MITSUBISHI ELECTRIC

Changes for the Better

Numerical Control (CNC)

Edge Computing Software

MTConnect Data Collector User's Manual

IB-1501538(ENG)-D

SAFETY PRECAUTIONS

(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.

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

⚠ **WARNING**	**Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.**

⚠ **CAUTION**	**Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.**

Under some circumstances, failure to observe the precautions given under " ⚠CAUTION" may lead to serious consequences.
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.

[Design Precautions]

⚠ WARNING

- **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.
- **Configure a safety circuit outside of an industrial personal computer equipped with this product so that the entire system operates to the safely side even when a fault occurs in the computer.**
  Failure to do so may result in an accident due to an incorrect output or malfunction.

[Design Precautions]

⚠ CAUTION

- **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.

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.

CONTENTS

RELEVANT MANUALS

Manual name	Manual number
Edgecross Basic Software for Windows User's Manual	ECD-MA1-0001

TERMS

Unless otherwise specified, this manual uses the following terms.

Terms related to Edgecross and MITSUBISHI ELECTRIC related products

Term	Description
Edgecross	A software platform that implements specifications and concepts for realizing manufacturing solutions by the FA-IT collaboration centering on the edge computing.
Data collector	A software component that collects data in production sites through each network. It is provided by vendors for each network and connection target devices.
Edgecross Basic Software	The name of the software product that implements the Edgecross function.
Real-time Flow Designer	The name of the software component that performs operation setting of Real-time Flow Manager.
Real-time Flow Manager	The name of the Windows version software component that implements the real-time data processing.

Terms related to Data Collector

Terms	Description
Data collecting	One of the data communication modes of Data Collector. This collects data from devices and delivers it to Edgecross periodically at at predetermined intervals.
Data reading	This reads data from devices according to a request from Edgecross.

Terms related to MTConnect

Terms	Description
MTConnect	An open protocol for the purpose of monitoring the status of the NC machine tools defined by MTConnect Institute. Reference: http://www.mtconnect.org/
Agent	Converts the collected data of the NC 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 NC device and notify the collected data successively 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.
Schema	Data structure defined by XML. Schema is used for MTConnect communication
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".
Type/SubType	An attribute to represent the meaning of the data defined by MTConnect Institute. Required for each DataItem.

1 MTConnect Data Collector

MTConnect Data Collector is a software component that performs data collecting or data reading function on a device equipped with MTConnect Agent.
MTConnect Data Collector can collect the data stored in the devices connected to MTConnect Agent by using in combination with Edgecross Basic Software.

For details on Edgecross Basic Software, refer to the following manual.

Edgecross Basic Software for Windows User's Manual

MEMO

2 SPECIFICATIONS

This chapter shows the functional specifications, operational specifications, and accessible devices of MTConnect Data Collector.

2.1 Functional Specifications

This section shows the functional specifications of MTConnect Data Collector.
MTConnect Data Collector supports reading only.

Item			Specification	
Connectable devices	Number of connectable devices		One agent can be connected for each setting.	
	Recommended agent		"C++ Agent" issued by MTConnect Institute (Ver1.3.0.11 or later)*3	
Data collecting function *1	Maximum number of settings		Up to 12 (Same as the upper limit of the setting number of collection and diagnosis flow of Edgecross)	
	Number of configurable locations	Per one setting	256	
		Total of all settings	3072 (256x12)	
	Data type		BOOL	1 byte (TRUE/FALSE)
			INT	2-byte integer value
			UINT	2-byte integer value (unsigned)
			DINT	4-byte integer value
			UDINT	4-byte integer value (unsigned)
			LINT	8-byte integer value
			ULINT	8-byte integer value (unsigned)
			REAL	4-byte floating point value
			LREAL	8-byte floating point value
			STRING	(1 to 32 characters)
			WSTRING	(1 to 16 characters)
Data reading function *2	Maximum number of settings		Up to 16 (Same as the upper limit of the setting number of access destination of Edgecross)	
	Number of configurable locations	Per one setting	256	
		Total of all settings	4096 (256x16)	
	Data type		BOOL	1 byte (TRUE/FALSE)
			INT	2-byte integer value
			UINT	2-byte integer value (unsigned)
			DINT	4-byte integer value
			UDINT	4-byte integer value (unsigned)
			LINT	8-byte integer value
			ULINT	8-byte integer value (unsigned)
			REAL	4-byte floating point value
			LREAL	8-byte floating point value
			STRING	(1 to 32 characters)
			WSTRING	(1 to 16 characters)

*1 Data collection is performed to MTConnect Agent at constant time intervals set by Edgecross.

*2 Data reading is performed to MTConnect Agent according to the read request from Edgecross.

*3 MTConnect Data Collector can be connected to the agent compliant with MTConnect, not only "C++ Agent".

2.2 Operational Specifications

This section shows the operational specifications of MTConnect Data Collector.

Operating status

MTConnect Data Collector has the independent status for each access target. The status is determined by the communication status with the access targets.
The communication status with access targets can be confirmed with Edgecross Basic Software.

The table below shows the operating status of MTConnect Data Collector in each communication status.
The operating status can be confirmed on the access target device list screen of Real-time Flow Designer.

Status of MTConnect Data Collector	Description	Connection status with an access target
Reading data from access target	A state in which a Data Collector is connected to an access target normally	Connected
Not reading data from access target (Requesting the reconnection)	A state in which a Data Collector is disconnected from an access target	Disconnected

Respond to errors

When MTConnect Data Collector detects an error, MTConnect Data Collector responds as follows depending on the type of error.

Type of error	Status of MTConnect Data Collector	Response of MTConnect Data Collector
Data collector operation stop error	A state in which operations according to the specifications cannot be guaranteed due to a hard disk error in an industrial personal computer which is the installation destination or a failure of resource securing.	- Discards collected data when this error occurs during a data collection. - Stops data collecting and data reading function, then reports the error to Edgecross Basic Software.
Data collector operation continuation error	A state in which operations such as a program execution or data exchange cannot be continued due to an error in a parameter setting or temporary network failure.	- Discards collected data when this error occurs during a data collection. - Continues data collecting and data reading function after the error is reported to Edgecross Basic Software.

Point

The type of errors to be reported to Edgecross Basic Software are as follows:
- Data collector operation stop error: moderate error
- Data collector operation continuation error: minor error

2.3 Accessible Devices

The target devices to which MTConnect Data Collector can access are shown below.

- A server with MTConnect Agent[*1] installed (industrial PC)
- A server with MTConnect Agent of another manufacturer installed (industrial PC)
- MTConnect Agent implemented equipment (other manufacturers)

*1 "C++ Agent" issued by MTConnect Institute (Ver1.3.0.11, OSS), etc.

The target devices to which MTConnect Adapter can access are shown below.

- MITSUBISHI CNC M8V series/M8 series/C80/M7 series

Recommended items

The recommended MTConnect Agent implemented equipment (other manufacturer's products) is shown below.

Manufacturer	Model name	Model number
Contec	COMPROSYS M2M controller	CPS-MC341-ADSC1-931
WAGO	750 series controller	PFC100

2.4 Operating Environment

Operating environment of MTConnect Data Collector

The operating environment of MTConnect Data Collector conforms to that of other Edgecross-enabled Data Collectors.

Item		Specification
H/W	Processor	Intel Atom E3826 1.46 GHz or above
	Required memory	4 GB or larger
	Required disk	4 GB or larger (excluding the required available capacity for OS operation)
	Required external I/F	RJ-45 (Communication method: Ethernet)
S/W	OS *1 *2	Supports 64-bit version of the following OS. Windows 10 Pro Windows 10 Enterprise Windows 10 IoT Enterprise
	Supported languages	Japanese, English (Can be switched by utility)
	Recommended agent	"C++ Agent" issued by MTConnect Institute (Ver 1.3.0.11 or later, OSS) Reference: https://github.com/mtconnect/cppagent/releases
	Number of concurrent connections	Up to 12 agents

*1 The following functions, settings or operations are not supported.

- Compatibility mode
- Fast user switching
- Windows Touch or Touch for Windows
- Hyper-V
- Virtual desktop
- Tablet mode
- Inactive or standby of Windows ®
- Unified write filter
- When 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
- When the screen resolution is changed during the operation
- Multi-display
- When you log in to Windows10 without using Administrator or Standard user account

*2 Remote Desktop is supported. However, the following cases are not covered by the warranty.

- Delay of screen updates at monitoring or operation, due to the network environment (speed, load, etc.)
- A part of text or window gets cut off due to the Remote Desktop settings.

Operational environment of MTConnect Adapter

Item		Specification
H/W	Processor	A processor with the clock rate of 2.66 GHz or higher and with two or more cores
	Required memory	2 GB or larger
	Required disk	1 MB or larger (excluding the required available capacity for OS operation)
	Required external I/F	RJ-45 (Communication method: Ethernet)
S/W	OS	Windows 7/Windows 8.1/Windows 10 (32-bit/64-bit version)
	Supported agent	"C++ Agent" issued by MTConnect Institute (Ver 1.3.0.11 or later, OSS) Reference: https://github.com/mtconnect/cppagent/releases

3 PROCEDURE BEFORE OPERATION

This chapter shows the start-up procedure of MTConnect Data Collector prior to running.

Operating procedure

1. Install MTConnect Data Collector, MTConnect Adapter, and MTConnect Agent to an industrial personal computer.

☞ "3.1 Installation Procedure"

2. Establish the setting and wiring of a device with MTConnect Adapter and MTConnect Agent installed, then connect it to the industrial personal computer.
   For details of setting, wiring, and connection, refer to the manuals of the MTConnect Agent, relevant device and the industrial personal computer to be used.

☞ "5.2 MTConnect Adapter"-"melNCAdapter.cfg (Setting file)", "5.3 MTConnect Agent"

3. Start-up Real-time Flow Designer of Edgecross, configure MTConnect Data Collector to the device to be accessed and make a setting for communication parameters.

☞ "5.1 MTConnect Data Collector" - "Data collecting function" - "Communication parameter settings"

4. Make settings for collection parameters and location of MTConnect by using data logging flow or data diagnosis flow of Real-time Flow Designer.

☞ "5.1 MTConnect Data Collector" - "Data collecting function" - "Parameter settings for data collection"/"Location parameter settings"

5. Start-up Real-time Flow Manager.

Edgecross Basic Software for Windows User's Manual

3.1 Installation Procedure

Installation of MTConnect Data Collector

Environment conditions

- Edgecross Basic Software has been installed.
- More than 350 MB of free storage space is secured on the system drive.

Precautions

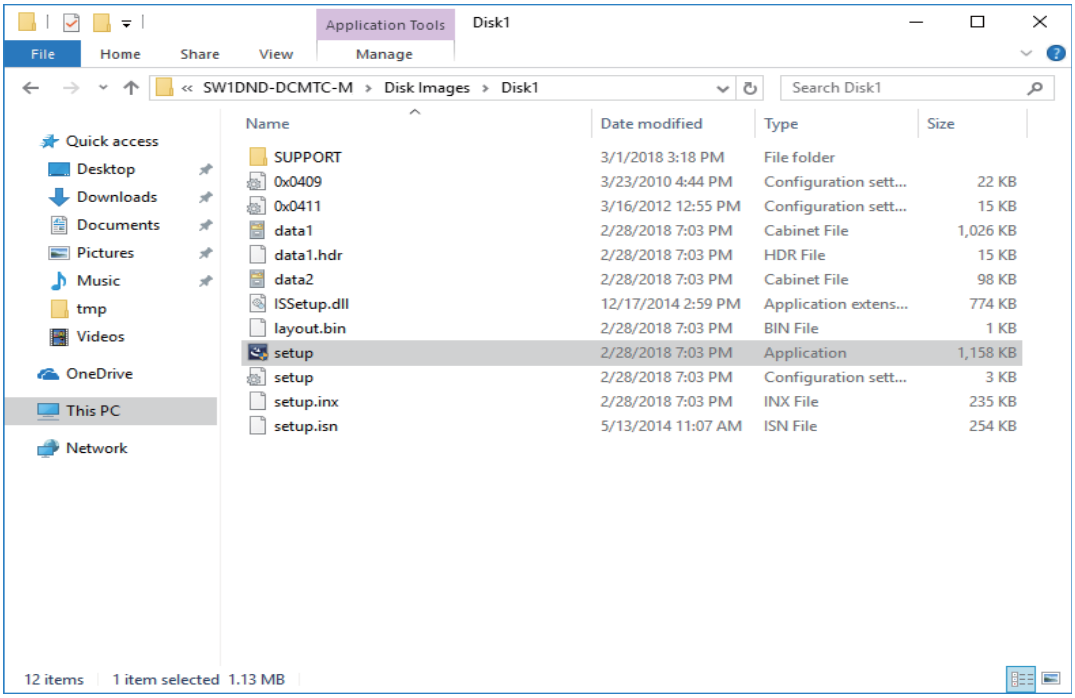
- If another version of the MTConnect Data Collector has been installed, the new version is installed additionally while leaving the existing version.
- Do not additionally install MTConnect Data Collector to the previous versions.
- When you install MTConnect Data Collector for the first time, the input of the product ID is required.
- Administrator authority is required.

Operating procedure

(1) Starting the installer

Start the installer file of MTConnect Data Collector "setup.exe".

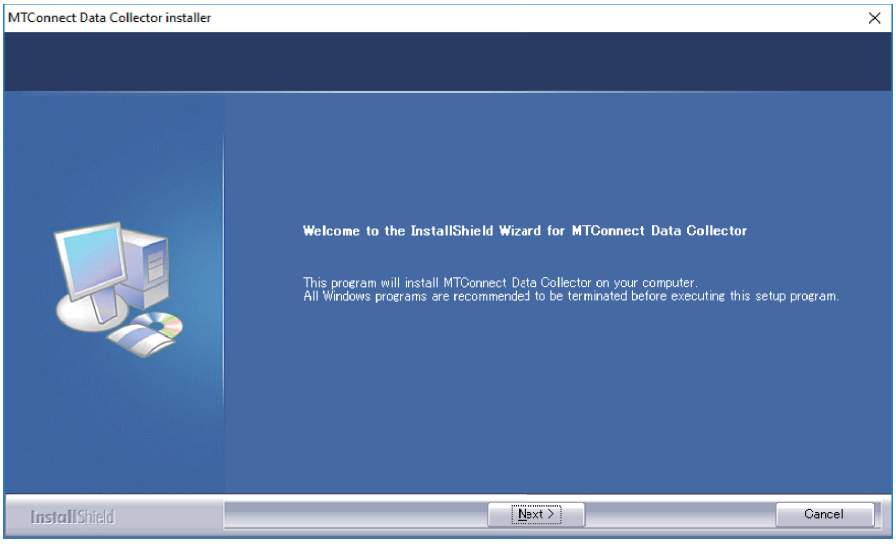
(Note) Do not use the network drive.



(2) Start MTConnect Data Collector installation

MTConnect Data Collector installer displays welcome screen.

[Next]: to continue the installation
[Cancel]: to display the installation cancel screen

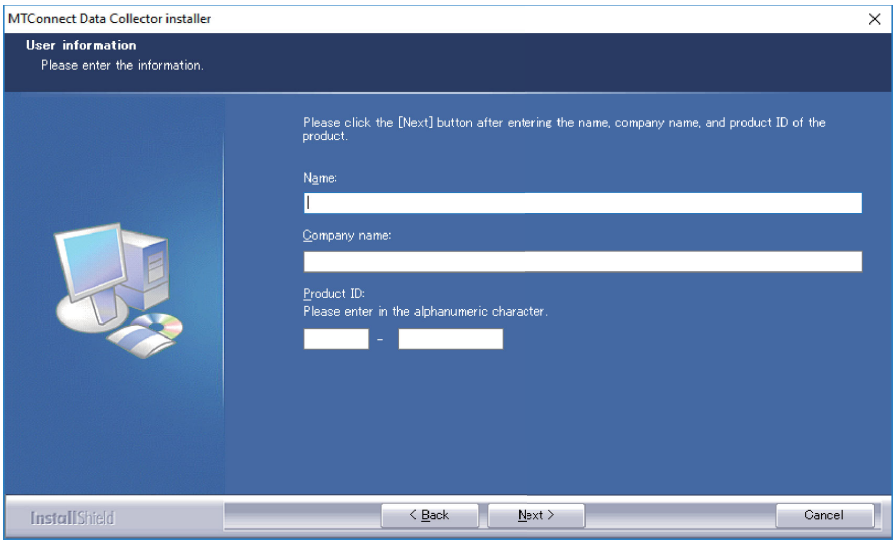


(3) Setting user information

Enter your name, company name, and product ID.
When MTConnect Data Collector is to be installed additionally, this window does not appear and procedure goes to next step.

[Next]: to continue the installation
[Back]: to back to previous screen
[Cancel]: to display the installation cancel screen

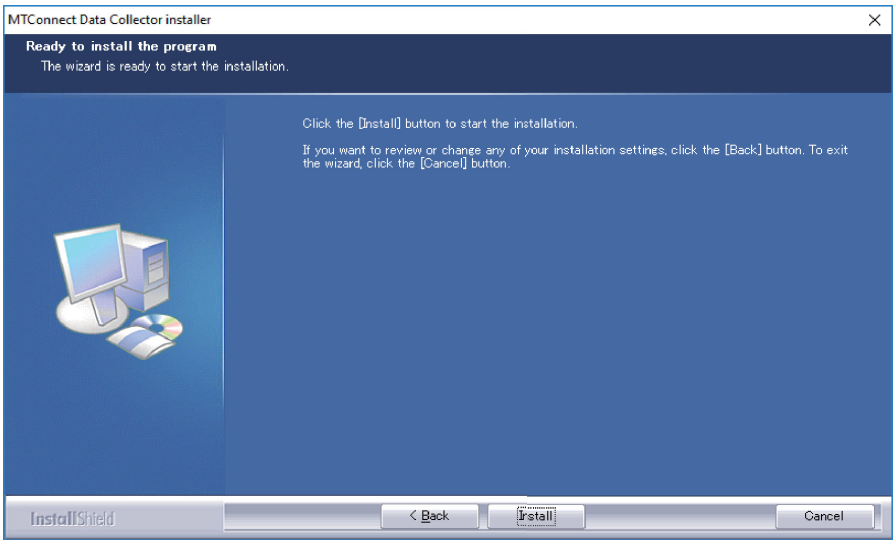
(Note) [Next] will be activated after all the user information consisting of user name, company name, and product ID are entered.



(4) Notification of installation ready

This window notifies the completion of MTConnect Data Collector installation preparation.

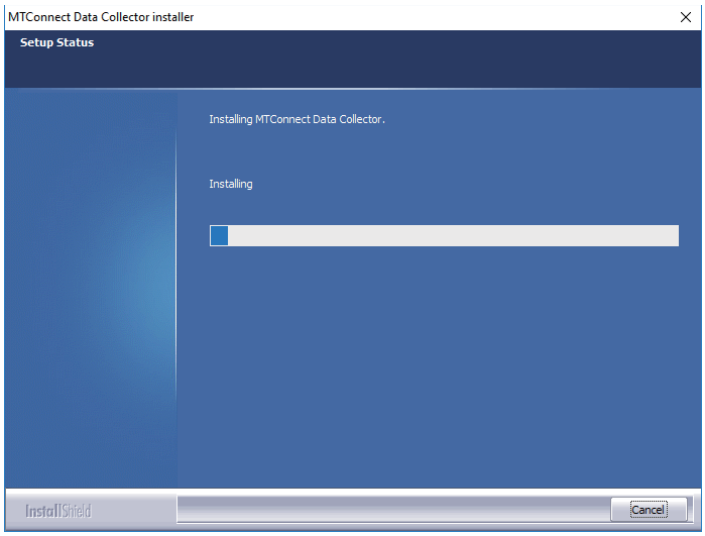
[Install]: to start installation of MTConnect Data Collector installer
[Back]: to back to previous screen
[Cancel]: to display the installation cancel screen



(5) Progress bar information

MTConnect Data Collector installation starts and the progress bar indicates the extent of the task.

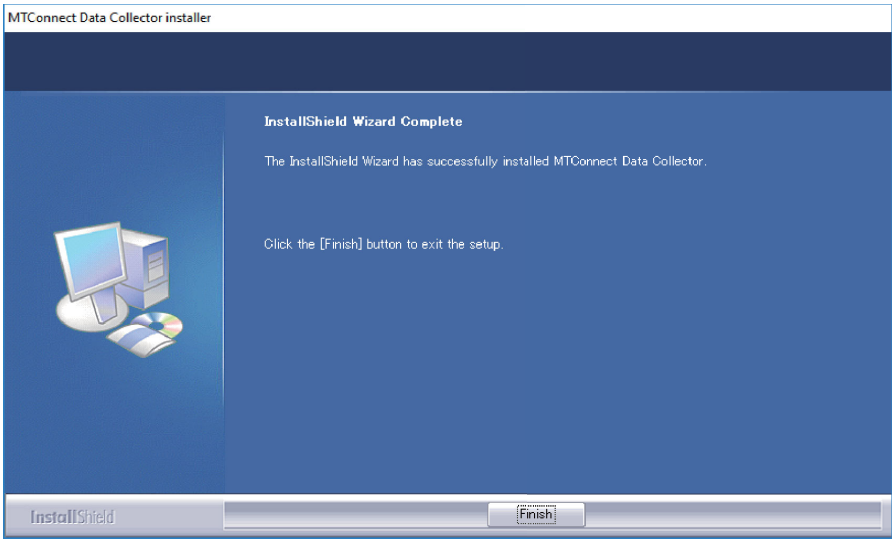
[Cancel]: to display the installation cancel screen



(6) Installation completed

When the installation of MTConnect Data Collector is completed, the completion message is displayed.

[Finish]: to finish the installation setup procedures



Installation of MTConnect Adapter

Precautions

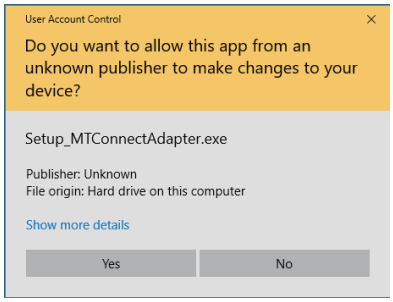
- The product ID input is required.
- Administrator authority is required.
- The MTConnect Adapter installed on the different PC from the industrial personal computer in which Edgecross is operating can be used. In this case, the installation procedure is the same. Refer to "2.4 Operating Environment" for the operating environment of the MTConnect Adapter.

Operating procedure

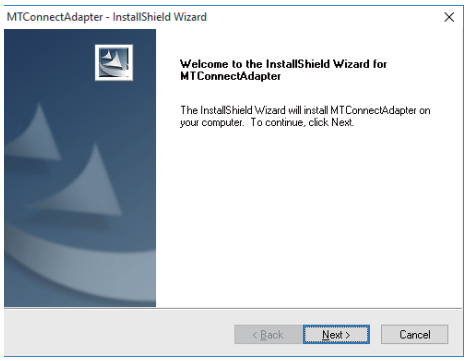
(1) Insert the MTConnect Data Collector installation DVD into the DVD drive of an industrial personal computer.

(2) Run the ".\Adapter\Setup_Adapter.exe" file in the installation DVD.

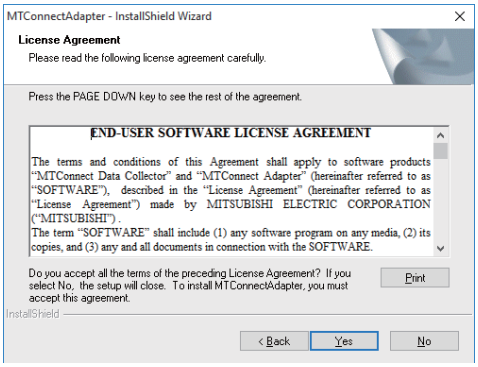
- The installation screens are displayed in Japanese when the version of Windows to be installed is Japanese, and they are displayed in English in other cases.
- When "User Account Control" is enabled, the confirmation dialog below appears. Click [Yes] to start installation.



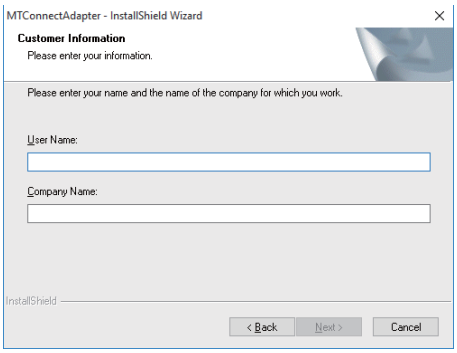
(3) The setup screen appears. Click [Next].



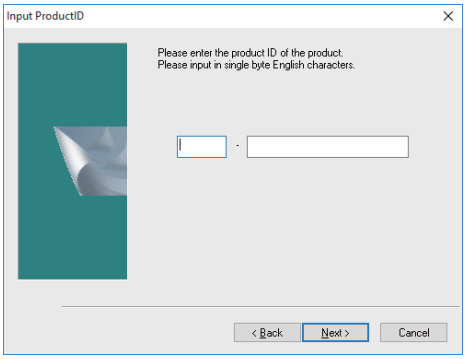
(4) The end user software license agreement screen appears. Read the contents carefully before clicking [Yes]. When [No] is clicked (you do not accept the agreement), the installation is canceled.



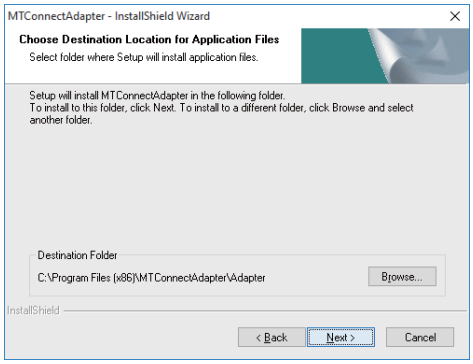
(5) The customer information screen appears. Enter the user name and company name, and click [Next].



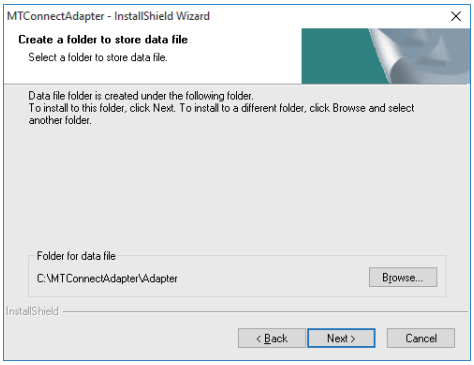
(6) The product ID input screen appears. Input the product ID which is indicated on the package of the installation DVD, and click [Next].
* The same product ID is used for both MTConnect Data Collector and MTConnect Adapter.



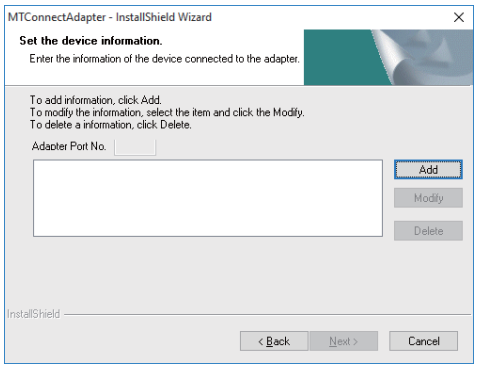
(7) The screen for selecting the destination location appears. To change the destination location, click [Browse] and select a new destination folder. After setting the destination, click [Next].



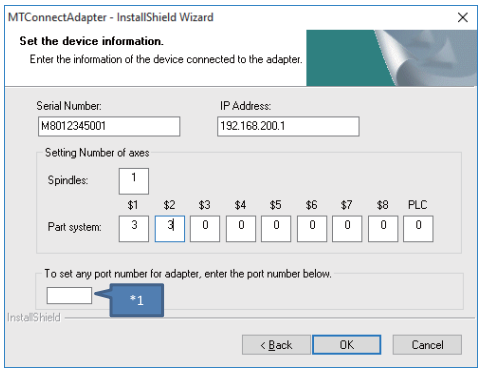
(8) The screen for selecting the folder to store data file appears. To change the folder, click [Browse] and select a new destination. After setting the folder to store data file, click [Next].



(9) The screen for setting the connecting devices information appears. Click [Add] to register the information of an NC to be connected to MTConnect Adapter.

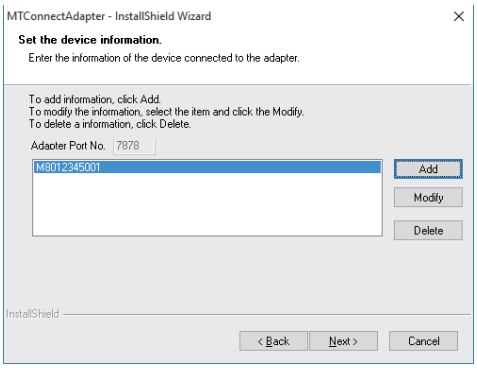


(10) The screen for entering the information of the device to be connected appears. Enter the serial No., IP address and machine configuration information (number of axes) of the NC to be connected. After entering the information, click [OK]. The information of the device to be connected can be changed or added after installation. Refer to "Resetting MTConnect Adapter" in "5.2 MTConnect Adapter".



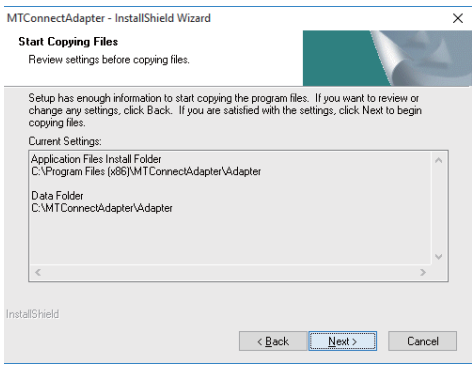
* Entering the port No. for MTConnect Adapter of this screen is optional. Port Nos. 7878 to 7927 are set automatically to MTConnect Adapter when no port No. is set. When any port No. is entered on this screen, that port No. will be set to MTConnect Adapter.

(11) The device is now added to the list on the connecting devices information screen. Repeat the above procedure for all the devices to be connected, and click [Next] when registration of all devices is completed.

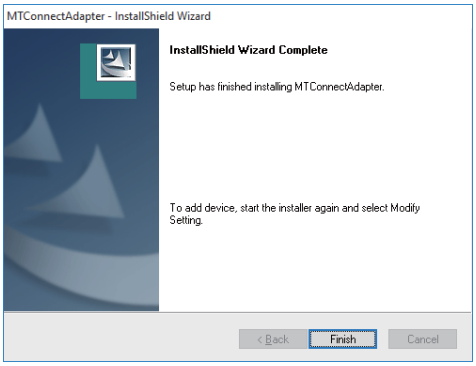


(Note) The port No. of the device selected on the list appears in the box of "Adapter Port No." Write down these port Nos. as they will be used to set MTConnect Agent.

(12) The screen for starting file copy appears. After checking the settings of the destination, click [Next] to start the installation.



(13) When the installation is successfully completed, the "InstallShield Wizard Complete" screen appears. Click [Finish] to end the installation.



Installation of MTConnect Agent

To use "C++ Agent" as MTConnect Agent, download the compressed file of "C++ Agent" from the following site.
Download site: https://github.com/mtconnect/cppagent/releases

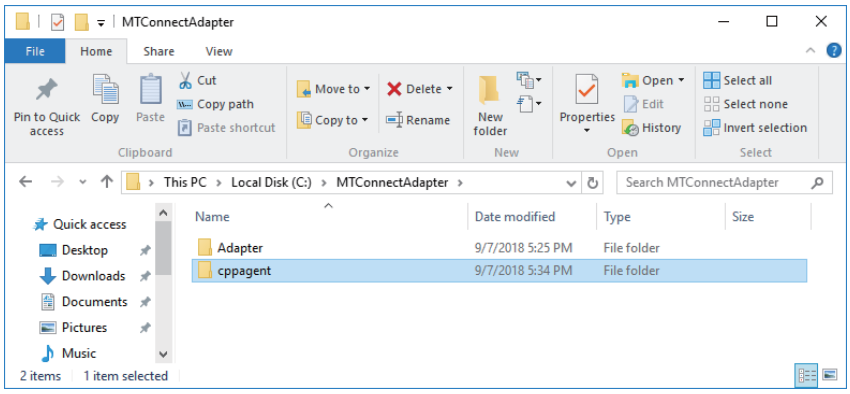
Precautions

- Administrator authority is required.
- "C++ Agent" installed on the different PC from the industrial personal computer in which Edgecross is operating can be used. In this case, the installation procedure is the same.

Operating procedure

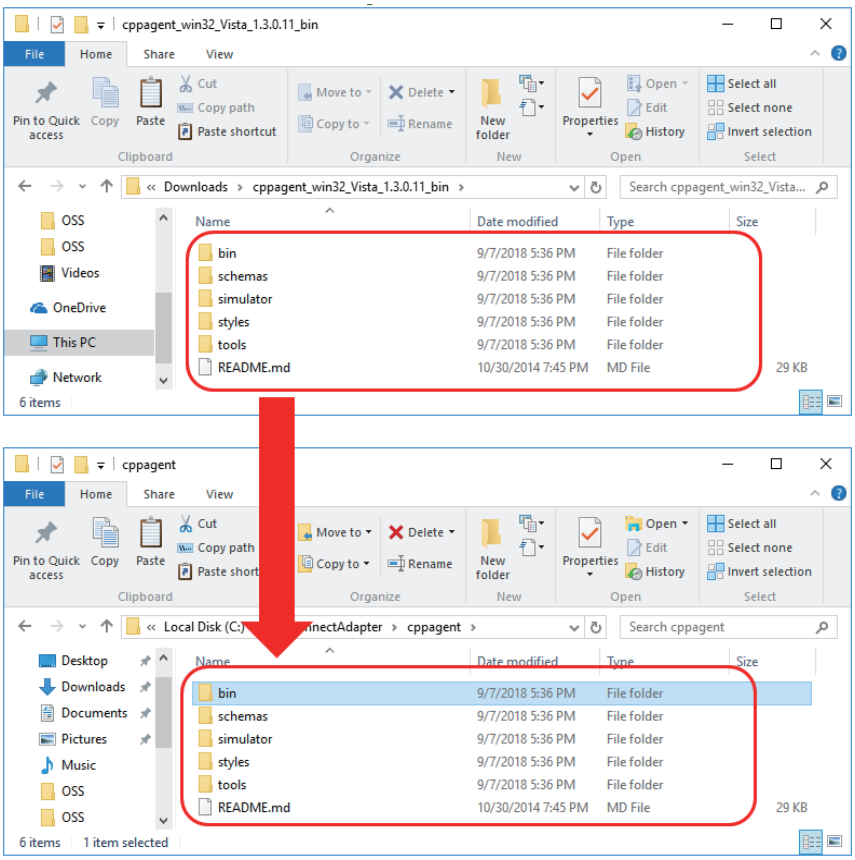
(1)　Create a folder to store "C++ Agent". Normally, create the destination folder as "C:\MTConnect\cppagent".

* Setting files stored in the folder need to be edited afterward. Therefore, when a folder other than "C:\MTConnect\cppagent" is designated, do not use "C:\ProgramFiles(x86)" or "C:\Windows" folder etc. which is protected by Windows.



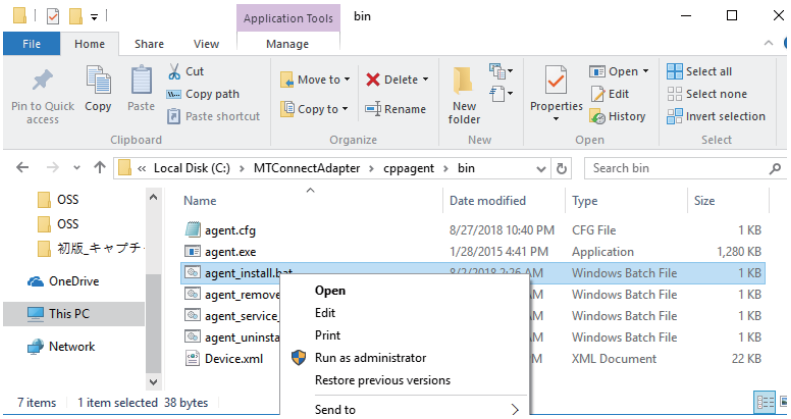
(2)　Extract the compressed file you downloaded (Example: "cppagent_win32_Vista_1.3.0.17_bin.zip") to an arbitrary folder. A folder named "cppagent_win32_Vista_1.3.0.17 bin" is created automatically under the folder where the file was decompressed.

(3) Copy all the files and sub folders under the "cppagent_win32_Vista_1.3.0.17_bin" folder into the destination folder of "C++ Agent".

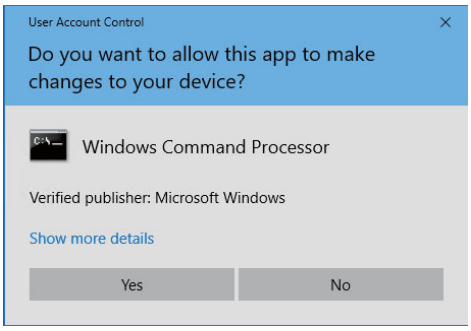


(4) Copy the following batch files stored under the ".\Agent\" directory of the installation DVD into "<destination folder of "C++ Agent">\bin" folder.
- agent_install.bat -> registers MTConnectAgent on Windows service
- agent_remove.bat -> stops MTConnectAgent operation
- agent_service_start.bat -> starts MTConnectAgent operation
- agent_uninstall.bat -> cancels the registration of MTConnectAgent on Windows service

(5) Right-click the copied file "agent_install.bat", and click "Run as administrator".



(6) The "User Account Control" dialog appears. Click [Yes].



(7) Registration of "C++ Agent" to Windows service is complete.

3.2 Procedure to Uninstall

Uninstalling MTConnect Data Collector

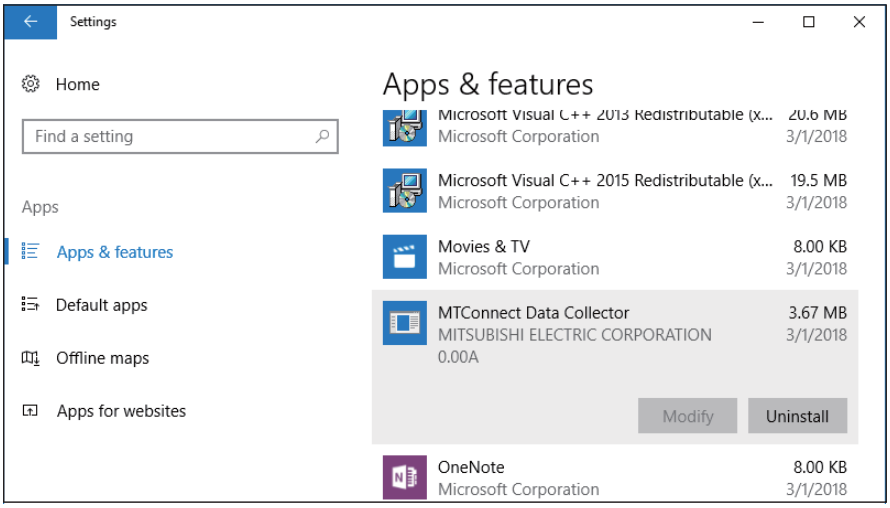
Precautions

- This procedure cannot be interrupted after starting uninstallation.

Operating procedure

(1) Addition and removal of program

Select [Control panel] -> [Uninstall a program], then select [Uninstall] for MTConnect Data Collector.



Uninstalling MTConnect Agent

Operating procedure

Follow the procedures below to stop and delete Windows service, then delete all of the relevant folders.

(1) Copy the "agent_uninstall.bat" file which is stored in the installation DVD to the folder where MTConnect Agent was expanded.

(2) Right-click the copied "agent_uninstall.bat" file, and click "Run as Administrator".

(3) The "User Account Control" dialog appears. Click [Yes].

Uninstalling MTConnect Adapter

Operating procedure

Select [Control panel] -> [Uninstall a program], then select [Uninstall] for MTConnect Data Adapter.

4 FUNCTIONS

This section shows the function list of MTConnect Data Collector and MTConnect Adapter.

Function name		Description	Reference
MTConnect Data Collector	Data collecting function	This function reads the data at the constant intervals from the device connected with MTConnect and notifies the data to Edgecross Basic Software.	4.1
	Data reading function	This function reads the data from the device connected with MTConnect in response to a reading request from Edgecross Basic Software.	4.2
	Parameter setting	This function enables the settings for the target device, data collection, etc. of MTConnect Data Collector.	5.1
MTConnect Adapter	Communication function	This function notifies the collected value to MTConnect Agent.	-
	Parameter setting	This function enables the setting for MTConnect Adapter. Multiple MTConnect Adapter can be set.	5.2

4.1 Data Collecting Function

This function sends a data reading request to the MTConnect Agent at the defined period, and collects the specified DataItem as a response from the MTConnect Agent.

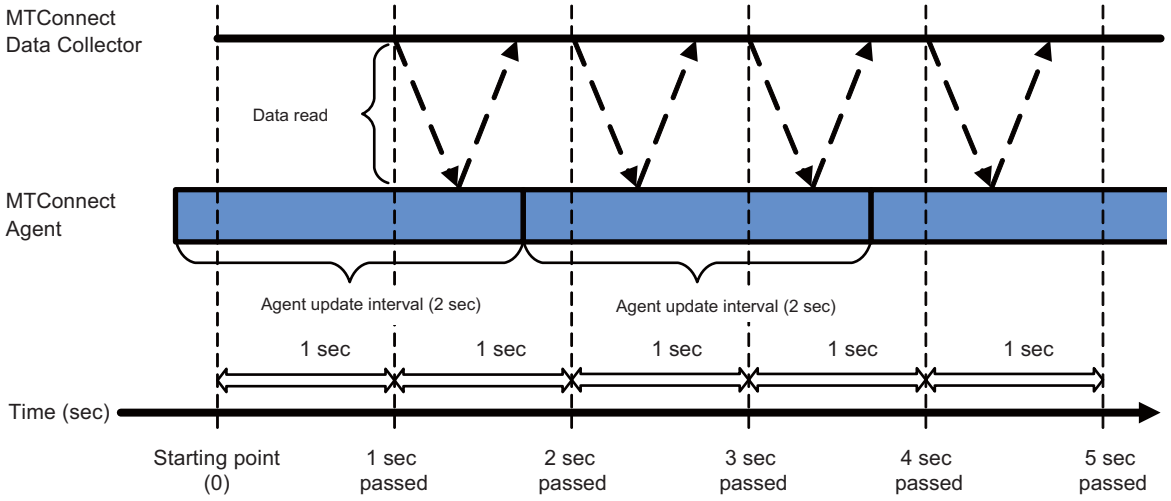
Data acquisition starts at the time when the defined time elapsed after the status of Edgecross Basic Software turns "RUN". After that, data collection is repeated at constant intervals.
This function operates at the constant intervals without being affected by the change of system time on the industrial personal computer in which MTConnect Data Collector runs.

Precautions

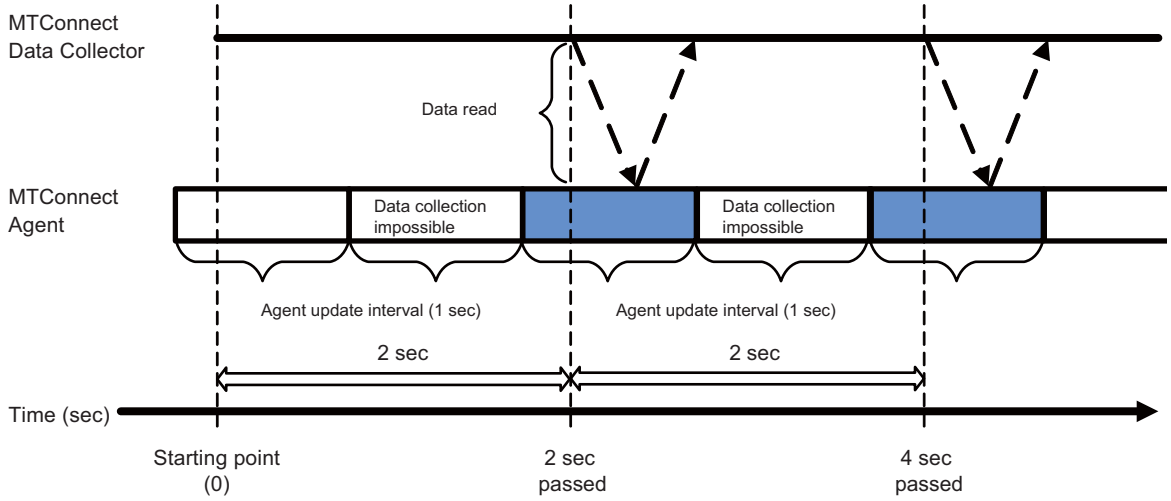
As MTConnect is the information exchange standard and MTConnect Agent collects the data at constant intervals, MTConnect Data Collector may not collect the data if the collection interval of MTConnect Data Collector is shorter than that of MTConnect Agent.
It is recommended to set the collection interval of MTConnect Data Collector to be longer than or equal to the collection interval of MTConnect Agent.

Additionally, as the actual collection interval depends on the performance or environment of the industrial personal computer on which the MTConnect Agent runs, refer to the MTConnect compatible product manual for details.

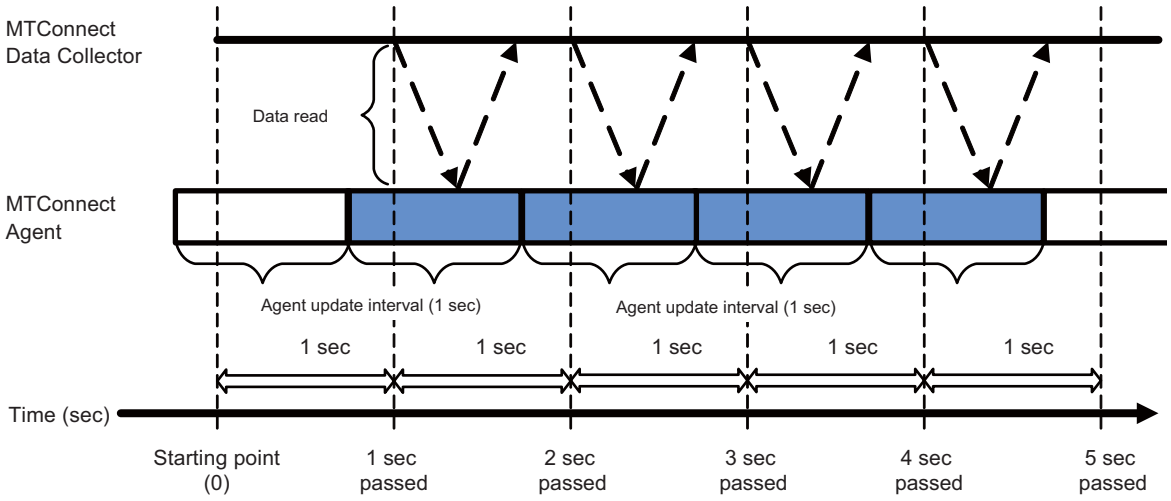
<When the collection interval of MTConnect Agent is longer than that of MTConnect Data Collector (recommended)>



<When the collection interval of MTConnect Agent is shorter than that of MTConnect Data Collector>



<When the collection interval of MTConnect Agent is the same as that of MTConnect Data Collector>



4.2 Data Reading Function

MTConnect Data Collector reads data from MTConnect Agent according to a data reading request from Edgecross Basic Software. Data is read once from MTConnect Agent when data reading is requested.

Precautions

- The data acquired with MTConnect Data Collector data reading is the data that MTConnect Agent retains when data reading is requested. As such, if data reading is requested multiple times at intervals shorter than the MTConnect Agent interval, MTConnect Data Collector may read a data value multiple times before it has been updated. Request data reading again at intervals longer than the MTConnect Agent interval.
- Missing may occur when communication is disconnected between an agent and Data Collector or between an agent and CNC unit. Additionally, "Unavailable" may be returned from the agent as the individual collection data for disconnection between the agent and NC equipment. When the data is missing or Unavailable, the value is not displayed in the Edgecross monitor diagnostics screen. Refer to the following document for details.

Edgecross Basic Software for Windows User's Manual

MEMO

5 PARAMETER SETTINGS

Parameters of MTConnect Data Collector can be set with Edgecross Basic Software.
For the procedure to display each parameter setting window, refer to "Edgecross Basic Software for Windows User's Manual".

Edgecross Basic Software for Windows User's Manual

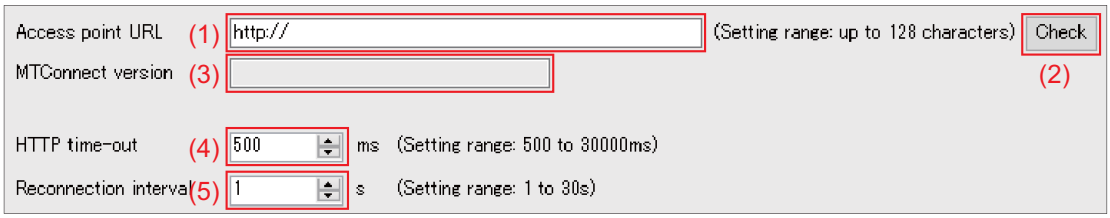
5.1 MTConnect Data Collector

Data collecting function

Communication parameter settings

Set the connection properties from MTConnect Data Collector to MTConnect Agent.

Window



Setting item

The following shows the items to be set and their descriptions.

No.	Item	Description
(1)	Access point URL	Sets the address (URL) of MTConnect Agent.
	Setting range	0 to 128 characters (Default value: http://)
(2)	Check button	When this button is pressed, a connection check will be performed using the address specified in access point URL. When any error occurs, a message dialog box appears to notify the result. (Message dialog box has only one button, labeled "OK".)
(3)	MTConnect version	The MTConnect version recognised by Data Collector in the check in (2) is displayed.
(4)	HTTP time-out	Sets the time for http communication time-out.
	Available setting range (Unit: ms)	500 to 30000 (Default value: 500) The last two digits of the setting value can not be set to a value other than "00". (Example) All of the following setting values will be set as "1200" 1200, 1208, 1230, 1299
(5)	Reconnection interval	Time interval between communication failure and reconnection attempt.
	Available setting range	1 to 30 (1s unit) (Default value: 1)

Setting examples

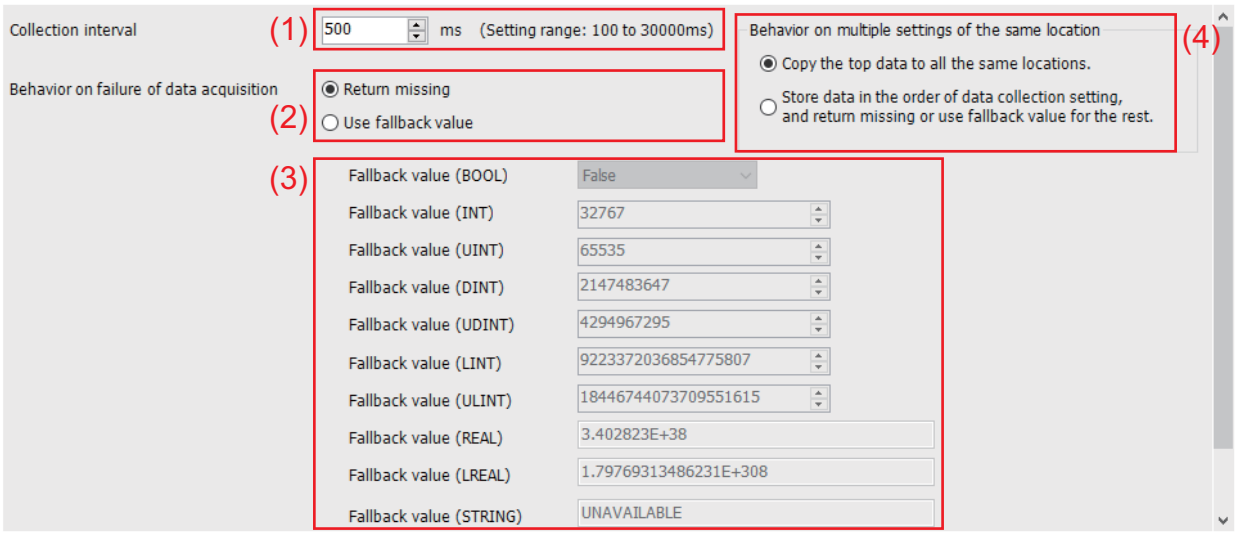
The following shows the setting examples of the communication parameters.

Item	Description
Access point URL	Sets URL of connection destination. Example: http://localhost:8080
HTTP time-out	Sets the time-out period. Example: 1000ms
Reconnection interval	Sets the reconnection interval. Example: 1s

Parameter settings for data collection

Set the parameters for data collection used in MTConnect Data Collector.

Window



Setting item

The following shows the items to be set and their descriptions.

No.	Item	Description
(1)	Collection Interval	Sets the interval of data collecting function.
	Available setting range (Unit: ms)	100 to 30000 (100 ms unit) (Default value: 500) The last two digits of the setting value can not be set other than "00". (Example) Any of the following inputs shown below will be regarded as "1200" and "1200" will be displayed in the box. 1200, 1208, 1230, 1299
(2)	Behavior on failure of data acquisition	In either of the following cases, select whether to be notified the data missing or to choose the fallback. *1 - when individual DataItem is "Unavailable" - when the conversion to the designated data format is not available (Default value: "Return missing")
(3)	Fallback value	When "Use fallback value" is specified in (2), the data type specified here will be applied to the collected data to be notified to Edgecross.
	Available setting range	Available range for each data type. Refer to the following table for each setting range.
(4)	Behavior on multiple settings of the same location	Specifies the operation method when multiple collection data items are set for the same location. *2 (Default: Store data in the order of data collection setting, and return missing or use fallback value for the rest.)

*1 Notice of data missing

When the periodic collection process cannot be completed within the period of time set in (1) due to the communication delay or abnormal communication etc. of MTConnect communication, the time interval will be notified to Edgecross as data missing. In the cases other than above, only a certain types of DataItem may be "Unavailable" depending on the collection status of MTConnect Agent. At least one of the DataItem specified as the data to be collected on location parameter setting screen (Refer to Section 5.3) becomes "Unavailable" (or issues data type conversion error), MTConnect Data Collector returns either (a) or (b), as follows.

(a) The corresponding interval in periodic collection is notified to Edgecross as data missing.
(b) The corresponding interval in periodic collection is not regarded as data missing.
(Set the fallback value to be stored in Edgecross.)

*2 Operations when storing data in the order of data collection

When the number of data items is smaller than the number of location settings set for the collection data, the fallback value will be applied or missing will be notified to the rest of the items.

Data type	Setting range of fallback value
BOOL	TRUE/FALSE
INT	-32768 to 32767
UINT	0 to 65535
DINT	-2,147,483,648 to 2,147,483,647
UDINT	0 to 4,294,967,295
LINT	-9,223,372,036,854,775,808 to 9,223,372,036,854,775,807
ULINT	0 to 18,446,744,073,709,551,616
REAL	0, 1.175495E-38 (Absolute value) to 3.402823E38 (Absolute value)
LREAL	0, 2.22507385850721E-308 (Absolute value) to 1.79769313486231E308 (Absolute value)
STRING	(1 to 32 characters) Example: abcdefghijklmnopqrstuvwxyz123456
WSTRING	(1 to 16 characters) Example: abcdefghijklmnopqrstuvwxyz123456

Setting examples

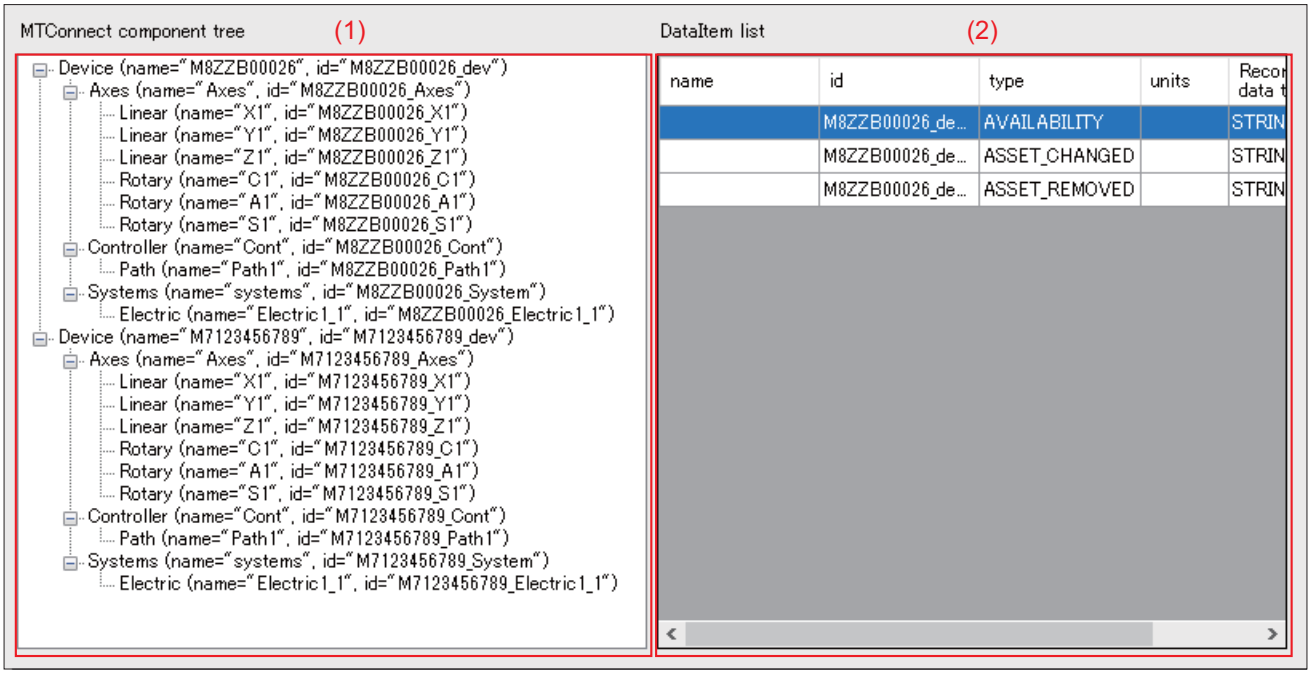
The following shows the setting examples of the collection parameters.

Item	Description
Collection Interval	Sets the collection interval of location. Example: 500ms
Behavior on failure of data acquisition	Mark the check box to select whether to notify the data missing.
Fallback value	Sets the fallback value. (When "Use fallback value" is selected.) Example: "0" for numerical data type, "UNAVAILABLE" for character data type, etc.
Behavior on multiple settings of the same location	Sets the operations for multiple settings on the same location. Setting example 1: Store data in the order of data collection setting, and return missing or use fallback value for the rest. Operation example 1: When up to five messages occur at the same time => When five collection data items are defined by the same location ID and two messages occur, the fallback value will be applied or missing will be notified for three collection data items. Setting example 2: Copy the top data to all the same locations. Operation example 2: When up to five messages occur at the same time => When five collection data items are defined by the same location ID and three messages occur, the first message will be stored for five collection data items.

Location parameter settings

Specify the DataItem to collect from the MTConnect Agent designated in the communication parameters.

Window



Setting item

The following shows the items to be set and their descriptions.

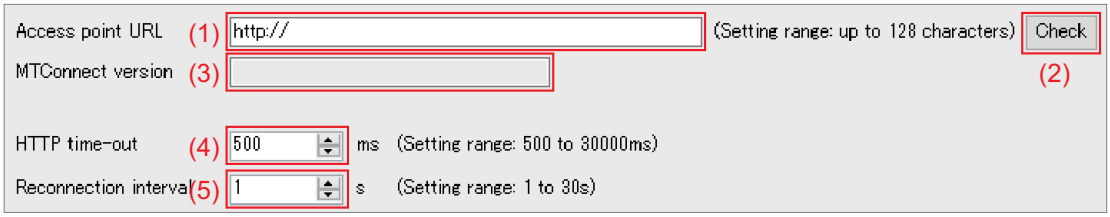
No.	Item	Description
(1)	MTConnect component tree	Displays a tree diagram of all available DataItem provided by the connected MTConnect Agent designated in the communication parameter. Each element of the tree diagram is represented as children of devices or components from which the data is collected. => Tag name (name = Name attribute value, id = Id attribute value) Select the device or component to add to DataItem. (Default: Root element is selected.)
(2)	DataItem list	Selecting a device or component on the tree diagram described in (1) adds the DataItem directly below them to the list. (Note) If the device or component which does not have DataItem is selected, no DataItem will be added to the list. **Column item** / **Description** name: Name attribute value id: Id attribute value of DataItem type: Type attribute value When subType attribute is applicable, the type attribute value will be as follows. Example: POSITION / CURRENT units: Unit attribute value Recommended data type: Recommended data type for each DataItem. Refer to "8.3 Appendix 3: DataItem Default Type". After selecting the necessary device or component, press the "OK" button.

Data reading function

Communication parameter settings

Configure communication settings for a connecting agent and data collection.

Window



Setting item

The following shows the items to be set and their descriptions.

No.	Item	Description
(1)	Access point URL	Sets the address (URL) of MTConnect Agent.
	Setting range	0 to 128 characters (Default value: http://)
(2)	Check button	When this button is pressed, a connection check will be performed using the address specified in access point URL. When any error occurs, a message dialog box appears to notify the result. (Message dialog box has only one button, labeled "OK".)
(3)	MTConnect version	The MTConnect version recognised by Data Collector in the check in (2) is displayed.
(4)	HTTP time-out	Sets the time for http communication time-out.
	Available setting range (Unit: ms)	500 to 30000 (Default value: 500) The last two digits of the setting value can not be set to a value other than "00". (Example) All of the following setting values will be set as "1200". 1200, 1208, 1230, 1299
(5)	Reconnection interval	Time interval between communication failure and reconnection attempt.
	Available setting range	1 to 30 (1s unit) (Default value: 1)

Setting examples

The following shows the setting examples of the communication parameters.

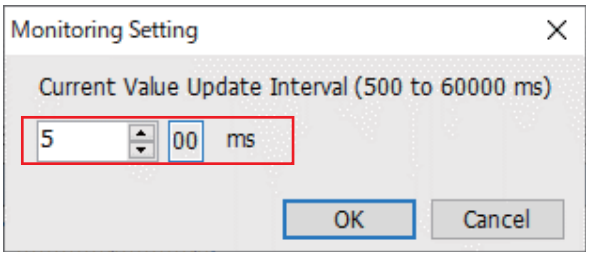
Item	Description
Access point URL	Sets URL of connection destination. Example: http://localhost:8080
HTTP time-out	Sets the time-out period. Example: 1000ms
Reconnection interval	Sets the reconnection interval. Example: 1s

Monitor parameter

Set a monitor parameter that is an update interval of a current value.

Window

(1)



Setting item

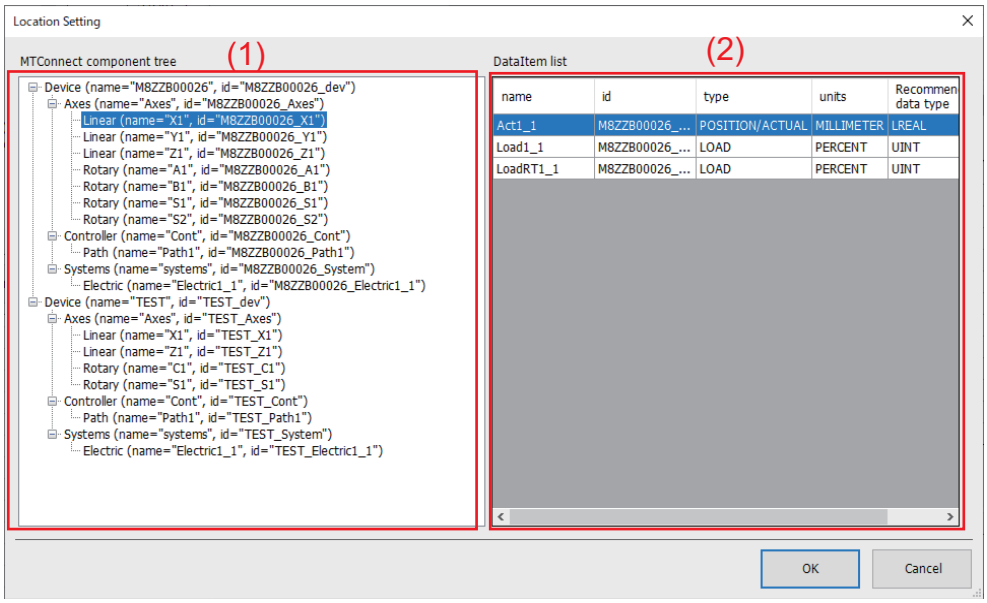
The following shows the items to be set and their descriptions.

No.	Item	Description
(1)	Update interval	Sets the update interval of the monitor.
	Available setting range (Unit: ms)	500 to 60000 (100 ms unit) (Default value: 1000)

Location parameter settings

Specify the DataItem to collect from the MTConnect Agent designated in the communication parameters.

Window



Setting item

The following shows the items to be set and their descriptions.

No.	Item	Description
(1)	MTConnect component tree	Displays a tree diagram of all available DataItem provided by the connected MTConnect Agent designated in the communication parameter. Each element of the tree diagram is represented as a child element of devices or components from which the data is collected. => Tag name (name = Name attribute value, id = Id attribute value) Select the device or component to add to DataItem. (Default: Root element is selected.)
(2)	DataItem list	Selecting a device or component on the tree diagram described in (1) adds the DataItem directly below them to the list. (Note) If the device or component which does not have DataItem is selected, no DataItem will be added to the list. **Column item** / **Description** name: Name attribute value id: Id attribute value of DataItem type: Type attribute value When subType attribute is applicable, the type attribute value will be as follows. Example: POSITION / CURRENT units: Unit attribute value Recommended data type: Recommended data type for each DataItem. Refer to "8.3 Appendix 3: DataItem Default Type". After selecting the necessary device or component, press the "OK" button.

5.2 MTConnect Adapter

melNCAdapter.cfg (Setting file)

"melNCAdapter.cfg" (Setting file) is a definition file of the information to operate MTConnect Adapter.
To change the operations of MTConnect Adapter, edit "melNCAdapter.cfg" file in the data folder (default location of the folder: "C:\MTConnectAdapter\MTConnect\Adapter\melNCAdapter.cfg") referring to the instructions in this chapter.
When the item with " ○ " in "Required" column is deleted, MTConnect Adapter cannot be connected to an NC or MTConnect Agent.
When the item with "×" in "Required" column is deleted or the setting value of each item is out of range, MTConnect Adapter is connected to an NC or MTConnect Agent with the default value.

■ Section name "Device"
Set the port No. to be connected to MTConnect Agent.

Section name	Key name	Details for setting	Value	Default setting	Re-quired
Device	Interval	Sets the interval (unit: ms) of periodic collection.	500 to 10000	500	×
	MgrInterval	Sets the interval (unit: min) to monitor changes of the "melNC-Adapter.cfg" file by the adapter management function. When the value is set to "0", the changes are not monitored.	0 to 10	1	×
	RetryInterval	Set the interval (unit: min) to attempt connection with a CNC when the CNC could not be connected when an Adapter administration starts. If this is not set, the connection will be attempted with the default value. If a value out of range is set, the connection will not be attempted.	1 to 5	1	×

■ Section name "DeviceXX"

Set the information of an NC to be connected to MTConnect Adapter and sets the port No. to be connected to MTConnect Agent.

Specify uniquely identifiable hexadecimal numbers in "XX" in the range of 01 to FF.

Activate MTConnect Adapter form the top until the number of the activating adapters reaches 50, targeting for all "DeviceXX" where the required items have been described.

If section names are duplicate, the one on the upper level is used.

Section name	Key name	Details for setting	Value	Default setting	Re-quired
DeviceXX	AgentPort	Sets the port No. to wait for connection from MTConnect Agent.	-	-	×
	SerialNo	Sets the serial No. of the NC to be connected.	-	-	×
	Ip	Sets the IP address of the NC to be connected. (An NC which is operating in different network segment can be connected.)	-	-	○*1
	SpAxis	Sets the number of spindles.	1 to 8	0	×
	PlcAxis	Sets the number of PLC axes.	1 to 16	0	×
	SystemX	Sets the number of axes for each valid part system Specify the number of the valid part system in "X" in the range of 1 to 8.	1 to 16	0	○
	NCType	Sets the model number of the CNC to be connected. 1: M800W, M800S, M80W, M80, E80, M800VW, M800VS, M80V, M80VW, C80 2: M700V, M70V, E70 3: M800LC 4: M700LC 5: M800UM, M800UM-V 6: M700UM, M700BM If the value out of the range is set, MTConnect adapter will not be connected to the CNC.	1 to 6	0	×*2
	PlcDataDef	Sets the file name of "PLC data definition file"*3.	File name (Optional)	File name No settings	×

*1: If Ip is not specified, MTConnect Adapter will not start.

*2: If connection cannot be made without NCType setting due to the network environment, set NCType.

*3: For details, refer to "PLC data definition file".

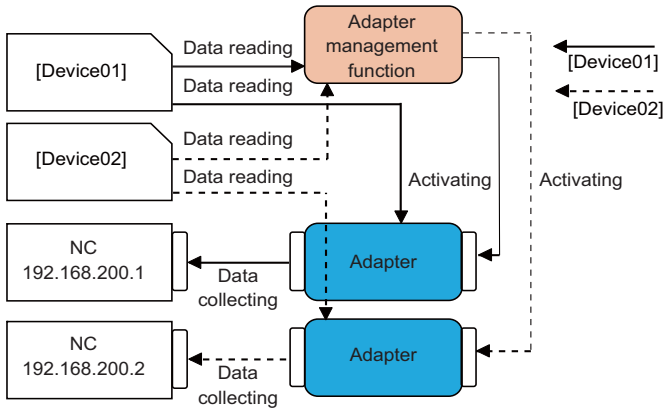
(Example) melNCAdapter.cfg (Setting file)

```
[Device]
Interval = 1000
MgrInterval = 1

[Device01]
AgentPort = 7878
Ip = 192.168.200.1
SpAxis = 2
PlcAxis = 1
System1 = 3
System2 = 5

[Device02]
AgentPort = 7879
Ip = 192.168.200.2
SpAxis = 1
PlcAxis = 1
System1 = 6
```

Activate the two adapters that communicate with [Device01] and [Device02].



PLC data definition file

A PLC data definition file enables acquiring of PLC device data in a CNC for specified collection data. This function is used only when connecting M800LC or M700LC.
Any file name can be set. The length of the file name is up to 128 bytes.
This file will be stored in the same folder (C:\MTConnect\Adapter) as melNCAdapter.cfg (setting file).
When the file contents are updated while Adapter is running, Adapter will restart to apply the updated information.
Set the following information in the file.

■ Section name "DataXXX"

Section name	Key name	Details for setting	Value	Default setting	Re-quired
DataXXX*1	DeviceName	Set the PLC device name.	Device name such as R or D*2	-	○
	DeviceNo	Set the PLC device number.	0 or larger*3	-	○
	DataUnit	Set the units for acquiring the PLC device data.	1: 2 byte unit 2: 4 byte unit	1	×
	DevicePrjNo	Set the No. of the PLC multiple project.	1 or larger*4	1	×

*1: For the available section names and assignment of collection data, refer to "Available section name and assignment of collection data".
*2: For the acquirable PLC devices, refer to "Acquirable PLC devices".
*3: The maximum device number differs depending on the CNC model.
*4: The maximum number of projects differs depending on the CNC model and options. When the CNC does not support PLC multiple project, the setting will be ignored.

Available section name and assignment of collection data

Section name	Agent schema definition	
	Item	Name (○: part system number)
Data001	Total number of completed parts	PartA○_1
Data002	Cycle time	CycT○_1

Acquirable PLC devices

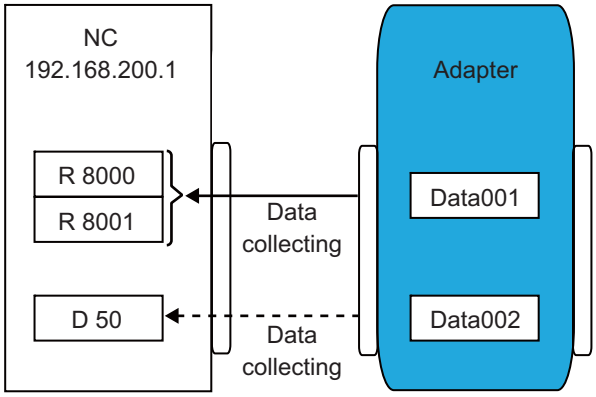
NC model	PLC device name
M8	D, R, ZR, W
M7	D, R, W

(Example) PLC data definition file (Machine_001.cfg)

```
[Data001]
DeviceName=R
DeviceNo=8000
DataSize=4

[Data002]
DeviceName=D
DeviceNo=50
```

Collects the PLC device data corresponding to [Data001] and [Data002].



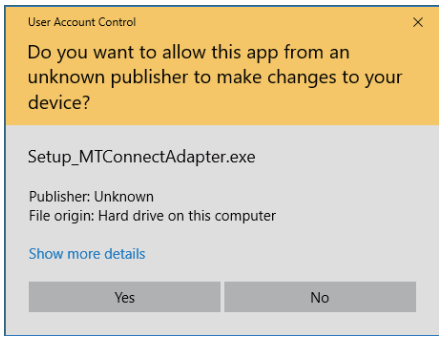
Resetting MTConnect Adapter

The device information registered in "Installation of MTConnect Adapter" in "3.1 Installation Procedures" can be set again after installation.

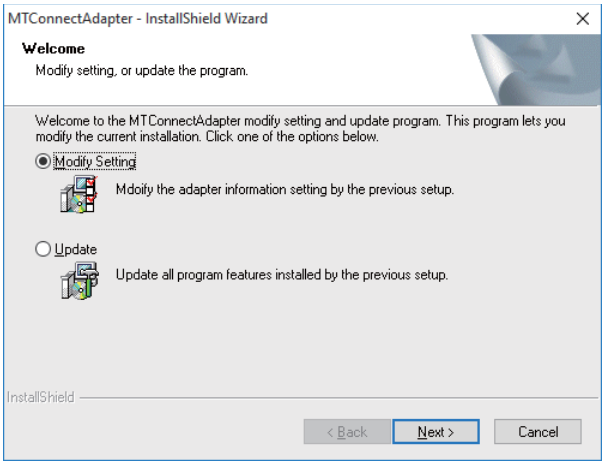
(Note) When the settings have been changed following the instructions below, the "agent.cfg" file and "Device.xml" file need to be rewritten.
Refer to "5.3 Set MTConnect Agent", and edit the "agent.cfg" and "Device.xml" files.

(1) Select "Start" menu - "All Programs" - "MTConnectAdapter" - "Adapter Modify".

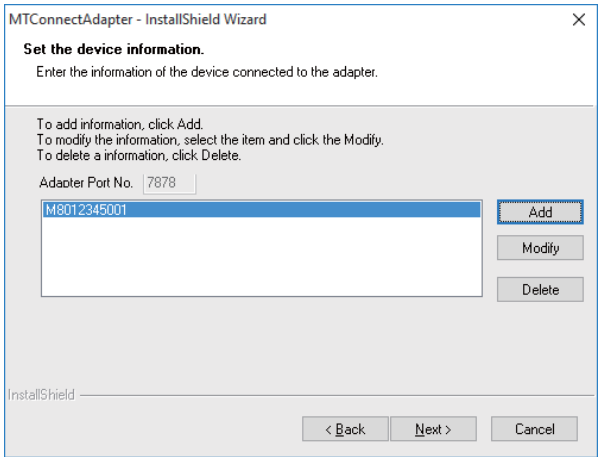
(2) When "User Account Control" is enabled, the confirmation dialog below appears. Click [Yes].



(3) The Modify Setting/Update screen appears. Select "Modify Setting" and click [Next].



(4) The setting screen appears. Set the device information in the same way as the device setting during installation.



(5) When setting is completed, click [Setup] to finish setting.

5.3 MTConnect Agent

MTConnect Agent setting

MTConnect Agent needs to be set to communicate with MTConnect Data Collector. For MTConnect Agent to receive data from MTConnect Adapter, the MTConnect Adapter connection information must be described in "agent.cfg", and the definition of the data collected from MTConnect Adapter must be described in "Device.xml".

(1) Editing "agent.cfg" file

Edit the "agent.cfg" file stored in "<destination folder of MTConnect Agent >\bin". (character enccoding: utf-8, newline code: LF)

The setting procedures and setting examples are as follows.

(a) Describing the top level settings

Describe the storage directory for the schema definition file to where MTConnect Agent loads (Refer to "MTConnect Agent setting" in "5.3 MTConnect Agent").

Describe as follows when storing it in the same folder as "agent.exe" (execution file of "MTConnect Agent") is stored.

```
Devices = Device.xml
```

(Note) When storing in a different folder that "agent.exe" is stored, describe the relative path from "agent.exe".

Next, describe the port No. to be used by MTConnect Agent.

```
Devices = Device.xml
Port = 5000
```

Describe the remaining items as follows.

```
Devices = Device.xml
Port = 5000

ReconnectInterval = 1000      ·····<1>
BufferSize = 17               ·····<2>
SchemaVersion = 1.3           ·····<3>
MonitorConfigFiles = true     ·····<4>
```

No.	Item	Description
<1>	ReconnectInterval	Describe "1000" (fixed value).
<2>	BufferSize	Describe "17" (fixed value).
<3>	SchemaVersion	Describe the XML schema version of MTConnect. Refer to "MTConnect Version" in "Chapter 9 SUPPORTED VERSION" for corresponding XML schema version.
<4>	MonitorConfigFiles	Describe "true" (fixed value).

(b) Describing the adapter settings

Describe the information of MTConnect Adapter to connect to MTConnect Agent.

```
Devices = Device.xml
Port = 5000

ReconnectInterval = 1000
BufferSize = 17
SchemaVersion = 1.3
MonitorConfigFiles = true

Adapters {
  Adapters_01 {
    Device = M8123456789   ·····<1>
    Host = 192.168.10.22   ·····<2>
    Port = 7878            ·····<3>
  }
}
```

No.	Item	Description
<1>	Device	Describe the serial No. of the NC to be connected to MTConnect Adapter.
<2>	Host	Describe the IP address of the PC that operates MTConnect Adapter (normally IP address of IPC).
<3>	Port	Describe the port No. for communication with MTConnect Agent set by MTConnect Apapter.

When connecting multiple devices, describe the setting of subsequent devices continuously.

```
Devices = Device.xml
Port = 5000

ReconnectInterval = 1000
BufferSize = 17
SchemaVersion = 1.3
MonitorConfigFiles = true

Adapters {
  Adapters_01 {
    Device = M8123456789
    Host = 192.168.10.22
    Port = 7878
  }
  Adapters_02 {
    Device = M7123456789
    Host = 192.168.10.25
    Port = 7879
  }
}
```

(c) Describing the file structure

Describe the file structure as follows.

```
Devices = Device.xml
Port = 5000

BufferSize = 17
ReconnectInterval = 1000
SchemaVersion = 1.3
MonitorConfigFiles = true

Adapters {
  Adapters_01 {
    Device = M8123456789
    Host = 192.168.10.22
    Port = 7878
  }
  Adapters_02 {
    Device = M7123456789
    Host = 192.168.10.25
    Port = 7879
  }
}

Files {
  schemas {
    Path = ../schemas
    Location = /schemas/
  }
  styles {
    Path = ../styles
    Location = /styles/
  }
  Favicon {
    Path = ../styles/favicon.ico
    Location = /favicon.ico
  }
}
```

Editing of the "agent.cfg" file is complete.

(2) Editing "Device.xml" file

This section shows an example how to edit the "Device.xml" file. After editing the "Device.xml" file, store it in the same folder as agent.exe. (Character encoding: UTF-8, newline code: LF)
Sample of "Device.xml" is stored in ".\Agent\ Device.xml" of the installation DVD.
Refer to chapter 7 for the specifications of "Device.xml"
When the data is collected from an NC configured with 1-part system, 1 spindle, 2 linear axes (servo axes) and 1 rotary axis (spindle C-axis), the description of "Device.xml" is as follows. ("####" is where the NC serial Nos. are entered.)

```
<?xml version="1.0" encoding="UTF-8"?>
<MTConnectDevices xmlns:m="urn:mtconnect.org:MTConnectDevices:1.3"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns="urn:mtconnect.org:MTConnectDevices:1.3"
xsi:schemaLocation="urn:mtconnect.org:MTConnectDevices:1.3 http://www.mtconnect.org/schemas/MTConnectDevices_1.3.xsd">
    <Header creationTime="2017-11-06T16:20+00:00" sender="localhost" instanceId="1267728234" bufferSize="131072" version="1.3"/>
        <Devices>
            <Device id="####_dev" name="####" sampleInterval="500" uuid="####_-9c9d-4773-88a8-ed39751225f5">
                <Description manufacturer="Mitsubishi Electric" serialNumber="xxxx"></Description>
                <DataItems>
                    <!-- NC Model -->
                    <DataItem category="EVENT" id="####_ModelType" name="ModelType" type="MESSAGE"/>
                </DataItems>
                <Components>
                    <Axes id ="####_Axes" name="Axes">
                        <Components>
                            <!-- Linear axis (NC axis) -->
                            <Linear id="####_X1" name="X1"><!-- X1: Axis name -->
                                <DataItems>
                                    <!-- Linear axis coordinates (machine) -->
                                    <DataItem category="SAMPLE" id="####_Act1_1" name="Act1_1" nativeUnits="MILLIMETER" type="POSITION" subType="ACTUAL" units="MILLIMETER" coordinateSystem="MACHINE"/>
                                    <!-- Linear axis load (filter value) -->
                                    <DataItem category="SAMPLE" id="####_Load1_1" name="Load1_1" nativeUnits="PERCENT" type="LOAD" units="PERCENT"/>
                                    <!-- Linear axis load (momentary value) -->
                                    <DataItem category="SAMPLE" id="####_LoadRT1_1" name="LoadRT1_1" nativeUnits="PERCENT" type="LOAD" units="PERCENT"/>
                                </DataItems>
                            </Linear>

                            <!-- Linear axis (NC axis) -->
                            <Linear id="####_Z1" name="Z1"><!-- Z1: Axis name -->
                                <DataItems>
                                    <!-- Linear axis coordinates (machine) -->
                                    <DataItem category="SAMPLE" id="####_Act1_2" name="Act1_2" nativeUnits="MILLIMETER" type="POSITION" subType="ACTUAL" units="MILLIMETER" coordinateSystem="MACHINE"/>
                                    <!-- Linear axis load (filter value) -->
                                    <DataItem category="SAMPLE" id="####_Load1_2" name="Load1_2" nativeUnits="PERCENT" type="LOAD" units="PERCENT"/>
                                    <!-- Linear axis load (momentary value) -->
                                    <DataItem category="SAMPLE" id="####_LoadRT1_2" name="LoadRT1_2" nativeUnits="PERCENT" type="LOAD" units="PERCENT"/>
                                </DataItems>
                            </Linear>

                            <!-- Rotary axis (NC axis) -->
                            <Rotary id="####_C1" name="C1"><!-- C1: Axis name -->
                                <DataItems>
                                    <!-- Rotary axis coordinates (machine) -->
                                    <DataItem category="SAMPLE" id="####_Act1_3" name="Act1_3" nativeUnits="DEGREE" type="ANGLE" subType="ACTUAL" units="DEGREE" coordinateSystem="MACHINE"/>
                                    <!-- Rotary axis load (filter value) -->
                                    <DataItem category="SAMPLE" id="####_Load1_3" name="Load1_3" nativeUnits="PERCENT" type="LOAD" units="PERCENT"/>
```

```
                    <!-- Rotary axis load (momentary value) -->
                    <DataItem category="SAMPLE" id="####_LoadRT1_3" name="LoadRT1_3" nativeUnits="PERCENT" type="LOAD"
                    units="PERCENT"/>
                </DataItems>
            </Rotary>
            <!-- Spindle -->
            <Rotary id="####_S1" name="S1"><!-- S1: Axis name -->
                <DataItems>
                    <!-- Spindle load (filter value) -->
                    <DataItem category="SAMPLE" id="####_LoadS1_1" name="LoadS1_1" nativeUnits="PERCENT" type="LOAD"
                    units="PERCENT"/>
                    <!-- Spindle load (momentary value) -->
                    <DataItem category="SAMPLE" id="####_LoadRTS1_1" name="LoadRTS1_1" nativeUnits="PERCENT" type="LOAD"
                    units="PERCENT"/>
                    <!-- Spindle actual revolutions -->
                    <DataItem category="SAMPLE" id="####_SpdActS1_1" name="SpdActS1_1" nativeUnits="REVOLUTION/MINUTE"
                    type="ROTARY_VELOCITY" subType="ACTUAL" units="REVOLUTION/MINUTE">
                        <Source>rotary_velocity</Source>
                    </DataItem>
                    <!-- Spindle commanded revolutions -->
                    <DataItem category="SAMPLE" id="####_SpdS1_1" name="SpdS1_1" nativeUnits="REVOLUTION/MINUTE" type="ROTA-
                    RY_VELOCITY" subType="COMMANDED" units="REVOLUTION/MINUTE">
                        <Source>rotary_velocity</Source>
                    </DataItem>
                    <!-- Spindle temperature -->
                    <DataItem category="SAMPLE" id="####_TempS1_1" name="TempS1_1" nativeUnits="CELSIUS" type="TEMPERA-
                    TURE" units="CELSIUS"/>
                </DataItems>
            </Rotary>
        </Components>
    </Axes>
    <Controller id="####_Cont" name="Cont">

        <DataItems>
            <!-- Power OFF status -->
            <DataItem category="EVENT" id="####_NcAvail1_1" name="NcAvail1_1" type="AVAILABILITY"/>
            <!-- Emergency stop -->
            <DataItem category="EVENT" id="####_Estop1_1" name="Estop1_1" type="EMERGENCY_STOP"/>
            <!-- NC alarm message (all part systems) -->
            <DataItem category="EVENT" id="####_AlmMsgA1_1" name="AlmMsgA1_1" type="MESSAGE"/>
            <DataItem category="EVENT" id="####_AlmMsgA1_2" name="AlmMsgA1_2" type="MESSAGE"/>
            <DataItem category="EVENT" id="####_AlmMsgA1_3" name="AlmMsgA1_3" type="MESSAGE"/>
            <DataItem category="EVENT" id="####_AlmMsgA1_4" name="AlmMsgA1_4" type="MESSAGE"/>
            <DataItem category="EVENT" id="####_AlmMsgA1_5" name="AlmMsgA1_5" type="MESSAGE"/>
            <DataItem category="EVENT" id="####_AlmMsgA1_6" name="AlmMsgA1_6" type="MESSAGE"/>
            <DataItem category="EVENT" id="####_AlmMsgA1_7" name="AlmMsgA1_7" type="MESSAGE"/>
            <DataItem category="EVENT" id="####_AlmMsgA1_8" name="AlmMsgA1_8" type="MESSAGE"/>
            <DataItem category="EVENT" id="####_AlmMsgA1_9" name="AlmMsgA1_9" type="MESSAGE"/>
            <DataItem category="EVENT" id="####_AlmMsgA1_10" name="AlmMsgA1_10" type="MESSAGE"/>
            <!-- NC alarm occurrence  -->
            <DataItem category="CONDITION" id="####_NcErrStsA1_1" name="NcErrStsA1_1" type="MOTION_PROGRAM"/>
            <!-- PLC alarm message -->
            <DataItem category="EVENT" id="####_PlcMsg1_1" name="PlcMsg1_1" type="MESSAGE"/>
            <DataItem category="EVENT" id="####_PlcMsg1_2" name="PlcMsg1_2" type="MESSAGE"/>
            <DataItem category="EVENT" id="####_PlcMsg1_3" name="PlcMsg1_3" type="MESSAGE"/>
            <DataItem category="EVENT" id="####_PlcMsg1_4" name="PlcMsg1_4" type="MESSAGE"/>
            <DataItem category="EVENT" id="####_PlcMsg1_5" name="PlcMsg1_5" type="MESSAGE"/>
            <DataItem category="EVENT" id="####_PlcMsg1_6" name="PlcMsg1_6" type="MESSAGE"/>
            <DataItem category="EVENT" id="####_PlcMsg1_7" name="PlcMsg1_7" type="MESSAGE"/>
            <DataItem category="EVENT" id="####_PlcMsg1_8" name="PlcMsg1_8" type="MESSAGE"/>
            <DataItem category="EVENT" id="####_PlcMsg1_9" name="PlcMsg1_9" type="MESSAGE"/>
            <DataItem category="EVENT" id="####_PlcMsg1_10" name="PlcMsg1_10" type="MESSAGE"/>
            <!-- PLC alarm occurrence -->
```

```
            <DataItem category="CONDITION" id="####_PlcErrSts1_1" name="PlcErrSts1_1" type="MOTION_PROGRAM"/>
            <!-- Power ON time (accumulated) -->
            <DataItem category="SAMPLE" id="####_TPwOnT1_1" name="TPwOnT1_1" nativeUnits="SECOND" type="ACCUMULATED_-
            TIME" units="SECOND"/>
            <!--Automatic start-up time (accumulated) -->
            <DataItem category="SAMPLE" id="####_TAtOpeT1_1" name="TAtOpeT1_1" nativeUnits="SECOND" type="ACCUMULATED_-
            TIME" units="SECOND"/>
            <!-- CPU temperature -->
            <DataItem category="SAMPLE" id="####_Temp1_1" name="Temp1_1" nativeUnits="CELSIUS" type="TEMPERATURE"
            units="CELSIUS"/>
        </DataItems>

        <Components>
            <Path id="####_Path1" name="Path1">
                <DataItems>
                    <!-- NC alarm message -->
                    <DataItem category="EVENT" id="####_AlmMsg1_1" name="AlmMsg1_1" type="MESSAGE"/>
                    <DataItem category="EVENT" id="####_AlmMsg1_2" name="AlmMsg1_2" type="MESSAGE"/>
                    <DataItem category="EVENT" id="####_AlmMsg1_3" name="AlmMsg1_3" type="MESSAGE"/>
                    <DataItem category="EVENT" id="####_AlmMsg1_4" name="AlmMsg1_4" type="MESSAGE"/>
                    <DataItem category="EVENT" id="####_AlmMsg1_5" name="AlmMsg1_5" type="MESSAGE"/>
                    <DataItem category="EVENT" id="####_AlmMsg1_6" name="AlmMsg1_6" type="MESSAGE"/>
                    <DataItem category="EVENT" id="####_AlmMsg1_7" name="AlmMsg1_7" type="MESSAGE"/>
                    <DataItem category="EVENT" id="####_AlmMsg1_8" name="AlmMsg1_8" type="MESSAGE"/>
                    <DataItem category="EVENT" id="####_AlmMsg1_9" name="AlmMsg1_9" type="MESSAGE"/>
                    <DataItem category="EVENT" id="####_AlmMsg1_10" name="AlmMsg1_10" type="MESSAGE"/>
                    <!-- NC alarm occurrence -->
                    <DataItem category="CONDITION" id="####_NcErrSts1_1" name="NcErrSts1_1" type="MOTION_PROGRAM"/>
                    <!-- Cycle time -->
                    <DataItem category="SAMPLE" id="####_CycT1_1" name="CycT1_1" nativeUnits="SECOND" type="ACCUMULATED_-
                    TIME" units="SECOND"/>
                    <!-- Actual machining speed (feed per minute) -->
                    <DataItem category="SAMPLE" id="####_FrtAct1_1" name="FrtAct1_1" nativeUnits="MILLIMETER" type="PATH_FEE-
                    DRATE" subType="AC TUAL" units="MILLIMETER/MINUTE"/>
                    <!-- Actual machining speed (feed per revolution) -->
                    <DataItem category="SAMPLE" id="####_FrtRevAct1_1" name="FrtRevAct1_1" nativeUnits="MILLIMETER" type="PATH_-
                    FEEDRATE" subType="ACTUAL" units="MILLIMETER/MINUTE"/>
                    <!-- Commanded machining speed -->
                    <DataItem category="SAMPLE" id="####_Frt1_1" name="Frt1_1" nativeUnits="MILLIMETER" type="PATH_FEEDRATE"
                    subType="COMMANDED" units="MILLIMETER/MINUTE"/>
                    <!-- Block in operation (B) -->
                    <DataItem category="EVENT" id="####_Block1_1" name="Block1_1" type="BLOCK"/>
                    <!-- Operation mode -->
                    <DataItem category="EVENT" id="####_Mode1_1" name="Mode1_1" type="CONTROLLER_MODE"/>
                    <!-- Operation status -->
                    <DataItem category="EVENT" id="####_Exec1_1" name="Exec1_1" type="EXECUTION"/>
                    <!-- Execution program line number -->
                    <DataItem category="EVENT" id="####_Line1_1" name="Line1_1" type="LINE"/>
                    <!-- M-code command -->
                    <DataItem category="EVENT" id="####_MCd1_1" name="MCd1_1" type="MESSAGE"/>
                    <DataItem category="EVENT" id="####_MCd1_2" name="MCd1_2" type="MESSAGE"/>
                    <DataItem category="EVENT" id="####_MCd1_3" name="MCd1_3" type="MESSAGE"/>
                    <DataItem category="EVENT" id="####_MCd1_4" name="MCd1_4" type="MESSAGE"/>
                    <!-- All machining completed parts -->
                    <DataItem category="EVENT" id="####_PartA1_1" name="PartA1_1" type="PART_COUNT"/>
                    <!-- NC program (O) number -->
                    <DataItem category="EVENT" id="####_Prg1_1" name="Prg1_1" type="PROGRAM"/>
                    <!-- T command number -->
                    <DataItem category="EVENT" id="####_TNum1_1" name="TNum1_1" type="TOOL_NUMBER"/>
                    <!-- Sequence number -->
                    <DataItem category="EVENT" id="####_Seq1_1" name="Seq1_1" type="x:SEQUENCE_NUMBER"/>
                    <!-- Main program number -->
                    <DataItem category="EVENT" id="####_PrgMain1_1" name="PrgMain1_1" type="PROGRAM"/>
```

```
<!-- Subprogram number -->
<DataItem category="EVENT" id="####_PrgSub1_1" name="PrgSub1_1" type="PROGRAM"/>
<DataItem category="EVENT" id="####_PrgSub1_2" name="PrgSub1_2" type="PROGRAM"/>
<DataItem category="EVENT" id="####_PrgSub1_3" name="PrgSub1_3" type="PROGRAM"/>
<DataItem category="EVENT" id="####_PrgSub1_4" name="PrgSub1_4" type="PROGRAM"/>
<DataItem category="EVENT" id="####_PrgSub1_5" name="PrgSub1_5" type="PROGRAM"/>
<DataItem category="EVENT" id="####_PrgSub1_6" name="PrgSub1_6" type="PROGRAM"/>
<DataItem category="EVENT" id="####_PrgSub1_7" name="PrgSub1_7" type="PROGRAM"/>
<DataItem category="EVENT" id="####_PrgSub1_8" name="PrgSub1_8" type="PROGRAM"/>
<DataItem category="EVENT" id="####_PrgSub1_9" name="PrgSub1_9" type="PROGRAM"/>
<DataItem category="EVENT" id="####_PrgSub1_10" name="PrgSub1_10" type="PROGRAM"/>
<!-- Main program sequence number -->
<DataItem category="EVENT" id="####_SeqMain1_1" name="SeqMain1_1" type="x:SEQUENCE_NUMBER"/>
<!-- Subprogram sequence number -->
<DataItem category="EVENT" id="####_SeqSub1_1" name="SeqSub1_1" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_SeqSub1_2" name="SeqSub1_2" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_SeqSub1_3" name="SeqSub1_3" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_SeqSub1_4" name="SeqSub1_4" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_SeqSub1_5" name="SeqSub1_5" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_SeqSub1_6" name="SeqSub1_6" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_SeqSub1_7" name="SeqSub1_7" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_SeqSub1_8" name="SeqSub1_8" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_SeqSub1_9" name="SeqSub1_9" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_SeqSub1_10" name="SeqSub1_10" type="x:SEQUENCE_NUMBER"/>
<!-- Main program sequence number -->
<DataItem category="EVENT" id="####_SeqMain1_1" name="SeqMain1_1" type="x:SEQUENCE_NUMBER"/>
<!-- Subprogram sequence number -->
<DataItem category="EVENT" id="####_SeqSub1_1" name="SeqSub1_1" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_SeqSub1_2" name="SeqSub1_2" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_SeqSub1_3" name="SeqSub1_3" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_SeqSub1_4" name="SeqSub1_4" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_SeqSub1_5" name="SeqSub1_5" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_SeqSub1_6" name="SeqSub1_6" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_SeqSub1_7" name="SeqSub1_7" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_SeqSub1_8" name="SeqSub1_8" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_SeqSub1_9" name="SeqSub1_9" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_SeqSub1_10" name="SeqSub1_10" type="x:SEQUENCE_NUMBER"/>
<!-- Main program block number -->
<DataItem category="EVENT" id="####_BlockMain1_1" name="BlockMain1_1" type="x:SEQUENCE_NUMBER"/>
<!-- Subprogram block number -->
<DataItem category="EVENT" id="####_BlockSub1_1" name="BlockSub1_1" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_BlockSub1_2" name="BlockSub1_2" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_BlockSub1_3" name="BlockSub1_3" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_BlockSub1_4" name="BlockSub1_4" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_BlockSub1_5" name="BlockSub1_5" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_BlockSub1_6" name="BlockSub1_6" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_BlockSub1_7" name="BlockSub1_7" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_BlockSub1_8" name="BlockSub1_8" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_BlockSub1_9" name="BlockSub1_9" type="x:SEQUENCE_NUMBER"/>
<DataItem category="EVENT" id="####_BlockSub1_10" name="BlockSub1_10" type="x:SEQUENCE_NUMBER"/>
<!-- Main program line number -->
<DataItem category="EVENT" id="####_LineMain1_1" name="LineMain1_1" type="LINE"/>
<!-- Subprogram line number -->
<DataItem category="EVENT" id="####_LineSub1_1" name="LineSub1_1" type="LINE"/>
<DataItem category="EVENT" id="####_LineSub1_2" name="LineSub1_2" type="LINE"/>
<DataItem category="EVENT" id="####_LineSub1_3" name="LineSub1_3" type="LINE"/>
<DataItem category="EVENT" id="####_LineSub1_4" name="LineSub1_4" type="LINE"/>
<DataItem category="EVENT" id="####_LineSub1_5" name="LineSub1_5" type="LINE"/>
<DataItem category="EVENT" id="####_LineSub1_6" name="LineSub1_6" type="LINE"/>
<DataItem category="EVENT" id="####_LineSub1_7" name="LineSub1_7" type="LINE"/>
<DataItem category="EVENT" id="####_LineSub1_8" name="LineSub1_8" type="LINE"/>
```

```
                    <DataItem category="EVENT" id="####_LineSub1_9" name="LineSub1_9" type="LINE"/>
                    <DataItem category="EVENT" id="####_LineSub1_10" name="LineSub1_10" type="LINE"/>
                </DataItems>
            </Path>
        </Components>
    </Controller>
    <Systems id="####_System" name="systems">
        <Components>
            <Electric id="####_Electric1_1" name="Electric1_1">

                <DataItems>
                    <!-- Power consumption amount -->
                    <DataItem category="SAMPLE" id="####_CPwr1_1" name="CPwr1_1" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_CPwr1_2" name="CPwr1_2" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_CPwr1_3" name="CPwr1_3" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_CPwr1_4" name="CPwr1_4" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_CPwr1_5" name="CPwr1_5" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_CPwr1_6" name="CPwr1_6" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_CPwr1_7" name="CPwr1_7" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_CPwr1_8" name="CPwr1_8" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_CPwr1_9" name="CPwr1_9" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_CPwr1_10" name="CPwr1_10" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_CPwr1_11" name="CPwr1_11" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_CPwr1_12" name="CPwr1_12" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_CPwr1_13" name="CPwr1_13" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_CPwr1_14" name="CPwr1_14" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_CPwr1_15" name="CPwr1_15" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_CPwr1_16" name="CPwr1_16" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <!-- Power regeneration amount -->
                    <DataItem category="SAMPLE" id="####_RePwr1_1" name="RePwr1_1" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_RePwr1_2" name="RePwr1_2" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_RePwr1_3" name="RePwr1_3" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_RePwr1_4" name="RePwr1_4" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_RePwr1_5" name="RePwr1_5" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_RePwr1_6" name="RePwr1_6" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_RePwr1_7" name="RePwr1_7" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_RePwr1_8" name="RePwr1_8" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_RePwr1_9" name="RePwr1_9" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_RePwr1_10" name="RePwr1_10" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_RePwr1_11" name="RePwr1_11" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    <DataItem category="SAMPLE" id="####_RePwr1_12" name="RePwr1_12" nativeUnits="KILOWATT_HOUR" type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
```

```
                        <DataItem category="SAMPLE" id="####_RePwr1_13" name="RePwr1_13" nativeUnits="KILOWATT_HOUR"
                        type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                        <DataItem category="SAMPLE" id="####_RePwr1_14" name="RePwr1_14" nativeUnits="KILOWATT_HOUR"
                        type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                        <DataItem category="SAMPLE" id="####_RePwr1_15" name="RePwr1_15" nativeUnits="KILOWATT_HOUR"
                        type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                        <DataItem category="SAMPLE" id="####_RePwr1_16" name="RePwr1_16" nativeUnits="KILOWATT_HOUR"
                        type="ELECTRICAL_ENERGY" units="KILOWATT_HOUR"/>
                    </DataItems>
                </Electric>
            </Components>
        </Systems>
    </Components>
  </Device>
 </Devices>
</MTConnectDevices>
```

Refer to "8.4 Appendix 4: XML Schema Definition" for details of the definitions that can be used.

To add machines to be connected, copy the Device elements and rewrite the necessary items as shown below.

(a) Replace "####" of each element with the product number of the machine to be added.
Set the product number to match the value of Device entered in agent.cfg.
(b) When the number of NC axes/spindles is different, change the number of axes referring to the description in the following pages.

```
<?xml version="1.0" encoding="UTF-8"?>
:
<Devices>
<Device id="####_dev" name="####" sampleInterval="500" uuid="####_-9c9d-4773-88a8-ed39751225f5">
<Description manufacturer="Mitsubishi Electric" serialNumber="xxxx"></Description>
<Components>
:
</Components>
</Device>
```

To add a machine whose product number is "M80001", Replace #### with the product number.

```
<Device id="M80001_dev" name="M80001" sampleInterval="500" uuid="00000000_-9c9d-4773-88a8-ed39751225f5">
<Description manufacturer="Mitsubishi Electric" serialNumber="M80001"></Description>
<Components>
<Axes id ="M80001_Axes" name="Axes">
<Components>
<!-- Linear axis (NC axis) -->
<Linear id="M80001_X1" name="X1"><!-- X1:Axis name -->
<DataItems>
<!-- Linear axis coordinates (machine)-->
<DataItem category="SAMPLE" id="M80001_Act1_1" name="Act1_1" nativeUnits="MILLIMETER" type="POSITION"
subType="ACTUAL" units="MILLIMETER" coordinateSystem="MACHINE"/>
<!-- Linear axis load (filter value)-->
<DataItem category="SAMPLE" id="M80001_Load1_1" name="Load1_1" nativeUnits="PERCENT" type="LOAD"
units="PERCENT"/>
<!-- Linear axis load (momentary value)-->
<DataItem category="SAMPLE" id="M80001_LoadRT1_1" name="LoadRT1_1" nativeUnits="PERCENT" type="LOAD"
units="PERCENT"/>
</DataItems>
</Linear>
:
</Components>
:
</Components>
</Device>
```

Set each DataItem with the same procedure.

Copy all the elements from <Device> to </Device>.

To increase the number of NC axes/spindles, copy the elements and rewrite the necessary items as shown below.
Example 1: To add the linear axis Y1

```
<Components>
  <Axes id ="####_Axes" name="Axes">
    <Components>
        :
      <!-- Linear axis (NC axis) -->
      <Linear id="####_Z1" name="Z1"><!-- Z1: Axis name -->
        <DataItems>
          <!-- Linear axis coordinates (machine) -->
          <DataItem category="SAMPLE" id="####_Act1_2" name="Act1_2" nativeUnits="MILLIMETER"
           type="POSITION" subType="ACTUAL" units="MILLIMETER" coordinateSystem="MACHINE"/>
          <!-- Linear axis load (filter value) -->
          <DataItem category="SAMPLE" id="####_Load1_2" name="Load1_2" nativeUnits="PERCENT"
           type="LOAD" units="PERCENT"/>
          <!-- Linear axis load（momentary value）-->
          <DataItem category="SAMPLE" id="####_LoadRT1_2" name="LoadRT1_2" nativeUnits="PERCENT"
           type="LOAD" units="PERCENT"/>
        </DataItems>
      </Linear>

      <!-- Linear axis (NC axis) -->
      <Linear id="####_Y1" name="Y1"><!-- Y1: Axis name -->
        <DataItems>
          <!-- Linear axis coordinates (machine) -->
          <DataItem category="SAMPLE" id="####_Act1_3" name="Act1_3" nativeUnits="MILLIMETER"
           type="POSITION" subType="ACTUAL" units="MILLIMETER" coordinateSystem="MACHINE"/>
          <!-- Linear axis load (filter value) -->
          <DataItem category="SAMPLE" id="####_Load1_3" name="Load1_3" nativeUnits="PERCENT"
           type="LOAD" units="PERCENT"/>
          <!-- Linear axis load（momentary value）-->
          <DataItem category="SAMPLE" id="####_LoadRT1_3" name="LoadRT1_3" nativeUnits="PERCENT"
           type="LOAD" units="PERCENT"/>
        </DataItems>
      </Linear>
        :
```

Change the axis name

Set the ranking of the axis

Example 2: To add the rotary axis A1

```
:
<!-- Rotary axis (NC axis) -->
<Rotary id="####_C1" name="C1"><!-- C1: Axis name -->
  <DataItems>
    <!-- Rotary axis coordinates (machine) -->
    <DataItem category="SAMPLE" id="####_Act1_4" name="Act1_4" nativeUnits="DEGREE"
    type="ANGLE"
     subType="ACTUAL" units="DEGREE" coordinateSystem="MACHINE"/>
    <!-- Rotary axis load (filter value) -->
    <DataItem category="SAMPLE" id="####_Load1_4" name="Load1_4" nativeUnits="PERCENT"
     type="LOAD"
     units="PERCENT"/>
    <!-- Rotary axis load (momentary value) -->
    <DataItem category="SAMPLE" id="####_LoadRT1_4" name="LoadRT1_4" nativeUnits="PERCENT"
     type="LOAD"
     units="PERCENT"/>
  </DataItems>
</Rotary>

<!-- Rotary axis (NC axis) -->
<Rotary id="####_A1" name="A1"><!-- A1: Axis name -->
  <DataItems>
    <!-- Rotary axis coordinates (machine) -->
    <DataItem category="SAMPLE" id="####_Act1_5" name="Act1_5" nativeUnits="DEGREE"
    type="ANGLE"
     subType="ACTUAL" units="DEGREE" coordinateSystem="MACHINE"/>
    <!-- Rotary axis load (filter value) -->
    <DataItem category="SAMPLE" id="####_Load1_5" name="Load1_5" nativeUnits="PERCENT"
     type="LOAD"
     units="PERCENT"/>
    <!-- Rotary axis load (momentary value) -->
    <DataItem category="SAMPLE" id="####_LoadRT1_5" name="LoadRT1_5" nativeUnits="PERCENT"
     type="LOAD"
     units="PERCENT"/>
  </DataItems>
</Rotary>
    :
```

Example 3: To add the spindle S2

```
 :
<!-- Spindle -->
<Rotary id="####_S1" name="S1"><!-- S1: Axis name -->
   <DataItems>
      <!-- Spindle load (filter value) -->
      <DataItem category="SAMPLE" id="####_LoadS1_1" name="LoadS1_1" nativeUnits="PERCENT"
       type="LOAD" units="PERCENT"/>
      <!-- Spindle load (momentary value) -->
      <DataItem category="SAMPLE" id="####_LoadRTS1_1" name="LoadRTS1_1" nativeUnits="PERCENT"
       type="LOAD" units="PERCENT"/>
      <!-- Spindle actual revolutions -->
      <DataItem category="SAMPLE" id="####_SpdActS1_1" name="SpdActS1_1" nativeUnits=
      "REVOLUTION/MINUTE" type="ROTARY_VELOCITY" subType="ACTUAL" units="REVOLUTION/MINUTE">
         <Source>rotary_velocity</Source>
      </DataItem>
      <!-- Spindle commanded revolutions -->
      <DataItem category="SAMPLE" id="####_SpdS1_1" name="SpdS1_1" nativeUnits=
      "REVOLUTION/MINUTE" type="ROTARY_VELOCITY" subType="COMMANDED" units="REVOLUTION/MINUTE">
         <Source>rotary_velocity</Source>
      </DataItem>
      <!-- Spindle temperature -->
      <DataItem category="SAMPLE" id="####_TempS1_1" name="TempS1_1" nativeUnits="CELSIUS"
       type="TEMPERATURE" units="CELSIUS"/>
   </DataItems>
</Rotary>

<!-- Spindle -->
<Rotary id="####_S2" name="S2"><!-- S2: Axis name -->
   <DataItems>
      <!-- Spindle load (filter value) -->
      <DataItem category="SAMPLE" id="####_LoadS1_2" name="LoadS1_2" nativeUnits="PERCENT"
       type="LOAD" units="PERCENT"/>
      <!-- Spindle load (momentary value) -->
      <DataItem category="SAMPLE" id="####_LoadRTS1_2" name="LoadRTS1_2" nativeUnits="PERCENT"
       type="LOAD" units="PERCENT"/>
      <!-- Spindle actual revolutions -->
      <DataItem category="SAMPLE" id="####_SpdActS1_2" name="SpdActS1_2" nativeUnits=
      "REVOLUTION/MINUTE" type="ROTARY_VELOCITY" subType="ACTUAL" units="REVOLUTION/MINUTE">
         <Source>rotary_velocity</Source>
      </DataItem>
      <!-- Spindle commanded revolutions -->
      <DataItem category="SAMPLE" id="####_SpdS1_2" name="SpdS1_2" nativeUnits=
      "REVOLUTION/MINUTE" type="ROTARY_VELOCITY" subType="COMMANDED" units="REVOLUTION/MINUTE">
         <Source>rotary_velocity</Source>
      </DataItem>
      <!-- Spindle temperature -->
      <DataItem category="SAMPLE" id="####_TempS1_2" name="TempS1_2" nativeUnits="CELSIUS"
       type="TEMPERATURE" units="CELSIUS"/>
   </DataItems>
</Rotary>
      :
```

To reduce the number of axes, delete the unnecessary elements.
Perform the same operation for the elements other than axes. Add the necessary element in the same manner referring to "8.4 Appendix 4: XML Schema Definition".

Starting MTConnect Agent service

Execute the batch file "agent_install.bat" to register MTConnect Agent to Windows service. After that, MTConnect Agent will start when the PC starts.
After the initial installation, the Windows service will not start until you restart the PC. You need to start the Windows service of MTConnect Agent by following the procedure below.
However, when the PC is restarted after the procedure of "Installation of MTConnect Agent" in "3.1 Installation Procedures", the following procedure is unnecessary.

(1) Right-click "agent_service_start.bat" stored in the installation DVD, and click "Run as Administrator".
(2) The "User Account Control" dialog appears. Click [Yes].

6 TROUBLESHOOTING

This chapter explains the errors which may occur when running MTConnect Data Collector and contains the information on troubleshooting.

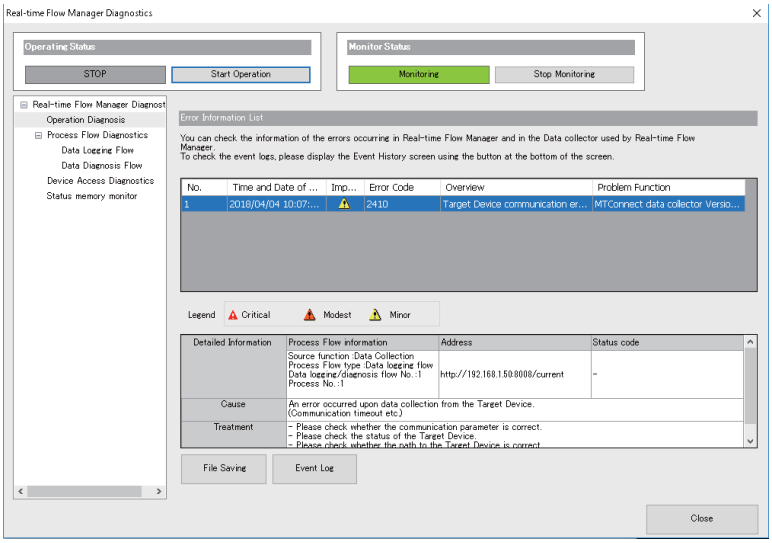
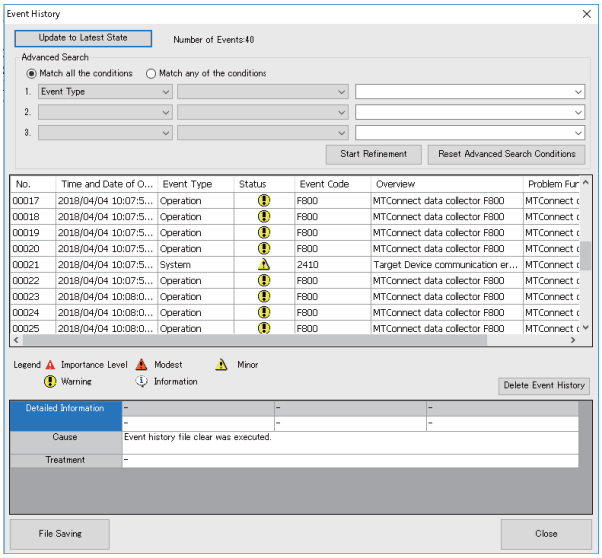
6.1 How to Check the Error History

Troubleshooting by checking the error code

The data being collected when an error occurred will be discarded. Confirm the error code that MTConnect Data Collector detected and perform troubleshooting according to the corrective action shown in "8.1 Appendix 1: Error Code List".
Refer to "8.2 Appendix 2: Event Code List" for the event codes issued by MTConnect Data Collector.

Real-time Flow Designer

The error code and event history of MTConnect Data Collector can be checked with "Real-time Flow Manager Diagnostics" of Real-time Flow Designer.

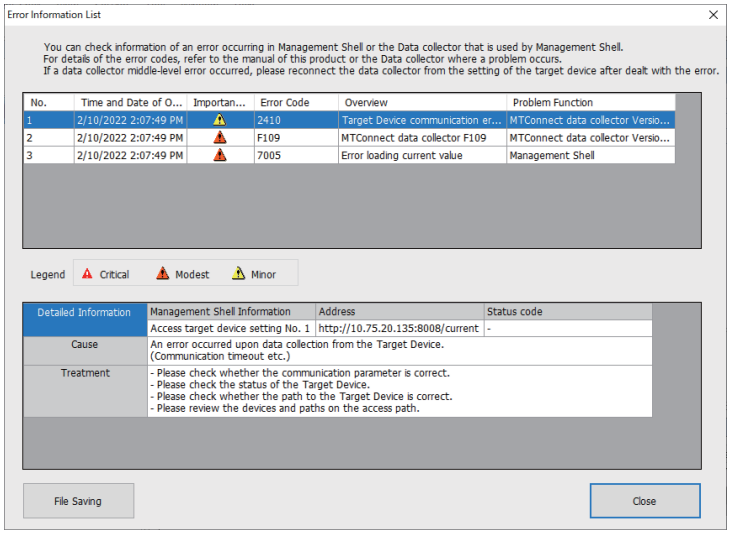
Error Information List	
Event History	

Refer to the following document for details.

Edgecross Basic Software for Windows User's Manual

Management Shell Explorer

Error codes and event codes can be checked in the Error Information List of Management Shell Explorer.

Error Information List	

Refer to the following document for details.

Edgecross Basic Software for Windows User's Manual

Error code type

There are two types of errors for MTConnect Data Collector; moderate error and minor error.
Refer to "Operations when an error occurs" in "2.2 Operational Specifications" for respond to errors.

Event code type

There are two types of events for MTConnect Data Collector; Warn (warning) and Info (information).
Collection process does not stop when the event occurs.

6.2 Troubleshooting from Symptoms

Troubleshooting on Edgecross Basic Software

■ A message is displayed in Edgecross Basic Software

Message	Check item	Corrective action
This function can not be executed because the Data collector used does not satisfy the implementation requirements of Edgecross specification.	Is Edgecross Basic Software Ver.1.01 or earlier being used?	Update Edgecross Basic Software to Ver.1.10 or later.

Troubleshooting on Ethernet communication

Ethernet communication to MTConnect compatible device cannot be established

Issue a PING from the industrial personal computer to the MTConnect compatible device and check the response.

■ Failure in the PING response

Check item	Corrective action
Is the Ethernet cable wired correctly?	Wire the Ethernet cable correctly.
Is the Ethernet cable disconnected?	Change the Ethernet cable.
Is there an IP address which is identical to the industrial personal computer or the MTConnect compatible device “within the same LAN”.	Contact the network administrator of LAN connected and set the IP address to without duplication.
Has the industrial personal computer in which this product was installed been replaced?	Reset all device connected in the network.
Is the network highly loaded?	- Contact the network administrator of connected LAN and disconnect other devices connected via Ethernet that is a cause of high load. - Use another network to connect the industrial personal computer and/or MTConnect compatible devices.
Is the specified IP address incorrect?	Specify the correct IP address.
Does the security settings prevent the MTConnect compatible device from establishing the connection?	- Delete the corresponding IP address in the IP filter setting of the security setting of the MTConnect compatible device. - Set the security setting of the MTConnect compatible device so that the IP filter function is not used.

Troubleshooting on screens

Contents in the screen may not be displayed properly

Check item	Corrective action
Is a value other than 100% set for "Change the size of text, apps, and other items" in Windows?	- Change the value to 100% for "Change the size of text, apps, and other items". - For Windows 10 (version 1703 or later)[*1], the display of a screen can be enlarged with high DPI scaling by using a Windows 10 function [*2]. (a) Select 'ProcessDesigner.exe'[*3], then select [Properties] on the right-click menu. (b) Select "Override high DPI scaling behavior. Scaling performed by:" in the [Compatibility] tab, then select "System" from the pull-down list. (c) Click the [OK] button.

*1 The Windows version can be checked by the following procedure.

(a) Press Windows key + [R], or select [Windows System] -> [Run] from the Start menu of Windows.

(b) Enter 'winver' in the "Run" screen.

(c) Check the version in the displayed screen.

*2 The display will be blurred by enlarging.

The following lists the setting values for "Change the size of text, apps, and other items" and the recommended display resolution for each setting value in Windows 10.

Setting value: 100%, display resolution: 1024×768 dots or more
Setting value: 125%, display resolution: 1900×1200 dots or more
Setting value: 150%, display resolution: 1900×1200 dots or more
Setting value: 175%, display resolution: 2880×1620 dots or more
Setting value: 200%, display resolution: 2880×1620 dots or more
Setting value: 225%, display resolution: 3840×2160 dots or more
Setting value: 250%, display resolution: 3840×2160 dots or more

*3 'ProcessDesigner.exe' is stored in the folder in which Edgecross Basic Software is installed.

The following is an example of a storage location.

(Example) When the installation destination folder is set as the default:
C:\Edgecross\Edgecross Basic Software\Real-timeFlowDesigner\ProcessDesigner.exe

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7 XML SCHEMA DEFINITION

XML schema definition file consists of a hierarchy of elements as shown below.

Elements configuration	Element name	Multiplici-ty	Reference
MTConnectDevices	Rule element	1	7.2
|			
├ Header	Header element	1	7.3
└ Devices	Devices element	1	7.4
└ Device	Device element	0. . *	7.5
├ Description	Description element	0. . 1	7.6
├ DataItems	DataItems element	0. . *	7.12
| └ DataItem	DataItem element	0. . *	7.13
└ Components	Components element	0. . *	7.7
├ Axes	Axes element	0. . *	7.8
| └ Components	Components element	0. . *	7.7
| ├ Linear	Linear element	0. . *	7.8 (1)
| | └ DataItems	DataItems element	0. . *	7.12
| | └ DataItem	DataItem element	0. . *	7.13
| └ Rotary	Rotary element	0. . *	7.8 (2)
| └ DataItems	DataItems element	0. . *	7.12
| └ DataItem	DataItem element	0. . *	7.13
├ Controller	Controller element	0. . *	7.9
| ├ DataItems	DataItems element	0. . *	7.12
| | └ DataItem	DataItem element	0. . *	7.13
| └ Components	Components element	0. . *	7.7
| └ Path	Path element	0. . *	7.10
| └ DataItems	DataItems element	0. . *	7.12
| └ DataItem	DataItem element	0. . *	7.13
└ Systems	Systems element	0. . *	7.11
└ Electric	Electric element	0. . *	7.11 (1)
└ DataItems	DataItems element	0. . *	7.12
└ DataItem	DataItem element	0. . *	7.13

The elements are represented using tags; information is enclosed with the start tag "<□□□□□>" and the end tag "</□□□□□>".

For details, refer to "MTConnect Standard Part 2 - Device Information Model" issued by MTConnect Institute.

(Example) XML schema definition

```
<?xml version="1.0" encoding="UTF-8"?>  <1>
<MTConnectDevices  <2>
  xmlns:m="urn:mtconnect.org:MTConnectDevices:1.3"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns="urn:mtconnect.org:MTConnectDevices:1.3"
  xsi:schemaLocation="urn:mtconnect.org:MTConnectDevices:1.3
    http://www.mtconnect.org/schemas/MTConnectDevices_1.3.xsd">
 <Header creationTime="2010-03-04T18:44:40+00:00" sender="localhost" instanceId="1267728234"  <3>
   bufferSize="131072" version="1.3"/>
  <Devices>  <4>
   <Device id="M01_dev" name="M01_M800W" sampleInterval="500" uuid="123456789">  <5>
    <Description manufActurer="Mitsubishi Electric" serialNumber="M8123456789"></Description>  <6>
     <Components>  <7>
      <Axes id ="M01_ax" name="Axes">  <8>
       <Components>
        <Linear id="M01_x1" name="X1">  <9>
         <DataItems>  <10>
          <DataItem category="SAMPLE" id="M01_X1act" name="Act1_1" nativeUnits="MILLIMETER"  <11>
            type="POSITION" subType="ACTUAL" units="MILLIMETER" coordinateSystem="MACHINE"/>
         </DataItems>
        </Linear>
       </Components>
      </Axes>
     </Components>
   </Device>
  </Devices>
</MTConnectDevices>
```

7.1 XML Declaration

For XML declaration, define the XML version and the character encoding which are being used. (<1>)

7.2 MTConnectDevices Element

Make sure to define one MTConnectDevices element. Define the referent of the namespace. (<2>)

Attribute	Description
xmlns	Define the referent of the namespace.
xsi:schemaLocation	Define the referent of the schema.

7.3 Header Element

Header element comes right after the root element of the XML schema definition file. (<3>)

Attribute	Description
creationTime	Define the time when the response was created.
sender	Define the Agent identifying information (the address and the port No. of Agent).
instanceId	Define the ID of Agent.
bufferSize	Define the number of samples, events, and conditions retained by Agent.
version	Define the version No. of the protocol.

7.4 Devices Element

Devices element is a top-level tag element of the XML schema definition file. (<4>)
Define at least one Device element. Multiple Device elements can be defined.

7.5 Device Element

For Device, define the following attributes. (<5>)

Attribute	Description
id	Define a unique ID to identify the device. (unique among "id" of the XML schema definition)
name	Define the name of the device. (unique within the XML schema definition)
sampleInterval	Define the time intervals at which data is acquired from the device in ms (millisecond).
uuid	Define a unique ID to identify the device.

7.6 Description Element

For Description element, define the optional information of Device. (<6>)

Attribute	Description
manufacturer	Define the manufacturer's name of the device.
serialNumber	Define the serial No. of the device.

7.7 Components Element

Components element is an XML container to define the structure of physical and logical sub-elements of the device. (<7>)

7.8 Axes Element

For Axes element, define the information of linear axis and rotary axis. (<8>)

Attribute	Description
id	Define a unique ID in the XML schema definition file to identify Axes.
name	Define the name of Axes. Specify a unique name within the Device definition.

(1) Linear element
For Linear element, define the linear axis as sub-elements of Axes. (<9>)

Attribute	Description
id	Define a unique ID in the XML schema definition file to identify Linear.
name	Define the name of Linear. Specify a unique name within the Device definition.

(2) Rotary element
For Rotary element, define the rotary axis as sub-elements of Axes.

Attribute	Description
id	Define a unique ID in the XML schema definition file to identify Rotary.
name	Define the name of Rotary. Specify a unique name within the Device definition.

7.9 Controller Element

For Controller element, define the controller information of the devices.

Attribute	Description
id	Define a unique ID to identify Controller. (unique among "id" of the XML schema definition)
name	Define the name of Controller. (unique within the XML schema definition)

7.10 Path Element

For Path element, define sub-elements per part system of the controller.

Attribute	Description
id	Define a unique ID to identify Path. (unique among "id" of the XML schema definition)
name	Define the name of Path. (unique within the XML schema definition)

7.11 Systems Element

For Systems element, define the hydraulic, air pressure, electric information, etc., which are attached to the device.

Attribute	Description
id	Define a unique ID to identify System. (unique among "id" of the XML schema definition)
name	Define the name of System. (unique within the XML schema definition)

(1) Electric element
For the Electric elements, define the following attributes.

Attribute	Description
id	Define a unique ID to identify Electric. (unique among "id" of the XML schema definition)
name	Define the name of Electric. (unique within the XML schema definition)

7.12 DataItems Element

DataItems element is an XML tag which includes one or more data element (DataItem). (<10>)

7.13 DataItem Element

For the DataItem element, define the data to be collected from the devices. (<11>)
Attributes to be defined are shown below.

Attribute	Description
category	Define the type of information on DataItem.
id	Define a unique ID in the XML schema definition file to identify DataItem.
name	Define the name of DataItem. Specify a unique name in the Device definition.
nativeUnits	Define the units to be collected from the device when the ones differ from the standard units.
type	Define the type of the data.
subType	Define the subtype of the data.
units	Define the unit of the data.
coordinateSystem	Define the coordinate system which is being used.
source	Define a unique ID within the Device definition to identify DataItem.

7.14 DataItem Type

Data types supported in this product are shown below.

(1) Sample

type	subType	Data	Unit
ACCUMULATED_TIME	-	Power ON time (accumulated), Power OFF time (accumulated), Cycle time	s (SECOND)
ANGLE	ACTUAL	Actual machine position (Angle)	° (DEGREE)
ELECTRICAL_ENERGY	-	Power consumption	W・s (WATT_SECOND)
LOAD	-	Load	% (PERCENT)
PATH_FEEDRATE	ACTUAL	Actual machining speed	mm/s (MILLIMETER/SECOND)
PATH_FEEDRATE	COMMANDED	Commanded machining speed	mm/s (MILLIMETER/SECOND)
POSITION	ACTUAL	Actual machine position	mm (MILLIMETER)
ROTARY_VELOCITY	ACTUAL	Actual rotation speed	r/min (REVOLUTION/MINUTE)
ROTARY_VELOCITY	COMMANDED	Commanded rotation speed	r/min (REVOLUTION/MINUTE)
TEMPERATURE	-	Temperature	°C (CELSIUS)

- Data is output in mm (MILLIMETER) for the actual machine position (POSITION) even if NC is setup to output data in inch system.
- For PATH_FEEDRATE (actual machining speed, commanded machining speed), the speed converted from mm/min (MILLIMETER/MINUTE) into mm/s (MILLIMETER/SECOND) is output. When the initial inch system is valid, the speed converted from inch/mm (INCH/MILLIMETER) into mm/s (MILLIMETER/SECOND) is output.
- Actual machining speed is output in mm/s (MILLIMETER/SECOND) also when feed per revolution is valid.
- For commanded machining speed, the F command value in feed per minute is converted into mm/s (MILLIMETER/SECOND) also when feed per revolution is valid.

(2) Event

type	Data	Value (Status)
BLOCK	Execution block	Execution block No.
CONTROLLER_MODE	Controller status	AUTOMATIC, MANUAL, MANUAL_DATA_INPUT, SEMI AUTOMATIC, EDIT
EMERGENCY_STOP	Emergency stop status	ARMED,TRIGGERED
LINE	Line No. of execution code	Integer
MESSAGE	Arbitrary character string	Arbitrary character string
PART_COUNT	No. of work machining	Integer
PROGRAM	Execution program name	Arbitrary character string
ROTARY_MODE	Mode of rotation-type axis	SPINDLE, INDEX, CONTOUR
TOOL_NUMBER	Tool identifier	Arbitrary character string

(3) Condition

type	Data	Value (Status)
LOGIC_PROGRAM	PLC error status	NORMAL, WARNING, FAULT, UNAVAILABLE
MOTION_PROGRAM	Machining program error status	NORMAL, WARNING, FAULT, UNAVAILABLE

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8 APPENDIX

8.1 Appendix 1: Error Code List

Code (Hexa-decimal)	Name	Description	Corrective action	Details 1	Details 2
2400H	Communication parameter setting error	There is an error in the communication parameter.	Please review the communication parameter because there is an error.	-	-
2401H	Cycle parameter setting error	There is an error in the cycle parameter.	Please review the cycle parameter because there is an error.	-	-
2402H	Location parameter setting error	There is an error in the location parameter.	Please review the location parameter because there is an error.	-	-
2404H	Insufficient memory error	There is not enough memory available to execute this operation.	- Please reset the system of this product. - Please shut down other applications.	-	-
2405H	System error	-	- Please write the Process Manager Parameter once again. - Please reset the system of this product. - Please reinstall the Edge Computing Basic Software. - If the same error recurs, please consult Edgecross Consortium or our branch office or agency.	-	-
2409H	Unsupported device error	There is an unsupported device and/or path on the access path.	Please review the devices and paths on the access path.	-	-
2410H	Target Device communication error	An error occurred upon data collection from the Target Device. (Communication timeout etc.)	- Please check whether the communication parameter is correct. - Please check the status of the Target Device. - Please check whether the path to the Target Device is correct. - Please review the devices and paths on the access path.	URL of access destination	Status code
2411H	Target Device connection error	An error occurred upon data collection from the Target Device. (Connection error etc.)	- Please check whether the communication parameter is correct. - Please check the status of the Target Device. - Please check whether the path to the Target Device is correct. - Please review the devices and paths on the access path.	URL of access destination	Status code
2412H	Target Device error	An error occurred upon data collection from the Target Device.	- Please check whether the communication parameter is correct. - Please check the status of the Target Device. - Please check whether the path to the Target Device is correct. - Please review the devices and paths on the access path.	URL of access destination	-

Code (Hexadecimal)	Name	Corrective action
F001H	Data Collector I/F error	- Write the Data Collector Parameters once again. - Restart the Industrial PC. - Reinstall the Edgecross Basic Software. - Please check the version of Edgecross Basic Software or Data Collector. - If the same error recurs, please consult with the Data Collector developer.
F002H		
F003H		
F004H		
F005H		
F006H		
F007H		
F008H		
F009H		
F00AH		
F00BH		
F00CH		
F00DH		
F00EH		
F00FH	Data Collector I/F error	- Carry out review to lower the load caused by collection cycle, number of collections, and contents of processing. - Restart the Industrial PC. - Reinstall the Edgecross Basic Software. - Please check the version of Edgecross Basic Software or Data Collector. - If the same error recurs, please consult with the Data Collector developer.
F010H	Data Collector I/F error	- Write the Data Collector Parameters once again. - Restart the Industrial PC. - Reinstall the Edgecross Basic Software. - Please check the version of Edgecross Basic Software or Data Collector. - If the same error recurs, please consult with the Data Collector developer.
F011H		
F012H		
F013H		
F100H	Error in the initialization process of Data Collector	- Check that the Data Collector is installed correctly. - Restart the Industrial PC. - Please check the version of Edgecross Basic Software or Data Collector. - If the same error recurs, please consult with the Data Collector developer.
F104H	Error in the reconnection interval setting process of Data Collector	- Check the error code, and consult the developer of the Data Collector.
F105H	Error in the collection interval setting process of Data Collector	
F106H	Error in the collection process of Data Collector	
F107H	Error in the read process of Data Collector	
F108H	Error in the write process of Data Collector	
F109H	Error in the read process of Data Collector	
F10AH	Error in the write process of Data Collector	
F200H	System error	- Write the Data Collector Parameters once again. - Restart the Industrial PC. - Reinstall the Edgecross Basic Software. - If the same error recurs, please consult with the Data Collector developer.
F205H		
F207H		
F20AH to F20FH		
F212H		
F218H to F21CH		
F21EH		
F221H		
F223H		
F227H to F22BH		
F22DH		
F22FH		

Code (Hexadecimal)	Name	Corrective action
F232H	Data Collector I/F error	- Write the Data Collector Parameters once again. - Restart the Industrial PC. - Reinstall the Edgecross Basic Software. - Please check the version of Edgecross Basic Software or Data Collector. - If the same error recurs, please consult with the Data Collector developer.
F233H		
F234H		
F240H	System error	- Write the Data Collector Parameters once again. - Restart the Industrial PC. - Reinstall the Edgecross Basic Software. - If the same error recurs, please consult with the Data Collector developer.
F242H		
F244H		
F245H		
F247H		
F248H	Data reference error in Data Collector	- Check the error code, and consult the developer of the Data Collector.
F249H		
F24AH		
F24CH	System error	- Write the Data Collector Parameters once again. - Restart the Industrial PC. - Reinstall the Edgecross Basic Software. - If the same error recurs, please consult with the Data Collector developer.
F24DH	Process data buffer overflow in Data Collector	- Carry out review to lower the load caused by collection cycle, number of collections, and contents of processing. - Lower the load on Windows by shutting down other applications or by other means.
F24EH		
F260H	Error: Character is out of range	- Please do not set characters out of range to collected STRING type character string.
F261H		- Please do not set characters out of range to read STRING type character string.
F262H	Error: Number of characters exceeded	- The number of characters in the collected STRING type character string exceeds the maximum number. Please consult with the Data Collector developer.
F263H		- The number of characters in the read STRING type character string exceeds the maximum number. Please consult with the Data Collector developer.
F264H	Error: Character is out of range	- Please do not set characters out of range to collected WSTRING type character string.
F265H		- Please do not set characters out of range to read WSTRING type character string.
F266H	Error: Number of characters exceeded	- The number of characters in the collected WSTRING type character string exceeds the maximum number. Please consult with the Data Collector developer.
F267H		- The number of characters in the read WSTRING type character string exceeds the maximum number. Please consult with the Data Collector developer.
F268H	Invalid real number data	- Please do not set invalid value(NaN, ±∞) to read REAL type real number.
F269H		- Please do not set invalid value(NaN, ±∞) to read LREAL type real number.
F280H to F284H	System error	- Write the Data Collector Parameters once again. - Restart the Industrial PC. - Reinstall the Edgecross Basic Software. - If the same error recurs, please consult with the Data Collector developer.
F2C5H		
F2C6H	Process data buffer overflow in Data Collector	- Carry out review to lower the load caused by collection cycle, number of collections, and contents of processing. - Lower the load on Windows by shutting down other applications or by other means.
F300H	Error: Not enough memory	- Shut down other applications. - Restart the Industrial PC.
F303H		
F306H		
F30EH		
F380H	System error	- Write the Data Collector Parameters once again. - Restart the Industrial PC. - Reinstall the Edgecross Basic Software. - If the same error recurs, please consult with the Data Collector developer.
F382H		
F383H		
F386H to F38BH		
F38DH		
F38FH		

8.2 Appendix 2: Event Code List

Code (Hexadecimal)	Event status	Name	Description	Corrective action	Details 1	Details 2
9400H	Warn	Data item ID is absent	The specified ID cannot be found on MTConnect.	Please review the location parameter because there is an error.	ID	-

Code (Hexadecimal)	Event status	Name	Description
F800H	Warn	Exceeded collection cycle	Collection process was not completed within the collection cycle.

8.3 Appendix 3: DataItem Default Type

Component and Subcomponent	category	DataItem Types		Extention	Description	Unit	Default type
Axes	sample	ACCELERATION		-	Acceleration	MILLIMETER/SECOND^2	LREAL
		ACCUMULATED_TIME		-	Cumulative time	SECOND	LINT
		ANGULAR_ACCELERATION		-	Angle acceleration	DEGREE/SECOND^2	LREAL
		ANGULAR_VELOCITY		-	Angular speed	DEGREE/SECOND	LREAL
		AMPERAGE		-	Current value	AMPERE	INT
			ALTERNATING	-	AC current value	AMPERE	INT
			DIRECT	-	DC current value	AMPERE	INT
		ANGLE		-	Angle	DEGREE	LREAL
			ACTUAL	-	Actual angle	DEGREE	LREAL
			COMMANDED	-	Commanded angle	DEGREE	LREAL
		AXIS_FEEDRATE		-	Linear axis feedrate	MILLIMETER/SECOND	LREAL
			ACTUAL	-	Actual linear axis feedrate	MILLIMETER/SECOND	LREAL
			COMMANDED	-	Commanded linear axis feedrate	MILLIMETER/SECOND	LREAL
			JOG	-	Manual linear axis feedrate	MILLIMETER/SECOND	LREAL
			PROGRAMMED	-	Programmed linear axis feedrate	MILLIMETER/SECOND	LREAL
			RAPID	-	High-speed linear axis feedrate	MILLIMETER/SECOND	LREAL
		CLOCK_TIME		-	Time	YYYY-MM-DDThh:mm:ss.ffff	STRING
		CONCENTRATION		-	Concentration	PERCENT	UINT
		CONDUCTIVITY		-	Electric conductivity	SIEMENS/METER	REAL
		DISPLACEMENT		-	Vector amount	MILLIMETER	REAL
		ELECTRICAL_ENERGY		-	Power consumption	WATT_SECOND	UDING
		FILL_LEVEL		-	Remaining ratio	PERCENT	UINT
		FLOW		-	Flow rate	LITER/SECOND	REAL
		FREQUENCY		-	Frequency	HERTZ	LINT
		LENGTH		-	Length	MILLIMETER	LREAL
			STANDARD	-	Standard or original length	MILLIMETER	LREAL
			REMAINING	-	Remaining length	MILLIMETER	LREAL
			USEABLE	-	Remaining available length	MILLIMETER	LREAL
		LINEAR_FORCE		-	Linear force	NEWTON	UDINT
		LOAD		-	Load	PERCENT	UINT
		MASS		-	Mass	KILOGRAM	UINT
		PATH_FEEDRATE		-	Axis feedrate	MILLIMETER/SECOND	LREAL
			ACTUAL	-	Actual axis feedrate	MILLIMETER/SECOND	LREAL
			COMMANDED	-	Commanded axis feedrate	MILLIMETER/SECOND	LREAL
			JOG	-	Manual axis feedrate	MILLIMETER/SECOND	LREAL
			PROGRAMMED	-	Programmed axis feedrate	MILLIMETER/SECOND	LREAL
			RAPID	-	High-speed axis feedrate	MILLIMETER/SECOND	LREAL
		PATH_POSITION		-	Control point coordinate	MILLIMETER_3D	STRING
			ACTUAL	-	Control point actual coordinate	MILLIMETER_3D	STRING
			COMMANDED	-	Control point commanded coordinate	MILLIMETER_3D	STRING
			TARGET	-	Control point target coordinate	MILLIMETER_3D	STRING
			PROBE	-	Control point probe coordinate	MILLIMETER_3D	STRING
		PH		-	Water solubility	PH	REAL

Component and Subcomponent	category	DataItem Types		Extention	Description	Unit	Default type
(Axes)	(sample)	POSITION		-	Position	MILLIMETER	LREAL
			ACTUAL	-	Actual position	MILLIMETER	LREAL
			COMMANDED	-	Commanded position	MILLIMETER	LREAL
			TARGET	-	Target position	MILLIMETER	LREAL
		POWER_FACTOR		-	Apparent power	PERCENT	UINT
		PRESSURE		-	Pressure	PASCAL	REAL
		RESISTANCE		-	Resistance	OHM	REAL
		ROTARY_VELOCITY		-	Rotation speed	REVOLUTION/MINUTE	DINT
			ACTUAL	-	Actual rotation speed	REVOLUTION/MINUTE	DINT
			COMMANDED	-	Commanded rotation speed	REVOLUTION/MINUTE	DINT
			PROGRAMMED	-	Programmed rotation speed	REVOLUTION/MINUTE	DINT
		SOUND_LEVEL		-	Volume	DECIBEL	INT
			NO_SCALE	-	No weight coefficient in scale	DECIBEL	INT
			A_SCALE	-	AB scale weight coefficient	DECIBEL	INT
			B_SCALE	-	B scale weight coefficient	DECIBEL	INT
			C_SCALE	-	C scale weight coefficient	DECIBEL	INT
			D_SCALE	-	D scale weight coefficient	DECIBEL	INT
		STRAIN		-	Deformation rate	PERCENT	REAL
		TEMPERATURE		-	Temperature	CELSIUS	DINT
		TILT		-	Angle displacement	MICRO_RADIAN	LREAL
		TORQUE		-	Rotation force	NEWTON_METER	DINT
		VOLT_AMPERE		-	Apparent power	VOLT_AMPERE	DINT
		VOLT_AMPERE_REACTIVE		-	Reactive energy	VOLT_AMPERE_REACTIVE	DINT
		VELOCITY		-	Velocity	MILLIMETER/SECOND	REAL
		VISCOSITY		-	Viscosity	PASCAL_SECOND	REAL
		VOLTAGE		-	Voltage	VOLT	DINT
			ALTERNATING	-	AC voltage	VOLT	DINT
			DIRECT	-	DC voltage	VOLT	DINT
		WATTAGE		-	Power consumption	WATT	UDING
	EVENT	ACTUATOR_STATE		-	Actuator state	ACTIVE/INACTIVE	STRING
		ACTIVE_AXES		-	Axis set related to the control part	Axis name divided by space	STRING
		AVAILABILITY		-	Availability of communication	AVAILABLE/UNAVAILABLE	STRING
		AXIS_COUPLING		-	Synchronous control type	TANDEM/SYNCHRONOUS/ MASTER/SLAVE	INT
		AXIS_FEEDRATE_OVERRIDE		-	Cutting override	Integer	INT
			JOG	-	For manual feedrate	Integer	INT
			PROGRAMMED	-	For programmed feedrate	Integer	INT
			RAPID	-	For high-speed feedrate	Integer	INT
		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

Component and Subcomponent	category	DataItem Types		Extention	Description	Unit	Default type
(Axes)	(EVENT)	COUPLED_AXES		-	Synchronized axis	Axis name divided by space	STRING
		DIRECTION		-	Moving direction	-	INT
			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	-	INT
			AUXILIARY	-	Additional bar	-	INT
		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	ULINT
			MAXIMUM	-	Maximum program line No.	Integer	ULINT
			MINIMUM	-	Minimum program line No.	Integer	ULINT
		MESSAGE		-		Arbitrary character string	WSTRING
		OPERATOR_ID		-	Number of abnormal products	Integer	ULINT
		PALLET_ID		-	Target number of production	Integer	ULINT
		PART_COUNT		-	Number of production stocks	Integer	ULINT
			ALL	-	Number of production plans	Integer	ULINT
			GOOD	-	Number of quality products	Integer	ULINT
			BAD	-	Number of abnormal products	Integer	ULINT
			TARGET	-	Target number of production	Integer	ULINT
			REMAINING	-	Number of remaining production plans	Integer	ULINT
		PART_ID		-	Completed workpiece ID	Arbitrary character string	WSTRING
		PATH_FEEDRATE_OVERRIDE		-	Manual feed override	Integer	INT
			JOG	-	For jog feedrate	Integer	INT
			PROGRAMMED	-	For programmed feedrate	Integer	INT
			RAPID	-	For high-speed feedrate	Integer	INT
		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

Component and Subcomponent	category	DataItem Types	Extention	Description	Unit	Default type
(Axes)	(EVENT)	PROGRAM	-	Running program name (O No.)	Arbitrary character string	WSTRING
		PROGRAM_EDIT	-	Machining program edited state	ACTIVE/READY/NOT_READY	STRING
		PROGRAM_EDIT_NAME	-	Name of the program being edited	Arbitrary character string	WSTRING
		PROGRAM_COMMENT	-	Comment of program being executed	Arbitrary character string	WSTRING
		PROGRAM_HEADER	-	Header of program being executed	Arbitrary character string	WSTRING
		ROTARY_MODE	-	Control mode of spindle/rotary axis	SPINDLE/INDEX/CONTOUR	STRING
		ROTARY_VELOCITY_OVERRIDE	-	Spindle override	Integer	INT
		TOOL_ASSET_ID	-	Spindle state during free rotation	ACTIVE/INACTIVE	STRING
		TOOL_NUMBER	-	Tool No.	Arbitrary character string	WSTRING
		WORKHOLDING_ID	-	Tool holder No.	Arbitrary character string	WSTRING
	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

8.4 Appendix 4: XML Schema Definition

Inside the brackets are the range.
"####" indicates NC product number + "_".

Section	Component/ Subcomponent/ Data Elements	category=	id=	type=	subType=	units=	coordinate System=	<Constraints>	<Source>	Item	Adpter/Agent output (Text)
Device/ Conponents			####dev							NC information	
	Axes		####Axes							Axis designation	
	Axes/Linear		#### + axis name							Linear axis (NC axis)	
	Axes/Linear/DataItem	SAMPLE	####Act1_1* (####Act1_1 to ####Act8_16)	POSITION	ACTUAL	MILLIMETER	MACHINE		Act1_1* (Act1_1 to Act8_16)	Linear axis coordinate value (machine) (NC axis)	Real number (The number of digits depends on the input setting unit.) (Unit: mm) Data acquisition failed: ERROR
	Axes/Linear/DataItem	SAMPLE	####Load1_1* (####Load1_1 to ####Load8_16)	LOAD		PERCENT			Load1_1* （Load1_1 to Load8_16)	Linear axis (Load filter value) (NC axis)	Integer (Unit: %) Data acquisition failed: ERROR
	Axes/Linear/DataItem	SAMPLE	####LoadRT1_1* (####LoadRT1_1 to ####LoadRT8_16)	LOAD		PERCENT			LoadRT1_1* （LoadRT1_1 to LoadRT8_16)	Linear axis (Load instantaneous value) (NC axis)	Integer (Unit: %) Data acquisition failed: ERROR
	Axes/Rotary		#### + axis name							Rotary axis (NC axis)	
	Axes/Rotary/DataItem	SAMPLE	####Act1_1* (####Act1_1 to ####Act8_16)	ANGLE	ACTUAL	DEGREE	MACHINE		Act1_1* (Act1_1 to Act8_16)	Rotary axis coordinate value (machine) (NC axis)	Real number (The number of digits depends on the input setting unit.) (Unit: degree) Data acquisition failed: ERROR
	Axes/Rotary/DataItem	SAMPLE	####Load1_1* (####Load1_1 to ####Load8_16)	LOAD		PERCENT			Load1_1* （Load1_1 to Load8_16	Rotary axis (Load filter value) (NC axis)	Integer (Unit: %) Data acquisition failed: ERROR
	Axes/Rotary/DataItem	SAMPLE	####LoadRT1_1* (####LoadRT1_1 to ####LoadRT8_16)	LOAD		PERCENT			LoadRT1_1* （LoadRT1_1 to LoadRT8_16)	Rotary axis (Load instantaneous value) (NC axis)	Integer (Unit: %) Data acquisition failed: ERROR
	Axes/Linear		#### + axis name							Linear axis (PLC axis)	
	Axes/Linear/DataItem	SAMPLE	####ActP1_1* (####ActP1_1 to ####ActP1_16)	POSITION	ACTUAL	MILLIMETER	MACHINE		ActP1_1* (ActP1_1 to ActP1_16)	Linear axis coordinate value (machine) (PLC axis)	Real number (The number of digits depends on the input setting unit.) (Unit: mm) Data acquisition failed: ERROR
	Axes/Linear/DataItem	SAMPLE	####LoadP1_1* (####LoadP1_1 to ####LoadP1_16)	LOAD		PERCENT			LoadP1_1* （LoadP1_1 to LoadP1_16)	Linear axis (Load filter value) (PLC axis)	Integer (Unit: %) Data acquisition failed: ERROR
	Axes/Linear/DataItem	SAMPLE	####LoadRTP1_1* (####LoadRTP1_1 to ####LoadRTP1_16)	LOAD		PERCENT			LoadRTP1_1* （LoadRTP1_1 to LoadRTP1_16)	Linear axis (Load instantaneous value) (PLC axis)	Integer (Unit: %) Data acquisition failed: ERROR
	Axes/Rotary		#### + axis name							Rotary axis (PLC axis)	
	Axes/Rotary/DataItem	SAMPLE	####ActP1_1* (####ActP1_1 to ####ActP1_16)	ANGLE	ACTUAL	DEGREE	MACHINE		ActP1_1* (ActP1_1 to ActP1_16)	Rotary axis coordinate value (machine) (PLC axis)	Real number (The number of digits depends on the input setting unit.) (Unit: degree) Data acquisition failed: ERROR
	Axes/Rotary/DataItem	SAMPLE	####LoadP1_1* (####LoadP1_1 to ####LoadP1_16)	LOAD		PERCENT			LoadP1_1* （LoadP1_1 to LoadP1_16)	Rotary axis (Load filter value) (PLC axis)	Integer (Unit: %) Data acquisition failed: ERROR
	Axes/Rotary/DataItem	SAMPLE	####LoadRTP1_1* (####LoadRTP1_1 to ####LoadRTP1_16)	LOAD		PERCENT			LoadRTP1_1* （LoadRTP1_1 to LoadRTP1_16)	Rotary axis (Load instantaneous value) (PLC axis)	Integer (Unit: %) Data acquisition failed: ERROR
	Axes/Rotary		#### + spindle name							Rotary axis (spindle)	

Section	Component/ Subcomponent/ Data Elements	category=	id=	type=	subType=	units=	coordinate System=	<Constraints>	<Source>	Item	Adpter/Agent output (Text)
	Axes/Rotary/DataItem	SAMPLE	####LoadS1_1 (####LoadS1_1 to ####LoadS1_8)	LOAD		PERCENT			LoadS1_1 （LoadS1_1 to LoadS1_8)	Rotary axis (Load filter value) (spindle)	Integer (Unit: %） Data acquisition failed: ERROR
	Axes/Rotary/DataItem	SAMPLE	####LoadRTS1_1 (####LoadRTS1_1 to ####LoadRTS1_8)	LOAD		PERCENT			LoadRTS1_1 （LoadRTS1_1 to LoadRTS1_8)	Rotary axis (Load instantaneous value) (spindle)	Integer (Unit: %） Data acquisition failed: ERROR
	Axes/Rotary/DataItem	SAMPLE	####SpdActS1_1 (####SpdActS1_1 to ####SpdActS1_8)	ROTARY_VELOCITY	ACTUAL	REVOLUTION/MINUTE			SpdActS1_1 (SpdActS1_1 to SpdActS1_8)	Spindle rotation actual speed	Integer (Unit: rotation/min) Data acquisition failed: ERROR
	Axes/Rotary/DataItem	SAMPLE	####SpdS1_1 (####SpdS1_1 to ####SpdS1_8)	ROTARY_VELOCITY	COMMANDED	REVOLUTION/MINUTE			SpdS1_1 (SpdS1_1 to SpdS1_8)	Spindle rotation target speed	Integer (Unit: rotation/min) Data acquisition failed: ERROR
	Axes/Rotary/DataItem	SAMPLE	####TempS1_1 (####TempS1_1 to ####TempS1_8)	TEMPERATURE		CELSIUS			TempS1_1 (TempS1_1 to TempS1_8)	Spindle temperature	Integer （Unit: ℃） Data acquisition failed: ERROR
	Controller		####Cont							Monitoring/Calculating	
	Controller/DataItem	EVENT	####Estop1_1	EMERGENCY_STOP					Estop1_1	Emergency stop	TRIGGERED ARMED Data acquisition failed: ERROR
	Controller/DataItem	EVENT	####AlmMsgA1_1 (####AlmMsgA1_1 to ####AlmMsgA1_10)	MESSAGE					AlmMsgA1_1 (AlmMsgA1_1 to AlmMsgA1_10)	NC alarm message	Refer to M800/M80/E80 Series Alarm/Parameter Manual IB-1501279 Text: Alarm section (fixed to 4 bytes) ☐ Message text (fixed to 30 bytes) ☐ Parameter1 (fixed to 12 bytes) ☐ Parameter2 (fixed to 12 bytes) No alarm: UNAVAILABLE Data acquisition failed: ERROR
	Controller/DataItem	EVENT	####DcAlmMsgA1_1 (####DcAlmMsgA1_1 to ####DcAlmMsgA1_10)	MESSAGE					DcAlmMsgA1_1 (DcAlmMsgA1_1 to DcAlmMsgA1_10)	NC alarm message (for MTConnect Data Collector)	Refer to M800/M80/E80 Series Alarm/Parameter Manual IB-1501279 Text: Alarm section (fixed to 4 bytes) ☐ Message text (fixed to 30 bytes) ☐ Parameter1 (fixed to 12 bytes) ☐ Parameter2 (fixed to 12 bytes) No alarm: (empty) Data acquisition failed: ERROR
	Controller/DataItem	CONDITION	####NcErrStsA1_1	MOTION_PROGRAM					NcErrStsA1_1	NC alarm occurrence	NORMAL FAULT Data acquisition failed: UNAVAILABLE
	Controller/DataItem	EVENT	####PlcMsg1_1 (####PlcMsg1_1 to ####PlcMsg1_10)	MESSAGE					PlcMsg1_1 (PlcMsg1_1 to PlcMsg1_10)	PLC alarm message	Refer to M800/M80/E80 Series PLC Programming Manual IB-1501271 Text: Alarm section (fixed to 5 bytes) ☐ Message text (fixed to 46 bytes) ☐ Parameter (fixed to 12 bytes) No alarm: UNAVAILABLE Data acquisition failed: ERROR
	Controller/DataItem	EVENT	####DcPlcMsg1_1 (####DcPlcMsg1_1 to ####DcPlcMsg1_10)	MESSAGE					DcPlcMsg1_1 (DcPlcMsg1_1 to DcPlcMsg1_10)	PLC alarm message (for MTConnect Data Collector)	Refer to M800/M80/E80 Series PLC Programming Manual IB-1501271 Text: Alarm section (fixed to 5 bytes) ☐ Message text (fixed to 46 bytes) ☐ Parameter (fixed to 12 bytes) Data acquisition failed: ERROR
	Controller/DataItem	CONDITION	####PlcErrSts1_1	LOGIC_PROGRAM					PlcErrSts1_1	PLC alarm occurrence	NORMAL FAULT Data acquisition failed: UNAVAILABLE

Section	Component/ Subcomponent/ Data Elements	category=	id=	type=	subType=	units=	coordinate System=	<Constraints>	<Source>	Item	Adpter/Agent output (Text)
	Controller/DataItem	SAMPLE	####TPwOnT1_1	ACCUMULATED_TIME		SECOND			TPwOnT1_1	Power ON time (accumulated)	Integer (Unit: sec) Data acquisition failed: ERROR
	Controller/DataItem	SAMPLE	####TAtOpeT1_1	ACCUMULATED_TIME		SECOND			TAtOpeT1_1	Cycle operation time (accumulated)	Integer (Unit: sec) Data acquisition failed: ERROR
	Controller/DataItem	SAMPLE	####Temp1_1	TEMPERATURE		CELSIUS			Temp1_1	CPU Temperature	Real number (1 digit after the decimal point) (Unit: ℃) Data acquisition failed: ERROR
	Controller/DataItem	EVENT	####NcAvail1_1	AVAILABILITY					NcAvail1_1	Power OFF status	Power ON：AVAILABLE Power OFF：UNAVAILABLE Data acquisition failed: ERROR
	Controller/Path		####Path1 (####Path1 to ####Path8)						Path1 (Path1 to Path8)	Each part system	
	Controller/Path/DataItem	EVENT	####AlmMsg1_1 (####AlmMsg1_1 to ####AlmMsg8_10)	MESSAGE					AlmMsg1_1 (AlmMsg1_1 to AlmMsg8_10)	NC alarm message	Refer to M800/M80/E80 Series Alarm/Parameter Manual IB-1501279 Text: Alarm section (fixed to 4 bytes) ☐ Message text (fixed to 30 bytes) ☐ Parameter1 (fixed to 12 bytes) ☐ Parameter2 (fixed to 12 bytes) ☐ Part system (fixed to 2 bytes) No alarm: UNAVAILABLE Data acquisition failed: ERROR
	Controller/Path/DataItem	EVENT	####DcAlmMsg1_1 (####DcAlmMsg1_1 to ####DcAlmMsg8_10)	MESSAGE					DcAlmMsg1_1 (DcAlmMsg1_1 to DcAlmMsg8_10)	NC alarm message (for MTConnect Data Collector)	Refer to M800/M80/E80 Series Alarm/Parameter Manual IB-1501279 Text: Alarm section (fixed to 4 bytes) ☐ Message text (fixed to 30 bytes) ☐ Parameter1 (fixed to 12 bytes) ☐ Parameter2 (fixed to 12 bytes) ☐ Part system (fixed to 2 bytes) No alarm: (empty) Data acquisition failed: ERROR
	Controller/Path/DataItem	CONDITION	####NcErrSts1_1 (####NcErrSts1_1 to ####NcErrSts8_1)	MOTION_PROGRAM					NcErrSts1_1 (NcErrSts1_1 to NcErrSts8_1)	NC alarm occurrence	NORMAL FAULT Data acquisition failed: UNAVAILABLE
	Controller/Path/DataItem	SAMPLE	####CycT1_1 (####CycT1_1 to ####CycT8_1)	ACCUMULATED_TIME		SECOND			CycT1_1 (CycT1_1 to CycT8_1)	Cycle time	Integer (Unit: sec) Data acquisition failed: ERROR
	Controller/Path/DataItem	SAMPLE	####TCycT1_1 (####TCycT1_1 to ####TCycT8_1)	ACCUMULATED_TIME		SECOND			TCycT1_1 (TCycT1_1 to TCycT8_1)	Cycle time (accumulated)	Integer (Unit: sec) Data acquisition failed: ERROR
	Controller/Path/DataItem	SAMPLE	####TWtT1_1 (####TWtT1_1 to ####TWtT8_1)	ACCUMULATED_TIME		SECOND			TWtT1_1 (TWtT1_1 to TWtT8_1)	Standby time (accumulated)	Integer (Unit: sec) Data acquisition failed: ERROR
	Controller/Path/DataItem	SAMPLE	####FrtAct1_1 （####FrtAct1_1 to ####FrtAct8_1)	PATH_FEEDRATE	ACTUAL	MILLIMETER/MINUTE			FrtAct1_1 （FrtAct1_1 to FrtAct8_1)	Actual machining speed (feed per minute)	Real number (fixed to 3 digits) (Unit: mm/min) Data acquisition failed: ERROR
	Controller/Path/DataItem	SAMPLE	####FrtRevAct1_1 （####FrtRevAct1_1 to ####FrtRevAct8_1)	PATH_FEEDRATE	ACTUAL	MILLIMETER/MINUTE			FrtRevAct1_1 （FrtRevAct1_1 to FrtRevAct8_1)	Actual machining speed (feed per revolution)	Real number (fixed to 3 digits) (Unit: mm/rev) Data acquisition failed: ERROR
	Controller/Path/DataItem	SAMPLE	####Frt1_1 (####Frt1_1 to ####Frt8_1)	PATH_FEEDRATE	COMMANDED	MILLIMETER/MINUTE			Frt1_1 (Frt1_1 to Frt8_1)	Command machining speed	Real number (fixed to 3 digits) (Unit: mm/min) Data acquisition failed: ERROR

Section	Component/ Subcomponent/ Data Elements	category=	id=	type=	subType=	units=	coordinate System=	<Constraints>	<Source>	Item	Adpter/Agent output (Text)
	Controller/Path/DataItem	EVENT	####Block1_1 (####Block1_1 to ####Block8_1)	BLOCK					Block1_1 (Block1_1 to Block8_1)	Block in operation (B)	Integer Data acquisition failed: ERROR
	Controller/Path/DataItem	EVENT	####Mode1_1 (####Mode1_1 to ####Mode8_1)	CONTROLLER_MODE					Mode1_1 (Mode1_1 to Mode8_1)	Operation mode	AUTOMATIC EDIT MANUAL_DATA_INPUT MANUAL Data acquisition failed: ERROR
	Controller/Path/DataItem	EVENT	####Exec1_1 (####Exec1_1 to ####Exec8_1)	EXECUTION					Exec1_1 (Exec1_1 to Exec8_1)	Operational status	STOPPED READY ACTIVE FEED_HOLD Data acquisition failed: ERROR
	Controller/Path/DataItem	EVENT	####ExecStd1_1 (####ExecStd1_1 to ####ExecStd8_1)	EXECUTION					ExecStd1_1 (ExecStd1_1 to ExecStd8_1)	Operational status (standard)	STOPPED READY ACTIVE FEED_HOLD Data acquisition failed: ERROR
	Controller/Path/DataItem	EVENT	####Line1_1 (####Line1_1 to ####Line8_1)	LINE					Line1_1 (Line1_1 to Line8_1)	Line No. of execution program	Integer (Unit: line) Data acquisition failed: ERROR
	Controller/Path/DataItem	EVENT	####MCd1_1 (####MCd1_1 to ####MCd8_1)	MESSAGE					MCd1_1 (MCd1_1 to 8_4)	M code command	"M" + acquired value Data acquisition failed: ERROR
	Controller/Path/DataItem	EVENT	####PartA1_1 (####PartA1_1 to ####PartA8_1)	PART_COUNT					PartA1_1 (PartA1_1 to PartA8_1)	Total number of completed parts	Integer (Unit: item) Data acquisition failed: ERROR
	Controller/Path/DataItem	EVENT	####Prg1_1 （####Prg1_1 to ####Prg8_1)	PROGRAM					Prg1_1 （Prg1_1 to Prg8_1)	NC program (O) No.	Main program in execution: "MAIN" + ":" + "text (up to 36 characters)" Sub program in execution: "SUB" + "nesting level" + ":" + "text (up to 36 characters)" Data acquisition failed: ERROR
	Controller/Path/DataItem	EVENT	####TNum1_1 (####TNum1_1 to ####TNum8_1)	TOOL_NUMBER					TNum1_1 (TNum1_1 to TNum8_1)	T command No.	Integer (Unit: No.) Data acquisition failed: ERROR
	Controller/Path/DataItem	EVENT	####Seq1_1 (####Seq1_1 to ####Seq8_1)	x:SEQUENCE_NUMBER (Mitsubishi Electric original)					Seq1_1 (Seq1_1 to Seq8_1)	Sequence No.	Integer (Unit: No.) Data acquisition failed: ERROR
	Controller/Path/DataItem	EVENT	####PrgMain1_1 （####PrgMain1_1 to ####PrgMain8_1)	PROGRAM					PrgMain1_1 （PrgMain1_1 to PrgMain8_1)	Main program No.	Text: program name (up to 36 characters) Data unreadable: UNAVAILABLE Data acquisition failed: ERROR
	Controller/Path/DataItem	EVENT	####PrgSub1_1 (####PrgSub1_1 to ####8_10)	PROGRAM					PrgSub1_1 (PrgSub1_1 to PrgSub8_10)	Subprogram No.	Text: program name (up to 36 characters) Data unreadable: UNAVAILABLE Data acquisition failed: ERROR

Section	Component/ Subcomponent/ Data Elements	category=	id=	type=	subType=	units=	coordinate System=	<Constraints>	<Source>	Item	Adpter/Agent output (Text)
	Controller/Path/DataItem	EVENT	####SeqMain1_1 (####SeqMain1_1 to ####SeqMain8_1)	x:SEQUENCE_NUMBER (Mitsubishi Electric original)					SeqMain1_1 (SeqMain1_1 to SeqMain8_1)	Main program sequence No.	Integer (Unit: No.) Data unreadable: UNAVAILABLE Data acquisition failed: ERROR
	Controller/Path/DataItem	EVENT	####SeqSub1_1 (####SeqSub1_1 to ####SeqSub8_10)	x:SEQUENCE_NUMBER (Mitsubishi Electric original)					SeqSub1_1 (SeqSub1_1 to SeqSub8_10)	Subprogram sequence No.	Integer (Unit: No.) Data unreadable: UNAVAILABLE Data acquisition failed: ERROR
	Controller/Path/DataItem	EVENT	####BlockMain1_1 (####BlockMain1_1 to ####BlockMain8_1)	BLOCK					SeqMain1_1 (SeqMain1_1 to SeqMain8_1)	Main program block No.	Integer Data unreadable: UNAVAILABLE Data acquisition failed: ERROR
	Controller/Path/DataItem	EVENT	####Sub1_1 (####BlockSub1_1 to ####BlockSub8_10)	BLOCK					BlockSub1_1 (BlockSub1_1 to BlockSub8_10)	Subprogram block No.	Integer Data unreadable: UNAVAILABLE Data acquisition failed: ERROR
	Controller/Path/DataItem	EVENT	####LineMain1_1 (####LineMain1_1 to ####LineMain8_1)	LINE					LineMain1_1 (LineMain1_1 to LineMain8_1)	Main program line No.	Integer (Unit: line) Data unreadable: UNAVAILABLE Data acquisition failed: ERROR
	Controller/Path/DataItem	EVENT	####LineSub1_1 (####LineSub1_1 to ####LineSub8_10)	LINE					LineSub1_1 (LineSub1_1 to LineSub8_10)	Subprogram repetition rest No.	Integer (Unit: time) Data unreadable: UNAVAILABLE Data acquisition failed: ERROR
	Systems		####System							Subsystem designation	
	Systems/Electric		####Electric1_1							Electric designation	
	Systems/Electric/DataItem	SAMPLE	####CPwr1_1 (####CPwr1_1 to ####CPwr1_16)	ELECTRICAL_ENERGY		KILOWATT_HOUR			CPwr1_1 (CPwr1_1 to CPwr1_16)	Power consumption	Integer (Unit: kwh) Data acquisition failed: ERROR
	Systems/Electric/DataItem	SAMPLE	####RePwr1_1 (####RePwr1_1 to ####RePwr1_16)	ELECTRICAL_ENERGY		KILOWATT_HOUR			RePwr1_1 (RePwr1_1 to RePwr1_16)	Regenerative power	Integer (Unit: kwh) Data acquisition failed: ERROR
		EVENT	####ModelType	MESSAGE					ModelType	NC model name	Text: NC model name (up to 15 characters) Data unreadable: UNAVAILABLE Data acquisition failed: ERROR

○: Can be acquired / ×: Cannot be acquired / △: Limited

id=	Type									Additional information
	M800V/M80V Series			M800L UC	M700V/M70V Series			M700L C	C80	
####dev										@@@@：NC type Acquired values are judged by broadcast
####Axes										
#### + axis name										
####Act1_1* (####Act1_1 to ####Act8_16)	○	○	○	○	○	○	○	○	○	
####Load1_1* (####Load1_1 to ####Load8_16)	○	○	○	○	○	○	○	○	○	
####LoadRT1_1* (####LoadRT1_1 to ####LoadRT8_16)	○	○	○	○	○	○	○	○	○	
#### + axis name										
####Act1_1* (####Act1_1 to ####Act8_16)	○	○	○	○	○	○	○	○	○	
####Load1_1* (####Load1_1 to ####Load8_16)	○	○	○	○	○	○	○	○	○	
####LoadRT1_1* (####LoadRT1_1 to ####LoadRT8_16)	○	○	○	○	○	○	○	○	○	
#### + axis name										
####ActP1_1* (####ActP1_1 to ####ActP1_16)	○	○	○	○	○	○	○	×	○	
####LoadP1_1* (####LoadP1_1 to ####LoadP1_16)	○	○	○	○	○	○	○	×	○	
####LoadRTP1_1* (####LoadRTP1_1 to ####LoadRTP1_16)	○	○	○	○	○	○	○	×	○	
#### + axis name										
####ActP1_1* (####ActP1_1 to ####ActP1_16)	○	○	○	○	○	○	○	×	○	
####LoadP1_1* (####LoadP1_1 to ####LoadP1_16)	○	○	○	○	○	○	○	×	○	
####LoadRTP1_1* (####LoadRTP1_1 to ####LoadRTP1_16)	○	○	○	○	○	○	○	×	○	
#### + spindle name										
####LoadS1_1 (####LoadS1_1 to ####LoadS1_8)	○	○	○	○	○	○	○	○	○	
####LoadRTS1_1 (####LoadRTS1_1 to ####LoadRTS1_8)	○	○	○	○	○	○	○	○	○	
####SpdActS1_1 (####SpdActS1_1 to ####SpdActS1_8)	○	○	○	○	○	○	○	○	○	
####SpdS1_1 (####SpdS1_1 to ####SpdS1_8)	○	○	○	○	○	○	○	○	○	
####TempS1_1 (####TempS1_1 to ####TempS1_8)	○	○	○	○	○	○	○	○	○	
####Cont										
####Estop1_1	○	○	○	○	○	○	○	○	○	
####AlmMsgA1_1 (####AlmMsgA1_1 to ####AlmMsgA1_10)	○	○	○	○	○	○	○	×	○	
####DcAlmMsgA1_1 (####DcAlmMsgA1_1 to ####DcAlmMsgA1_10)	○	○	○	○	○	○	○	×	○	
####NcErrStsA1_1	○	○	○	○	○	○	○	○	○	
####PlcMsg1_1 (####PlcMsg1_1 to ####PlcMsg1_10)	○	○	○	○	○	○	○	△	○	M700LC cannot acquire alarms of machine manufactures.
####DcPlcMsg1_1 (####DcPlcMsg1_1 to ####DcPlcMsg1_10)	○	○	○	○	○	○	○	△	○	M700LC cannot acquire alarms of machine manufactures.
####PlcErrSts1_1	○	○	○	○	○	○	○	○	○	
####TPwOnT1_1	○	○	○	○	○	○	○	○	○	

id=	Type									Additional information
	M800V/M80V Series			M800LUC	M700V/M70V Series			M700LC	C80	
####TAtOpeT1_1	○	○	○	○	○	○	○	○	○	
####Temp1_1	○	○	○	○	○	○	○	○	○	
####NcAvail1_1	○	○	○	○	○	○	○	○	○	
####Path1 (####Path1 to ####Path8)										
####AlmMsg1_1 (####AlmMsg1_1 to ####AlmMsg8_10)	○	○	○	○	○	○	○	○	○	
####DcAlmMsg1_1 (####DcAlmMsg1_1 to ####DcAlmMsg8_10)	○	○	○	○	○	○	○	○	○	
####NcErrSts1_1 (####NcErrSts1_1 to ####NcErrSts8_1)	○	○	○	○	○	○	○	○	○	
####CycT1_1 (####CycT1_1 to ####CycT8_1)	○	○	○	○	○	○	○	○	○	Setting a PLC data definition file is necessary to acuire data for M800LC/M700LC.
####TCycT1_1 (####TCycT1_1 to ####TCycT8_1)	×	×	×	×	×	×	×	×	×	Total cycle time of each part sysem When the power OFF state (NcAvail1_1)changed from UNAVAILABLE to AVAILABLE, this will be cleared and be 0.
####TWtT1_1 (####TWtT1_1 to ####TWtT8_1)	×	×	×	×	×	×	×	×	×	Automatic operation standby time of each part system When the power OFF state (NcAvail1_1)changed from UNAVAILABLE to AVAILABLE, this will be cleared and be 0.
####FrtAct1_1 (####FrtAct1_1 to ####FrtAct8_1)	○	○	○	○	○	○	○	○	○	When the speed display unit is mm/rev or inch/rev, "UNAVAILABLE" will be output.
####FrtRevAct1_1 (####FrtRevAct1_1 to ####FrtRevAct8_1)	○	○	○	○	○	○	○	×	○	When the speed display unit is other than mm/rev or inch/rev, "UNAVAILABLE" will be output.
####Frt1_1 (####Frt1_1 to ####Frt8_1)	○	○	○	○	○	○	○	○	○	
####Block1_1 (####Block1_1 to ####Block8_1)	○	○	○	○	○	○	○	○	○	
####Mode1_1 (####Mode1_1 to ####Mode8_1)	○	○	○	○	○	○	○	○	○	
####Exec1_1 (####Exec1_1 to ####Exec8_1)	○	○	○	○	○	○	○	○	○	
####ExecStd1_1 (####ExecStd1_1 to ####ExecStd8_1)	○	○	○	○	○	○	○	○	○	"STOPPED" is output when NC alarm 1 to 3 occurred. The operation status is output when NC alarm 4 occurred or no NC alarm occurred.
####Line1_1 (####Line1_1 to ####Line8_1)	○	○	○	○	○	○	○	×	○	
####MCd1_1 (####MCd1_1 to ####MCd8_1)	○	○	○	○	○	○	○	○	○	
####PartA1_1 (####PartA1_1 to ####PartA8_1)	○	○	○	○	○	○	○	○	○	Setting a PLC data definition file is necessary to acuire data for M800LC/M700LC.
####Prg1_1 (####Prg1_1 to ####Prg8_1)	○	○	○	○	○	○	○	○	○	
####TNum1_1 (####TNum1_1 to ####TNum8_1)	○	○	○	○	○	○	○	○	○	
####Seq1_1 (####Seq1_1 to ####Seq8_1)	○	○	○	○	○	○	○	○	○	

id=	Type									Additional information
	M800V/M80V Series			M800L UC	M700V/M70V Series			M700L C	C80	
####PrgMain1_1 (####PrgMain1_1 to ####PrgMain8_1)	○	○	○	○	○	○	○	○	○	
####PrgSub1_1 (####PrgSub1_1 to ####8_10)	○	○	○	○	○	○	○	○	○	
####SeqMain1_1 (####SeqMain1_1 to ####SeqMain8_1)	○	○	○	○	○	○	○	○	○	
####SeqSub1_1 (####SeqSub1_1 to ####SeqSub8_10)	○	○	○	○	○	○	○	○	○	
####BlockMain1_1 (####BlockMain1_1 to ####BlockMain8_1)	○	○	○	○	○	○	○	○	○	
####Sub1_1 (####BlockSub1_1 to ####BlockSub8_10)	○	○	○	○	○	○	○	○	○	
###LineMain1_1 (####LineMain1_1 to ####LineMain8_1)	○	○	○	○	○	○	○	×	○	
####LineSub1_1 (####LineSub1_1 to ####LineSub8_10)	○	○	○	○	○	○	○	○	○	
####System										
####Electric1_1										
####CPwr1_1 (####CPwr1_1 to ####CPwr1_16)	○	○	○	×	○	○	○	×	×	"0" can be acquired even for the power of the EcoMonitorLight that is not connected, and Adapter outputs 0. Therefore, in this case, data items as many as the number of collection machines are collected and output so that Adapter does not output the data of the machine that is not connected and the value of the machine will be "UNAVAILABLE".
####RePwr1_1 (####RePwr1_1 to ####RePwr1_16)	○	○	○	×	○	○	○	×	×	
####ModelType	○	○	○	○	○	○	○	○	○	

9 SUPPORTED VERSION

When using MTConnect Data Collector, use software of the supported version.

MTConnect Data Collector	MTConnect Data Collector version	MTConnect Adapter (Mitsubishi Electric products)	Edgecross Basic Software	C++ Agent (recommended)
Version A0	1.1.0.0	Unsupported	1.00	1.3.0.11 or later (MTConnect Version: 1.3.1)
Version A1	1.1.0.0	1.1.0.0	1.00	1.3.0.11 or later (MTConnect Version: 1.3.1)
Version A2	1.1.0.0	1.1.2.0	1.10	1.3.0.11 or later (MTConnect Version: 1.3.1)
Version A3	1.1.3.0	1.1.2.0	1.10	1.3.0.11 or later (MTConnect Version: 1.3.1)
Version A4	1.1.4.0	1.1.3.1	1.10	1.3.0.11 or later (MTConnect Version: 1.3.1)
Version A5	1.1.5.0	1.1.5.0	1.22	1.3.0.11 or later (MTConnect Version: 1.3.1)
Version A6	1.1.6.0	1.1.6.0	1.22	1.3.0.11 or later (MTConnect Version: 1.3.1)

9.1 Supported products

Products supported by this product and versions supported by each machine are shown below.

<table>
<tr><th>Machine type</th><th>Manufacturer</th><th>Supported model</th><th>MTConnect Agent</th><th>MTConnect Adapter</th></tr>
<tr><td rowspan="5">CNC</td><td rowspan="6">Mitsubishi Electric</td><td>M800 Series
M700V/M70V Series
E80/E70 Series</td><td rowspan="5">C++Agent</td><td rowspan="5">Mitsubishi Electric products</td></tr>
<tr><td>M700/M70 Series</td></tr>
<tr><td>M800LUC Series
M700LC Series</td></tr>
<tr><td>M800V/M80V Series
C80</td></tr>
<tr><td>M700UM Series
M700BM Series</td></tr>
<tr><td colspan="2">Other manufacturer's products</td></tr>
<tr><td>EDM processing machine</td><td rowspan="2">MTConnect-compatible models</td><td>C++Agent</td><td>Mitsubishi Electric products</td></tr>
<tr><td>NC machine tool</td><td>Other manufacturer</td><td colspan="2">Other manufacturer's products</td></tr>
</table>

MEMO

REVISIONS

Revision date	Manual No.	Revision details
Apr. 2018	IB(NA)1501538-A	First edition
Sep. 2018	IB(NA)1501538-B	Added support for Agent and Adapter. Corrected errors in writing.
Feb. 2022	IB(NA)1501538-C	Added the accessible equipment. Added the description on the data reading function. Revised the description on the data collecting function of MTConnect Data Collector. Revised the description on melNCAdapter.cfg (setting file). Added the PLC data definition file. Added the editing example of the Device.xml file. Revised the description on the troubleshooting. Revised the XML schema definition. Added the table of supported version. Added the table of supported products. Corrected errors in writing.
Nov. 2023	IB(NA)1501538-D	Revised the XML schema definition. Corrected errors in writing.

TRADEMARKS

Global Service Network

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Hartford, CT Service Satellite
Knoxville, TN Service Satellite
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Huntsville, AL Satellite
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Notice

Every effort has been made to keep up with software and hardware revisions in the contents described in this manual. However, please understand that in some unavoidable cases simultaneous revision is not possible.
Please contact your Mitsubishi Electric dealer with any questions or comments regarding the use of this product.

MITSUBISHI ELECTRIC CORPORATION

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MODEL	MTConnect Data Collector
MODEL CODE	100-666
Manual No.	IB-1501538

IB(NA)1501538(ENG)-D(2311)MEE

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