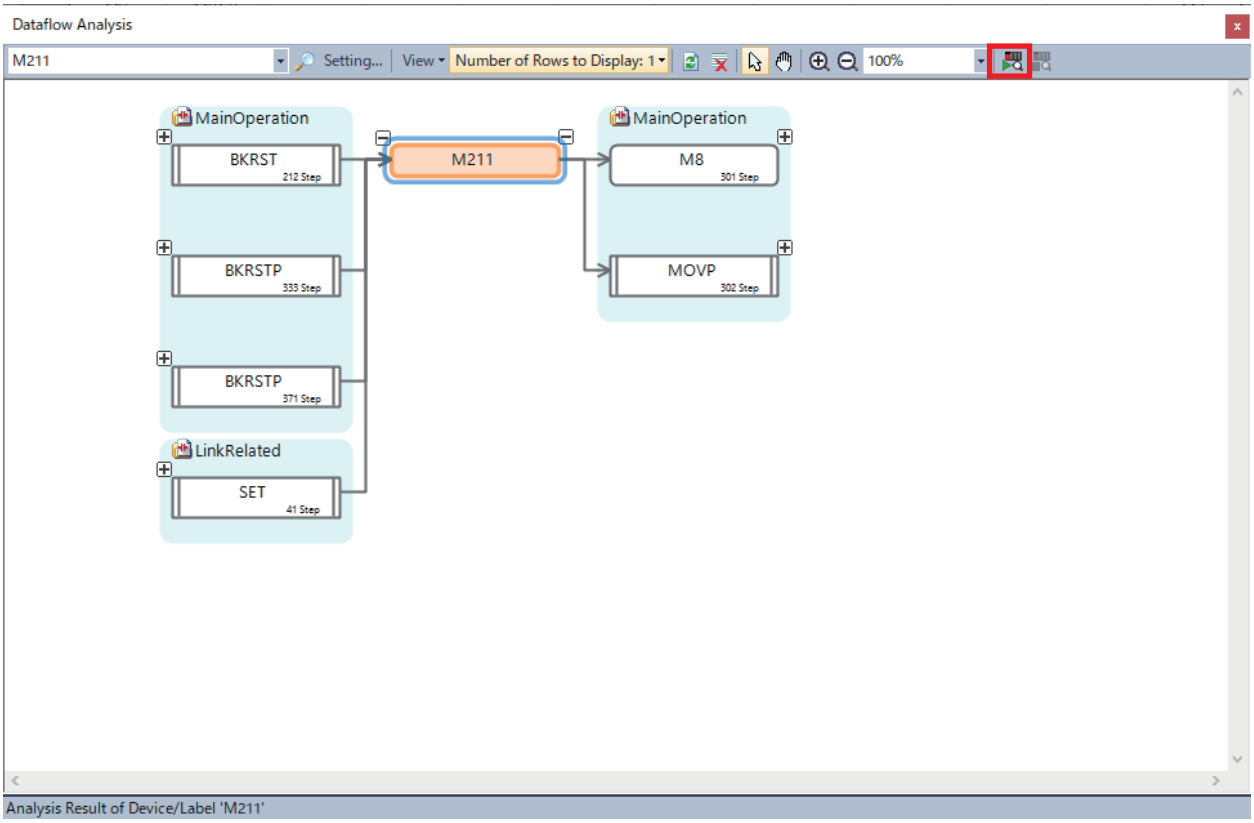
Operating procedure

1. Start GX Works3, and open the program.
2. Select a device to be the basing point, and execute the data flow analysis.

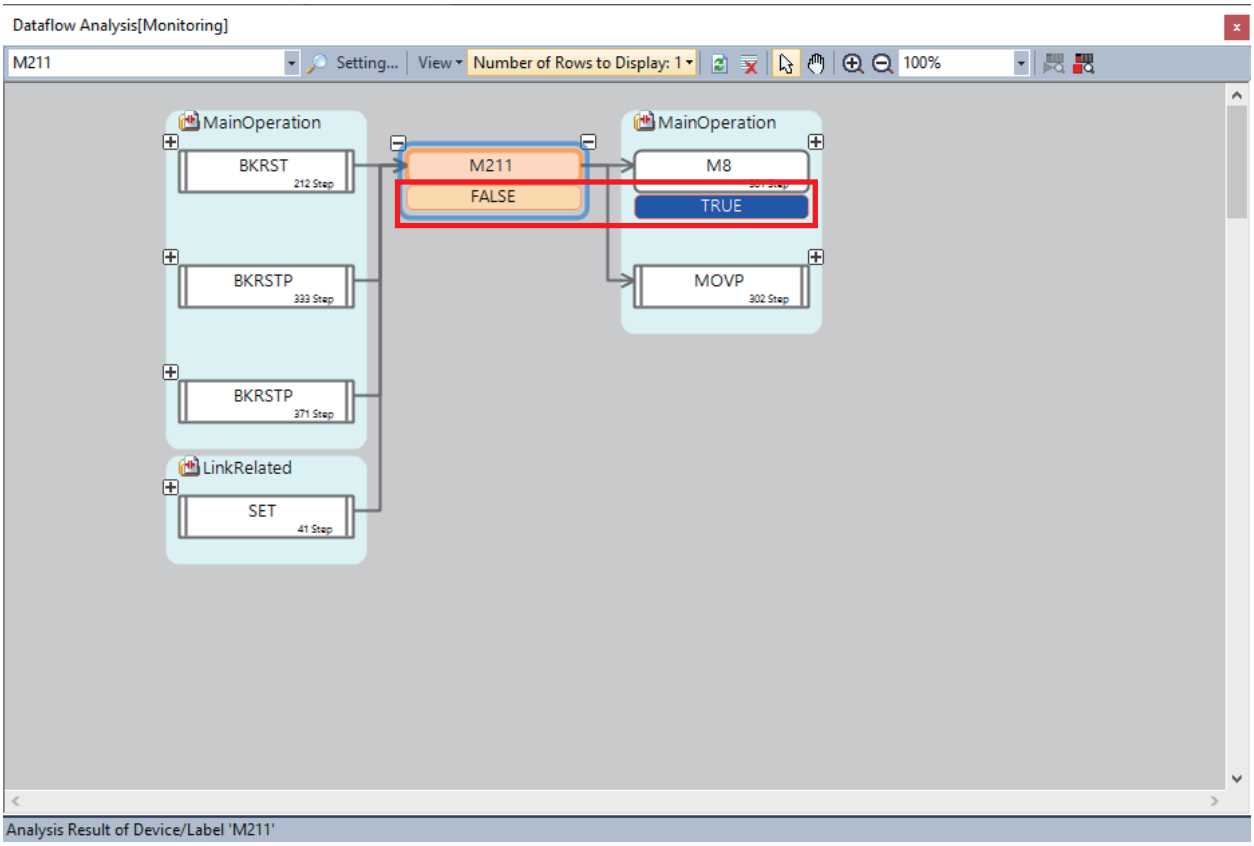
Right-click ⇨ [Dataflow Analysis]



3. The data flow is displayed. Click the [Start Monitoring] button.

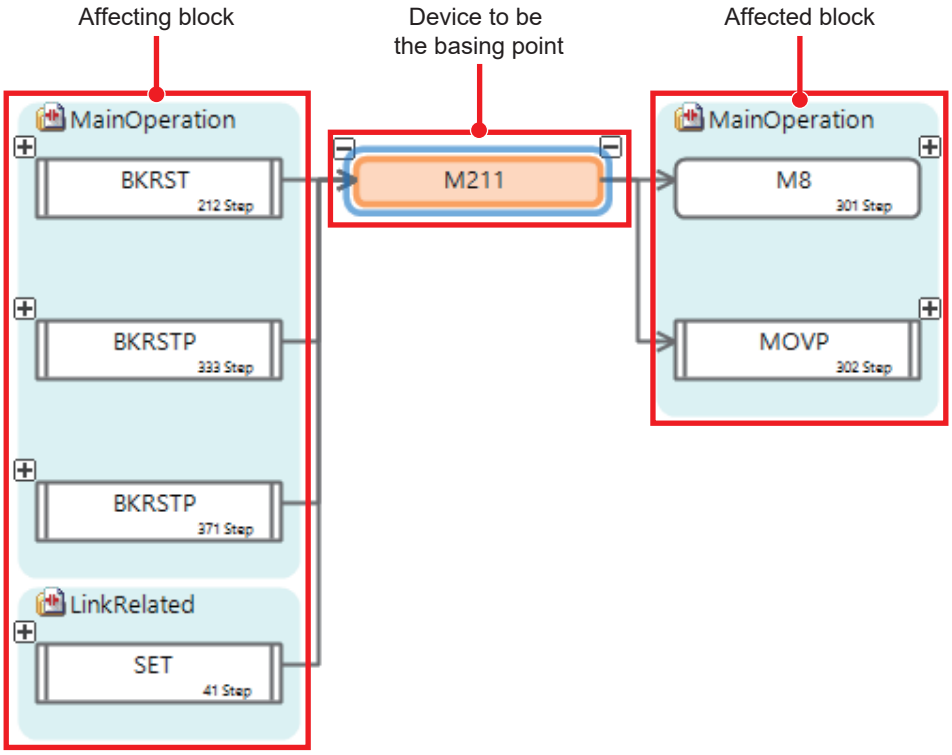


4. The monitor value of the device/label is displayed.



6.1 Overview of Data Flow Analysis

In the data flow analysis, the device/label to be analyzed is displayed in the center as the basing point. The block which affects the device/label to be analyzed is displayed on the left, and the one to be affected is displayed on the right.



For details on the screen, refer to the following.

GX Works3 Operating Manual

7 OPERATION EXAMPLE

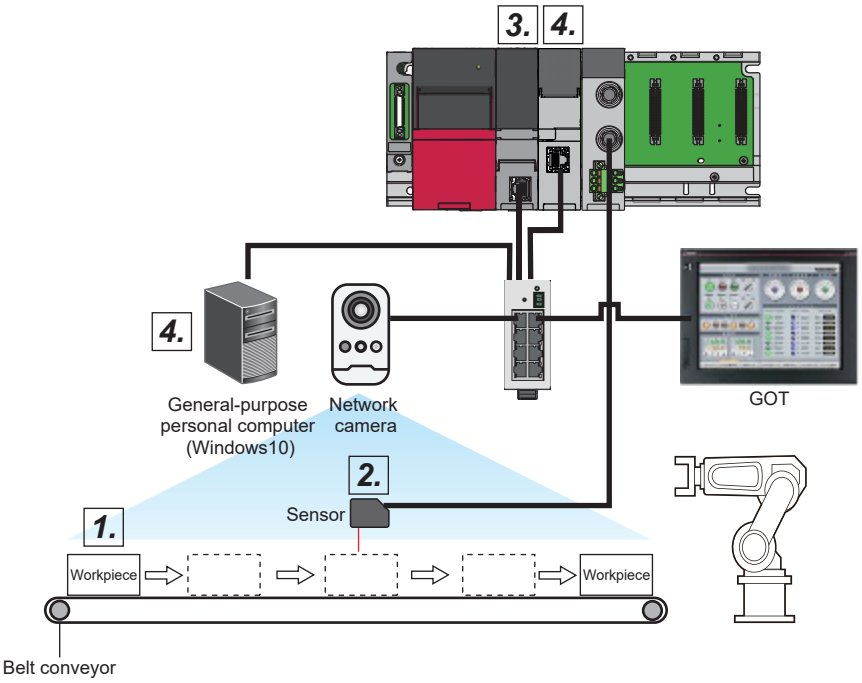
Chapter 3 through Chapter 6 describe the settings and how to start the functions of the record, reproduction, and analysis that are the three phases of the system recorder. This chapter describes examples of actual utilization of the system recorder.

7.1 How to Check the Recording Result

Replay the data sampled by the recorder module and video recorded by the camera to assume the error cause, and then dig deep into it by analysis.

Operation details

The inspection process of a print circuit board is used as an operation example.



1. Workpieces flow on the belt conveyor.
2. The sensor detects the flowing workpieces and measures their heights to judge them as passed or failed products.
3. If any of the four causes are enabled, such as failed product generation and detection of multiple workpieces, a device error occurs.

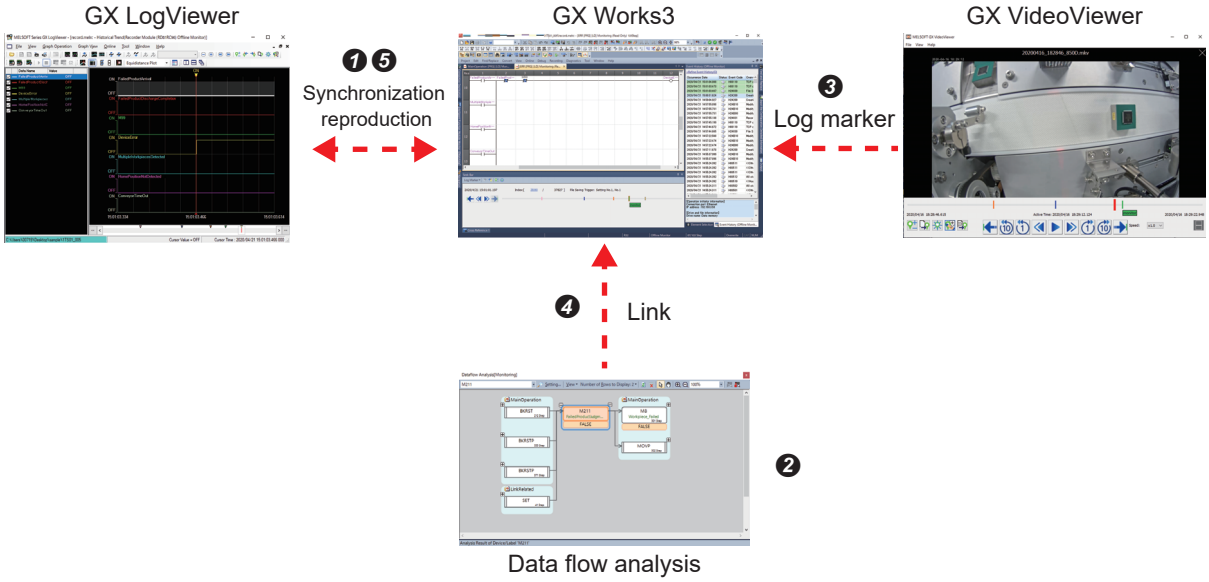
Device error cause

4. The device error triggers the saving operation of the data sampled by the recorder module in the SD memory card and video of the network camera in the general-purpose personal computer (Windows10).

Analysis procedure

If a device error which is a saving trigger of the recorder module turns on, the error cause is determined from four causes that are the conditions of turning on the device error. As an example, a failed product arrival is used here. Then, check the device/label value which is the cause of the error occurrence.

The following describes the analysis procedure.



❶ In GX LogViewer, check the cause of the device error set as the saving trigger has turned on.

❷ After the cause is determined, set the device as the basing point device, and check the execution condition of the basing point device by data flow analysis.

❸ After the execution condition is determined, make a log mark at the position where the operation, which is the execution condition, is performed in GX VideoViewer, and add the log marker information to the seek bar in GX Works3.

❹ Check the device which is the execution condition of the error cause in the program of GX Works3.
By clicking a device in the data flow analysis screen, the program where the clicked device is used can be displayed.

❺ Check the operation of the displayed program and GX LogViewer.

Synchronous playback of GX Works3 and GX LogViewer

Check which one of the four error causes has caused the error.

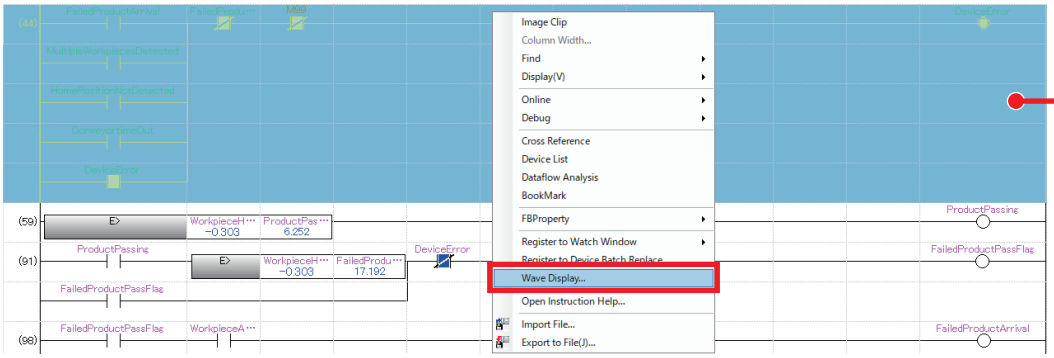
Operating procedure

1. Start the offline monitoring. (☞ Page 51 OFFLINE MONITOR FUNCTION)
2. Double-click "File Saving Trigger Establishment" in the event history to open the program of the file saving trigger establishment condition.

At this time, one of the four devices that are a condition of the error device cannot be determined.

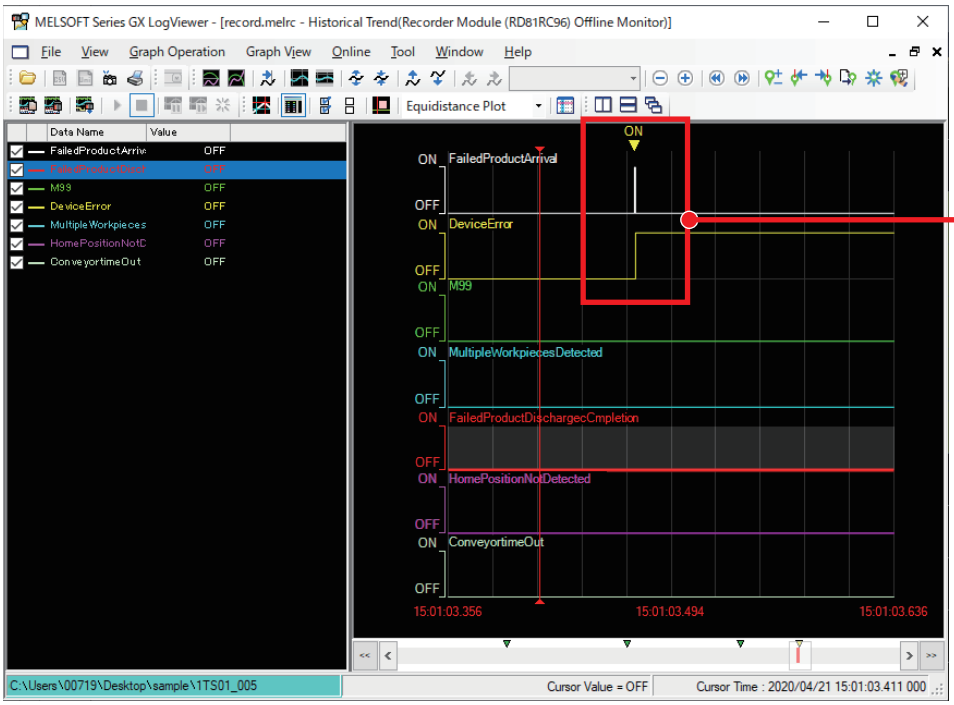
3. To determine the cause, display the waveform data in GX LogViewer.

Select a device/label ⇨ Right-click ⇨ [Wave Display]



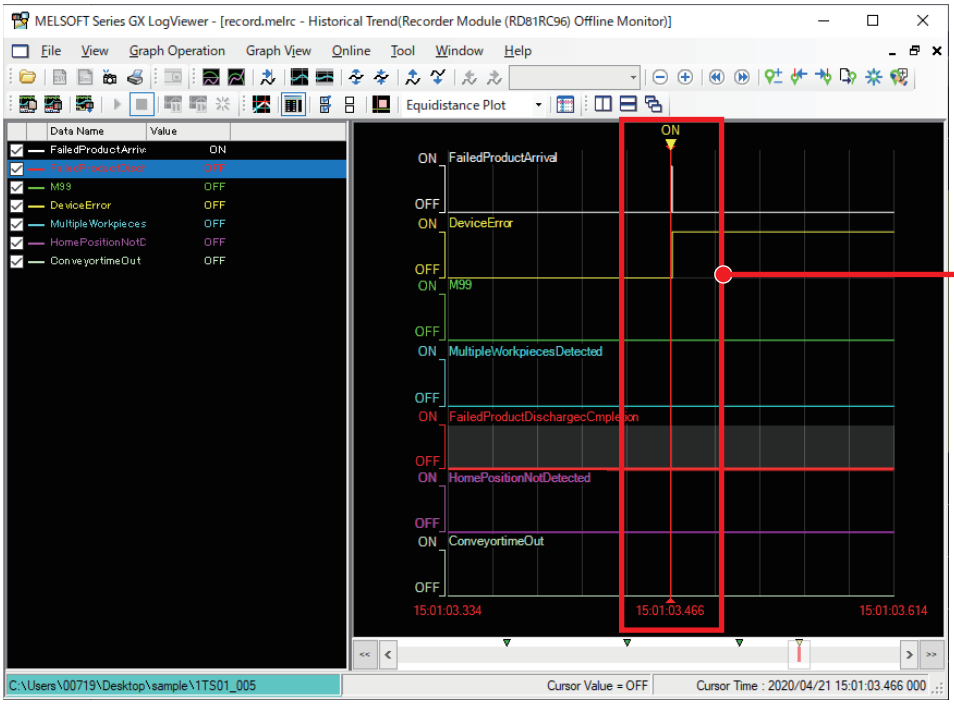
Select a device/label to be displayed in a waveform.

4. Check the turning on of the device error in the waveform data.



When the device error turns on, the failed product arrival turns on.

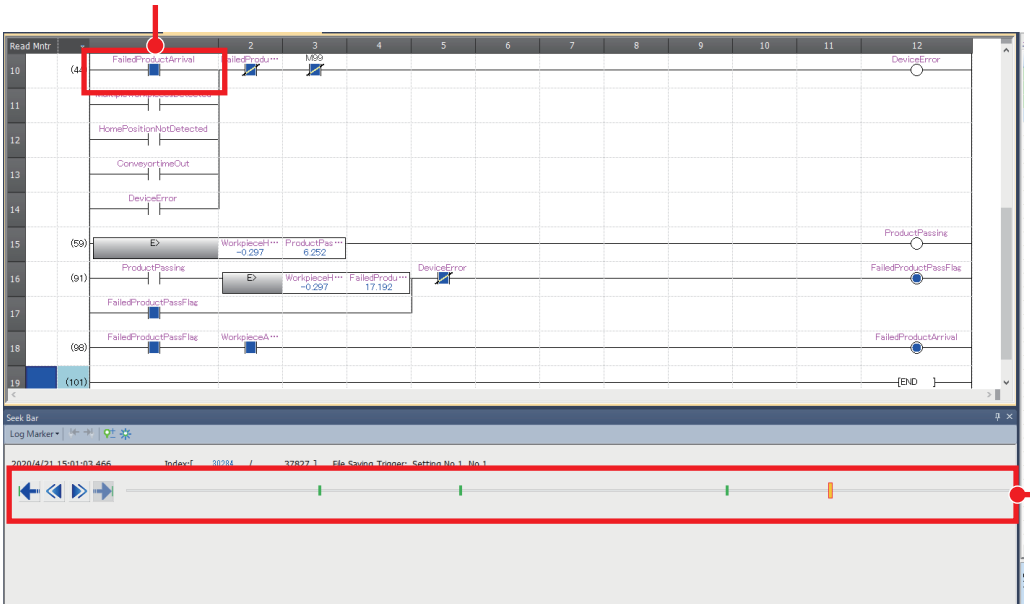
5. Move the red cursor in GX LogViewer to the position where the failed product arrival turns on.



Move the red cursor.

6. The seek bar in GX Works3 moves in synchronization with the red cursor in GX LogViewer. Check that the error cause is on in the program.

Error cause turns on.



It moves to the same operation position as the red cursor in GX LogViewer.

7. From the above, it is determined that the failed product arrival has caused the device error.

Data flow analysis

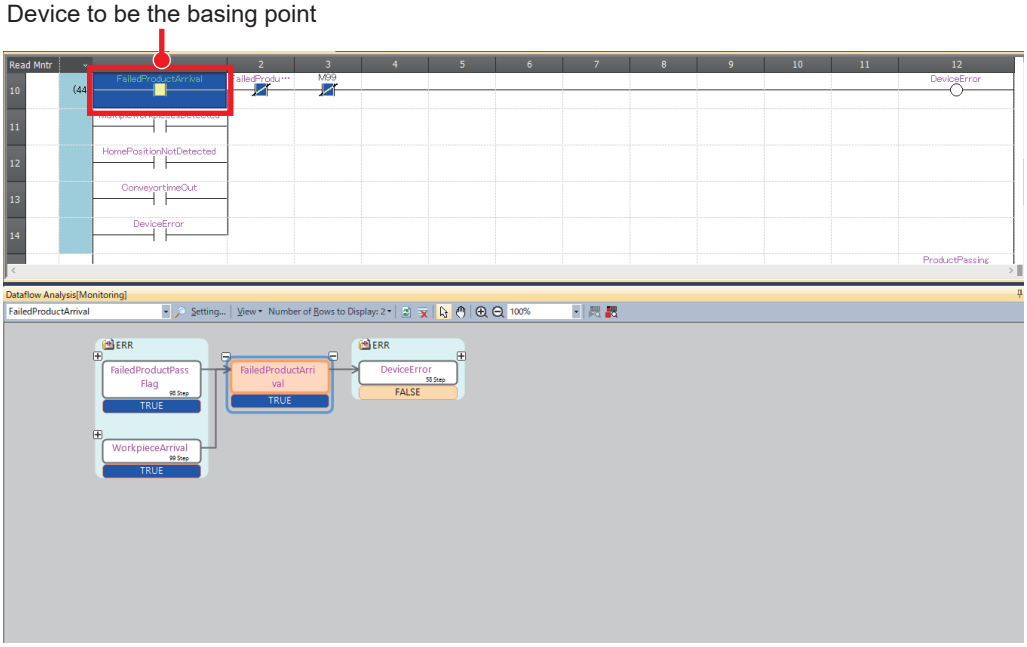
Analyze the device/label error which has caused the device error to inspect the error cause.

Operating procedure

1. Perform the data flow analysis based on the error cause device/label. (☞ Page 59 DATA FLOW ANALYSIS FUNCTION)

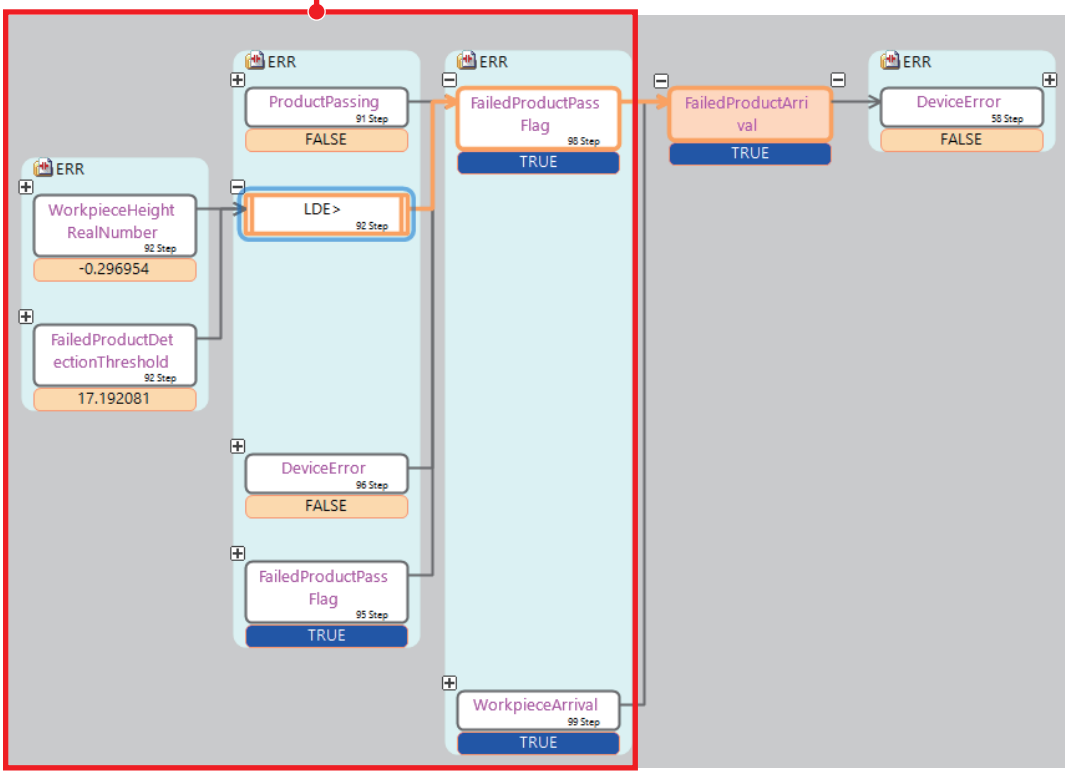
Right-click ⇨ [Dataflow Analysis]

Device to be the basing point



2. Check the execution condition to turn on the failed product arrival.

Expand items on the left side.



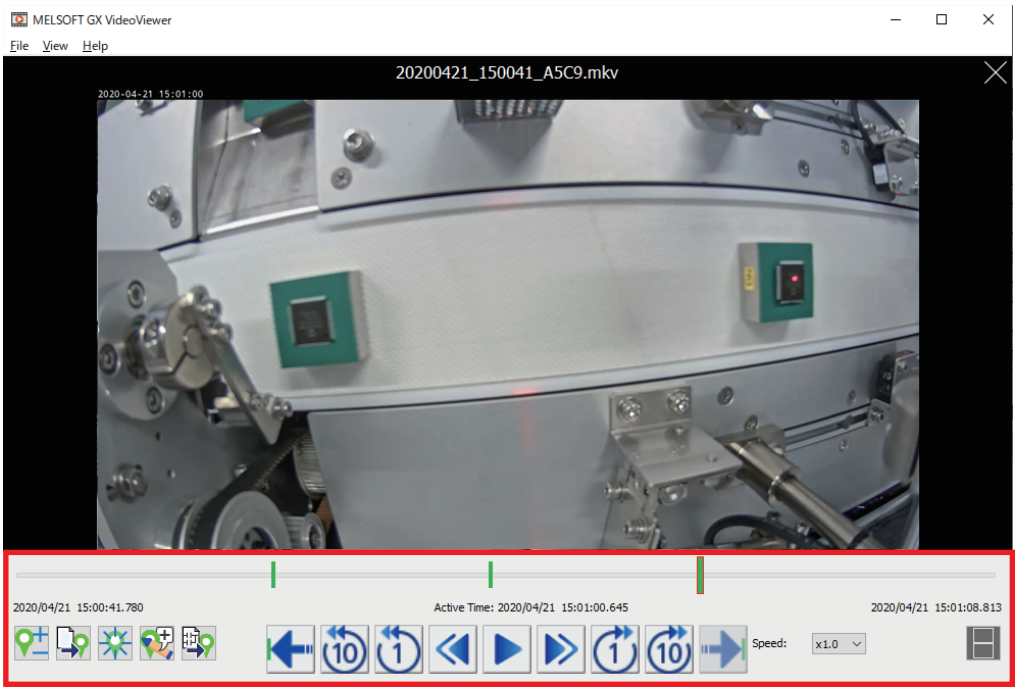
3. It is determined that comparing the workpiece height real number and failed product detection threshold is the execution condition of the failed product pass flag enabled the failed product arrival..

Adding log markers in GX VideoViewer to GX Works3

Add log markers to the positions where the program operation is to be checked in GX VideoViewer, and synchronize the positions with the seek bar in GX Works3.

Operating procedure

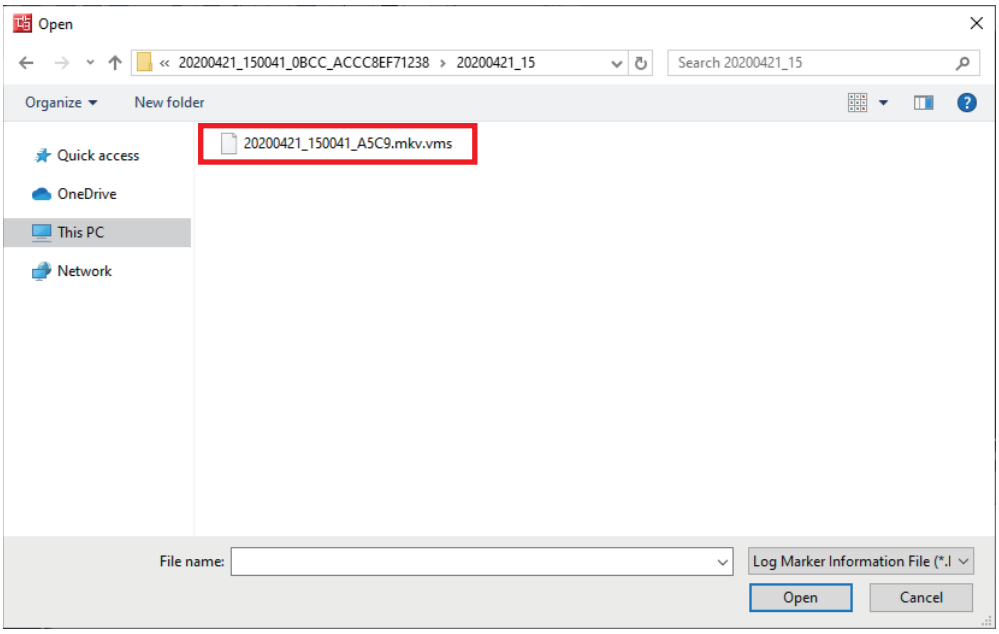
1. Since it has been determined that the workpiece height real number has effects in the data flow analysis, make log marks at the positions where the workpiece heights are measured in GX VideoViewer. (☞ Page 47 GX VideoViewer)



2. Synchronize the log markers with the offline monitoring in GX Works3.

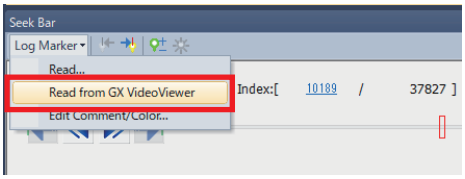
[Log Marker] ⇨ [Read]

3. Open the log marker information file (*.vms).

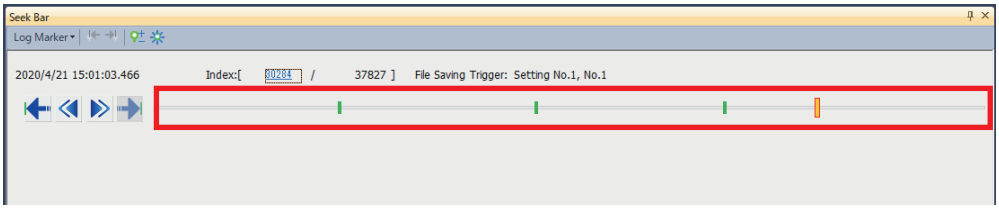


*1 When GX VideoViewer is started and the video to which log markers have been added is opened, they can be synchronized with the following procedure.

[Log Marker] ⇨ [Read from GX VideoViewer]



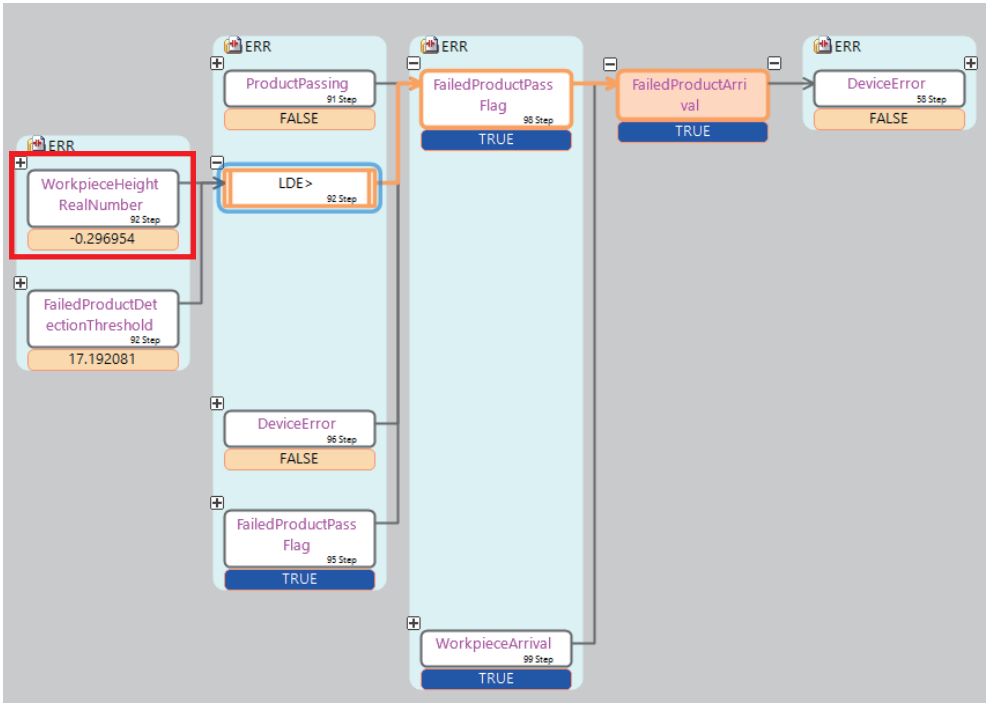
4. The log markers added in GX VideoViewer are added to the seek bar.



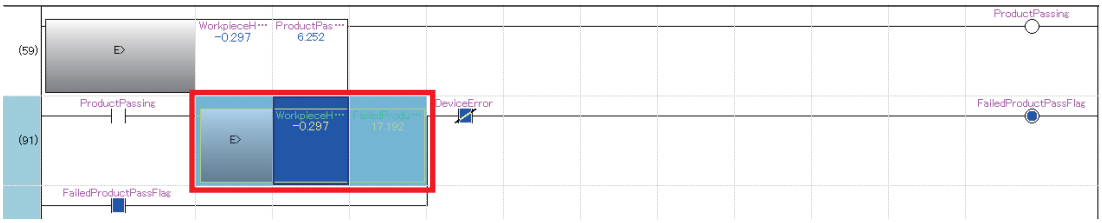
Jump to a device/label

Check the workpiece heights at the positions where the log markers are made.

1. Double-click the workpiece height real number in the data flow analysis.

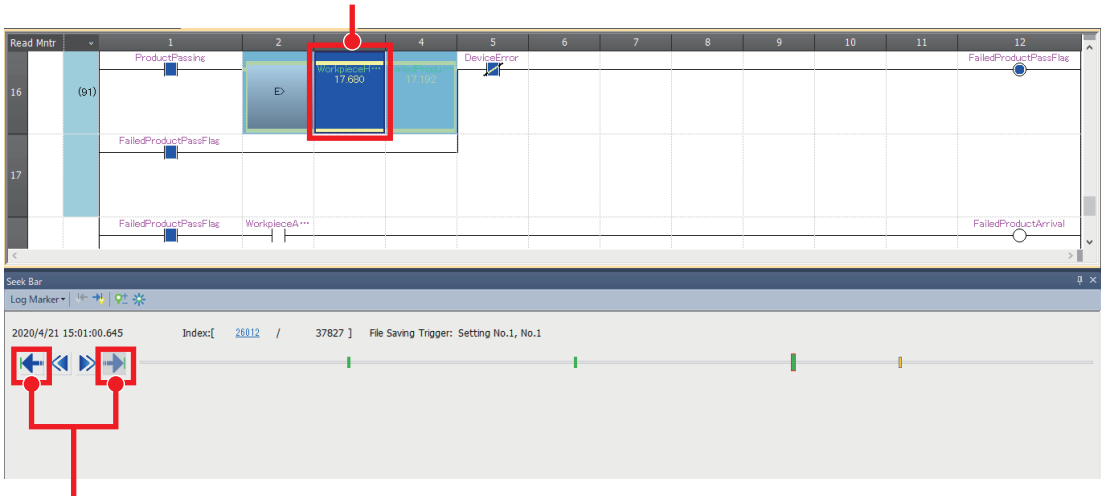


2. Jump to the label in which the workpiece height read with the sensor is stored.



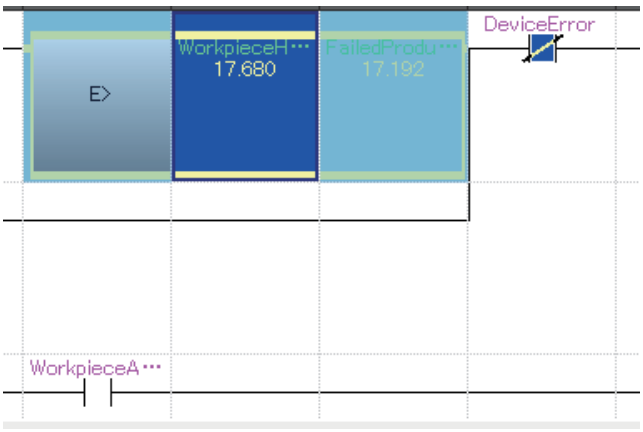
3. With the and buttons, perform the frame-by-frame playback of the positions where the log markers have been made. Check the workpiece height at each position where the log marker has been made.

The real number value at the position where the logo mark is made can be checked.



The frame-by-frame playback can be performed at the positions where the logo marks are made.

4. It is determined that the workpiece height at one position is a little higher than the others.



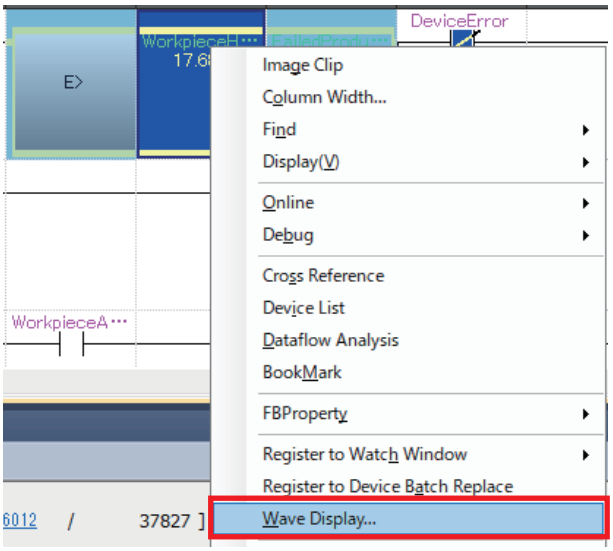
Layering in GX LogViewer

Display the workpiece height in a waveform in GX LogViewer to check.

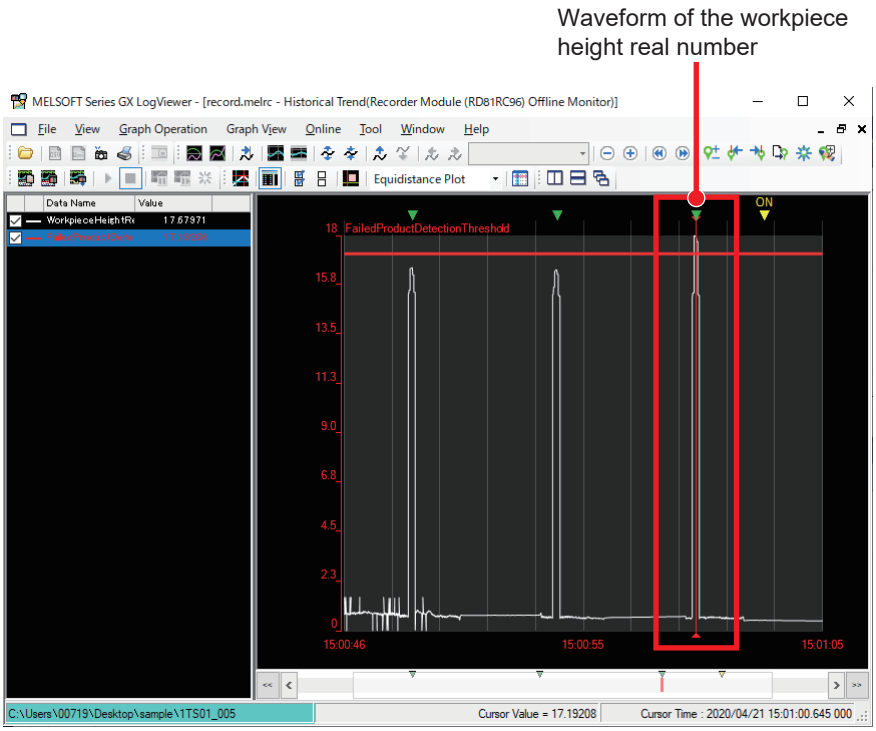
Operating procedure

1. Display the failed product detection threshold and workpiece height real number in waveforms in GX LogViewer.

Select a device/label ⇨ Right-click ⇨ [Wave Display]



2. Layer the waveforms of the failed product detection threshold and workpiece height real number.



3. It is determined that one workpiece was judged as a failed product since its height was higher than the threshold, and the error occurred.

APPENDIX

Appendix 1 Troubleshooting

This section describes the details, causes, and corrective actions of errors which may occur.

Errors in the recorder module

The following shows the checking methods of errors which may occur in the recorder module and troubleshooting.

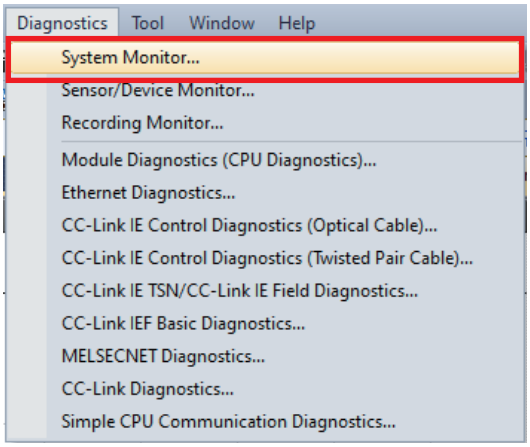
Error checking method

The following two checking methods of errors are provided for the recorder module.

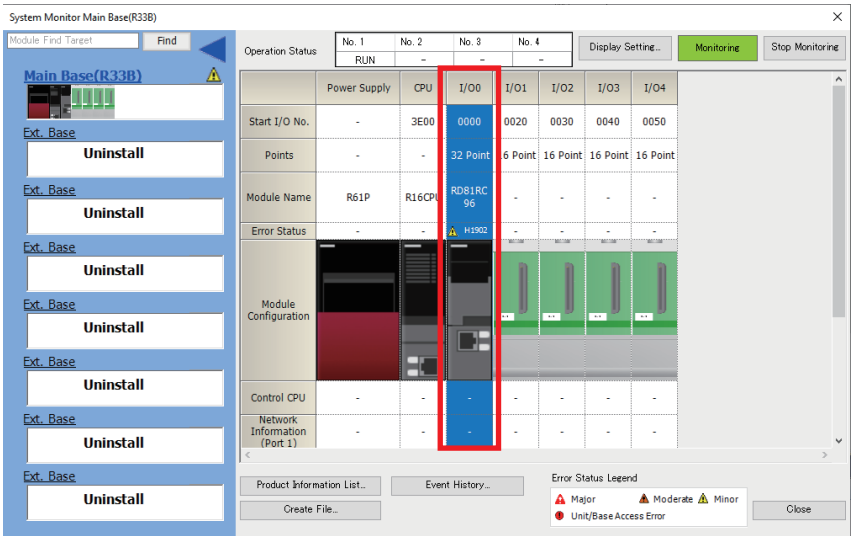
■System monitor of the engineering tool

Operating procedure

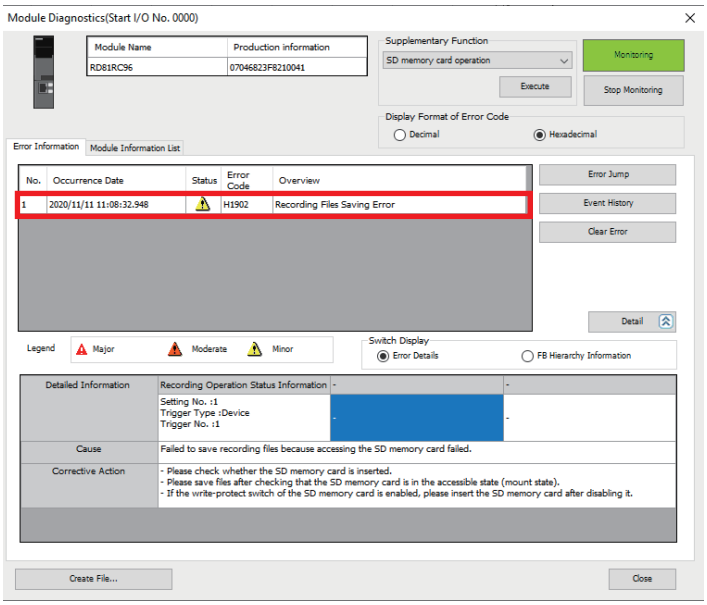
1. Click [Diagnostics] ⇨ [System Monitor] in GX Works3.



2. Double-click the recorder module.



3. In the module diagnostics window, check the details and corrective action of the error which has occurred.



■Buffer memory

Error codes can be checked with the following buffer memory areas.

- Current error area (Un\G140 to 149)
- Error log area (Un\G152 to 311)

For details on the buffer memory, refer to the following.

MELSEC iQ-R System Recorder User's Manual (Application)

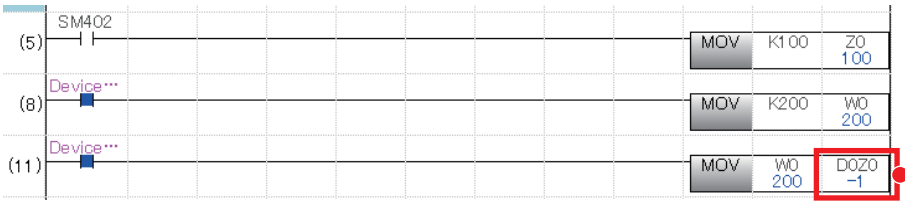
Troubleshooting by symptom

For troubleshooting related to each symptom, refer to the following.

MELSEC iQ-R System Recorder User's Manual (Application)

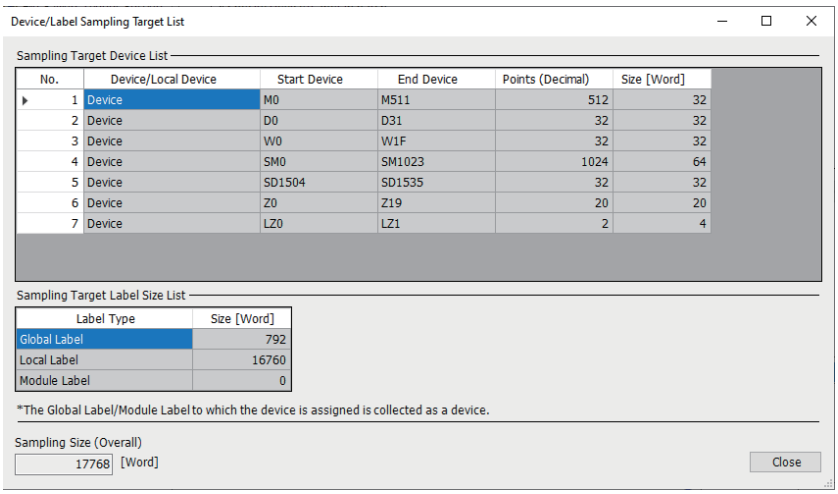
■Sampling target of the index modification

When the program has any index modification devices, they are not sampled.



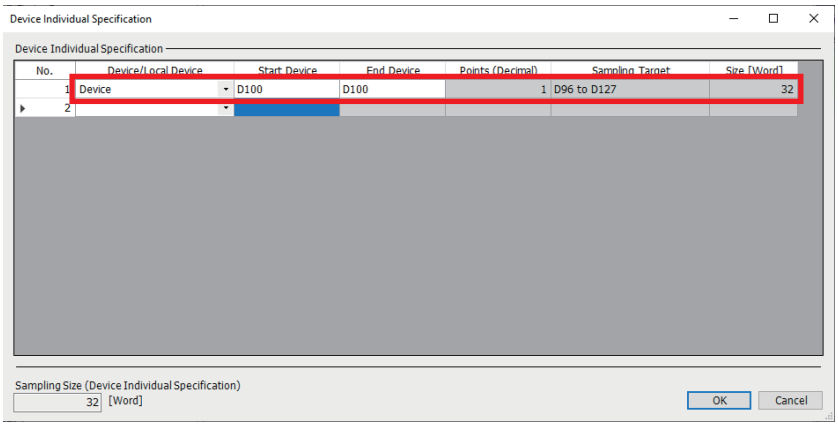
It is confirmed that 200 is the input when checked online. However, it is not applied to the offline monitoring.

Although D0Z0 = D100 is set here, D100 is not sampled automatically as well.



To sample D100, describe D100 in the program or set D100 in "Device Individual Specification" of "Device/Label Sampling Setting".

[Recording Setting] ⇨ [Device/Label Sampling Setting] ⇨ [Device Individual Specification]

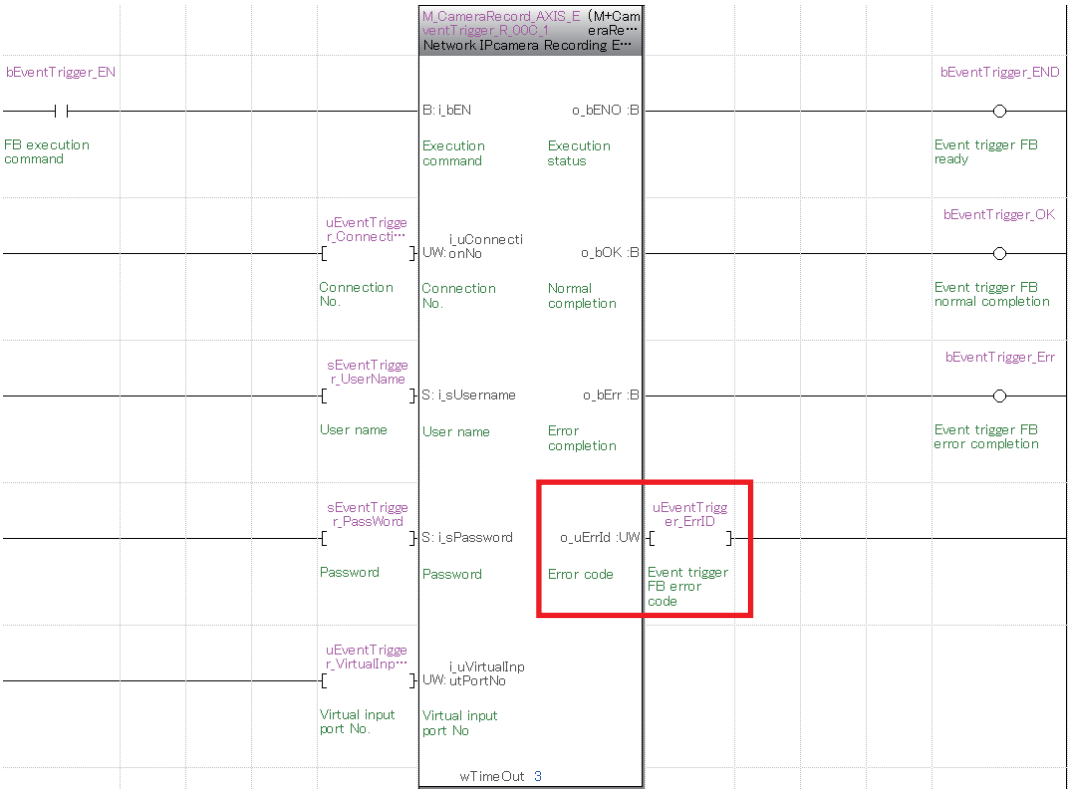


Errors related to camera recording

The following shows the checking method of errors which may occur in use of the camera recording package and troubleshooting.

Error checking method

Error codes are output from o_uErrId which is an output label of the FB. Connect a device/label to the output label, and check the output values.



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Troubleshooting by symptom

For troubleshooting related to each symptom, refer to the following.

📖Camera Recording Package User's Manual

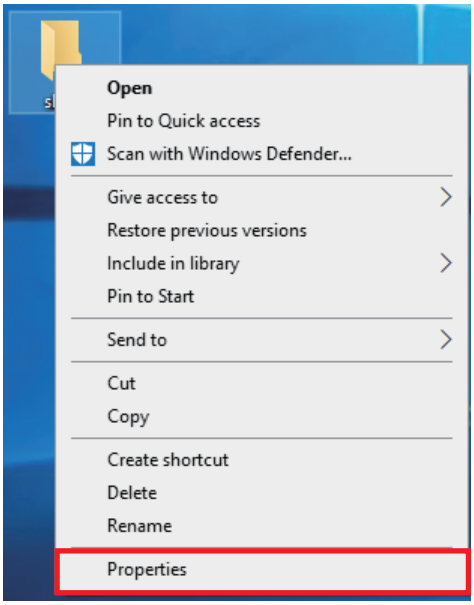
■Unable to connect to the general-purpose personal computer (Windows10)

Check if a shared folder is created in the general-purpose personal computer (Windows10).

Operating procedure

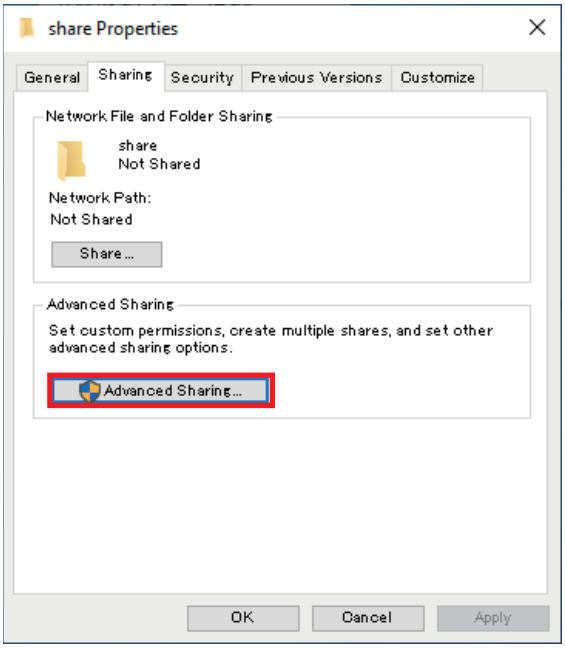
1. Create a new folder, and open its properties.

Right-click ⇨ [Properties]

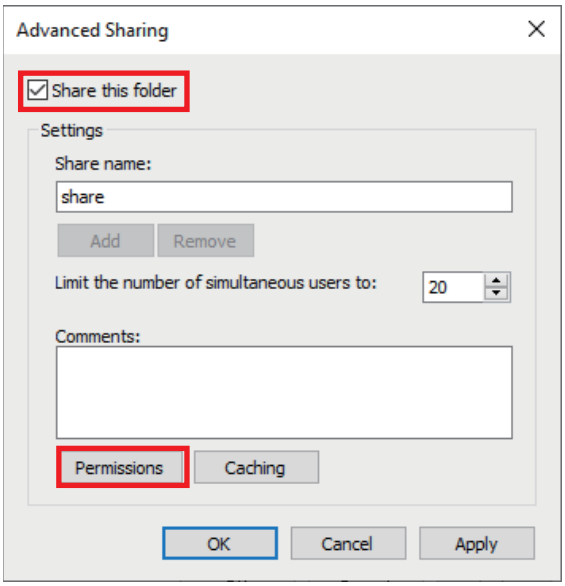


2. Configure the detailed sharing settings.

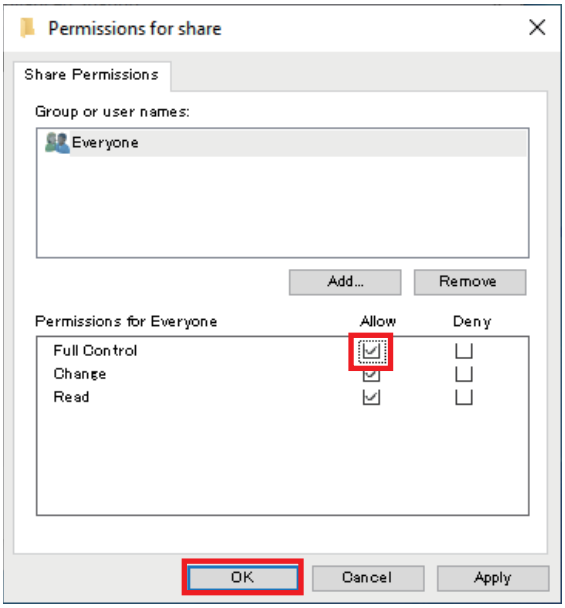
[Sharing] tab ⇨ [Advanced Sharing]



3. Select "Share this folder", and click [Permissions].



4. Select "Full Control", and click the [OK] button.



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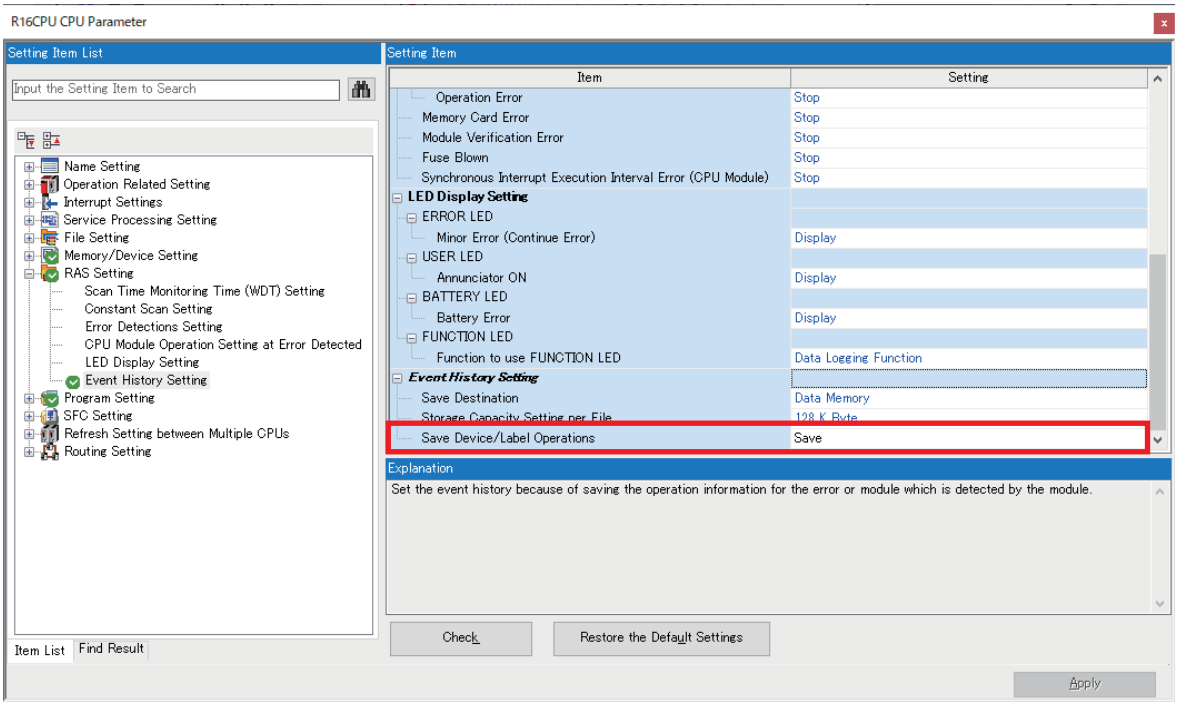
Appendix 2 Event History Function (Saving Device/Label Operations)

If "Save Device/Label Operations" is set in the event history setting of the CPU parameter, the event history is saved when a device/label operation is performed from an external device.

It is automatically set to "Save" when the recorder module is added to the system configuration and the parameters are confirmed.

☞ Page 9 Creating a New Project

[CPU Parameter] ⇨ [RAS Setting] ⇨ [Event History Setting]



History target operations

The event history is saved when the device writing operations of the following operations and functions are selected.

Operation and function	
Operation from the engineering tool (current value change operation)	Watch window
	Device/buffer memory batch monitor
	SFC diagram editor (activating and deactivating selected steps)
	Writing the device memory to the programmable controller
Writing the device/label by SLMP	
Writing the device with an instruction (Writing operation from another station or another CPU)	
Simple CPU communication function (Writing from the communication target)	

Target device/label

■Device

All the device writing operations that can be specified with the engineering tool and SLMP are the saving targets.

■Label

All the label writing operations that can be specified with the engineering too (GX Works3 Version1.065T) are the saving targets.

However, the label writing operations from the tools earlier than GX Works3 Version1.065T, GOT2000, and SLMP are displayed as GV, LV, LLV, or UV.

MEMO

RELEVANT MANUALS

The following table lists the manuals related to the products described in this document.

Manual name [manual number]	Description
MELSEC iQ-R System Recorder User's Manual (Startup) [SH-082279ENG]	Specifications, procedures before operation, and system configuration of the system recorder and specifications of the recorder module
MELSEC iQ-R System Recorder User's Manual (Application) [SH-082281ENG]	Functions, parameter settings, recording settings, and troubleshooting of the system recorder and detailed specifications of the recorder module
MELSEC iQ-R CPU Module User's Manual (Startup) [SH-081263ENG]	Specifications, procedures before operation, and troubleshooting of the CPU module
MELSEC iQ-R CPU Module User's Manual (Application) [SH-081264ENG]	Memory, functions, devices, and parameters of the CPU module
GX Works3 Operating Manual [SH-081215ENG]	System configuration, parameter settings, and online operations of GX Works3
MELSEC iQ-R Module Configuration Manual [SH-081262ENG]	Combinations of the available MELSEC iQ-R series modules, common information on the installation/wiring in the system configuration, and specifications of the power supply module, base unit, SD memory card, and battery
Camera Recording Package User's Manual [BCN-P5999-1324]	Network camera settings, CPU module settings, and function blocks for the camera recording function
GX VideoViewer Version 1 Operating Manual [SH-082370ENG]	Basic operating procedure of GX VideoViewer and playback procedure of video files
GT Designer3 (GOT2000) Screen Design Manual [SH-081220ENG]	Operations and settings of GT Designer3, which is the screen design software for the GOT2000 series
GOT2000 Series User's Manual (Hardware) [SH-081194ENG]	Specifications, procedures before operation, and troubleshooting of the GOT2000 series
GOT2000 Series Connection Manual (Mitsubishi Electric Products) For GT Works3 Version1 [SH-081197ENG]	Procedure for connecting the GOT2000 series to Mitsubishi Electric products such as the MELSEC iQ-R CPU

REVISIONS

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

Revision date	*Manual number	Description
July 2020	L(NA)08732ENG-A	First edition
November 2020	L(NA)08732ENG-B	■Added or modified part Screen changes due to the version upgrade of the engineering tool, Chapter 1, 2, Section 3.3, 3.4, Chapter 4, 5, 6, 7, RELEVANT MANUALS
March 2021	L(NA)08732ENG-C	■Added or modified part RELEVANT MANUALS

Japanese manual number: L-08728-D

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ISO 14001 JACO EC 98 J 2017 UKAS MANAGEMENT SYSTEMS 0051

ISO 9001 BUREAU VERITAS Certification UKAS MANAGEMENT SYSTEMS 0008

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