

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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REVISIONS	
WARRANTY	
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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) <sh-082452eng></sh-082452eng>	0	0	
MELSEC iQ-F FX5 User's Manual (Application) <jy997d55401></jy997d55401>	0	0	
MELSEC iQ-F FX5 Programming Manual (Program Design) <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) <sh-082625eng></sh-082625eng>	0	0	
MELSEC iQ-F FX5 Ethernet Module User's Manual <sh-082026eng></sh-082026eng>	0	0	
GX Works3 Operating Manual <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[®] 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. The sender of a message is called a publisher, the receiver is called a subscriber, and an entity playing an intermediate role is called a broker. The term "publish" means "send", and "subscribe" means "receive".
Торіс	A key to be used for messaging. 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. 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/ 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/ ES, FX5UJ-40MT/ESS, FX5UJ-60MR/ES, FX5UJ-60MT/ES, FX5UJ-60MT/ESS, FX5UJ-24MR/DS, FX5UJ- 24MT/DS, FX5UJ-24MT/DSS, FX5UJ-40MR/DS, FX5UJ-40MT/DS, FX5UJ-40MT/DSS, FX5UJ-60MR/DS, FX5UJ-60MT/DS, and FX5UJ-60MT/DSS
GX Works3	A generic product name for the product model SWnDND-GXW3 (where n represents the version)

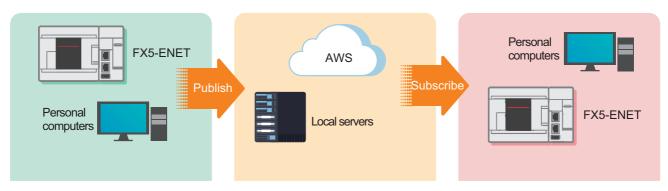
KEY FEATURES

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.



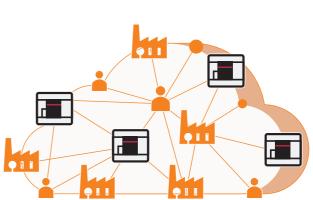
Connecting to AWS enables handling of information without

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)

8

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.

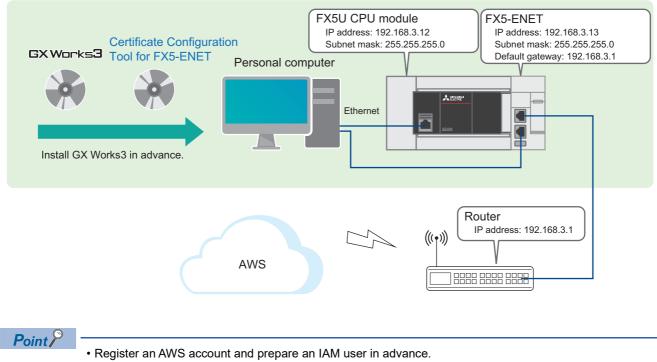
To use applicable CPU modules other than the FX5U CPU module, refer to the following manuals.

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 conditions. • Serial number: 17X**** or later • Firmware version: 1.280 or later	Use an FX5-ENET that meets the following conditions. • Serial number: 234**** or later • Firmware version: 1.200 or later	GX Works3 ^{*1} Applicable software version: 1.095Z or later Certificate Configuration Tool for FX5-ENET^{*1} Applicable software version: 1.00A or later
*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 computer and the FX5U CPU module, the personal	Register an AWS account and prepare an IAM user 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

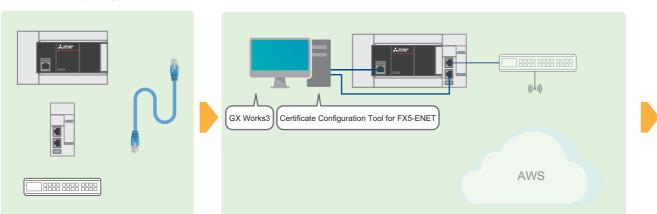
2.3 Wiring

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

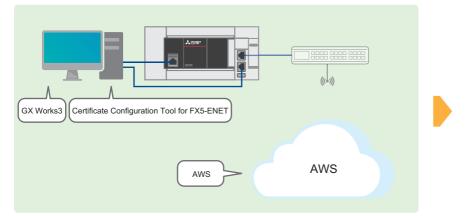
MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware), Section 13.4 Power Supply Wiring

2.4 Operation Flow Diagram

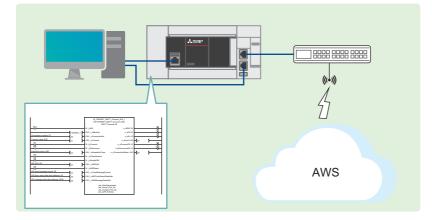
- **1.** Preparing the required products (wiring)
- 2. Configuring the clients (MQTT Publisher, MQTT Subscriber)



3. Configuring the server (MQTT broker) connection



4. Program examples and checking the operation



3 CONFIGURING CLIENTS (MQTT PUBLISHER, MQTT SUBSCRIBER)

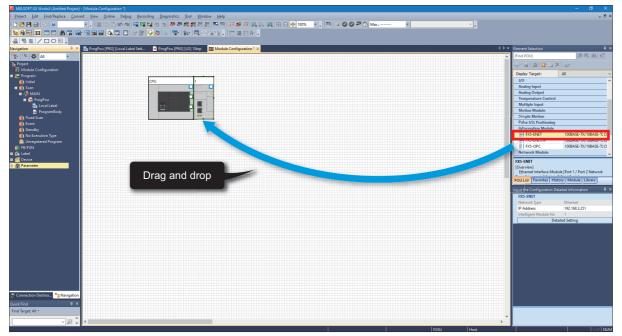
This chapter describes the setting items for the clients (MQTT Publisher, MQTT Subscriber).

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.

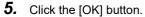


3. Click the [Setting Change] button.

MELSOFT GX Works3			
	ne] FX5-ENET 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.

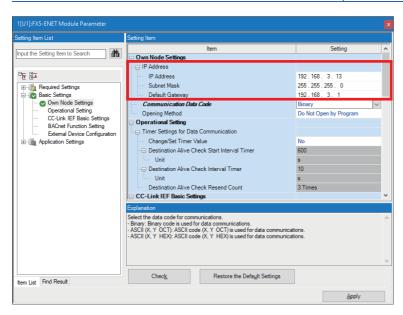
Options		
		Departion Setting
Froject	<u>^</u>	
Save		Use Module Label Yes 🔻
Revision		Kead Sample Comment
Device Comment		Message
Reference/Reflection Target		Show the confirmation message in adding module Yes
Add New Module		
Navigation		
Element Selection		
🔁 Program Editor		
😼 Other Editor		
🔏 Edit		
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. 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. [Module Name] FX5-ENE [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	

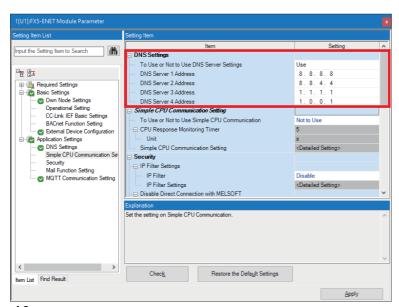
8. Drag and drop [MQTT Connection Module] to add it. Set the protocol and port number as shown below, and click [Close with Reflecting the Setting].

Item	Setting
Protocol	TLS
Port No.	50000

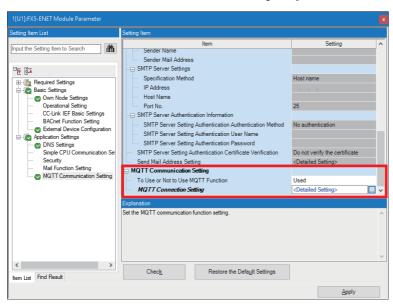
ther		iguration (Mounting Position) uration <u>E</u> dit <u>V</u> iew Cla		the Setting	Close with <u>R</u> eflectin	g the Setting			- 🗆	×
_									Module List	×
									Ethernet Selection Find Module	Myi⊄≯
	onnected (Count (Cur./Max.): 1/32							記 24 🔚 🏗 🗶 🖻 🗙 👘	
			Communication		Fixed Buffer	PL	.c	or/Di	Ethernet Device (General)	^
	No.	Model Name	Method	Protocol	Send/Receive Setting	IP Address	Port No.	MAC 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 1	cted Count								Inverter(FR-A800 Series	s)
		MQTT							Inverter(FR-F800 Series	
									Servo Amplifier(MELSER)	VO-J
									Vision Sensor	~
									[Outline]	
		MQTT Conn 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].



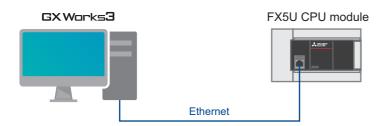
- **11.** To avoid errors, temporarily enter arbitrary character strings for "MQTT Server Host Name" and "Client ID". Click the [Apply] button.
- Configure the proper settings at the following timing.

Page 40 Configuring Settings with GX Works3

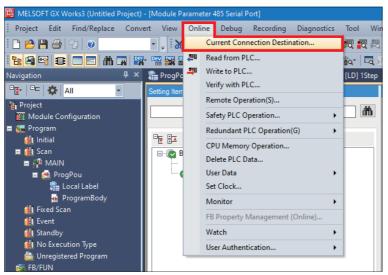
put the Setting Item to Search			
Ba Population Populatio	User Name Password MQTTCertificate Setting Verify Server Certificate g Explanation	Method Host name assas a bbbbb bbbb Verify	ng
	Set the client ID of FX5-ENET(/IP). [Setting range] The string within 1 to 492 character A + (B + C) x 2 + D <= 984 A - the number of characters for Mig B: the number of characters for ruler C - the number of characters for page	nt ID rname	^
c 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 Ether h the CPU module without fy the IP address of CPU n	t using a hub. nodule.	
	* This setting is applied t 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 CPU module with a conne than the direct coupled s	ction method other	(Open the Sp	ection Method ecify Connection on window)
Do not show this dialog * Always open the Spe 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 Etherne th the CPU module without usin 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 CPU module with a conne than the direct coupled s	ection method other	Other Connection Method (Open the Specify Connection Destination window)
Do not show this dialo * Always open the Sp 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 Please select the direct co	onnection method with CPU m	nodule.
● <u>E</u> thernet		
	Ethernet Board Ethern h the CPU module without us 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 CPU module with a conne than the direct coupled se	ction method other	Other Connection Method (Open the Specify Connection Destination window)
Do not show this dialog * Always open the Spe Connection Destination	ocify OK	Cancel

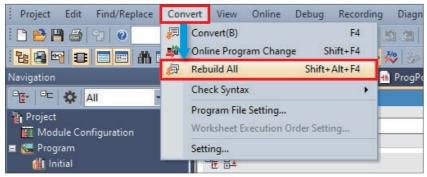
For the connection via a hub, refer to the following.

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.

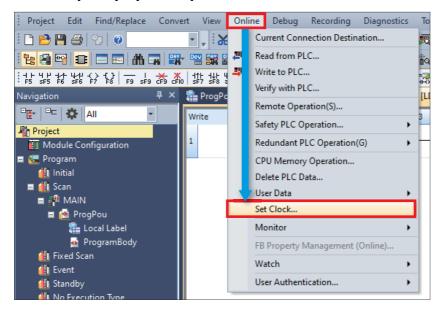
- The operation to determine the programs and the parameters is required before writing them to the programmable controller.
- **1.** Select [Convert] ⇒ [Rebuild All].



2. Click the [OK] button.

Rebuild All		×
Rebuild all pro	ograms in the Project.	
	uild with the following settings. details in Options.	
Label Assignment	○ Retain () Reassignment	
Others	Do Not Use the Same Label Name in Global Label and Local Label 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 6 Currently Specified Station Specify Target Network No. Specify Group No.
27 28 29 30 31 1 2 3 4 5 6 7 8 9 Today: 8/30/2023	Explanation From Get Time from PC setting, users are able to get the time coupled with the time zone set in PC. To set the setting, please execute it after matching the time zone of PLC and PC. From Get Time from PLC setting, users are able to
8/30/2023 10: 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 📼 📣 Scan			CPU Memor	y Operation		

3

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

!)))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 nory Capaci Size CAN	amory Capacity 😮 🗋 Check I Sh Program Namory	ferrory Capacit	y before Wr	iting						Free 64000/640005tep
end Used	Data Memory Program:1024/1024KB	Re	storation Inf	lo:1024/1024	K8 I	larameten:1024/1024	KB	Device Comment:2048/	20468/8	Free
Increased Decreased	SD Memory Card									Free 0,10KB
Free: 5%	ss Program.Q/DKB	Re	storation In	0:0/0K8		arameter:0/088		Device Comment/0/088		

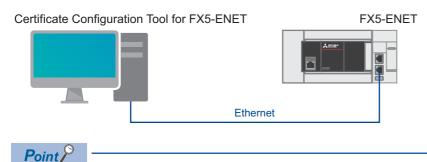
7. When the following window appears, click [Yes to all].

MELSOFT GX Works3							
	e following file already exists, a you sure you want to overwrit	xe it?					
System Parame CPU Paramete Module Parame 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.

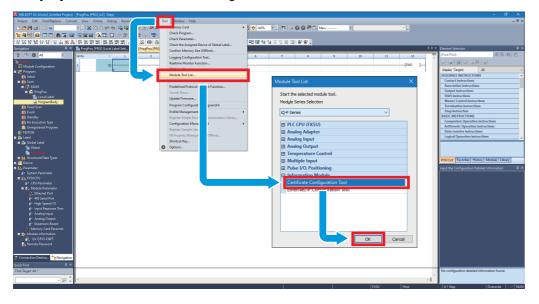
3.2 Configuring Settings with Certificate Configuration Tool for FX5-ENET

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.

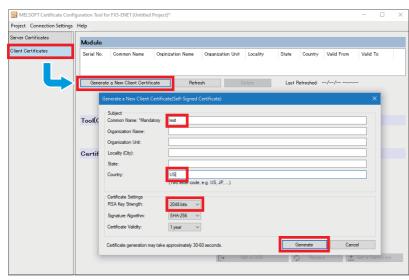
The set common name is used when issuing certificates in AWS.

Page 32 Creating a certificate

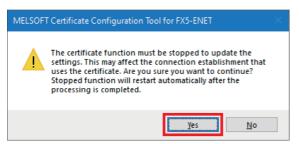
Item	Setting
Common Name ^{*1}	Any name
Country	US
RSA Key Strength	2048 bits

*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 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 ge the AWS Cloud — in one web interf	face	
	Free AVIS Training Advances your career with AVIS Cloud Practitioner Exernational—after e.g.u-hour, foundational course	AVS Certification Propel your career forward with AWS Certification.	AVS Machine Learning Training Choose from course that cover the entire machine learning pipeline	AVS Training Free digital courses to help you develop your skills	
	Anzon Lightsali Extended Free Tier New customers get up to three months free on select virtual private servers	Euld Mobile and Web Apps Fast Add authentication and data synchray with AWS Amplify in just a few lines of code	Mac	Introducing Amazon EKS Anywhere Create and operate Kubernetes clusters 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 Trigger AWS Lambda functions from simple devices	Getting started with AWS [2] Learn the fundamentals and find valuable 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 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		
U	Internet of Things	AWS IOT FleetWise Easily collect, organize, and transfer vehicle data to the cloud at scale.	
	Machine Learning		
	Management &	IoT Greengrass 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						
 Detect 						
 Fleet Hub 						
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 ^{*1}	*
Policy resource ^{*1}	*

*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 Connect one device Connect many devices		Policy properties AWS IoT Core supports named policies so that many identities can reference the same policy document.	_				
Test MQTT test client Device Location <u>New</u>		Policy name test_policy Tags - optional					
Manage All devices Greengrass devices 		Policy statements Policy examples					
 LPWAN devices Software packages New Remote actions 	<u>«</u>	Policy document info 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
 Message routing Retained messages Security 		Policy effect Policy action Policy resource Allow • • •		Remo	/e		
Intro Certificates Policies		Add new xistement					Cancel
Certificate authorities Role aliases Authorizers	25						Create
 Audit Detect Fleet Hub 							
CloudShell Feedback La	↓ 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 Connect one device 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 MQTT test client						
Device Location New 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 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.					
 Connect many devi 		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							
 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		0 things selected					^
Decompositation D		v 	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 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 Create a thing resource to register a device. Provision the certificate and policy necessary to allow the device to connect to AWS 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 4 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 A thing resource is a digital representation of a physical device or logical entity in AWS IoT. Your device or entity needs a thing resource in the registry to use AWS IoT features such as Device Shadows, events, Jobs, and device management features.		
Configure device certificate Step 3 - optional	Thing properties Info		
Attach policies to certificate	Thing name test, things tote a unspe name containing only letters, numbers, hyphens, colon, or underscores. A triang name can't contain any spaces.		
	Additional configurations 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 Device Shadows allow connected devices to sync states with AWS. You can also get, update, or delete the state information of this thing's 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) 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.

aws	Services Q Search	[Alt+5]	Ð	\$	3 Sydney •	Averaging on to be the
≡	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 A device requires a certificate to connect to AWS IoT. You can choose how to register a certificate for your device now, or you 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 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 Register your CA and use your own certificates on one or many devices.				
		• Skip creating a certificate at this time You can create a certificate for this thing and attach a policy to the certificate at a later time.				
		Cancel Previous Create thing				
Elo	udShell Feedback Language	٥	2023, Amazon Web Se	rvices, Inc. or	its affiliates. Pri	vacy Terms Cookie preferences

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 Connect one device Connect many devices	Things (1) infe An hit thing is a representation and record of your physical device in the cloud. A physical device needs a thing record in order to work with AWS IoT. 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 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		
CloudShell Feedback Language		© 2023, Amazon Web Services, Inc. or its affiliates. Privacy Terms Cookie preferences

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 Register certificates
MQTT test client Device Location	Certificate ID V Status V Created		▽
Device Location New	No certificates		
Manage	You don't have any certificates in ap-southeast-2.		
 All devices 	Create certificate		
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 coftware	v		
	© 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) Generate a new certificate, public key, and private key using AWS Iol's certificate authority and register it with AWS Iol'.	 Create certificate with certificate signing request (CSR) Upload your own certificate signing request (CSR) file to create and register a certificate that's based on a private key you own. 					
	Certificate signing request Uplade the certificate signing request (CSR) file for the certificate and the avaid CSR file Choose file Other States States byte	you want to create and register. The file must have a file extension of .cr					
	Certificate status Asign the initial state of the new certificate. The certificate must 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.

aws	Services Q Search	Alt+5]	E 4 0	Sydney 🔻	Partnerse productions
		Download certificates and keys X			
		Download certificates and keys Download and install the certificate and key files to your device so that it can connect securely to AWS IoT. You can download the certificate now, or later, but the key files can only be downloaded now.			
		Device certificate			
		Root CA certificates 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 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 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 Connect one device 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 MQTT test client Device Location <u>New</u>	Certificates (1) Q. Find certificates Certificate ID V Status V Created		C	Action	15 🔻	Add certific		
Manage All devices Greengrass devices LPWAN devices 								
Software packages <u>New</u> Remote actions Message routing Retained messages								
Security Intro Certificates								
Policies Certificate authorities Role aliases Authorizers								
▶ Audit▶ Detect▶ Fleet Hub								
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 v
Connect Connect one device	Details					
 Connect many devices 	Continues ID BetS515740025500050574517550790221884584628bot65445007900500 (Seerice	dentes Ørheine				
Test MQTT test client	Constitute Mill Ginemanicany materials III Million Constitute Constitute Million Million Account (Million Million All Million Million All Million M	Created August 22, 2023, 100231-(272-08.00)				
Device Location New	Index4	Visio August: 22, 2025, 10:00(39-0/TC-493.00)				
Manage	towy.	Explores January 17, 2018, 0818-18 (JTC+20122)				
All devices	Olin-Amagon/WebServices Onlineazon.com/inc. LrSeatch: ST-Mathington CH25					
 Greengrass devices LPWAN devices 						
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 Connect one device Connect many devices		
Test MQTT test client		
Device Location <u>New</u> Manage All devices	Attach policies to the certificate ×	
 ▶ Greengrass devices ▶ LPWAN devices Software packages New 	COL Advanced law Low and Col Learning of Linear International I	
 Remote actions Message routing Retained messages Security 	Policies (0) into Cancel Attach policies	
Intro		
Certificates Policies Certificate authorities		
Role aliases Authorizers ▶ Audit		
 ▶ Detect ▶ Fleet Hub 		
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 Connect one device Connect many devices	Details					
Test MQTT test client Device Location <u>New</u>	ANTEENSA-SEESEN PREPARATION AND AND AND AND AND AND AND AND AND AN	Datus @Anton Ganad Assart12 DIEL 101228 6/70-10100				
Manage All devices Greengrass devices LPWAN devices 	Soliter Ofmax	Vola August 33, 3023, 1048-39 (J.FC-1968) Orgino January (M. 2058, 00:20:50:071C-49340				
Software packages New Remote actions Message routing	Policies Things Noncompliance					
Retained messages Security Intro	Things (0) into 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 Policies	Name					.
Certificate authorities Role aliases Authorizers	No thin This certificate is not atta					_
 ▶ Audit ▶ Detect ▶ Fleet Hub 						
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 Connect one device Connect many devices			
Test MQTT test client Device Location New			
Manage	Attach certificate X		
 Greengrass devices LPWAN devices Software packages <u>New</u> 	Things Choose things to attach this certificate to. Choose thing resource		
 Remote actions Message routing Retained messages Security 	Pelicies Things Noncompliance Est_things Cancel Attach to thing Things (O) use		
Intro Certificates Policies			
Certificate authorities Role aliases Authorizers			
 Audit Detect Fleet Hub 			
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.)

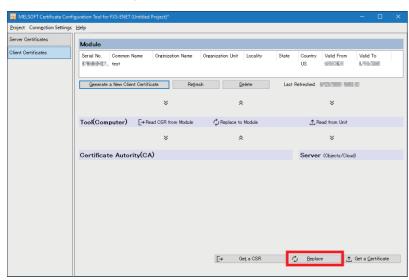
1. Select [Settings] in the left menu. The endpoint assigned to each AWS account is displayed.

aws Services Q Search	[Alt+S]		D 4	⑦ Sydney ▼	Rents fiel greet to Million +
AWS IoT ×	AWS IOT > Settings				
Monitor	Settings Info				
Connect 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 MQTT test client 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]				
 Greengrass devices LPWAN devices Software packages <u>New</u> Remote actions 	Domain configurations unformation to simplify tasks such as migrating devices to AWS lot Core, migrating application infrastructure t				
 Message routing Retained messages 	Name Domain name Status Service type Date updated				
 Security Fleet Hub 	No domain configurations You don't have any domain configurations. Create domain configuration				
Device software Billing groups					
Settings 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 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.

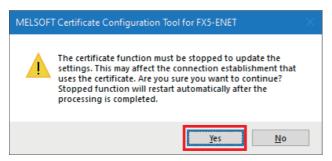
MELSOFT Certificate Configuration Tool for FX5-ENET					
	The module already contains a Client Certificate. Do you want to replace the existing certificate?				
	<u>Y</u> es <u>N</u> o				

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 URL		
CN	=Amazon Root CA 1,0=Amazon,C=US	Analos constantes and the constant of the second	Test URL		
CN	=Amazon Root CA 2,0=Amazon,C=US	90H5464454664090946449666700854844856940	Test URL		
CN	=Amazon Root CA 3,0=Amazon,C=US	State STREE AND ADDRESS OF THE ADDRE	Test URL		
CN	=Amazon Root CA 4,0=Amazon,C=US	Parkation (10) and 10 cm (11) and 1000 the method of the	Test URL		
Cer g2,	"Starfield Services Root rtificate Authority - ,0"Starfield Technologies c.,L=Scottsdale,ST=Arizona,C=US	2671a Heleler Michellin (2000 HERA HERA DA	Test 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 open open	can calculate the SHA-256 hash of the subject mail command:: certificate.pem enssl x509 -in certificate.pem -noou	and does not have a Text URL. You can download the cartificar <u>here.</u> I's public ley as follows: For PEM-tercaded certificate files, run the following it - publicy opensil asripurse -noout - inform pee -out			
	certificate.key opensildgst -sha256 certificate.key				
	example, if the Starfield Class 2 Certification A mand::sf-class2-root.crt openss1	uthority's self-signed certificate is a PEM-encoded file, run the following			
clas	ass2-root.key anssl dgst -sha256 sf-class2-root.ke	cout -pubkey openssl asnlparse -noout -inform pem -out sf- y ∼ 9C7da233d3470164e8137fe35ee0f38ae858183f08410ea82ac4b4			

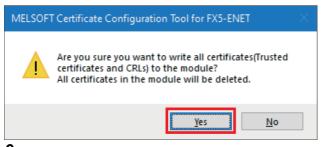
6. In Certificate Configuration Tool for FX5-ENET, select [Server Certificates] ⇒ [Import] button to import the server certificate (sf-class2-root.crt).

	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

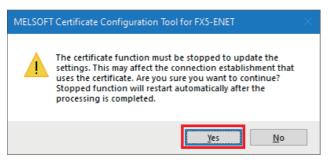
7. When the file has normally been imported, click the [Write] button to write it to the FX5-ENET.

🚟 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 0	Organizati Organizati. Starfield Starfield		Coun Valid From US		DNS N., URI	IP Add	
	Import	Delete from List						
	\$	\$	*		Verify Legend			
	, Read from Module ☆	verify with Module ⊗	e _y_Write tomo ⊗	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.

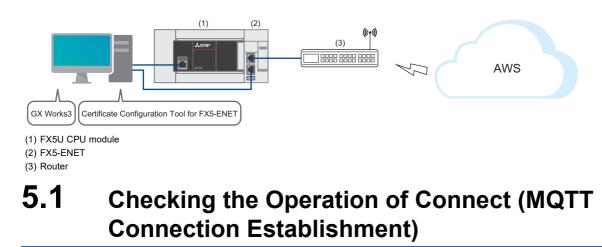
Item	Setting
MQTT Server Specification Method	Host name
MQTT Server Host Name	********.amazonaws.com (own endpoint) Enter the endpoint that was copied in the section below. In Page 36 Checking an endpoint
MQTT Server Port No.	8883
Client ID	test_things Enter the name of the thing that was created in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

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

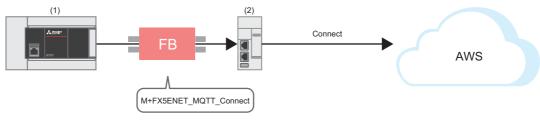
- **3.** Configuring the settings with GX Works3 is completed by creating a program and writing it to the programmable controller.
- ST Page 41 CHECKING OPERATIONS
- Page 19 Writing data to the programmable controller

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 ── ──	\$MOV	MQTT_TEST/Will/Topic/Name	R0		Set the Will topic name data for R0.
			D 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.

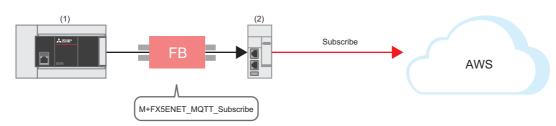
After M4 (Enable Will) turns on, M0 turns on. When FX5ENET_1.uSts_CertFuncReadyStatus_D (Certificate function ready-toenable state) turns on, M14 (Execution command) turns on. M1 (CONNECT instruction) subsequently turns on to establish the connection.

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

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

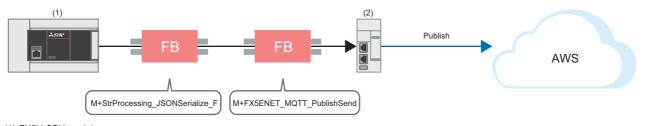
M29 (Execution command) turns on. After M23 (Execution status) turns on, M21 (SUBSCRIBE instruction) turns on for sending the SUBSCRIBE command.

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

	M_FX5ENET_MQTT (M+FX5ENET_MQT 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

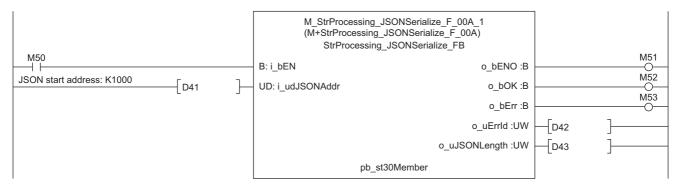
• Settings for data to be sent

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 (M+FX5ENET_MQTT_Publishs 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	- D52	\vdash	UW: i_uPublishTopicNameDataAddr				
Publish message size: K0	- D53	Ĩ	UW: i_uPublishMessageSize				
Publish message data start address: K1000	_ [D41]_	UW: i_uPublishMessageDataAddr				

Checking reception on AWS

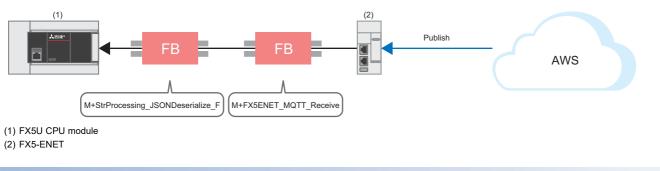
The sent message can be checked from [Test] ⇒ [MQTT test client] in the left menu of AWS.

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 Connect 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 All devices Greengrass devices 	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 (message": "Hello from AWS IoT console")					
 Retained messages Security Fleet Hub 	Additional configuration Publish					
Device software Billing groups	▼ MQTT_TEST/topic/name			Aq	at 34, 3633,	111143 (UTC>000)
Settings Feature spotlight 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

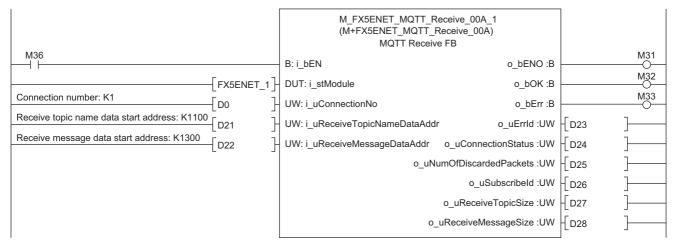
■Receiving of message data

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).

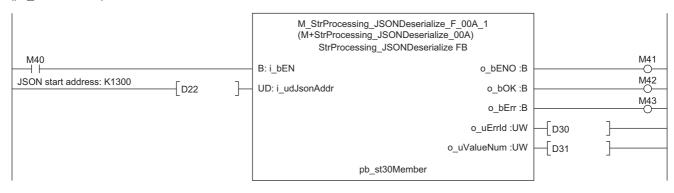
 2
 M_StrProcessing_JSONDeserialize_F_00A_1.pb_st30Member[0].s32Key := 'Sample'; //Set the Key name to "Sample".

 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 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.

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			v	ew all services	-						
			# AWS Health Info	E Cost and usage Info	II Cost and usage Info						
			No health data This could be because you don't have permissions to access AWS Health. Please contact your account administrator.	No cost	No cost and usage 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.

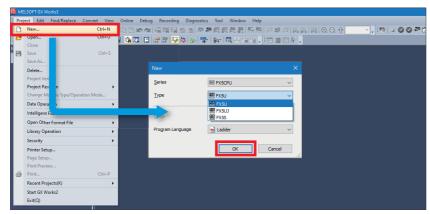
Importing the FB library

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



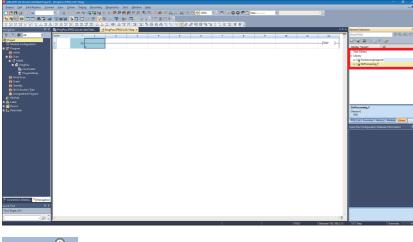
2. Select [Project] on the toolbar ⇒ [Library Operation] ⇒ [Register to Library List] ⇒ [Library].

	LSOFT GX Works3 (Untitled Pro		
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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.
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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 Cancel

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



Point

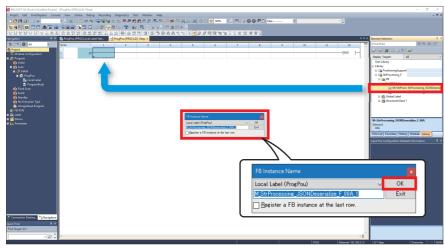
If the "Element Selection" window is not displayed, select [View] on the toolbar \Rightarrow [Docking Window] \Rightarrow [Element Selection] to open the window.

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.

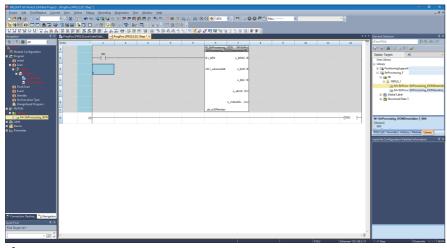
1. Go to the "Element Selection" window ⇒ the [Library] tab ⇒ [Library]. Then, select an FB to be used and drop it in the program editor. When the "FB Instance Name" window appears, click the [OK] button.



2. The FB is pasted to the program editor.

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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.

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5. Repeat these steps to create the ladder.

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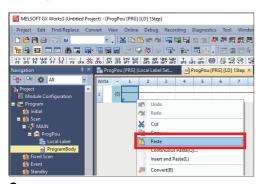
Appendix 3 How to Use the Program Copy Function of e-Manual

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] Station number	W:i_wStationNo Station number	o_bOK:B Normal end		M231 Normal end
[D220] Parameter number	W:i_wParameterNo Parameter number	o_bErr∶B Failed end		M232 Failed end
number		o_wErrID:W Error code	Error code	
		o_wParameterVal:W Parameter value which was read	Parameter value 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.

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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_ 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.

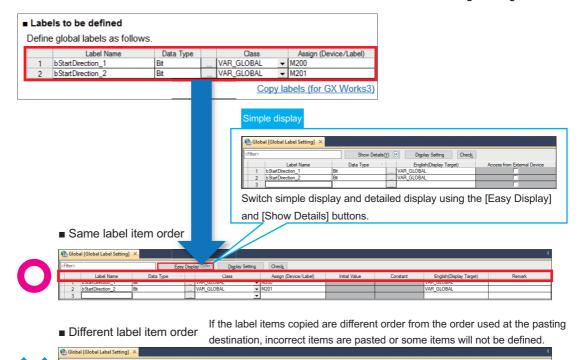
FB Instance Name	x
Local Label (ProgPou) 🗸	OK
M_INVERTER_CC_IEF_Basic_Running_F_00A_1	Exit

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
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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

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October 2023	A	First edition

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