MITSUBISHI ELECTRIC

Changes for the Better

Numerical Control (CNC)

User's Manual

NC Machine Tool Connector

IB-1501634(ENG)-E

Introduction

This manual is for understanding the specifications, procedures before operation, and troubleshooting required to use this product.
Before using this product, read this manual and related manuals thoroughly to understand the functions and performance of the product to use the product properly.

⚠ CAUTION

⚠ **Some functions may not be available on your NC system. To use this product, be sure to confirm the manuals issued by the MTB.**

⚠ **To protect the availability, integrity and confidentiality of the NC system against cyber-attacks including unauthorized access, denial-of-service (Dos) (*1) attack, and computer virus from external sources via a network, take security measures such as firewall, VPN, and anti-virus software.**
(*1) Denial-of-service (Dos) refers to a type of cyber-attack that disrupts services by overloading the system or by exploiting a vulnerability of the system.

⚠ **Mitsubishi Electric assumes no responsibility for any problems caused to the NC system by any type of cyberattacks including DoS attack, unauthorized access and computer virus.**

Refer to the manuals on "Related Manuals" as necessary.

Related Manuals

Manual	IB No.
M800V/M80V Series Instruction Manual	IB-1501618
M800V/M80V Series Alarm/Parameter Manual	IB-1501623
M800/M80/E80 Series Instruction Manual	IB-1501274
M800/M80/E80 Series Alarm/Parameter Manual	IB-1501279
M700V/M70V Series Instruction Manual (1/2)	IB-1501563
M700V/M70V Series Instruction Manual (2/2)	IB-1501564
M700VS Series Setup Manual	IB-1500906
M700VW Series Setup Manual	IB-1500933
M70V Series Setup Manual	IB-1500958
E70 Series Instruction Manual	IB-1501186
E70 Series Setup Manual	IB-1501158
700/70 Series Instruction Manual	IB-1500042

Precautions for Safety

(Be sure to read before using this product.)
When using this product, read this manual and the related manuals introduced in this manual thoroughly, and pay full attention to safety to handle this product correctly.
The precautions shown in this manual are for this product only. For the safety precautions of the NC system, refer to the manual of the numerical controller to be used.

This section "Precautions for Safety" ranks the safety precautions into " ⚠ DANGER", " ⚠ WARNING" and " ⚠ CAUTION".

⚠ DANGER **When the user may be subject to imminent fatalities or major injuries if handling is mistaken.**
⚠ WARNING **When the user may be subject to fatalities or major injuries if handling is mistaken.**
⚠ CAUTION **When the user may be subject to injuries or when physical damage may occur if handling is mistaken.**

Note that even items ranked as ⚠ "CAUTION", may lead to major results depending on the situation.
In any case, important information that must always be observed is described.
Keep this manual in a safe place for future reference and be sure to deliver it to the end user.

The following signs indicate prohibition and compulsory.

	This sign indicates prohibited behavior (must not do). **For example, indicates "Keep fire away".**

	This sign indicated a thing that is pompously (must do). **For example, indicates "it must be grounded".**

The meaning of each pictorial sign is as follows.

 CAUTION	 **CAUTION rotated object**	 **CAUTION HOT**	 **Danger Electric shock risk**	 **Danger explosive**
 Prohibited	 **Disassembly is prohibited**	 **KEEP FIRE AWAY**	 **General instruc-tion**	 **Earth ground**

⚠ DANGER

Not applicable in this manual.

⚠ WARNING

■ Matters concerning design

⚠ To perform control (data change, operation status change, etc.) on an device and equipment (numerical controller, PLC, servo, robot, server, etc.) that is in operation from an industrial personal computer equipped with this product, configure an interlock circuit outside the device and equipment so that the entire system always works on the safe side. Read the manual thoroughly and make sure it is safe before proceeding. In particular, the above control for device and equipment from a remote location via a network may not be able to immediately deal with troubles on the device and equipment side due to abnormal data communication.

⚠ Provide a safety circuit outside the industrial personal computer so that the entire system works safely even if the industrial personal computer equipped with the product fails. Accidents may occur due to incorrect output or malfunction.

⚠ CAUTION

■ Matters concerning design

⚠ While various settings are reflected, do not perform the operation that forces the power of the industrial personal computer equipped with this product to be turned OFF. If you perform an operation such that the industrial personal computer equipped with this product is forcibly turned OFF during the reflection, the data becomes unstable and it needs to be reconfigured and re-reflected. It may also cause the product to malfunction.

■ Matters concerning operation

⚠ The judgment result of the data diagnosis function does not guarantee the result. Before performing an operation that affects the target device with a device command or program execution, be sure to check the safety sufficiently.

Application of this software

Users must agree the following conditions for an unexpected software problem:
- Use the software in a way that the problem will not cause a serious accident.
- Functions for data backup and fail-safe need to be systematically implemented outside the device as preventive measures for the problem.

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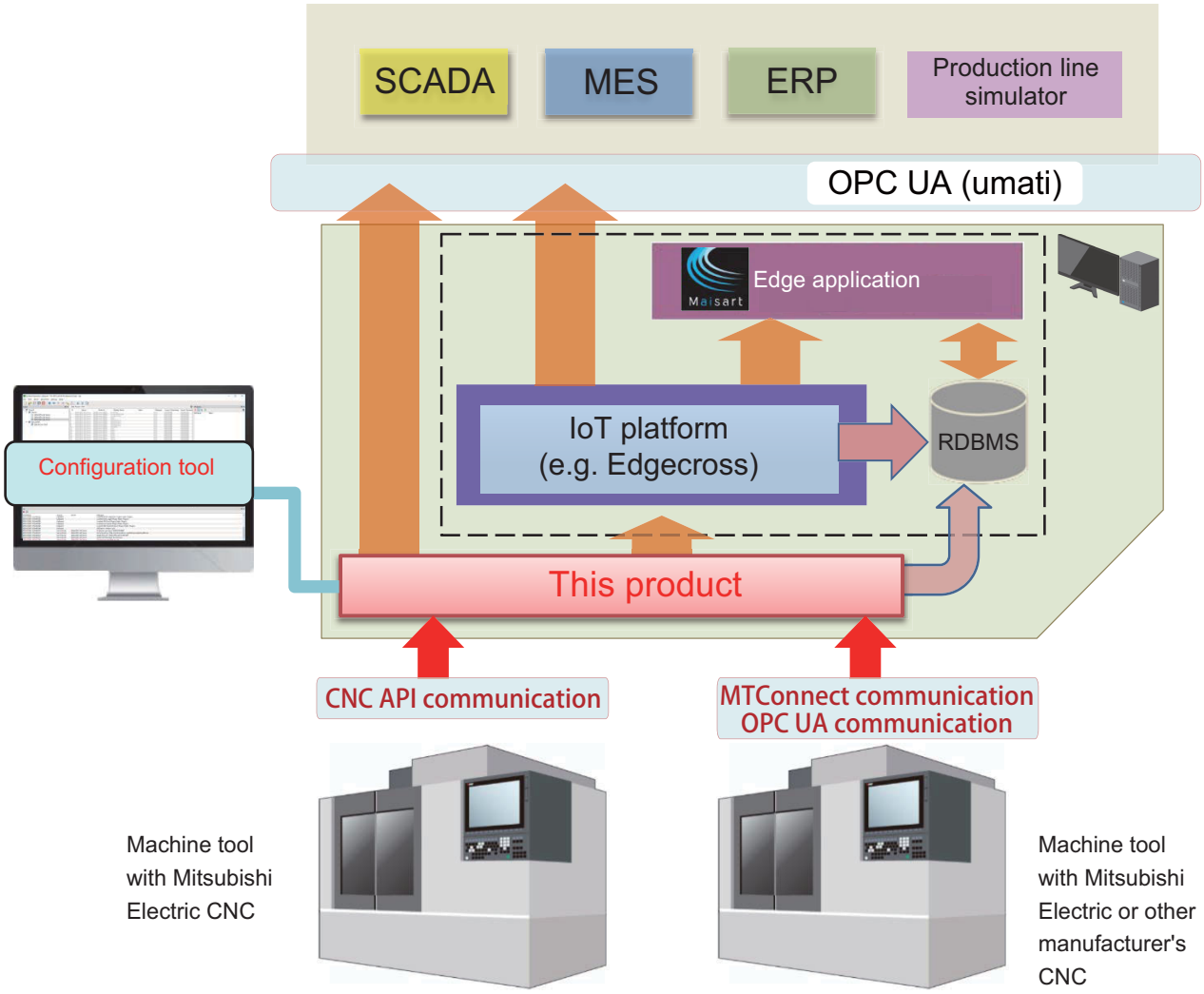
1

Overview

This product is a software (OPC UA server) that collects operation data and PLC device data from controllers of CNC machine tools and provides the collected data to host IT systems, industrial platforms for edge computing, edge applications, etc.

The data collected from this product can be used by the following applications (hereafter they are called "OPC UA client").

- Monitoring system (e.g. SCADA, operation monitoring software)
- Host IT system (MES, ERP)
- Simulation (e.g. production line simulator)
- Edge applications, engineering tools, etc.



2

Definitions of Terms

2.1 Terms Related to OPC UA

Terms	Details
OPC UA	An abbreviation for OPC Unified Architecture. OPC UA is a platform-independent and service-oriented architecture which has integrated all the functionality of the OPC (OLE for Process Control) Classic specifications into one extensible framework. Reference: https://opcfoundation.org/
OPC UA server	Software that returns the data collected from equipments, devices, and machines in response to the requests from OPC UA clients by OPC UA communication.
OPC UA client	Software (SCADA, MES, ERP, etc.) that accesses the OPC UA server to make data access via OPC UA communication.
Address space	A data area that has a hierarchical structure of information about connected devices, machines, and tags. Consisted of nodes to which OPC UA server allows OPC UA clients to access.
End point URL	A URL used to identify the OPC UA server by the OPC UA client, or to identify the client by the server.
Node	A unit that can be accessed by OPC UA clients in the address space, and an entity of objects and variables to compose various data types defined in the OPC UA information model.
Node ID	An ID defined on the information model as a node identifier.
Tag	A reference name managed by the OPC UA server and used by OPC UA clients to access the node.
Companion specifications	An information model for which specifications are formulated by various industrial organizations for the purpose of information collaboration between multi-vendors.
Extended specifications	An information model in which vendor-specific extended definitions are added.
umati	An abbreviation for Universal Machine Technology Interface. A companion specification whose specifications are being developed for the purpose of standardizing machine tool interfaces.

2.2 Other Terms

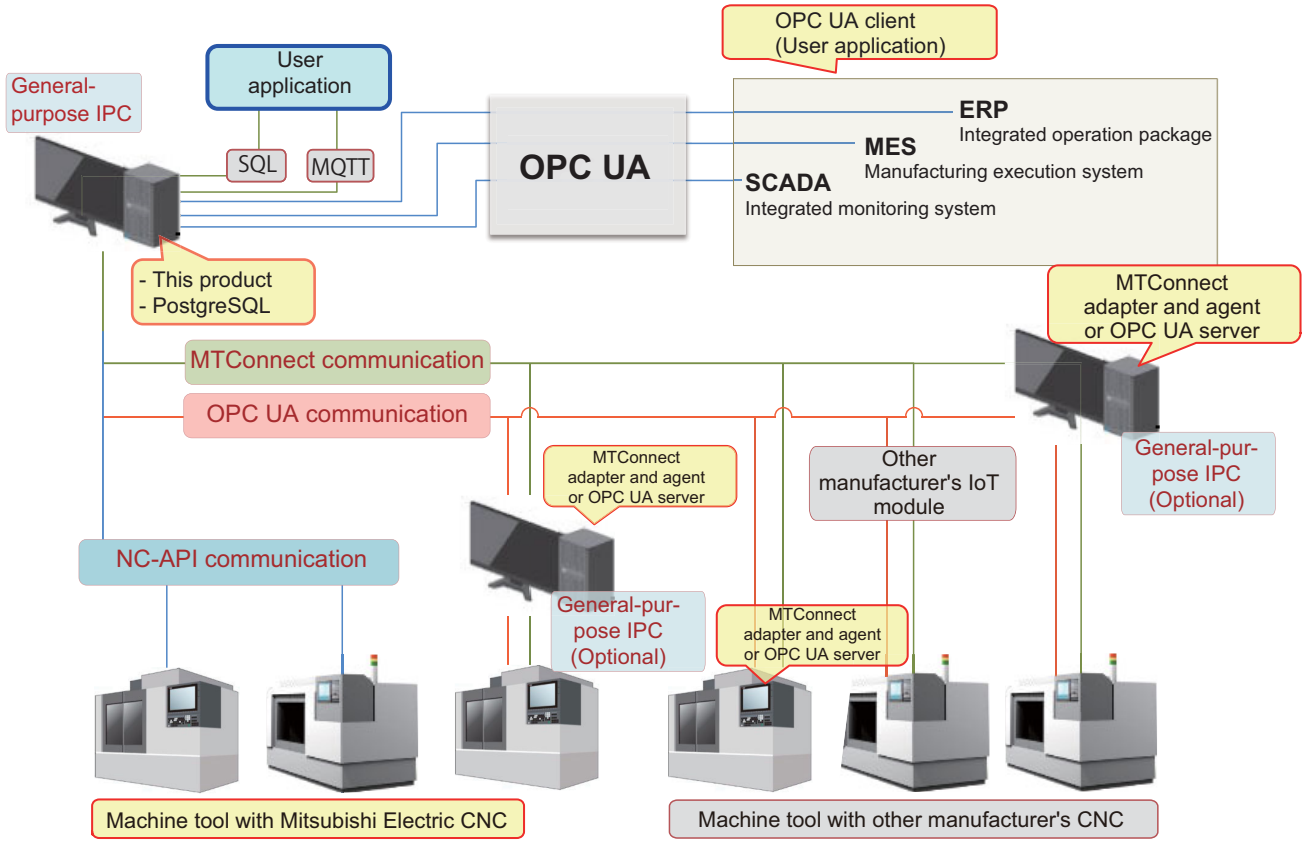
Terms	Details
SCADA	An abbreviation for Supervisory Control And Data Acquisition. A type of industrial control system, and a system which monitors the computer system and controls process for various production processes, infrastructure, and equipment.
MES	An abbreviation for Manufacturing Execution System. A system which monitors and manages the work of factory machines and workers by connecting with each part of the factory production line.
ERP	An abbreviation for Enterprise Resource Planning. A means and concept for integrated resource management for effective use of management resources and improving management efficiency.
Edge computing	An information processing method and area, for not only collecting and analyzing data in production sites in real-time, and feed backing the data, but summarizing the production site data and sharing information with IT systems efficiently with the hardware and software in production sites.
Edge application	A software that executes processing aimed at various improvements and efficiency by making effective use of data on the production site in the edge computing area.
Engineering tool	A software that aims to support the works at each process of the engineering chain, such as design, manufacturing, setting of hardware and software and maintenance.
Edgecross (IoT platform)	A software platform that implements specifications and concepts for realizing manufacturing solutions by the FA-IT collaboration based on the edge computing.
Data collector	A software component that collects data in production sites via the network.
Custom API library	This software library is installed on an external computer to collect and operate various data from Mitsubishi Electric CNC.
Sha256	An abbreviation for Secure Hash Algorithm 256-bit. One of the hash functions that calculates the characteristic value of fixed length from the source text of arbitrary length.
Configuration tool	A tool name equipped with this product which makes settings for collecting data from the machine connected to the OPC UA server, and it also diagnoses the data.
MTConnect	An open protocol defined by MTConnect Institute which is aimed for monitoring the status of the NC machine tool. Reference: https://www.mtconnect.org/
Agent	Converts the collected data of the CNC device to the communication data format of MTConnect according to the schema definition, and returns it to the application.
Adapter	An application to collect the data from the CNC device and notify the collected data consecutively to Agent according to the schema definition. Implemented depending on the NC device.
Device	Target machine to be monitored by MTConnect. "Device ≈ Machine tool"
DataItem	One of the attributes defined by MTConnect schema. An element of minimum unit representing the data of the device which can be acquired by MTConnect. ID, name, unit, supplementary information, etc. can be written.
Unavailable	When DataItem defined by the schema cannot be notified from the Adapter due to the loss of communication or any other causes, Agent returns the data to the client as "Unavailable".
MQTT	An abbreviation for Message Queuing Telemetry Transport. Message Queuing Telemetry Transport is a lightweight message communication protocol using TCP/IP, publish-subscribe pattern. MQTT requires a message broker (MQ server). Clients can receive the messages selectively.
RDBMS	RDBMS (Relational Database Management System) is a software that manages a relational database (RDB) in a comprehensive way. RDB manages data in a table structure. SQL is the standard programming language used to access the database.
Missing	When data cannot be collected from devices or equipment, the corresponding cycle is regarded as missing and data is not stored in this product.

3

System Configuration

3.1 Connection Configuration

An example of the connection configuration to use this product is shown below.



3.2 Number of Connectable CNC

Compatible models for this product are as follows.
Refer to "10.4 Appendix 4: Supported Version" for supported version of each model.

■ Machine tool with Mitsubishi Electric CNC (with custom API)

Mitsubishi Electric CNC-equipped machines which can communicate with the custom API library are as follows.
[M8/M8V Series]

M800W/M800VW		M800S/M800VS		M80W /M80VW	M80/M80V		E80	C80
M850	M830	M850	M830		M80 TypeA	M80 TypeB		
○	○	○	○	○	○	○	○	○

[M7 Series]

M700VW			M700VS			M70V		E70
M750VW	M730VW	M720VW	M750VS	M730VS	M720VS	M70V TypeA	M70V TypeB	
○	○	○	○	○	○	○	○	○

M700			M70	
M750	M730	M720	M70 TypeA	M70 TypeB
○	○	○	○	○

■ Machine tool with Mitsubishi Electric CNC (with MTConnect/OPC UA communication)

Mitsubishi Electric CNC-equipped machines supporting MTConnect or OPC UA communication are as follows.

- M800/M80/E80 Series
- M700V/M70V/E70 Series, M700/M70 Series

■ Machine tool with other manufacturer's CNC

In the following cases, this product can connect with machine tool with other manufacturer's CNC.

- When connecting the other manufacturer's CNC-equipped machines supporting MTConnect or OPC UA communication
- When connecting the other manufacturer's CNC-equipped machines via third party vendors' products supporting MTConnect or OPC UA communication

3.3 Operating Environment

The minimum operating environment required to install this product is shown below.

Item	Specification
Processor	Intel Core-i5 2 cores or higher 64-bit architecture
Required memory	8 (GB) or more (16 GB or more are recommended for connecting 20 machines or more)
Required disk	64 (GB) or more (500 GB or more are recommended for using the data logging function)
Required external I/F	RJ-45 (Communication method: Ethernet)
Display resolution	SXGA (1280 x 1024) or higher
OS	Supports 64-bit version of the following OS. Windows 10 IoT Enterprise Windows 10 Enterprise Windows 10 Pro
Required library	.NET Framework 4.5 or later Microsoft Visual C++ 2015 Redistributable Package x64 Microsoft Visual C++ 2015 Redistributable Package x86 Microsoft Visual C++ 2010 Redistributable Package x86 (Only when Windows 10 Pro is used.)
Supported languages	Japanese, English

- When any of the following Windows functions is used, the configuration tool may not operate properly.
  - Compatibility mode
  - Fast user switching
  - Touch panel function
  - Hyper-V
  - Virtual desktop (*1)
  - Tablet mode
  - Inactive or sleep (standby) of Windows
  - Unified write filter
  - The setting of "Change the size of text, apps and other items" is changed from 100% while the current OS version is prior to 1703.
  - The screen resolution is changed during the operation.
  - Multi-display
  - Using a user account other than "Administrator" or standard user.

(*1) Although the configuration tool supports Windows remote desktop, the following problems may occur.
  - Delay in screen updates at monitoring or operation due to the network environment (speed, load, etc.)
  - Part of text or a window gets cut off due to the remote desktop screen settings.

4

Specification

4.1 Product Specifications

Product specifications are shown below.

Functions					Details	
Basic specifications	Connected machine		Mitsubishi Electric CNC		M800W/M800S/M80W/M80/E80 Series, C80 M800VW/M800VS/M80VW/M80V Series M700VW/M700VS/M70V/E70/M700/M70 Series	
			Other manufacturer's CNC			
	Number of connectable units		Total number of connectable units		30 (upper limit)	
				Machine (with Mitsubishi Electric CNC)	30 (upper limit)	
				MTConnect Agent	10 (upper limit)	
				OPC UA server	10 (upper limit)	
			Application		3 sessions	
	Collected data points		Collected data points		Up to 4500	
			Collected data points	Machine	150/machine	
				MTConnect Agent	100/MT Connect agent	
				OPC UA server	100/server	
	Logging data points		Logging data points		3000	
			Number of database settings		7	
			Number of logging settings		30	
			Number of logging setting data (fields)		100/machine (or MTConnect agent, or OPC UA server)	
	Publishing data points		Publishing data points		1200	
			Number of MQTT broker connections		1	
			Number of publishing settings		15	
			Number of publishing setting data (fields)		100/machine (or MTConnect agent, or OPC UA server)	
	Security policy		Security policy		Basic256Sha256	
			Certificate specification (algorithm)		RSA 2048bit/SHA256	
Communication specifications	OPC UA		OPC UA compatible version		1.03	
			End point URL		opc.tcp://127.0.0.1:4840 (default setting)	
			Supported data type		Boolean	1 bit (1: TRUE/0: FALSE)
					Int16	2-byte integer value
					UInt16	2-byte integer value (unsigned)
					Int32	4-byte integer value
					UInt32	4-byte integer value (unsigned)
					Float	4-byte floating point value (IEEE 754)
					Double	8-byte floating point value (IEEE 754)
					String	Character string (UTF-8), up to 127 characters Up to 3 bytes for multibyte characters (SJIS compatible character)
			Companion specifications		OPC UA for Machine Tools 1.00.00 (OPC UA 40501-1)	
			Extended specifications		PLC I/F with built-in CNC	
	Connected machine side	Custom API	Mitsubishi Electric		Interface library for data collection and operation of Mitsubishi Electric CNC	
		MTConnect	MTConnect		MTConnect version 1.3.1 or later	
			Supported agent		CppAgent (Ver1.3.0.17 or later) is recommended	
		OPC UA	Supported server		Commercial OPC UA server products (OPC UA Ver.1.03 or later is recommended)	
	Data logging		Supported database		PostgreSQL Ver.10.18	
	Data publishing		Supported version		MQTT 3.1.1	
			MQTT broker		Eclipse Mosquitto 1.3.5	
			Supported QoS		2	
Screen specifications	Supported languages				Japanese, English	

5

Installation

5.1 Microsoft Visual C++ Redistributable Package Installation

To use this product, the Microsoft Visual C++ Redistribution Package must be installed.
The required libraries for each OS are shown below.

	Windows 10 IoT Enterprise	Windows 10 Enterprise	Windows 10 Pro
Microsoft Visual C++ 2015 Redistributable Package x64	○	○	○
Microsoft Visual C++ 2015 Redistributable Package x86	○	○	○
Microsoft Visual C++ 2013 Redistributable Package x86	○	○	○
Microsoft Visual C++ 2010 Redistributable Package x86	-	-	○

Select [Control Panel] - [Programs] - [Programs and Features] to check that the required library has been installed.
When the required library is already installed, execute "5.2 Installing the Product".

5.1.1 Microsoft Visual C++ 2015 Redistributable Package Installation

(1) Access the following website, then download "vc_redist.x64.exe" and " vc_redist.x86.exe".
https://www.microsoft.com/en-us/download/details.aspx?id=53587
(2) Execute "vc_redist.x64.exe".
(3) Read the license agreement and if there is no problem, check "I agree to the license terms and conditions" and click [Install] button.
(4) Execute "vc_redist.x86.exe".
(5) Read the license agreement and if there is no problem, check "I agree to the license terms and conditions" and click [Install] button.

5.1.2 Microsoft Visual C++ 2013 Redistributable Package Installation

(1) Access the following website and download "vcredist_x86.exe".
https://www.microsoft.com/en-us/download/details.aspx?id=40784
(2) Execute "vcredist_x86.exe".
(3) Read the license agreement and if there is no problem, check "I agree to the license terms and conditions" and click [Install] button.

5.1.3 Microsoft Visual C++ 2010 Redistributable Package Installation

If you are using Windows 10 Pro, Microsoft Visual C++ 2010 Redistributable Package must be installed.
(1) Access the following website and download "vcredist_x86.exe".
https://www.microsoft.com/en-us/download/details.aspx?id=26999
(2) Execute "vcredist_x86.exe".
(3) Read the license agreement and if there is no problem, check "I agree to the license terms and conditions" and click [Install] button.

5.2 Installing the Product

5.2.1 Installation Procedure

The installation procedure is as follows.

(1) Execute "\NC Machine Tool Connector\setup.exe" stored in the installer folder of this product.

(2) Follow the instructions on the installation screen to select and enter the required items.
"NC Machine Tool Connector" is added to [Control Panel] - [Programs] - [Programs and Features].

After installation, the NC Machine Tool Connector starts automatically.

Note

(1) Close all running applications beforehand, and execute the installation of the following software with administrator rights. Also restart Windows after installation.

5.2.2 Folder Structure after Installation

The folder structure after installation is as follows.

[C:\Program Files\MITSUBISHI ELECTRIC\NC Machine Tool Connector]

	CsWrapperCCLI64.dll	
	DataClientMgr_Install.bat	
	DataClientMgr_Uninstall.bat	
	icon.ico	
	ID_UAClient.dll	
	id_uaserver.dll	
	imageicon.png	
	libcrypto-1_1-x64.dll	
	libeay32.dll	
	libiconv-2.dll	
	libintl-8.dll	
	libpq.dll	
	libssl-1_1-x64.dll	
	libxml2.dll	
	license.key	
	MTConnectClient.dll	
	MTConnectDataCollectorUtility.dll	
	ncClientMgr.exe	
	ncClientMgrEx.dll	
	ncDataBaseClient.exe	
	ncMachineToolConfigurator.exe	
	ncMachineToolConfigurator.ini	
	NcMqttGateway.dll	
	ncOpcUaDataClient.exe	
	ncMqttPublisher.exe	
	ncUaComMem.dll	
	ncUaDataClient.exe	
	ncUaServer.exe	
	paho-mqtt3c.dll	
	ssleay32.dll	
	StringTable_EN.resx	
	StringTable_JP.resx	
	uastack.dll	
	Config	
		ncMachineToolConfigurator.conf
		ncUaDataClient.conf

	Images			
		browse.png		
		browse_online.png		
		check.png		
		datatype.png		
		error.png		
		method.png		
		object.png		
		objecttype.png		
		property.png		
		reftype.png		
		success.png		
		treefolder.png		
		type.png		
		variable.png		
		variabletype.png		
		view.png		
		warning.png		
	pki			
		CA		
			certs	
				uaclkey.der
				uasvkey.der
			crl	
			private	
				uaclkey.pfx
		certs		
			uaclkey.der	
		crl		
		own		
			certs	
				uasvkey.der
			crl	
			private	
				uaclkey.pfx
				uasvkey.pfx
		svcerts		
	Tools			
		MTConnect		
			Agent	
				agent_install.bat
				agent_remove.bat
				agent_service_start.bat
				agent_uninstall.bat
				Device.xml
	XML			
		API-Template.xml		
		industrial_automation.xml		
		machinery.xml		
		MTConnect-Template.xml		
		Opc.Ua.Di.NodeSet2.xml		
		Opc.Ua.MachineTool.Nodeset2.xml		
		OpcUa-Template.xml		

		PLC-Template.xml
		uaserver.config.xml
		umati-Template.xml
		umati-Template2.xml

[C:\Program Files(x86)\MITSUBISHI ELECTRIC\NC Machine Tool Connector]

	CsWrapperCCLI.dll	
	DataClient_Install.bat	
	DataClient_Uninstall.bat	
	MTConnectClient.dll	
	ncDataClient.exe	
	ncMTConnectDataClient.exe	
	ncUaComMem.dll	
	ja-JP	
		MTConnectClient.resources.dll
	Machine01	
		BKChkFile.dll
		BKChkFileProcess.exe
		BKChkFileSub.dll
		chgapivl.dll
		diaprost.dll
		dllab06cmk.dll
		melcfg.dll
		melcfg.ini
		meldev.dll
		melezcom.dll
		melmdldr.dll
		melpapi.dll
		melpctrl.dll
		melsafe.dll
		melsmem.dll
		melvnckd.dll
		melwin.dll
		modalrecv.exe
		ncapi32.dll
		ncapi32.exe
		nccom.dll
		ncMocha.dll
		Ncpccom.exe
		nxalmsg.dll
		NXALMSG_CHI1.BIN
		nxalmsg_chi1.dat
		NXALMSG_CHI2.BIN
		nxalmsg_chi2.dat
		NXALMSG_CZE.BIN
		nxalmsg_cze.dat
		NXALMSG_DEU.BIN
		nxalmsg_deu.dat
		NXALMSG_DUT.BIN
		nxalmsg_dut.dat
		NXALMSG_ENG.BIN
		nxalmsg_eng.dat
		NXALMSG_FRA.BIN
		nxalmsg_fra.dat
		NXALMSG_HUN.BIN
		nxalmsg_hun.dat
		NXALMSG_ITA.BIN
		nxalmsg_ita.dat
		NXALMSG_JPN.BIN

		nxalmsg_jpn.dat
		NXALMSG_KOR.BIN
		nxalmsg_kor.dat
		NXALMSG_POL.BIN
		nxalmsg_pol.dat
		NXALMSG_POR.BIN
		nxalmsg_por.dat
		NXALMSG_RUS.BIN
		nxalmsg_rus.dat
		NXALMSG_SPA.BIN
		nxalmsg_spa.dat
		NXALMSG_SWE.BIN
		nxalmsg_swe.dat
		NXALMSG_TUR.BIN
		nxalmsg_tur.dat
		nxBkGrnd.dll
		nxBkGrndSub.dll
		nxBkGrndSub_M80W.dll
	Machine02	
		BKChkFile.dll
		BKChkFileProcess.exe
		BKChkFileSub.dll
		chgapivl.dll
		diaprost.dll
		dllab06cmk.dll
		melcfg.dll
		melcfg.ini
		meldev.dll
		melezcom.dll
		melmdldr.dll
		melpapi.dll
		melpctrl.dll
		melsafe.dll
		melsmem.dll
		melvnckd.dll
		melwin.dll
		modalrecv.exe
		ncapi32.dll
		ncapi32.exe
		nccom.dll
		ncMocha.dll
		Ncpccom.exe
		nxalmsg.dll
		NXALMSG_CHI1.BIN
		nxalmsg_chi1.dat
		NXALMSG_CHI2.BIN
		nxalmsg_chi2.dat
		NXALMSG_CZE.BIN
		nxalmsg_cze.dat
		NXALMSG_DEU.BIN
		nxalmsg_deu.dat
		NXALMSG_DUT.BIN
		nxalmsg_dut.dat
		NXALMSG_ENG.BIN
		nxalmsg_eng.dat

		NXALMSG_FRA.BIN
		nxalmsg_fra.dat
		NXALMSG_HUN.BIN
		nxalmsg_hun.dat
		NXALMSG_ITA.BIN
		nxalmsg_ita.dat
		NXALMSG_JPN.BIN
		nxalmsg_jpn.dat
		NXALMSG_KOR.BIN
		nxalmsg_kor.dat
		NXALMSG_POL.BIN
		nxalmsg_pol.dat
		NXALMSG_POR.BIN
		nxalmsg_por.dat
		NXALMSG_RUS.BIN
		nxalmsg_rus.dat
		NXALMSG_SPA.BIN
		nxalmsg_spa.dat
		NXALMSG_SWE.BIN
		nxalmsg_swe.dat
		NXALMSG_TUR.BIN
		nxalmsg_tur.dat
		nxBkGrnd.dll
		nxBkGrndSub.dll
		nxBkGrndSub_M80W.dll
	Machine03	
		chgapivl.dll
		melcfg.dll
		melcfg.ini
		meldev.dll
		melmdldr.dll
		melsmem.dll
		melvnckd.dll
		melwin.dll
		modalrecv.exe
		msvcr100.dll
		ncalmsg.dll
		ncalmsg_bgr.bin
		ncalmsg_chi1.bin
		ncalmsg_chi2.bin
		ncalmsg_cze.bin
		ncalmsg_dan.bin
		ncalmsg_deu.bin
		ncalmsg_dut.bin
		ncalmsg_eng.bin
		ncalmsg_fin.bin
		ncalmsg_fra.bin
		ncalmsg_hun.bin
		ncalmsg_ita.bin
		ncalmsg_jpn.bin
		ncalmsg_kor.bin
		ncalmsg_pol.bin
		ncalmsg_por.bin
		ncalmsg_rom.bin
		ncalmsg_rus.bin

		ncalmsg_slv.bin
		ncalmsg_spa.bin
		ncalmsg_swe.bin
		ncalmsg_trk.bin
		ncapi32.dll
		nccom.dll
		ncMocha.dll

5.3 Uninstalling the Product

To reinstall this product after uninstallation, back up config files or the like in advance as necessary.
(The config files or the like are in the "Config", "pki" and "XML" folders under the "C:\Program Files\MITSUBISHI ELECTRIC\NC Machine Tool Connector" folder.)

5.3.1 Uninstallation Procedure

Procedure to uninstall this product is as follows.

(1) Right-click the Start button and select [Control Panel].
(2) Select [Uninstall a program] on the control panel screen (View by: Category).
(3) Select "NC Machine Tool Connector" from the list of programs and select [Uninstall].
(4) Select [Yes] on the confirmation screen to uninstall.
(5) When "User Account Control is enabled" is specified, select [Yes] on the installer startup confirmation screen.

5.4 Database Setup

When logging the device data collected by this product to a database, the setup of the database (PostgreSQL) is required.

5.4.1 Installing PostgreSQL

Procedures (1) to (11) for installing and setting PostgreSQL are as follows.

Note

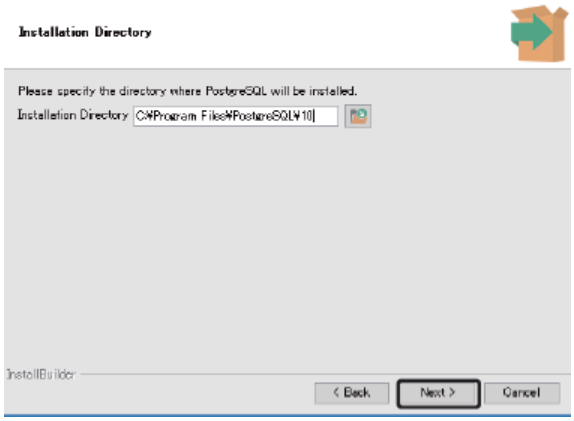
(1) When using the default administrator account, creating a PostgreSQL account is not required.

[Operating procedure]

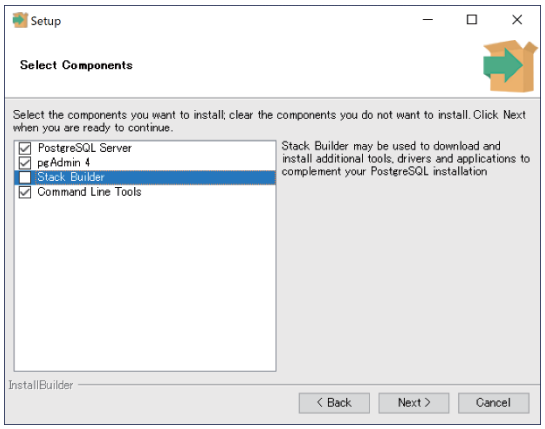
(1) Access the website (https://www.postgresql.org/download/windows/), and download the PostgreSQL installer for Windows.

(2) Run the installer, and select or input the required information.

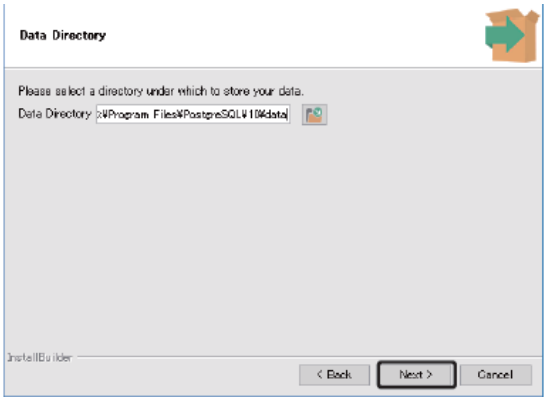
(3) Select an installation folder, and click the [Next>] button.



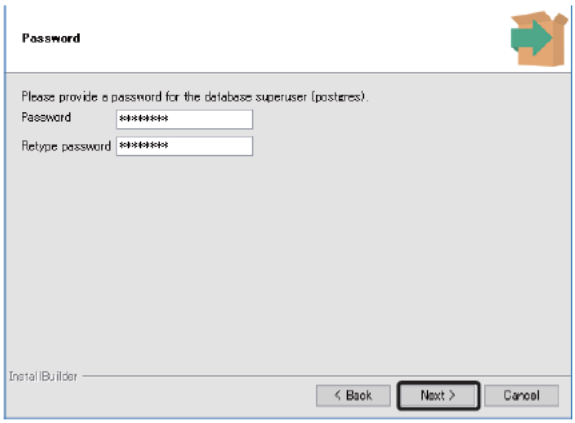
(4) Unselect the checkbox of [Stack Builder], and click the [Next>] button.



(5) Select a data directory, and click the [Next>] button.

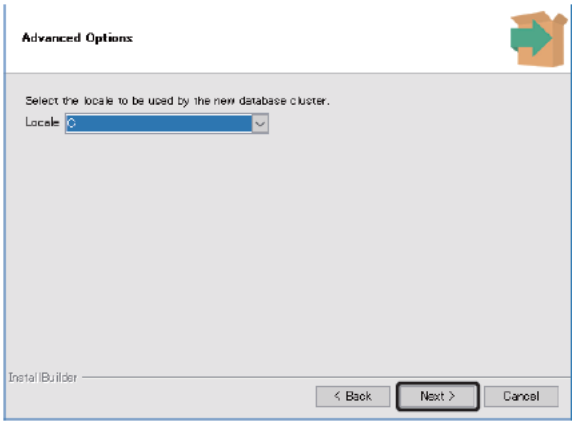


(6) Set a password for the 'postgres' account that is a superuser, and click the [Next>] button. The password must be set to 6 to 32 characters when using the 'postgres' account.



(7) Set a port number for "Port", and click the [Next>] button.

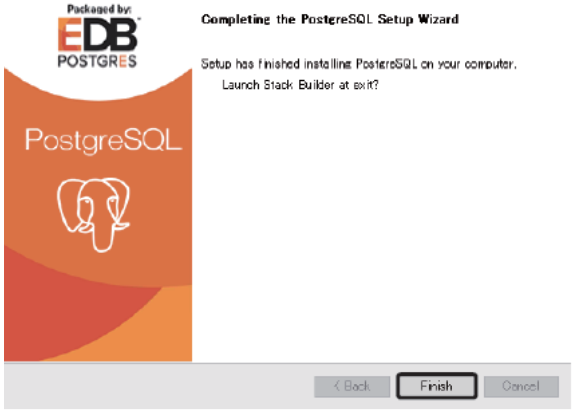
(8) Select "C" for "Locale", and click the [Next>] button.



(9) Click the [Next>] button.

(10) Click the [Next>] button.

(11) Click the [Finish] button.

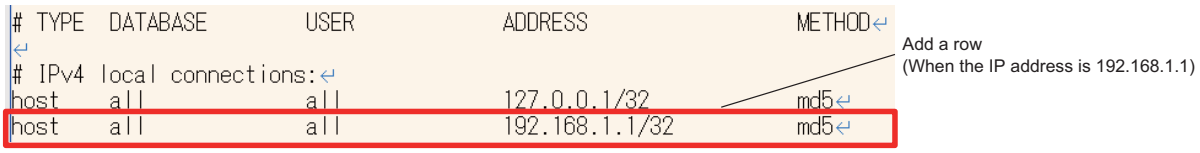


5.4.2 Setting PostgreSQL

When installing PostgreSQL to another computer that does not have this product installed, the following setting is required.

(1) Copy "pg_hba.conf" on "C:¥Program Files¥PostgreSQL¥10¥data" to the desktop, and open the file with a text editor.

(2) Set the IP address of the computer with this product installed to "# IPv4 local connections:"



(3) Save the copied "pg_hba.conf" file and overwrite the original file in "C:¥Program Files¥PostgreSQL¥10¥data".

(4) Restart the PostgreSQL services from Windows service screen.

5.5 MQTT Broker Setup

When publishing the device data collected by this product via MQTT communication, the setup of an MQTT broker (Mosquitto) is required.

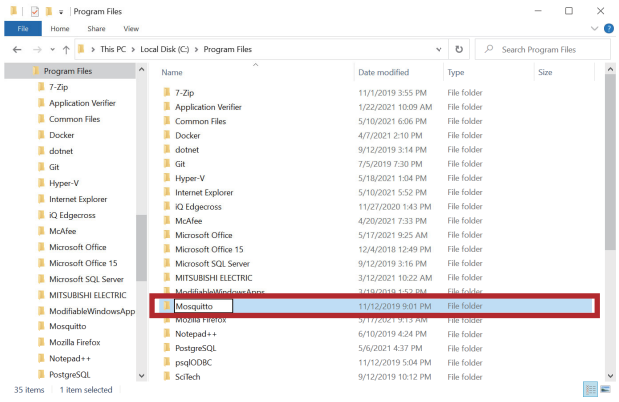
5.5.1 Installing Pthread

Follow procedures (1) to (3) below for installing pthread.

(1) Creating an installation folder for Mosquitto

Create an installation folder for Mosquitto in advance.

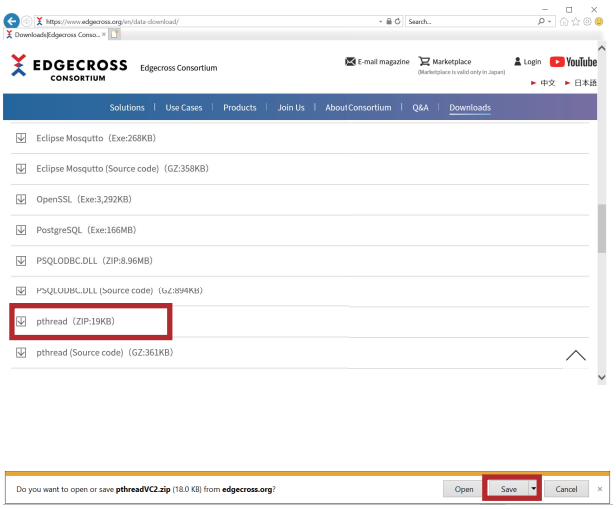
An example of creating a "Mosquitto" folder on "C:¥Program Files" is shown below.



(2) Downloading pthread

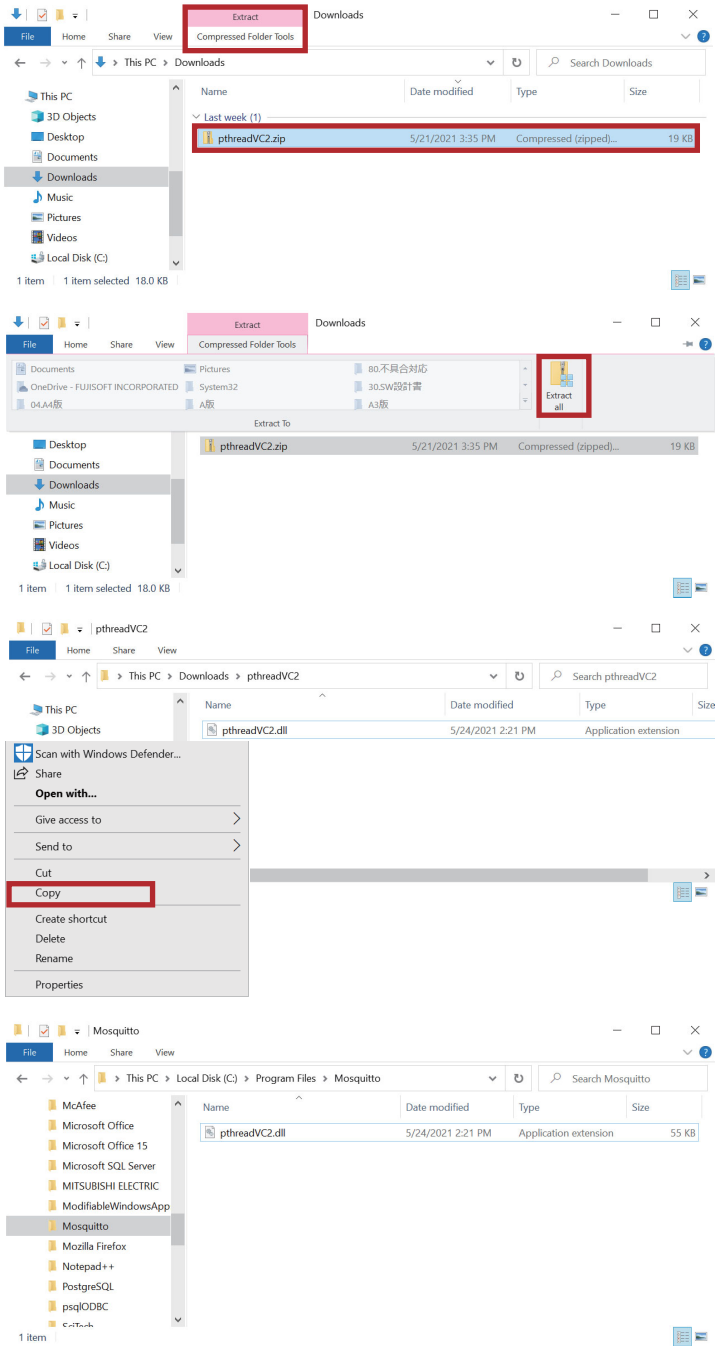
Access the Edgecross Consortium website (https://www.edgecross.org/en/data-download/), and download pthread.

Select "pthread", and then select [Save] on the dialog for downloading the file (pthreadVC2.zip).



(3) Storing pthread folder

Select the downloaded pthread compressed folder, right-click, and select "Extract all" to extract the contents from the folder. Copy the "pthreadVC2.dll" file from the extracted pthread folder to the Mosquitto folder created in (1) (C:¥Program Files¥Mosquitto).

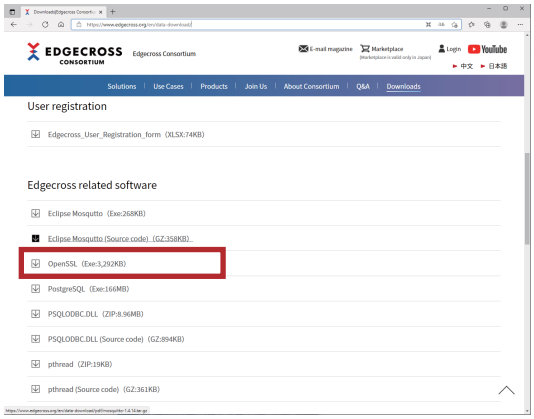


5.5.2 Installing OpenSSL

Follow procedures (1) to (3) below for installing OpenSSL.

(1) Downloading OpenSSL

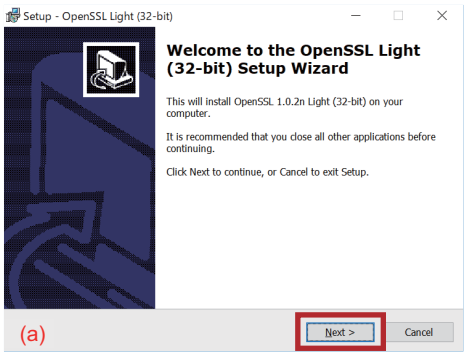
Access the Edgecross Consortium website (https://www.edgecross.org/en/data-download/), and download OpenSSL. Select "OpenSSL", and then select [Run] on the dialog for downloading the file (OpenSSL installer) that appears at the bottom of the screen.

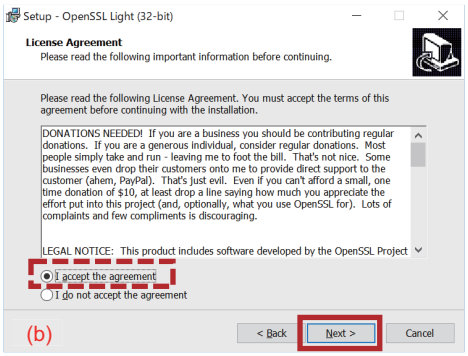


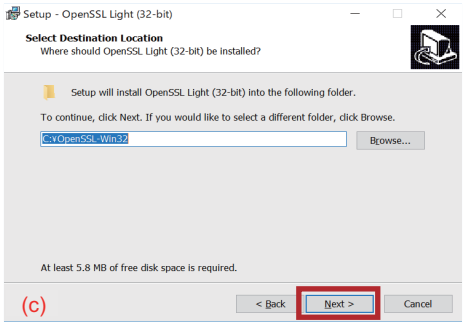
(2) Installing OpenSSL

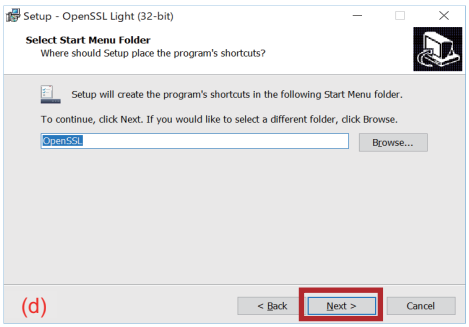
Install OpenSSL following the procedures (a) to (g) below.

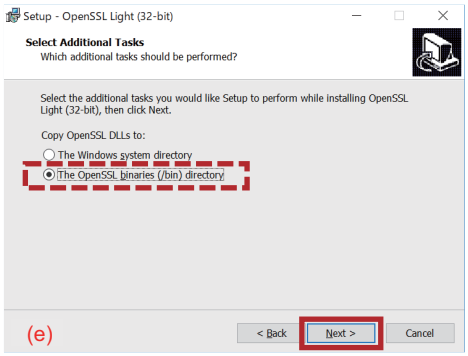
Check the selection status in the screens (in the red broken line boxes) when installing. The installation can be performed with the default installation folder and default folder name.

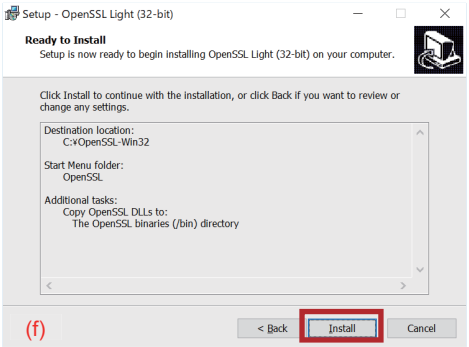


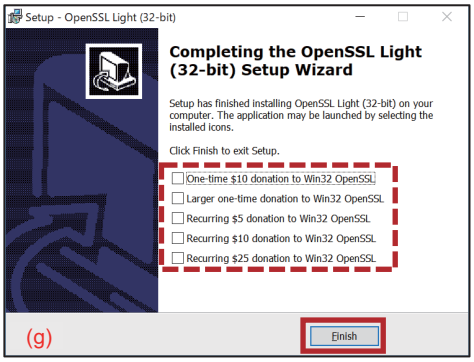












(3) Copying OpenSSL(DLL)

Copy the DLL of OpenSSL to the installation folder of Mosquitto created in (1) in "5.5.1 Installing Pthread" following the procedures below.

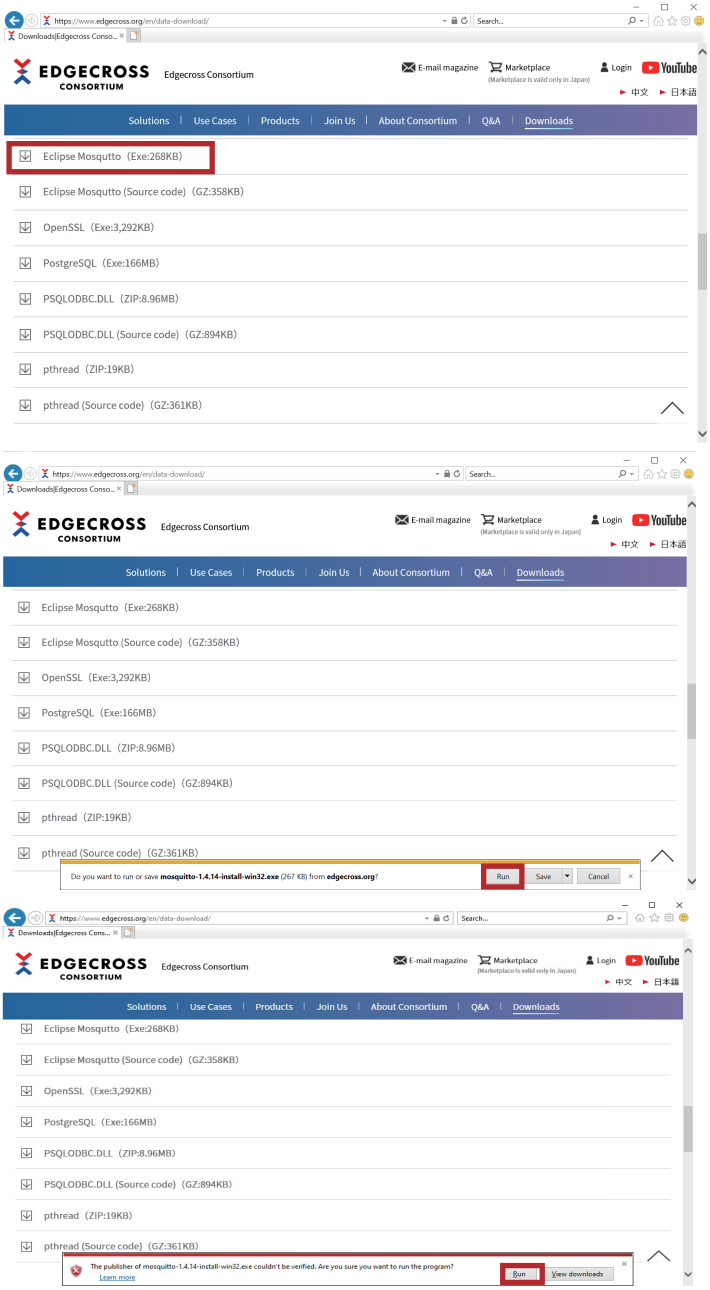
Copy "libeay32.dll" and "ssleay32.dll" from the folder that OpenSSL was installed (specified in (2)(c) in "5.5.2 Installing OpenSSL") to the installation folder of Mosquitto.

5.5.3 Installing Mosquitto

Procedures (1) to (3) for installing Mosquitto are as follows.

(1) Downloading Mosquitto

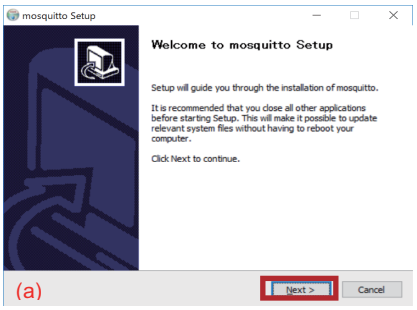
Access the Edgecross Consortium website (https://www.edgecross.org/en/data-download/), and download Mosquitto. Select "Eclipse Mosqutto", and then select [Run] on the message below to download the file (Mosquitto installer).

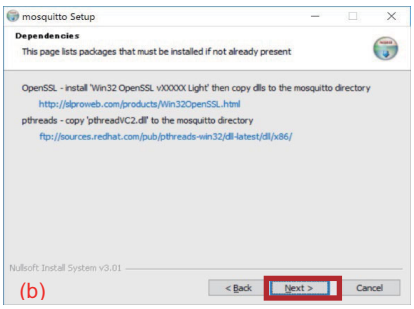


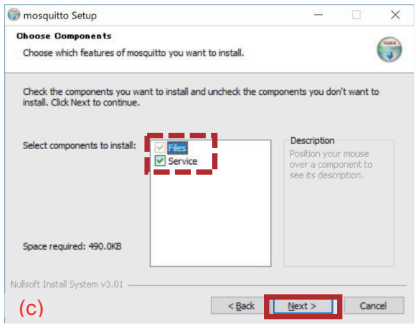
(2) Installing Mosquitto

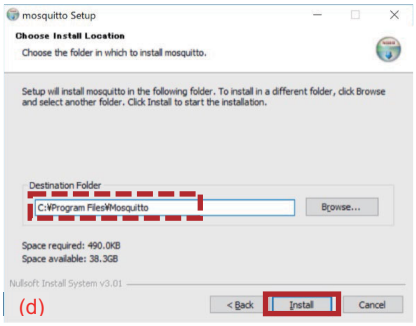
Install Mosquitto following the procedures (a) to (e) below. The default settings can be used for installation.

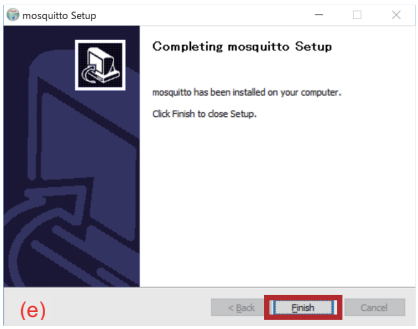
(a) Click the [Next>] button.
(b) Click the [Next>] button.
(c) Click the [Next>] button with the checkbox of [Service] selected.
(d) Specify the path of the installation folder created in "5.5.1 Installing Pthread" (1), and click the [Install] button.
(e) Click the [Finish] button to finish installing Mosquitto.









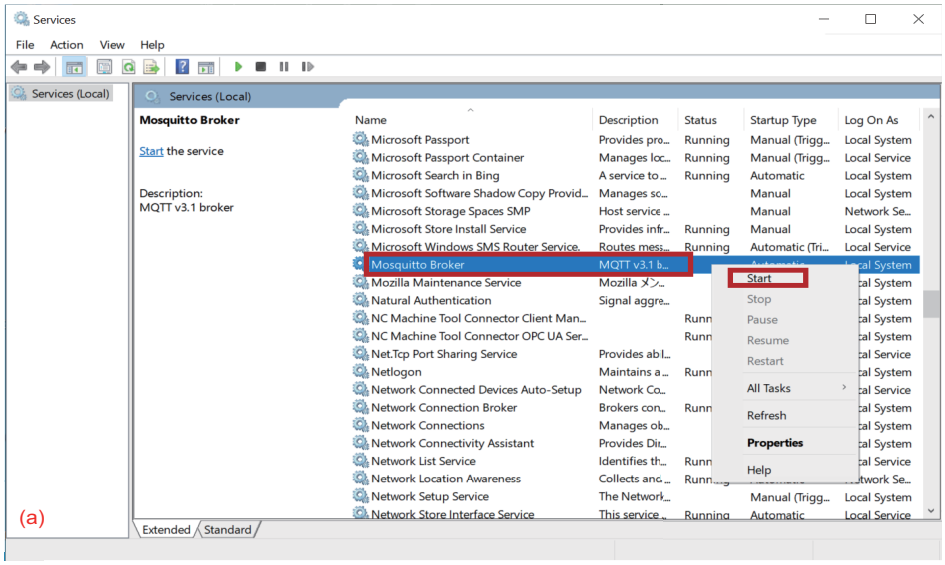


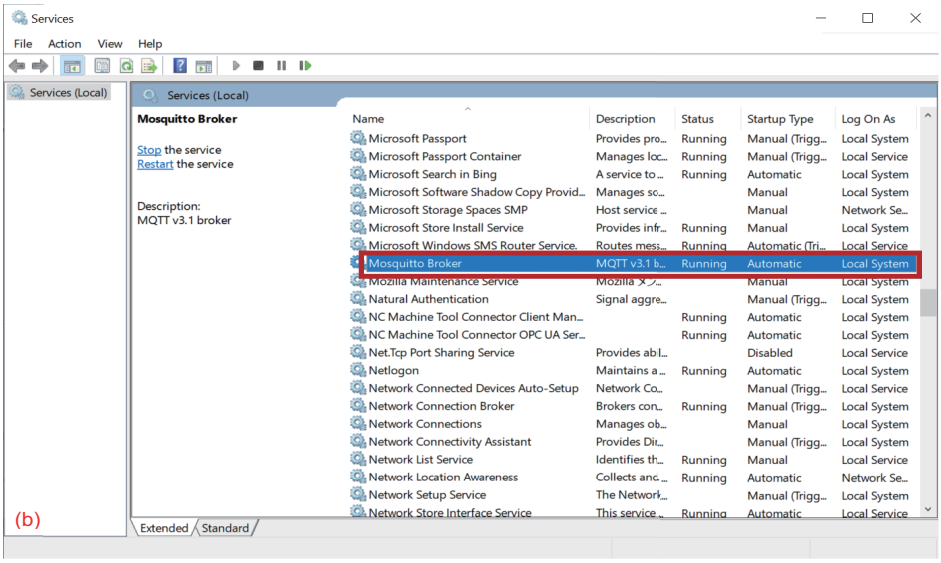
(3) Starting Mosquitto

Start Mosquitto following procedures (a) to (b) below.

(a) Select [Windows Administratative Tools] - [Services] on the Start menu. Select and right-click "Mosquitto Broker", then click [Start].

(b) When the status of Mosquitto Broker changes to "Running", the setup is completed.





5.6 Procedure before Operation

The following shows the initial operation procedure from installation to operation start of the NC Machine Tool Connector.

Operating procedure		Reference
(1)	Start the configuration tool.	7.2 Startup and Termination
(2)	Configure settings to communicate with the NC Machine Tool Connector.	7.5 Server Connection Setting Screen
(3)	Configure the machine connection settings.	
	(a) Add machines to be connected.	7.6.1 Machine Setting Screen
	(b) Check the communication status of the connected machines.	7.6.2 Communication Status with Machine
	(c) Set the machine information of the connected machines.	7.6.3 Machine Data Edit Screen
	(d) Set the tag setting of PLC device data.	7.6.4 PLC Device Registration Screen
	(e) Set the tag setting of CNC.	7.6.5 CNC Data Registration Screen
	(f) Set the tag setting of MTConnect data.	7.6.6 MTConnect Setting Screen
	(g) Set the tag setting of OPC UA data.	7.6.7 OPC UA Setting Screen
(4)	Configure the machine collection setting.	7.7 Collection Settings of Machines
(5)	Diagnose using the monitor function.	7.8 Monitor Diagnostics
(6)	Configure the logging settings of a database (optional).	7.9 Data Logging Settings
	(a) Set a connection destination database.	7.9.1 Database Settings
	(b) Set logging data.	7.9.2 Data Logging Settings
	(c) Create a table to log the database.	7.9.3 Creating a Logging Table
(7)	Configure the data publishing settings (optional).	7.10 Data Publish Settings
	(a) Set a connection destination MQTT broker.	7.10.1 MQTT Broker Settings
	(b) Set publishing data.	7.10.2 Data Publish Settings
(8)	Start operation.	-

6

NC Machine Tool Connector Functions

6.1 List of Functions

List of functions of the NC Machine Tool Connector is shown below.

Functions		Details	Reference
Category	Function classification		
Security	Certificate management	Manages the certificates required to communicate with OPC UA clients.	6.3.1 Certificate Management
	Security settings	Communication settings which use certificates can prevent theft, falsification, erroneous operation, and unauthorized execution of the NC Machine Tool Connector due to unauthorized access by third parties.	6.3.2 Security Settings
Data access	Periodical collection	Collects data from the connected machine in accordance with the contents set in advance with the configuration tool to collect nodes, PLC devices, NC data, MTConnect data, or OPC UA data.	7.6 Machine Connection
	Communication between a node (*1) and PLC device tag	Accumulates the data as node or PLC data based on the collected machine data, and OPC UA communication is performed in accordance with the request from the OPC UA client.	7.7 Collection Settings of Machines
Data output	Logging to a database	Logs the collected machine data to a database in accordance with the settings.	7.9 Data Logging Settings
	Data publishing	Publishes the collected machine data to an MQTT broker in accordance with the settings.	7.10 Data Publish Settings
	Fallback setting function	By presetting a fallback value, this function will output an arbitrary value for each data type without missing (no data output) when a connection with a connected machine is lost. The output of a fallback setting is supported by data logging and data publishing by MQTT. Configure the fallback settings for each communication protocol for machines.	7.6.5 CNC Data Registration Screen 7.6.6 MTConnect Setting Screen 7.6.7 OPC UA Setting Screen

(*1) A node is a variable defined for each data type, and an identifier (node ID) is defined for each node.

6.2 Start and Stop the NC Machine Tool Connector

Since this product is installed as a Windows service, it usually does not need to be started or stopped. If it need to be started or stopped manually, perform the follwing procedure.

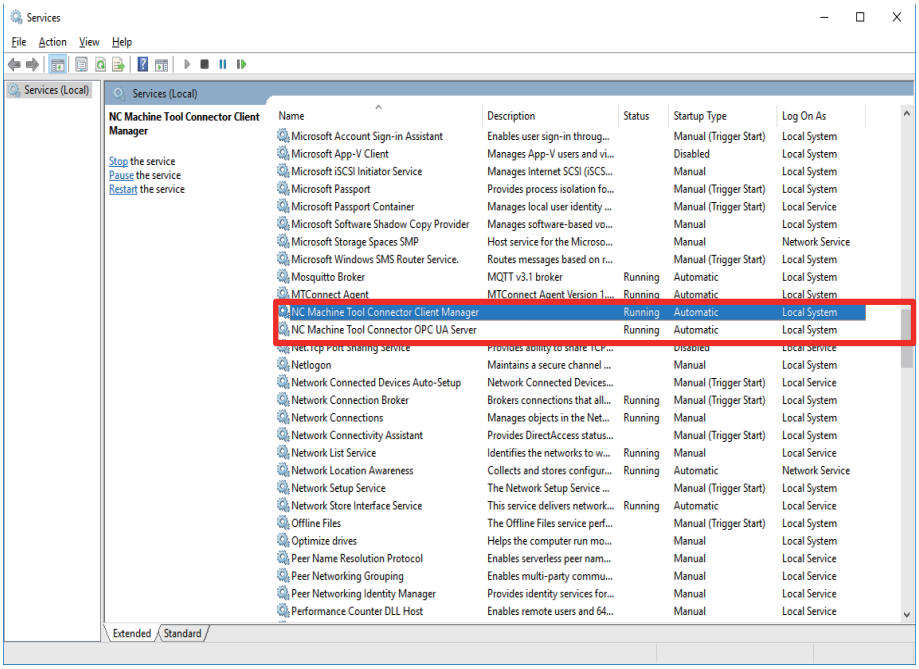
When the NC Machine Tool Connector is running, the status of "NC Machine Tool Connector OPC UA Server" and "NC Machine Tool Connector Client Manager" is displayed as "Running" on the Windows service management screen.

6.2.1 Start the Service

The operation procedure is as follows.

(1) Right-click [Start] of Windows, select "Run" and enter "Services.msc" in the dialog that appears.

(2) After starting the Windows service management screen, select "NC Machine Tool Connector OPC UA Server" and "NC Machine Tool Connector Client Manager", and then right-click to select [Start] to start the NC Machine Tool Connector . (Available only when the service is not running.)



6.2.2 Stop the Service

Similar to the startup procedure, select "NC Machine Tool Connector OPC UA Server" and "NC Machine Tool Connector Client Manager" on the Windows service management screen, and then right-click to select [Stop] to stop the service. (Only when the service is in running state.)

Note

(1) When the stop operation is performed while the NC Machine Tool Connector is connected, the communication between the server and the configuration tool or OPC UA client will be disconnected.

6.3 Security

To prevent data theft, falsification, unauthorized execution, etc. due to unauthorized access to the NC Machine Tool Connector, user authentication and communication using certificates can be performed.

6.3.1 Certificate Management

OPC UA server function

For OPC UA communication, it is necessary that the certificates issued by both OPC UA server and the OPC UA client are trusted by both sides. For details on how to exchange the certificate, refer to the manual of your OPC UA client.

The respective certificate management folders for clients and servers are shown below.
After installation, the certificate files are stored in each folder in advance. Do not delete or change these files.

[Certificate management folder (for client)]

Folder name	Details	Default storage file
certs	OPC UA client certificate authenticated by the NC Machine Tool Connector	uaclkey.der

Path to each folder
C:\Program Files(x86)\MITSUBISHI ELECTRIC\NC Machine Tool Connector\pki
When the installation folder of this product is changed, replace the path before "\MITSUBISHI ELECTRIC".

[Certificate management folder (for server)]

Folder name	Details	Default storage file
certs	NC Machine Tool Connector certificate which OPC UA client authenticates	uasvkey.der
private	Private key corresponding to the NC Machine Tool Connector certificate which the OPC UA client authenticates	uasvkey.pfx

Path to each folder
C:\Program Files(x86)\MITSUBISHI ELECTRIC\NC Machine Tool Connector\pki\own
When the installation folder of this product is changed, replace the path before "\MITSUBISHI ELECTRIC".

Note

(1) Note that the certificate stored by default is a sample. Mitsubishi Electric does not grant this certificate for commercial purposes.
Mitsubishi Electric shall not be liable for any damages including, but not limited to, loss of profits, business interruption, loss of business information, and other pecuniary damages caused by using the certificate for such a purpose. In addition, Mitsubishi Electric have no liability for defect warranty nor quality responsibility.

OPC UA client function

For OPC UA communication, it is necessary that the certificates issued by both OPC UA server and the OPC UA client of NC Machine Tool Connector are trusted by both sides. For details on how to exchange the certificate, refer to the manual of your OPC UA server.

The certificate management folders for the client server and connection destination server are shown below.
After installation, the certificate files are stored in the folder for the OPC UA client function of NC Machine Tool Connector in advance. Do not delete or change these files.

[Certificate management folder (for the OPC UA client function of NC Machine Tool Connector)]

Folder name	Details	Default storage file
certs	OPC UA client certificate of NC Machine Tool Connector authenticated by the connection destination OPC UA server	uaclkey.der
private	Private key corresponding to the OPC UA client certificate of NC Machine Tool Connector authenticated by the connection destination OPC UA server	uaclkey.pfx

Path to each folder
C:\Program Files\MITSUBISHI ELECTRIC\NC Machine Tool Connector\pki\own
When the installation folder of this product is changed, replace the path before "\MITSUBISHI ELECTRIC".

[Certificate management folder (for connection destination server)]

Folder name	Details	Default storage file
svcerts	Connection destination OPC UA server certificate authenticated by the OPC UA client of NC Machine Tool Connector	N/A

Path to each folder
C:\Program Files\MITSUBISHI ELECTRIC\NC Machine Tool Connector\pki\certs
When the installation folder of this product is changed, replace the path before "\MITSUBISHI ELECTRIC".
The above are the recommended folders for NC Machine Tool Connector. The folder can be changed in the setting screen (refer to "7.6.7 OPC UA Setting Screen"). However, it is generally recommended to not store certificates in folders other than the above.

Note

(1) Note that the certificate stored by default is a sample. Mitsubishi Electric does not grant this certificate for commercial purposes.
Mitsubishi Electric shall not be liable for any damages including, but not limited to, loss of profits, business interruption, loss of business information, and other pecuniary damages caused by using the certificate for such a purpose. In addition, Mitsubishi Electric have no liability for defect warranty nor quality responsibility.

6.3.2 Security Settings

To enable settings

Security settings such as user authentication and certificates can be enabled or disabled using the configuration tool. Refer to "7.5 Server Connection Setting Screen" for the setting method.

To enable certificate

When "Allow None access" is unchecked on the server setting screen, mutual authentication using NC Machine Tool Connector and OPC UA client certificates is required.
In this case, follow the procedure below to store the server and client certificates in the specified folders.

(1) On the computer with the OPC UA client installed, set the certificate and the corresponding private key (*1) in accordance with the product specifications of the OPC UA client.
(2) Store the unexpired certificate of the OPC UA client which has already been set in (1) to certificate management folder (certs) for clients.
(3) Set "uasvkey.der" stored in the certificate management folder (certs) for the server in accordance with the product specifications (*2) of the OPC UA client.

(*1) The setting method may differ depending on the OPC UA client.
Use the certificate and private key recommended by the OPC UA client product.
To update the certificate and private key, refer to the manual of your OPC UA client.
(*2) The setting method may differ depending on the OPC UA client.
It is necessary to set the server certificate of this product to be trusted.

To use custom certificate

To use your own certificates instead of the default certificates included in the package of this product (See "6.3.1 Certificate Management".), contact the support for this product.

7

Configuration Tool Functions

7.1 List of Functions

List of functions of the configuration tool is shown below.

Functions		Details	Reference
Category	Function classification		
Management	Setting information management	Manages the setting information (project) of the NC Machine Tool Connector.	-
	Server settings	Configures the connection settings and security settings with the NC Machine Tool Connector.	7.5 Server Connection Setting Screen
Settings	Communication settings	Adds a machine to connect to the NC Machine Tool Connector, makes communication settings, and confirms the communication status with the connected machine.	7.6 Machine Connection
	Machine settings	Sets the specifications of the machine connected to the NC Machine Tool Connector.	7.7 Collection Settings of Machines
	Collection Settings	Configures collection settings of nodes, PLC devices, CNC data, MTConnect data tags, and OPC UA data tags to be collected by NC Machine Tool Connector.	
	Data logging settings	Configures the settings to log the collected nodes and tags to a database.	7.9 Data Logging Settings
	Data publish settings	Configures the settings to publish the collected nodes and tags to an MQTT broker.	7.10 Data Publish Settings
Diagnosis	Monitoring function	Monitors the nodes and PLC device tags to be collected by the NC Machine Tool Connector and outputs the communication status log.	7.8 Monitor Diagnostics
Output	Operation log output	Displays the communication log with the NC Machine Tool Connector.	7.4 Main Screen

7.2 Startup and Termination

Startup procedure

Select [Start] - [MITSUBISHI ELECTRIC NC Machine Tool Connector] - [NC Machine Tool Configurator] of Windows to start the configuration tool.

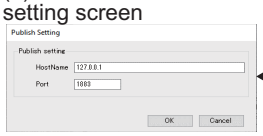
Termination procedure

Select [File] - [Exit] from the configuration tool menu.

7.3 Screen Configuration

The configuration of the setting screens of the configuration tool is shown below.

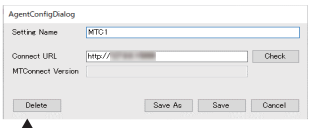
(3) MQTT broker connection setting screen



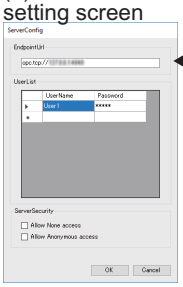
Version information screen

(2) Machine setting screen

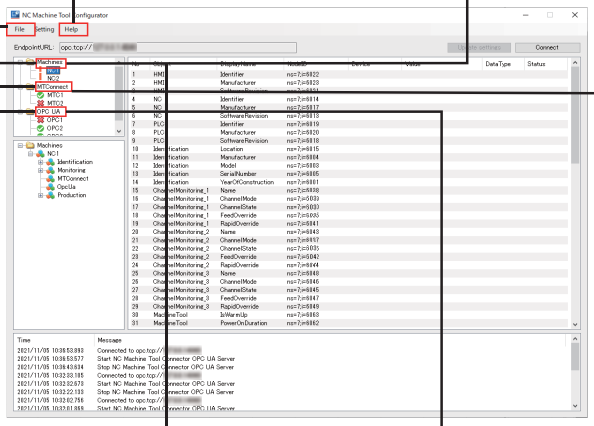
(7) MTConnect agent setting screen



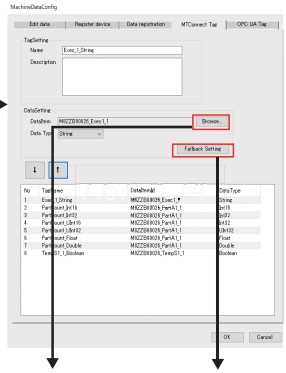
(4) Server connection setting screen



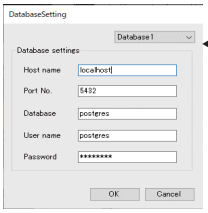
(1) Main screen



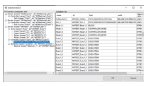
(12) MTConnect data registration screen



(5) Database setting screen

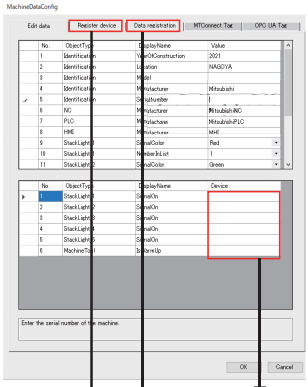


MTConnect data selection screen

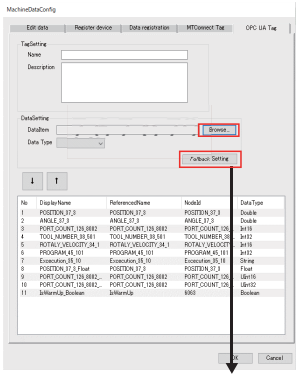


Fallback setting screen

(9) Machine data edit screen



(15) OPC UA data registration screen

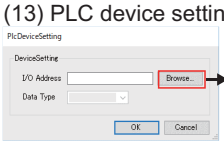


(14) OPC UA setting screen

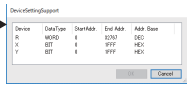
(6) Data logging setting screen

(8) Publishing data setting screen

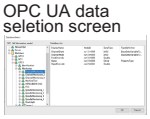
(13) PLC device setting screen



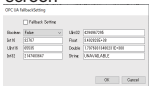
PLC device selection



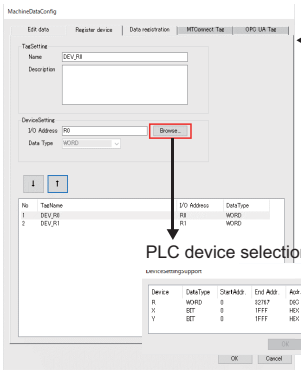
OPC UA data seletion screen



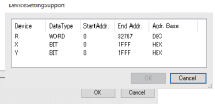
Fallback setting screen



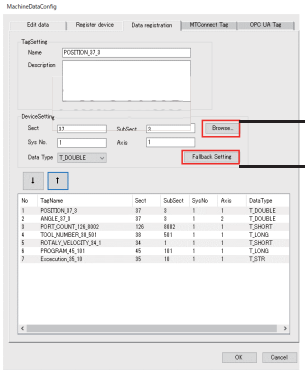
(10) PLC device registration screen



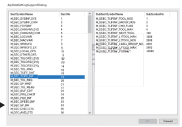
PLC device selection screen



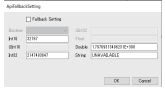
(11) CNC data registration screen



CNC data seletion screen



Fallback setting screen



Screen name	Description	Reference
(1) Main screen	The following operations can be performed on this screen. • Registering machines to be connected. • Listing information models of connected machines. • Performing node collection settings and monitor diagnostics. • Displaying communication logs of an OPC UA server.	7.4 Main Screen
(2) Machine setting screen	Registers, edits, and deletes machine information.	7.6.1 Machine Setting Screen
(3) MQTT broker connection setting screen	Configures connection settings of an MQTT broker.	7.10.1 MQTT Broker Settings
(4) Server connection setting screen	Configures connection settings of an OPC UA server.	7.5 Server Connection Setting Screen
(5) Database setting screen	Configures a database to log collected data items.	7.9.1 Database Settings
(6) Data logging setting screen	Configures data items to be logged to the database.	7.9.2 Data Logging Settings
(7) MTConnect agent setting screen	Configures an MTConnect agent to connect to this product.	7.6.6 MTConnect Setting Screen
(8) Publishing data setting screen	Configures a data item to be published.	7.10.2 Data Publish Settings
(9) Machine data edit screen	Edits machine information.	7.6.3 Machine Data Edit Screen
(10) PLC device registration screen	Registers or deletes devices to be collected for each machine.	7.6.4 PLC Device Registration Screen
(11) CNC data registration screen	Configures arbitrary data of Mitsubishi Electric custom API to be collected.	7.6.5 CNC Data Registration Screen
(12) MTConnect data registration screen	Registers data to be collected by this product.	7.6.6 MTConnect Setting Screen
(13) PLC device setting screen	Configures PLC devices.	7.6.3 Machine Data Edit Screen
(14) OPC UA setting screen	Registers, edits, and deletes an OPC UA server to be connected with this product.	7.6.7 OPC UA Setting Screen
(15) OPC UA data registration screen	Configures an OPC UA server to collect data.	7.6.7 OPC UA Setting Screen

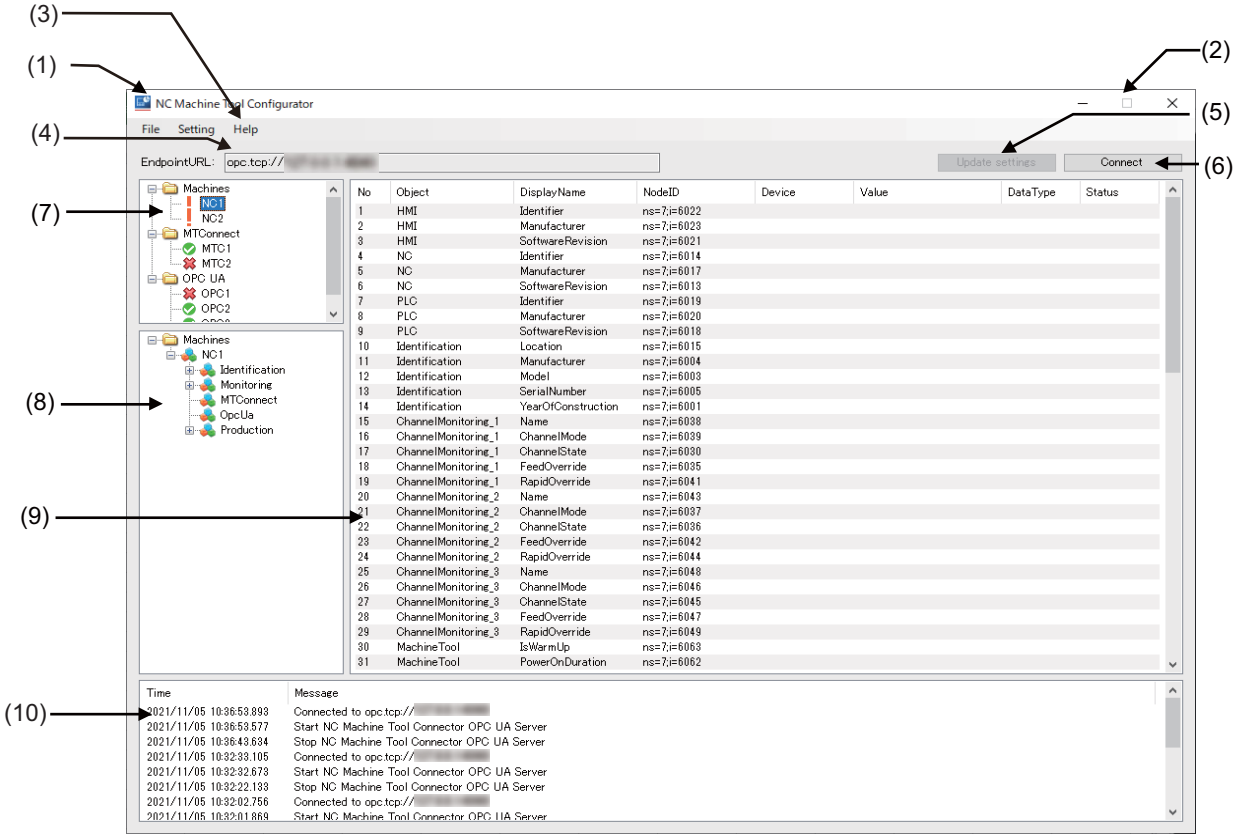
7.4 Main Screen

7.4.1 Overview

When the configuration tool is started, the following screen appears.

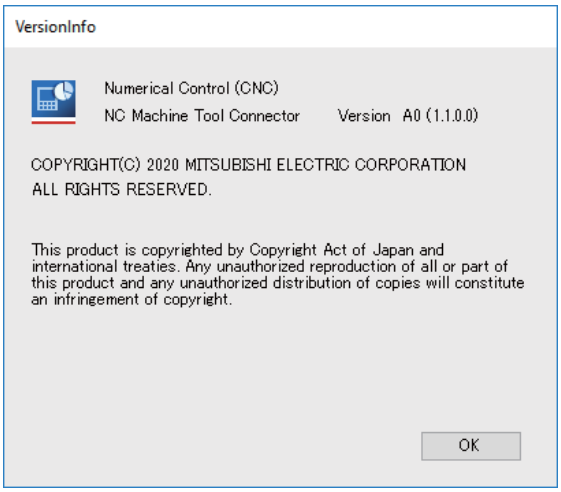
Main operations can be performed on this screen are as follows.

- Selects menus on each setting screens.
- Registers machines to be connected.
- Lists information model of connected machines.
- Performs node collection settings and monitor diagnostics.
- Displays the communication log of the NC Machine Tool Connector.



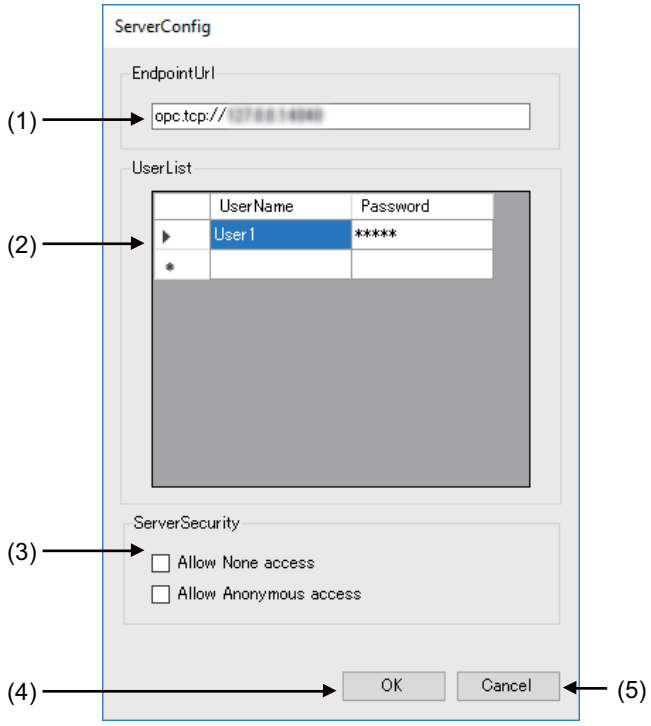
Display items		Description	Reference
(1)	Title header section	Displays the configuration tool name and a project file name.	-
(2)	Window operation button	Minimizes, maximizes, or closes the window.	
(3)	Menu bar	Menus for various settings and help.	7.4.2 Menu Configuration
(4)	End point URL display section	Displays the endpoint URL of the connecting NC Machine Tool Connector.	7.5 Server Connection Setting Screen
(5)	Update settings button	Reflects the latest settings to the NC Machine Tool Connector.	7.7 Collection Settings of Machines
(6)	Connect button	Starts or terminates monitor diagnostics. The button display varies as follows depending on the connection status of the server. Server unconnected status: Connect Server connected status: Disconnect	7.5 Server Connection Setting Screen
(7)	Machine list display section	Displays a list of registered machine names for which collection settings can be made.	7.6 Machine Connection
(8)	Information model display section	Displays the referable information model of the selected machine.	7.7 Collection Settings of Machines
(9)	Monitor display section	Displays the collection settings and monitor display for each machine.	7.8 Monitor Diagnostics
(10)	Communication log display section	Displays the communication log with the server.	7.8 Monitor Diagnostics

7.4.2 Menu Configuration

Menu		Description	Reference
File	Set server	Moves to the server connection setting screen.	7.5 Server Connection Setting Screen
	Database settings	Displays the database setting screen.	7.9.1 Database Settings
	Publish setting	Displays the setting screen of an MQTT broker.	7.10.1 MQTT Broker Settings
	Exit	Terminates the configuration tool.	7.2 Startup and Termination
Setting	Set monitor cycle	Sets the display update cycle during monitor diagnosis. (This is not the data collection cycle from the NC Machine Tool Connector machine.)	-
	Language	Sets the display language of the configuration tool.	-
Help	Version information	Displays the version information dialog. <Display example> 	-

7.5 Server Connection Setting Screen

Select [Setting] - [Set server] on the main screen to display the server connection settings screen.
If the monitor display is not updated when the [Connect] button is clicked on the main screen, the connection settings of the NC Machine Tool Connector need to be changed.



Display items		Description
(1)	EndpointUrl	Set the endpoint URL of the NC Machine Tool Connector to which the OPC UA client connects. Default value: opc.tcp://127.0.0.1:4840 <Note> • Set a port number (default value "4840" part) which does not overlap with other applications on the local PC.
(2)	UserList	Set the user name and password used when authenticating the OPC UA client which is allowed to be connected. Default value: Unregistered <Note> • When "Allow Anonymous access" in (3) is not checked, this item must be set. • When the password is entered, the entered content is displayed as "*" (mask display).
(3)	ServerSecurity	By checking items in this section, non-secure mode communication with the OPC UA client becomes valid. Allow None access: Allows certificateless client connections. (When this item is checked, "Allow Anonymous access" is also checked automatically.) Allow Anonymous access: Allows unregistered users to connect. Default value: unchecked
(4)	OK button	Save the settings and close this screen. The settings are reflected on the NC Machine Tool Connector.
(5)	Cancel button	Discards the settings and closes this screen.

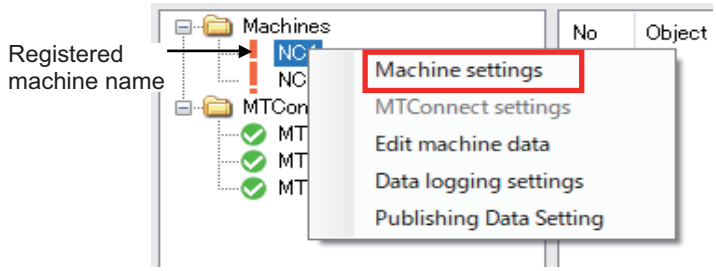
7.6 Machine Connection

To collect data from the machine using the NC Machine Tool Connector, the connection settings for the target machine need to be set first.

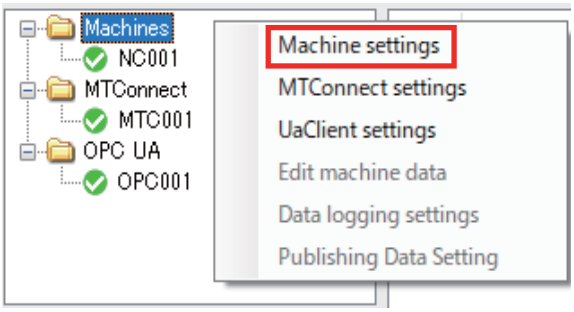
7.6.1 Machine Setting Screen

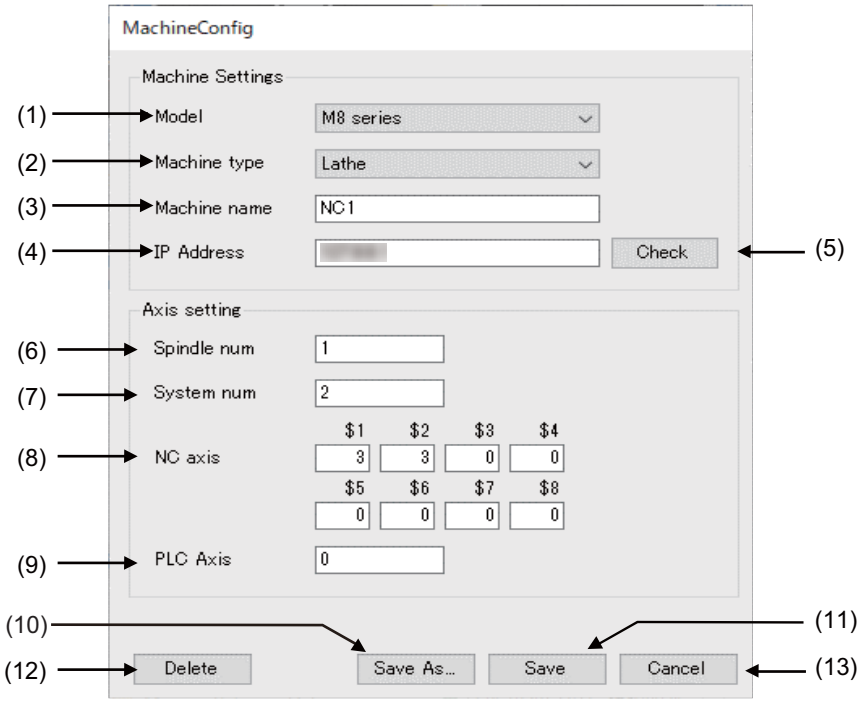
The connected machine can be added or edited from the machine list display section on the main screen.

[Adding a new machine]
When you right-click and select [Set machine] in the area of the machine list display section without selecting registered machine, the machine setting screen appears.
[Editing the settings of registered machines]
Select the machine you want to edit from the machine list display section, right-click and select [Set machine] to display the machine setting screen.



Select the area without selecting machines, and right-click to add a new machine.

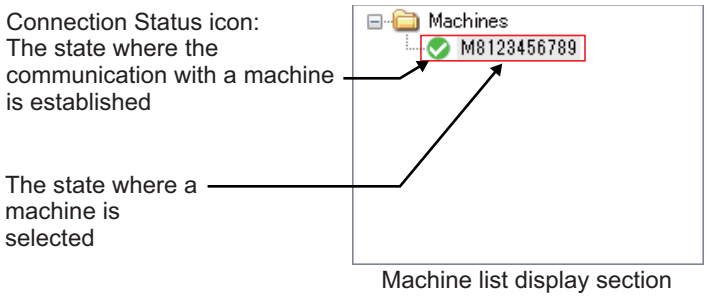




Display items		Description
(1)	Model	Select the model name of the machine to add or set from the list. The model can be selected from the following options. M8 Series: M800W/M800S/M80W/M80/E80/C80 M8V Series: M800VW/M800VS/M80VW/M80V M7 Series: M700V/M70V/E70/M700/M70
(2)	Machine type	Set the type of machine. M/C/Lathe (machining center or lathe system)
(3)	Machine name	Set the name (machine manufacturing number, etc.) of the machine to be added. Set within 11 half-width alphanumeric characters.
(4)	IP Address	Set the IP address of the machine to be connected. Set an IP address that does not overlap with the IP addresses of the machines that are already added.
(5)	Check button	Check the connection with Ping for the machine set in (2).
(6)	Spindle num	Set the number of spindles of the machine. (0 to 8) The total number of control axes varies depending on the CNC type. The total number of axes is not checked.
(7)	System num	Set the number of systems of the machine. (1 to 8) The total number of control axes varies depending on the CNC type. The total number of axes is not checked.
(8)	NC axis	Set the number of CNC axes for each machine system. (0 to 8) The setting that exceeds the number of systems will be invalid. The total number of control axes varies depending on the CNC type. The total number of axes is not checked.
(9)	PLC axis	Set the number of PLC axes of the machine. (0 to 8) The total number of control axes varies depending on the CNC type. The total number of axes is not checked.
(10)	Save As button	Registers and saves as a new machine, and closes this screen. The added contents are applied to NC Machine Tool Connector. When each setting item of Machines, MTConnect, or OPC UA exceeds 30, an error message will appear and the machine setting screen cannot be opened.
(11)	Save button	Saves the setting contents of the machine being edited and closes this screen. The setting contents are applied to NC Machine Tool Connector.
(12)	Delete button	After displaying the delete confirmation dialog, deletes the machine being edited and closes this screen. The deleted contents are applied to NC Machine Tool Connector. The machine being selected in the machine list is deleted regardless of the editing contents.
(13)	Cancel button	Discards the settings and closes this screen.

7.6.2 Communication Status with Machine

The established status of communication between the machine and NC Machine Tool Connector can be confirmed with the connection status icon.



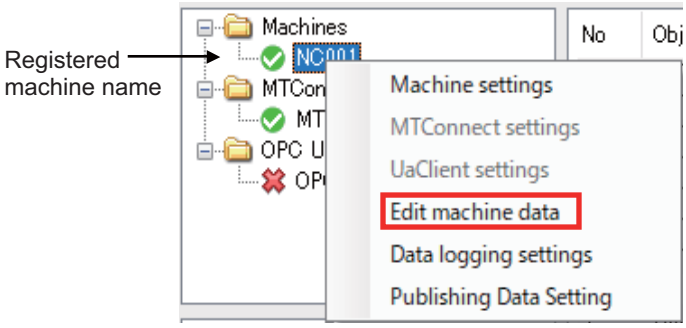
Machine list display section

Icon	Status	Details
	Checking status	The NC Machine Tool Connector is checking the connection with the CNC, MTConnect agent, or OPC UA server, such as immediately after adding a machine. It is displayed until the communication with the CNC, MTConnect agent, or OPC UA server is established.
	Connection is not possible.	Communication with CNC, MTConnect agent, or OPC UA server is not possible. Check the network connection status with the machine or the setting contents on the machine setting screen. (Refer to "7.6.1 Machine Setting Screen".)
	Connection is possible. (Model identification is possible.)	Communication between NC Machine Tool Connector and CNC, MTConnect agent, or OPC UA server is possible. OPC UA communication is possible between the NC Machine Tool Connector and OPC UA client. The information model of the machine is displayed in the information model display section by default.
	Model identification is not possible.	Communication is not possible between the NC Machine Tool Connector and CNC because connected machine is not supported. (Depending on the model, only data communication may be possible.)

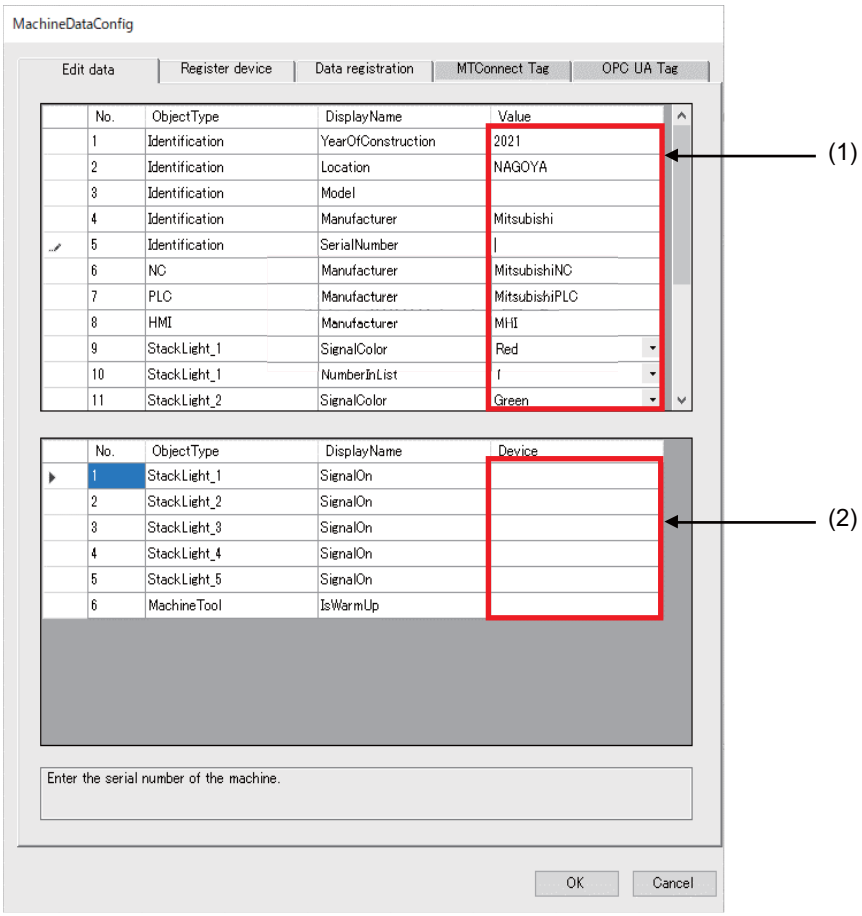
Depending on the settings in the configuration tool and the communication status of the machine, communication may not be established even though the machine has already established communication.

7.6.3 Machine Data Edit Screen

The initial value of machine information can be set from the machine list display section of the main screen.
Select the machine you want to set from the machine list display section, right-click and select [Edit machine data] to display the machine data edit screen.



The editable screen differs depending on the selected machine type (NC type of "Machines", "MTConnect" or "OPC UA" in the tree of machines). The tab background of the uneditable screen is displayed in gray and those tabs cannot be switched. (In the screen below, "MTConnect Tag" and "OPC UA Tag" are not available.)



Data settings on the [Edit data] tab

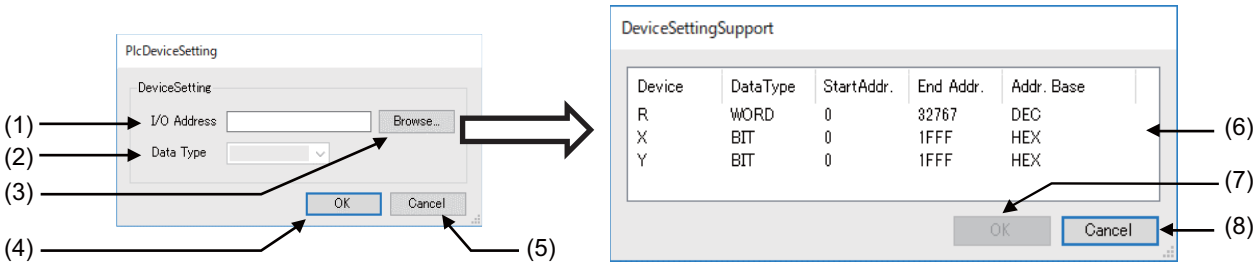
In the area of [Edit data] tab (1), set the initial value of the variable corresponding to the umati information model.

Setting display items			Settings contents	Setting examples
No.	Object Type	DisplayName		
1	Identification	YearOfConstruction	The year of construction Set in the range of 1960 to 2050.	2019
2	Identification	Location	Machine installation building and place Set within 64 characters.	Hole 9-Stand D40
3	Identification	Model	Machine model name Set within 64 characters.	iMulti Machine
4	Identification	Manufacturer	Machine manufacturer name Set within 64 characters.	Mitsubishi Electric Corporation
5	Identification	SerialNumber	Machine serial No. Set within 64 characters.	M8123456789
6	SoftwareIdentification_1	Manufacturer	CNC manufacturer name Set within 64 characters.	Mitsubishi Electric Corporation
7	SoftwareIdentification_2	Manufacturer		
8 + 2(n-1) (*1)	StackLight n (*1)	SignalColor	Select the display color corresponding to the No. 9 stack light from the following options. 0.(No setting) 1. Red 2. Green 3. Blue 4. Yellow 5. Purple 6. Cyan 7. White	1. Red
9 + 2(n-1) (*1)	StackLight n (*1)	NumberInList	Stack light position (sequence No. from wiring side) Set within the range of 1 to 5.	1

(*1) n = 1 to 5

PLC device settings for stack lights

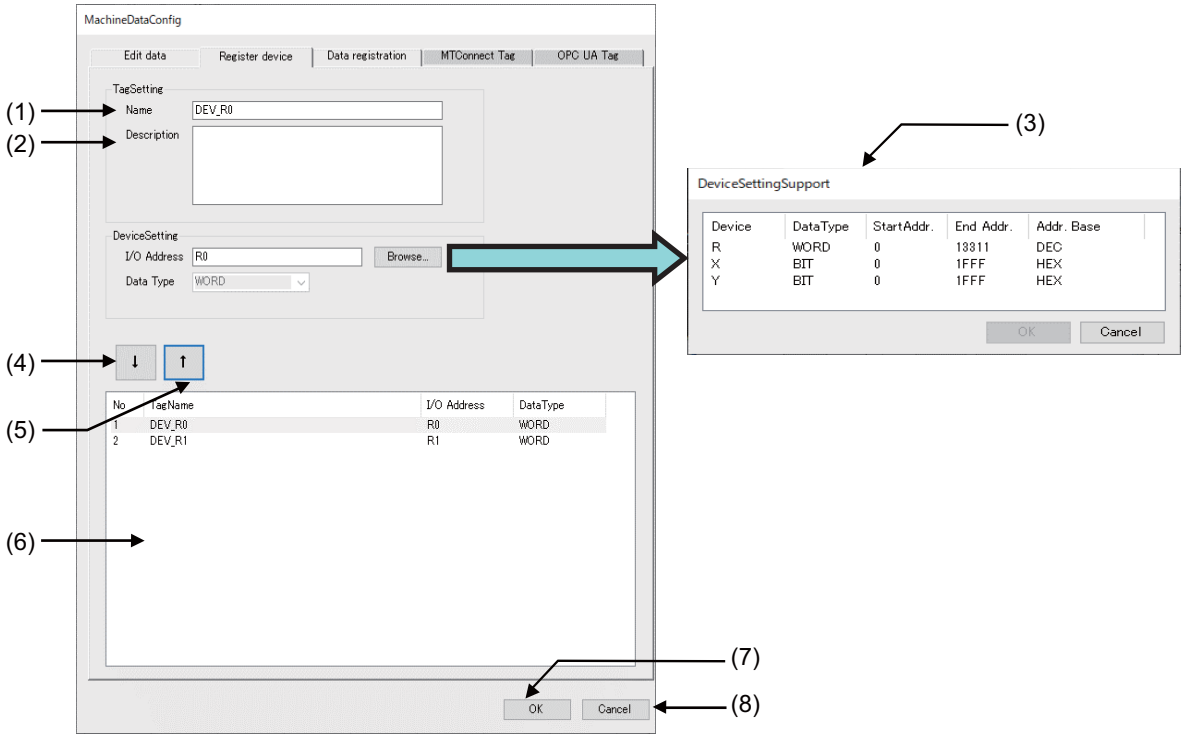
In the area of the [Edit data] tab (2), set the PLC device to be associated with the stack light (StackLight1 to 5).
Click the "Device" column to display the PLC device selection dialog.
Set the PLC device according to the table below.



Display items		Description
(1)	I/O Address	The PLC device type (X/Y) to be added can be set from the PLC device selection dialog. Enter the device number after the set device type. Device numbers out of range cannot be set.
(2)	DataType	The device corresponding to the device type selected in (1) is automatically set. 1. WORD 2. BIT Set the data type according to the device type.
(3)	Browse button	The PLC device selection dialog ((6) to (8)) appears. Refer to and select the PLC device that can be set in (1).
(4)	OK button	Save the settings and close the screen. The set PLC device is displayed in the Device column of the data edit tab.
(5)	Cancel button	Discards the settings and closes the screen.
(6)	Device selection area	When a row is selected for device type, the selected row is highlighted.
(7)	OK button	Sets the selected device type in (1) of the PLC device setting screen.
(8)	Cancel button	Returns to the PLC device setting dialog without selecting the device type.

7.6.4 PLC Device Registration Screen

Select the device registration tab on the machine data edit screen to display the PLC device registration screen.
Users can make the NC Machine Tool Connector collect PLC device data by setting the collection settings for any PLC device set from this screen (refer to "7.7 Collection Settings of Machines").

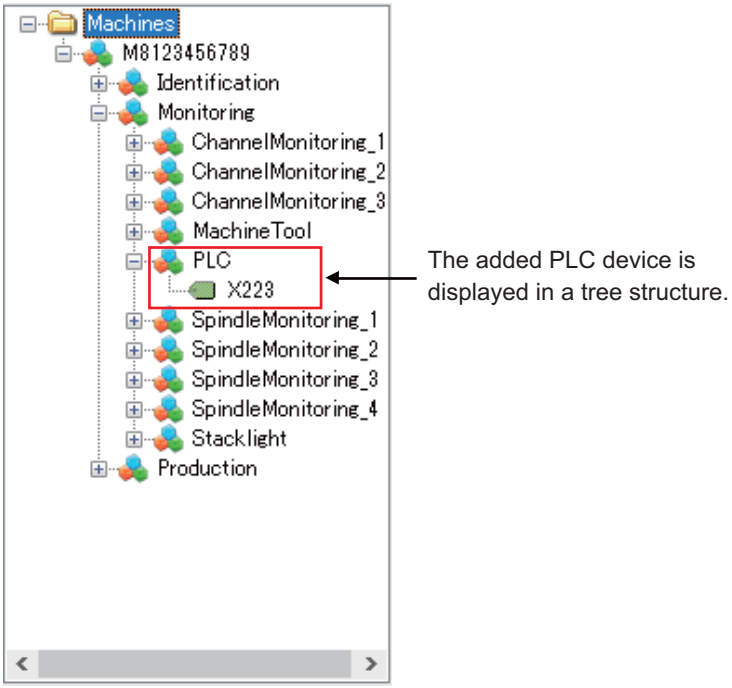


Display items		Description
(1)	Name	Set the tag name of the PLC device to add. Set within 32 half-width alphanumeric characters.
(2)	Description	Set the outline of PLC device data. (Optional) Set within 50 full-width characters.
(3)	PLC device selection dialog	Set the PLC device number to add. Only X, Y, and R devices can be set. Refer to "PLC device settings for stack lights" in "7.6.3 Machine Data Edit Screen". When the machine being edited is M700/M70, data of between R0 and R13311 can be collected from NC. When any of R13312 to R32767 is set, the R device value is not output and [Bad] is displayed in "Status" of the monitor diagnosis.
(4)	[↓] button	The settings contents of (1) and [Device Setting] are registered in the device registration area (6).
(5)	[↑] button	The information of the PLC device selected in the device registration area (6) is reflected in [Device Setting].
(6)	Device registration area	Lists the additionally configured PLC devices. (PLC device tag name, PLC device name, data type)
(7)	OK button	Save the settings and close the screen. The set PLC device is added to the information model display section. You can add up to 50 devices in total. <Note> • If the data type of (3) does not match, it cannot be saved.
(8)	Cancel button	Discards the settings and closes the screen.

To delete the registered PLC device, select the PLC device to delete in the device registration area and perform one of the following operations.

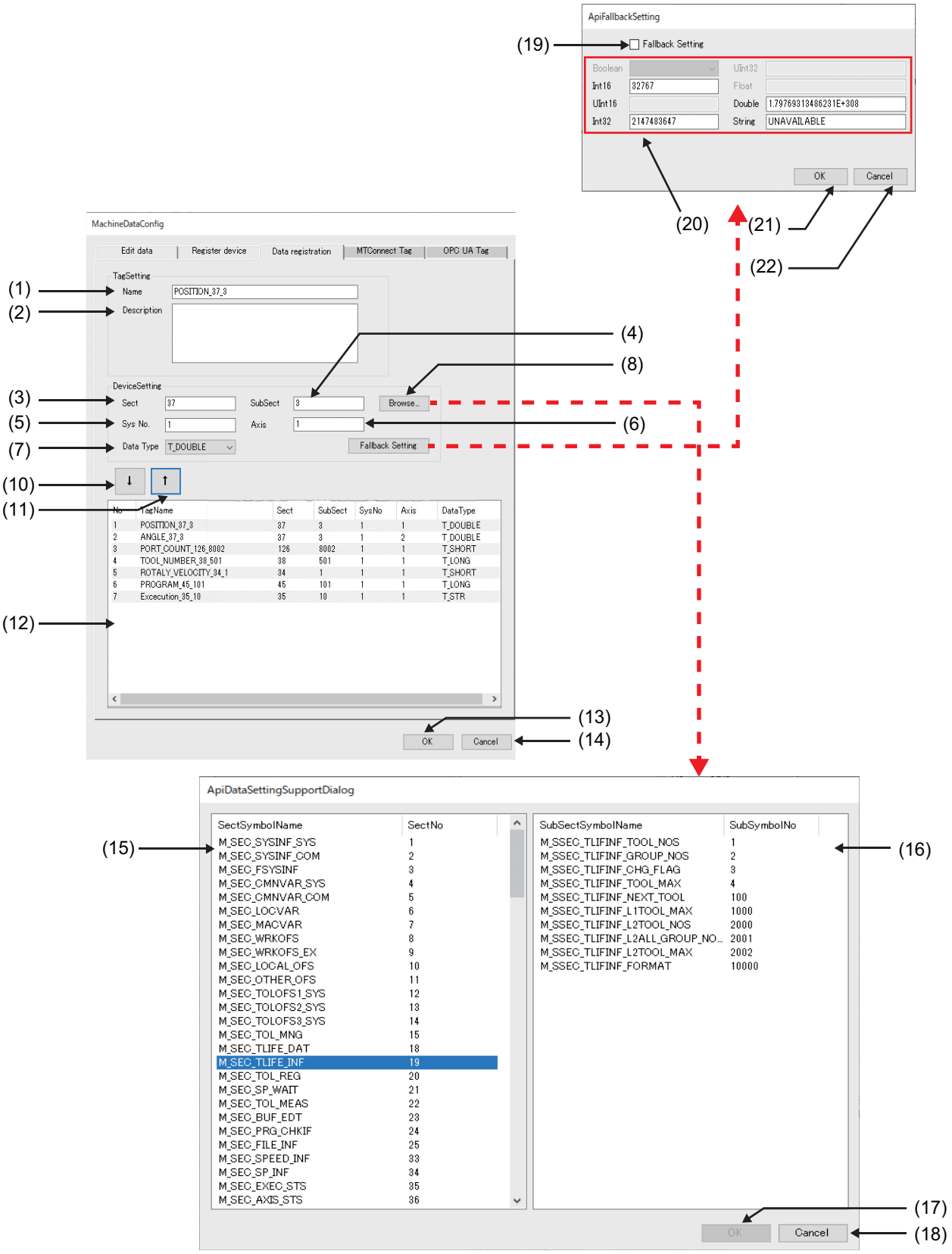
- Right-click and select [Delete].
- Press the [Delete] key on the keyboard.

When PLC device is correctly added and set, [PLC] - [(tag name corresponding to the PLC device)] is displayed in a tree structure in the information model display section of the main screen.



7.6.5 CNC Data Registration Screen

Select the [Data registration] tab in the machine data edit screen to display the CNC data registration tab screen. By configuring the collection settings (refer to "7.7 Collection Settings of Machines") for arbitrary data of Mitsubishi Electric custom API set in this screen, NC Machine Tool Connector can collect data of Mitsubishi Electric CNC.



Display items		Description
(1)	Name	Set a tag name (arbitrary name) of the CNC data to be added. Set within 15 half-width alphanumeric characters. In addition to the half-width alphanumeric characters, '_' (under score) can be used.
(2)	Description	Set the outline of the CNC data. (Optional) Set within 50 full-width characters.
(3)	Sect	Set the section number of the CNC data to configure the collection settings. When data is selected in the CNC data selection dialog, this number is set automatically. <Note> • The setting range differs depending on the CNC version. Refer to "Custom API Variables List" (BNP-C3072-152). • When a number that exceeds the setting range is set, the number cannot be registered to the CNC data registration area.
(4)	SubSect	Set the subsection number of the CNC data to configure the collection settings. When data is selected in the CNC data selection dialog, this number is set automatically. <Note> • The setting range differs depending on the CNC version. Refer to "Custom API Variables List" (BNP-C3072-152). • When a number that exceeds the setting range is set, the number cannot be registered to the CNC data registration area. • When the data specified by the section number and the subsection number is PLC device, the range to collect R register data differs depending on the machine being edited. Refer to the item "PLC device selection dialog" in "7.6.4 PLC Device Registration Screen".
(5)	Sys No.	Set the system number of the CNC data designated in (3) and (4). For data other than CNC axes, set 1. A number that exceeds the number of systems or axes designated in the machine setting screen cannot be set.
(6)	Axis	Set the axis number of the CNC data designated in (3) and (4). Designate a correct number of the CNC axis, spindle, or PLC axis in accordance with the contents of the data. A number that exceeds the number of systems or axes designated in the machine setting screen cannot be set.
(7)	Data Type	Designate the collection data type of the CNC data designated in (3) and (4). SHORT, INT, DOUBLE, or STRING can be selected. Designate the data type in accordance with the contents of the CNC (custom API subsection) data. (*1) For output data types, refer to "4.1 Product Specifications". The output data type can be checked by the monitoring diagnostics. For the data types supporting API, refer to "Custom API Variables List" (BNP-C3072-152). When selecting a different data type to the variable table, the contents of the output data will not be guaranteed.
(8)	Browse button	Displays the CNC data selection dialog.
(9)	Fallback Setting button	Displays the Fallback setting dialog.
(10)	[↓] button	Displays the CNC data set in (1) to (7) in the CNC data registration area (12).
(11)	[↑] button	Automatically sets the CNC data setting information selected in the CNC data registration area (12) to the input areas (1) to (7). Update the setting contents with the [↓] button (10) after editing the contents of the input areas.
(12)	CNC data registration area	Lists the additionally configured CNC data. The setting contents can be changed by selecting the row and pressing the [↑] button (11). Make sure to press the OK button (13) to confirm the setting contents.
(13)	OK button	Saves the contents in the CNC data registration area and closes the screen. The set CNC data is added to the information model display section in the main screen. The data is added with the tag name designated in (1) in the MITSUBISHI ELECTRIC folder.
(14)	Cancel button	Discards the settings and closes the screen.
(15)	CNC data list (section)	Lists the CNC data (section) that can be set. When a row is selected, it is inverted, and the CNC data (subsection) corresponding to the selected section number is displayed in the CNC data list(15). <Note> • Data cannot be input. • The display contents may differ depending on the CNC version. Refer to "Custom API Variables List" (BNP-C3072-152).
(16)	CNC data list (subsection)	Lists the CNC data (subsection) corresponding to the section number selected in (14). When the CNC data (subsection) to be collected is selected, the corresponding row is inverted, <Note> • Data cannot be input. • The display contents may differ depending on the CNC version. Refer to "Custom API Variables List" (BNP-C3072-152).

Display items		Description
(17)	OK button	Automatically sets the CNC data numbers (section, subsection) selected in (15) to (3) and (4) in the CNC data registration screen.
(18)	Cancel button	Returns to the CNC data registration screen without selecting CNC data.
(19)	Fallback availability setting	Select the checkbox to enable the fallback settings. (Default: Disabled)
(20)	Fallback settings	Sets the fallback value (default value) as the collection data for each data type to be stored during data logging and data publishing when a collection error occurs for a registered data item while communicating with a Mitsubishi Electric CNC connected to NC Machine Tool Connector. This is a setting that applies to the data type set in (7). It does not apply to each type of CNC data. <Data types that can be set and the setting range> Int16: -32768 to 32767 Int32: -2147483648 to 2147483647 Double: 4.94065645841247E-324 (absolute value) to 1.79769313486231E308 (absolute value) String: 127 half-width alphanumeric characters When this setting is disabled, if any data that has been set as a target of data collection cannot be collected from Mitsubishi Electric CNC, the CNC data for the corresponding cycle is missing and is not stored, or the data is not logged or published. For Float or Double type, if the precision of the absolute value exceeds the lower limit, the setting value will be 0.
(21)	OK button	Saves the fallback setting and closes the dialog.
(22)	Cancel button	Discards the fallback setting and closes the dialog.

(*1)

Designated data type (*2) (API Supported data type)	Output data type
T_SHORT	Int16
T_LONG	Int32
T_CHAR	
T_DOUBLE	Double
T_STR(*3)	String (up to 127 characters)

(*2) The data of T_BUFF, T_DLONG, T_FLOATBIN, or T_USHORT cannot be collected.

(*3) Designate the data of T_LONG(BIT) type as T_STR.

(*4) The fallback settings of MTConnect cannot be used for NC data. Refer to "7.6.6 MTConnect Setting Screen" for the MTConnect fallback settings.

When CNC data is correctly added and set in the CNC data registration screen, [MITSUBISHI ELECTRIC] - [(tag name corresponding to the CNC data)] is displayed in a tree structure in the information model display section.

7.6.6 MTConnect Setting Screen

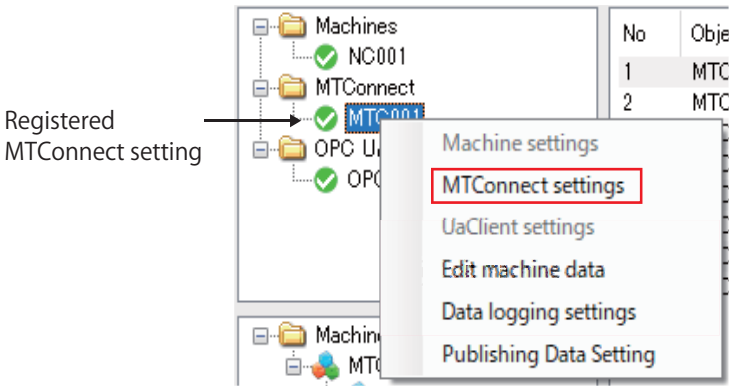
To collect MTConnect data, the connection setting between this product and an MTConnect agent is necessary.
For the connection between an MTConnect agent and an actual machine, refer to the manual of the software of MTConnect or the machine to be used.

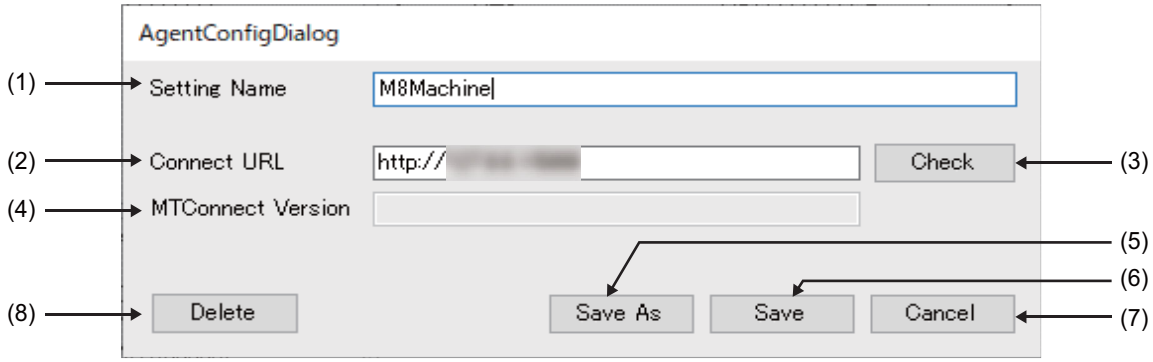
Adding an MTConnect agent

Before configuring MTConnect data collection settings, set the MTConnect agent to connect to this product. The machine to be connected can be added or set in the machine list display section on the main screen.

[Adding a new machine]
Right-click in the MTConnect area of the machine list display section without selecting any registered MTConnect agent, and select [MTConnect settings] to display the MTConnect setting screen.

[Editing the settings of a registered machine]
Select the MTConnect agent to be edited in the machine list display section, right-click, and select [MTConnect settings] to display the MTConnect setting screen.





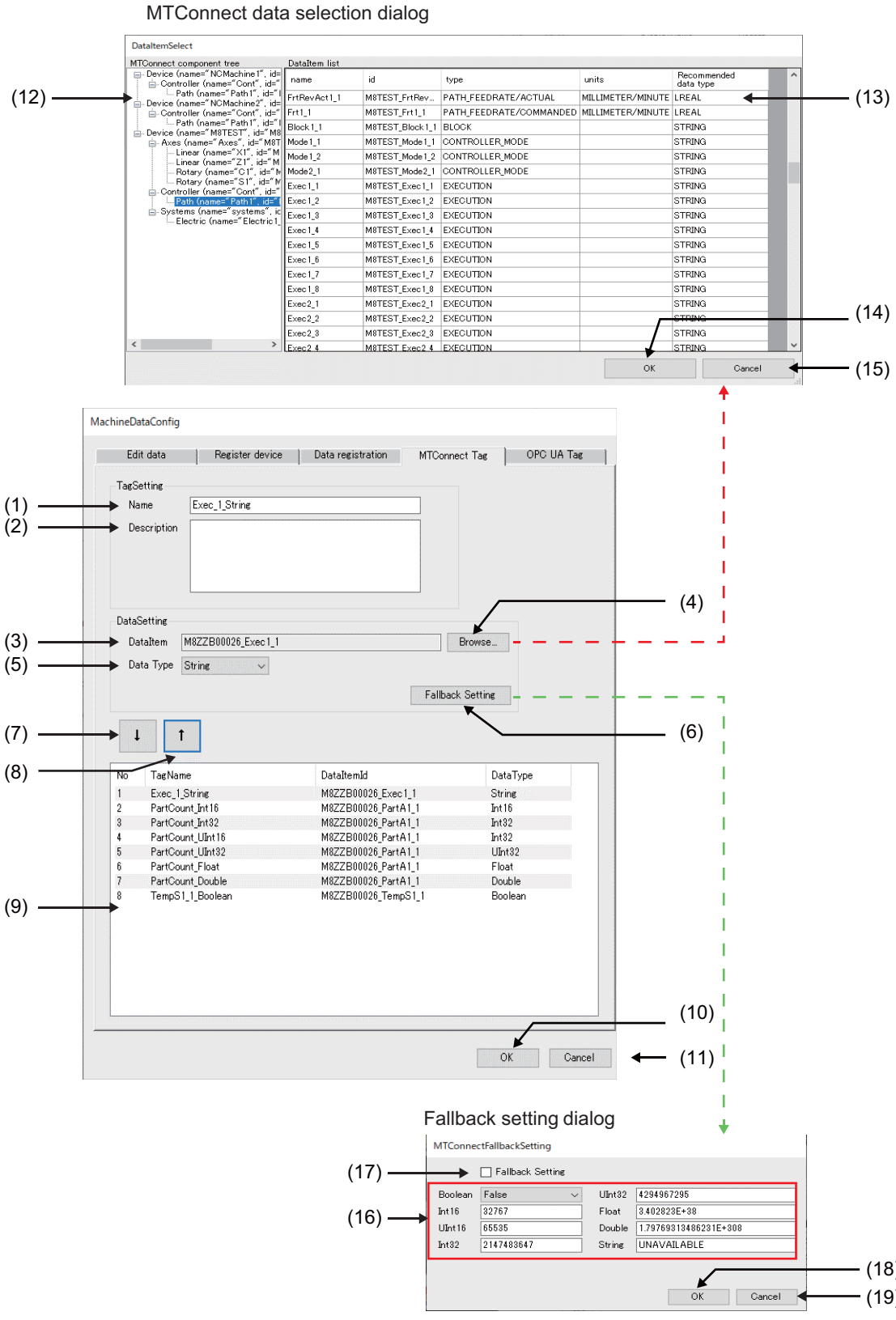
Display items		Description
(1)	Setting Name	Set an arbitrary display name of the MTConnect agent in the list display area. Set within 11 half-width alphanumeric characters.
(2)	Connect URL	Set the URL of the MTConnect agent to be connected. Designate http:// (IP address):(port number). Default value: http:// <Note> • Set within 128 characters. • localhost cannot be designated.
(3)	Check button	Checks the connection to the MTConnect agent designated in (2). Pressing the button displays the following message dialogs depending on the check result. • When connection succeeds: Connection Successfully • When connection fails: Connection Failed The connection check times out in 10 seconds.
(4)	MTConnect Version	Displays the version name automatically when the check button (3) is pressed and the connection to the MTConnect agent succeeds. Settings cannot be input.
(5)	Save As button	Saves the settings and closes the setting screen. When each setting item of Machines, MTConnect, or OPC UA exceeds 30, an error message will appear and the MTConnect setting screen cannot be opened.
(6)	Save button	Saves the setting contents. Settings can be continued.
(7)	Cancel button	Discards the settings and closes the setting screen.
(8)	Delete button	Deletes the MTConnect settings being edited. After being deleted, the settings will be hidden from the machine list display.

Collection data settings of MTConnect

Select the [MTConnect Tag] tab in the machine data edit screen to display the MTConnect tag registration tab screen. By configuring the collection settings (refer to section "7.7 Collection Settings of Machines") for arbitrary data of MTConnect set in this screen, MTConnect data can be collected with NC Machine Tool Connector.

Register the MTConnect data to be collected in the MTConnect Tag tab. Register the MTConnect data for each MTConnect agent added and set in the MTConnect setting screen.

MTConnect data selection dialog



Fallback setting dialog

Display items		Description
(1)	Name	Set a tag name (arbitrary name) of the MTConnect data to be added. Set within 32 half-width alphanumeric characters. In addition to the half-width alphanumeric characters, '_' (under score) can be used.
(2)	Description	Set the outline of the MTConnect data. (Optional setting) Set within 50 full-width characters.
(3)	DataItem	Set the data item ID of the MTConnect data to configure the collection settings. When data is selected in the MTConnect data selection dialog, this number is set automatically. The data that can be set differs depending on the product specifications of the MTConnect corresponding to the connected machine.
(4)	Browse button	Displays the MTConnect data selection dialog. The data that can be set differs depending on the product specifications of the MTConnect corresponding to the connected machine.
(5)	Data Type	Designate the collection data type (the supported data type in "4.1 Product Specifications") of the MTConnect data designated in (3) and (4). Designate the recommended data type displayed in the MTConnect data selection dialog (13) for each data item. When selecting a different data type, the contents of the output data will not be guaranteed. The recommended data types are the default type for each data item in "10.2 Appendix 2: MTConnect Recommended Data Types"
(6)	Fallback Setting button	Displays the Fallback setting dialog. When a data collection error occurs at the MTConnect agent to be connected, configure settings as necessary.
(7)	[↓] button	Displays the setting contents of (1) to (5) in the MTConnect data registration area (9).
(8)	[↑] button	Automatically sets the MTConnect data setting information selected in the MTConnect data registration area (9) to the input areas (1) to (5).
(9)	MTConnect data registration area	Lists the set MTConnect data. The setting contents can be changed by selecting the row and pressing the [↑] button (8). Make sure to press the OK button (10) to confirm the setting contents.
(10)	OK button	Saves the contents in the MTConnect data registration area and closes the screen. The set MTConnect data is added to the information model display section in the main screen.
(11)	Cancel button	Discards the settings and closes the screen.
(12)	MTConnect component tree	Displays the components of the tree (information model) of the MTConnect data that can be set. When a row is selected, it is inverted, and the MTConnect data corresponding to the selected row is displayed in the MTConnect data list (13).
(13)	DataItem list	Displays the MTConnect data corresponding to the row selected in (12) in units of data items. When the row of the MTConnect data to be collected is selected, the corresponding row is inverted. Name: Data name of the MTConnect data Id: ID of the MTConnect data Type: Type of the MTConnect data Data Type: Data type of the MTConnect data <Note> • Data cannot be input. • The display contents and data items in the list differ depending on the MTConnect software corresponding to the connected machine. For details, refer to the manual of the product.
(14)	OK button	Automatically sets the MTConnect data (data item ID) selected in (13) to (3) and (5) in the MTConnect tag registration screen .
(15)	Cancel button	Returns to the MTConnect data registration screen without selecting any MTConnect data items.

Display items		Description
(16)	Fallback value setting	Sets the fallback value (default value) for each data type to be stored during data logging and data publishing when a collection error occurs for a registered data item in the MTConnect agent connected to NC Machine Tool Connector. This is a setting that applies to the data type set in (5). It does not apply to each type of MTConnect data. For the data types that can be set and their setting range, refer to "OPC UA Supported data type" in "4.1 Product Specifications". When this setting is disabled, if any data that has been set as a target of data collection cannot be collected with an agent, the MTConnect data for the corresponding cycle is missing and is not stored, and the data is not logged and published. Boolean: 1 bit (1: TRUE/0: FALSE) Int16: -32768 to 32767 UInt16: 0 to 65535 Int32: -2147483648 to 2147483647 UInt32: 0 to 4294967295 Float: 1.401298E-45 (absolute value) to 3.402823E38 (absolute value) Double: 4.94065645841247E-324 (absolute value) to 1.79769313486231E308 (absolute value) String: 127 half-width alphanumeric characters For Float or Double type, if the precision of the absolute value exceeds the lower limit, the setting value will be 0.
(17)	Fallback Setting	Select the checkbox to enable the fallback settings. Default: Disabled When a collection error occurs in the agent while this setting is disabled, the error is not stored.
(18)	OK button	Saves the fallback setting and closes the dialog.
(19)	Cancel button	Discards the fallback setting and closes the dialog.

When MTConnect data is correctly added and set in the MTConnect data registration screen, [MTConnect] - [(tag name corresponding to the MTConnect data)] is displayed in the information model display section.

7.6.7 OPC UA Setting Screen

To collect OPC UA data, connection settings between NC Machine Tool Connector and an OPC UA server is necessary. For the connection between an OPC UA server and an actual machine, refer to the manual of the OPC UA server product or the machine to be used.

Adding an OPC UA server

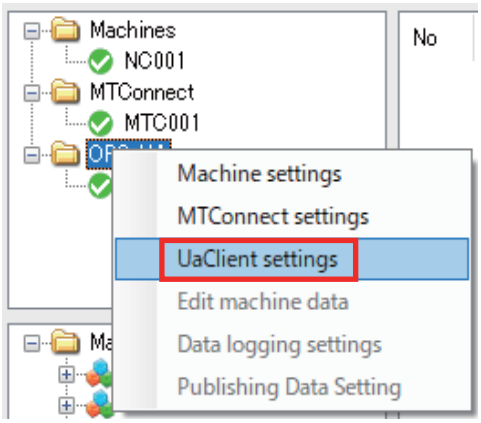
Before configuring OPC UA data collection settings, set the OPC UA server to be connected to NC Machine Tool Connector. The OPC UA server to be connected can be added or set in the machine list display section on the main screen.

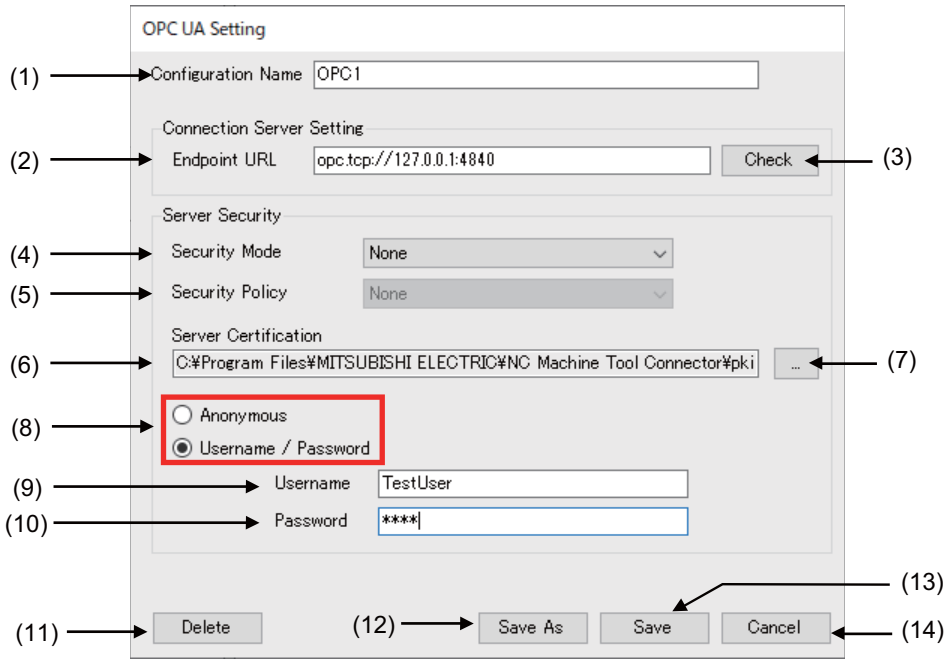
[Adding a new OPC UA server]

Right-click in the OPC UA area of the machine list display section without selecting any registered OPC UA server, and select [UaClient settings] to display the OPC UA setting screen.

[Editing the settings of a registered OPC UA server]

Select the OPC UA server to be edited in the machine list display section, right-click, and select [UaClient settings] to display the OPC UA setting screen.



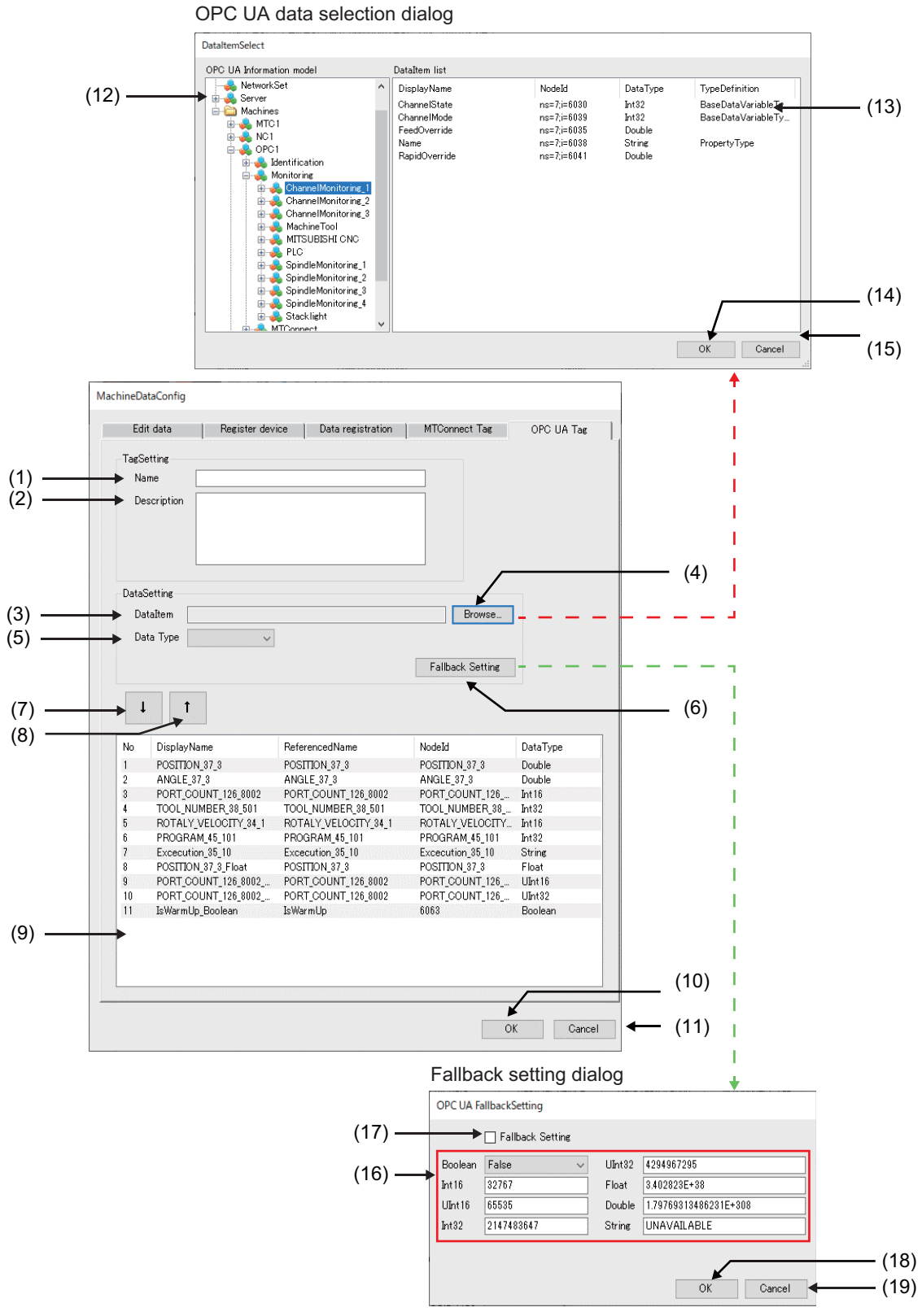


Display items		Description
(1)	Configuration Name	Set an arbitrary display name of the OPC UA server in the list display area. Set within 11 half-width alphanumeric characters.
(2)	Endpoint URL	Set the endpoint URL of the OPC UA server to be connected. Designate opc.tcp:// (IP address):(port number). Default value: opc.tcp:// <Note> • Set within 128 characters. • localhost cannot be designated.
(3)	Check button	Checks the connection to the OPC UA server designated in (2). Pressing the button displays the following message dialogs depending on the check result. • When connection succeeds: Connection Successfully • When connection fails: Connection Failed The connection check times out in 10 seconds.
(4)	Security Mode	Select from the following depending on the settings of the OPC UA server to be connected. 1. None (default setting value) 2. Sign & Encrypt <When 2 is set> The certificates of both sides must be set. For details, refer to "OPC UA client function" in "6.3.1 Certificate Management". When the certificate settings in (7) have not been configured, the settings in this screen cannot be completed. Pressing (12) or (13) displays an error message.
(5)	Security Policy	Displays the following depending on the setting of (4). 1. None 2. Basic256Sha256
(6)	Server Certification	Displays the path of the certificate set in (7). When the correct certificate is not set, communication cannot be established with the server. When a file path does not exist, pressing (12) or (13) displays an error message. For the default path, refer to "OPC UA client function" in "6.3.1 Certificate Management".
(7)	"..." button	Displays the file selection dialog. Set the certificate of the connection destination server designated in (2). When the correct certificate is not set, communication cannot be established with the server. When a file path does not exist, pressing (12) or (13) displays an error message. For the default path, refer to "OPC UA client function" in "6.3.1 Certificate Management".
(8)	User authorization setting selection (Anonymous, Username/Password)	Select whether to execute user authorization depending on the settings of the OPC UA server to be connected. When selecting "Username/Password", set user account information to be used for the authorization to (9) and (10). The account information to be used needs to be registered in the OPC UA server to be connected in advance. When (1) is set in (4), blank spaces are displayed in (8) to (10) and user account information cannot be set. When selecting "Username/Password", if a user name and password are not set, the settings in this screen cannot be completed. Pressing (12) or (13) displays an error message.
(9)	Username	Set a user name to be used for user authorization. The account information to be used needs to be registered in the OPC UA server to be connected in advance. When (1) is set in (4), blank spaces are displayed in (8) to (10) and user account information cannot be set. When selecting "Username/Password", if a user name and password are not set, the settings in this screen cannot be completed. Pressing (12) or (13) displays an error message.
(10)	Password	Set a password to be used for user authorization. The account information to be used needs to be registered in the OPC UA server to be connected in advance. When (1) is set in (4), blank spaces are displayed in (8) to (10) and user account information cannot be set. When selecting "Username/Password", if a user name and password are not set, the settings in this screen cannot be completed. Pressing (12) or (13) displays an error message.
(11)	Delete button	Deletes the OPC UA setting being edited. After being deleted, the settings will be hidden from the machine list display.
(12)	Save As button	Saves the settings and closes the setting screen. When each setting item of Machines, MTConnect, or OPC UA exceeds 30, an error message will appear and the OPC UA setting screen cannot be opened.
(13)	Save button	Saves the setting contents. Settings can be continued.
(14)	Cancel button	Discards the settings and closes the setting screen.

Collection data settings of OPC UA

Select the [OPC UA Tag] tab in the machine data edit screen to display the OPC UA data registration tab screen. By configuring the collection settings (refer to "7.7 Collection Settings of Machines") for arbitrary OPC UA data set in this screen, NC Machine Tool Connector can collect OPC UA data.

Register the OPC UA data to be collected in the OPC UA Tag tab. Register the OPC UA data to be collected for each OPC UA server that has been added and set in the OPC UA setting screen.

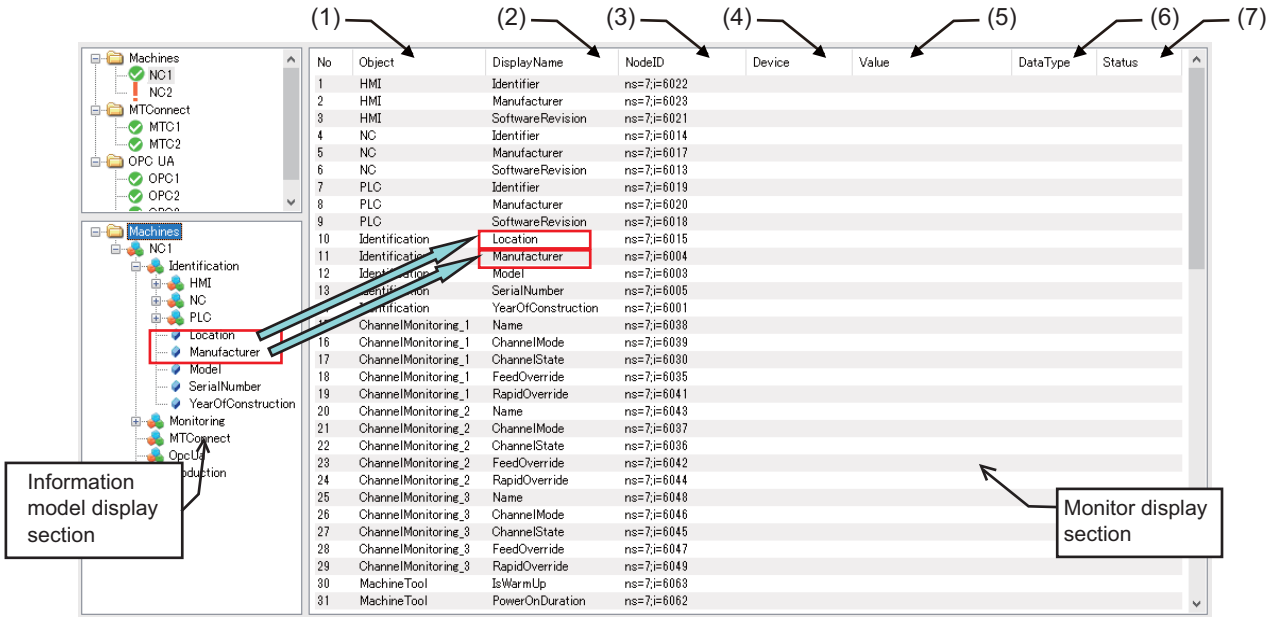


Display items		Description
(1)	Name	Set a tag name (arbitrary name) of the OPC UA data to be added. Set within 32 half-width alphanumeric characters. In addition to the half-width alphanumeric characters, '_' (under score) can be used.
(2)	Description	Set an outline of the OPC UA data. (Optional setting) Set within 50 full-width characters.
(3)	DataItem	Set a display name of the OPC UA data to be configured the collection settings. When data is selected in the OPC UA data selection dialog, this item is set automatically. The data that can be set differs depending on the product specifications of the OPC UA corresponding to the connected machine.
(4)	Browse button	Displays the OPC UA data selection dialog. The data that can be set differs depending on the product specifications of the OPC UA corresponding to the connected machine.
(5)	Data Type	Designate the collection data type (the supported data type of OPC UA in "4.1 Product Specifications") of the OPC UA data designated in (3) and (4). Designate the data type displayed in the OPC UA data selection dialog (13) for each data item. When selecting a different data type, the contents of the output data will not be guaranteed. The data (type) unique to the OPC UA server to be connected, such as WORD type of MX OPC Server UA may not be able to be collected. Configure the data settings in the OPC UA server to be connected with the data types supported by NC Machine Tool Connector. For the supported data types, refer to supported data type of OPC UA in "4.1 Product Specifications".
(6)	Fallback Setting button	Displays the Fallback setting dialog. When a data collection error occurs at the OPC UA server to be connected, configure settings as necessary. When part of the data set as a logging target is missing, the fallback setting value will be logged only for the corresponding data.
(7)	[↓] button	Displays the setting contents of (1) to (5) in the OPC UA data registration area (9).
(8)	[↑] button	Automatically sets the OPC UA data setting information selected in the OPC UA data registration area (9) to the input areas (1) to (5).
(9)	OPC UA data registration area	Lists the set OPC UA data. The setting contents can be changed by selecting the row and pressing the [↑] button (8). Make sure to press the OK button (10) to confirm the setting contents.
(10)	OK button	Saves the contents in the OPC UA data registration area and closes the screen. The set OPC UA data is added to the information model display section in the main screen.
(11)	Cancel button	Discards the settings and closes the screen.
(12)	OPC UA Information model	Displays the components of the tree (information model) of the OPC UA data that can be set. Up to 1000 data tags can be displayed at the same time. When a row is selected, it is inverted, and the OPC UA data corresponding to the selected row is displayed in the OPC UA data list (13). <Note> • Data cannot be input. • The display contents and data items in the list differ depending on the OPC UA server corresponding to the connected machine. For details, refer to the manual of the product. • Only the data items that can be converted to the data types of OPC UA supported by NC Machine Tool Connector can be set. (Only variable and supported data types)
(13)	DataItem list	Displays the OPC UA data corresponding to the row selected in (12) in units of data items. When the OPC data to be collected is selected, the corresponding row is inverted. Display Name: Data name of the selected OPC UA data (Variable) Node ID: Node ID of the selected OPC UA data (Variable) Data Type: Data type of the the selected OPC UA data Type Definition: Type definition of the selected OPC UA data <Note> • Data cannot be input. • The display contents and data items in the list differ depending on the OPC UA server corresponding to the connected machine. For details, refer to the manual of the product. • Only the data items that can be converted to the data types of OPC UA supported by NC Machine Tool Connector can be set. (Only variable and supported data types)
(14)	OK button	Automatically set the OPC UA data (Browse Name, Data Type) selected in (13) to (3) and (5) in the OPC UC data registration screen.
(15)	Cancel button	Returns to the OPC UA data registration screen without selecting OPC UA data.

Display items		Description
(16)	Fallback value setting	Sets the fallback value (default value) as the collection data for each data type to be stored during data logging and data publishing when a collection error occurs for a registered data item in communication with the OPC UA server connected to NC Machine Tool Connector. This is a setting that applies to the data type set in (5). It does not apply to each type of OPC UA data. Boolean: 1 bit (1: TRUE/0: FALSE) Int16: -32768 to 32767 UInt16: 0 to 65535 Int32: -2147483648 to 2147483647 UInt32: 0 to 4294967295 Float: 1.401298E-45 (absolute value) to 3.402823E38 (absolute value) Double: 4.94065645841247E-324 (absolute value) to 1.79769313486231E308 (absolute value) String: 127 half-width alphanumeric characters When this setting is disabled, if any data that has been set as a target of data collection cannot be collected with an OPC UA server, the OPC UA data for the corresponding cycle is missing and is not stored, or the data is not logged or published. For Float or Double type, if the precision of the absolute value exceeds the lower limit, the setting value will be 0.
(17)	Fallback Setting	Select the checkbox to enable the fallback settings. Default: Disabled
(18)	OK button	Saves the fallback setting and closes the dialog.
(19)	Cancel button	Discards the fallback setting and closes the dialog.

7.7 Collection Settings of Machines

On the main screen, set the data (nodes and PLC devices) that the NC Machine Tool Connector collects from the machine.



Display items		Description
(1)	Object	Displays the object name to which the set object or node belongs.
(2)	DisplayName	Displays the tag name when the OPC UA client refers to the node. For PLC devices, the PLC device tag name specified on the PLC device registration screen is displayed.
(3)	NodeID	This is an identifier for each node.
(4)	Device	For PLC device, the device name is displayed.
(5)	Value	Monitoring: The value of the actual data collected from the machine is displayed. Not monitoring: Blank When monitoring is stopped after performing it, the value of the last collected data is displayed.
(6)	DataType	Displays the data type of the collection set node.
(7)	Status	The collection status for each tag is displayed. When communication is normal, "Good" appears. When an error is found in the collection result, "bad" appears.

The meanings of the icons in the information model display section are shown below.

Icon	Type	Display name	Details
	Folder	Machines or Objects	Indicates a parent folder that stores information model components (objects and nodes) for each machine. The following folders need not to be referred or operated by the user. • Types • Views
	Object	(Object name)	An object that has subordinate objects, nodes, properties, etc. under it according to the umati specification definition. <Example> • MachineTools • Identification etc.
	Property	(Property name)	Represents attribute data that holds a value according to the umati specification definition.
	Variable	(Variable name)	Represents variable data that holds a value according to the umati specification definition.

7.7.1 Collection Setting Procedure

(1) Select the object ( ) or variable ( ) to be collected in the information model display section and drag and drop it on the monitor display section.
- The information of the collection node is displayed on the monitor display section.
- If you drag and drop an object, you can set the nodes under them all at once.

(2) Click the [Update settings] button.
- When it is reflected to the NC Machine Tool Connector normally, monitor diagnostics can be executed.
- When an error is found in the collection result, "bad" appears in the "Status" column.

The procedure for collecting and setting PLC devices is similar. Drag and drop the PLC device displayed in the information model display section.

Note

(1) Only objects and nodes can be dragged and dropped.
(2) The same object or node cannot be duplicated in the monitor display section.
(3) You cannot drag and drop multiple objects and nodes in a batch.

7.7.2 Delete Collection Settings

To delete the collection settings, select the line to be deleted on the monitor display section and perform one of the following operations to delete the collection settings data.
- Right-click and select [Delete].
- Press the [Delete] key on the keyboard.
- Press [Ctrl] + [A] + [Delete] on the keyboard. (or instead of pressing [Delete], right-click and select [Delete])

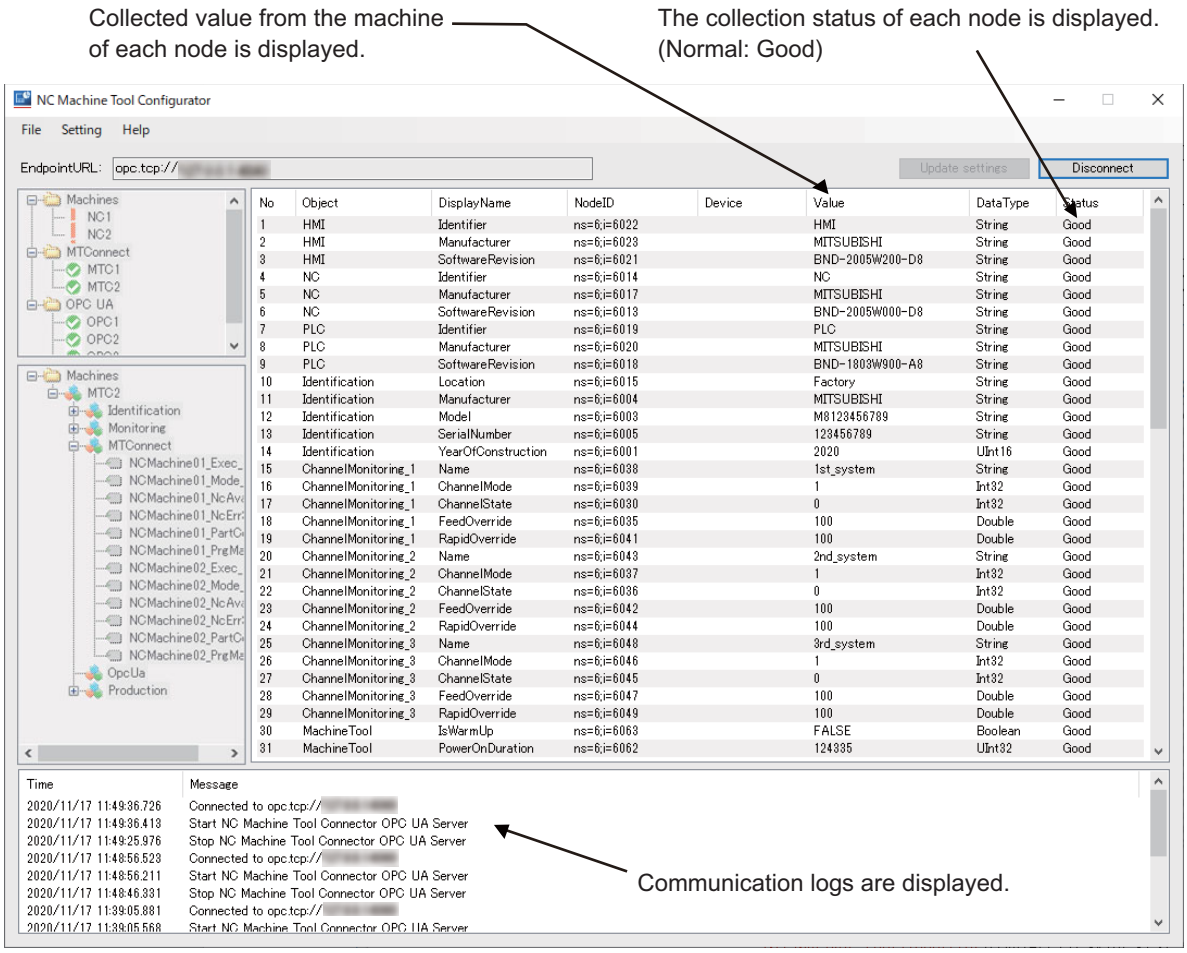
7.8 Monitor Diagnostics

For nodes and PLC device set as targets of data collection, the value of the actual collected data from the machine is displayed on the monitor.

7.8.1 Start Monitoring

To check the contents of the data collected by the NC Machine Tool Connector from the machine, click the [Connect] button.

After the [Connect] button is clicked, monitoring of each node starts in accordance with the latest collection settings reflected in the NC Machine Tool Connector.
(When monitoring can be started, the display button switches from "Connect" to "Disconnect".)



For nodes that failed to be collected, the contents of the "Value" and "Status" columns are displayed in red characters. Perform troubleshooting corresponding to the content displayed in the "Status" column. (Refer to "9 Troubleshooting".)

7.9 Data Logging Settings

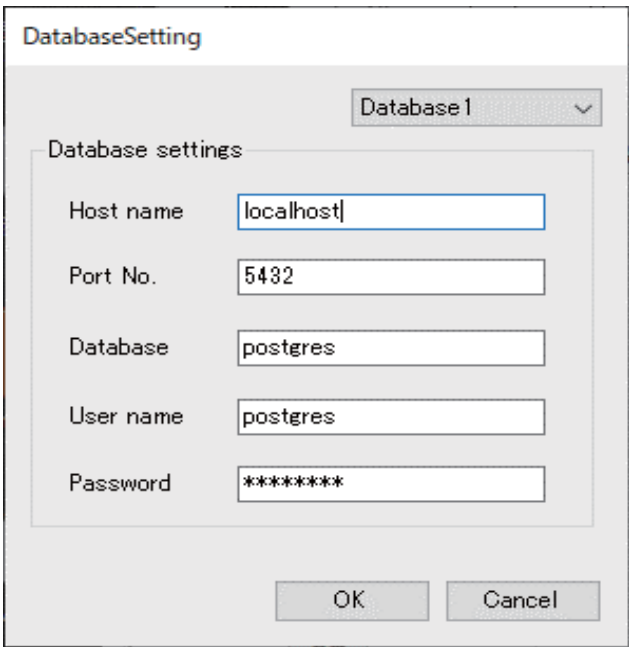
Data can be logged to a database (PostgreSQL) by applying the settings in this section to the nodes and tags (custom API data, PLC device, MTConnect data) whose collection settings have been configured.

Note

To log data, follow the procedures in 5.4 Database Setup to set up PostgreSQL in advance.

7.9.1 Database Settings

Select [Database settings] from the File menu of the main screen to display the Database setting screen.



When using the default account of PostgreSQL, set in accordance with the table below.
When connecting to the PostgreSQL installed in a different computer to the computer that this product is connected to, set the IP address of the computer for the host name.

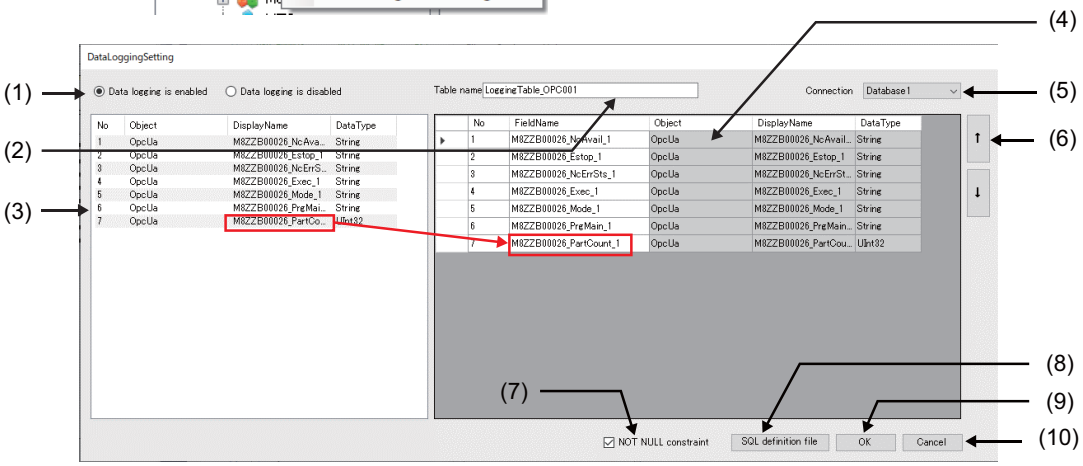
	Editing item	Description	Setting example
(1)	Database switch	Switching connection settings of PostgreSQL Up to 7 connection databases can be set.	Database 1
(2)	Host name	Sever name of PostgreSQL	localhost
(3)	Port No.	Port number of PostgreSQL	5432
(4)	Database	Database name of PostgreSQL	postgres
(5)	User name	User name of PostgreSQL	postgres
(6)	Password	Password of PostgreSQL	postgres

7.9.2 Data Logging Settings

Select a machine in the machine list display section of the main screen, right-click, and select [Data logging settings] to display the DataLoggingSetting screen.
In this screen, data items whose collection settings have been configured are set to be logged to a database.

[Logging settings procedure]

Select a data item row from the collection setting data list (3), and drag and drop it in the logging data list (4) to display the corresponding data in the logging data list. After completing the settings, output the SQL definition file (7).

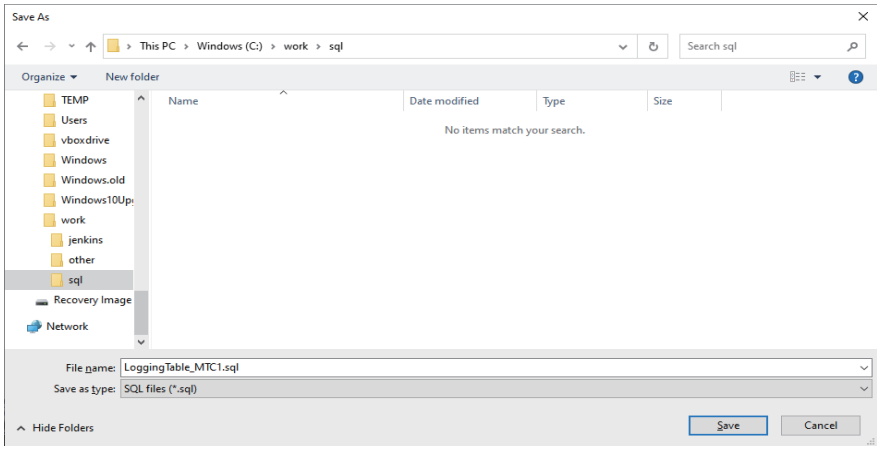


Display item		Details
(1)	Logging availability setting	Select Data logging is enabled to log a database.
(2)	Table name	Designate a table name (arbitrary name) of a database to store data.
(3)	Collection setting data display area	Lists the data of the selected machine whose collection settings have been configured. Drag and drop a data item to the logging setting data display area (4). <Note> • The same node cannot be set for multiple logging settings. • Up to 100 logging data can be set.
(4)	Logging setting data display area	The set data will be the logging target. Field Name: Designate a field (column) name of a database for each data item. Edit the name to the field name that can be used with an application as necessary. Set within 28 half-width alphanumeric characters. Some characters such as a space, delimiter(.), %, or double-quotations etc. cannot be used. The following cannot be edited. • Object • DisplayName • DataType
(5)	Connection	Select a database to log data. Select in accordance with the settings of the DatabaseSetting screen.
(6)	[↑], [↓] button	The storing order (column position) of each data in the database can be changed.
(7)	NOT NULL constraint	Selecting this check box adds a NOT NULL restriction to the SQL output in (8). If any column item of logging data includes NULL, the record will not be recorded.
(8)	SQL definition file button	Outputs the setting contents to a file in the SQL (query) format in a designated folder. The file is used when creating a table to be stored in a database. The file is created with the setting contents of (2) and (4).
(9)	OK button	Saves the settings.
(10)	Cancel button	Discards the setting contents and closes the screen.

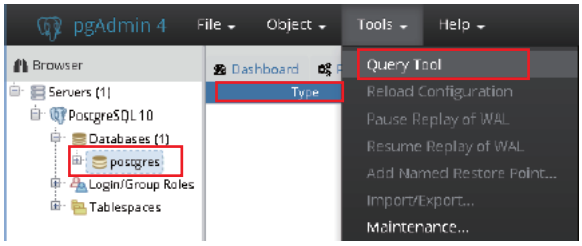
7.9.3 Creating a Logging Table

Follow the procedure below to create a logging table with PostgreSQL.

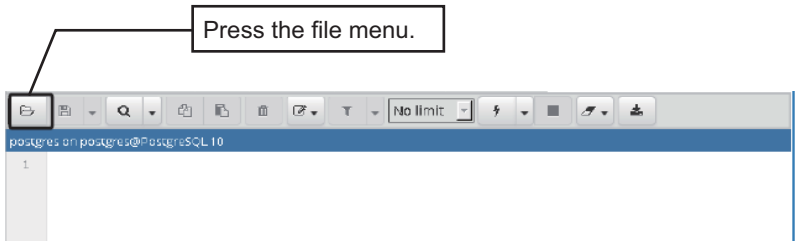
(1) Press the SQL definition file button (7) in the DataLoggingSetting screen to display the following file dialog. Select a save destination folder and press the [Save] button.



(2) Starting a query tool of pgAdmin 4.
Select [PostgreSQL 10] - [pgAdmin 4] from the Windows start menu.
Select the database name set in (4) in the table of 7.9.1 Database Settings and click [Tools]-[Query Tool] from the menu to start the tool.



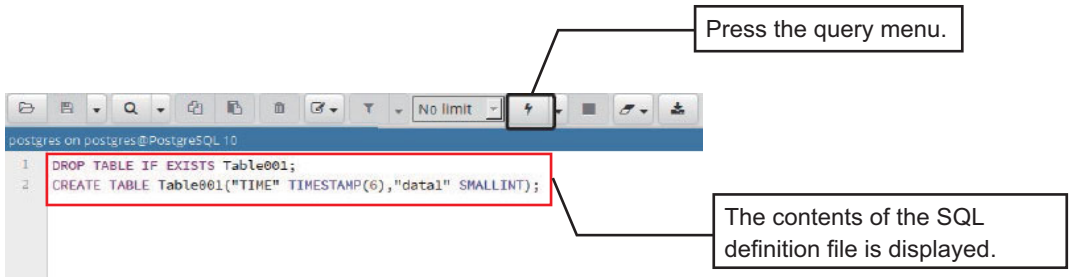
(3) Importing the SQL definition file output in the DataLoggingSetting screen.
Open the file menu of pgAdmin, designate the SQL definition file, and press the Select button.



(4) Executing the query.
Check that the contents of the SQL definition file are correct and press the query execution menu of pgAdmin.
A logging table will be created.

Note

When the table with the same name exists, the existing table will be deleted and a new table will be created.



Logging can be started by pressing the Connect button in the main screen.

7.10 Data Publish Settings

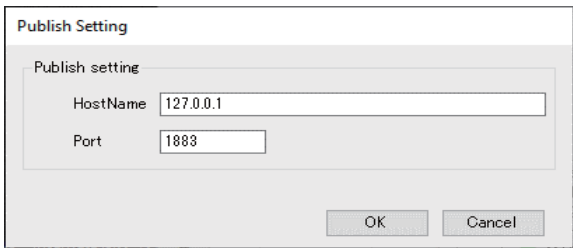
Data can be published via an MQTT broker (Mosquitto) by MQTT communication by applying the settings in this section to the nodes and tags (custom API data, PLC device, MTConnect data) whose collection settings have been configured.

Note

To publish data, follow the procedures in 5.5 MQTT Broker Setup to set an MQTT broker in advance.

7.10.1 MQTT Broker Settings

Select [Publish setting] from the File menu of the main screen to display the PublishSetting screen.



Set in accordance with the table below.
When connecting to the MQTT broker installed in a different computer to the computer that this product is connected to, set the IP address of the corresponding computer for the host name.

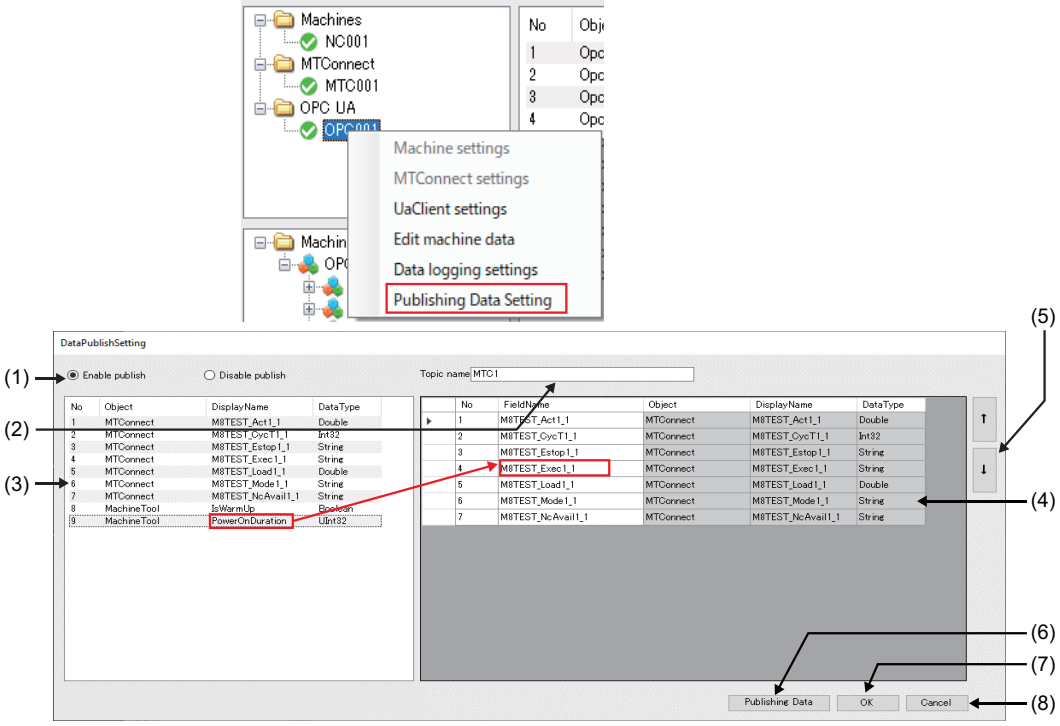
	Editing item	Description	Default value
(1)	HostName	Host name or IP address of the MQTT broker. Set within 15 half-width alphanumeric characters.	localhost
(2)	Port	Port number of the MQTT broker. Set in the range of 1024 to 65535.	1883

7.10.2 Data Publish Settings

Select a machine in the machine list display section of the main screen, right-click, and select [Publishing Data Setting] to display the DataPublishSetting screen.
In this screen, data items whose collection settings have been configured are set to publish the data.
Up to 15 machines can be set to publish the data.

[Setting Procedure]

Select a data item row from the collection setting data list (3), and drag and drop it in the publishing data list (4) to display the corresponding data in the publishing data list. After completing the settings, output the publishing data (6).



Display items		Description
(1)	Data publishing availability setting	Select Enable publish to publish data.
(2)	Topic name	Designate a topic name (arbitrary name) of data to be published. (Half-width alphanumeric characters and slash) Set within 64 characters.
(3)	Collection setting data display area	Lists the data of the selected machine whose collection settings have been configured. Select a data item, and drag and drop it in the publishing setting data display area (4). The same node cannot be set for multiple logging settings.
(4)	Publishing setting data display area	The set data will be the publishing target. FieldName: Designate a field (column) name of each data item. Edit the name to the content that can be used with an application as necessary. (Half-width alphanumeric characters, under score) Set within 28 half-width alphanumeric characters. Some characters such as a space, delimiter(.), %, or double-quotations etc. cannot be used. The following cannot be edited. - Object - DisplayName - DataType
(5)	Item order change button	The publishing order (column position) of each data item can be changed.
(6)	Publishing Data button	Outputs the setting contents set in (2) and (4) with an arbitrary name in a designated folder. ■ Specifications of the publishing data File format: JSON file (*.json) Format Character code: UTF-8 (without BOM) Field data: RFC7159 conformed (only primitive type) <Note> - The file is created with the setting contents of (2) and (4). - Do not edit the publishing data after outputting. - The file needs to be output and imported with an application every time the publishing settings are changed.
(7)	OK button	Saves the setting contents.
(8)	Cancel button	Discards the setting contents and closes the screen.

7.11 Operations when missing

When communication with a connected machine is disconnected, the data output by the OPC UA server function, and the output operations in data logging and MQTT data publishing differ depending on the settings. The following shows the output values.

<table>
<tr><th colspan="3" rowspan="2">Data output function</th><th colspan="2">Fallback setting for when communication is disconnected</th><th colspan="2">Fallback setting for when communication is normal</th></tr>
<tr><th>Enabled</th><th>Disabled</th><th>Enabled</th><th>DIsabled</th></tr>
<tr><td colspan="3">OPC UA server function</td><td colspan="2">Missing</td><td colspan="2" rowspan="3">Data collection value from machines</td></tr>
<tr><td rowspan="2">Data logging (database)
MQTT data publishing</td><td rowspan="2">NOT NULL</td><td>Restriction enabled</td><td rowspan="2">Fallback setting value</td><td>Missing</td></tr>
<tr><td>Restriction disabled</td><td>NULL value</td></tr>
</table>

8

Restrictions

Restrictions of this product are as follows.

- When Windows in which this product is installed is in any of the following states, the configuration tool and the OPC UA client cannot connect to the NC Machine Tool Connector
  - Sleep state
  - Inactive state
  - Shutdown

  Set Windows in which this product is installed not to go to sleep state or inactive state.
- The value stored in the NC Machine Tool Connector can be rewritten from the OPC UA client. However, the changed value will not be reflected in connected machine.
- When the values stored in the NC Machine Tool Connector are rewritten from the OPC UA client, the values of the following data types will not be reflected in the configuration tool (refer to "7.6.3 Machine Data Edit Screen").
  - Identification
  - StackLight
- Do not stop or restart the NC Machine Tool Connector while the configuration tool is running.
- The OPC UA client can be connected to the NC Machine Tool Connector while the configuration tool is running. However, the operation is not guaranteed.

9

Troubleshooting

If this product does not operate in accordance with the specifications even after the setup is completed, perform the troubleshooting appropriate for the problems.

Problem	Remedy	Reference
When the IP address is set on the machine setting screen and the [Check] button is pressed, the "Connection Failed" dialog appears.	<Common items> • Check that the LAN cable is connected. • Check the IP address of the specified machine.	7.6.1 Machine Setting Screen
	<When the machine is connected to a different network> • Check the operating status of your router. • If you are not using a router, connect the product to the machine within the same network.	
When opening the OPC UA data selection screen, nothing is displayed in the [OPC UA Information model] area.	<Common items> • Check that the LAN cable is connected to the target OPC UA server. • Check the end point URL specified in the OPC UA setting screen.	7.6.7 OPC UA Setting Screen
	<When NC Machine Tool Connector is installed in the same computer as the connection destination OPC UA server> • Check that the end point URL and also the port number specified in the OPC UA setting screen does not overlap with the end point URL of this product set in the server connection screen.	7.5 Server Connection Setting Screen 7.6.7 OPC UA Setting Screen
After the machine registration is completed in the machine setting screen or after the agent registration is completed in the MTConnect setting screen, the connection status of the machine becomes disabled.	<Common items> • Check that the LAN cable is connected. • Check the IP address of the specified machine or computer.	7.6.1 Machine Setting Screen 7.6.6 MTConnect Setting Screen
	<The machine connection status is not established again after connecting the LAN cable> After connecting the LAN cable, wait for about 30 seconds, and then check the established status again.	
	<MTConnect> Check that the MTConnect agent (or the adapter) has started normally.	Refer to the manual of your MTConnect.
The connection with the machine was confirmed. However, the status icon on the machine list display section does not indicate communicating status even if the [Save] button is pressed on the machine setting screen.	<Common items> • Check that the "NC Machine Tool Connector Client Manager" is running on the Windows service management screen. • Check that the IP address overlap with that of the machine which have already been added. • Check that the model specified on the machine setting screen is correct for the machine to be connected.	6.2 Start and Stop the NC Machine Tool Connector 7.6.1 Machine Setting Screen
The status icon on the machine list display section indicates communicating status. However, nothing is displayed on the information model display on the main screen.	<Common items> • Check that the "NC Machine Tool Connector OPC UA Server" is running on the Windows service management screen. • Check that the port No. specified on the server connection setting screen is being used by another application.	6.2 Start and Stop the NC Machine Tool Connector 7.5 Server Connection Setting Screen
	<Client authentication> • Check that "uaclkey.der" is stored in the following folder. C:\Program Files(x86)\MITSUBISHI ELECTRIC\NC Machine Tool Connector\pki\certs	6.3.1 Certificate Management
Monitoring is started. However, the display value of the collection node is not updated.	<umati node> • For the following nodes, the contents set by the configuration tool are displayed as they are. Therefore, the same value is displayed unless the setting value is changed. Check that the displayed content is correct on the machine data edit screen of the configuration tool. - Variables of "IdentificationType" and "SoftwareVersion" - Variables of "Channel" and "SpindleStateMode"	10.1 Appendix 1: Supported Information Model (umati)
	<MTConnect> Check that the MTConnect communication data has been collected normally with an MTConnect agent.	Refer to the manual of your MTConnect.
	<The Status column shows "bad"> • Check the LAN cable connection between the computer in which this product is installed and the connected machine. • Check the setting contents of the machine being monitored.	7.6.1 Machine Setting Screen

Problem	Remedy	Reference
During monitoring, the display value of the collection node is incorrect.	<Machine information> • For the following nodes, check the setting values of the configuration tool. - Variables of "IdentificationType" and "SoftwareVersion"	7.6.3 Machine Data Edit Screen
	<Stack light lighting status (LampStatus)> • Check the following settings with the configuration tool. - Lamp display order - PLC device assigned to lamp • Check the output value of the PLC device value on the I/F diagnostic screen of the CNC.	7.6.3 Machine Data Edit Screen Refer to your CNC manual.
	<Number of completed parts (RunsCompleted)> • Check that "#8001 WRK COUNT M" is set correctly. • Check that the "#8002 WRK COUNT" has changed. • Check that the count up (M) command is executed in the running program.	Refer to your CNC manual.
	<PLC optional device> • Check that the PLC device value has changed on the I/F diagnosis screen of the CNC.	
	<Custom API data> Check that the set data type of the CNC data registered in the CNC data registration tab screen is correct.	7.6.5 CNC Data Registration Screen
	<MTConnect data> Check that the set data type of the CNC data registered in the MTConnect data registration tab screen is correct.	7.6.6 MTConnect Setting Screen
The collected data is not logged normally to a database.	<When PostgreSQL is installed in another personal computer> • Check the LAN cable connection between the computer in which this product is installed and the connected machine. • Check that the IP address is set correctly.	5.4.2 Setting PostgreSQL
	<Database setting> Check that the target database is set correctly. (Host name, port number, etc.)	7.9.1 Database Settings
	<Data logging settings> • Check that the target database is designated correctly in the Data logging setting screen. • Check that the table name designated in the Data logging setting screen has been created.	7.9.2 Data Logging Settings 7.9.3 Creating a Logging Table
"NC Machine Tool Connector OPC UA Server" does not start.	Check that the Microsoft Visual C++ Redistribution Package has been installed.	5.1 Microsoft Visual C++ Redistributable Package Installation
"NC Machine Tool Connector Client Manager" does not start.		
When the configuration tool is started up, a popup screen saying "The program can't start because VCRUNTIME140.dll is missing from your computer. Try reinstalling the program to fix this problem." appears and the startup fails.		
Data is not published (MQTT communication is not available).	• Check that the data publish setting is correct. • Some services might not be started. Restart the computer.	7.10 Data Publish Settings

10

Appendix

10.1 Appendix 1: Supported Information Model (umati)

BrowseName		BrowseName (Variable)	BrowseName	NodeClass	DataType	Item	Output value
(Category)	(SubCategory)						
MachineTools	Identification	(None)	Manufacturer	Variable	String	Manufacturer name	Arbitrary character string
			YearOfConstruction	Variable	UInt16	Year of manufacturing	A.D.
			SerialNumber	Variable	String	Machine serial No.	Arbitrary character string
			Model	Variable	String	Product name (Model name)	Arbitrary character string
			Location	Variable	String	Machine installation location	Arbitrary character string
		SoftwareIdentification_xx	SoftwareRevision	Variable	String	Software version	Arbitrary character string
			Identifier	Variable	String	Software identifier (CNC/PLC/HMI)	Fixed string
			Manufacturer	Variable	String	Manufacturer name	Arbitrary character string
	Monitoring	ChannelMonitoring_xx	ChannelState	Variable	ChannelState	Part system operating status	Active_0 Interrupted_1 Reset_2
			ChannelMode	Variable	ChannelMode	NC operation mode	Automatic_0 MdaMdi_1 JogManual_2 JogIncrement_3 Reference_6 Other_7
			FeedOverride	Variable	Double	Cutting override	Ratio (%)
			Name	Variable	String	Part system	Fixed string
			RapidOverride	Variable	Double	Rapid traverse override	Ratio (%)
		SpindleMonitoring_xx	Name	Variable	String	Spindle name	Fixed string
			IsRotating	Variable	Boolean	Spindle in rotation	True/False
			Override	Variable	Double	Spindle override	Ratio (%)
		MachineTool	PowerOnDuration	Variable	UInt32	Accumulated time when power is ON	Accumulated time (ms)
			IsWarmUp	Variable	Boolean	During warming operation	True/False
		StackLight_xx	SignalColor	Variable	SignalColor	Signal lamp lighting color	Off_0 Red_1 Green_2 Blue_3 Yellow_4 Purple_5 Cyan_6 White_7
			SignalOn	Variable	Boolean	Signal lamp lighting state	True/False
			StacklightMode	Variable	SignalModeLight	Signal lamp mode	Continuous_0 Blinking_1 Flashing_2 Other_3
			NumberInList	Variable	UInt16	Stack position	Index value (1 to 5)
		NC-PLC	<DeviceTagName>	Variable	Boolean	PLC device (bit)	True/False
					UInt32	PLC device (File register)	Unsigned integer value

BrowseName		BrowseName (Variable)	BrowseName	NodeClass	DataType	Item	Output value
(Category)	(SubCategory)						
MachineTools	Production	Production-Job_xx	identifier	Variable	String	Job ID (Program No.)	String
			RunsCompeted	Variable	UInt32	Number of completed parts	Quantity
			RunsPlanned	Variable	UInt32	Number of parts to be machined	Quantity

10.2 Appendix 2: MTConnect Recommended Data Types

■ DataItem default types

Component and Subcomponent	category	DataItem Types		Description	Unit	Default type
Axes	sample	ACCELERATION		Acceleration	MILLIMETER/SECOND^2	Double
		ACCUMULATED_TIME		Cumulative time	SECOND	Int32
		ANGULAR_ACCELERATION		Angle acceleration	DEGREE/SECOND^2	Double
		ANGULAR_VELOCITY		Angular speed	DEGREE/SECOND	Double
		AMPERAGE		Current value	AMPERE	Int16
			ALTERNATING	AC current value	AMPERE	Int16
			DIRECT	DC current value	AMPERE	Int16
		ANGLE		Angle	DEGREE	Double
			ACTUAL	Actual angle	DEGREE	Double
			COMMANDED	Commanded angle	DEGREE	Double
		AXIS_FEEDRATE		Linear axis feedrate	MILLIMETER/SECOND	Double
			ACTUAL	Actual linear axis feedrate	MILLIMETER/SECOND	Double
			COMMANDED	Commanded linear axis feedrate	MILLIMETER/SECOND	Double
			JOG	Manual linear axis feedrate	MILLIMETER/SECOND	Double
			PROGRAMMED	Programmed linear axis feedrate	MILLIMETER/SECOND	Double
			RAPID	High-speed linear axis feedrate	MILLIMETER/SECOND	Double
		CLOCK_TIME		Time	YYYY-MM-DDThh:mm:ss.ffff	String
		CONCENTRATION		Concentration	PERCENT	Ulnt16
		CONDUCTIVITY		Electric conductivity	SIEMENS/METER	Double
		DISPLACEMENT		Vector amount	MILLIMETER	Float
		ELECTRICAL_ENERGY		Power consumption	WATT_SECOND	Ulnt32
		FILL_LEVEL		Remaining ratio	PERCENT	Ulnt16
		FLOW		Flow rate	LITER/SECOND	Float
		FREQUENCY		Frequency	HERTZ	Int32
		LENGTH		Length	MILLIMETER	Double
			STANDARD	Standard or original length	MILLIMETER	Double
			REMAINING	Remaining length	MILLIMETER	Double
			USEABLE	Remaining available length	MILLIMETER	Double
		LINEAR_FORCE		Linear force	NEWTON	Ulnt32
		LOAD		Load	PERCENT	Ulnt16
		MASS		Mass	KILOGRAM	Ulnt16
		PATH_FEEDRATE		Axis feedrate	MILLIMETER/SECOND	Double
			ACTUAL	Actual axis feedrate	MILLIMETER/SECOND	Double
			COMMANDED	Commanded axis feedrate	MILLIMETER/SECOND	Double
			JOG	Manual axis feedrate	MILLIMETER/SECOND	Double
			PROGRAMMED	Programmed axis feedrate	MILLIMETER/SECOND	Double
			RAPID	High-speed axis feedrate	MILLIMETER/SECOND	Double
		PATH_POSITION		Control point coordinate	MILLIMETER_3D	String
			ACTUAL	Control point actual coordinates	MILLIMETER_3D	String
			COMMANDED	Control point commanded coordinates	MILLIMETER_3D	String
			TARGET	Control point target coordinates	MILLIMETER_3D	String
			PROBE	Control point probe coordinates	MILLIMETER_3D	String
		PH		Water solubility	PH	Float
		POSITION		Position	MILLIMETER	Double
			ACTUAL	Actual position	MILLIMETER	Double
			COMMANDED	Commanded position	MILLIMETER	Double
			TARGET	Target position	MILLIMETER	Double
		POWER_FACTOR		Apparent power	PERCENT	Ulnt16
		PRESSURE		Pressure	PASCAL	Float
		RESISTANCE		Resistance	OHM	Double
		ROTARY_VELOCITY		Rotation speed	REVOLUTION/MINUTE	Int32
			ACTUAL	Actual rotation speed	REVOLUTION/MINUTE	Int32
			COMMANDED	Commanded rotation speed	REVOLUTION/MINUTE	Int32
			PROGRAMMED	Programmed rotation speed	REVOLUTION/MINUTE	Int32
		SOUND_LEVEL		Volume	DECIBEL	Int16
			NO_SCALE	No weight coefficient in scale	DECIBEL	Int16
			A_SCALE	AB scale weight coefficient	DECIBEL	Int16
			B_SCALE	B scale weight coefficient	DECIBEL	Int16
			C_SCALE	C scale weight coefficient	DECIBEL	Int16
			D_SCALE	D scale weight coefficient	DECIBEL	Int16
		STRAIN		Deformation rate	PERCENT	Float
		TEMPERATURE		Temperature	CELSIUS	Int32
		TILT		Angle displacement	MICRO_RADIAN	Double
		TORQUE		Rotation force	NEWTON_METER	Int32
		VOLT_AMPERE		Apparent power	VOLT_AMPERE	Int32
		VOLT_AMPERE_REACTIVE		Reactive energy	VOLT_AMPERE_REACTIVE	Int32
		VELOCITY		Velocity	MILLIMETER/SECOND	Double
		VISCOSITY		Viscosity	PASCAL_SECOND	Float
		VOLTAGE		Voltage	VOLT	Int32
			ALTERNATING	AC voltage	VOLT	Int32
			DIRECT	DC voltage	VOLT	Int32
		WATTAGE		Power consumption	WATT	Ulnt32

	EVENT	ACTUATOR_STATE				
		ACTIVE_AXES				
		AVAILABILITY				
		AXIS_COUPLING		Synchronous control type	TANDEM/SYNCHRONOUS/MASTER/SLAVE	Int16
		AXIS_FEEDRATE_OVERRIDE		Cutting override	Integer	Int16
			JOG	For manual feedrate	Integer	Int16
			PROGRAMMED	For programmed feedrate	Integer	Int32
			RAPID	For high-speed feedrate	Integer	Int32
		AXIS_INTERLOCK		Axis interlock state	ACTIVE/INACTIVE	String
		AXIS_STATE		Axis state	HOME/TRAVEL/PARKED/STOPPED	String
		BLOCK		Execution block	Execution block No.	String
		CHUCK_INTERLOCK		Chuck interlock state	ACTIVE/INACTIVE	String
			MANUAL_UNCLAMP	Manual unclamp state	ACTIVE/INACTIVE	String
		CHUCK_STATE		Chuck state	OPEN/CLOSED/UNLATCHED	String
		CONTROLLER_MODE		Operation mode	AUTOMATIC/MANUAL/MANUAL_DATA_INPUT/SEMI AUTOMATIC/EDIT	String
		COUPLED_AXES		Synchronized axis	Axis name divided by space	String
		DIRECTION		Moving direction	-	Int16
			ROTARY	Rotation direction of rotary axis	CLOCKWISE/COUNTER_CLOCKWISE	String
			LINEAR	Operation direction of linear axis	POSTIVE/NEGATIVE	String
		DOOR_STATE		Door open or close state	OPEN/UNLATCHED/CLOSED	String
		END_OF_BAR		Bar end reaching state	YES/NO	String
			PRIMARY	Bar	-	Int16
			AUXILIARY	Additional bar	-	Int16
		EMERGENCY_STOP		Emergency stop state	ARMED/TRIGGERED	String
		EXECUTION		NC status	READY/ACTIVE/INTERRUPTED/FEED_HOLD/STOPPED/OPTIONAL_STOP/PROGRAM_STOPPED/	String
		FUNCTIONAL_MODE		Machine state	PRODUCTION/SETUP/TEARDOWN/MAINTENANCE/PROCESS_DEVELOPMENT	String
		INTERFACE_STATE		Interface state	DISABLED/NOT_READY	String
		LINE		Program execution line	Integer	UInt32
			MAXIMUM	Maximum program line No.	Integer	UInt32
			MINIMUM	Minimum program line No.	Integer	UInt32
		MESSAGE		Arbitrary character string	Arbitrary character string	String
		OPERATOR_ID		Number of abnormal products	Integer	UInt32
		PALLET_ID		Target number of production	Integer	UInt32
		PART_COUNT		Number of production stock	Integer	UInt32
			ALL	Number of production plans	Integer	UInt32
			GOOD	Number of satisfactory products	Integer	UInt32
			BAD	Number of unsatisfactory products	Integer	UInt32
			TARGET	Target number of production	Integer	UInt32
			REMAINING	Number of remaining production plans	Integer	UInt32
		PART_ID		Completed workpiece ID	Arbitrary character string	String
		PATH_FEEDRATE_OVERRIDE		Manual feed override	Integer	Int16
			JOG	For jog feedrate	Integer	Int16
			PROGRAMMED	For programmed feedrate	Integer	Int32
			RAPID	For high-speed feedrate	Integer	Int32
		PATH_MODE		Interpolation/non-interpolation	INDEPENDENT	String
		POWER_STATE		Power supply state or signal state	-	String
			LINE		ON/OFF	String
			CONTROL	Power supply state	ON/OFF	String
		POWER_STATUS		Operation activation signal	ON/OFF	String
		PROGRAM		Running program name (O No.)	Arbitrary character string	String
		PROGRAM_EDIT		Machining program edit state	ACTIVE/READY/NOT_READY	String
		PROGRAM_EDIT_NAME		Name of the program being edited	Arbitrary character string	String
		PROGRAM_COMMENT		Comment of program being executed	Arbitrary character string	String
		PROGRAM_HEADER		Header of program being executed	Arbitrary character string	String
		ROTARY_MODE		Control mode of spindle/rotary axis	SPINDLE/INDEX/CONTOUR	String
		ROTARY_VELOCITY_OVERRIDE		Spindle override	Integer	Int16
		TOOL_ASSET_ID		Spindle state during free rotation	ACTIVE/INACTIVE	String
		TOOL_NUMBER		Tool No.	Arbitrary character string	String
		WORKHOLDING_ID		Tool holder ID	Arbitrary character string	String
	CONDITION	ACTUATOR		Supply state	UNAVAILABLE/READY/ACTIVE/NOT_READY/FAIL	String
		CHUCK_INTERLOCK		Chuck interlock state	UNAVAILABLE/READY/ACTIVE/NOT_READY/FAIL	String
		COMMUNICATIONS		Communication state	UNAVAILABLE/READY/ACTIVE/NOT_READY/FAIL	String
		DATA_RANGE			UNAVAILABLE/READY/ACTIVE/NOT_READY/FAIL	String
		DIRECTION			UNAVAILABLE/READY/ACTIVE/NOT_READY/FAIL	String
		END_OF_BAR			UNAVAILABLE/READY/ACTIVE/NOT_READY/FAIL	String
		HARDWARE		Production type change state	UNAVAILABLE/READY/ACTIVE/NOT_READY/FAIL	String
		INTERFACE_STATE		Interface state	UNAVAILABLE/READY/ACTIVE/NOT_READY/FAIL	String
		LOGIC_PROGRAM		PLC operation state	UNAVAILABLE/READY/ACTIVE/NOT_READY/FAIL	String
		MOTION_PROGRAM		NC automatic operation state	UNAVAILABLE/READY/ACTIVE/NOT_READY/FAIL	String
		SYSTEM		System state	UNAVAILABLE/READY/ACTIVE/NOT_READY/FAIL	String

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10.3.1.4 UA-AnsiC
10.3.1.5 PostgreSQL libpq
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Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

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If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

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When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

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10.4 Appendix 4: Supported Version

This product is compatible with the following versions or later of CNC and OPC UA.

<table>
<tr><th rowspan="4">This product</th><th colspan="10">Mitsubishi Electric CNC</th><th colspan="2">OPC UA</th></tr>
<tr><th colspan="2">M8V Series</th><th colspan="2">M8 Series</th><th colspan="4">M7V Series</th><th colspan="2">M7 Series</th><th rowspan="3">OPC UA</th><th>Companion specifications</th></tr>
<tr><th colspan="2">General</th><th colspan="2">General</th><th>For lines</th><th colspan="4">General</th><th colspan="2">General</th><th rowspan="2">OPC UA for Machine Tools (OPC UA40501-1)</th></tr>
<tr><th colspan="2">M800VW/ M800VS/ M80VW/M80V</th><th colspan="2">M800W/ M800S/M80/ M80W/E80</th><th>C80</th><th>M700VW</th><th>M700VS</th><th>M70V</th><th>E70</th><th>M700</th><th>M70</th></tr>
<tr><td>Version A0 (1.1.0.0)</td><td colspan="2" rowspan="2">-</td><td colspan="2" rowspan="3">Version A1 or later</td><td rowspan="2">-</td><td rowspan="4">Version F2 or later</td><td rowspan="4">Version F0 or later</td><td rowspan="4">Version H0 or later</td><td rowspan="4">Version K0 or later</td><td rowspan="4">Version FM or later</td><td rowspan="4">Version FM or later</td><td rowspan="4">1.03</td><td rowspan="4">1.00.00</td></tr>
<tr><td>Version A1 (1.2.0.0)</td></tr>
<tr><td>Version A2 (1.3.0.0)</td><td colspan="2" rowspan="2">Version A1 or later</td><td rowspan="2">Version B6 or later</td></tr>
<tr><td>Version A3 (1.4.0.0)</td></tr>
</table>

Revision History

Date of revision	Manual No.	Revision details
Jan..2021	IB(NA)1501634-A	First edition created.
Jun. 2021	IB(NA)1501634-B	Added the description on MQTT and MTConnect. Added the CNC data collection function and data logging function. Corrected errors.
Jul. 2021	IB(NA)1501634-C	Added the description on installing OpenSSL. Added the open source software information.
Dec. 2021	IB(NA)1501634-D	Added the description on M8V Series and C80. Added the OPC UA client function. Added and revised the description on connectable number of units, collection data types, logging settings, and fallback function. Added the description on operations when missing. Added the troubleshooting. Corrected errors.
Jun. 2022	IB(NA)1501634-E	Contents were revised to correspond to NC Machine Tool Connector version A3. The structure of the following chapters were changed. • 5.1 Microsoft Visual C++ Redistributable Package Installation • 5.5 MQTT Broker Setup The following chapter was deleted. • 5.3.2 Status after Uninstallation The following chapters were changed. • 4.1 Product Specifications • 5.1 Microsoft Visual C++ Redistributable Package Installation • 5.2.2 Folder Structure after Installation • 5.3 Uninstalling the Product • 6.3.2 Security Settings • 7.6.3 Machine Data Edit Screen • 7.6.4 PLC Device Registration Screen • 7.6.5 CNC Data Registration Screen • 7.9.2 Data Logging Settings • 7.10.2 Data Publish Settings • 9 Troubleshooting • 10.4 Appendix 4: Supported Version Other mistakes were corrected.

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MODEL	NC Machine Tool Connector
MODEL CODE	100-726
Manual No.	IB-1501634

IB(NA)1501634(ENG)-E(2206)MEE
Made in JAPAN

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