

# FACTORY AUTOMATION

Mitsubishi Electric Programmable Controller MELSEC iQ-F Series



# INTRODUCTION

Thank you for purchasing the MELSEC iQ-F series.

This manual describes the setting method for connecting to Amazon Web Services (hereinafter referred to as AWS) to send/ receive JSON strings using the FX5-ENET Ethernet module (hereinafter referred to as FX5-ENET).

Before using this product, please read this manual and the relevant manuals carefully and develop familiarity with the specifications to handle the product correctly.

When applying the program examples provided in this manual to an actual system, ensure the applicability and confirm that it will not cause system control problems.

The screen images in this manual were captured when the manual was created. For the latest information, check the website of AWS.

#### Regarding use of this product

- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, please contact Mitsubishi Electric sales office.
- This product has been manufactured under strict quality control. However when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions into the system.

#### Note

- If in doubt at any stage during the installation of the product, always consult a professional electrical engineer who is qualified and trained to the local and national standards. If in doubt about the operation or use, please contact your local Mitsubishi Electric representative.
- Mitsubishi Electric will not accept responsibility for actual use of the product based on these illustrative examples. Please use it after confirming the function and safety of the equipment and system.
- The content, specifications etc. of this manual may be changed, for improvement, without notice.
- The information in this manual has been carefully checked and is believed to be accurate; however, if you notice a doubtful point, an error, etc., please contact your local Mitsubishi Electric representative. When doing so, please provide the manual number given at the end of this manual.

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# **RELEVANT MANUALS**

The following relevant manuals can be downloaded from the Mitsubishi Electric FA site.

www.mitsubishielectric.co.jp/fa/ref/ref.html?kisyu=plcf&manual=download\_all

#### [O: Available, -: Not available]

| Manual name   | Available form |     |  |
|---|----------------|-----|--|
| <manual number=""></manual>   | e-Manual       | PDF |  |
| MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware)<br><sh-082452eng></sh-082452eng>                       | 0              | 0   |  |
| MELSEC iQ-F FX5 User's Manual (Application)<br><jy997d55401></jy997d55401>  | 0              | 0   |  |
| MELSEC iQ-F FX5 Programming Manual (Program Design)<br><jy997d55701></jy997d55701>                                | 0              | 0   |  |
| MELSEC iQ-F FX5 Programming Manual (Instructions, Standard Functions/Function Blocks) <jy997d55801></jy997d55801> | 0              | 0   |  |
| MELSEC iQ-F FX5 User's Manual (Communication)<br><sh-082625eng></sh-082625eng>                                    | 0              | 0   |  |
| MELSEC iQ-F FX5 Ethernet Module User's Manual<br><sh-082026eng></sh-082026eng>                                    | 0              | 0   |  |
| GX Works3 Operating Manual<br><sh-081215eng></sh-081215eng>   | 0              | 0   |  |



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# e-Manual

# Copying program examples to an engineering tool

Program examples contained in a document can be directly copied to an engineering tool, eliminating the need of inputting the programs.



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■Introduction for the concept and features of e-Manual Viewer is available on the following website. www.mitsubishielectric.com/fa/ref/ref.html?k=plceng&smerit=emaviewer\_win

The installation file for Windows<sup>®</sup> can be downloaded from the following website.

www.mitsubishielectric.com/fa/ref/ref.html?k=plceng&software=emaviewer\_en

Unless otherwise specified, this manual uses the following terms.

| Term  | Description  |
|---|--|
| Broker  | An MQTT server that mediates messages (MQTT broker)  |
| Engineering tool The product name of the software package for the MELSEC programmable controllers |  |
| Message Data to be exchanged between the sender (publisher) and receiver (subscriber)             |  |
| Publish/Subscribe message exchange model  | A protocol capable of one-to-many asynchronous communications.<br>The sender of a message is called a publisher, the receiver is called a subscriber, and an entity playing an<br>intermediate role is called a broker.<br>The term "publish" means "send", and "subscribe" means "receive". |
| Торіс   | A key to be used for messaging.<br>In the topic hierarchy, a slash (/) is regarded as a delimiter. For example, when multiple sensors send their individual information to the topic, the messages can be appropriately organized according to their installation location and device name.  |
| Will  | This function sends a Will message with a specified Will topic name to subscribers when the publisher is disconnected and the server communications are disabled.<br>If any unexpected disconnection or such an event occurs, subscribers can judge that the publisher is disconnected.      |

# **GENERIC TERMS AND ABBREVIATIONS**

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

| Generic term/abbreviation | Description  |
|---------------------------|--|
| FX5U CPU module           | A generic term for the FX5U-32MR/ES, FX5U-32MT/ES, FX5U-32MT/ESS, FX5U-64MR/ES, FX5U-64MT/ES, FX5U-64MT/ESS, FX5U-80MR/ES, FX5U-80MT/ES, FX5U-64MT/DS, FX5U-32MT/DS, FX5U-32MT/DS, FX5U-32MT/DS, FX5U-64MT/DS, FX5U-64MT/DS, FX5U-80MT/DS, FX5U-80MT/DS, and FX5U-80MT/DSS   |
| FX5UC CPU module          | A generic term for the FX5UC-32MT/D, FX5UC-32MT/DSS, FX5UC-64MT/D, FX5UC-64MT/DSS, FX5UC-96MT/<br>D, FX5UC-96MT/DSS, FX5UC-32MT/DS-TS, FX5UC-32MT/DSS-TS, and FX5UC-32MR/DS-TS   |
| FX5UJ CPU module          | A generic term for the FX5UJ-24MR/ES, FX5UJ-24MT/ES, FX5UJ-24MT/ESS, FX5UJ-40MR/ES, FX5UJ-40MT/<br>ES, FX5UJ-40MT/ESS, FX5UJ-60MR/ES, FX5UJ-60MT/ES, FX5UJ-60MT/ESS, FX5UJ-24MR/DS, FX5UJ-<br>24MT/DS, FX5UJ-24MT/DSS, FX5UJ-40MR/DS, FX5UJ-40MT/DS, FX5UJ-40MT/DSS, FX5UJ-60MR/DS,<br>FX5UJ-60MT/DS, and FX5UJ-60MT/DSS |
| GX Works3                 | A generic product name for the product model SWnDND-GXW3 (where n represents the version)  |

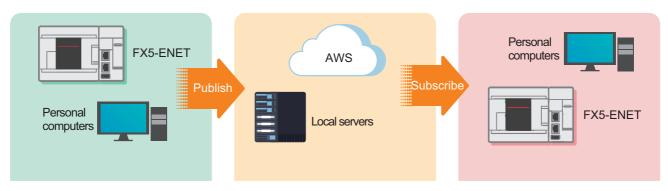
# **KEY FEATURES**

# Point1

Publish: Sending information collected in the FX5 CPU module to the MQTT broker with the MQTT communication function, Subscribe: Subscribing the information from the MQTT broker

MQTT is an OASIS-standard communication protocol using a publish/subscribe message exchange model. Once the FX5-ENET executes publishing to the MQTT broker, information is distributed to all the information receive devices that have executed the subscribe request.

In addition, secure communication encrypted with TLS (MQTTS) is also supported.



Point2 Cloud connection

# Point3

Interconnection with programmable controllers in a wide area, and managing them collectively

Cloud connection enables a wide-area network connection, which achieves quick resource sharing.

In addition, the programmable controllers can be collectively managed by creating a security group or granting the access right.



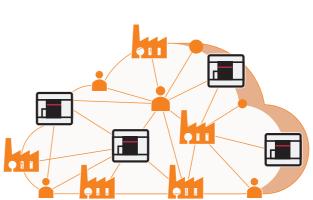
Connecting to AWS enables handling of information without

accumulation, but also services such as data visualization

preparation of the computing environment.

and AI predictions) are available.

Various services prepared by AWS (not only data



# **1** APPLICABLE MODELS

The following models can be used for a series of operations described in this manual.

| FX5UJ CPU module | FX5U CPU module | FX5UC CPU module | Ethernet module (FX5-ENET) |
|------------------|-----------------|------------------|----------------------------|
|                  |                 |                  |                            |

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# **2 PREPARATION**

This manual describes a configuration example in which an FX5-ENET is connected to an FX5U CPU module and is connected to AWS via a router.

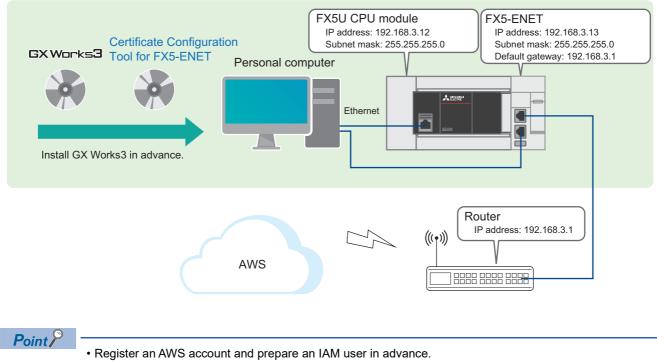
To use applicable CPU modules other than the FX5U CPU module, refer to the following manuals.

MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware)

MELSEC iQ-F FX5 Ethernet Module User's Manual, Appendix 7 Added and Changed Functions

# 2.1 System Configuration

This section describes the system configuration in which one FX5-ENET is connected to one FX5U CPU module and is connected to AWS via a router.



• Prepare an Internet line on which a port 8883 can be used.

# **2.2** Required Products and Software

| One FX5U CPU module   | One FX5-ENET   | Personal computer and software  |
|---|--|---|
|   |  |   |
| Use an FX5U CPU module that meets the following<br>conditions.<br>• Serial number: 17X**** or later<br>• Firmware version: 1.280 or later | Use an FX5-ENET that meets the following<br>conditions.<br>• Serial number: 234**** or later<br>• Firmware version: 1.200 or later | GX Works3 <sup>*1</sup> <ul> <li>Applicable software version: 1.095Z or later</li> <li>Certificate Configuration Tool for FX5-ENET<sup>*1</sup></li> <li>Applicable software version: 1.00A or later</li> </ul> |
| *1 To obtain the latest version, please conta   | ct your local Mitsubishi Electric representative.  |   |
| Router  | Three Ethernet cables  | AWS account   |
|   |  | AWS   |
| Use the router for connecting the programmable controller to AWS.   | Use these cables for connecting the personal<br>computer and the FX5U CPU module, the personal                                     | Register an AWS account and prepare an IAM user<br>in advance.  |

#### FB library

GX Works3 must import the following.

| Name                                  | File name            | Reference          |
|---------------------------------------|----------------------|--------------------|
| Character string operation FB library | StrProcessing_F.msIm | Page 53 FB Library |

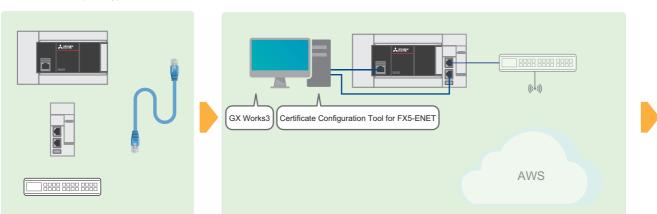
# 2.3 Wiring

For the power supply wiring of the FX5U CPU module, refer to the following.

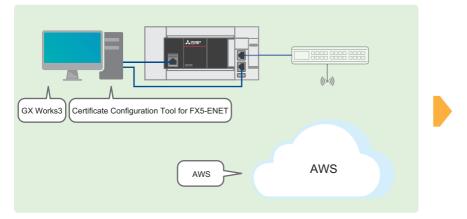
MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware), Section 13.4 Power Supply Wiring

# 2.4 Operation Flow Diagram

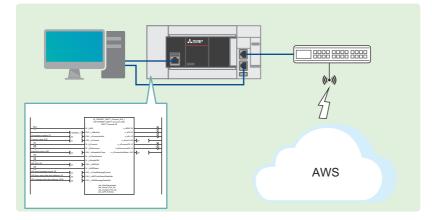
- **1.** Preparing the required products (wiring)
- 2. Configuring the clients (MQTT Publisher, MQTT Subscriber)



3. Configuring the server (MQTT broker) connection



4. Program examples and checking the operation



# **3** CONFIGURING CLIENTS (MQTT PUBLISHER, MQTT SUBSCRIBER)

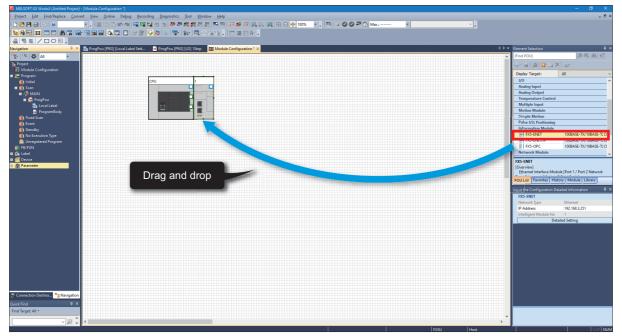
This chapter describes the setting items for the clients (MQTT Publisher, MQTT Subscriber).

# **3.1** Configuring Settings with GX Works3

This section describes how to configure the settings with GX Works3.

### Procedure for setting parameters

1. Open the "Navigation" window ⇔ [Module Configuration]. Drag and drop [FX5-ENET] to add it.



2. Double-click [FX5-ENET] on [Module Configuration]. Click the [Yes] button.

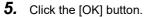


**3.** Click the [Setting Change] button.

| MELSOFT GX Works3          |                                |                |  |
|----------------------------|--------------------------------|----------------|--|
|                            | ne] FX5-ENET<br>psition No.] 1 |                |  |
| Module Setting             |                                | Setting Change |  |
| Module Label:Not use       |                                | ^              |  |
|                            |                                | Ý              |  |
| Do Not Show this Dialog Ag | ain                            | OK             |  |

4. Change [Use Module Label] to [Yes] and click the [OK] button.

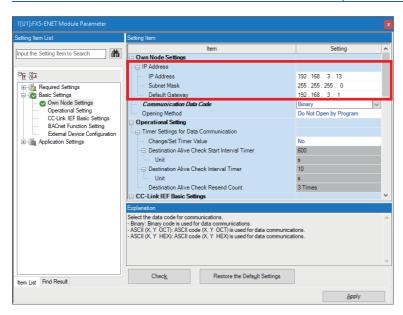
| Options                        |              |  |
|--------------------------------|--------------|--|
|                                |              | Departion Setting  |
| Froject                        | <u>^</u>     |  |
| Save                           |              | Use Module Label Yes 🔻   |
| Revision                       |              | Kead Sample Comment  |
| Device Comment                 |              | Message  |
| Reference/Reflection Target    |              | Show the confirmation message in adding module Yes   |
| Add New Module                 |              |  |
| Navigation                     |              |  |
| Element Selection              |              |  |
| 🔁 Program Editor               |              |  |
| 😼 Other Editor                 |              |  |
| 🔏 Edit                         |              |  |
| H Find/Replace                 |              | Use Module Label   |
| Parameter                      |              | Select whether to add the module label in adding module.   |
| R Monitor                      |              | [Caution]  |
| Soline                         |              | Please set other than module labels as refresh destination for module parameter to use the   |
| Convert                        |              | label of direct access in program.<br>If module labels are selected as refresh destination, the value which has been set to label of |
| La Intelligent Function Module |              | direct access is overwritten in refreshing with the value of label for Auto-refresh.   |
| 🚚 Simulation                   | ¥            |  |
|                                |              |  |
|                                |              | Import Export  |
| Back to Default Back to Us     | e <u>r</u> C | efault Set as User Default OK Cancel   |



| MELSOFT GX Works3   |                |  |
|---|----------------|--|
| Add a module.<br>[Module Name] FX5-ENE<br>[Mounting Position No.] |                |  |
| Module Setting  | Setting Change |  |
| Module Label:Use  | ^              |  |
|   |                |  |
|   |                |  |
| Do Not Show this Dialog Again                                     | ОК             |  |

**6.** Select [Basic Settings] ⇒ [Own Node Settings] and configure [IP Address] as shown below.

| Item            | Setting       |
|-----------------|---------------|
| IP Address      | 192.168.3.13  |
| Subnet Mask     | 255.255.255.0 |
| Default Gateway | 192.168.3.1   |



**7.** Select [Basic Settings] ⇒ [External Device Configuration] and double-click <Detailed Setting>.

| 1[U1]:FX5-ENET Module Parameter   |  |   |     |
|---|--|---|-----|
| Setting Item List   | Setting Item   |   |     |
| Input the Setting Item to Search       Image: Setting Item to Search       Image: Setting Item to Setting Item Item Item Item Item Item Item Item | Item  Report Destination Network No.  Report Destination PAdress  Report Destination PAdress  Report Destination Port No.  Report De | Setting       0     Setting       192. 168. 0.254       47808       Ignore </th <th></th> |     |
| Item List Find Result   | Set external devices to be used for communications.           Check         Restore the Default Settings   |   | ~ ~ |
|   |  | Apply   |     |

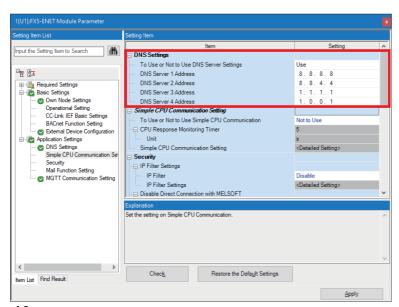
**8.** Drag and drop [MQTT Connection Module] to add it. Set the protocol and port number as shown below, and click [Close with Reflecting the Setting].

| Item     | Setting |
|----------|---------|
| Protocol | TLS     |
| Port No. | 50000   |

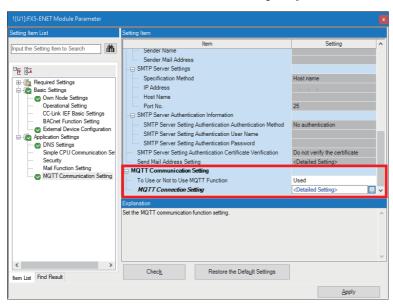
| ther      |            | iguration (Mounting Position)<br>uration <u>E</u> dit <u>V</u> iew Cla |               | the Setting | Close with <u>R</u> eflectin | g the Setting |          |             | - 🗆                              | ×      |
|-----------|------------|--|---------------|-------------|------------------------------|---------------|----------|-------------|----------------------------------|--------|
| _         |            |  |               |             |                              |               |          |             | Module List                      | ×      |
|           |            |  |               |             |                              |               |          |             | Ethernet Selection   Find Module | Myi⊄≯  |
|           | onnected ( | Count (Cur./Max.): 1/32  |               |             |                              |               |          |             | 記 24   🔚 🏗   🗶 🖻 🗙 👘             |        |
|           |            |  | Communication |             | Fixed Buffer                 | PL            | .c       | or/Di       | Ethernet Device (General)        | ^      |
|           | No.        | Model Name   | Method        | Protocol    | Send/Receive<br>Setting      | IP Address    | Port No. | MAC<br>Idre | MELSOFT Connection I -           |        |
|           |            |  |               |             | octang                       |               |          | Jure:       | SLMP Connection Modu -           | _      |
|           | E I        | Host Station   |               |             | 1                            | 192.168.3.13  |          |             | UDP Connection Modul -           | _      |
|           | 1          | MQTT Connection Module   | MQTT          | TLS         |                              | 192.168.3.13  | 50000    |             | P Unpassive Connection Nod -     |        |
|           |            |  |               |             |                              |               |          |             | EP Fullpassive Connection -      | _      |
|           |            |  |               | _           |                              |               |          |             | BAC BACnet/IP Connection -       | _      |
|           |            | Drag and   | d drop 📃 📃    |             |                              |               |          |             | Mail Server Connection -         |        |
|           |            |  |               |             |                              |               |          |             | MQTT Connection Mod -            |        |
|           |            | Connection   |               |             |                              |               |          |             | Ethernet Device (Mitsubish       | 11 Ele |
| -         | -          | No.1   |               |             |                              |               |          |             | Code Reader                      |        |
|           |            |  |               |             |                              |               |          |             | GOT2000Series                    |        |
|           | tation     |  |               |             |                              |               |          |             | ⊞ General-Purpose AC Ser         | vo     |
| onne<br>1 | cted Count |  |               |             |                              |               |          |             | Inverter(FR-A800 Series          | s)     |
|           |            | MQTT   |               |             |                              |               |          |             | Inverter(FR-F800 Series          |        |
|           |            |  |               |             |                              |               |          |             | Servo Amplifier(MELSER)          | VO-J   |
|           |            |  |               |             |                              |               |          |             | Vision Sensor                    | ~      |
|           |            |  |               |             |                              |               |          |             | [Outline]                        |        |
|           |            | MQTT Conn<br>ection Modul  |               |             |                              |               |          |             | MQTT Connection Module           |        |
|           |            |  |               |             |                              |               |          |             | [Specification]                  |        |
|           |            | e  |               |             |                              |               |          |             | Use when specify open method by  | MOTT   |

#### 9. Select [Application Settings] and configure [DNS Settings] as shown below.

| Item                                     | Setting |
|--|---------|
| To Use or Not to Use DNS Server Settings | Use     |
| DNS Server 1 Address                     | 8.8.8.8 |
| DNS Server 2 Address                     | 8.8.4.4 |
| DNS Server 3 Address                     | 1.1.1.1 |
| DNS Server 4 Address                     | 1.0.0.1 |



**10.** Select [Application Settings] ⇒ [MQTT Communication Setting], check that [To Use or Not to Use MQTT Function] is set to "Used", and double-click <Detailed Setting> of [MQTT Connection Setting].



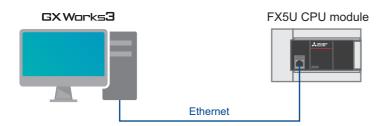
- **11.** To avoid errors, temporarily enter arbitrary character strings for "MQTT Server Host Name" and "Client ID". Click the [Apply] button.
- Configure the proper settings at the following timing.

Page 40 Configuring Settings with GX Works3

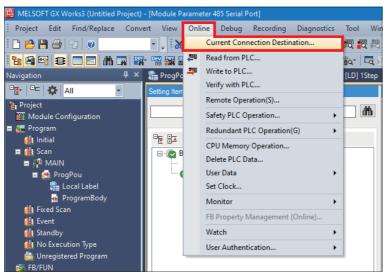
| put the Setting Item to Search  |  |  |    |
|---|--|--|----|
| Ba     Population     Populatio | User Name     Password     MQTTCertificate Setting     Verify Server Certificate g Explanation   | Method Host name assas a bbbbb bbbb Verify | ng |
|   | Set the client ID of FX5-ENET(/IP).<br>[Setting range]<br>The string within 1 to 492 character<br>A + (B + C) x 2 + D <= 984<br>A - the number of characters for Mig<br>B: the number of characters for ruler<br>C - the number of characters for page | nt ID<br>rname                             | ^  |
| c<br>em List Find Result  | > Chec <u>k</u>  | Restore the Defa <u>ul</u> t Settings      |    |

### **Configuring communication settings with GX Works3**

Directly connect the Ethernet ports as shown below. To execute the writing process, perform a communication test first.



**1.** Select [Online] ⇒ [Current Connection Destination].



**2.** Select "Direct Coupled Setting".

| Connection Destination Simpl  | e Setting Connection  |                           | ×   |
|---|---|---------------------------|---|
| Direct Coupled Setting     Please select the direct co                            | onnection method with CP  | U module.                 |   |
| ● <u>E</u> thernet  |   |                           |   |
|   | Ethernet Board<br>Ether<br>h the CPU module without<br>fy the IP address of CPU n | t using a hub.<br>nodule. |   |
|   | * This setting is applied t<br>Not Specified                                      | o all Echemer port di     | rect coupled settings.                          |
| <u>A</u> dapter   | Not Specified   |                           | ~   |
| IP Address of Adapter   |   | Commun                    | ication <u>T</u> est                            |
| O Other Connection Method   | i   |                           |   |
| Select this method if you<br>CPU module with a conne<br>than the direct coupled s | ction method other  | (Open the Sp              | ection Method<br>ecify Connection<br>on window) |
| Do not show this dialog<br>* Always open the Spe<br>Connection Destination        | ecify C   | К                         | Cancel  |

**3.** Specify an Ethernet adapter of the personal computer which is used when the personal computer is directly connected to the CPU module.

When [Not Specified] is set, select an adapter to be used from the drop-down list.

| Connection Destination Simp   | le Setting Connection   | ×  |
|---|---|--|
| Direct Coupled Setting     Please select the direct c                             | onnection method with CPU mo  | odule.   |
| ● <u>E</u> thernet  |   |  |
|   | Ethernet Board<br>Etherne<br>th the CPU module without usin<br>if the IP address of CPU modul | g a hub.   |
|   | * This setting is applied to all I  | Ethernet port direct coupled settings.   |
| <u>A</u> dapter   | Not Specified   | · · · · ·  |
| IP Address of Adapter   |   | Communication <u>T</u> est   |
| O Other Connection Method   | d   |  |
| Select this method if you<br>CPU module with a conne<br>than the direct coupled s | ection method other   | Other Connection Method<br>(Open the Specify Connection<br>Destination window) |
| Do not show this dialo<br>* Always open the Sp<br>Connection Destination          | ecify OK  | Cancel   |

4. After the adapter is selected, click the [Communication Test] button.

| Connection Destination Simpl   | e Setting Connection   |  |
|--|--|--|
| Direct Coupled Setting<br>Please select the direct co                              | onnection method with CPU m  | nodule.  |
| ● <u>E</u> thernet   |  |  |
|  | Ethernet Board<br>Ethern<br>h the CPU module without us<br>fy the IP address of CPU modu | ng a hub.  |
|  |  | Ethernet port direct coupled settings.   |
| <u>A</u> dapter  | State Elleviel Come So   |  |
| IP Address of Adapter  | 10.97.219.90   | Communication <u>T</u> est   |
| O Other Connection Method  | I  |  |
| Select this method if you<br>CPU module with a conne<br>than the direct coupled se | ction method other   | Other Connection Method<br>(Open the Specify Connection<br>Destination window) |
| Do not show this dialog<br>* Always open the Spe<br>Connection Destination         | ocify OK   | Cancel   |

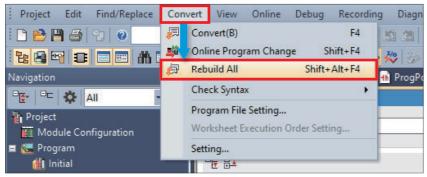
For the connection via a hub, refer to the following.

MELSEC iQ-F FX5 User's Manual (Communication), Section 4.2 Connection via a Hub

## Writing data to the programmable controller

Write the program to the FX5U CPU module.

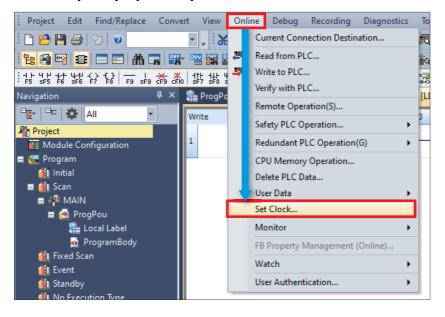
- The operation to determine the programs and the parameters is required before writing them to the programmable controller.
- **1.** Select [Convert] ⇒ [Rebuild All].



2. Click the [OK] button.

| Rebuild All      |   | ×  |
|------------------|---|----|
| Rebuild all pro  | ograms in the Project.  |    |
|                  | uild with the following settings.<br>details in Options.  |    |
| Label Assignment | ○ Retain () Reassignment  |    |
| Others           | Do Not Use the Same Label Name in Global Label and Local Label<br>Optimize the Number of Steps(Level 2) |    |
| Check Program    |   |    |
| Execute Check P  | rogram after Completing Rebuild All   | el |

**3.** Select [Online]  $\Rightarrow$  [Set Clock].



**4.** Configure the following settings and click the [Execute] button.

For the setting details, refer to the following.

GX Works3 Operating Manual

| Set Clock  |  |
|--|--|
| PLC Time Zone Time Zone UTC+09:00 Commen   | nt   |
| Date Tir   | ne <u>S</u> pecify Execution Target  |
| 30         31         1         2         3         4         5           6         7         8         9         10         11         12           13         14         15         16         17         18         19           20         21         22         23         24         25         26 | 9<br>6<br>Currently Specified Station<br>Specify Target Network No. Specify Group No.  |
| 27 28 29 30 31 1 2<br>3 4 5 6 7 8 9<br>Today: 8/30/2023  | Explanation<br>From Get Time from PC setting, users are able to<br>get the time coupled with the time zone set in PC.<br>To set the setting, please execute it after<br>matching the time zone of PLC and PC.<br>From Get Time from PLC setting, users are able to |
| 8/30/2023 10:<br>Get Time from PC Get Time from P  | 10:00 AM   |
|  | Execute Close  |

**5.** Select [Online]  $\Rightarrow$  [Write to PLC].

| Project Edit Find/Replace Conv | vert View    | Onli | ne Debug      | Recording      | Diagnostics | Тоо  |
|--------------------------------|--------------|------|---------------|----------------|-------------|------|
| i 🗅 🖻 💾 🎒 🕲 🖉                  | - 🗐 🕺        |      | Current Con   | nection Destin | nation      | R ,  |
| 12 🛛 🕶 🗉 🔲 🗥 🖬 🗳               | - 🔤 📴 🖁      | Æ    | Read from P   | LC             |             | Îq.  |
| Navigation 4 ×                 |              | -    | Write to PLC  |                |             | [LD] |
| □ <u>•</u> • □=   ✿ All •      | Setting Item |      | Verify with P | LC             |             |      |
| Project                        |              |      | Remote Ope    | ration(S)      |             |      |
| Module Configuration           |              |      | Safety PLC C  | peration       | •           |      |
| 🖿 🔚 Program                    |              |      | Redundant P   | LC Operation   | (G) 🔸       |      |
| 🙀 Initial<br>📼 📣 Scan          |              |      | CPU Memor     | y Operation    |             |      |

3

6. Click [Parameter + Program], and click [Execute].

| <b>!</b> )))e                   | 1) www. 🖳 📢 🗐 🛤                                 | a 🛄             | ,ÓE           | Verty        | - 🔜 🎸  | >==                 |        |                          |          |                      |
|---------------------------------|---|-----------------|---------------|--------------|--------|---------------------|--------|--------------------------|----------|----------------------|
| Parameter +                     | Program(E) Select All                           | Legend          |               |              |        |                     |        |                          |          |                      |
| Open/(                          | e All( <u>T</u> ) Deselect All( <u>N</u> )      | CPUI            | Built-in Me   | mory         | SD SD  | Memory Card         | 💼 Inte | elligent Function Module |          |                      |
| fodule Nan                      | ata Name  | *               | 2             |              | Detail | Title               |        | Last Change              | Size (By | rte)                 |
| 📲 Un                            | d Project                                       |                 |               |              |        |                     |        |                          |          |                      |
| - 🔁                             | ameter  |                 |               |              |        |                     |        |                          |          |                      |
|                                 | System Parameter/CPU Parameter                  | 2               |               |              |        |                     |        | 9/15/2022 9:12:28 AM     | Not Calo | ulated               |
| -                               | Module Parameter                                | 2               |               |              |        |                     |        | 9/15/2022 9:15:30 AM     | Not Calo | ulated               |
|                                 | Memory Card Parameter                           |                 |               |              |        |                     |        | 9/15/2022 9:12:27 AM     | Not Calo | ulated               |
|                                 | Remote Password                                 | 2               |               |              |        |                     |        | 9/15/2022 9:12:27 AM     | Not Calo | ulated               |
| 🕀 🐔                             | bal Label                                       |                 |               |              |        |                     |        |                          |          |                      |
|                                 | Global Label Setting                            |                 |               |              |        |                     |        | 9/15/2022 9:12:29 AM     | Not Calo | ulated               |
| 0 🚰                             | gram  | ×               |               |              |        |                     |        |                          |          |                      |
|                                 | MAIN  |                 |               |              |        |                     |        | 9/15/2022 9:12:29 AM     | Not Calo | ulated               |
| - 😅                             | vice Memory                                     |                 |               |              |        |                     |        |                          |          |                      |
|                                 | MAIN  |                 |               |              | Datail |                     |        | 0/15/3022 0-12-20 AM     | -        |                      |
| Disp<br>nory Capaci<br>Size CAN | amory Capacity 😮 🗋 Check I<br>Sh Program Namory | ferrory Capacit | y before Wr   | iting        |        |                     |        |                          |          | Free 64000/640005tep |
| end<br>Used                     | Data Memory<br>Program:1024/1024KB              | Re              | storation Inf | lo:1024/1024 | K8 I   | larameten:1024/1024 | KB     | Device Comment:2048/     | 20468/8  | Free                 |
| Increased<br>Decreased          | SD Memory Card                                  |                 |               |              |        |                     |        |                          |          | Free<br>0,10KB       |
| Free: 5%                        | ss Program.Q/DKB                                | Re              | storation In  | 0:0/0K8      |        | arameter:0/088      |        | Device Comment/0/088     |          |                      |

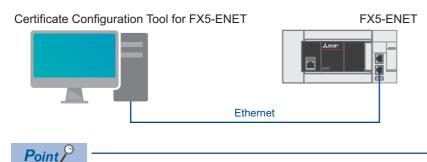
7. When the following window appears, click [Yes to all].

| MELSOFT GX Works3   |   |                |  |  |  |  |  |
|---|---|----------------|--|--|--|--|--|
|   | e following file already exists,<br>a you sure you want to overwrit | xe it?         |  |  |  |  |  |
| System Parame<br>CPU Paramete<br>Module Parame<br>Program File(M. | ter   | ^              |  |  |  |  |  |
|   |   | ~              |  |  |  |  |  |
| <u>Y</u> es   | Yes to <u>a</u> ll  |                |  |  |  |  |  |
| <u>N</u> o  | N <u>o</u> to all   | <u>C</u> ancel |  |  |  |  |  |

8. After the writing is complete, reset (or power off and on) the FX5U CPU module.

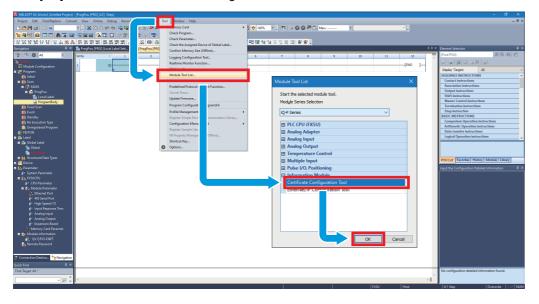
# **3.2** Configuring Settings with Certificate Configuration Tool for FX5-ENET

Start Certificate Configuration Tool for FX5-ENET, set the certificate, and perform the writing process.



Because the settings cannot be written to the FX5-ENET with the connection of a personal computer and an FX5U CPU module, connect a personal computer and the FX5-ENET with an Ethernet cable.

**1.** Select [Tool] ⇔ [Module Tool List] ⇔ [Information Module] ⇔ [Certificate Configuration Tool] of GX Works3 and click the [OK] button to start Certificate Configuration Tool for FX5-ENET.



2. Select [Connection Settings]. Enter the IP address of the FX5-ENET in [Host (IP Address)] and click the [Communication Test] button.

| B MELSOFT Certificate Cor  | figuration Tool for FXS-ENET (Untitled Project)* – 🗆 🗙  |
|----------------------------|---|
| Project Connection Setting | s Help  |
| Server Certificates        | Server(Objects/Cloud) Server Certificate/CRL files  |
| Client Certificates        | *   |
|                            | Tool  |
|                            | Trusted Certificates CRLs   |
|                            | Serial Common Name Organizati Organizati Lolality State Coun Valid From Valid To DNS N URI IP Add   |
|                            | Current connection Settings X   |
|                            | Host([P Address): 192.168.3.13  |
|                            | Import Enable Password  |
|                            | Password:     Interview of the second s |
|                            | Communication Text  |
|                            | Module Trusted Certificates ORLs  |
|                            | Serial Common Name Organizati Organizati Locality State Coun Valid From Valid To DNS N URI IP Add   |
|                            | Update Delete from List   |

Point P

- If a firewall is set up between the FX5-ENET and the personal computer, the communication test will fail. In this case, permission must be given to a port to be used, so check the firewall settings.
- The IP address of the personal computer must be set to the same segment as the FX5-ENET, so review the IP address settings.
- **3.** Select [Client Certificates] and click the [Generate a New Client Certificate] button. Configure the settings as shown below, and click the [Generate] button.

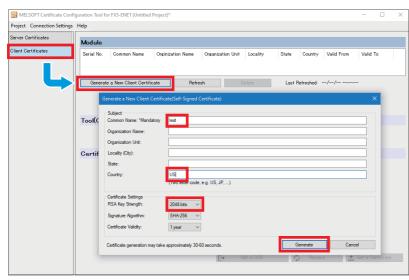
The set common name is used when issuing certificates in AWS.

Page 32 Creating a certificate

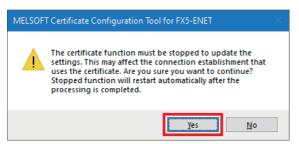
| Item                      | Setting   |
|---------------------------|-----------|
| Common Name <sup>*1</sup> | Any name  |
| Country                   | US        |
| RSA Key Strength          | 2048 bits |

\*1 Set a common name that is not a duplicate.

(This is the restriction at the time of the publication of this manual. For the latest information on the restriction, check the website of AWS.



#### 4. Click the [Yes] button.



5. When generation is completed, click the [Get a CSR] button, name the CSR file, and save it.

The saved CSR file is used when issuing certificates in AWS.

Page 32 Creating a certificate

| 🚟 MELSOFT Certificate Confi | iguration Tool for FX5-ENET | Untitled Project)*                 |                            |                                | - 0                     | ×  |
|-----------------------------|-----------------------------|------------------------------------|----------------------------|--------------------------------|-------------------------|----|
| Project Connection Settings | <u>H</u> elp                |                                    |                            |                                |                         |    |
| Server Certificates         | Module                      |                                    |                            |                                |                         |    |
| Client Certificates         | Serial No. Common I         | Vame Orginization Name             | Organization Unit Locality | State Country Valid From<br>US | Valid To                |    |
|                             | Generate a New Clier        | nt Certificate Refres              | h <u>D</u> elete           | Last Refreshed                 |                         |    |
|                             |                             | *                                  | *                          | *                              |                         |    |
|                             | Tool(Computer)              | $\rightarrow$ Read CSR from Module | C Replace to Module        | 1 Read from Unit               |                         |    |
|                             |                             | *                                  | *                          | *                              |                         |    |
|                             | Certificate Autor           | ity(CA)                            |                            | Server (Objects/Clou           | d)                      |    |
|                             |                             |                                    | [→ Qet a CSR               | 1 Beplace                      | Get a <u>C</u> ertifica | te |

# **4** CONFIGURING SERVER (MQTT BROKER) CONNECTION

This chapter describes the setting items for the server (MQTT broker).

# 4.1 Configuring Settings with AWS

Configure the server (MQTT broker) for connecting to AWS.

#### Point P

Configure the server (MQTT broker) while signed in to AWS Management Console. Prepare your account ID, user name, password, and IAM user in advance.

# Sign-in

**1.** Access the following URL with a web browser. (Click the [Log back in] button to sign in.) https://aws.amazon.com/console/?nc1=h\_ls

| Products Solutions Pricing Documental | tion Learn Partner Network AWS Mari  | xetplace Customer Enablement Events   | Explore More Q   | Contact Us Support 		 Englisi   | h • My Account • Sign In to the Console |
|---------------------------------------|--|---|--|---|---|
|                                       | AWS Management Console Overvi  | ew Features FAQs  |  |   |   |
|                                       | ot   | in AWS in supporting relief efforts for tho   | se impacted by Maui wildfires. Learn more  | »   |   |
|                                       | Eve  | rything you need to access and mana   | ment Console<br>ge the AWS Cloud — in one web interf   | face  |   |
|                                       | Free AVIS Training<br>Advances your career with AVIS Cloud<br>Practitioner Exernational—after e.g.u-hour,<br>foundational course | AVS Certification<br>Propel your career forward with AWS<br>Certification.  | AVS Machine Learning Training<br>Choose from course that cover the entire<br>machine learning pipeline | AVS Training<br>Free digital courses to help you develop<br>your skills   |   |
|                                       | Anzon Lightsali Extended Free Tier<br>New customers get up to three months<br>free on select virtual private servers             | Euld Mobile and Web Apps Fast<br>Add authentication and data synchray with<br>AWS Amplify in just a few lines of code | Mac  | Introducing Amazon EKS Anywhere<br>Create and operate Kubernetes clusters<br>on your on-premises infrastructure |   |
|                                       | Console Overview   |   | Additional Resources   |   |   |

# **Configuring settings with AWS IoT services**

Configure the AWS IoT services to be used with AWS connection.

The settings required for MQTT communication between the FX5-ENET and AWS IoT services are as follows.

- Policies
- Things
- Certificates
- **1.** On the top left, select [Services] ⇒ [Internet of Things] ⇒ [IoT Core].

|          | Services Q Search        | [Alt+S]   | D  |
|----------|--------------------------|---|--|
|          | Recently visited         | ↔ Internet of Things ×  | Reset to default layout + Add widgets  |
|          | All services             | FreeRTOS  | : Welcome to AWS :   |
|          |                          | FreeRTOS is an IoT Operating System for Microcontrollers  |  |
|          | Analytics                | IoT 1-Click<br>Trigger AWS Lambda functions from simple devices                                 | Getting started with AWS [2]<br>Learn the fundamentals and find valuable<br>information to at the most out of AWS. |
|          | Application Integration  | IoT Analytics   | information to get the most out of Aws.  |
|          | AWS Cost Management      | IOT ANALYTICS<br>Collect, preprocess, store, analyze and visualize data of IoT devices          | Training and certification   |
|          | Blockchain               |   | Training and certification 🗹   |
|          | Business Applications    | Connect Devices to the Cloud  | skills and knowledge.  |
|          | Compute                  | Connect Devices to the Clobu  |  |
|          | 🖮 Containers             | IoT Device Defender   | What's new with AWS?   |
|          | ③ Customer Enablement    | Secure your fleet of connected IoT devices  | CIT Discover new AWS services, features, and Regions.  |
|          | 🗑 Database               | IoT Device Management   |  |
|          | 💥 Developer Tools        | Securely Manage Fleets as Small as One Device, or as Broad as Millions of Devices               |  |
|          | End User Computing       | IoT Events  |  |
|          | 🔯 Front-end Web & Mobile | Detect and respond to events from IoT sensors and Industrial IoT equipment                      | i i  |
|          | Fill Game Development    |   |  |
| <b>U</b> | Internet of Things       | AWS IOT FleetWise<br>Easily collect, organize, and transfer vehicle data to the cloud at scale. |  |
|          | Machine Learning         |   |  |
|          | Management &             | IoT Greengrass<br>Deploy and run code on your devices   |  |
|          | Governance               |   |  |
|          | DI Media Services        | IoT RoboRunner  | No cost and usage  |
|          | Migration & Transfer     | Optimize robotics automation  | e you haven't configured AWS Cost Explorer or you do not have permission.  |
|          | Networking & Content     | IoT SiteWise  |  |
|          | Delivery                 | Data driven decisions in Industrial operations  |  |
|          | Quantum Technologies     | IoT TwinMaker   |  |
|          | A Robotics               | Easily create digital twins of real-world systems to optimize operations                        |  |
|          | 🦪 Satellite              | Go to AWS Cost Management   |  |
|          | Security, Identity, &    |   | ×  |
| Cloud    | fShell Feedback Language |   | © 2023, Amazon Web Services, Inc. or its affiliates. Privacy Terms Cookie preferences                              |

#### Creating a policy

A policy manages which operations to be allowed for things.

Configure detailed settings for MQTT communication by associating things and certificates.

**1.** Select [Security] ⇒ [Policies] from the left menu and click the [Create policy] button.

| aws Services Q Search                | [Alt+S]  | 2        | ¢          | Sydney •             | Rent Charge and the | omia e      |
|--------------------------------------|--|----------|------------|----------------------|---------------------|-------------|
| AWS IoT ×                            | AWS IOT > Security > Policies  |          |            |                      |                     | 0           |
| _                                    |  |          |            |                      | County and line     |             |
| Monitor                              | AWS IOT policies allow you to control access to the AWS IOT Core data plane operations. AWS IOT policies are separate and different from IAM policies. AWS IOT policies apply only to AWS IOT data plane operations. | ons.     |            |                      | Create policy       |             |
|                                      | Q. Find policies   |          |            |                      | < 1 > @             |             |
| Connect                              |  |          |            |                      |                     |             |
| Connect one device                   | Policy name  |          |            |                      | •                   |             |
| Connect many devices                 | No policies  |          |            |                      |                     |             |
|                                      | You don't have any AWS IoT policies in ap-southeast-2.   |          |            |                      |                     |             |
| Test                                 | Create   |          |            |                      |                     |             |
| MQTT test client Device Location New |  |          |            |                      |                     |             |
| Device Location New                  |  |          |            |                      |                     |             |
|                                      |  |          |            |                      |                     |             |
| Manage Mal devices                   |  |          |            |                      |                     |             |
| All devices     Greengrass devices   |  |          |            |                      |                     |             |
| LPWAN devices                        |  |          |            |                      |                     |             |
| Software packages New                |  |          |            |                      |                     |             |
| Remote actions                       |  |          |            |                      |                     |             |
| Message routing                      |  |          |            |                      |                     |             |
| Retained messages                    |  |          |            |                      |                     |             |
| ▼ Security                           |  |          |            |                      |                     |             |
| Intro                                |  |          |            |                      |                     |             |
| Certificates                         |  |          |            |                      |                     |             |
| Policies                             |  |          |            |                      |                     |             |
| Certificate authorities              |  |          |            |                      |                     |             |
| Role aliases                         |  |          |            |                      |                     |             |
| Authorizers  Audit                   |  |          |            |                      |                     |             |
| <ul> <li>Detect</li> </ul>           |  |          |            |                      |                     |             |
| <ul> <li>Fleet Hub</li> </ul>        |  |          |            |                      |                     |             |
|                                      |  |          |            |                      |                     |             |
| Pouries software                     |  |          |            |                      |                     |             |
| CloudShell Feedback Language         | © 2023, Amazon V   | leb Serv | ices, Inc. | or its affiliates. F | rivacy Terms Cookie | preferences |

2. Configure settings as shown below, and click the [Create] button.

| Item                          | Setting  |
|-------------------------------|----------|
| Policy name                   | Any name |
| Policy effect                 | Allow    |
| Policy action <sup>*1</sup>   | *        |
| Policy resource <sup>*1</sup> | *        |

\*1 This item describes the policy settings for testing. For actual use, configure settings with restrictions.

| aws iii Services Q   | Search               | [Alt+S]  | Ð         | \$           | 0             | Sydney 🔻      | formation growthe coordinate of |
|--|----------------------|--|-----------|--------------|---------------|---------------|---------------------------------|
| AWS IoT  | ×                    | AWS IoT > Security > Policies > Create policy  |           |              |               |               |                                 |
| Monitor  |                      | Create policy Info AWS IoT Core policies allow you to manage access to the AWS IoT Core data plane operations.   |           |              |               |               |                                 |
| Connect<br>Connect one device<br>Connect many devices                                    |                      | Policy properties<br>AWS IoT Core supports named policies so that many identities can reference the same policy document.  | _         |              |               |               |                                 |
| Test<br>MQTT test client<br>Device Location <u>New</u>                                   |                      | Policy name test_policy Tags - optional  |           |              |               |               |                                 |
| Manage <ul> <li>All devices</li> <li>Greengrass devices</li> </ul>                       |                      | Policy statements Policy examples  |           |              |               |               |                                 |
| <ul> <li>LPWAN devices</li> <li>Software packages New</li> <li>Remote actions</li> </ul> | <u>«</u>             | Policy document info<br>An AVS IoT policy contains one or more policy statements. Each policy statement contains actions, resources, and an effect that grants or denies the actions by the resources. |           |              |               |               | Builder JSON                    |
| <ul> <li>Message routing<br/>Retained messages</li> <li>Security</li> </ul>              |                      | Policy effect         Policy action         Policy resource           Allow         •         •         •  |           | Remo         | /e            |               |                                 |
| Intro<br>Certificates<br><b>Policies</b>   |                      | Add new xistement  |           |              |               |               | Cancel                          |
| Certificate authorities<br>Role aliases<br>Authorizers                                   | 25                   |  |           |              |               |               | Create                          |
| <ul> <li>Audit</li> <li>Detect</li> <li>Fleet Hub</li> </ul>                             |                      |  |           |              |               |               |                                 |
| CloudShell Feedback La   | <b>↓</b><br>Language | © 2023, Arra   | zon Web S | Services, In | c. or its aff | liates. Priva | icy Terms Cookie preferences    |

#### **3.** The policy is added to the list.

| aws iii Services Q Search                             | [Ait+5]   | ¢           | 0                | Sydney 🔻      | weather that the last the last the | - HT    |
|---|---|-------------|------------------|---------------|------------------------------------|---------|
| AWS IoT $\times$                                      | Successfully created policy test_policy.  |             |                  |               | View policy                        | ×       |
| Monitor   | AWS IOT > Security > Policies   |             |                  |               |                                    |         |
| Connect<br>Connect one device<br>Connect many devices | AWS IoT policies (1) Info AWS IoT policies (1) Info AWS IoT policies (1) Info AWS IoT policies are separate and different from IAM policies. AWS IoT policies apply only to AWS IoT data plane operations.           Q. Find policies           Policy name |             | C                | Delete        | Create policy                      | ,       |
| Test<br>MQTT test client                              |   |             |                  |               |                                    |         |
| Device Location New<br>Manage                         |   |             |                  |               |                                    |         |
| All devices   |   |             |                  |               |                                    |         |
| Greengrass devices                                    |   |             |                  |               |                                    |         |
| LPWAN devices   |   |             |                  |               |                                    |         |
| Software packages New                                 |   |             |                  |               |                                    |         |
| Remote actions  |   |             |                  |               |                                    |         |
| Message routing                                       |   |             |                  |               |                                    |         |
| Retained messages                                     |   |             |                  |               |                                    |         |
| ▼ Security  |   |             |                  |               |                                    |         |
| Intro   |   |             |                  |               |                                    |         |
| Certificates  |   |             |                  |               |                                    |         |
| Policies  |   |             |                  |               |                                    |         |
| Certificate authorities                               |   |             |                  |               |                                    |         |
| Role aliases  |   |             |                  |               |                                    |         |
| Authorizers   |   |             |                  |               |                                    |         |
| ▶ Audit   |   |             |                  |               |                                    |         |
| Detect  |   |             |                  |               |                                    |         |
| Fleet Hub   |   |             |                  |               |                                    |         |
|   |   |             |                  |               |                                    |         |
| Davies coltunes                                       | ×   |             |                  |               |                                    |         |
| CloudShell Feedback Language                          | © 2023, Amazon Web 5  | ervices, In | c. or its affili | ites. Privacy | Terms Cookie pref                  | erences |

#### **Creating AWS IoT things**

A thing is an object that connects to the Internet. In this manual, this refers to the FX5-ENET.

**1.** Select [Manage]  $\Rightarrow$  [All devices]  $\Rightarrow$  [Things] from the left menu, and click the [Create things] button.

| aws III Services                      | Q Search | [Alt+S]  | Ð                  | \$            | 0           | Sydney 🔻      | funitatial genelation to the  |
|---------------------------------------|----------|--|--------------------|---------------|-------------|---------------|---|
| AWS IoT                               | ×        | AWSIOT > Manage > Things   |                    |               |             |               |   |
|                                       |          |  |                    |               |             |               |   |
| Monitor                               |          | An IoT thing is a representation and record of your physical device in the cloud. A physical device<br>needs a thing record in order to work with AWS IoT. |                    |               |             |               | Create things   |
| Connect                               |          |  |                    |               |             |               | < 1 > @   |
| Connect one device                    |          | Q. Filter things by: name, type, group, billing, or searchable attribute.  |                    |               |             |               |   |
| <ul> <li>Connect many devi</li> </ul> |          | Name   |                    |               |             | Thing typ     | be and a second s |
|                                       |          |  |                    |               |             |               |   |
|                                       |          | No things  |                    |               |             |               |   |
| Test                                  |          | No things to display in this Region  |                    |               |             |               |   |
| MQTT test client                      |          | Create things  |                    |               |             |               |   |
| Device Location N                     | ew       |  |                    |               |             |               |   |
|                                       |          |  |                    |               |             |               |   |
| Manage                                |          |  |                    |               |             |               |   |
| <ul> <li>All devices</li> </ul>       |          |  |                    |               |             |               |   |
| Things                                |          |  |                    |               |             |               |   |
| Thing groups                          |          |  |                    |               |             |               |   |
| Thing types                           |          |  |                    |               |             |               |   |
| Fleet metrics                         |          |  |                    |               |             |               |   |
| Greengrass devices                    |          |  |                    |               |             |               |   |
| LPWAN devices                         |          |  |                    |               |             |               |   |
| Software packages                     | New      |  |                    |               |             |               |   |
| Remote actions                        |          |  |                    |               |             |               |   |
| Message routing                       |          |  |                    |               |             |               |   |
| Retained messages                     |          |  |                    |               |             |               |   |
| Security                              |          |  |                    |               |             |               |   |
| Fleet Hub                             |          |  |                    |               |             |               |   |
|                                       |          |  |                    |               |             |               |   |
| Device software                       |          |  |                    |               |             |               |   |
| Billing groups                        |          |  |                    |               |             |               |   |
| Settings                              |          |  |                    |               |             |               |   |
| Feature spotlight                     |          | 0 things selected  |                    |               |             |               | ^   |
| Decompositation D                     |          | v<br>  | 2023, Amazon Web S |               |             |               |   |
| CloudShell Feedback                   | Language | 62   | 2025, Amazon Web S | ervices, Inc. | or its atti | liates. Priva | cy Terms Cookie preferences   |

**2.** Select [Create single thing] and click the [Next] button.

| aws     | III Services Q. Search [Alt+5]  | D          | ¢              | ⑦ Sydney           | Parencial graduation #           |
|---------|---|------------|----------------|--------------------|----------------------------------|
| =       | AWS loT > Manage > Things > Create things   |            |                |                    |                                  |
|         | Create things Info  |            |                |                    |                                  |
|         | A thing resource is a digital representation of a physical device or logical entity in AWS IoT. Your device or entity needs a thing<br>resource in the registry to use AWS IoT features such as Device Shadows, events, jobs, and device management features. |            |                |                    |                                  |
|         | Number of things to create  |            |                |                    |                                  |
|         | Create single thing<br>Create a thing resource to register a device. Provision the certificate and policy necessary to allow the device to connect to AWS<br>IoT.   |            |                |                    |                                  |
|         | Create a task that creates multiple thing resources to register devices and providion the resources those devices require to connect to AWS IoT.  |            |                |                    |                                  |
|         | Cancel  |            |                |                    |                                  |
|         |   |            |                |                    |                                  |
|         |   |            |                |                    |                                  |
|         |   |            |                |                    |                                  |
|         |   |            |                |                    |                                  |
|         |   |            |                |                    |                                  |
|         |   |            |                |                    |                                  |
| S. Clou | xiSheli Feedback Language © 2023, Ama   | zon Web Se | rvices, Inc. ( | or its affiliates. | Privacy Terms Cookie preferences |

**3.** Configure settings as shown below, and click the [Next] button.

| Item          | Setting   |
|---------------|-----------|
| Thing name    | Any name  |
| Device Shadow | No shadow |

| Services Q Search  | [Alt+S]  | 5 <b>4</b> Ø | Sydney 🔻 🛛 Funituritali gi makazitikitika m |
|--|--|--------------|---|
| AWS IOT > Manage > Things >                                  | Create things > Create single thing  |              | ٥   |
| Step 1 Specify thing properties The second step 2 - optional | Specify thing properties Info<br>A thing resource is a digital representation of a physical device or logical entity in AWS IoT. Your device or entity needs a thing<br>resource in the registry to use AWS IoT features such as Device Shadows, events, Jobs, and device management features. |              |   |
| Configure device certificate<br>Step 3 - optional            | Thing properties Info  |              |   |
| Attach policies to certificate                               | Thing name<br>test, things<br>tote a unspe name containing only letters, numbers, hyphens, colon, or underscores. A triang name can't contain any spaces.  |              |   |
|  | Additional configurations<br>You can use these configurations to add detail that can help you to organize, manage, and search your things.   |              |   |
|  | Thing type - optional     Searchable thing attributes - optional   |              |   |
|  | Thing group - optional     Billing group - optional  |              |   |
|  | Packages and versions - optional   |              |   |
|  | Device Shadow Info<br>Device Shadows allow connected devices to sync states with AWS. You can also get, update, or delete the state information of this thing's<br>shadow using either HTTPs or MQTT topics.   |              |   |
|  | No shadow     Normed shadow     Crate multiple shadow with different names to manage access to properties, and logically group     your devices properties.  |              |   |
|  | O Umamod shadow (stactic)<br>A thing can have only one unnamed shadow.   |              |   |
|  | Cancel Next  |              |   |

4. Select [Skip creating a certificate at this time] and click the [Create thing] button.

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|-----|--|---|---------------------|-----------------|---------------------|-------------------------------|
| ≡   | AWS IoT > Manage > Things > C  | reate things > Create single thing  |                     |                 |                     |                               |
|     | Step 1 Specify thing properties Step 2 - optional Configure device certificate | Configure device certificate - optional Lefo<br>A device requires a certificate to connect to AWS IoT. You can choose how to register a certificate for your device now, or you<br>can create and register a certificate for your device later. Your device won't be able to connect to AWS IoT until it has an active<br>certificate with an appropriate policy. |                     |                 |                     |                               |
|     |  | Device certificate  |                     |                 |                     |                               |
|     |  | Auto-generate a new certificate (recommended)     Generate a certificate, public kay, and private key using AMS IoT's certificate authority.      Use my certificate     Use a certificate signed by your own certificate authority.  |                     |                 |                     |                               |
|     |  | O Upload CSR<br>Register your CA and use your own certificates on one or many devices.  |                     |                 |                     |                               |
|     |  | • Skip creating a certificate at this time<br>You can create a certificate for this thing and attach a policy to the certificate at a later time.   |                     |                 |                     |                               |
|     |  | Cancel Previous Create thing  |                     |                 |                     |                               |
|     |  |   |                     |                 |                     |                               |
|     |  |   |                     |                 |                     |                               |
|     |  |   |                     |                 |                     |                               |
|     |  |   |                     |                 |                     |                               |
|     |  |   |                     |                 |                     |                               |
|     |  |   |                     |                 |                     |                               |
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### **5.** The thing is added to the list.

| aws Ervices Q Search                                  | [Alt+S]  | D A Ø Sydney ▼   |
|---|--|--|
| AWS IoT $	imes$                                       |  | View thing X   |
| Monitor   | AWS IoT > Manage > Things  |  |
| Connect<br>Connect one device<br>Connect many devices | Things (1) infe<br>An hit thing is a representation and record of your physical device in the cloud. A physical device<br>needs a thing record in order to work with AWS IoT.<br>Q. Filter things by: name, type, group, billing, or searchable attribute. | C     Advanced search     Run aggregations     Edit     Delete     Create things       < 1 |
|   | Name   | Thing type   |
| Test  | test_things  |  |
| MQTT test client<br>Device Location New               |  |  |
| CONCELOCATION INCOM                                   |  |  |
| Manage  |  |  |
| All devices   |  |  |
| Things  |  |  |
| Thing groups  |  |  |
| Thing types   |  |  |
| Fleet metrics   |  |  |
| Greengrass devices                                    |  |  |
| LPWAN devices   |  |  |
| Software packages New                                 |  |  |
| Remote actions  |  |  |
| Message routing                                       |  |  |
| Retained messages                                     |  |  |
| Security  |  |  |
| Fleet Hub   |  |  |
|   |  |  |
| Device software                                       |  |  |
| Billing groups  |  |  |
| Settings  |  |  |
| Feature spotlight                                     |  |  |
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#### Creating a certificate

A certificate authenticates the connection between a device and a client. To enable a device or client to communicate with AWS IoT, a certificate must be registered and activated with AWS IoT.

**1.** Select [Security] ⇒ [Certificates] from the left menu and click the [Create certificate] button.

| aws 🔛 Services Q Sear               | ch [Alt+S]  | ▶ 🕹 Ø Sydney                            | Invalating relationer                       |
|-------------------------------------|---|---|---|
| AWS IoT >                           | AWS10T > Security > Certificates  |   |   |
| Monitor                             | Certificates Info   |   |   |
|                                     | X.509 certificates authenticate device and client connections. Certificates must be registered with AWS IoT and activated before a device or client can communicate with AWS IoT. |   |   |
| Connect                             | Certificates Certificates you've transferred  |   |   |
| Connect one device                  |   |   |   |
| Connect many devices                | Certificates (0)  | C Actions V                             |   |
| Test                                | of the definitions  |   | Create certificate<br>Register certificates |
| MQTT test client<br>Device Location | Certificate ID V Status V Created   |   | ▽   |
| Device Location New                 | No certificates   |   |   |
| Manage                              | You don't have any certificates in ap-southeast-2.  |   |   |
| <ul> <li>All devices</li> </ul>     | Create certificate  |   |   |
| Greengrass devices                  |   |   |   |
| LPWAN devices                       |   |   |   |
| Software packages New               |   |   |   |
| Remote actions                      |   |   |   |
| Message routing                     |   |   |   |
| Retained messages                   |   |   |   |
| ▼ Security                          |   |   |   |
| Intro                               |   |   |   |
| Certificates                        |   |   |   |
| Policies<br>Certificate authorities |   |   |   |
| Role aliases                        |   |   |   |
| Authorizers                         |   |   |   |
| Audit                               |   |   |   |
| Detect                              |   |   |   |
| Fleet Hub                           |   |   |   |
|                                     |   |   |   |
| Davies coftware                     | <b>v</b>  |   |   |
|                                     | © 2023, Amazon  | n Web Services. Inc. or its affiliates. | Privacy Terms Cookie preferences            |

2. Select [Create certificate with certificate signing request (CSR)]. Select the CSR file generated by Certificate Configuration Tool for FX5-ENET from the [Choose file] button. ( Page 22 Configuring Settings with Certificate Configuration Tool for FX5-ENET)

Select [Active] for the certificate status and click the [Create] button.

| aws     | Services Q Search   | [Alt+S]   |      | Ð                  | \$ @               | Sydney 🔻        | formativity relations are     |
|---------|---|---|------|--------------------|--------------------|-----------------|-------------------------------|
| =       | AWS IoT > Security > Certificates > Create certificat   | te  |      |                    |                    |                 |                               |
|         | Create certificate  |   |      |                    |                    |                 |                               |
|         |   | in connect to AWS IoT. Your device won't be able to connect to AWS  |      |                    |                    |                 |                               |
|         | IoT without authentication and an appropriate policy.   |   |      |                    |                    |                 |                               |
|         | Certificate   |   |      |                    |                    |                 |                               |
|         | Auto-generate new certificate (recommended)<br>Generate a new certificate, public key, and private key<br>using AWS Iol's certificate authority and register it with<br>AWS Iol'.                                   | <ul> <li>Create certificate with certificate signing request<br/>(CSR)</li> <li>Upload your own certificate signing request (CSR) file to<br/>create and register a certificate that's based on a private<br/>key you own.</li> </ul> |      |                    |                    |                 |                               |
|         | Certificate signing request<br>Uplade the certificate signing request (CSR) file for the certificate<br>and the avaid CSR file<br>Choose file<br>Other States<br>States byte  | you want to create and register. The file must have a file extension of .cr   |      |                    |                    |                 |                               |
|         | Certificate status<br>Asign the initial state of the new certificate. The certificate must<br>status later in the certificate's detail page.  | be active before it can be used to connect to AWS IoT. You can change its   |      |                    |                    |                 |                               |
|         | Inactive     A device won't be able to connect to AWS using this certificat     Advice will be able to connect to AWS using this certificate I     A device will be able to connect to AWS using this certificate I |   |      |                    |                    |                 |                               |
|         |   | Cancel  |      |                    |                    |                 |                               |
|         |   |   |      |                    |                    |                 |                               |
| > Cloud | ihell Feedback Language   |   | © 20 | 123, Amazon Web Se | rvices, Inc. or it | affiliates. Pri | vacy Terms Cookie preferences |

**3.** Download [Device certificate]. This certificate is required for writing to the FX5-ENET. ( Page 37 Writing a certificate) When downloading is completed, click the [Continue] button.

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|-----|-------------------|--|-------|----------|-----------------------|
|     |                   |  |       |          |                       |
|     |                   |  |       |          |                       |
|     |                   |  |       |          |                       |
|     |                   |  |       |          |                       |
|     |                   |  |       |          |                       |
|     |                   | Download certificates and keys X   |       |          |                       |
|     |                   |  |       |          |                       |
|     |                   | Download certificates and keys<br>Download and install the certificate and key files to your device so that it can connect securely to AWS<br>IoT. You can download the certificate now, or later, but the key files can only be downloaded now. |       |          |                       |
|     |                   | Device certificate   |       |          |                       |
|     |                   | Root CA certificates<br>Download the root CA certificate file that corresponds to the type of data endpoint and cipher suite   |       |          |                       |
|     |                   | you're using. You can also download the root CA certificates later.  |       |          |                       |
|     |                   | Amazon trust services endpoint 🔛 Download RSA 2048 bit key: Amazon Root CA 1   |       |          |                       |
|     |                   | Amazon trust services endpoint<br>ECC 256 bit key: Amazon Root CA 3  |       |          |                       |
|     |                   | If you don't see the root CA certificate that you need here, AWS IoT supports additional<br>root CA certificates. These root CA certificates and others are available from our   |       |          |                       |
|     |                   | developer guides.  |       |          |                       |
|     |                   | Continue   |       |          |                       |
|     |                   |  |       |          |                       |
|     |                   |  |       |          |                       |
|     |                   |  |       |          |                       |
|     |                   |  |       |          |                       |
|     |                   |  |       |          |                       |

4. The certificate is added to the list. Click the certificate ID created now.

| aws 🔛 Services Q. Search  | [Alt+5]  | ۶.         | ¢          | @ s              | ydney 🔻    | Notes that p | met ballinge | in e    |
|---|--|------------|------------|------------------|------------|--------------|--------------|---------|
| AWS IoT ×   | ⊙ You successfully created certificate into a main incommon multi common and information and incommon and an a   |            |            |                  |            | View cer     | tificate     | ×       |
| Monitor   | AWSINT > Security > Certificates   |            |            |                  |            |              |              | _       |
| Connect<br>Connect one device<br>Connect many devices                                     | Certificates into C.509 certificates authenticate device and client connections. Certificates must be registered with AWS IoT and activated before a device or client can communicate with AWS IoT. Certificates Certificates you've transferred |            |            |                  |            |              |              |         |
| Test<br>MQTT test client<br>Device Location <u>New</u>                                    | Certificates (1)<br>Q. Find certificates<br>Certificate ID<br>V Status<br>V Created  |            | C          | Action           | 15 🔻       | Add certific |              |         |
| Manage <ul> <li>All devices</li> <li>Greengrass devices</li> <li>LPWAN devices</li> </ul> |  |            |            |                  |            |              |              |         |
| Software packages <u>New</u> Remote actions  Message routing Retained messages            |  |            |            |                  |            |              |              |         |
| Security     Intro     Certificates   |  |            |            |                  |            |              |              |         |
| Policies<br>Certificate authorities<br>Role aliases<br>Authorizers                        |  |            |            |                  |            |              |              |         |
| <ul><li>▶ Audit</li><li>▶ Detect</li><li>▶ Fleet Hub</li></ul>                            |  |            |            |                  |            |              |              |         |
| CloudShell Feedback Language  | 0.2013. Anaz   | on Web Ser | vices. Inc | or its affiliate | es. Privac | y Terms      | Cookie prefe | erences |

#### 5. Click the [Attach policies] button in [Policies].

| aws III Services Q Search                                     | [Alt+S]  |   | D | \$ Ø | Sydney 🔻       | funite/bitg mellio0800 er 1 |
|---|--|---|---|------|----------------|-----------------------------|
| AWS IoT $\times$  | AWS IOT > Security > Certificates > Indiantina Difficult Protocols - Resident and the Protocols - Resid       |   |   |      |                |                             |
| Monitor   | INTERACTION PRETAINED IN TRACE   | Company and a state info                          |   |      |                | Actions <b>v</b>            |
| Connect<br>Connect one device                                 | Details  |   |   |      |                |                             |
| <ul> <li>Connect many devices</li> </ul>                      | Continues ID<br>BetS515740025500050574517550790221884584628bot65445007900500 (Seerice  | dentes<br>Ørheine                                 |   |      |                |                             |
| Test<br>MQTT test client                                      | Constitute Mill<br>Ginemanicany materials III Million Constitute Constitute Million Million Account (Million Million<br>All Million Million<br>All Million M | Created<br>August 22, 2023, 100231-(272-08.00)    |   |      |                |                             |
| Device Location New   | Index4   | Visio<br>August: 22, 2025, 10:00(39-0/TC-493.00)  |   |      |                |                             |
| Manage  | towy.  | Explores<br>January 17, 2018, 0818-18 (JTC+20122) |   |      |                |                             |
| All devices   | Olin-Amagon/WebServices Onlineazon.com/inc. LrSeatch: ST-Mathington CH25   |   |   |      |                |                             |
| <ul> <li>Greengrass devices</li> <li>LPWAN devices</li> </ul> |  |   |   |      |                |                             |
| Software packages New   | Policies Things Noncompliance  |   |   |      |                |                             |
| Remote actions  |  |   |   |      |                |                             |
| Message routing   | Policies (0) Info  |   | Γ | C D  | etach policies | Attach policies             |
| Retained messages   | AWS IoT policies allow you to control access to the AWS IoT Core data plane operations.  |   | L | 0    |                |                             |
| Security  | Name   |   |   |      |                |                             |
| Intro   | (WITH)   |   |   |      |                |                             |
| Certificates Policies   |  | blicies   |   |      |                |                             |
| Certificate authorities                                       | You don't have any poucies   | attached to this certificate.                     |   |      |                |                             |
| Role aliases  |  |   |   |      |                |                             |
| Authorizers   |  |   |   |      |                |                             |
| ▶ Audit   |  |   |   |      |                |                             |
| Detect  |  |   |   |      |                |                             |
| ▶ Fleet Hub   |  |   |   |      |                |                             |
|   |  |   |   |      |                |                             |
| Device coftware   | *  |   |   |      |                |                             |

**6.** Select the created policy name and click the [Attach policies] button.

| aws iii Services Q Search   | [Atros]   | 🗵 🛛 🐥 👘 Öydney 🕶 👘 Austria salaigi saat kaideliin a. e |
|---|---|--|
| AWS IoT X   |   |  |
| Monitor   |   |  |
| Connect<br>Connect one device<br>Connect many devices   |   |  |
| Test<br>MQTT test client  |   |  |
| Device Location <u>New</u><br>Manage<br>All devices   | Attach policies to the certificate ×  |  |
| <ul> <li>▶ Greengrass devices</li> <li>▶ LPWAN devices</li> <li>Software packages New</li> </ul>    | COL Advanced law Low and Col Learning of Linear International I |  |
| <ul> <li>Remote actions</li> <li>Message routing<br/>Retained messages</li> <li>Security</li> </ul> | Policies (0) into Cancel Attach policies  |  |
| Intro   |   |  |
| Certificates<br>Policies<br>Certificate authorities   |   |  |
| Role aliases<br>Authorizers<br>▶ Audit  |   |  |
| <ul> <li>▶ Detect</li> <li>▶ Fleet Hub</li> </ul>   |   |  |
| CloudShell Feedback Language  |   |  |

### 7. Click the [Attach to things] button in [Things].

| aws Services Q Search   | [Alt+S]   |   | Ð           | \$ ( | ⑦ Sydney ▼     | Famila hall gives its 100 has + |
|---|---|---|-------------|------|----------------|---------------------------------|
| AWS IoT ×   | O Successfully attached the policy test_policy to certificate   | el 2004 Sec   |             |      |                | ×                               |
| Monitor   | AWSIOT > Security > Certificates > INTERTIFICATIONALISTICATION AND AND AND AND AND AND AND AND AND AN   | Husting Control in Sec.   |             |      |                | Actions 🔻                       |
| Connect<br>Connect one device<br>Connect many devices                                     | Details   |   |             |      |                |                                 |
| Test<br>MQTT test client<br>Device Location <u>New</u>                                    | ANTEENSA-SEESEN PREPARATION AND AND AND AND AND AND AND AND AND AN  | Datus<br>@Anton<br>Ganad<br>Assart12 DIEL 101228 6/70-10100                                     |             |      |                |                                 |
| Manage <ul> <li>All devices</li> <li>Greengrass devices</li> <li>LPWAN devices</li> </ul> | Soliter<br>Ofmax  | Vola<br>August 33, 3023, 1048-39 (J.FC-1968)<br>Orgino<br>January (M. 2058, 00:20:50:071C-49340 |             |      |                |                                 |
| Software packages New<br>Remote actions<br>Message routing                                | Policies Things Noncompliance   |   |             |      |                |                                 |
| Retained messages      Security     Intro   | Things (0) into<br>An AVIS loff thing is a representation and record of your physical device in the cloud. Attaching a certificate to an AVIS loff thing relates the devi | ice using the certificate to the thing resource.  | C           | Deta | ch from things | Attach to things                |
| Certificates<br>Policies  | Name  |   |             |      |                | <b>.</b>                        |
| Certificate authorities<br>Role aliases<br>Authorizers                                    | No thin<br>This certificate is not atta   |   |             |      |                | _                               |
| <ul> <li>▶ Audit</li> <li>▶ Detect</li> <li>▶ Fleet Hub</li> </ul>                        |   |   |             |      |                |                                 |
| Device cofficience  | •   |   | and Mak Con |      |                |                                 |

 $\pmb{8.}$  Select the name of the created thing, and click the [Attach to thing] button.

| aws iii Services Q Search   |   |  |  |
|---|---|--|--|
| AWS IoT X   |   |  |  |
| Monitor   |   |  |  |
| Connect<br>Connect one device<br>Connect many devices   |   |  |  |
| Test<br>MQTT test client<br>Device Location New   |   |  |  |
| Manage  | Attach certificate X  |  |  |
| <ul> <li>Greengrass devices</li> <li>LPWAN devices</li> <li>Software packages <u>New</u></li> </ul> | Things<br>Choose things to attach this certificate to.<br>Choose thing resource |  |  |
| <ul> <li>Remote actions</li> <li>Message routing<br/>Retained messages</li> <li>Security</li> </ul> | Pelicies Things Noncompliance Est_things Cancel Attach to thing Things (O) use  |  |  |
| Intro<br>Certificates<br>Policies   |   |  |  |
| Certificate authorities<br>Role aliases<br>Authorizers  |   |  |  |
| <ul> <li>Audit</li> <li>Detect</li> <li>Fleet Hub</li> </ul>  |   |  |  |
| CloudShell Feedback Language  |   |  |  |

## Checking an endpoint

An endpoint represents a URL required for connecting to AWS services.

The endpoint will be needed for configuring the GX Works3 settings. Therefore, users are recommended to copy and keep it. (The URL must be copied with "\*\*\*\*\*\*\*.amazonaws.com" included.)

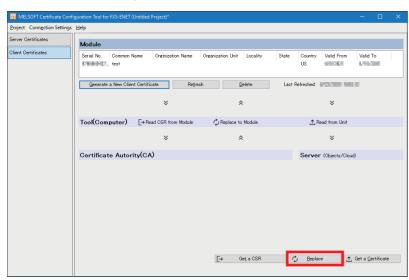
**1.** Select [Settings] in the left menu. The endpoint assigned to each AWS account is displayed.

| aws Services Q Search   | [Alt+S]   |              | <b>D</b> 4          | ⑦ Sydney ▼                | Rents fiel greet to Million + |
|---|---|--------------|---------------------|---------------------------|-------------------------------|
| AWS IoT ×   | AWS IOT > Settings  |              |                     |                           |                               |
| Monitor   | Settings Info   |              |                     |                           |                               |
| Connect<br>Connect one device   | Device data endpoint Info Your device data endpoint to cannet to AWS.   |              |                     |                           |                               |
| Connect many devices  | Each of your things has a REST API available at this endpoint. MQTT clients and AWS IoT Device SDKs 🖸 also use this endpoint.   |              |                     |                           |                               |
| Test<br>MQTT test client<br>Device Location <u>New</u>  | Exclosion  C H-CH-TWH XIII - HILD CLap-HoutHwalt - C amazonaws.com  Select security policy. Info To customiz your TLS settings, such as TLS versions and supported cipher wites, choose a security policy.  Informational security policy   |              |                     |                           |                               |
| Manage All devices  | Compare security policies [2]   |              |                     |                           |                               |
| <ul> <li>Greengrass devices</li> <li>LPWAN devices</li> <li>Software packages <u>New</u></li> <li>Remote actions</li> </ul> | Domain configurations unformation to simplify tasks such as migrating devices to AWS lot Core, migrating application infrastructure t |              |                     |                           |                               |
| <ul> <li>Message routing</li> <li>Retained messages</li> </ul>  | Name Domain name Status Service type Date updated   |              |                     |                           |                               |
| <ul> <li>Security</li> <li>Fleet Hub</li> </ul>   | No domain configurations<br>You don't have any domain configurations.<br>Create domain configuration  |              |                     |                           |                               |
| Device software<br>Billing groups   |   |              |                     |                           |                               |
| Settings<br>Feature spotlight   | Logs ten You can manage AWS for logging to log helpful information to CloudWatch Logs. Manage logs  |              |                     |                           |                               |
| Documentation 🖸   | As messages from your devices pass through the message broker and the rules engine, AWS IoT logs process events<br>which can be helpful in troubleshooting.   |              |                     |                           |                               |
| Tell us what you think  | Role Log level  |              |                     |                           |                               |
| CloudShell Feedback Language  | Log role is not available Logging level is not available  | © 2023, Amaz | on Web Services, In | . or its affiliates. Priv | racy Terms Cookie preferences |

## 4.2 Configuring Settings with Certificate Configuration Tool for FX5-ENET

## Writing a certificate

1. In Certificate Configuration Tool for FX5-ENET, click [Client Certificates] ⇒ [Replace] button.



2. Click the [Yes] button.

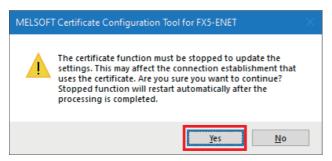
| MELSOFT Certificate Configuration Tool for FX5-ENET |  |  |  |  |  |
|---|--|--|--|--|--|
|   | The module already contains a Client Certificate. Do you want to replace the existing certificate? |  |  |  |  |
|   | <u>Y</u> es <u>N</u> o   |  |  |  |  |

3. Select the certificate (\*.crt) downloaded in 🖙 Page 32 Creating a certificate and import the certificate.

Point P

If the certificate (\*.crt) is not displayed, delete the end of the file name (.crt). (The extension will become .pem.)

4. Click the [Yes] button.



**5.** Download the server certificate (sf-class2-root.crt) from AWS.

### Point P

The certificate can be downloaded from the following (as of the publication of this manual).

https://aws.amazon.com/blogs/security/how-to-prepare-for-aws-move-to-its-own-certificate-authority/ ?nc1=h\_ls

Certificates have expiration dates. For the latest information, check the website of AWS.

| aws product Solution fee document le |   |  |             |  | Sign up now for free > |
|--------------------------------------|---|--|-------------|--|------------------------|
| Blog Home category * edition *       |   |  |             |  |                        |
| Veri                                 | ify that your certificate store cont  | ains a suite of Amazon Trust Services certificate authorities  |             |  |                        |
|                                      | e, click each Test URL in the table to see if it a  | . Trust Services. To verify that these certificates are in your browser's trust popears correctly. If there is a problem, an error is displayed as shown in the  | _           |  |                        |
| Dist                                 | stinguished Name (DN)   | Subject public key SHA-256 hash  | Test<br>URL |  |                        |
| CN                                   | =Amazon Root CA 1,0=Amazon,C=US   | Analos constantes and the constant of the second  | Test<br>URL |  |                        |
| CN                                   | =Amazon Root CA 2,0=Amazon,C=US   | 90H5464454664090946449666700854844856940   | Test<br>URL |  |                        |
| CN                                   | =Amazon Root CA 3,0=Amazon,C=US   | State STREE AND ADDRESS OF THE ADDRE | Test<br>URL |  |                        |
| CN                                   | =Amazon Root CA 4,0=Amazon,C=US   | Parkation (10) and 10 cm (11) and 1000 the method of the   | Test<br>URL |  |                        |
| Cer<br>g2,                           | "Starfield Services Root<br>rtificate Authority -<br>,0"Starfield Technologies<br>c.,L=Scottsdale,ST=Arizona,C=US       | 2671a Heleler Michellin (2000 HERA HERA DA   | Test<br>URL |  |                        |
| Star                                 | arfield Class 2 Certification Authority   | We have the local design of the stand of the stand of the stand stand stand stand stand stand stand stand stand  | Without*    |  |                        |
| You a<br>open<br>open                | can calculate the SHA-256 hash of the subject<br>mail command:: certificate.pem<br>enssl x509 -in certificate.pem -noou | and does not have a Text URL. You can download the cartificar <u>here.</u><br>I's public ley as follows: For PEM-tercaded certificate files, run the following<br>it - publicy   opensil asripurse -noout - inform pee -out  |             |  |                        |
|                                      | certificate.key<br>opensildgst -sha256 certificate.key  |  |             |  |                        |
|                                      | example, if the Starfield Class 2 Certification A<br>mand::sf-class2-root.crt openss1                                   | uthority's self-signed certificate is a PEM-encoded file, run the following  |             |  |                        |
| clas                                 | ass2-root.key<br>anssl dgst -sha256 sf-class2-root.ke   | cout -pubkey   openssl asnlparse -noout -inform pem -out sf-<br>y ∼<br>9C7da233d3470164e8137fe35ee0f38ae858183f08410ea82ac4b4  |             |  |                        |

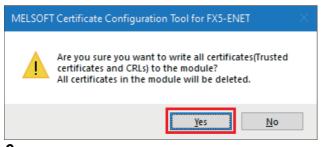
**6.** In Certificate Configuration Tool for FX5-ENET, select [Server Certificates] ⇒ [Import] button to import the server certificate (sf-class2-root.crt).

|                            | nfiguration Tool for FXS-ENET (Untitled Project)* — 🗆 🔀   |
|----------------------------|---|
| Project Connection Setting | is Help   |
| Server Certificates        | Server(Objects/Cloud) Server Certificate/CRL files  |
| Client Certificates        | *   |
|                            | Tool  |
|                            | Trusted Certificates CRLs   |
|                            | Serial Common Name Oreanizati Oreanizati tolality State Coun Valid From Valid To DNS N URI IP Add   |
|                            | Delete from Lot   |
|                            | • Presd from Module         • Verify with Module         • Verify with Module         • Verify with Module         • Verify with Module only         • Verify with Module only         • Verify with Module only         • Verify verify with Module         • Verify verify with Module only         • Verify verify with Module         • Verify verify verify with Module         • Verify ver |
|                            | Module  |
|                            | Trusted Certificates CRLs   |
|                            | Serial Common Name Oreanizati Oreanizati Locality State Coun Valid From Valid To DNS N URI IP Add   |
|                            | Update Delete from List 🏠 Read 🔖 Vorify 😃 Write   |

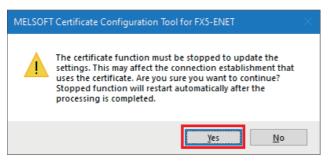
7. When the file has normally been imported, click the [Write] button to write it to the FX5-ENET.

| 🚟 MELSOFT Certificate Confi | iguration Tool for FX5-ENET (Untitle |   |                      |                       |               |             |           |      |
|-----------------------------|--------------------------------------|---|----------------------|-----------------------|---------------|-------------|-----------|------|
| Project Connection Settings | <u>H</u> elp                         |   |                      |                       |               |             |           |      |
| Server Certificates         | Server(Objects/Cloud                 | )   | Ser                  | ver Certificate/CRL   | files         |             |           |      |
| Client Certificates         |                                      |   |                      | ≈                     |               |             |           |      |
|                             | Tool                                 |   |                      |                       |               |             |           |      |
|                             | Trusted Certificates CRLs            |   |                      |                       |               |             |           |      |
|                             | Serial Common Name<br>0              | Organizati Organizati.<br>Starfield Starfield |                      | Coun Valid From<br>US |               | DNS N., URI | IP Add    |      |
|                             |                                      |   |                      |                       |               |             |           |      |
|                             | Import                               | Delete from List                              |                      |                       |               |             |           |      |
|                             | \$                                   | \$  | *                    |                       | Verify Legend |             |           |      |
|                             | , Read from Module<br>☆              | verify with Module<br>⊗                       | e _y_Write tomo<br>⊗ | odule                 | Match         | Tool only   | Module of | only |
|                             | Module                               | Ť   | Ŷ                    |                       |               |             |           |      |
|                             | Trusted Certificates CRLs            |   |                      |                       |               |             |           |      |
|                             | Serial Common Name                   | Organizati Organizati                         | . Locality State     | Coun Valid From       | Valid To      | INS N URI   | IP Add    |      |
|                             |                                      |   |                      |                       |               |             |           |      |
|                             | Update                               | Delete from <u>L</u> ist                      |                      | <u>↑</u> <u>B</u> ead | *             |             | Ł, ∰rite  |      |

8. Click the [Yes] button.



9. Click the [Yes] button.



## 4.3 Configuring Settings with GX Works3

- **1.** Select the "Navigation" window ⇒ [Parameter] ⇒ [Module Information] ⇒ [FX5-ENET] ⇒ [Application Settings] ⇒ [MQTT Communication Setting] ⇒ [MQTT Connection Setting] and double-click <Detailed Setting>.
- **2.** Configure the following settings and click the [Apply] button.

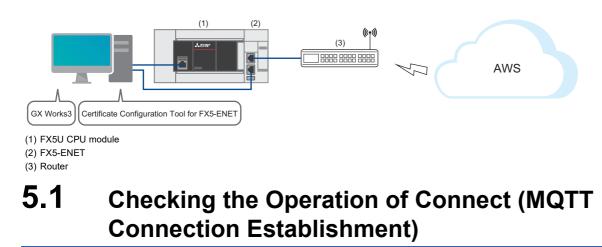
| Item                             | Setting  |
|----------------------------------|--|
| MQTT Server Specification Method | Host name  |
| MQTT Server Host Name            | ********.amazonaws.com (own endpoint)<br>Enter the endpoint that was copied in the section below.<br>In Page 36 Checking an endpoint |
| MQTT Server Port No.             | 8883   |
| Client ID                        | test_things<br>Enter the name of the thing that was created in the section below.<br>にず Page 29 Creating AWS IoT things              |
| Verify Server Certificate        | Verify   |

| tting Item List                | Setting Item  |                                       |  |  |
|--------------------------------|---|---------------------------------------|--|--|
| put the Setting item to Search | I<br>■ MQTT Connection Setting<br>■ MQTT Server Specification Method<br>■ MQTT Server Host Name           | Setting<br>Host name<br>amazonaws.com |  |  |
|                                | MQTT Server IP Address<br>MQTT Server Port No.<br>Client ID   | 1<br>test_things                      |  |  |
|                                | Varify Server Certificate  Explanation Set whether to verify/hot to verify the validity with MQTT server. | Verify                                |  |  |
|                                | Related Functions<br>Certificate Configuration Tool   |                                       |  |  |

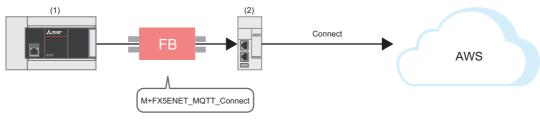
- **3.** Configuring the settings with GX Works3 is completed by creating a program and writing it to the programmable controller.
- ST Page 41 CHECKING OPERATIONS
- Page 19 Writing data to the programmable controller

## **5** CHECKING OPERATIONS

Based on the system configuration (B Page 9 System Configuration), write the program to the FX5U CPU module and check the operation.



Use M+FX5ENET\_MQTT\_Connect (MQTT connection establishment) for controlling the connection with the server (MQTT broker).



(1) FX5U CPU module(2) FX5-ENET

### Program

### M12 turns on for setting the information used for M+ENET\_MQTT\_Connect (MQTT connection establishment).

| SM402<br> ──   ── | \$MOV | MQTT_TEST/Will/Topic/Name | R0           |  | Set the Will topic name data for R0.                |
|-------------------|-------|---------------------------|--------------|--|---|
|                   |       |                           | <b>D</b> 000 |  |   |
|                   | \$MOV | MQTT_TEST Will message    | R300         |  | Set the Will message data for R300.                 |
|                   | \$MOV | MQTT_TEST/topic/name      | R600         |  | Set the Publish/Subscribe topic name data for R600. |
| M12               | MOV   | K1                        | D0           |  | Set the connection number to K1.                    |
|                   | MOV   | K30                       | D1           |  | Set the timeout value to K30.                       |
|                   | MOV   | K60                       | D2           |  | Set the KeepAlive timer to K60.                     |
|                   | MOV   | КО                        | D3           |  | Set Will QoS to K0.                                 |
|                   | MOV   | KO                        | D4           |  | Set the Will topic/message format to K0.            |
|                   | MOV   | К0                        | D5           |  | Set the Will topic name data start address to K0.   |
|                   | MOV   | K300                      | D6           |  | Set the Will message data start address to K300.    |

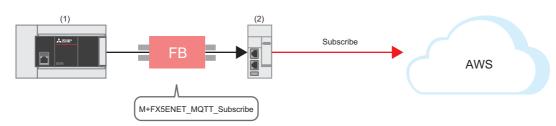
After M4 (Enable Will) turns on, M0 turns on. When FX5ENET\_1.uSts\_CertFuncReadyStatus\_D (Certificate function ready-toenable state) turns on, M14 (Execution command) turns on. M1 (CONNECT instruction) subsequently turns on to establish the connection.

When the connection is successfully established, M9 (Establishment completion) turns on.

|   | TEST    | FX5ENET_1.uSts_CertFund<br>U1\G108899 | cReadyStatus_D   | К0  | M13                 |        |   |      |   |           |
|---|---------|---------------------------------------|--|---|---------------------|--------|---|------|---|-----------|
| M13<br>M0   |         |                                       |  | - SET<br>- RST                                    | M14<br>M14          | ]<br>] |   |      |   |           |
| M14   |         |                                       |  | ENET_MC<br>5ENET_M<br>MQTT (                      | QTT_C               | onne   |   |      |   | M6        |
| Connection number: K1   |         | [FX5ENET_1][D0 ]                      | DUT: i_stModule  |   |                     |        | o_bOK :B<br>o_bErr :B                             |      |   | M7<br>    |
| Timeout value: K30  |         | [D1 ]-                                | UW: i_uTimeout<br>B: i_bConnect<br>B: i_bDisconnec     |   |                     |        | o_uErrld :UW<br>_bConnectOK :B<br>DisconnectOK :B | [D7  | ] | M9<br>M10 |
| KeepAlive timer: K60<br>M3  |         | [D2 ]                                 | UW: i_uKeepaliv<br>B: i_bCleanSess                     | eTimer  | o_uC                | _      | ectionStatus :UW                                  | —[D8 | ] |           |
| M4<br>Will QoS: K0<br>M5  |         | [D3 ]                                 | B: i_bEnableWill<br>UW: i_uWillQoS<br>B: i_bWillRetain |   |                     |        |   |      |   |           |
| Will topic/message forma<br>Will topic name data start<br>Will message data start a | address | D5                                    | UW: i_uTopicMe<br>UW: i_uWillTopic<br>UW: i_uWillMess  | cNameDat  | aAddr               |        |   |      |   |           |
|   |         |                                       | ,<br>p   | bi_bUsePa<br>bi_uLocal_<br>bi_uTarge<br>bi_u2IP_A | _Port_N<br>t_Port_I | lo     |   |      |   |           |

# 5.2 Checking the Operation of Subscribe (Sending of Subscribe Command)

Use M+FX5ENET\_MQTT\_Subscribe (Sending of Subscribe command) for sending a SUBSCRIBE/UNSUBSCRIBE command to the server (MQTT broker).



(1) FX5U CPU module

(2) FX5-ENET

### Program

M27 turns on for setting the information used for M+ENET\_MQTT\_Subscribe (Sending of Subscribe command).

| MOV K1 D10   | Set subscribe ID to K1.                             |
|--------------|---|
| MOV K0 D11   | Set the maximum QoS to K0.                          |
| MOV K0 D12   | Set the topic message format to K0.                 |
| MOV K600 D13 | Set the Subscribe topic name start address to K600. |

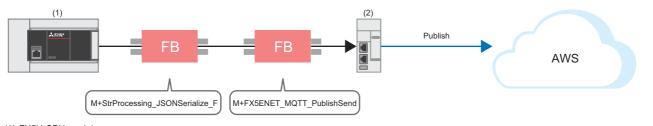
M29 (Execution command) turns on. After M23 (Execution status) turns on, M21 (SUBSCRIBE instruction) turns on for sending the SUBSCRIBE command.

After the Subscribe is successfully sent, M26 (Send completion) turns on.

|   | M_FX5ENET_MQTT<br>(M+FX5ENET_MQT<br>MQTT Su |                          |                         |       |     |
|---|---|--------------------------|-------------------------|-------|-----|
| M29   |   | B: i_bEN                 | o_bENO :B               |       | M23 |
|   | FX5ENET_1                                   | DUT: i_stModule          | o_bOK :B                |       | M24 |
| Connection number: K1                         | [do ]-                                      | UW: i_uConnectionNo      | o_bErr :B               |       | M25 |
| M21   |   | B: i_bSubscribe          | o_uErrld :UW            | [ D14 | ]   |
| M22   |   | B: i_bUnSubscribe        | o_bSendOK :B            |       | M26 |
| Subscribe ID: K1                              | [D10 ]-                                     | UW: i_uSubscribeId       | o_uConnectionStatus :UW | [ D15 | ]   |
| Maximum QoS: K0                               | {d11 }                                      | UW: i_uMaxQoS            |                         |       |     |
| Topic message format: K0                      | D12 -                                       | UW: i_uTopicMessageForm  | at                      |       |     |
| Subscribe topic name data start address: K600 | [D13 ]                                      | UW: i_uSubscribeTopicNam | neDataAddr              |       |     |

# 5.3 Checking the Operation of Publish (Sending of MQTT Data)

Create a JSON string with M+StrProcessing\_JSONSerialize\_F, and use M+FX5ENET\_MQTT\_PublishSend (Sending of MQTT data) to send messages to the server (MQTT broker).



(1) FX5U CPU module

(2) FX5-ENET

### FB library registration

Register the FB library. For the operating procedures, refer to the following.

Page 53 FB Library

### Program

### ■Send data creation

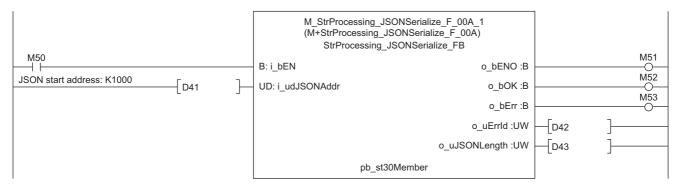
• Settings for data to be sent

M50 (Execution command) turns on for setting the data to be sent.

| 1   | Set JS  | ON start | address to | ა K1000 | ι, |
|-----|---|----------|------------|---------|----|
| M50 |   | DMOV     | K1000      | D41     | μ  |
|     |   |          |            |         | 1  |
|     | 1 M_StrProcessing_JSONSerialize_F_00A_1.pb_st30Member[0].uType := K3; //Set the Value type to K3 (character string).                  |          |            |         | Л  |
|     | 2 M_StrProcessing_JSONSerialize_F_00A_1.pb_st30Member[0].s32Key := 'Sample'; //Set the Key name to "Sample".                          |          |            |         |    |
|     | 3 M_StrProcessing_JSONSerialize_F_00A_1.pb_st30Member[0].s64Value := "MQTT_TEST"; //Set Value to "MQTT_TEST".                         |          |            |         |    |
|     | 4 M_StrProcessing_JSONSerialize_F_00A_1.pb_st30Member[0].uDepth := K1; //Set the depth of layer to K1.                                |          |            |         |    |
|     | 5 M_StrProcessing_JSONSerialize_F_00A_1.pb_st30Member[1].uType := K0; //Set the Value type to K0 (end of the member structure array). |          |            |         |    |
|     |   |          |            |         |    |

#### JSON string creation

When M50 (Execution command) turns on, the function block creates a JSON string in accordance with the information of uType (Value type), s32Key (Key name), s64Value (value of Value), and uDepth (depth of layer) in the set member list (pb\_st30Member) and it outputs the string to the file register at the address specified with the start address of the JSON string storage destination.



### ■Sending of message data

M67 turns on for setting the information used for M+ENET\_MQTT\_PublishSend (Sending of MQTT data).

| 1 | MOV | K0   | D50 | ] | Set QoS to K0.  |
|---|-----|------|-----|---|---|
|   | MOV | K0   | D51 | ] | Set the binary/ASCII/Unicode strings to K0.           |
|   | MOV | K600 | D52 | ] | Set the Publish topic name data start address to K600 |
|   | MOV | К0   | D53 |   | Set the Publish message size to K0.                   |

M69 (Execution command) turns on. After M63 (Execution status) turns on, M61 (PUBLISH instruction (Rise detection)) turns on for sending a message.

|   |             |          | M_FX5ENET_MQTT_PublishS<br>(M+FX5ENET_MQTT_Publishs<br>MQTT Publish Send I | Send_00A)         |      |    |     |
|---|-------------|----------|--|-------------------|------|----|-----|
| M69   |             |          | B: i_bEN   | o_bENO :B         |      |    | M63 |
|   | -[FX5ENET_1 | ]_       | DUT: i_stModule  | o_bOK :B          |      |    | 0   |
| Connection number: K1                       | -[D0        | ]_       | UW: i_uConnectionNo  | o_bErr :B         |      |    | M65 |
| M61   |             |          | B: i_bPublish  | o_uErrld :UW      | [D54 | ]— |     |
| Binary/ASCII/Unicode strings: K0            | D50         | ]_       | UW: i_uQoS   | o_bSendOK :B      |      |    |     |
| M62   |             |          | B: i_bMessageRetain o_uCon   | nectionStatus :UW |      |    | O   |
| QoS: K0                                     | [D51        | ]_       | UW: i_uTopicMessageFormat  |                   | [D55 | ]— |     |
| Publish topic name data start address: K600 | -<br>D52    | $\vdash$ | UW: i_uPublishTopicNameDataAddr  |                   |      |    |     |
| Publish message size: K0                    | -<br>D53    | Ĩ        | UW: i_uPublishMessageSize  |                   |      |    |     |
| Publish message data start address: K1000   | _<br>[D41   | ]_       | UW: i_uPublishMessageDataAddr  |                   |      |    |     |

### Checking reception on AWS

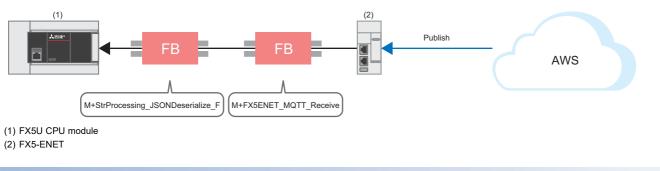
The sent message can be checked from [Test] ⇒ [MQTT test client] in the left menu of AWS.

C Enter "MQTT\_TEST/topic/name" in [Topic filter]. ⇒ Click the [Subscribe] button.

| aws Services Q Search   | [Alt+S]  | Þ.      | ¢          | 0           | Sydney 🔻     | Familacitati ginesi kalikisi ka 🔻 |
|---|--|---------|------------|-------------|--------------|-----------------------------------|
| AWS IoT $\times$  | Connection details     You can update the connection details by choosing Disconnect and making updates on the Establish connection to continue page. |         |            |             |              | ⊘ Connected                       |
| Monitor<br>Connect<br>Connect one device  | Subscribe to a topic Publish to a topic  |         |            |             |              |                                   |
| Connect one device Connect many devices Test MQTT test client Device Location New                         | Topic filter Infe MQTT_TEST/topic/name Additional configuration Subscribe  |         |            |             |              |                                   |
| Manage <ul> <li>All devices</li> <li>Greengrass devices</li> </ul>  | Subs rtions MQTT_TEST/topic/name   |         | Pat        | ise         | Clear        | Export Edit                       |
| Greengrass devices      LPWAN devices      Software packages New      Remote actions      Message routing | MQT IST/topic/name V Message payload<br>(message": "Hello from AWS IoT console" )  |         |            |             |              |                                   |
| <ul> <li>Retained messages</li> <li>Security</li> <li>Fleet Hub</li> </ul>                                | Additional configuration     Publish   |         |            |             |              |                                   |
| Device software<br>Billing groups   | ▼ MQTT_TEST/topic/name   |         |            | Aq          | at 34, 3633, | 111143 (UTC>000)                  |
| Settings<br>Feature spotlight<br>Documentation 🛂  | {     Sample": "HQT_TEST"     }  |         |            |             |              |                                   |
| Tell us what you think  | ► Properties   |         |            |             |              |                                   |
| CloudShell Feedback Language  | © 2023, Amazor   | Web Ser | vices, Inc | or its affi | liates. Priv | acy Terms Cookie preferences      |

# 5.4 Checking the Operation of Subscribe (Receiving of MQTT Data)

Use M+FX5ENET\_MQTT\_Receive (Receiving of MQTT data) for reading a message received from the server (MQTT broker).



### FB library registration

Register the FB library. For the operating procedures, refer to the following.

Page 53 FB Library

### Program

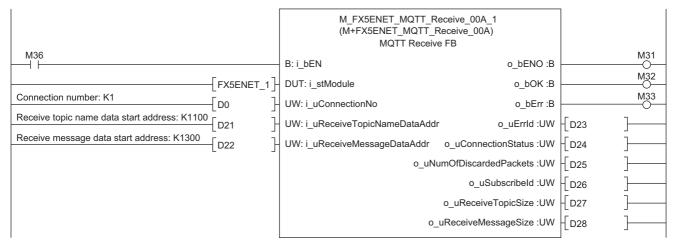
### ■Receiving of message data

M34 turns on for setting the information used for M+ENET\_MQTT\_Receive (Receiving of MQTT data).

| M34 | MOV | K1100 | D21 |          | Set the receive topic name data start address to K11 |  |  |  |  |
|-----|-----|-------|-----|----------|--|--|--|--|--|
|     | MOV | K1300 | D22 | <u> </u> | Set the receive message data start address to K1300. |  |  |  |  |

M36 (Execution command) turns on for storing the receive data into the specified file register.

After the data is successfully received, M32 (Normal completion) turns on. The receive data is stored in the file register set with i\_uReceiveTopicNameDataAddr (Receive topic name data start address) and i\_uReceiveMessageDataAddr (Receive message data start address).



### ■Acquisition of only the required strings from receive data

· Settings for required member information

M40 (Execution command) turns on for setting the member information to be acquired.

 M40
 1
 M\_StrProcessing\_JSONDeserialize\_F\_00A\_1.pb\_st30Member[0].uType := K3; //Set the Value type to K3 (character string).

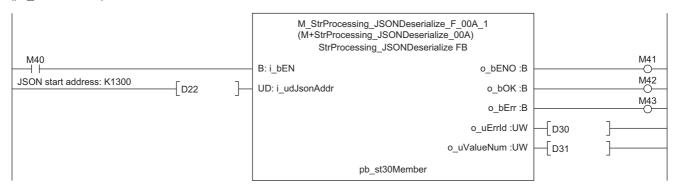
 2
 M\_StrProcessing\_JSONDeserialize\_F\_00A\_1.pb\_st30Member[0].s32Key := 'Sample'; //Set the Key name to "Sample".

 3
 M\_StrProcessing\_JSONDeserialize\_F\_00A\_1.pb\_st30Member[0].uDepth := K1; //Set the depth of layer to K1.

 4
 M\_StrProcessing\_JSONDeserialize\_F\_00A\_1.pb\_st30Member[1].uType := K0; //Set the Value type to K0 (end of the member structure array).

### Acquisition of JSON string

When M40 (Execution command) turns on, the function block acquires the Value strings that exactly match the values of uType (Value type), s32Key (Key name), and uDepth (depth of layer) in the set member list (pb\_st30Member) from JSON strings stored at the JSON start address, and it stores the values into the s64Value (Value) values in the member list (pb\_st30Member).



### Checking reception on GX Works3

Messages received from AWS can be checked from the "Device/Buffer Memory Batch Monitor" of GX Works3.

C [Online] ⇒ [Monitor] ⇒ [Device/Buffer Memory Batch Monitor]

| 1 [Device/Buff      | ier Memo | ry Batch Monitor] Monitoring          |       |                              |                              | X               |
|---------------------|----------|---------------------------------------|-------|------------------------------|------------------------------|-----------------|
| Device <u>N</u>     | ame      | R1300                                 | ~     | Open D <u>i</u> splay Format | Detai <u>l</u> ed Conditions | Monitoring      |
| ◯ Buffer <u>M</u> e | mory     | Intelligent<br>Module No.( <u>U</u> ) | ~     | (HEX) <u>A</u> ddress        | V DEC V                      | Stop Monitoring |
| Device Name         | FE       | DCBA9876543                           | 2 1 0 | Current Value                | String                       | ^               |
| R1300               | 0 0      | 1 0 0 0 1 0 0 1 1 1 1 0               | 1 1   | 8827                         | 7 {"                         |                 |
| R1301               | 0        | 100001010100                          | 0 1 1 | 24915                        | 5 Se                         |                 |
| R1302               | 0        | 1 1 0 0 0 0 0 1 1 0 1                 | 0 1   | 28781                        | 1 mp                         |                 |
| R1303               | 0        | 10010101101                           | 0 0   | 25964                        | 4 le                         |                 |
| R1304               | 0 0      | 1 1 1 0 1 0 0 0 1 0 0 0               | 1 0   | 14882                        | 2 1:                         |                 |
| R1305               | 0        | 0 0 1 1 0 1 0 0 1 0 0 0               | 0 1 0 | 19746                        | 5 "M                         |                 |
| R1306               | 0        | 0 1 0 1 0 0 0 1 0 1 0 0               | 0 1   | 21585                        | 5 QT                         |                 |
| R1307               | 0        | 0 1 1 1 1 1 0 1 0 1 0 1               | 0 0   | 24404                        | 4 T_                         |                 |
| R1308               | 0        | 0001010101010                         | 0 0   | 17748                        | BTE                          |                 |
| R1309               | 0        | 0 1 0 1 0 0 0 1 0 1 0 0               | 1 1   | 21587                        | 7 ST                         |                 |
| R1310               | 0        | 1 1 1 1 0 1 0 0 1 0 0 (               | 0 1 0 | 32034                        | 4 7                          |                 |
| R1311               | 0 0      | 0 0 0 0 0 0 0 0 0 0 0                 | 0 0   |                              | D                            |                 |
| R1312               | 0 0      |                                       | 0 0 0 |                              | D                            |                 |
| R1313               | 0 0      | 0 0 0 0 0 0 0 0 0 0 0 0 0             | 0 0 0 |                              | D                            |                 |
| R1314               | 0 0      |                                       | 0 0 0 |                              | D                            |                 |
| R1315               | 0 0      | 0 0 0 0 0 0 0 0 0 0 0 0 0             | 0 0 0 |                              | D                            |                 |
| R1316               | 0 0      |                                       | 0 0 0 | 0                            | D                            |                 |
| R1317               | 0 0      |                                       | 0 0 0 | 0                            | D                            |                 |
| R1318               | 0 0      |                                       | 0 0 0 |                              | D                            |                 |
| R1319               | 0 0      |                                       | 0 0 0 |                              | pi                           |                 |
| R1320               | 0 0      |                                       | 0 0 0 |                              | D                            |                 |
| R1321               | 0 0      |                                       | 0 0 0 |                              | pi                           |                 |
| R1322               | 0 0      | 0 0 0 0 0 0 0 0 0 0 0 0               | 0 0 0 |                              | D                            |                 |
| R1323               | 0 0      |                                       | 0 0 0 |                              | D                            |                 |
| R1324               | 0 0      |                                       | 0 0 0 |                              | p                            |                 |
| R1325               | 0 0      |                                       | 0 0 0 |                              | p                            |                 |
| R1326               | 0 0      | 0 0 0 0 0 0 0 0 0 0 0 0               | 0 0 0 |                              | D                            |                 |
| R1327               | 0 0      | 0 0 0 0 0 0 0 0 0 0 0 0               | 0 0 0 | 0                            | D                            |                 |
| R1328               | 0 0      | 0 0 0 0 0 0 0 0 0 0 0 0               | 0 0 0 |                              | D                            |                 |
| R1329               | 0 0      | 0 0 0 0 0 0 0 0 0 0 0 0               | 0 0 0 | 0                            | D                            |                 |
| R1330               | 0 0      | 0 0 0 0 0 0 0 0 0 0 0 0               | 0 0 0 |                              | D                            |                 |
| R1331               | 0 0      |                                       | 0 0 0 |                              | p                            | ~               |

## 6 TROUBLESHOOTING

## 6.1 Checking Procedure

### 1. Checking the LED status

Check the communication status with the display status of the LEDs.

For the FX5U CPU module, refer to the following.

MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware), Section 15.2 Checking with LEDs

For the FX5-ENET, refer to the following.

MELSEC iQ-F FX5 Ethernet Module User's Manual, Section 10.1 Checking with LEDs

For the router, refer to the manual of the router used.

### 2. Checking the error code

Check the following according to the error code of the error occurred in the FX5U CPU module and FX5-ENET. For the FX5U CPU module, refer to the following.

Error codes common to CPU modules

MELSEC iQ-F FX5 User's Manual (Application), Appendix 3 Error Code

• Error codes related to Ethernet communication of CPU modules

MELSEC iQ-F FX5 User's Manual (Communication), Section 47.1 Ethernet Communication

For the FX5-ENET, refer to the following.

MELSEC iQ-F FX5 Ethernet Module User's Manual, Section 10.6 List of Error Codes

### Checking the wiring

For the wiring, refer to the following.

- Page 9 System Configuration
- Are the Ethernet cables fully inserted?

### ■Checking the communication settings

Refer to Server (MQTT PUBLISHER, MQTT SUBSCRIBER) and Server (MQTT BROKER) CONFIGURING SERVER (MQTT BROKER) CONNECTION.

- Are the GX Works3 parameter settings, Certificate Configuration Tool for FX5-ENET settings, and AWS setting details correct?
- Are the IP address and subnet mask settings of the FX5U CPU module, FX5-ENET, personal computer, and router correct?
- If a firewall is set up between the FX5-ENET and the personal computer, has permission been given to the port to be used?

6

### 3. Checking the AWS settings

For the AWS settings, follow the instructions on the window or contact the support center.

| aws     | Services      | Q Search    | [Alt+   | 1                     |  | Þ.       | \$          | 0             | Sydney 🔻      | Antabalığı meterdüldər -      | • |
|---------|---------------|-------------|---|-----------------------|--|----------|-------------|---------------|---------------|-------------------------------|---|
|         |               |             | Console Home Info   |                       | Reset to default l Support Center  |          |             |               |               | Q                             | Ð |
|         |               |             | Recently visited Info   | :                     | II Welcome to A re:Post 🗗  |          |             |               |               |                               |   |
|         |               |             | <ul> <li>IoT Core</li> <li>Support</li> </ul>   |                       | Commentation Comme | Resour   | -           | ter [2]       |               |                               |   |
|         |               |             | v   | ew all services       | -  |          |             |               |               |                               |   |
|         |               |             | # AWS Health Info   | E Cost and usage Info | II Cost and usage Info   |          |             |               |               |                               |   |
|         |               |             | No health data<br>This could be because you don't have permissions<br>to access AWS Health. Please contact your<br>account administrator. | No cost               | No cost and usage<br>This could be because you haven't configured AWS Cost Explorer or you do not have permission.   |          |             |               |               |                               |   |
|         |               |             | Go to AWS Health  | Go to AWS Co          | st Management  |          |             |               |               |                               |   |
| > Cloud | Shell Feedbac | :k Language |   |                       | © 2023, Amazo  | n Web Si | ervices, In | nc. or its af | filiates. Pri | vacy Terms Cookie preference: | s |

# APPENDICES

# Appendix 1 List of FX5 Ethernet-equipped Module FBs

The FX5 Ethernet-equipped module FB library contains the following FBs. Programs are created by combining FBs according to each application.

| Name                       | Description  |
|----------------------------|--|
| M+FX5ENET_MQTT_Connect     | Controls the connection with a server (MQTT broker) to establish a TCP or TLS session by the CONNECT instruction or to disconnect the session by the DISCONNECT instruction. |
| M+FX5ENET_MQTT_PublishSend | Sends a message to the server (MQTT broker).   |
| M+FX5ENET_MQTT_Receive     | Reads a message received from the server (MQTT broker).  |
| M+FX5ENET_MQTT_Subscribe   | Sends a SUBSCRIBE/UNSUBSCRIBE command to the server (MQTT broker).   |

## Appendix 2 FB Library

## Downloading the FB library

In this manual, the character string operation FB library is used.

To obtain the FB library, please contact your local Mitsubishi Electric representative.

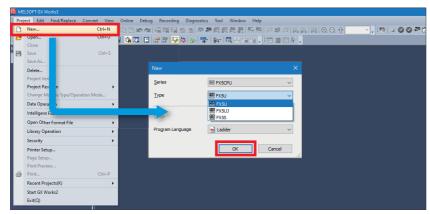
## Importing the FB library

This section describes how to register the obtained FB library to GX Works3. Decompress the FB library folder (zip file) before registering the FB library.

**1.** Start GX Works3, and select [Project] on the toolbar ⇒ [New].

In this manual, the following settings are used.

| Item             | Description |
|------------------|-------------|
| Series           | FX5CPU      |
| Туре             | FX5U        |
| Program Language | Ladder      |



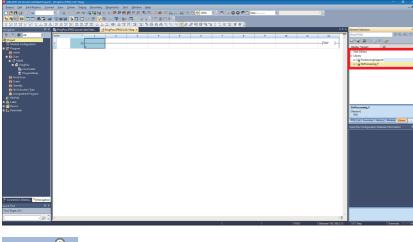
**2.** Select [Project] on the toolbar ⇒ [Library Operation] ⇒ [Register to Library List] ⇒ [Library].

|      | LSOFT GX Works3 (Untitled Pro  |  |  |
|------|--|--|--|
| Proj |  | Convert View<br>Ctrl+N<br>Ctrl+O<br>Ctrl+S | All (Lor Jack)<br>Online Deby Recording Diagnostics Tool Window Help<br>Done @ Yang 영상 가 가 하 전 고실일, 한 가 가 다 다 15<br>G G G I I I III 가 가 다 다 다 다 다 다 다 다 다 다 다 다 다  |
|      | Oper Other Format File   |  | For a like (D)   |
| 4    | Libray Operation Security Printer Setup Page Setup Print Preview Print. Recent Projects(K) Start GX Works2 Exit(Q) | Ctrl+P                                     | Sport library(S)     User Library       Verticity (Site of Control Site)     Verticity (Site)       Verticity (Site)     Library       Verticity (Site)     Verticity (Site)       Verticity (Site)     Verticity (Site) |

3. Select the "StrProcessing\_F.msIm" file in the decompressed FB library folder, and click [Open].

| 📴 Register Library to Libr | ary List                                   |                    |             |              |                        |
|----------------------------|--|--------------------|-------------|--------------|------------------------|
| ← → ~ ↑ <mark>.</mark> >   | This PC > Desktop > fb-strprocessing_f_v10 | 00                 | ```         | ・ ひ          | fb-strprocessing_f_v1. |
| Organize 🔻 New fo          |  |                    |             |              |                        |
| Ouick access               | Name                                       | Date modified      | Туре        | Size         |                        |
|                            | Manual_Chinese                             | 8/22/2023 11:06 AM | File folder |              |                        |
| lene OneDrive              | Manual_English                             | 8/22/2023 11:06 AM | File folder |              |                        |
| This PC                    | Manual Japanese                            | 8/22/2023 11:06 AM | File folder |              |                        |
| Network                    | StrProcessing_F.msIm                       | 4/25/2023 9:07 AM  | MSLM File   | 900 KB       |                        |
|                            |  |                    |             |              |                        |
| File                       | name: StrProcessing_F.mslm                 |                    |             | Uibrary (*.m | slm) v<br>Cancel       |

4. The selected file is added to [Library] in the "Element Selection" window.



**Point** 

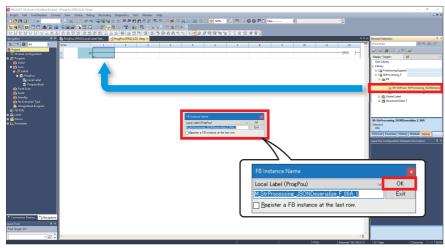
If the "Element Selection" window is not displayed, select [View] on the toolbar  $\Rightarrow$  [Docking Window]  $\Rightarrow$  [Element Selection] to open the window.

## How to use the FB library

Select an FB registered in the library from the "Element Selection" window, and drag and drop it to the program editor. Create an input ladder and an output ladder of the pasted FB to create a program.

Arrange the FB input ladder to the left side, and output ladder to the right side of the window in the same manner as standard ladder programs.

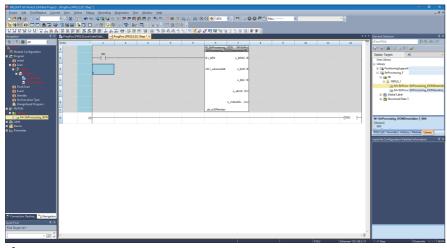
**1.** Go to the "Element Selection" window ⇒ the [Library] tab ⇒ [Library]. Then, select an FB to be used and drop it in the program editor. When the "FB Instance Name" window appears, click the [OK] button.



**2.** The FB is pasted to the program editor.

| MELSOFT GX Works3 (Unditled Project)   |               |                       |       |                |              |   |   |                    |                                  |   |   |    |    |                      |      |  |                              |
|--|---------------|-----------------------|-------|----------------|--------------|---|---|--------------------|----------------------------------|---|---|----|----|----------------------|------|--|------------------------------|
| Driject Edit EindiReplace Convert View Online Deljug Becording Dogmatics Dol Window Help - # X |               |                       |       |                |              |   |   |                    |                                  |   |   |    |    |                      |      |  |                              |
| 🗅 😂 💾 🍪 🗇 🔍  |               |                       |       |                |              |   |   |                    |                                  |   |   |    |    |                      |      |  |                              |
| 2016년 8 그는 유명은 수전 이 강한 우선 가 잘 해 적고했다. 그는 그는 것  |               |                       |       |                |              |   |   |                    |                                  |   |   |    |    |                      |      |  |                              |
| 삸놰삸웲샦숺넊듞놂똜쵧쓝햜깱꼜홂똜뼒뽧놁 <sub>냙</sub> 굷回챵뇄옍뉌얟똜뒏틦븮쇝넊넊 <mark>כ</mark> 챮캾쩺떝옣뉌긜읭썮꼛윩휾                   |               |                       |       |                |              |   |   |                    |                                  |   |   |    |    |                      |      |  |                              |
|  | 💼 ProgPou (PF | NG] (Local Label Sett | 📄 Pro | gPou (PRG) (LI | 0] 19tep * × |   |   |                    |                                  |   |   |    |    | 4                    |      | ment Selection                               | # ×                          |
| PE PC 🕸 AI 🔹   | Write         |                       | 1     | 2              | 3            | 4 | 5 | 6                  | 7                                | 8 | 2 | 10 | 11 | 12                   |      | ind POU)                                     | 部战战国                         |
|  | 1             |                       |       |                |              |   |   | M_StrProcessing_JC | SON. (M+Stefro.<br>NDesenaize FB |   |   |    |    |                      | - 44 | • 🛛 🚳 🖄 🗁 🗙 🔤                                | 10°                          |
| <ul> <li>Record computation</li> <li>Record</li> </ul>   |               |                       |       |                |              |   |   | B i KEN            | · LENO B                         |   |   |    |    |                      |      | Xeplay Target: Al                            | l v                          |
|  | *             |                       |       |                |              |   |   | Di CORN            | O DENU D                         |   |   |    |    |                      |      | User Library<br>Library                      |                              |
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| 🖬 😭 PagPao   |               |                       |       |                |              |   |   |                    | ~~~~                             |   |   |    |    |                      |      | E E SoProcessing,F                           |                              |
| 🔐 Local Label<br>👾 Programboly   | 4             |                       |       |                |              |   |   |                    | o_bErr E                         |   |   |    |    |                      |      | E CON FILE                                   |                              |
| Fired Scan   |               |                       |       |                |              |   |   |                    |                                  |   |   |    |    |                      |      | Im M+StrProce S                              | 9bProcessing_ISONDeserials   |
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| Unregistered Program   | 6             |                       |       |                |              |   |   |                    | uValueNu. :UV-                   |   |   |    |    |                      |      |  |                              |
|  | 7             |                       |       |                |              |   |   | pb_st30Member      |                                  |   |   |    |    |                      |      |  |                              |
| E PIPELI<br>M+StrProcessing JSON   |               | -                     |       |                |              |   |   |                    |                                  |   |   |    |    | (END )               |      | 4+StrProcessing JSONDese                     | J.R., 7 884                  |
| 🗉 🏥 Label  | 1             |                       |       |                |              |   |   |                    |                                  |   |   |    |    | • •                  | E N  | fersion                                      | state r win                  |
| 🖬 🚝 Device<br>🖬 🚱 Parameter  |               |                       |       |                |              |   |   |                    |                                  |   |   |    |    |                      |      | 004  |                              |
| a SA Landarda  |               |                       |       |                |              |   |   |                    |                                  |   |   |    |    |                      | P    | OULIST Favorites History                     | Module Library               |
|  |               |                       |       |                |              |   |   |                    |                                  |   |   |    |    |                      | Inp  |  |                              |
|  |               |                       |       |                |              |   |   |                    |                                  |   |   |    |    |                      |      |  |                              |
|  |               |                       |       |                |              |   |   |                    |                                  |   |   |    |    |                      |      |  |                              |
|  |               |                       |       |                |              |   |   |                    |                                  |   |   |    |    |                      |      |  |                              |
|  |               |                       |       |                |              |   |   |                    |                                  |   |   |    |    |                      |      |  |                              |
|  |               |                       |       |                |              |   |   |                    |                                  |   |   |    |    |                      |      |  |                              |
|  |               |                       |       |                |              |   |   |                    |                                  |   |   |    |    |                      |      |  |                              |
|  |               |                       |       |                |              |   |   |                    |                                  |   |   |    |    |                      |      |  |                              |
|  |               |                       |       |                |              |   |   |                    |                                  |   |   |    |    |                      |      |  |                              |
|  |               |                       |       |                |              |   |   |                    |                                  |   |   |    |    |                      |      |  |                              |
|  |               |                       |       |                |              |   |   |                    |                                  |   |   |    |    |                      |      |  |                              |
|  |               |                       |       |                |              |   |   |                    |                                  |   |   |    |    |                      |      |  |                              |
|  |               |                       |       |                |              |   |   |                    |                                  |   |   |    |    |                      |      |  |                              |
| Connection Destina ** Nevigation   |               |                       |       |                |              |   |   |                    |                                  |   |   |    |    |                      |      |  |                              |
| Quick Find 4 ×   |               |                       |       |                |              |   |   |                    |                                  |   |   |    |    |                      |      |  |                              |
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|  |               |                       |       |                |              |   |   |                    |                                  |   |   | €  | GU | Ethernet-192.168.3.1 | 3  · | -/1 Step                                     | Overwrite 040 NUM            |

### **3.** Insert a contact and input to B:i\_bEN.



4. Insert an FB word device input to the left side of the FB. Insert an FB word device output to the right side of the FB.

| MELSOFT GX Works3 (Unstitled Project) - (ProgPau (PRG) (LD) 15te | 01  |   |                                     | - ø ×   |
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|  | Label Sett 🕐 ProgPou (PRG) (LD) 1Step * 🗙 |   | 4 ▷ ♥ Element Sel                   |   |
| Og- DC 🔅 Al Y Write  | 1 2 3                                     | 4 5 6 7 8   | 9 18 11 12 Find POU                 |   |
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| E hand blok  |   | a_bErr B  |                                     | PB FBFILE_1   |
| Fixed Scan   |   |   |                                     | IN A StrProce StrProcessing_ISONDeserials                   |
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| 🚡 Unregistered Program   |   |   |                                     |   |
|  |   | pb_at30Member   |                                     |   |
| III (III: M+StrProcessing,JSON 8                                 | 0)  |   | [END ] M+StrPre                     | cessing ISONDeserialize F_00A                               |
| n da Label<br>n 🍏 Device   |   |   | (Version)<br>004                    |   |
| CARVER     CARVER     CARVER                                     |   |   |                                     | Favorites History Module Library                            |
|  |   |   |                                     |   |
|  |   |   | Input the Co                        |   |
|  |   |   |                                     |   |
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|  |   |   |                                     |   |
|  |   |   |                                     |   |
| Connection Destina.  |   |   |                                     |   |
|  |   |   |                                     |   |
| Quick Find P ×<br>Find Terget: All *                             |   |   |                                     |   |
|  |   |   | v .                                 |   |
|  |   |   |                                     |   |
|  |   |   | FXSU Ethernet-192.168.3.13 -/1 Step | Overwrite C40 NUM   |

**5.** Repeat these steps to create the ladder.

|                                     |          | 5) (Local Label Sett |   | 38 38 5 16 A |        |   |                               |         |   |       | 4     | Element Selection   |
|-------------------------------------|----------|----------------------|---|--------------|--------|---|-------------------------------|---------|---|-------|-------|---|
| PC 🕼 🗚 👻                            | Write    | - 1                  | 2 | 3 4          | 3      |   | 7                             | 8       | 3 | 10 11 |       | (Find POU) (# 45 46 9                                       |
| aject<br>Module Configuration       | 1        | (2)                  |   |              |        | M_StrProcessing_JSC<br>StrProcessing_JSCN | N. (M-StrPro.<br>Depending FB |         |   |       |       | \$P\$ |
|                                     | 2        | ND                   |   |              |        | B i bEN                                   | a LENO B                      |         |   |       | M.    | Display Target: All   |
|                                     | <b>*</b> |                      |   |              |        | Di Geon                                   | o_penu a-                     |         |   |       |       | User Library  |
| Scen<br>MAIN                        | 2        |                      |   |              | F 00 - | UD i udJaonAddr                           | o bOK Br                      |         |   |       | 8     | III E PositioningSupport                                    |
| 🖬 🙍 ProgPau                         |          |                      |   |              |        |   |                               |         |   |       | ~     | B Eg SoProcessing, F  |
| Local Label<br>ProgramBody          | 4        |                      |   |              |        |   | L                             |         |   | RST   | MD    | E Sep FE<br>FBFILE 1  |
| Fired Scan                          |          |                      |   |              |        | -   | -                             |         |   |       | 83    | In M+StrProce StrProcessing_ISONDe                          |
|                                     | s        |                      |   |              |        |   | o_bGr 8                       |         |   |       | — Õ—  | M+StiProce StiProcessing_ISONSer     Global Label           |
| Standby<br>No Execution Type        |          |                      |   |              |        | -   |                               |         |   |       |       | iii Galanti Laber   |
|                                     | 6        |                      |   |              |        |   | o_uEmid :Uni-                 | E 02 ]- |   |       |       |   |
| I/TUN                               |          |                      |   |              |        |   | Nelvella, 17r                 |         |   |       |       |   |
| FBFILE_1<br>M+StrProcessing_JSON    | 2        |                      |   |              |        | -   | WelceNu. (JW)-                | L m F   |   |       |       | M+StrProcessing JSONDeserialize F 00A                       |
| a Local Label                       | 8        |                      |   |              |        | pb_st30Member                             |                               |         |   |       |       | [Version]   |
| ProgramBody<br>M+StrProcessing_JSON | 2        | (45)                 |   |              |        |   |                               |         |   |       | END 1 | 004   |
| abel                                |          |                      |   |              |        |   |                               |         |   |       |       | POUList Favorites History Module Library                    |
|                                     |          |                      |   |              |        |   |                               |         |   |       |       | Input the Configuration Detailed Information                |
|                                     |          |                      |   |              |        |   |                               |         |   |       |       |   |
|                                     |          |                      |   |              |        |   |                               |         |   |       |       |   |
|                                     |          |                      |   |              |        |   |                               |         |   |       |       |   |
|                                     |          |                      |   |              |        |   |                               |         |   |       |       |   |
|                                     |          |                      |   |              |        |   |                               |         |   |       |       |   |
|                                     |          |                      |   |              |        |   |                               |         |   |       |       |   |
|                                     |          |                      |   |              |        |   |                               |         |   |       |       |   |
|                                     |          |                      |   |              |        |   |                               |         |   |       |       |   |
|                                     |          |                      |   |              |        |   |                               |         |   |       |       |   |
|                                     |          |                      |   |              |        |   |                               |         |   |       |       |   |
|                                     |          |                      |   |              |        |   |                               |         |   |       |       |   |
|                                     |          |                      |   |              |        |   |                               |         |   |       |       |   |
|                                     |          |                      |   |              |        |   |                               |         |   |       |       |   |
| Presenter<br>Presenter              | a        |                      |   |              |        |   |                               |         |   |       |       |   |
|                                     |          |                      |   |              |        |   |                               |         |   |       |       |   |

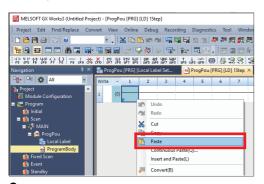
# Appendix 3 How to Use the Program Copy Function of e-Manual

Program examples in e-Manual can be copied and pasted to GX Works3.

1. Click "Copy Ladder Program (for GX Works3)" in e-Manual.

| [ D0 ]<br>Station number          | W:i_wStationNo<br>Station number     | o_bOK:B<br>Normal end                               |                                   | M231<br>Normal end |
|-----------------------------------|--------------------------------------|---|-----------------------------------|--------------------|
| [ D220 ]     Parameter     number | W:i_wParameterNo<br>Parameter number | o_bErr∶B<br>Failed end                              |                                   | M232<br>Failed end |
| number                            |                                      | o_wErrID:W<br>Error code                            | Error code                        |                    |
|                                   |                                      | o_wParameterVal:W<br>Parameter value which was read | Parameter value<br>which was read |                    |
|                                   |                                      |   |                                   | -[ END ]-          |
|                                   |                                      |   | Copy Ladder Program               | n (for GX Works3)  |

2. Right-click the mouse on the ladder editor of GX Works3, and select [Paste].



**3.** The copied program is pasted in undefined state. Select the FB used in the program example from [Library] on the "Element Selection" window, and drag and drop it to the FB area on the ladder editor.

| MELSOFT GX Works3 (Untitled F                             | reject) - PresPa | pe (PRG) (LD) 15tep | 1                              |                      |                           |                              |           |     |      |      |       |  | - 0                      | 1 X   |
|---|------------------|---------------------|--------------------------------|----------------------|---------------------------|------------------------------|-----------|-----|------|------|-------|--|--------------------------|-------|
|   |                  |                     | Recording Diagnostics Tool     | Window Help          |                           |                              |           |     |      |      |       |  |                          | - @ X |
|   |                  |                     | 1 X 10 15 in al 12 12 15       |                      |                           |                              | 825       |     |      |      |       |  |                          |       |
| 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1                     | 8.               |                     |                                |                      |                           |                              |           |     |      |      | 10    | a 🔘 🔘 🕶 Mara                             |                          |       |
| 1888 - MR   |                  | 101 17 🐥 🏷          | 😨 🗽 🗖 🛋 .                      |                      |                           |                              | and.      |     |      |      |       |  |                          |       |
| 방문문문 영요 고 문   |                  |                     |                                | 2 3 3 5 6 8          | 6月生生 元老泉。                 |                              | 388.      |     |      |      |       |  |                          |       |
| Navigation 🕴 X  | 🔒 ProgPou ()     | PRG] [Local Label S | et. (i) ProgPou (PRG) (LD) 15h | 10" X                |                           |                              |           |     |      |      | 0 D 🛥 | Element Selection                        |                          | + × 1 |
| °∰•  °⊂  ∯  MI  | Write ·          | 1 2                 | 3 4 5                          | 6                    |                           | 7                            |           | 9 3 | 0 11 | 12   | -     | (Find POU)                               | 時間はする。                   |       |
| Project<br>Module Configuration                           | 15               |                     |                                | M_INVERTER_CC_IEF_Ba | nic_Running_F_00A_1 (M+NV | ERTER-CC-IEF-Basic_Running_F | .0.       |     |      |      |       | <u>su</u> -                              |                          |       |
| <ul> <li>Module Configuration</li> <li>Program</li> </ul> |                  | MO                  |                                | i KEN                |                           |                              | 240       |     |      | M10  |       | User Library                             |                          |       |
| 🏥 INDA  | 16               | _,                  |                                | Coch                 |                           | 0_0                          |           |     |      | MII  |       | Library     B B INVERTER-CC-IEF-Basic_F  | INVERTER-CC-IEF-         | Bale  |
| <ul> <li>Scin</li> <li>Scin</li> <li>Scin</li> </ul>      | 17               |                     | [ 00 ]                         | i_wStationNo         |                           | 0_                           | 0×        |     |      | -0   |       | - in Fi                                  | 1110-001-00-00           |       |
| 🕐 hughu   |                  | M1                  |                                |                      |                           |                              |           |     |      | 1412 |       | 🗄 🎥 MELSOFT_FBRILE                       | esic Exec: ExecuteComman |       |
| The Local Label   | 18               |                     |                                | i bForword           |                           | ٥,                           | ten       |     |      | -0-  |       | Im M+INVERIER-CC-IEF-B                   |                          | stede |
| Proportine<br>In Fixed Scan                               |                  | 10                  |                                |                      |                           |                              | -[ 010 ]- |     |      |      |       | M+INVERTER-CC-IEF-B                      | asic Men MoniterFRQ      |       |
|   | 19               |                     |                                |                      |                           |                              |           |     |      |      |       | M+INVERTER-CC-IEF-B<br>INVERTER-CC-IEF-B |                          |       |
| Standby No Execution Type                                 | 20               |                     | Drag and                       | drop                 |                           |                              |           |     |      |      |       | a www.co.co.co.co                        | inclus and internation   |       |
| Unregistered Program                                      |                  | N                   |                                |                      |                           |                              |           |     |      |      |       | Im M+INVERTER-CC-IEF-B                   |                          |       |
|   | 21               |                     |                                |                      |                           |                              | 1         |     |      | -    |       | M+INVERTER-CC-EF-B                       | arie Soal Stachusian     | _     |
| 🖬 🚰 Label<br>🖩 🎬 Device                                   | 22               | MS                  |                                | i Nov                |                           |                              |           |     |      |      |       | Im M+INVERTER-CC-IEF-B                   |                          |       |
| a Contra  |                  |                     |                                |                      |                           |                              |           |     |      |      |       | 🚊 🦚 Global Label                         |                          |       |

Point P

When an FB is used in the program example, the definition of the FB will be unclear immediately after the program is pasted to the ladder editor. Drag and drop the FB from the "Element Selection" window to define the FB properly.

| Unclear definition                        | on of FB                      | Properly de                                       | efine        |
|---|-------------------------------|---|--------------|
| ERTER_CC_IEF_Basic_Running_F_00A_1 (M+INV | ERTER-CC-IEF-Basic_Running_F_ | M_INVERTER_CC_IEF_Basic_Running_F_00A_<br>Running | _1 (M+INVERT |
|   | o_bENO                        | B: i_bEN  |              |
| tionNo                                    | ₀_ЬОК                         | W: i_wStationNo                                   |              |
| word                                      | o_bErr                        | B: i_bForword                                     |              |
| verse                                     | o_wErrID                      | B: i_bReverse                                     |              |
| h   |                               | B:i_bHigh   |              |
| ddle                                      |                               | B.i_bMiddle                                       |              |
| v   |                               | B:i_bLow  |              |

4. Click the [OK] button on the "FB Instance Name" window.

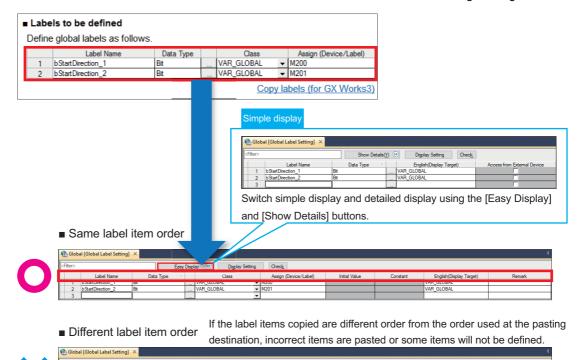
| FB Instance Name                        | x    |
|---|------|
| Local Label (ProgPou) 🗸                 | OK   |
| M_INVERTER_CC_IEF_Basic_Running_F_00A_1 | Exit |

5. When the FB is properly defined, the FB instance name is highlighted in gray.

| Write | × 1  | 2 | 3 | 4 | 5 | 6   | 7   | 8        | 9 | 10 | 11 | 12  |
|-------|------|---|---|---|---|---|---|----------|---|----|----|-----|
| 15    |      |   |   |   |   | M_INVERTER_CC_IEF_Basic_Running_F_0<br>Ru | DA_1 (M+INVERTER-CC-IEF-Basic_Running_F_<br>nning |          |   |    |    |     |
| 16    | H    |   |   |   |   | B: i_bEN                                  | o_bENO:B  |          |   |    |    | M10 |
| 17    | -    |   |   |   |   | W: i_wStationNo                           | o_bOK:B   |          |   |    |    | 0   |
| 18    | M    |   |   |   |   | B: i_bForword                             | o_bErr:B  |          |   |    |    | M12 |
| 19    | -MC  |   |   |   |   | B:i_bReverse                              | o_wErrID:W  | -[ D10 ] |   |    |    |     |
| 20    | MC H |   |   |   |   | B:i_bHigh                                 |   |          |   |    |    |     |
| 21    | M    |   |   |   |   | B:i_bMiddle                               |   |          |   |    |    |     |
| 22    | M    |   |   |   |   | B: i_bLow                                 |   |          |   |    |    |     |

### Point P

Label items (label name, data type, and others) are copied in the order defined as an example in this manual. Therefore, define label items in the same order as shown on the label editor of the engineering tool.





## REVISIONS

| Revision date | Version | Description   |
|---------------|---------|---------------|
| October 2023  | A       | First edition |

Japanese manual number: L08896-A

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