MITSUBISHI ELECTRIC

Changes for the Better

Numerical Control (CNC)

Install Manual

NC Machine Tool Optimizer (Pro/Lite)

IB-1501673(ENG)-D

PRECAUTIONS FOR SAFETY

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

This section "Precautions for Safety" ranks the safety precautions into: " ⚠ 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.**

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

[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 PC 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.
- **To protect the availability, integrity and confidentiality of the NC system against cyber-attacks including unauthorized access, denial-of-service (Dos) (*1) attack, and computer virus from external sources via a network, take security measures such as firewall, VPN, and anti-virus software.**
  (*1) Denial-of-service (Dos) refers to a type of cyber-attack that disrupts services by overloading the system or by exploiting a vulnerability of the system.
- **Mitsubishi Electric assumes no responsibility for any problems caused to the NC system by any type of cyberattacks including DoS attack, unauthorized access and computer virus.**

[Operating Precautions]

⚠ CAUTION

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

APPLICATION OF THIS SOFTWARE

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

INTRODUCTION

This manual is for understanding the 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
MTConnect Data Collector User's Manual	IB-1501538
NC Machine Tool Optimizer (Pro/Lite) User's Manual	IB-1501672
NC Machine Tool Connector User's Manual	IB-1501634

REFERENCE

Document	Acquisition method
MTConnect Standard Part 2 - Device Information Model	Download from the website of MTConnect Institute.
MTConnect Standard Part 3 - Streams Information Model	Download from the website of MTConnect Institute.
PostgreSQL Japanese manual	Refer to the following website. https://www.postgresql.jp/document/

TERMS

Unless otherwise specified, this manual uses the following terms.

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 (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 (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 (Device)	Target machine to be monitored by MTConnect. "Device ≈ Machine tool"
DataItem (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	An attribute indicating a type of data defined by MTConnect Institute. Type needs to be specified for each DataItem.

Terms Related to OPC UA

Terms	Description
OPC UA	An abbreviation for OPC Unified Architecture. OPC UA is a platform-independent and service-oriented architecture which has integrated all the functionality of the OPC (OLE for Process Control) Classic specifications into one extensible framework. Reference: https://opcfoundation.org/
OPC UA server	Software that returns the data collected from equipments, devices, and machines in response to the requests from OPC UA clients by OPC UA communication.
OPC UA client	Software (SCADA, MES, ERP, etc.) that accesses the OPC UA server to make data access via OPC UA communication.

Terms Related to Production

Terms	Description
Utilization	The ratio of operation time to planned operating time. The maximum planned operating time in NC Machine Tool Optimizer is 24 hours (the total amount of time per day that products can be manufactured at a plant). (Operation time ÷ Planned operating time × 100) (*1)
Availability	The ratio of the time taken to produce the actual number of parts (availability time) to the actual operating time. Performance. (Actual number of parts produced × Cycle time ÷ Operating time × 100) (*2)
Planned operating time (Loading time)	The time per period unit during which the machine can operate, excluding planned downtime. The time during which the machine is powered on for production. Availability loss is included.
Operation time	The remaining time after subtracting availability loss from the planned operating time. Performance loss and quality loss are included.
Downtime (Availability loss)	Loss time caused by small stops during the planned operating time. Times required for warming up, process (operator) wait, failure, repair, unplanned power outage, setup, adjustment, etc. are included.
Performance loss	Loss time caused by decreased performance of the equipment such as idling, minor stoppages, reduced speed.
Quality loss	Loss time caused by rework such as rectification.
Cycle time	The time required to produce one production unit (e.g. process, machining program).

(*1) It is calculated with the following formula in NC Machine Tool Optimizer.

Utilization [%] = operation time ÷ sum of operation status time × 100

(*2) It is calculated with the following formula in NC Machine Tool Optimizer.

Availability [%] = ∑run time ÷ ∑ operation time × 100

Other Terms

Terms	Description
MQTT	An abbreviation for MQ Telemetry Transport. MQ Telemetry Transport is a lightweight message queuing protocol using TCP/IP, publish-subscribe pattern. MQTT requires a message broker (MQ server). Clients can receive the messages selectively.
RDBMS	RDBMS(Relational Database Management System) is a software that manages a relational database (RDB) in a comprehensive way. RDB manages data in a table structure. SQL is the standard programming language used to access the database.

MEMO

1 OVERVIEW

This manual describes the setup procedures for the Mitsubishi Electric CNC NC Machine Tool Optimizer.
NC Machine Tool Optimizer is a software that collects operation information from CNC machine tools and peripheral devices and uses various data from the production site for the visualization of operation status and data for analysis.
NC Machine Tool Optimizer can be used in the following situations.
- Improving the operation ratio for overall optimization
- Improving the production site for increasing productivity

NC Machine Tool Connector supports various communication protocols and can be used to connect and collect operation information from various equipment from any manufacturer at the production site. The collected operation information can be used to analyze the operation status.
Follow the setup procedures in this manual.

1.1 Required Software

The following software is required for the Machine Tool Optimizer operating environment.
Software related to MTConnect is not required for Mitsubishi Electric CNC that can be connected with the custom API library.

Item		Software name
This product		NC Machine Tool Optimizer
NC Machine Tool Connector (*1)		NC Machine Tool Connector 1.2.0.0 or later (version A1)
MTConnect (*2)	**MTConnect agent (*3)**	C++ Agent 1.3.0.17 or later (*4)
	MTConnect adapter (*5)	MTConnect Adapter
OPC UA (*2)	**OPC UA server (*8)**	OPC UA server from other manufacturers (OPC UA Ver.1.03 or later)
Database	**An RDBMS product**	PostgreSQL Ver.16 (*6)
MQTT related	**Broker (*7)**	Eclipse Mosquitto 1.3.5
Optimizer Setting Tool operating environment		Microsoft Excel 2010 (64-bit) or later

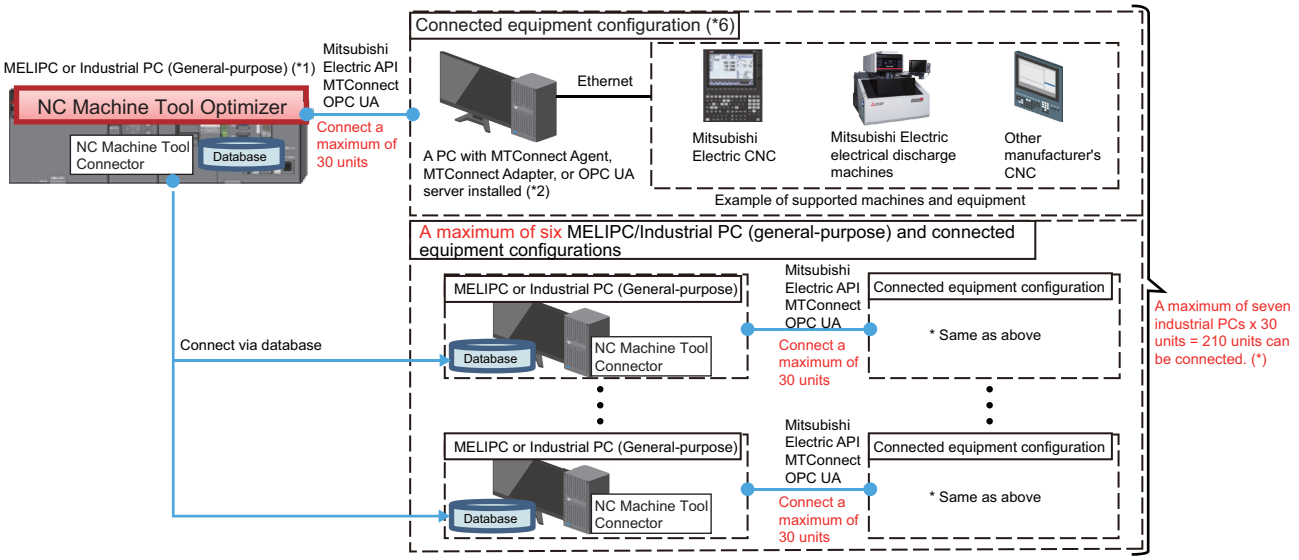
(*1) An IoT platform (software) used with NC Machine Tool Optimizer to store operation data collected from devices and equipment to a database.
(*2) The communication protocol used when connecting equipment from other manufacturers with NC Machine Tool Connector.
(*3) The software that collects data from MTConnect adapter and returns data to MTConnect client.
(*4) The recommended software. A software that complies with the MTConnect standard and can communicate with the MTConnect adapter used is required.
(*5) The software that collects operation data from CNC, etc. and sends it to MTConnect agent. An MTConnect adapter that supports the connecting CNC equipment is required.
(*6) The recommended software. Only an RDBMS type of database can be used with NC Machine Tool Optimizer.
(*7) NC Machine Tool Optimizer can obtain data collected in real-time that is output from NC Machine Tool Connector via an MQTT broker.
(*8) Refers to the software that operates on computers or communication unit products supporting OPC UA.
Software whose operation with NC Machine Tool Optimizer has been confirmed: DeviceXPlorer OPC server manufactured by TAKEBISHI, FBR-100AN manufactured by silex

MEMO

2 SYSTEM CONFIGURATION

An example of the configuration to use NC Machine Tool Optimizer is shown below.
When using multiple computers with NC Machine Tool Optimizer, make sure to match the Windows time and date settings.

Pro version example configuration (maximum of 210 units (30 units per plant))



(*1) NC Machine Tool Connector, database, MQTT broker, etc. need to be installed in addition to NC Machine Tool Optimizer.

(*2) Installation of MTConnect Agent and Adapter/OPC UA server is required only when connecting some Mitsubishi Electric CNCs and equipment from other manufacturers to NC Machine Tool Connector.
Computers are not required when installing MTConnect Agent/OPC UA server on the same industrial PC side as NC Machine Tool Optimizer or when an MTConnect adapter and agent/OPC UA server is built in the other manufacturer's equipment.
When connecting CNC equipment from manufacturers other than Mitsubishi Electric, software for each manufacturers adapters is required.
For details, contact the manufacturer of the product.

(*3) In addition to an industrial PC with NC Machine Tool Optimizer installed, up to six industrial PCs with NC Machine Tool Connector installed can be used to connect a maximum of 210 units.

(*4) When the communication protocols for different connected equipment varies, it is still possible to connect using a combination of API communication, MTConnect communication, and OPC UA communication within one system. In this case, the following limitations apply to the maximum number of units that can be connected.
- A machine that can use Mitsubishi Electric Custom API communication (Max 30 units)
- A machine that can use Mitsubishi Electric MTConnect communication (Max 30 units) (Max 10 units when using Optimizer Setting Tool)
- A machine that can use other manuafacturer's MTConnect communication (Max 10 units) (*5)
- A machine that can use other manuafacturer's OPC UA communication (Max 10 units) (*5)

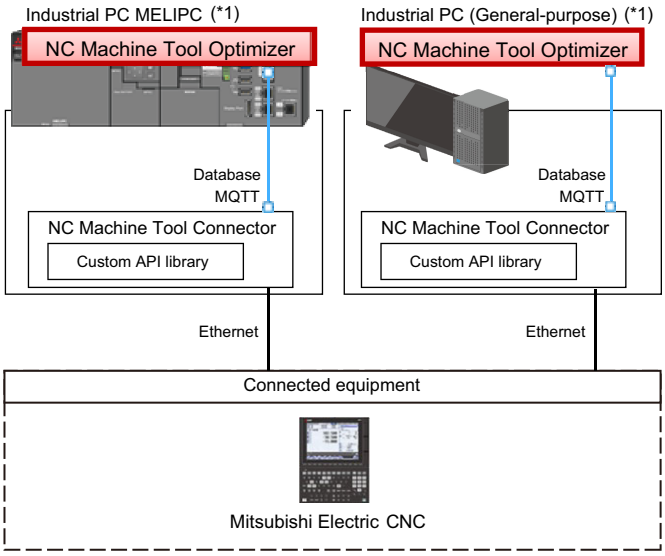
(*5) For products from other manufacturers, there may be limitations to the maximum number of units. It may also not be possible to use a combination of different communication protocols.

(*6) For details of the connected equipment configuration for one plant, refer to "Lite version example configuration (maximum of 10 units)/Pro version example configuration for one plant".

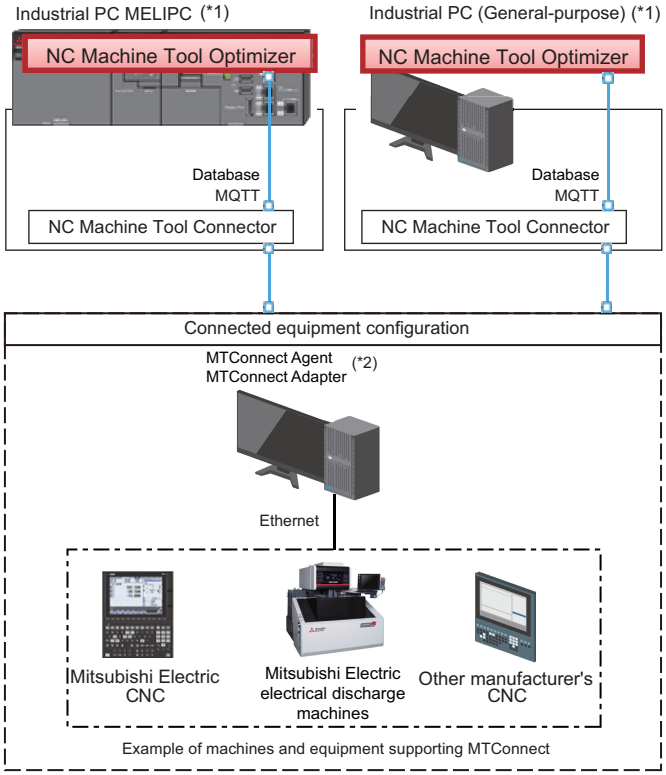
Lite version example configuration (maximum of 10 units)/

Pro version example configuration for one plant

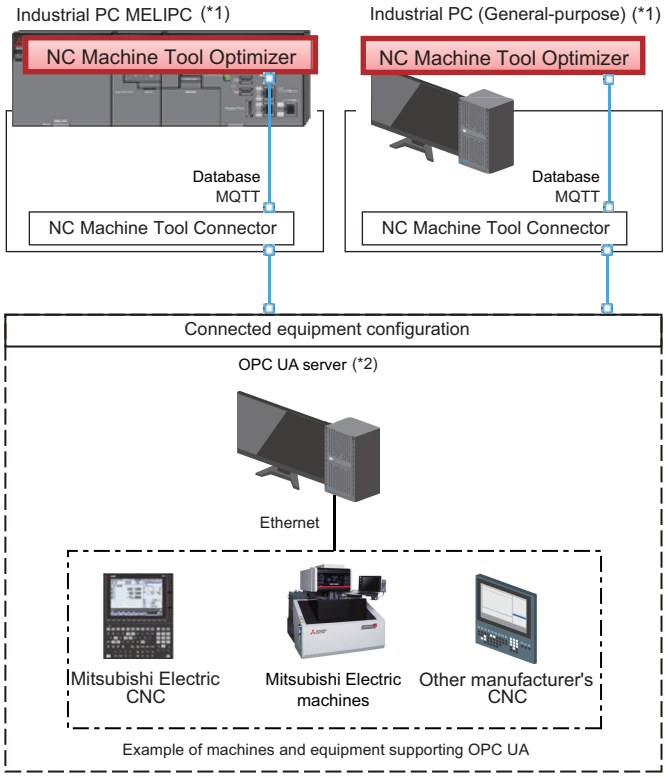
[Equipment supporting the Custom API library]



[Equipment supporting MTConnect]



[Equipment supporting OPC UA]



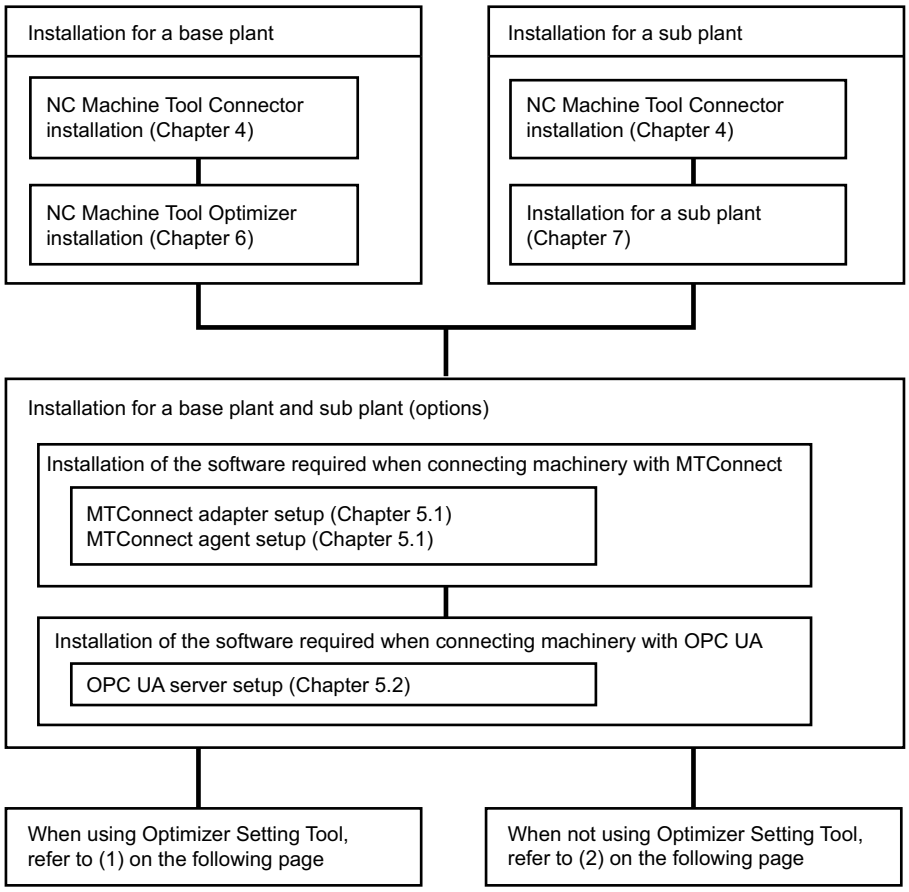
(*1) NC Machine Tool Connector, database, MQTT broker, etc. need to be installed in addition to NC Machine Tool Optimizer.

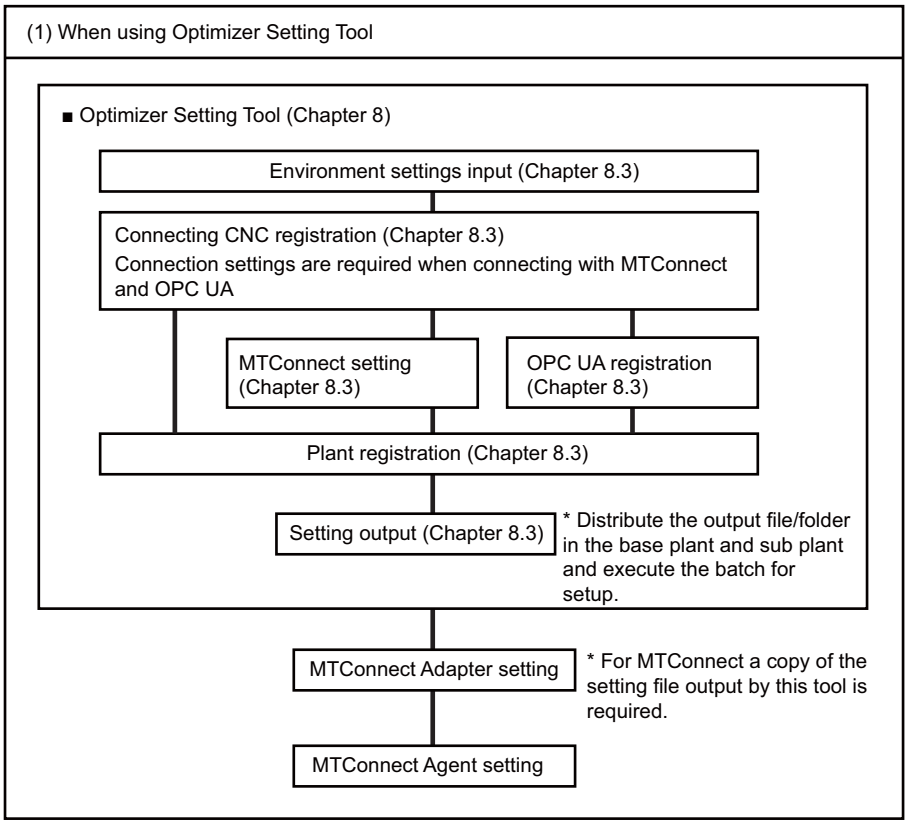
(*2) Installation of MTConnect Agent and Adapter/OPC UA server is required only when connecting some Mitsubishi Electric CNCs and equipment from other manufacturers to NC Machine Tool Connector.
Computers are not required when installing MTConnect Agent/OPC UA server on the same industrial PC side as NC Machine Tool Optimizer or when an MTConnect adapter and agent/OPC UA server is built in the other manufacturer's equipment.
When connecting CNC equipment from manufacturers other than Mitsubishi Electric, software for each manufacturers adapters is required.
For details, contact the manufacturer of the product.

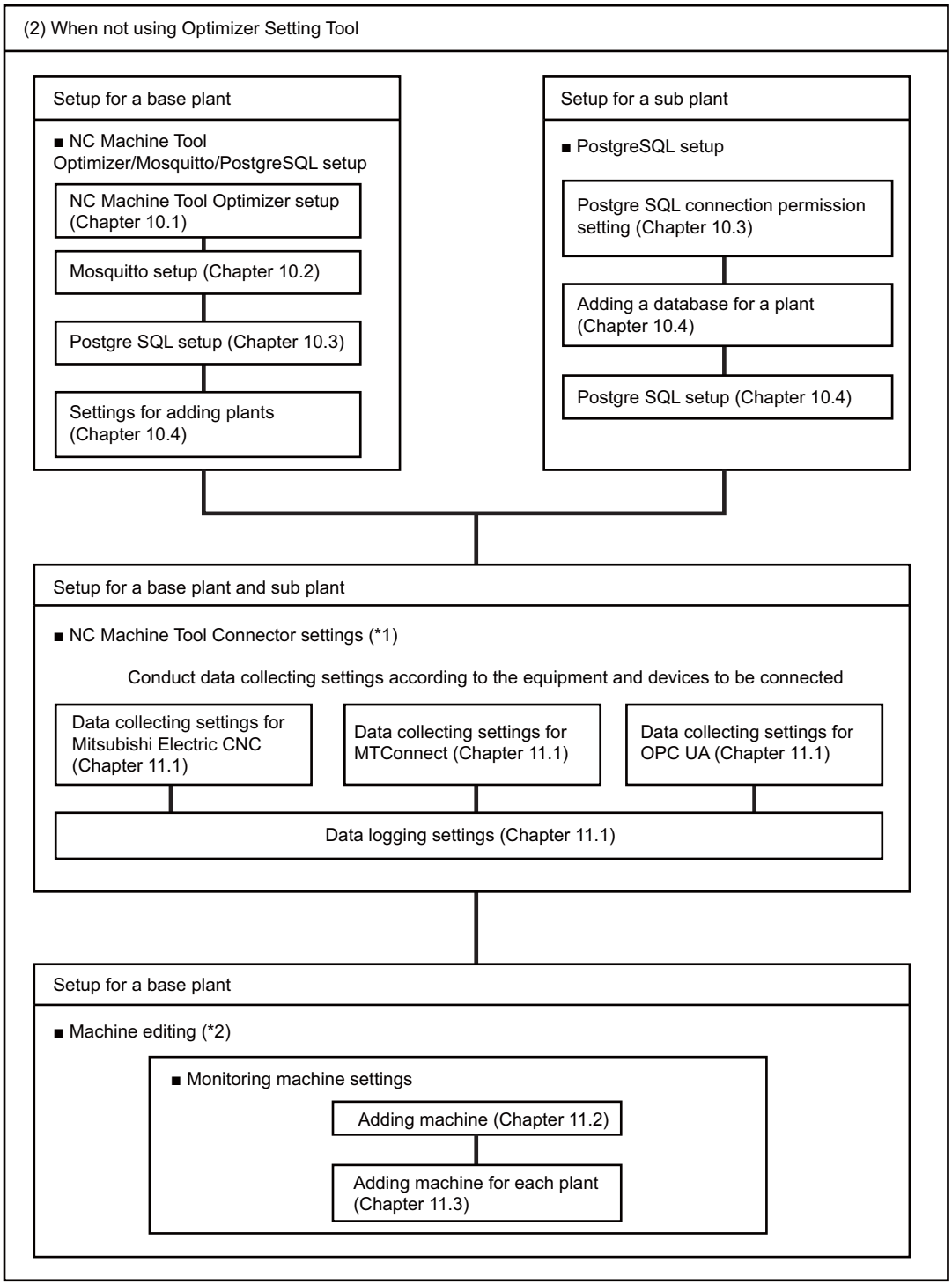
MEMO

3 INSTALLATION AND SETUP FLOWCHART

The procedures for the initial setup are shown below.
For the procedures to change settings when the initial setup is complete and after operation of NC Machine Tool Optimizer has started, refer to Chapter 12.




(1) When using Optimizer Setting Tool
■ Optimizer Setting Tool (Chapter 8)
Environment settings input (Chapter 8.3)
Connecting CNC registration (Chapter 8.3)
Connection settings are required when connecting with MTConnect and OPC UA
MTConnect setting (Chapter 8.3)
OPC UA registration (Chapter 8.3)
Plant registration (Chapter 8.3)
Setting output (Chapter 8.3)
* Distribute the output file/folder in the base plant and sub plant and execute the batch for setup.
MTConnect Adapter setting
* For MTConnect a copy of the setting file output by this tool is required.
MTConnect Agent setting



(*1) Refer to the following for details.

NC Machine Tool Connector User's Manual

(*2) Refer to the following for details.

NC Machine Tool Optimizer (Pro/Lite) User's Manual

MEMO

4 NC Machine Tool Connector INSTALLATION

The installation procedures for NC Machine Tool Connector are shown in (1) and (2) below.
Refer to the following for details of the installation procedures.

NC Machine Tool Connector User's Manual

Operating procedure

(1) Execute "setup.exe" stored in the installation folder.
(2) Select or input necessary items according to the instructions on the screen.

Precautions

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

4.1 Data Collecting Settings

The following settings in NC Machine Tool Connector are required to collect data from connected equipment using NC Machine Tool Connector.

- Server setting
- Machine setting (machine registration)
- Machine data editing
- Data collecting settings and monitor diagnostics
- Data logging settings
- Data publish settings

When connecting other manufacturers' equipment that supports MTConnect or OPC UA, separate communication software is required. Refer to "5. MTConnect/OPC UA RELATED SOFTWARE INSTALLATION" for setup.
For the particular setting procedures for connecting with NC Machine Tool Optimizer, follow the procedures in "3. Installation and Setup Flowchart" and refer to "9. Collection Setting Procedures to Connect CNC" after setting up PostgreSQL.
Also, refer to the following for details of basic operation procedures.

NC Machine Tool Connector User's Manual

4.2 NC Machine Tool Connector Uninstallation

Refer to the following for NC Machine Tool Connector Uninstallation.

NC Machine Tool Connector User's Manual

MEMO

5 MTConnect/OPC UA RELATED SOFTWARE INSTALLATION

When connecting other manufacturer's equipment that supports MTConnect or OPC UA communication, the installation of an MTConnect agent and an MTConnect adapter, or OPC UA server as well as NC Machine Tool Connector is required. (Installation may not be required for a hardware product.)

Precautions

- When connecting other manufacturer's equipment that supports MTConnect or OPC UA communication, install an MTConnect agent, MTConnect adapter, or OPC UA server to be used according to the instruction manuals.

5.1 MTConnect Related Software Installation

MTConnect adapter installation

The installation procedures for MTConnect adapter are shown in (1) and (2) below.
Refer to the following for details of the installation procedures.

MTConnect Data Collector User's Manual

Operating procedure

(1) Execute ".\Adapter\Setup_Adapter.exe" stored in the installation folder of the MTConnect data collector.
(2) Select or input necessary items according to the instructions on the installation screen.
(Connected device information settings can be reset after installation.)

MTConnect adapter setting

Refer to the following manual for the basic setting procedures of the MTConnect adapter setting file (melNCAdapter.cfg).

MTConnect Data Collector User's Manual

When using Optimizer Setting Tool, use the setting file (melNCAdapter.cfg) output by the tool. Refer to "8. OPTIMIZER SETTING TOOL" for details.
When using an adapter other than the MTConnect Adapter included with MTConnect Data Collector, refer to the instruction manual of the adapter being used.

MTConnect agent installation

Install the MTConnect agent which can communicate with the MTConnect adapter installed in "MTConnect Adapter Installation".

Installing C++Agent

When using the C++Agent (free software) as the MTConnect agent, installation procedures are as follows.
Refer to the following for details of the installation procedures.

MTConnect Data Collector User's Manual

When using an MTConnect agent other than C++Agent, refer to its instruction manual.

Operating procedure

(1) Create the destination folder to store the C++Agent. (Example. C:\ MTConnect\cppagent)
(2) Download the C++Agent from the site (https://github.com/mtconnect/cppagent/releases).
(3) Decompress the downloaded file (example. cppagent_win32_Vista_1.3.0.17_bin.zip) and store it to the folder created in (1).
(4) Copy the bat file from ".\tools\Agent\" stored in the NC Machine Tool Connector installation folder to the bin folder of (3).
(5) Right click the agent_install.bat in the bat files stored in (4) and click "Run as administrator".
(6) MTConnect agent is registered to Windows services.
(7) Start MTConnect agent by restarting the computer or by following the procedures of "Start MTConnect Agent Service".
(8) Set the configuration file (agent.cfg) and Device.xml file. (Restart MTConnect agent after the settings.)

Editing agent.cfg file

An agent.cfg files needs to be set to operate C++ Agent correctly.
Depending on the data collected by MTConnect, set a Device.xml file for data collected with the MTConnect as needed.
Refer to "Editing Device.xml file" for the setting procedures of MTConnect agent Device.xml.
Set the following in the agent.cfg file.

(1) The scheme definition file name (default setting: Device.xml) that MTConnect uses.
(2) The TCP port number (Default setting: 5000) that MTConnect uses.
(3) Collection cycle with the MTConnect adapter (Default setting: 1000 ms)
(4) MTConnect supported version (Default setting: 1.3)

■ Setting example when collecting operation data from multiple machines with one MTConnect agent

Set the machine names, IP addresses, and port numbers under "Adapters". (Up to 3 machines can be set when using NC Machine Tool Optimizer.)

```
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
  }
}
```

(a)

(b)

(c)

(a) Set the machine name (this is used for the Device.xml file.)

(b) Settings of machine Adapters_01

(c) Settings of machine Adapters_02

Editing Device.xml file

Refer to the following manual for the basic setting procedures of the MTConnect agent Device.xml.

MTConnect Data Collector User's Manual

When Device.xml is edited,the MTConnect agent must be restarted. Refer to "Restart MTConnect Agent Service" for the restarting procedures.

When connecting one machine using the Mitsubishi Electric MTConnect adapter, editing the included xml file is not required.

Start MTConnect agent service

When MTConnect agent is registered to Windows services by executing agent_install.bat, MTConnect agent starts automatically every time the computer is started. After installing the MTConnect agent for the first time, start the Windows service of the MTConnect agent by the following procedures as the service does not start until the computer is restarted. (The following procedures are not required when the computer is restarted after installing the MTConnect agent.)

Operating procedure

(1) Right click agent_service_start.bat stored in the installation folder and click "Run as administrator".
(2) When a user account control dialog is displayed, click "Yes".

Restart MTConnect agent service

When Device.xml is edited, restart the MTConnect agent service by the following procedures (1) to (4). (The following procedures are not required when the computer is restated.)

Operating procedure

(1) Stop the MTConnect agent service. Select [Windows Administrative Tools] - [Services] from the start menu, then right-click "MTConnect Agent" on the service management screen to stop the MTConnect agent service.
(2) Right-click agent_uninstall.bat from the bat files created in (4) of "MTConnect Agent Installation" and click "Run as administrator".
(3) Right-click agent_install.bat from the bat files and click "Run as administrator".
(4) Restart the MTConnect agent service by following the procedures of "Start MTConnect Agent Service".

Uninstallation

Refer to the following manual for uninstallation of the MTConnect agent and the MTConnect adapter.

 MTConnect Data Collector User's Manual

When using other manufacturer's MTConnect adapter and agent, refer to the manuals of the products.

5.2 OPC UA Server Installation

OPC UA server installation

Install an OPC UA server that can communicate data with the equipment or devices to be connected.
The basic setup procedures of OPC UA servers are as follows.
For details on the procedures, refer to the product manual of your OPC UA Server.

Operating procedure

(1) Install an OPC UA server. (For software products)
(2) Configure the sever settings (network settings such as an end point URL and IP address, and security settings such as a certificate and user authorization).
(3) Configure the data collection settings from the connected equipment or devices such as adding data definitions of arbitrary tag names.
(4) Check that the data can be normally collected with a diagnosis tool.

Uninstallation

For uninstallation of an OPC UA server, refer to the product manual of your OPC UA Server.

MEMO

6 INSTALLATION OF NC Machine Tool Optimizer

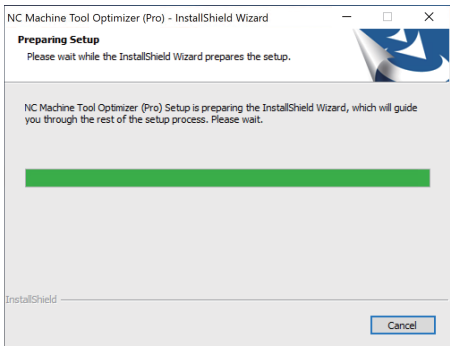
The following software is included with the NC Machine Tool Optimizer installer.
- Visual C++ Redistributable package for Visual Studio 2010 (x86)
- Visual C++ Redistributable package for Visual Studio 2013 (x86)
- Visual C++ Redistributable package for Visual Studio 2015 (x86, x64)
- Mosquitto (MQTT broker)
- Postgre SQL 16
- NC Machine Tool Optimizer

Install the redistributable package, Mosquitto, and Postgre SQL only when they are not installed.
When a Mosquitto version less than 1.3.5 is installed, the NC Machine Tool Optimizer operation cannot be guaranteed, thus installation is canceled. Save any installed data, and install NC Machine Tool Optimizer again after updating or uninstalling Mosquitto.
When a version of PostgreSQL other than 16 is installed, uninstalling PostgreSQL in advance is recommended.

The installation procedure is as follows.

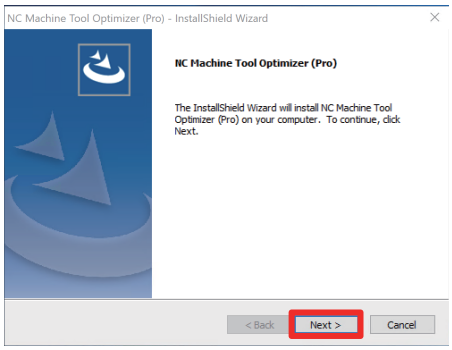
Operating procedure

(1) Execute ".¥NCMT_Optimizer¥setup.exe" stored in the installation media for NC Machine Tool Optimizer.

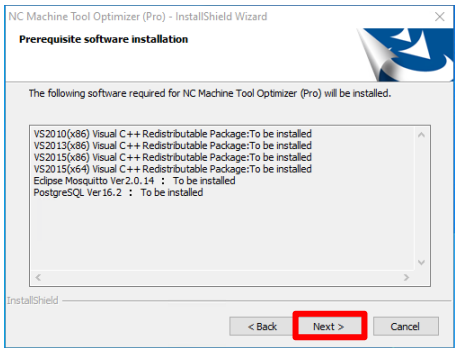


When a user account control dialog opens when executing the file, click "Yes".

(2) The following screen appears when preparation for setup is completed. Click [Next].



(3) Confirm the software to be installed and click [Next].

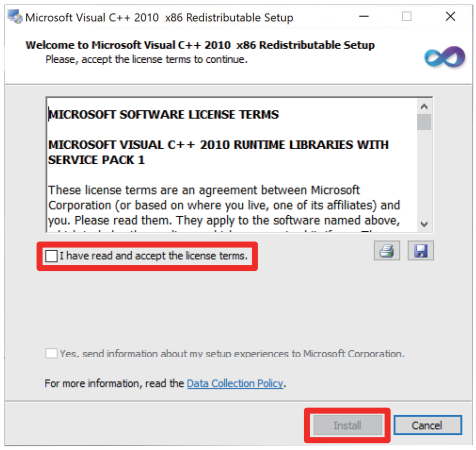


(4) Follow the procedures in Chapter 6.1 onwards, and select or input necessary items according to the instructions on each installation screen.

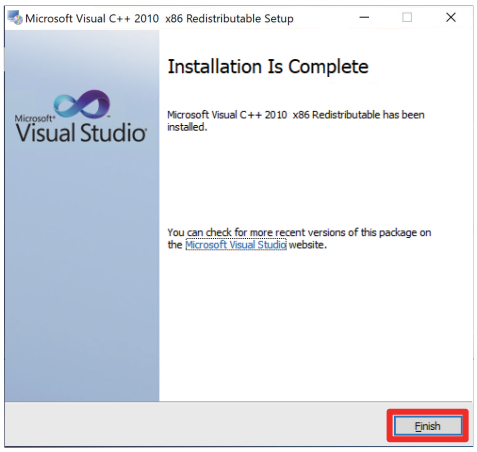
6.1 Installation of Visual C++ Redistributable Packages

Install Visual C++ redistributable packages by following the procedures below.

(1) When the installation screen of Visual C++ redistributable package for Visual Studio 2010 (x86) appears, check the [I have read and accept the license terms] box and click [Install].

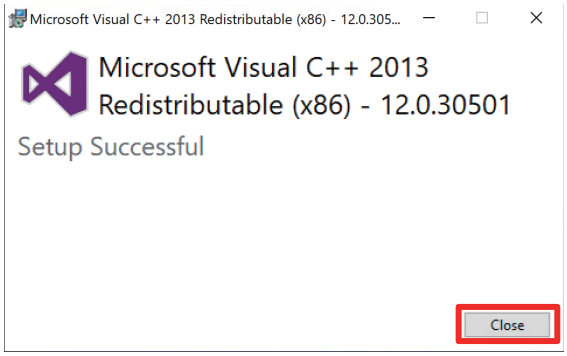


(2) When installation is completed, the following screen appears. Click [Finish].

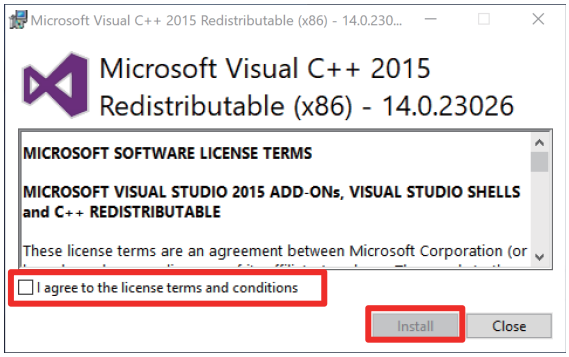


(3) When the installation screen of Visual C++ redistributable package for Visual Studio 2013 (x86) appears, check the [I agree to the license terms and conditions] box and click [Install].

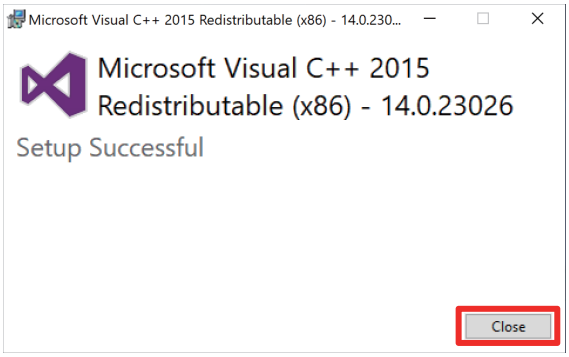
(4) When installation is completed, the following screen appears. Click [Close].



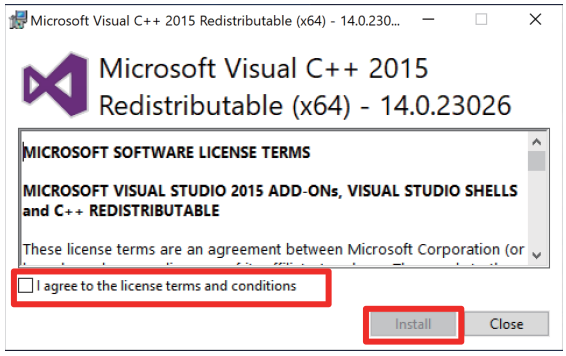
(5) When the installation screen of Visual C++ redistributable package for Visual Studio 2015 (x86) appears, check the [I agree to the license terms and conditions] box and click [Install].



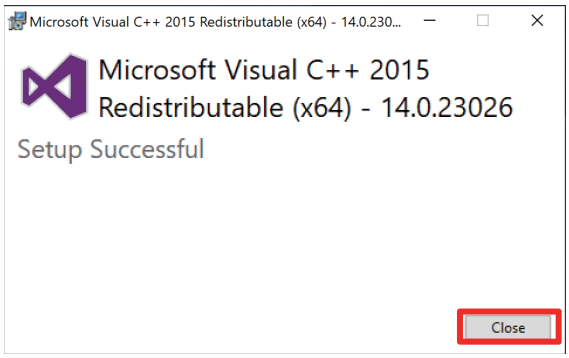
(6) When installation is completed, the following screen appears. Click [Close].



(7) When the installation screen of Visual C++ redistributable package for Visual Studio 2015 (x64) appears, check the [I agree to the license terms and conditions] box and click [Install].



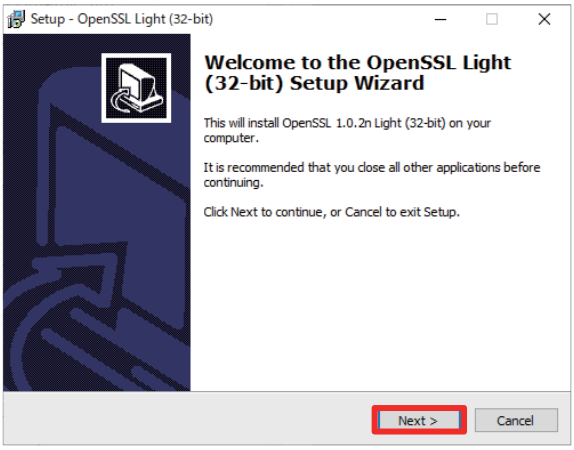
(8) When installation is completed, the following screen appears. Click [Close].



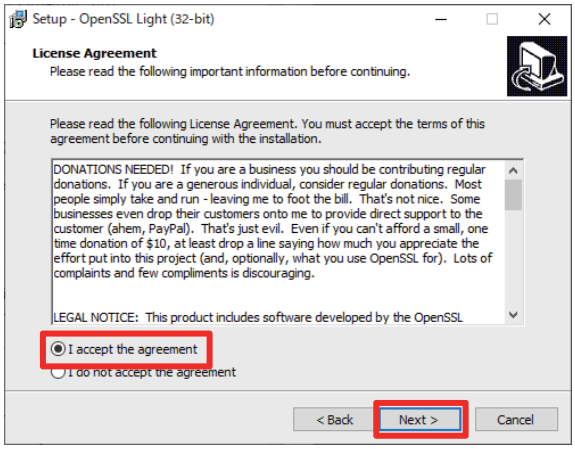
6.2 Installation of Mosquitto (MQTT broker)

Install the prerequisite software "OpenSSL", and Mosquitto by following the procedures below.

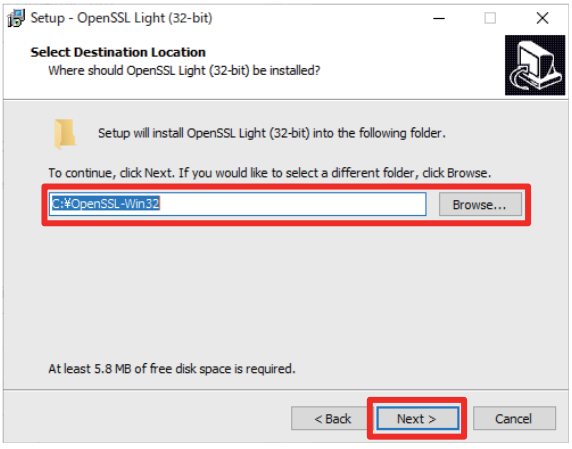
(1) When the installation screen of OpenSSL appears, click [Next >].



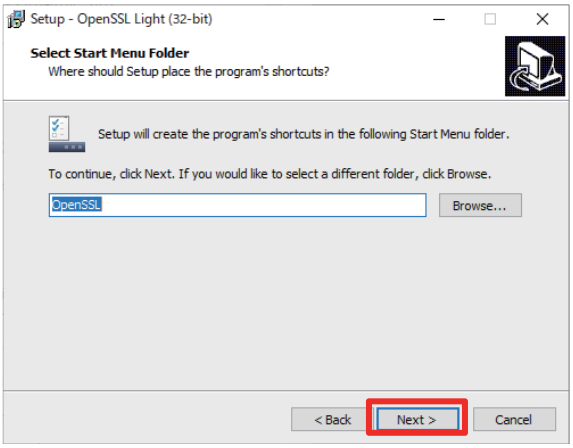
(2) Select [I accept the agreement] and click [Next >].



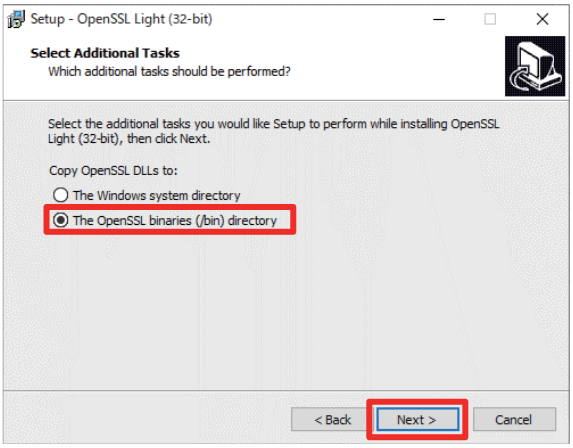
(3) Select the destination of installation and click [Next >].



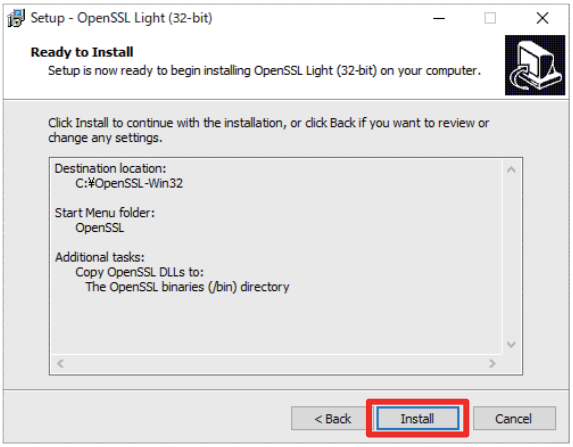
(4) Click [Next >].



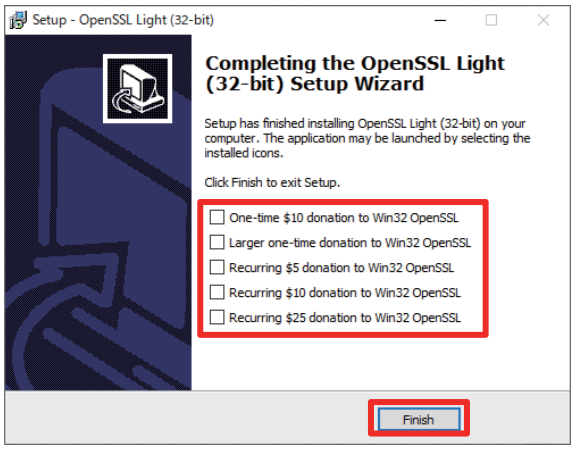
(5) Select [The OpenSSL binaries (/bin) directory] and click [Next >].



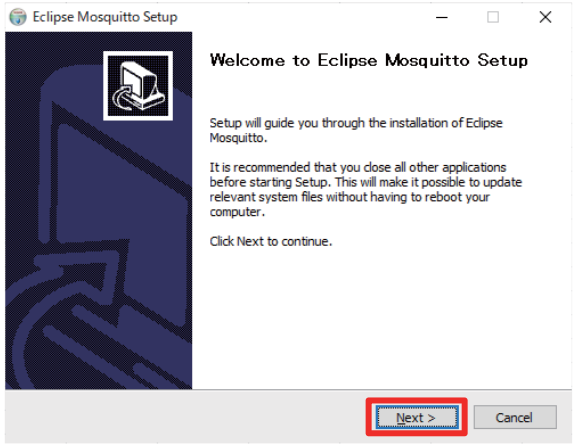
(6) Click [Install].



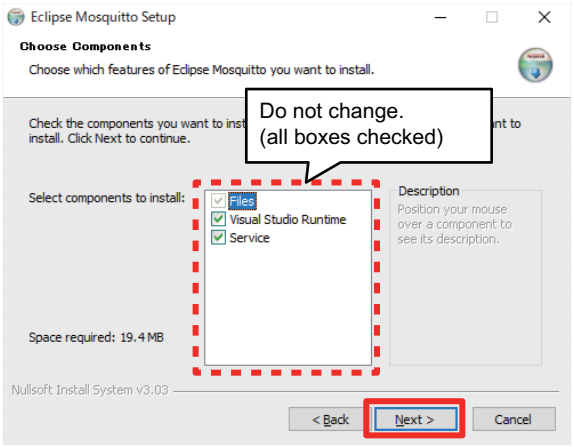
(7) Remove the checks from all the boxes and click [Finish].



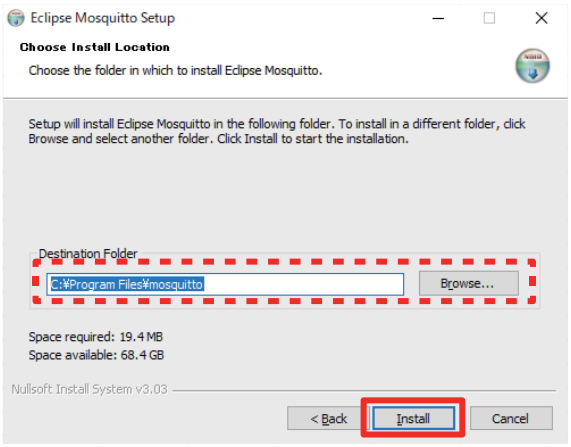
(8) When the installation screen of Mosquitto appears, click [Next >].



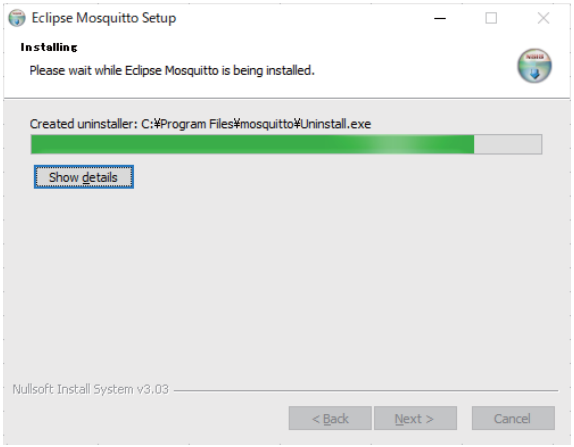
(9) With the Service and Visual Studio Runtime boxes checked, click [Next >].



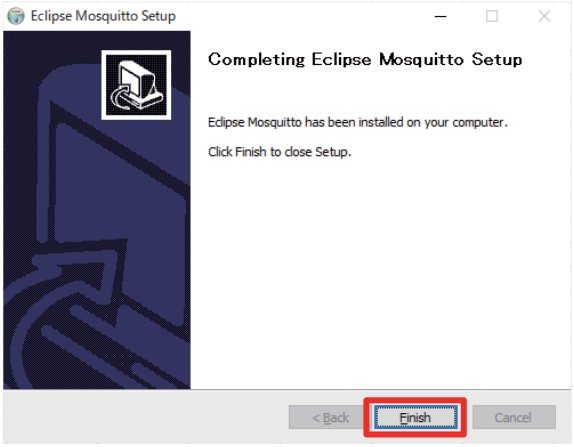
(10) Click [Install].
Change the destination folder as required.



(11) The installation progress is displayed.



(12) Click [Finish] to end the Mosquitto installation



6.3 Installation of PostgreSQL

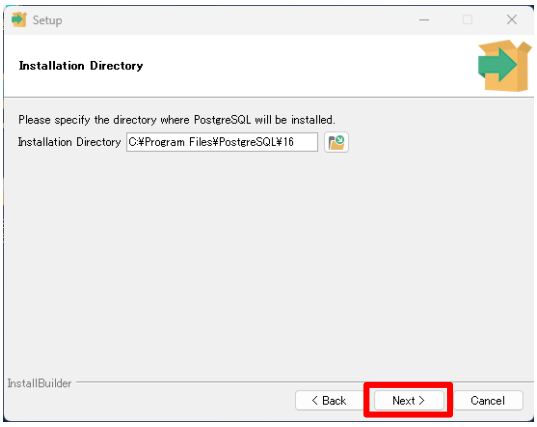
Procedures for installing and setting PostgreSQL are as follows.
Install PostgreSQL to a PC with NC Machine Tool Optimizer installed by following the procedures below.

Precautions

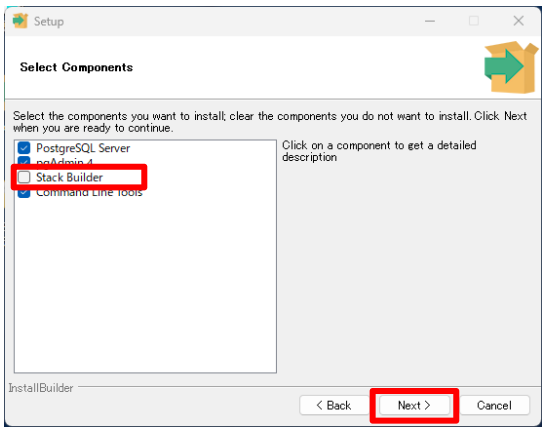
- When using an administrator account, creating a PostgreSQL account is not required.
- When installing a version of PostgreSQL other than 16, the actual procedure may differ from the following. Uninstalling the version of PostgreSQL other than 16 in advance is recommended.
- The following information to be set in this section will be used in later sections. Please make a note of their set values.
    - Password for a Postgres account
    - Port number

Operating procedure

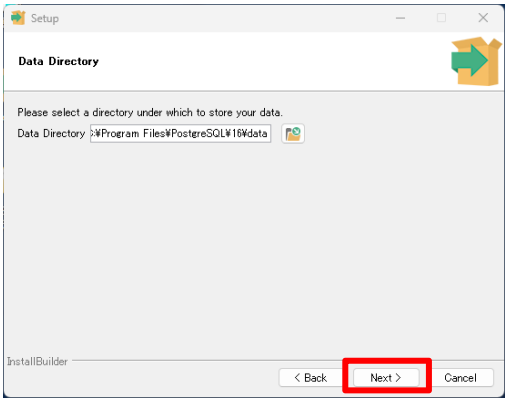
(1) Select an installation folder, and click the [Next>] button.



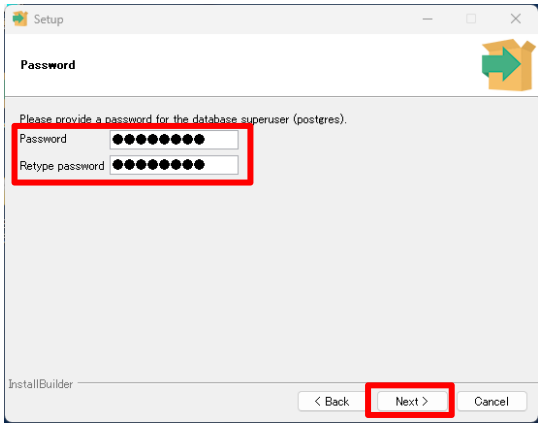
(2) Unselect the checkbox of [Stack Builder], and click the [Next>] button.



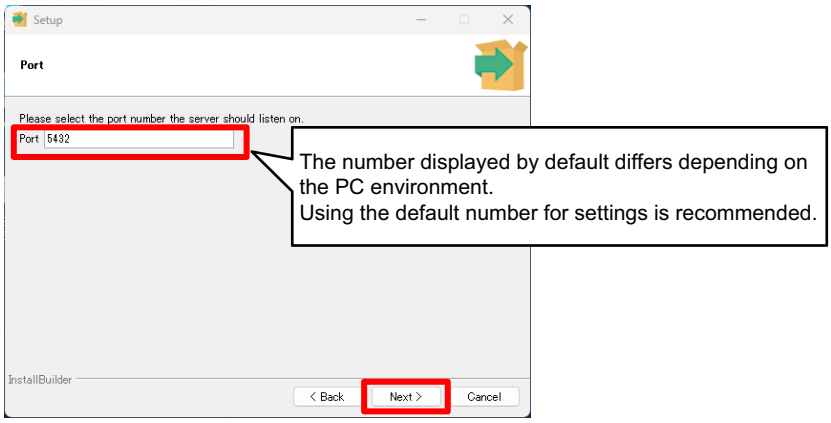
(3) Select a data directory, and click the [Next>] button.



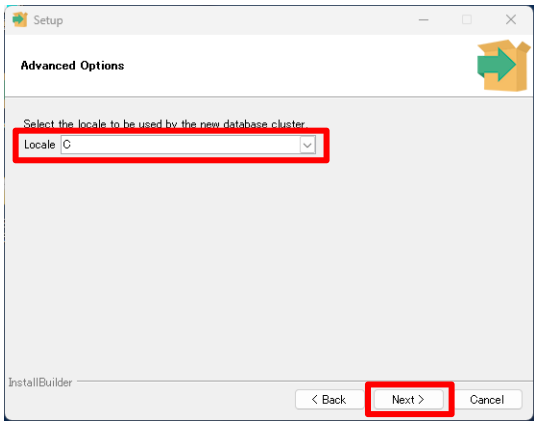
(4) Set a password for the "postgres" account that is a superuser, and click the [Next>] button. A password of 6 to 32 characters must be set when using the "postgres" account.
The default setting "postgres" is recommended for the password .



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



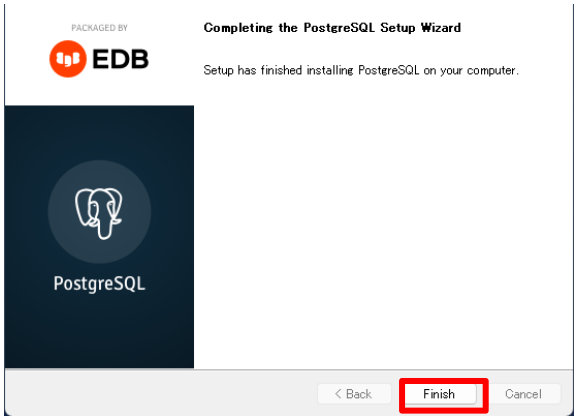
(6) Select "C" for "Locale", and click the [Next>] button.



(7) Click the [Next>] button.

(8) Click the [Next>] button.

(9) Click the [Finish] button.

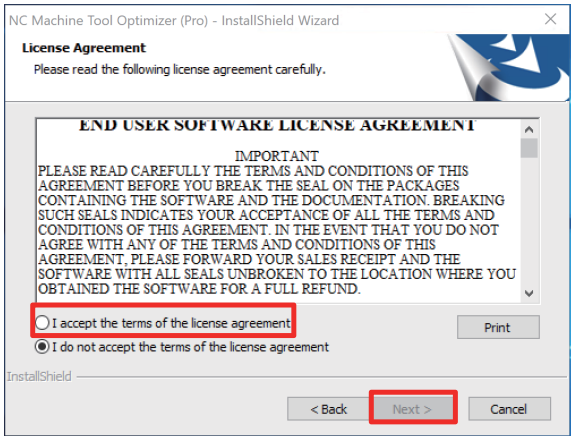


6.4 NC Machine Tool Optimizer Installation Procedure

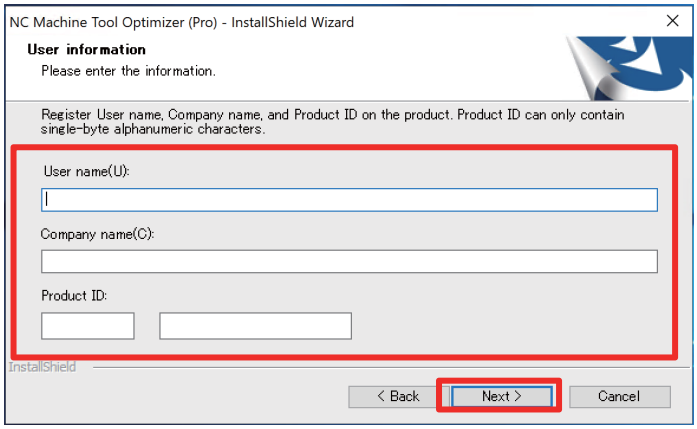
Procedures for installing NC Machine Tool Optimizer are as follows.

Operating procedure

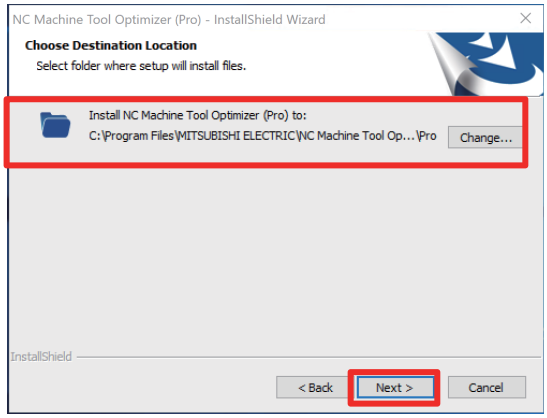
(1) Select [I accept the terms of the license agreement] and click [Next >].



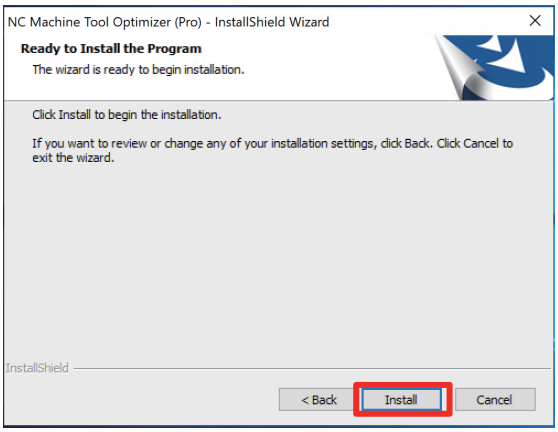
(2) Following the instructions on the screen, input the necessary items and click [Next >].



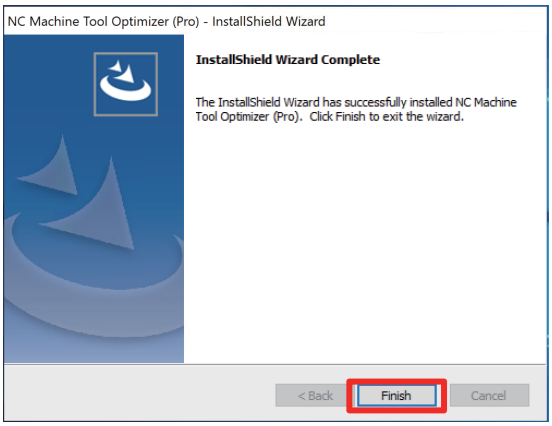
(3) Change the install destination as required, and click [Next >].



(4) Review the installation settings, and click [Install].



(5) Click [Finish].
The installation is complete.



6.5 Uninstallation Procedure

Procedures (1) to (4) for uninstalling NC Machine Tool Optimizer are as follows.

Operating procedure

(1) Right-click the Start button and select [Control Panel].
(2) Select [Uninstall a program] on the control panel screen (View by: Category). Select "NC Machine Tool Optimizer" from the displayed list of programs and select [Uninstall].
(3) Select [Yes] on the confirmation screen to uninstall.
When "Enable user account control" is specified, select [Yes] on the installer startup confirmation screen.
(4) Decide whether to uninstall Mosquitto, PostgreSQL, etc. that is not related to NC Machine Tool Optimizer depending on the operating environment.

6.6 NC Machine Tool Optimizer Update

Execute "\NCMT_Optimizer\setup.exe" stored in the installation media for NC Machine Tool Optimizer and follow the instructions on the installation screens to update NC Machine Tool Optimizer. The procedures that need to be performed after the update are as follows.

Update to version A7 (1.1.7.0)

When NC Machine Tool Optimizer is updated from version A6 or earlier to A7, the supported database version changes. In this case, set up the database again following the procedure below.

Operating procedure

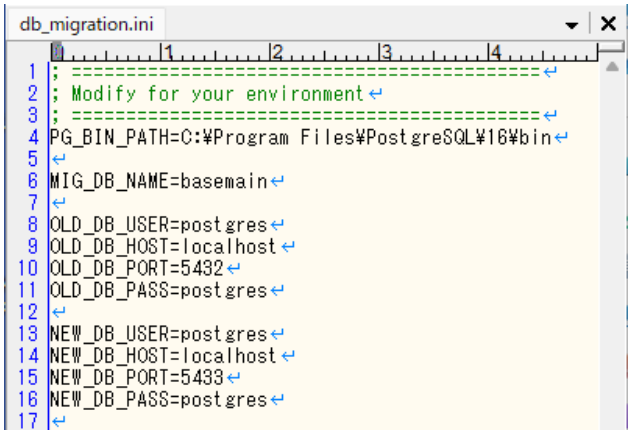
(1) Migrating the data in the database
Data will be migrated from the previous database (PostgreSQL10) to the new database (PostgreSQL16) by using the following files.

Location of the data migration tool (DBMigrationTool)
[Installation folder for NC Machine Tool Optimizer]\tools\DBMigrationTool
├ db_migration.bat: File to run
└ db_migration.ini: Setting file

This tool needs to be executed for each database (each plant) set for the connection destination in "NCMachineToolOptimizer.exe.config". When connecting to multiple databases, perform procedures (a) and (b) each time for the number of the connections.
For the settings of "NCMachineToolOptimizer.exe.config", refer to "10.1 NC Machine Tool Optimizer Setup" and "Setting a configuration file".
When NC Machine Tool Connector has been installed and the data in the target databases has been migrated, this procedure is not necessary.

(a) Setting the data migration tool

Edit "db_migration.ini" with a text editor such as Notepad to set the databases whose data is to be migrated.



No.	Setting item	Setting content	Recommended setting
1	PG_BIN_PATH	Folder path to the bin folder where PostgreSQL16 is installed	C:\Program Files\PostgreSQL\16\bin
2	MIG_DB_NAME	Database name of the previous database (PostgreSQL10)	Refer to "10.1 NC Machine Tool Optimizer Setup" and "Setting a configuration file" to set the information of the databases to be connected.
3	OLD_DB_USER	Username of the previous database (PostgreSQL10)	
4	OLD_DB_HOST	Host name of the previous database (PostgreSQL10)	
5	OLD_DB_PORT	Port number of the previous database (PostgreSQL10)	
6	OLD_DB_PASS	Password of the previous database (PostgreSQL10)	
7	NEW_DB_USER	Username of the new database (PostgreSQL16)	postgres (*1)
8	NEW_DB_HOST	Host name of the new database (PostgreSQL16)	localhost
9	NEW_DB_PORT	Port number of the new database (PostgreSQL16)	This depends on the PC environment. (*1)
10	NEW_DB_PASS	Password of the new database (PostgreSQL16)	postgres (*1)

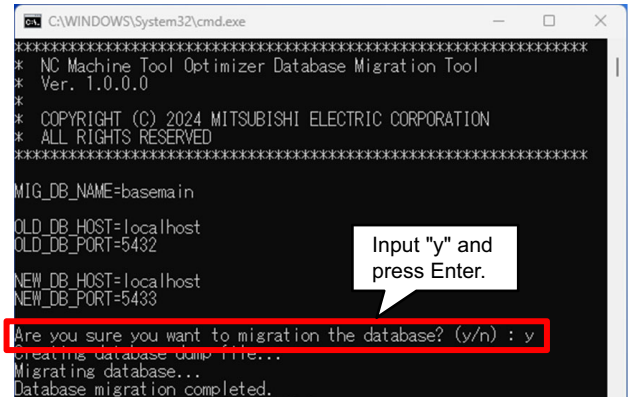
(*1) Set based on the information set in "6.3 Installation of PostgreSQL".

(b) Executing the data migration tool

Double click "db_migration.bat" to run the file.

When "Database migration completed." is displayed, the data migration completed successfully. If the message is not displayed, the setting items may be incorrect. Review the settings using the error information that are output to "db_migration_log.txt", and execute again.

Data migration may take time depending on the amount of data used by the database to be migrated. Please wait for a while.



(2) Updating settings

Configure the settings to connect to the new database (PostgreSQL16) following the procedures below.

(a) Change the connection destination referring to "10.1 NC Machine Tool Optimizer Setup" and "Setting a configuration file".

(b) Configure connection permission settings referring to "Connection permission settings".

(c) Configure the database data regular deletion tool referring to "Registering to Task Scheduler".

7 INSTALLATIONS FOR SUB PLANTS

When configuring a sub plant, install the required software to each PC in a sub plant by following the procedures below.
This is not required when not configuring any sub plants.

The following software is included with the installer for sub plants.
- Visual C++ Redistributable package for Visual Studio 2010 (x86)
- Visual C++ Redistributable package for Visual Studio 2013 (x86)
- Visual C++ Redistributable package for Visual Studio 2015 (x86, x64)
- Postgre SQL 16

Install the redistributable package, Mosquitto, and Postgre SQL only when they are not installed.
When a version of PostgreSQL other than 16 is installed, uninstalling PostgreSQL in advance is recommended.

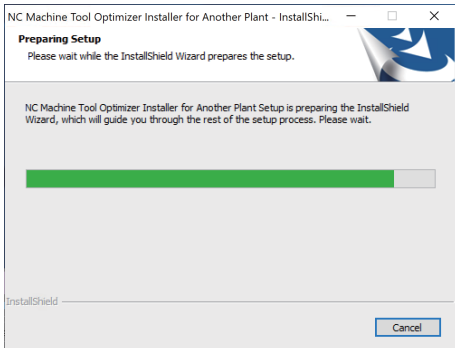
The installation procedure is as follows.

Operating procedure

(1) Execute setup.exe stored in the installation folder for NC Machine Tool Optimizer.
Copy the file to the PC in a sub plant. (Refer to "6 INSTALLATION OF NC Machine Tool Optimizer" for NC Machine Tool Optimizer installation)

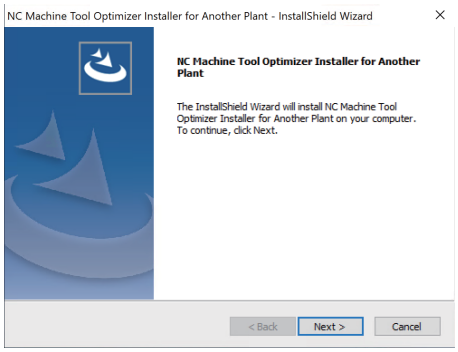
When the default settings were used for NC Machine Tool Optimizer installation, the file is located in the following destination.
C:\Program Files\MITSUBISHI ELECTRIC\NC Machine Tool Optimizer\Pro\tools\Another_Plant_Installer\setup.exe

(2) Execute "setup.exe" in the PC of the sub plant.

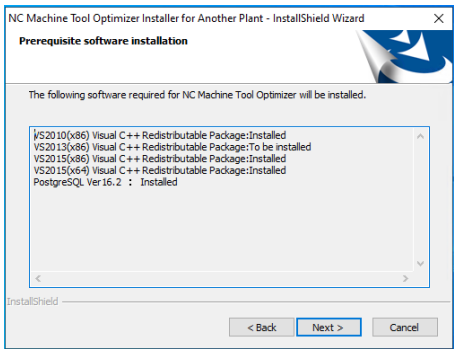


When a user account control dialog opens when executing the file, click "Yes".

(3) The following screen appears when preparation for setup is completed. Click [Next].



(4) Confirm the software to be installed and click [Next].



(5) Follow the procedures in Chapter 7.1 onwards, and select or input necessary items according to the instructions on each installation screen.

7.1 Installation of Visual C++ Redistributable Packages

Refer to "6.1 Installation of Visual C++ Redistributable Packages" to install Visual C++ redistributable packages.

7.2 Installation of PostgreSQL

Refer to "6.3 Installation of PostgreSQL" to install PostgreSQL.

MEMO

8 OPTIMIZER SETTING TOOL

Using Optimizer Setting Tool enables each setting to be executed in a batch. This chapter describes the setting methods and procedures when using Optimizer Setting Tool.
Optimizer Setting Tool needs to be executed in a computer in which Microsoft Excel is installed.

8.1 Optimizer Setting Tool File Configuration

The file configuration for Optimizer Setting Tool is as follows.

File/folder name	Description
OptimizerSettingTool.xlsm	Optimizer Setting Tool
SettingToolData	Data folder for executing the setting tool

Clicking the setting output button generates the following files/folders.

File/folder name	Description
MTConnectAdapter_setting	MTConnect Adapter setting file output folder
192.168.0.100 (*1)	The folder name is the IP address of the adapter
192.168.0.101 (*1)	The folder name is the IP address of the adapter
...	
MTConnectAgent_setting	MTConnect Agent setting file output folder
192.168.0.100_5000 (*1)	The folder name is the IP address and port number of the agent
192.168.0.101_5000 (*1)	The folder name is the IP address and port number of the agent
...	
Plant 1 (*2)	
setup_batch	Data folder for executing the batch file for settings
Backup	Backup folder
Connector_setting	Backup folder of NC Machine Tool Connector setting file
Optimizer_setting	Backup folder of NC Machine Tool Optimizer setting file
Connector_setting	Files for NC Machine Tool Connector settings
Optimizer_setting	Files for NC Machine Tool Optimizer settings
db_setup.bat	Batch file for creating NC Machine Tool Optimizer database
setup.bat	Setup process
setup_connector.bat	NC Machine Tool Connector setting process
setup_optimizer1.bat	NC Machine Tool Optimizer setting process
call_setup.bat	Batch file for starting setup process
Plant 2 (*2)	
setup_batch	Data folder for executing batch file for settings
Backup	Backup folder
Connector_setting	Backup folder of NC Machine Tool Connector setting file
Connector_setting	Files for NC Machine Tool Connector settings
setup.bat	Setup process
setup_connector.bat	NC Machine Tool Connector setting process
call_setup.bat	Batch file for starting setup process
Plant 3 (*2)	
...	

(*1) Folders that are named with the MTConnect Adapter and MTConnect Agent IP addresses and port numbers entered in the MTConnect setting sheet are generated in the "MTConnectAdapter_setting" and "MTConnectAgent_setting" folders. The folder names in the table above are examples.

(*2) The plant name entered in the Optimizer Setting Tool cover sheet becomes the name of the folder.

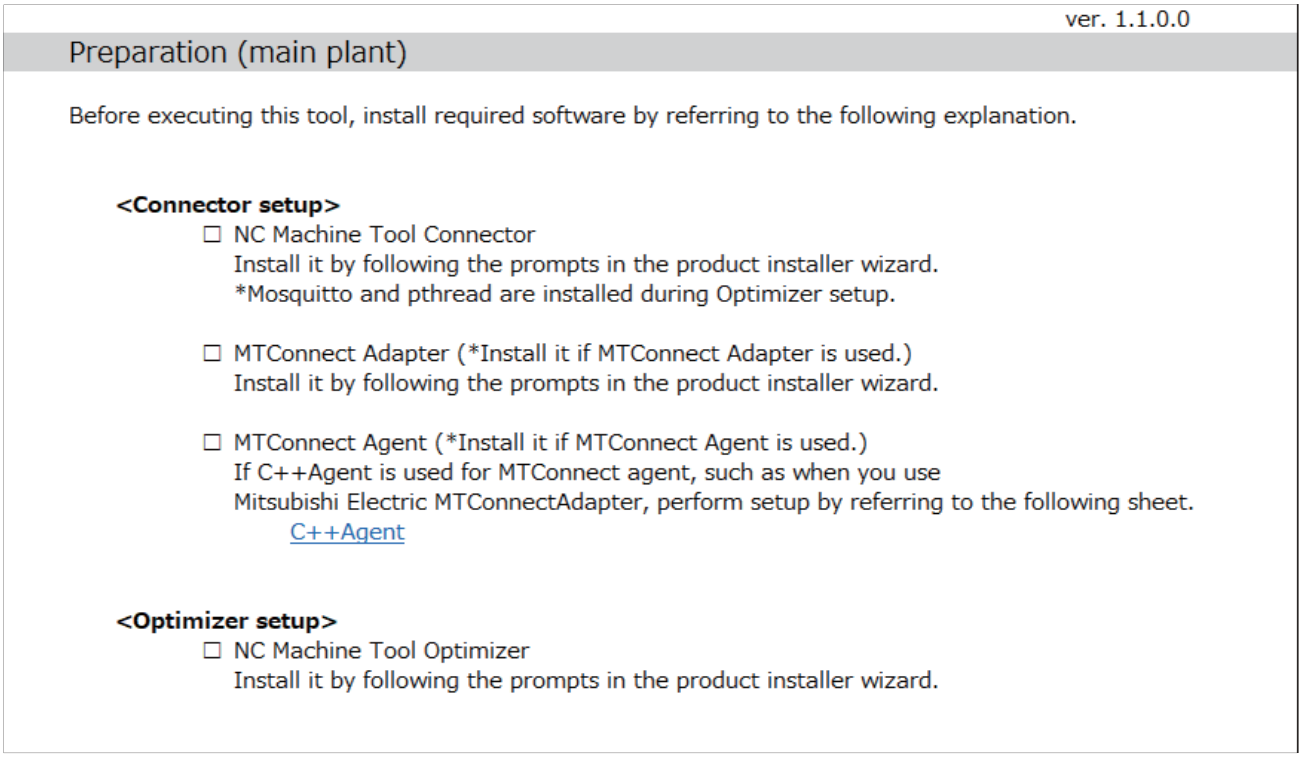
8.2 Preparation

Copy the ".\tools\setup_tool\" folder (under the "en" folder when using the English version, or under the "ja" folder when using the Japanese version) stored in the NC Machine Tool Optimizer installation folder to any folder on the desktop, etc. Before performing the following procedures, refer to the "Preparation" sheet of Optimizer Setting Tool or "INSTALLATION AND SETUP FLOWCHART (Chapter 3)", and complete the installation of NC Machine Tool Optimizer.

Preparation sheet

The contents of the preparation sheet are shown below.

[Preparation (main plant) sheet]



ver. 1.1.0.0

Preparation (main plant)

Before executing this tool, install required software by referring to the following explanation.

<Connector setup>

☐ NC Machine Tool Connector
Install it by following the prompts in the product installer wizard.
*Mosquitto and pthread are installed during Optimizer setup.

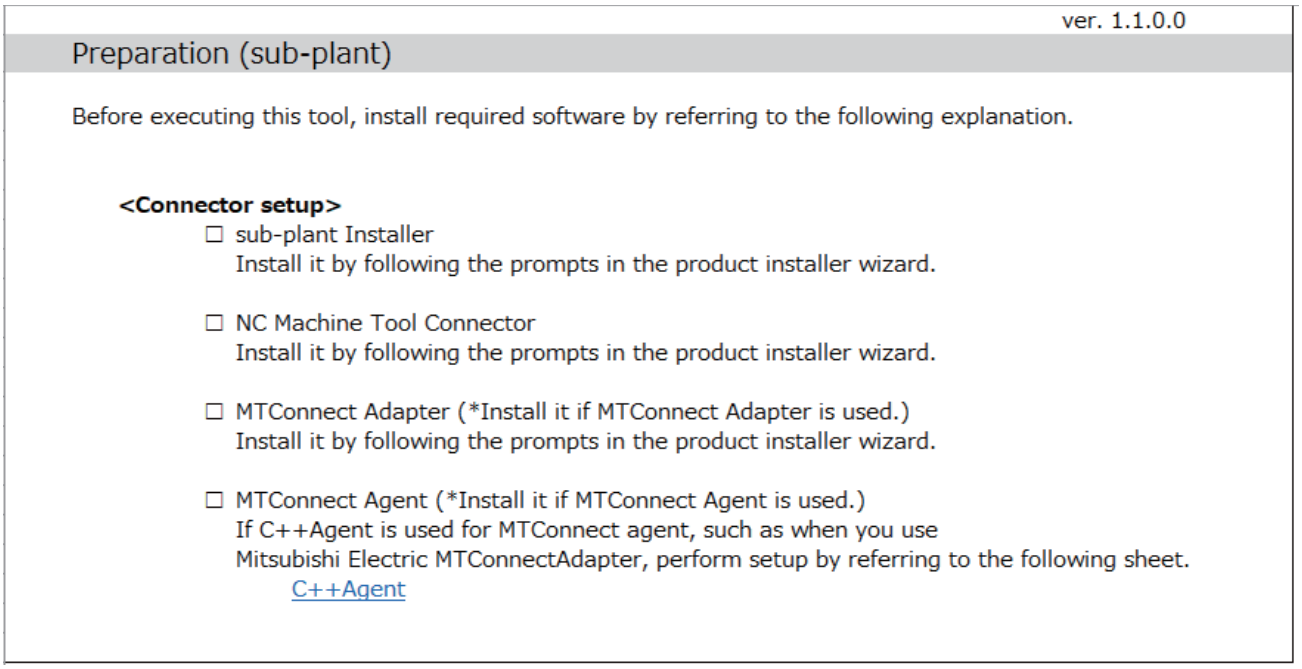
☐ MTConnect Adapter (*Install it if MTConnect Adapter is used.)
Install it by following the prompts in the product installer wizard.

☐ MTConnect Agent (*Install it if MTConnect Agent is used.)
If C++Agent is used for MTConnect agent, such as when you use Mitsubishi Electric MTConnectAdapter, perform setup by referring to the following sheet.
C++Agent

<Optimizer setup>

☐ NC Machine Tool Optimizer
Install it by following the prompts in the product installer wizard.

[Preparation (sub-plant) sheet]



ver. 1.1.0.0

Preparation (sub-plant)

Before executing this tool, install required software by referring to the following explanation.

<Connector setup>

☐ sub-plant Installer
Install it by following the prompts in the product installer wizard.

☐ NC Machine Tool Connector
Install it by following the prompts in the product installer wizard.

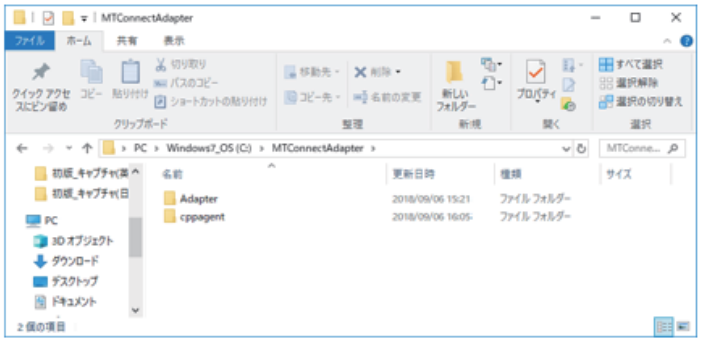
☐ MTConnect Adapter (*Install it if MTConnect Adapter is used.)
Install it by following the prompts in the product installer wizard.

☐ MTConnect Agent (*Install it if MTConnect Agent is used.)
If C++Agent is used for MTConnect agent, such as when you use Mitsubishi Electric MTConnectAdapter, perform setup by referring to the following sheet.
C++Agent

[C++Agent sheet]

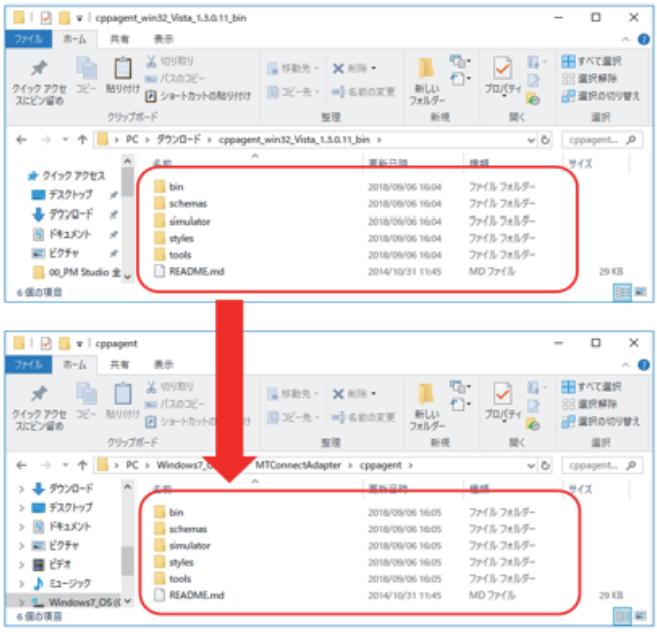
To install C++ Agent on the industrial PC, complete the following steps.
You must be logged on with a user account that has administrator rights to install items.

1) Create a destination folder. (e.g., C: ¥MTConnect¥cppagent)



2) Download the executable file from the following site.
The supported versions are C++ Agent 1.3.0.11 and newer.
https://github.com/mtconnect/cppagent

3) Unzip the downloaded compressed file (e.g., cppagent_win32_Vista_1.3.0.17_bin.zip), and save in the folder created in 1).



4) Save the bat files in ".¥tools¥Agent¥" stored in the installer folder of NC Machine Tool Connector to the bin folder in 3).

・agent_install.bat → Register MTConnectAgent to Windows service.
・agent_remove.bat → Stop the operation of MTConnectAgent.
・agent_service_start.bat → Start the operation of MTConnectAgent.
・agent_uninstall.bat → Unregister MTConnectAgent from Windows service.

5) Right-click agent_install.bat among the bat files saved in 4), and click [Run as administrator (A)].

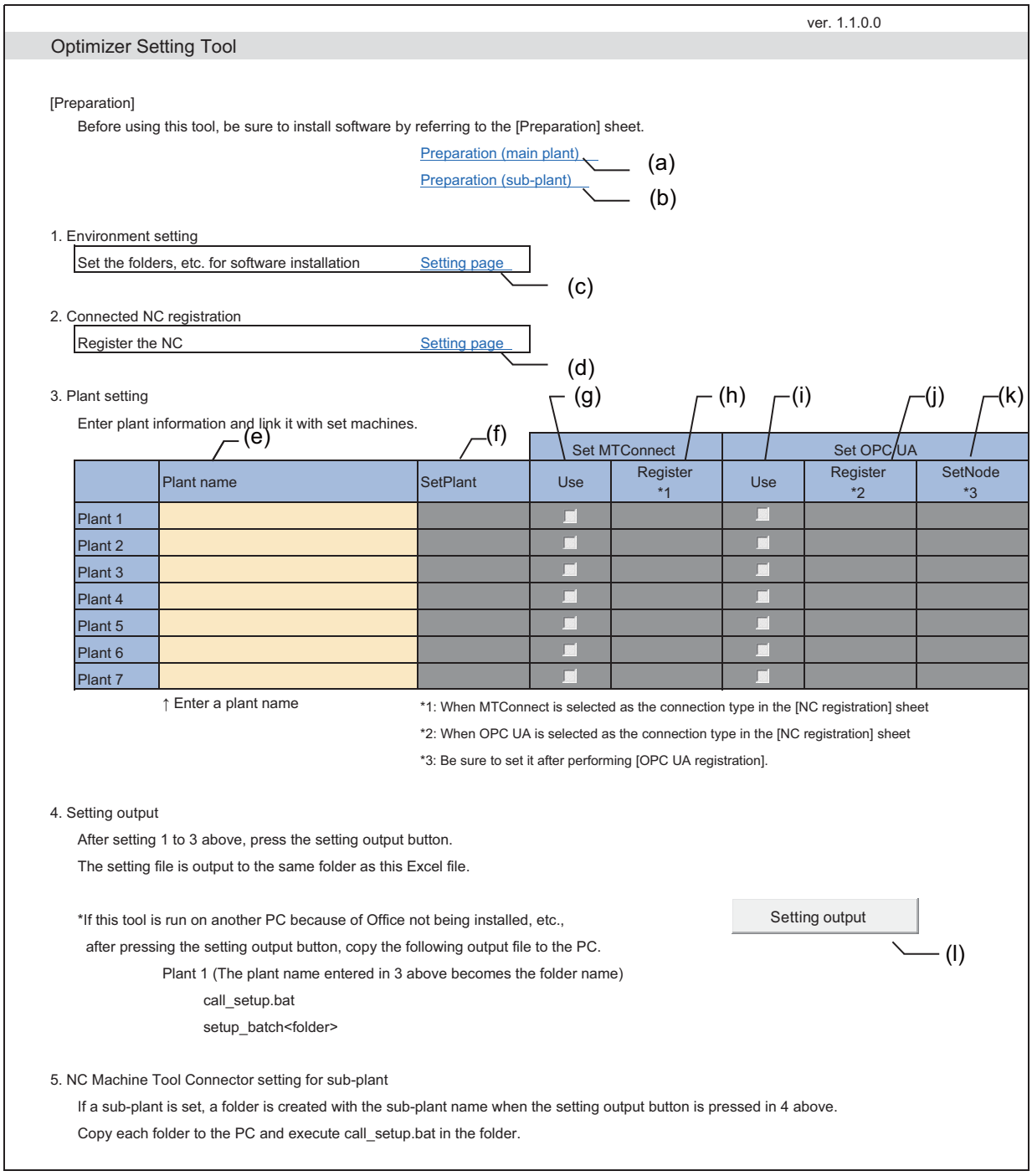
6) When a UAC (user account control) dialog appears, press [Yes] to confirm.

7) You are done installing MTConnect C++Agent.
The following service is registered to Windows service manager.
[MTConnect Agent]

8.3 Screen Descriptions

Optimizer Setting Tool cover sheet

After conducting procedures 1 to 3 on this sheet, click the Setting output button to output the settings.
When using MTConnect connection, refer to the contents of "6. MTConnect Agent, Adapter setting" of this sheet to copy the setting files.



6. MTConnectAgent, Adapter setting

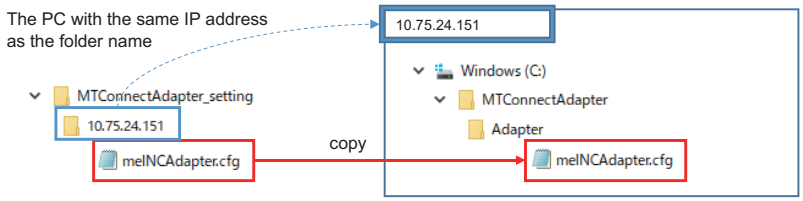
1. Copy Adapter setting file

Copy the [melNCAdapter.cfg] file in the [MTConnectAdapter_setting] folder to the PC where Adaptor is installed.

Folders are separated for each IP address of the PC. Copy each folder to the corresponding PC.

Example of setting file copy:

*The location of the folder set as the copy destination may vary depending on the environment.。



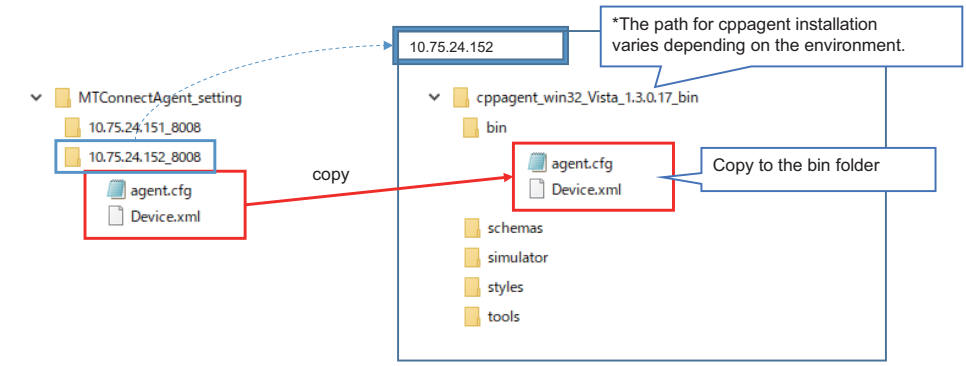
2. Copy Agent setting file

Copy the [agent.cfg] and [Device.xml] files in the [MTConnectAgent_setting] folder to the PC where Agent is installed.

Folders are separated for each IP address of the PC. Copy each folder to the corresponding PC.

Example of setting file copy:

*The location of the folder set as the copy destination may vary depending on the environment.。



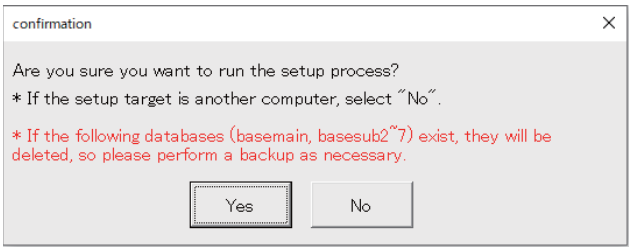
You are done with the setting.

8

No.	Name	Description	Reference
(a)	Link to preparation (main plant) sheet	Jumps to the sheet with the preparation (main plant) procedures.	-
(b)	Link to preparation (sub-plant) sheet	Jumps to the sheet with the preparation (sub-plant) procedures.	-
(c)	Link to environment settings sheet	Jumps to the environment setting sheet for setting installation paths, MQTT broker, and database connection.	8.3 Environment setting
(d)	Link to NC registration sheet	Jumps to the NC registration sheet for CNC registration.	8.3 NC Registration
(e)	Plant name	Set the plant names for Plant 1 to 7. (Max 32 characters) When a plant name is entered, a sheet for the corresponding plant 1 to 7 is displayed and a link to the sheet is created. The "MTConnect Use checkbox" and "OPC UA Use checkbox" are also enabled.	-
(f)	Link to plant setting sheet (plant 1 to 7)	Jumps to the setting sheets for plants 1 to 7 to register NCs to the plants	8.3 Plant 1 to 7
(g)	Using MTConnect checkbox	Checkbox to indicate whether Plant 1 to 7 use MTConnect or not. When checked, the corresponding MTConnect setting sheet (plant 1 to 7) is displayed and a link to the sheet is created.	-
(h)	Link to MTConnect setting sheet (plant 1 to 7)	Jumps to the MTConnect setting sheet for MTConnect connection settings.	8.3 MTConnect setting
(i)	Using OPC UA checkbox	Checkbox to indicate whether Plant 1 to 7 use OPC UA or not. When checked, the corresponding OPC UA registration sheet (plant 1 to 7) and OPC UA node setting sheet (plant 1 to 7) are displayed and a link to each sheet is created.	-
(j)	Link to OPC UA registration sheet (plant 1 to 7)	Jumps to the OPC UA registration sheet for OPC UA connection settings.	8.3 OPC UA setting
(k)	Link to OPC UA node setting sheet (plant 1 to 7)	Jumps to the OPC UA node setting sheet for node settings of the corresponding data tags.	8.3 OPC UA node setting
(l)	Setting output button	Outputs setting data based on the contents that are entered. The contents entered in each sheet are checked and when there is a problem with the contents, an error message is displayed and the processing of settings is canceled. Refer to the contents of the error message to correct the sheet contents and click the button again.	-

Setting output

After clicking the setting output button, the following confirmation dialog is displayed.
Click "No" when using Optimizer Setting Tool on a PC other than the setup target PC for reasons such as Office not being installed on the setup target PC.
When conducting the setup on the current PC, check the precautions on the dialog for problems before clicking "Yes".



The following files/folders are created in the same directory as this tool for each plant.
Plant name (folder) (*1)
- call_setup.bat
- setup_batch (folder)

(*1) The plant name entered in the Optimizer Setting Tool cover sheet becomes the folder name.

Operating procedure

(1) Execute setup

Copy the output "call_setup.bat" and "setup_batch" folders to the setup target PC of each plant, and check the precautions for problems before executing "call_setup.bat".
When "Yes" is selected in the "confirmation" dialog that appears after clicking the setting output button, the batch file is automatically executed therefore copying each folder to the target PC is not required.

User account control dialog opens after executing "call_setup.bat". Allow the batch execution.

Precautions

- A command prompt starts. Do not perform any other operations until setup is completed.
- This tool overwrites old setting files of NC Machine Tool Connector and NC Machine Tool Optimizer in order to reflect settings. A backup of old setting files are created in a Backup folder. The files/folders that are backed up are as follows.

No.	Section	File/folder name	
1	Connector	Conf\	All files in the Conf folder
2		PKI\certs\	All files in the PKI\certs folder
3		XML\	All files in the XML folder
4	Optimizer	NCMachineToolOptimizer.exe.config	The setting file with Optimizer DB connection settings, etc.

- The NC Machine Tool Connector services "NC Machine Tool Connector Client Manager" and "NC Machine Tool Connector OPC UA Server" are stopped. Execute the setup after confirming that stopping these will not create problems for collection processing.
- When the following logical databases exist, take a backup in addition to deleting them.

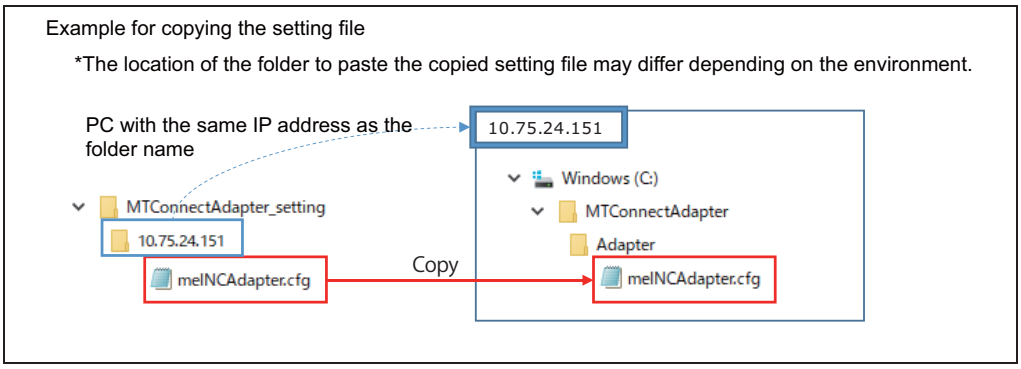
No.	Database name	Description
1	basemain	Database for main plant.
2	basesub2	Database for sub-plants. Only the number of databases corresponding to the number plants input in the cover sheet are created.
3	basesub3	
4	basesub4	
5	basesub5	
6	basesub6	
7	basesub7	

Additionally, when using MTConnect connection, after outputting the settings, follow the procedures below to copy the setting files for MTConnect Adapter and MTConnect Agent.

(2) MTConnect Adapter settings (only when using MTConnect connection)

When the setting output button is clicked, an "MTConnectAdapter_setting" folder is created in the folder of this tool.

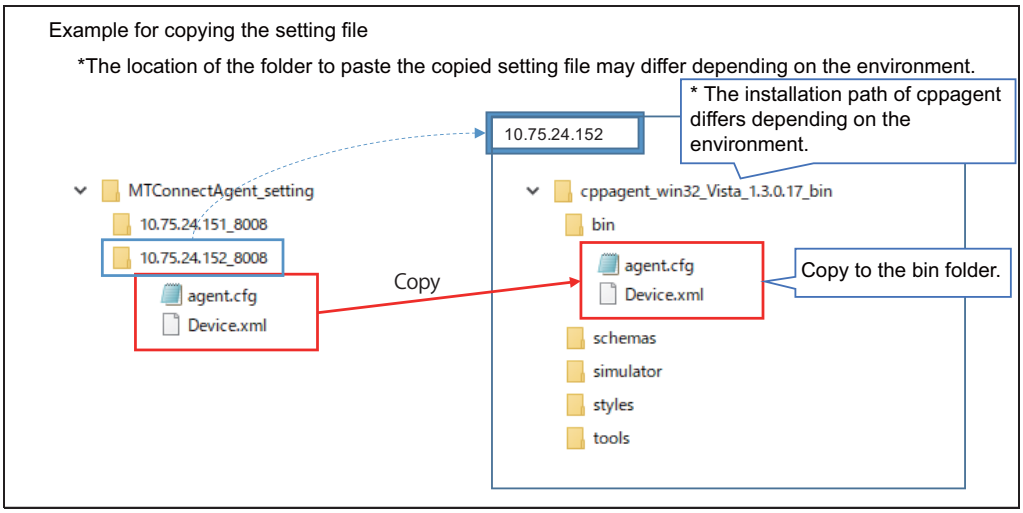
As an MTConnect Adapter setting file is output for each IP address, copy each file to the designated folder of the PC with the same IP address when using Mitsubishi Electric MTConnect Adapter.



(3) MTConnect Agent settings (only when using MTConnect connection)

In the same way as MTConnect Adapter, when the setting output button is clicked, an "MTConnectAgent_setting" folder is created in the folder of this tool.

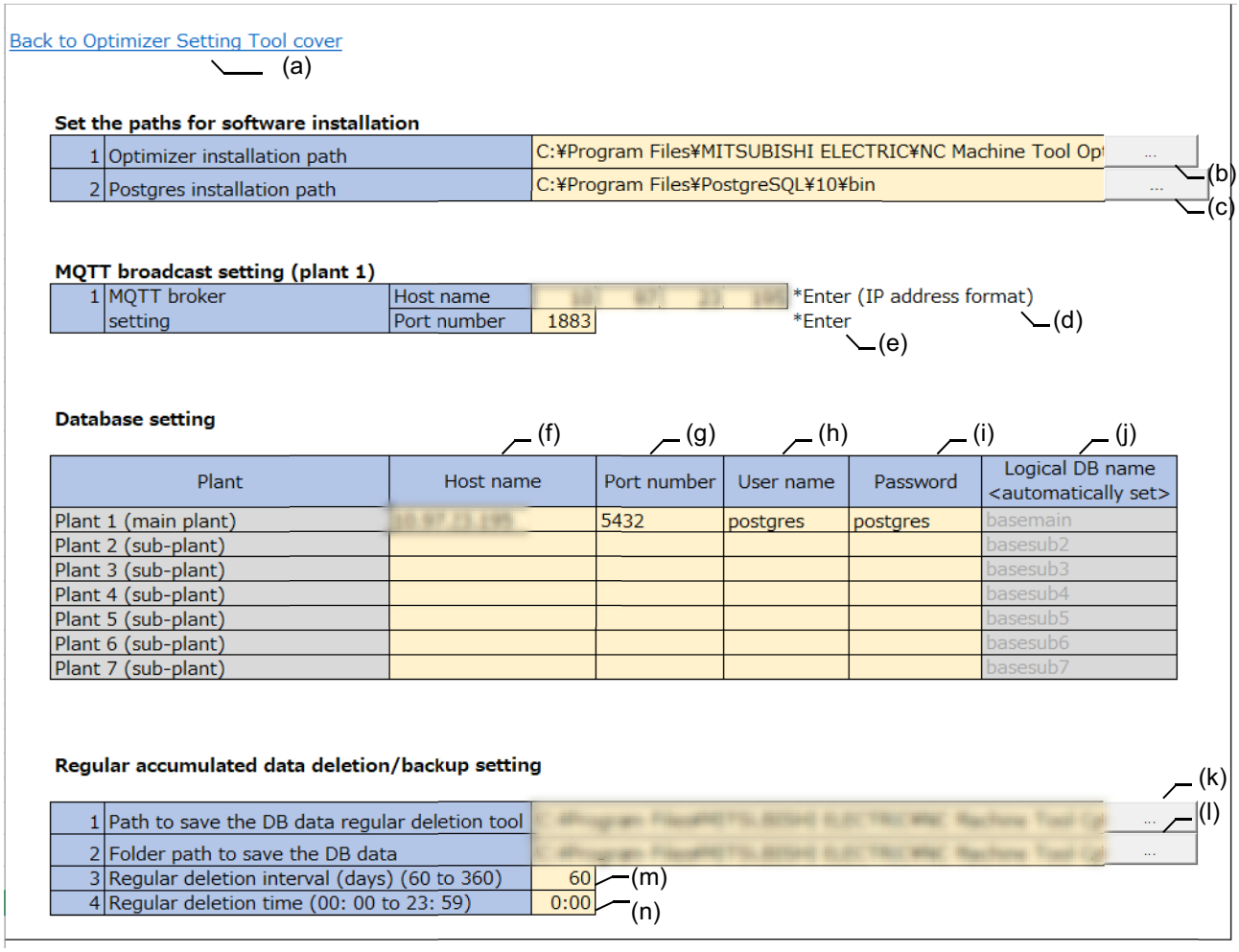
As an MTConnect Agent setting file is output for each IP address, copy each file to the designated folder of the PC with the same IP address when using CppAgent.



Environment settings

Screen outline

The NC Machine Tool Optimizer and PostgreSQL installation paths, MQTT broker, and database connection settings are entered in this sheet.



Setting items

Item	Location	Name	Description	Remarks
(a)	-	Back to Optimizer Setting Tool cover	Jumps to "Optimizer Setting Tool cover" sheet.	
(b)	Set the paths for software installation	Optimizer installation path	Enter the installation path for copying the setting file to NC Machine Tool Optimizer. Specify the folder where "NCMachineToolOptimizer.exe" exists. (*1)	
(c)		Postgres installation path	Enter the installation path for executing the database creation command to the Postgres server. Specify the folder where the "bin" folder exists. (*2)	
(d)	MQTT broadcast setting (plant 1)	Host Name	Set the IP address of MQTT broker.	Refer to Chapter 6 for how to install MQTT broker.
(e)		Port number	Enter the MQTT broker port number. Default: 1883	
(f)	Database setting	Host Name	Enter the host name (IP address) of the database server. Default: localhost	
(g)		Port number	Enter the port number of the database server. Default: 5432	The number to be set differs depending on the PC environment.
(h)		User name	Enter the user name of the database server. Default: postgres	The user needs database creation privileges. (*3)
(i)		Password	Enter the password of the database server. Default: postgres	
(j)		Logical DB name <automatically set>	<Not editable> The name of the created logical database is displayed.	
(k)	Regular accumulated data deletion/backup setting	Path to save the DB data regular deletion tool	Enter the path that the DB data regular deletion tool was copied to for outputting the setting file for DB data regular deletion tool.	
(l)		Folder path to save the DB data	Enter the path to output the DB data file to be backed up the DB data regular deletion tool.	
(m)		Regular deletion interval (days) (60 to 360)	Enter the execution interval for the DB data regular deletion tool.	
(n)		Regular deletion time (00:00 to 23:59)	Enter the execution time for the DB data regular deletion tool.	

(*1) For Pro version, "C:\Program Files\MITSUBISHI ELECTRIC\NC Machine Tool Optimizer\Pro"
For Lite version, "C:\Program Files\MITSUBISHI ELECTRIC\NC Machine Tool Optimizer\Lite"

(*2) By default, "C:\Program Files\PostgreSQL\16\bin".

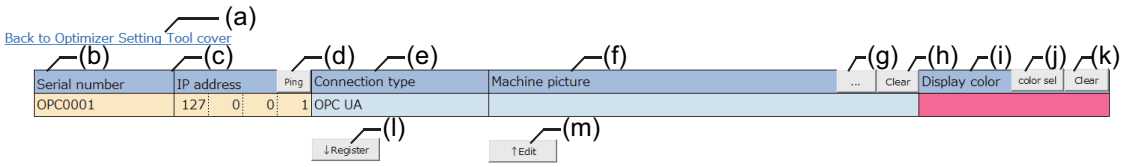
(*3) A SUPERUSER, or user with CREATEDB privileges.

NC registration

Screen outline

Register the CNC machines from which to collect data.

A maximum of 210 units can be registered. Items are aligned to the top.



No	Serial number	IP address	Connection type	Machine picture	Display color
1	MTC0001	127 0 0 1	MTConnect(M8/M8V/C80)		
2	MTC0002	127 0 0 1	MTConnect(M8/M8V/C80)		
3	OPC0001	127 0 0 1	OPC UA		
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
• • •					
208					
209					
210					

The following items are set in this sheet.

- The CNC serial number and IP address setting
- The connection method selection

  When MTConnect and OPC UA are selected as the connection method, enter the settings for each in the MTConnect setting sheet and OPC UA registration sheet.
- Selection of the machine picture to be displayed in NC machine Tool Optimizer
- Selection of the machine display color in NC machine Tool Optimizer

Setting items

Item	Location	Name	Description	Remarks
(a)	-	Back to Optimizer Setting Tool cover	Jumps to "Optimizer Setting Tool cover" sheet.	
(b)	Machine information	Serial number	Enter the name (such as the machine serial number) of the machine to be connected. The serial number entered here will be the machine name displayed on NC Machine Tool Connector and NC Machine Tool Optimizer. Do not enter duplicating serial numbers. A maximum of 11 half-width characters (no symbols) can be entered.	
(c)		IP address	Enter the IP address of the machine to be connected. For MTConnect and OPC UA, enter the IP address of the machine and not that of the MTConnect Agent or OPC UA server.	
(d)		Connection check	Checks the connection for the IP address set in (c) using ping.	
(e)		Connection type	Select the connection type for the machine. (*1)	When MTConnect and OPC UA are selected as the connection type, enter the settings for each in the "MTConnect setting" sheet and "OPC UA registration" sheet.
(f)	Machine picture	Machine picture	Select the picture to be registered as the machine image on NC Machine Tool Optimizer. Files with bmp/jpg/png/gif extensions can be registered (max 10Mb).	The standard picture size is 160 (width) x 70 (height) pixels.
(g)		...		
(h)		Clear machine picture	Clears the selected machine picture.	
(i)	Display color	Display color	Select the machine display color for NC Machine Tool Optimizer.	
(j)		Color sel		
(k)		Clear	Clears the selected machine display color.	
(l)	-	↓Register	Reflects the data in the editing area to the CNC list.	
(m)		↑Edit	Reflects the selected data in the CNC list to the editing area.	

(*1)

No.	Connection type	Supported models
1	M8/M8V/C80	M800W/M800S/M80W/M80/E80 M800VW/M800VS/M80VW/M80V M800UM, M800LUC, C80
2	M7/M7V	M700V/M70V/E70/M700/M70 M700UM/M700BM
3	MTConnect (M8/M8V/C80)	MTConnect supported equipment (M8/M8V/C80 Series) (*2)
4	MTConnect (M7/M7V)	MTConnect supported equipment (M7/M7V Series) (*2)
5	MTConnect (M7LC)	MTConnect supported equipment (*2)(*3) M700LUC/M70LPC M700LPC-V/M70LPC-V
6	MTConnect (Other)	MTConnect supported equipment other than the above (*2)(*3)
7	OPC UA	OPC UA supported equipment (OPC UA server settings are also required.)

(*2) MTConnect Agent settings are also required.

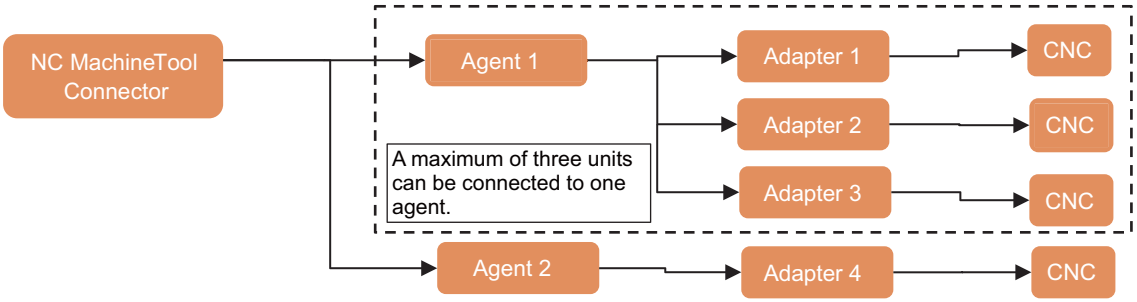
(*3) When connecting M7LC Series, select MTConnect.

MTConnect setting (Plant 1 to 7)

Screen outline

The agent settings of the MTConnect connection are entered in this sheet.
Set the CNC and corresponding adapter for each agent. A maximum of three CNCs can be connected to one agent.

After outputting the settings, the MTConnect Adapter and MTConnect Agent setting files need to be copied. Refer to "Setting output" for copy procedures.
A maximum of ten adapters can be set in one plant.



(a)

Back to Optimizer Setting Tool cover

MTConnect agent setting *Up to 3 machines per agent can be set

No.	MTConnect agent name (b)	IP address (c)	Port number (d)	Agent connection check (e)	Connected adaptor setting: Optional — Connection setting 1 / Adapter 1: NC to connect	Connect Adapter (f)	Port number (g)	Connection setting 2 / Adapter 2: NC to connect (i)	Connect Adapter (j)	Port number (k)	Connection setting 3 / Adapter 3: NC to connect (l)	Connect Adapter (m)	Port number (n)
1	Agent01	127 0 0 1	8008	Ping	MTC0001	Adapter01	7878 (h)						
2	Agent02			Ping									
3	Agent03			Ping									
4	Agent04			Ping									
5	Agent05			Ping									
6	Agent06			Ping									
7	Agent07			Ping									
8	Agent08			Ping									
9	Agent09			Ping									
10	Agent10			Ping									

(o) No.	MTConnect adaptor name	(p) IP address	(q)
1	Adapter01	127 0 0 1	Ping
2	Adapter02		Ping
3	Adapter03		Ping
4	Adapter04		Ping
5	Adapter05		Ping
6	Adapter06		Ping
7	Adapter07		Ping
8	Adapter08		Ping
9	Adapter09		Ping
10	Adapter10		Ping

Setting items

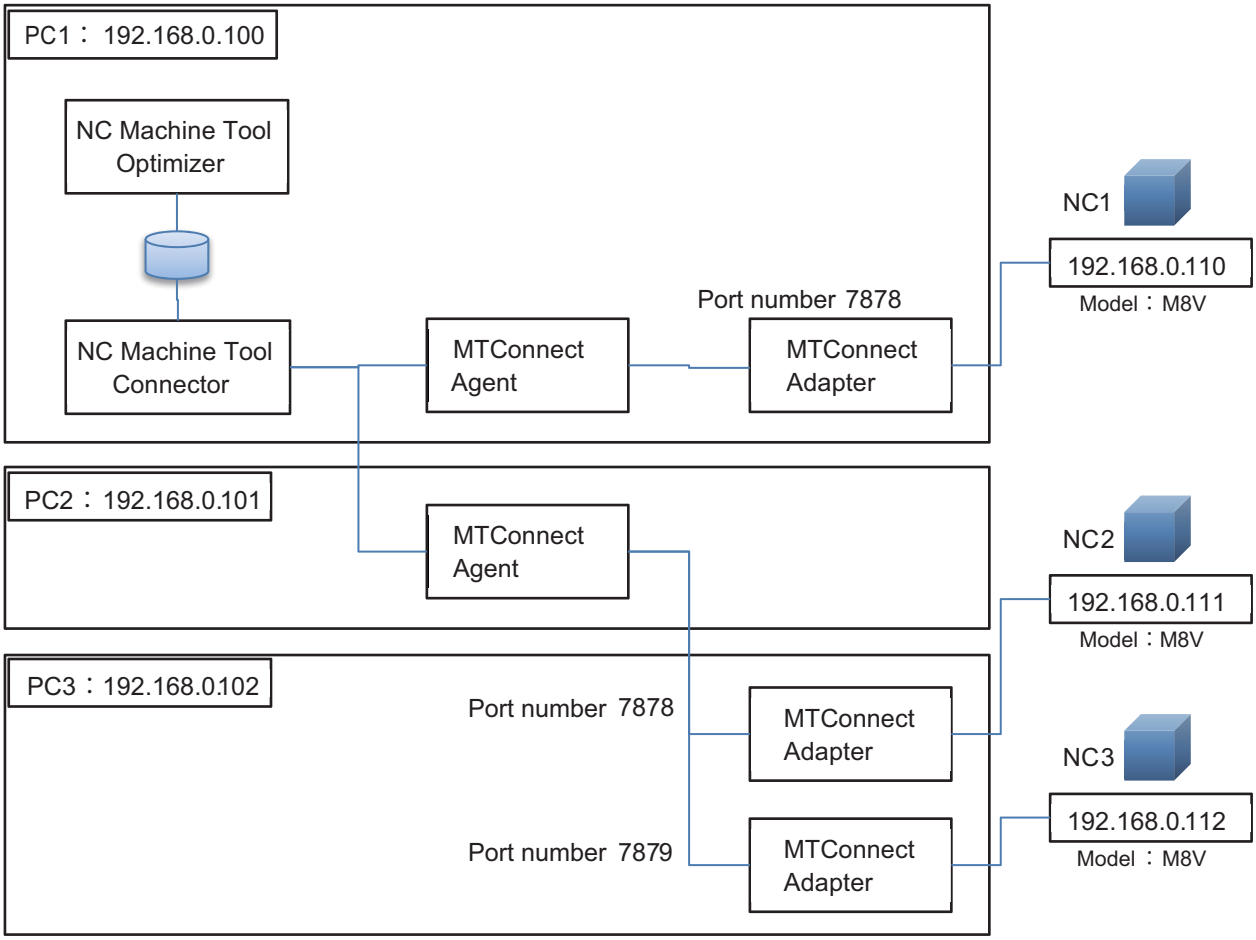
Item	Location	Name	Description	Remarks
(a)	-	Back to Optimizer Setting Tool cover	Jumps to "Optimizer Setting Tool cover" sheet.	
(b)	MTConnect agent setting	MTConnect agent name	The MTConnect Agent name.	
(c)		IP address	Enter the IP address of the MTConnect Agent.	
(d)		Port number	Enter the port number of the MTConnect Agent. Default: 5000	
(e)		Agent connection check	Creates a probe request for the MTConnect Agent based on the IP address and port number entered in (c) and (d), and opens the browser. When the IP address and port number are correct, the Probe response XML is displayed. When the probe response XML is not displayed, review the IP address, port number, firewall settings, etc.	
(f)	Connection setting 1 Adapter 1	NC to connect	Select the CNC to connect to this agent. The machines registered in the "NC registration" sheet that have MTConnect as the connection type appear in the list.	
(g)		Connect Adapter	Select the MTConnect Adapter for connecting the CNC selected in (f).	
(h)		Port number	Enter the port number used when connecting this agent with the MTConnect Adapter. Default: 7878	
(i)	Connection setting 2 Adapter 2	NC to connect	Select the CNC to connect to this agent. The machines registered in the "NC registration" sheet that have MTConnect as the connection type appear in the list. Connection setting 1 to 3 should be entered left-aligned.	Used when connecting multiple CNCs to one agent.
(j)		Connect Adapter	Select the MTConnect Adapter for connecting the CNC selected in (i).	
(k)		Port number	Enter the port number used when connecting this agent with the MTConnect Adapter. Default: 7879	
(l)	Connection setting 3 Adapter 3	NC to connect	Select the CNC to connect to this agent. The machines registered in the "NC registration" sheet that have MTConnect as the connection type appear in the list. Connection setting 1 to 3 should be entered left-aligned.	Used when connecting multiple CNCs to one agent.
(m)		Connect Adapter	Select the MTConnect Adapter for connecting the CNC selected in (l).	
(n)		Port number	Enter the port number used when connecting this agent with the MTConnect Adapter. Default: 7880	
(o)	MTConnect adapter setting	MTConnect adaptor name	The names of the MTConnect Adapters displayed in the "Connect Adapter" column of connection setting 1 to 3.	
(p)		IP address	The IP address of the PC that has the adapter installed.	
(q)		Ping	Uses Ping to check the connection for the IP address entered in (o).	

(*1) It is assumed that the MTConnect Agents set using this function connect to a C++Agent issued by MTConnect Institute.

■Example

The following explains how to enter items in this sheet using the example connection diagram below.

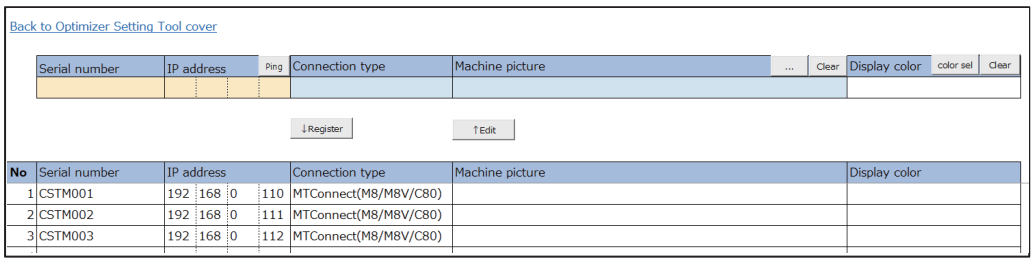
Enter items in the sheet as follows when NC Machine Tool Connector, MTConnect Agent ("Agent"), and MTConnect Adapter ("Adapter") are installed on the same PC, and connecting to "NC1:192.168.0.101".



NC1	When the Agent and Adapter are installed on the same PC
NC2	When the Agent and Adapter are installed on separate PCs
NC3	When the Agent is shared with NC2

[Example of entering items in the sheet for the configuration above]

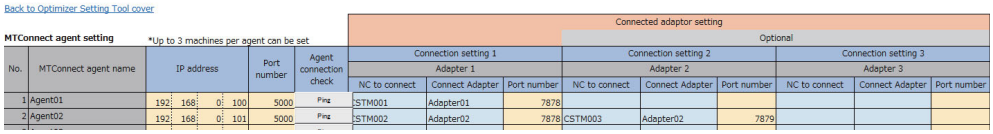
(1) NC registration sheet



No	Serial number	IP address	Connection type	Machine picture	Display color
1	CSTM001	192 168 0 110	MTConnect(M8/M8V/C80)		
2	CSTM002	192 168 0 111	MTConnect(M8/M8V/C80)		
3	CSTM003	192 168 0 112	MTConnect(M8/M8V/C80)		

Set the machine names and IP addresses of NC1, NC2, and NC3 in the NC registration sheet. Select MTConnect(M8/M8V/C80) as the connection type for all CNCs. Set the preferred machine picture and display color.

(2) MTConnect setting sheet
[MTConnect agent setting]



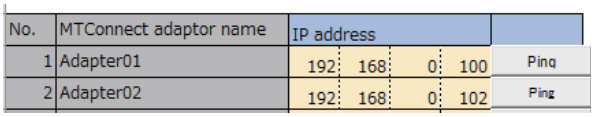
Back to Optimizer Setting Tool cover

MTConnect agent setting *Up to 3 machines per agent can be set

No.	MTConnect agent name	IP address	Port number	Agent connection check	Connected adaptor setting								
					Connection setting 1			Optional					
					Adapter 1			Connection setting 2 Adapter 2			Connection setting 3 Adapter 3		
					NC to connect	Connect Adepter	Port number	NC to connect	Connect Adepter	Port number	NC to connect	Connect Adepter	Port number
1	Agent01	192 168 0 100	5000	Ping	CSTM001	Adapter01	7878						
2	Agent02	192 168 0 101	5000	Ping	CSTM002	Adapter02	7878	CSTM003	Adapter02	7879			

In the IP address field, enter the address of the PC in which the Agent is installed. Also, select the Adapter that connects to the Agent and the CNC it connects to.
In the example above, CSTM001 connects to Agent01, and CSTM002 connects to Agent02.
The Agent of CSTM001 is "192.168.0.100", and the port number is "5000".
The Agent of CSTM002 is the IP address of the PC to which it is installed "192.168.0.101", and the port number is "5000".
Because CSTM003 shares the same agent with CSTM002, it is entered in Adapter 2 column of the Agent02 row.
Also, because the Adapter of CSTM003 is in the same PC as the Adapter for CSTM002, the same Adapter "Adapter02" is selected for CSTM003. The port number is set to "7879" to avoid duplication with CSTM002.

[MTConnect Adapter setting]
The Adapter setting is as folllows.

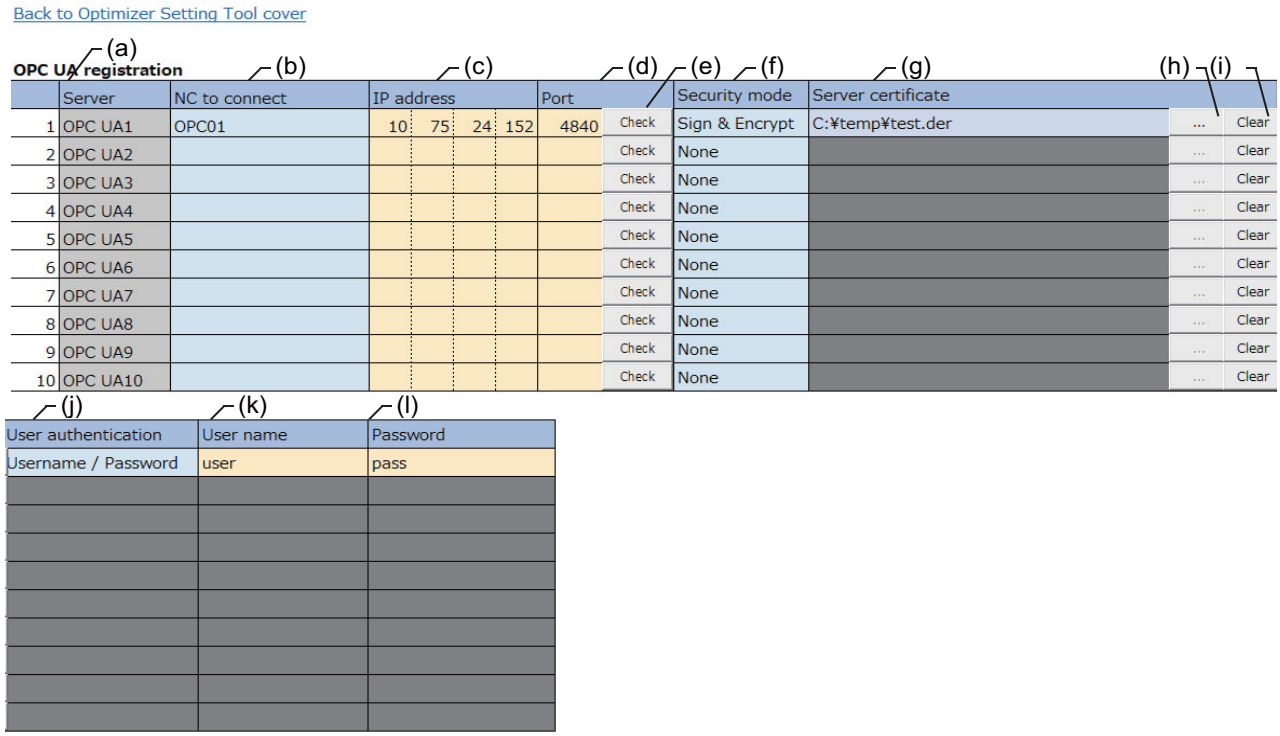


No.	MTConnect adaptor name	IP address	
1	Adapter01	192 168 0 100	Ping
2	Adapter02	192 168 0 102	Ping

OPC UA registration (Plant 1 to 7)

Screen outline

The OPC UA server connection settings are entered in this sheet. Also, in order to bind the tags of the OPC UA server, enter settings in "OPC UA node setting (Plant 1 to 7)" (Chapter 8.3).



Setting items

Item	Location	Name	Description	Remarks
(a)	OPC UA server connection settings	Server	A maximum of 10 OPC UA servers can be set.	
(b)		NC to connect	Select the machine to set.	
(c)		IP address	Enter the IP address of the OPC UA server.	
(d)		Port	Enter an OPC UA server port number within the range of 1024 to 65535.	
(e)		Check	Checks the connection for the IP address entered in (c) using ping.	
(f)	Security settings	Security mode	Select the security mode of the OPC UA server. (1) None: Connects to the OPC UA server with no security. (2) Sign & Encrypt: Connects to the OPC UA server with security. The following security policy is automatically selected. Basic2565ha256 (*1)	
(g)		Server certificate	When "Sign & Encrypt" is selected in security mode, specify the server certificate (*.der) of the OPC UA to be connected with.	
(h)		...		
(i)		Clear	Clears the contents of the server certificate field.	
(j)		User authentication	When "Sign & Encrypt" is selected in security mode, select the user authentication method. (1) Anonymous: No user authentication (2) Username/Password: Authentication by user name and password.	
(k)		User name	Enter the user name for authentication when connecting to the OPC UA server. This field does not need a user name to be entered when "None" is selected for security mode or "Anonymous" is selected for user authentication.	
(l)		Password	Enter the password for authentication when connecting to the OPC UA server. This field does not need a user name to be entered when "None" is selected for security mode or "Anonymous" is selected for user authentication.	

(*1) http://opcfoundation.org/UA/SecurityPolicy#Basic256Sha256

OPC UA node setting (Plant 1 to 7)

Screen outline

For an OPC UA connection, setting the NodeIDs that are associated with the data tags used by this application is required.
The NodeID association settings for each tag are entered in this sheet.

Back to Optimizer Setting Tool cover

(a)

	NC to connect
1	OPC01
2	
3	
4	
5	
6	
7	
8	
9	
10	

OPC UA node setting

(b) (c) (d) (e) (f)

1	OPC01	NodeId		
	Tag name	NamespaceIndex	IdentifierType	Identifier
1	Avail_1			
2	Active_1			
3	Ready_1			
4	Stop_1			
5	Alarm_1			
6	Estop_1			
7	PrgMain_1			
8	Mode_1			
9	PartCount_1			
10	Active_2			
11	Ready_2			
12	Stop_2			
13	Alarm_2			
14	Estop_2			
15	PrgMain_2			
16	Mode_2			
17	Active_3			
18	Ready_3			
19	Stop_3			
20	Alarm_3			
21	Estop_3			
22	PrgMain_3			
23	Mode_3			

---Omission---

There are input fields for 10 machines. The settings for each machine can be entered.

10		NodeId		
	Tag name	NamespaceIndex	IdentifierType	Identifier
1	Avail_1			
2	Active_1			
3	Ready_1			
4	Stop_1			
5	Alarm_1			
6	Estop_1			
7	PrgMain_1			
8	Mode_1			
9	PartCount_1			
10	Active_2			
11	Ready_2			
12	Stop_2			
13	Alarm_2			
14	Estop_2			
15	PrgMain_2			
16	Mode_2			
17	Active_3			
18	Ready_3			
19	Stop_3			
20	Alarm_3			
21	Estop_3			
22	PrgMain_3			
23	Mode_3			

Setting items

A maximum of three part systems can be set. When the second and third part system do not exist, leave the fields blank. (Refer to Example 1)

Refer to "Setting data items" (Chapter 11.1) for details of what data should be set to each data tag.

Item	Name	Description	Remarks
(a)	NC to connect	The CNC name entered in the OPC UA registration screen. Click on this field to jump to the row to be set.	
(b)	Target CNC serial number	The serial number of the CNC for which the settings apply to. (Data entry is not possible)	
(c)	Tag name	The tag name for each data item. (Data entry is not possible) The tag names for this item correspond with the data names in "Setting data items" (Chapter 11.1). Although both the single block and feed hold stopping statuses are assigned to Stop_1 to 3, in this tool single block stopping is prioritized.	
(d)	NamespaceIndex	Enter the NamespaceIndex of the data to be assigned to the tag. Example: ns=4;s=NC01_Avail_1 For the example above, enter the "4" that follows ns=.	
(e)	IdentifierType	When the identifier is a character thread, select "String". When the identifier is a numerical thread, select "Numeric". The Guid and Opacue IdentifierType are not supported.	
(f)	Identifier	Enter the NodeID (Identifier) of the data tag to be assigned. Data tags vary between OPC UA products. Refer to the instruction manual of the product for the appropriate data tag. Example: ns=4;s=NC01_Avail_1 For the example above, enter the "NC01_Avail_1" that follows s= only.	

■Example 1: For a part system machine

A maximum of three part systems can be set with this tool. When there are no CNC devices for the second or third part systems, leave the remaining fields blank.

The following is an example of entering NodeIDs for first part system machine.

OPC UA node setting

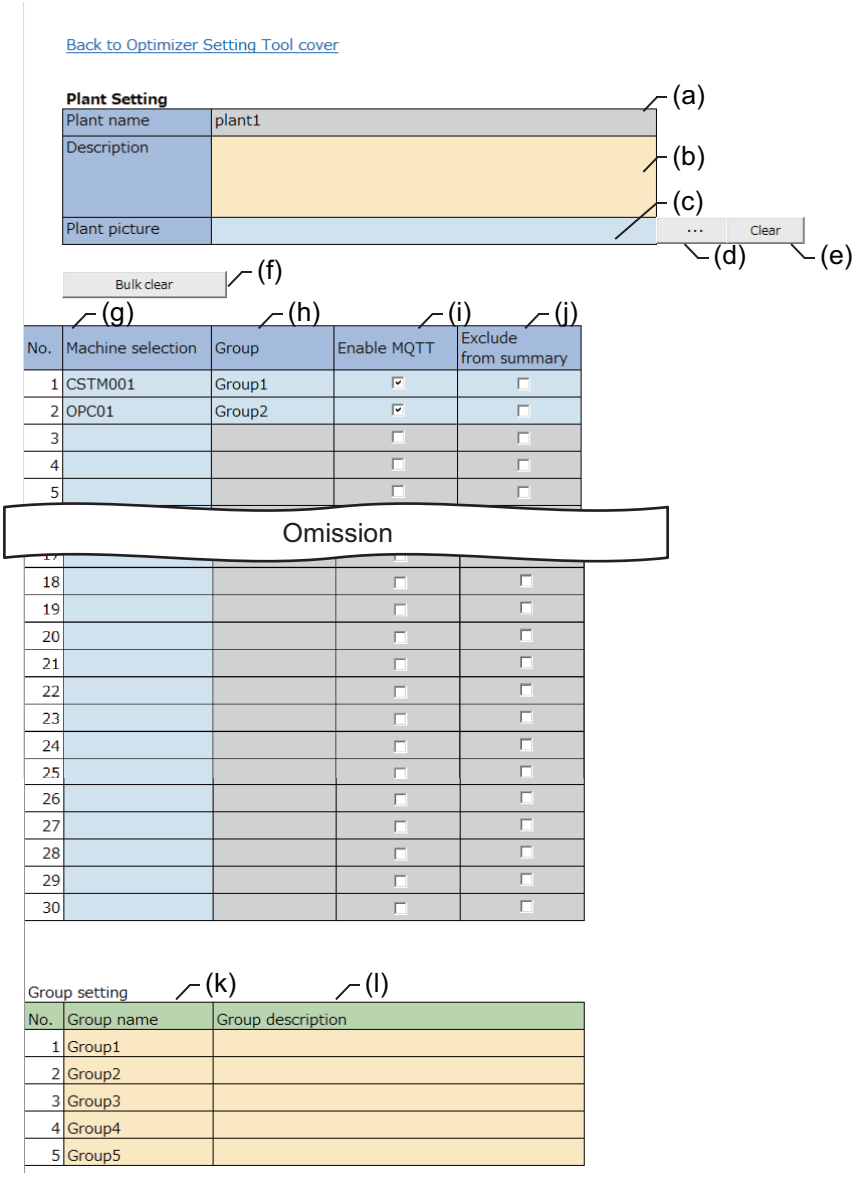
1	OPC01	NodeId		
	Tag name	NamespaceIndex	IdentifierType	Identifier
1	Avail_1	6	String	OPC01_Avail_1
2	Active_1	6	String	OPC01_Active_1
3	Ready_1	6	String	OPC01_Ready_1
4	Stop_1	6	String	OPC01_Stop_1
5	Alarm_1	6	String	OPC01_Alarm_1
6	Estop_1	6	String	OPC01_Estop_1
7	PrgMain_1	6	String	OPC01_PrgMain_1
8	Mode_1	6	String	OPC01_Mode_1
9	PartCount_1	6	String	OPC01_PartCount_1
10	Active_2			
11	Ready_2			
12	Stop_2			
13	Alarm_2			
14	Estop_2			
15	PrgMain_2			
16	Mode_2			
17	Active_3			
18	Ready_3			
19	Stop_3			
20	Alarm_3			
21	Estop_3			
22	PrgMain_3			
23	Mode_3			

For part systems that don't exist, leave the fields blank.

Plant 1 to 7

Screen outline

Enter the plant information for each plant and the machine and group assignments.



Setting items

The setting items for this sheet are as follows.

The items below are the same on each sheet for plant 1 to 7.

Item	Section	Name	Description	Remarks
(a)	Plant setting	Plant name	This is the Optimizer plant name. This is set on the cover sheet.	
(b)		Description	Enter supplementary information about the plant. A maximum of 64 characters can be entered.	
(c)		Plant picture	Select the plant picture of Optimizer. Files with bmp/jpg/png/gif extensions can be registered (max 10Mb).	The standard picture size is 160 (width) x 70 (height) pixels.
(d)		...		
(e)		Clear plant picture	Clears the selected plant picture.	
(f)	Plant machine list	Bulk clear	Clears all the information entered in the plant machine list at once.	
(g)		Machine selection	Select the machines to register to this plant. Duplicate machines cannot be registered.	
(h)		Group	Select the group to assign this machine to. Select "Nothing" when not using groups.	
(i)		Enable MQTT	When real-time monitoring is enabled, check this checkbox. MQTT can be enabled for a maximum of 15 units from plants 1 to 7.	
(j)		Exclude from summary	Check this checkbox when not including this machine in the summary of collected data in Optimizer.	
(k)	Group setting	Group name	Group names can be customized by changing the contents of this field. The default group names are "Group1" to "Group5". (Max 16 characters)	
(l)		Group description	A group description can be entered. This field is optional. (Max 64 characters)	

8.4 Setting output

Items that cannot be set in Optimizer Setting Tool

The items that cannot be set in Optimizer Setting Tool should be corrected after the settings in the tool are completed and before starting operation. Refer to "12. RECONFIGURING PROCEDURE AFTER STARTING OPERATION" for changing settings after operation has started.
The items that are set in this tool are as follows.

No.	Category	Setting item	Setting availability	Remarks
1	Plant settings	Plant name	○	
2		Plant description	○	
3		Plant picture	○	
4		Operating status setting	×	
5		Aggregation exclusion setting	×	
6		Planning method setting	×	
7		Custom display setting	×	
8	Plant machine list	Automatic update interval	×	
9	Machine editing	Machine name	○	
10		Description	×	
11		Display color	○	
12		Machine picture	○	
13		Access table	○	
14		MQTT host name	○	
15		MQTT port number	○	
16		MQTT subscribed data topic	○	
17		Operating status setting	○	
18		Aggregation exclusion	○	
19		Planning method setting	×	
20	Group editing	Add group	○	
21		Group name	○	
22		Description	○	
23		Display color	×	
24		Group machine	○	

MEMO

9 DATABASE DATA REGULAR DELETION TOOL

Using the database data regular deletion tool prevents the database of each plant from becoming bloated. This chapter describes how to use the database data regular deletion tool.

9.1 Preparation

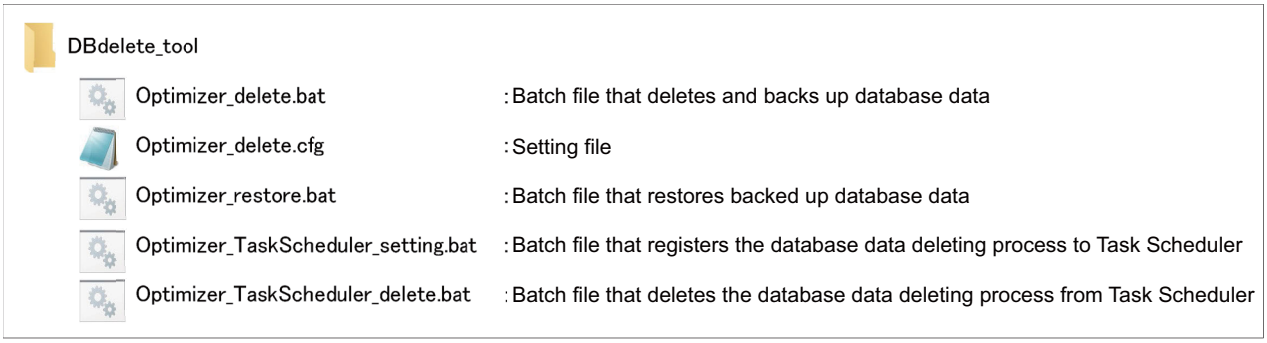
Copy the folder ".\Tools\DBdelete_tool" in the NC Machine Tool Optimizer installation folder to a folder on a PC with PostgreSQL installed. Because PostgreSQL installation is required, the PC where the base plant database is set is recommended.

Precautions

- Copy this tool to any folder other than the installation folder that is not located on a path that includes blank spaces, full-width characters, and "(". When task scheduler registration is conducted in the installation folder, periodic processes may not operate correctly.
- When blank spaces, full-width characters, and "(" are included in the storage path, the task scheduler and database data regular deletion tool may not run.

9.2 Database Data Regular Deletion Tool File Configuration

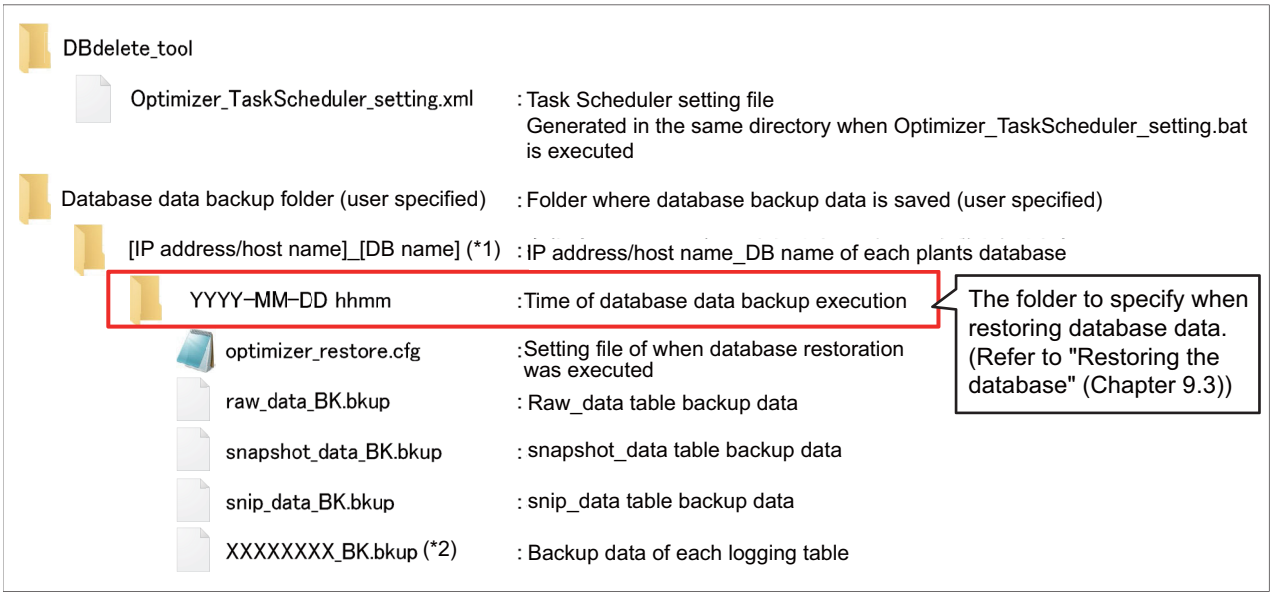
The file configuration for Database Regular Deletion Tool is as follows.



Precautions

- Keep all the above files in the same folder.

Backup data is created when database data is deleted. A list of the folders/files generated during the backup are shown below.



(*1) A folder for each plant database set in the setting file (Optimizer_delete.cfg) is created.
(*2) A file for each logging table set by the plant is created.

9.3 Description of Each Batch Process

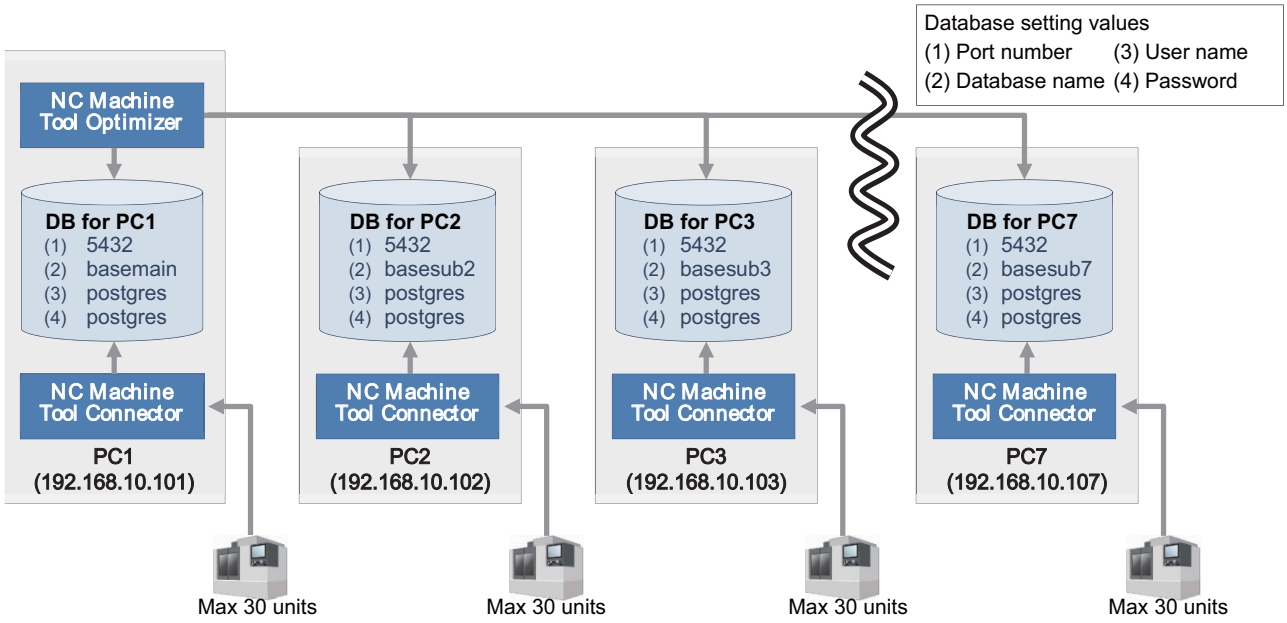
Registering to Task Scheduler

This batch registers the database data deleting process to Task Scheduler.

(1) Set the required information for the database data deleting process to the setting file (Optimizer_delete.cfg).

No.	Section	File/folder name
1	Execution file path for PostgreSQL	Set the file path after "[1]," of the PostgreSQL installed in the PC that executes this tool.
2	Path to save database data	Set the path after "[2]," to save the database data deleted by this tool.
3	Data deletion interval (days)	Set the interval (days) after "[3]," at which to execute the database backup. An interval of 60 to 360 days can be set.
4	Data deletion time	Set the time after "[4]," at which to execute the database backup. A time from 00:00 to 23:59 can be set.
5	Data deletion database information	Enter the IP address/host name, port number, database name, user name, and password (separated by a comma) of the data to be deleted.

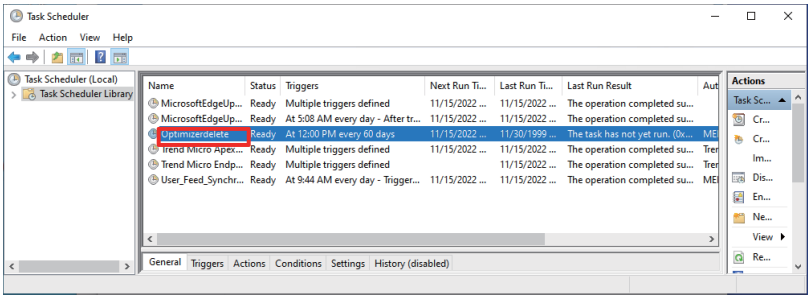
The following is an example configuration and setting.



(Setting example)
###PostgreSQL executable file path
[1],C:\Program Files\PostgreSQL\16\bin
###DB data save destination path
[2],D:\DBdelete_tool\backup_data
###Delete cycle (days)
[3],60
###Backup time 00:00 to 23:59
[4],00:00
###IP address/host name, port number, DB name, user name, password
192.168.0.101,5432,basemain,postgres,postgres
192.168.0.102,5432,basesub2,postgres,postgres
192.168.0.103,5432,basesub3,postgres,postgres
192.168.0.104,5432,basesub4,postgres,postgres
192.168.0.105,5432,basesub5,postgres,postgres
192.168.0.106,5432,basesub6,postgres,postgres
192.168.0.107,5432,basesub7,postgres,postgres

The databases that do not require data to be deleted can be omitted.

(2) Run the Task Scheduler registration batch.
Run "Optimizer_TaskScheduler_setting.bat" as an administrator.
When the batch is completed, open Task Scheduler and check that "Optimizerdelete" is registered.
To run the batch as an administrator, right-click the file and select "Run as administrator".



To open Task Scheduler, click on the Windows start button, and select “Task Scheduler” from “Windows Administrative Tools”.

Deleting from Task Scheduler

This batch deletes the database data deleting process from Task Scheduler.

Operating procedure

(1) Run the Task Scheduler delete batch.
Run "Optimizer_TaskSchedulerSetting_delete.bat" as an administrator.
When the batch is completed, open Task Scheduler and check that "Optimizerdelete" is not registered.

Deleting database data

When registered to Task Scheduler, this batch deletes database data at the specified interval. The deleted database data is saved to the specified folder as a backup file. Database data can also be deleted and backed up by running "Optimizer_delete.bat" directly. The procedure for running the batch file directly is described below.

Operating procedure

(1) Set the required information for the database data deleting process to the setting file (Optimizer_delete.cfg).
Refer to "Registering to Task Scheduler" for details.

(2) Run the database data deleting batch.
Run "Optimizer_delete.bat" as an administrator. A backup file is created in the specified folder.

Restoring database data

This batch restores backed up database data. By restoring database data, the operating information for the applicable period can be used in NC Machine Tool Optimizer operating details.

Operating procedure

(1) Run the database data restoring batch.
Run Optimizer_restore.bat as an administrator.

(2) Enter the folder path of the data to be restored. Enter the full path of the backup folder (YYYY-MM-DD hhmm (the time the database data backup was executed)) created when the database data was deleted.

(3) Enter "y" to start restoring.
After entering "y", the restoring process is executed.
Data cannot be registered to the database during the restoring process. Stopping the NC Machine Tool Connector Client Manager service is recommended.

(4) Restoring process complete.
Restart the NC Machine Tool Connector Client Manager service if it was stopped.

10 NC Machine Tool Optimizer, Mosquitto, and PostgreSQL SETUP

The procedures for NC Machine Tool Optimizer, Mosquitto, and PostgreSQL setup without using Optimizer Setting Tool are as follows.
When using Optimizer Setting Tool, these settings are configured automatically by the tool. Therefore these procedures are not required.

10.1 NC Machine Tool Optimizer Setup

Copy "NCMachineToolOptimizer.exe.config" stored in the installation destination folder of NC Machine Tool Optimizer to another folder, and edit the file with a text editor. After editing the file, copy it back to the installation folder and overwrite the original file.
- For Pro version
C:\Program Files\MITSUBISHI ELECTRIC\NC Machine Tool Optimizer\Pro\NCMachineToolOptimizer.exe.config
- For Lite version
C:\Program Files\MITSUBISHI ELECTRIC\NC Machine Tool Optimizer\Lite\NCMachineToolOptimizer.exe.config
Setting items are shown below.

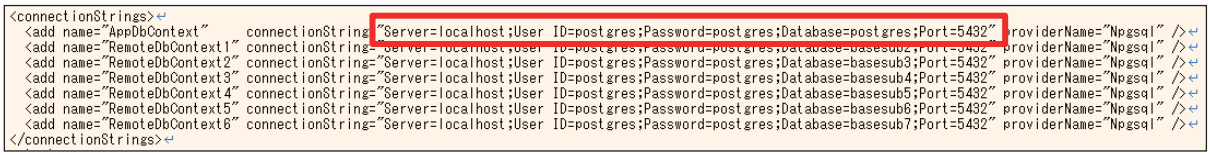
Precautions

- When using PostgreSQL with the default settings, editing the file is not necessary.
- Each item needs to match the setting content of db_setup.bat in chapter 10.3.

(a) Setting item list of NCMachineToolOptimizer.exe.config

No.	Editing item	Description	Default value	Additional explanation
1	Server	Host name of PostgreSQL	localhost	Set based on the information that was set in "6.3 Installation of PostgreSQL".
2	User ID	User name of PostgreSQL	postgres	
3	Password	Password of PostgreSQL	postgres	
4	Database	Database name of PostgreSQL	postgres	
5	Port	Port number of PostgreSQL	This value differs depending on the PC environment.	

(b) The part of NCMachineToolOptimizer.exe.config to be edited



10.2 Mosquitto Setup

Connecting to Mosquitto from a PC other than the PC with Mosquitto installed is not possible with the initial settings.
Conduct the following procedures as required.
These procedures are required under the following situations.
- NC Machine Tool Optimizer and NC Machine Tool Connector are installed on separate PCs
- Multiple plant configuration with NC Machine Tool Optimizer (not required when all plants are in the same PC)

Precautions

- This procedure assumes that Mosquitto is configured with the following initial settings. Make adjustments to the procedure according to any changes made to the initial settings. (Refer to Chapter 6.2 for Installation of Mosquitto)

Item	Initial setting value
Installation folder	C:\Program Files\mosquitto
Port	1883

(1) Edit the Mosquitto setting file
Copy the Mosquitto setting file "mosquitto.conf" to a folder other than the installation folder for editing.
After editing the file, copy it back to the installation folder and overwrite the original file.

C:\Program Files\mosquitto\mosquitto.conf

[Before editing]

```
231 # listener port-number [ip address/host name/unix socket path]
232 #listener
:
526 # Defaults to false, unless there are no listeners defined in the configuration
527 # file, in which case it is set to true, but connections are only allowed from
528 # the local machine.
529 #allow_anonymous false
```

[After editing]

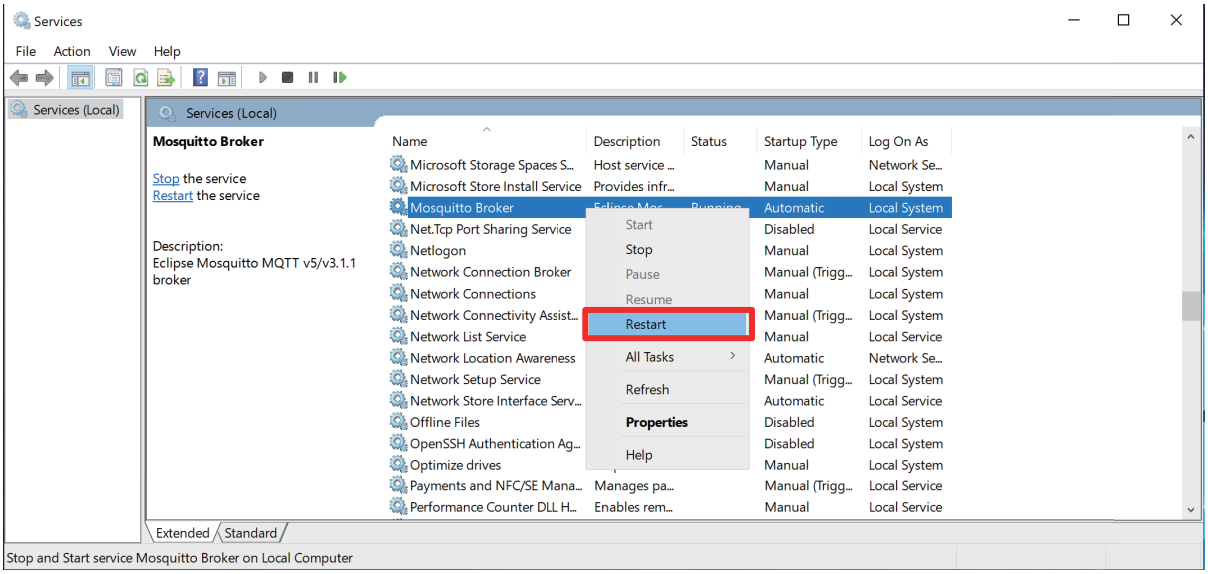
```
231 # listener port-number [ip address/host name/unix socket path]
232 listener 1883
:
526 # Defaults to false, unless there are no listeners defined in the con
527 # file, in which case it is set to true, but connections are only all
528 # the local machine.
529 allow_anonymous true
```

Remove "#" and set
listener 1883
allow_anonymous true

(2) Restart Mosquitto service

From the Windows menu, select [Windows Administrative Tools] - [Services].

Right-click the Mosquitto Broker service row, and select [Restart] from the menu.

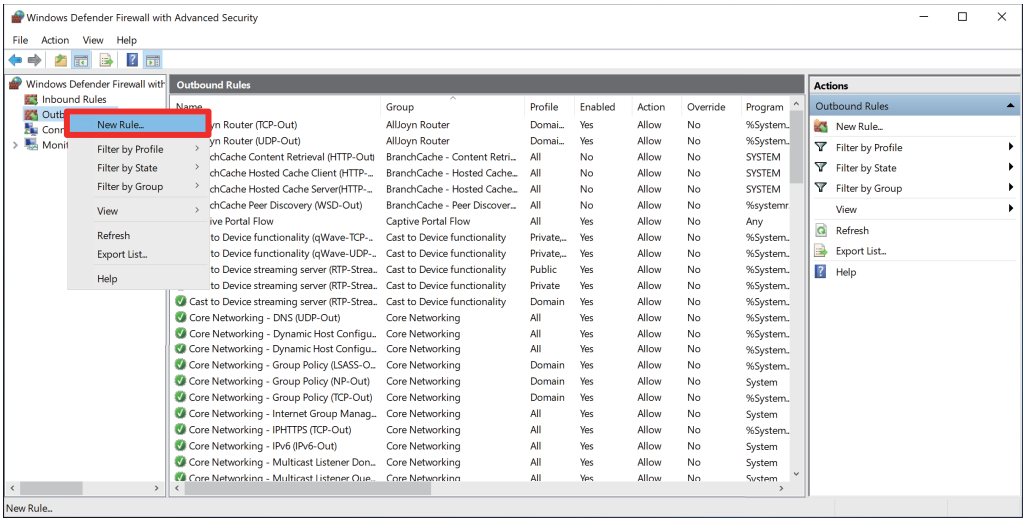


After the dialog is displayed, if the status is "Running" the restart is completed.

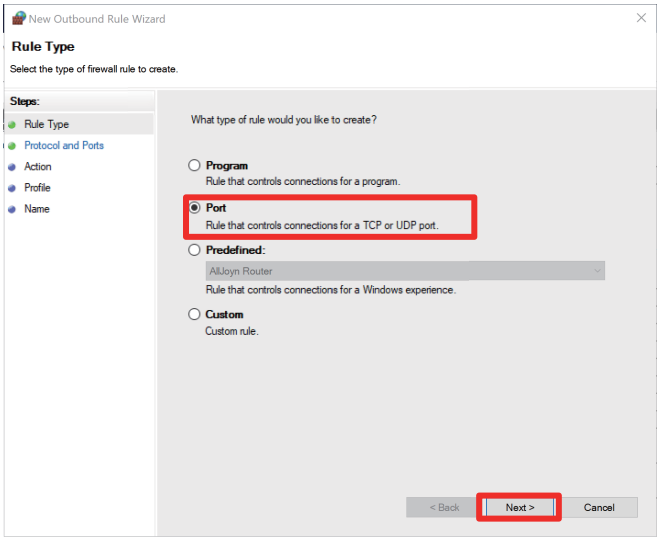
(3) Open port

(a) From the Windows menu, select [Windows Administrative Tools] - [Windows Defender Firewall with Advanced Security].

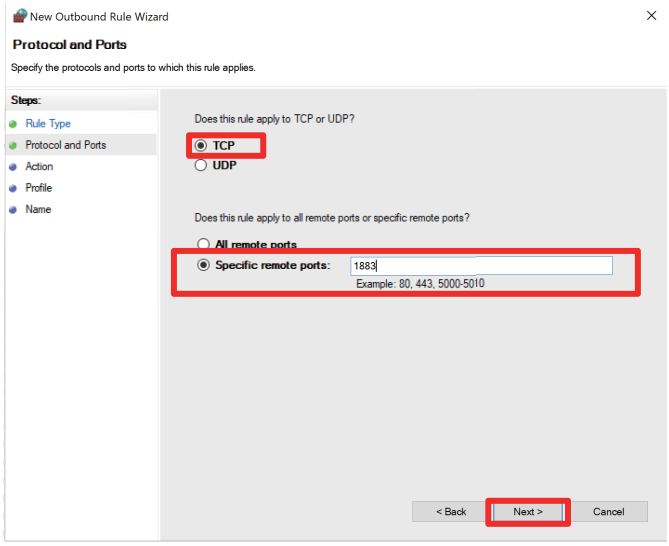
(b) Right-click inbound rules and select [New Rule].



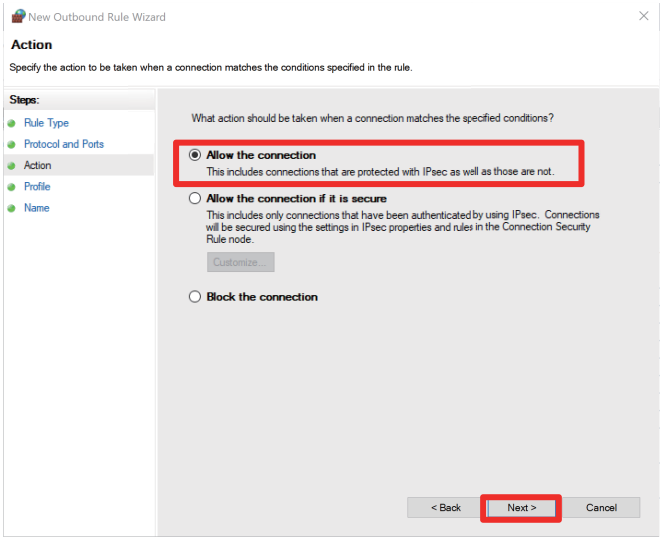
(c) Select [Port] and click the [Next>] button.



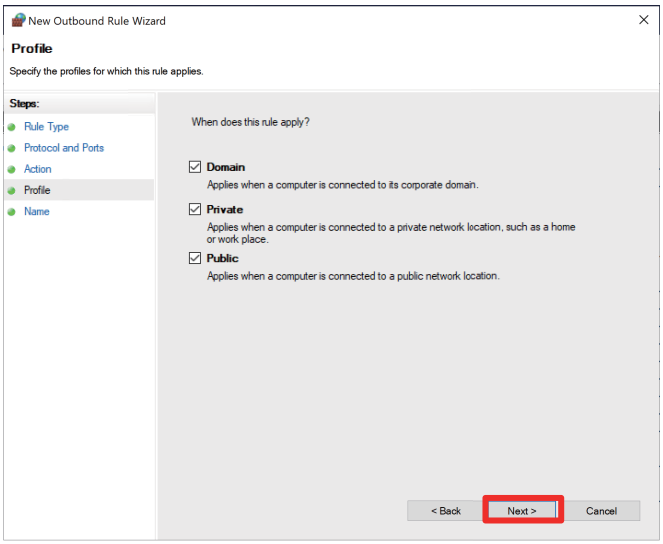
(d) Select [TCP] and [Specific local ports]. Enter the port number "1883" and click the [Next>] button.



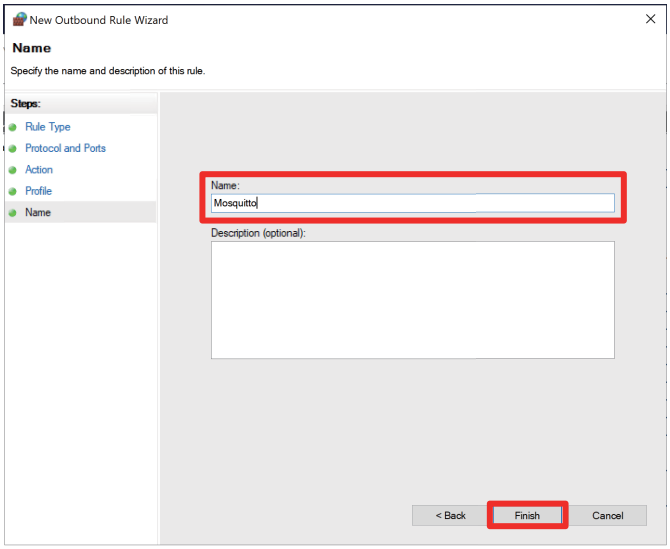
(e) Select [Allow the connection] and click the [Next>] button.



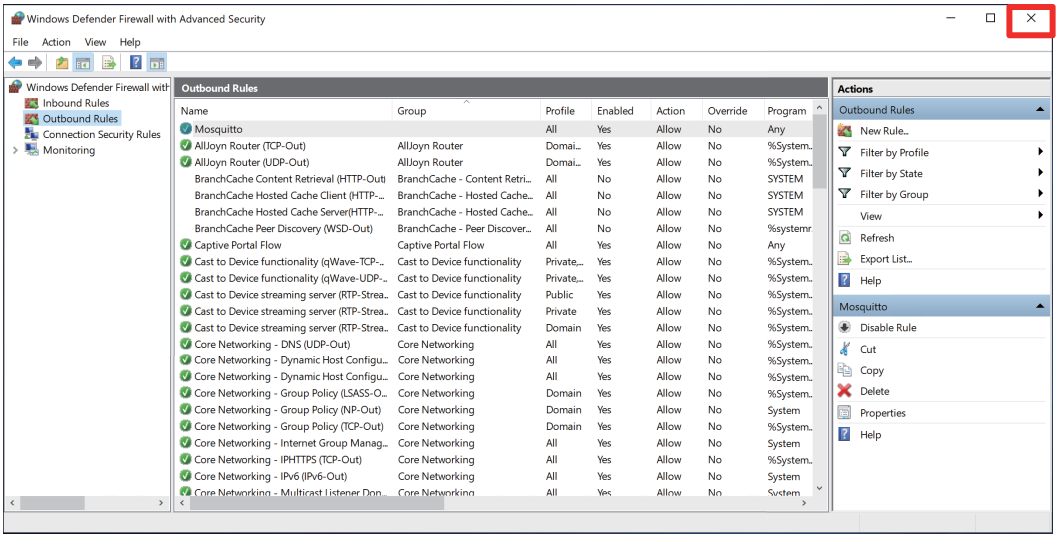
(f) Click the [Next>] button.



(g) Enter "Mosquitto" in [Name], and click the [Finish] button.



(h) Click the [X] button of the Windows Defender Firewall with Advanced Security window.



10.3 PostgreSQL Setup

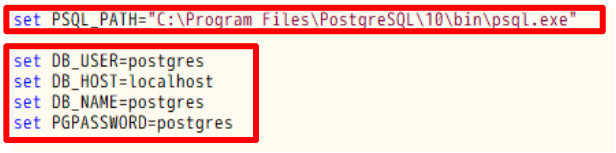
Setup procedure for PostgreSQL is as follows.

(1) Edit ".¥tools¥db_setup.bat" stored in the installation folder of NC Machine Tool Optimizer with a text editor.

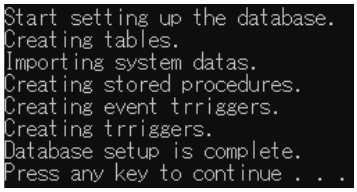
Precautions

- Copy all the contents of the tools folder in the installation folder of NC Machine Tool Optimizer to another folder.
- When using PostgreSQL with the default settings, editing the file is not necessary.
- The contents need to match the setting contents of "NCMachineToolOptimizer.exe.config" set in (1) (a) in chapter 10.1.
- Databases set up with Lite or Pro licenses cannot be used (shared) with a different type of license. Make sure to use the setup.bat included in the installer of each product to set up.
- A database set up with the license of iQ Edgecross NC Machine Tool Optimizer (product type: FCSB1813W001) cannot be used (shared) with this product. Make sure to use the setup.bat included in the installer of this product to set up.

No.	Editing item	Description	Default value	Additional explanation
1	PSQL_PATH	File path of psql.exe	Default installation path	C:\Program Files\PostgreSQL\16\bin\psql.exe
2	DB_USER	User name of PostgreSQL	postgres	Set the same setting value as (1) (a) No.2 in "NC Machine Tool Optimizer Setup" (chapter 10.1)
3	DB_HOST	Host name of PostgreSQL	localhost	Set the same setting value as (1) (a) No.1 in "NC Machine Tool Optimizer Setup" (chapter 10.1).
4	DB_NAME	Database name of PostgreSQL	postgres	Set the same setting value as (1) (a) No.4 in "NC Machine Tool Optimizer Setup" (chapter 10.1).
5	PGPASSWORD	Password of PostgreSQL	Postgres	Set the same setting value as (1) (a) No.3 in "NC Machine Tool Optimizer Setup" (chapter 10.1).



(2) After editing, execute ".¥tools¥db_setup.bat" as an administrator. When the operation is completed successfully, the following message is displayed.

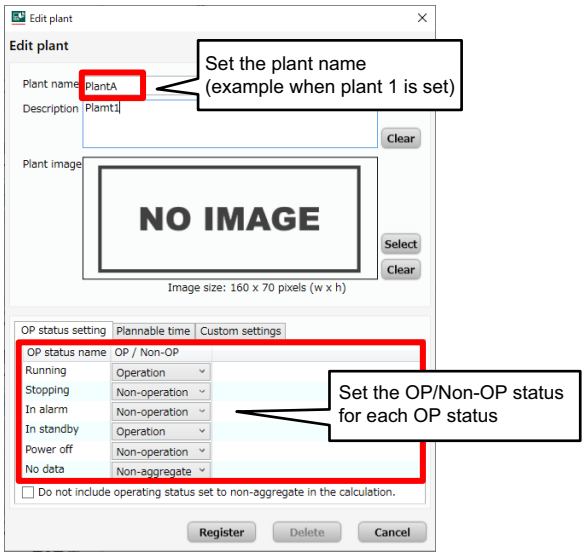


Precautions

- The setup contents of db_setup.bat differ depending on the version of NC Machine Tool Optimizer. Do not install PostgreSQL using a version of db_setup.bat that is different to the version of NC Machine Tool Optimizer.
- db_setup.bat cannot be executed again to a database for which the db_setup.bat has been executed once. To execute the db_setup.bat again, create a new database.
- To reinstall PostgreSQL and reexecute db_setup.bat, delete all contents of the data folder (the default is 'C:\Program Files\PostgreSQL\16\data') after uninstalling PostgreSQL before reinstalling PostgreSQL.

(3) Start NC Machine Tool Optimizer, and select [Setting] - [Plant setting] menu with the tab of the default plant selected in the Plant machines overview screen to open the Edit plant screen.

(4) Set a plant name in the Edit plant screen, and press the Register button. Close the application once.



Connection permission settings

Connecting to PostgreSQL from a PC other than the PC with PostgreSQL installed is not possible with the initial settings.
Follow these procedures to conduct the connection permission settings as required.
These procedures are required under the following situations.
- NC Machine Tool Optimizer, NC Machine Tool Connector, and PostgreSQL, are not installed on the same PC
- Multiple plant configuration with NC Machine Tool Optimizer (not required when all plants are in the same PC)

Precautions

- This procedure assumes that PostgreSQL is configured with the following initial setting values. Make adjustments to the procedure according to any changes made to the initial settings. (Refer to 6.3 Installation of PostgreSQL for installation of PostgreSQL)

Item	Initial setting value
Data Directory	C:\Program Files\PostgreSQL\16\data
Port	5432

(1) Edit the PostgreSQL setting file

Copy the PostgreSQL setting file "pg_hba.conf" to a folder other than the Data Directory folder, and add rows for editing. After editing the file, copy it back to the Data Directory folder and overwrite the original file.

C:¥Program Files¥PostgreSQL¥16¥data¥pg_hba.conf

```
# TYPE  DATABASE        USER            ADDRESS                 METHOD
# IPv4 local connections:
host    all             all             127.0.0.1/32            md5
# IPv6 local connections:
host    all             all             ::1/128                 md5
# Allow replication connections from localhost, by a user with the
# replication privilege.
host    replication     all             127.0.0.1/32            md5
host    replication     all             ::1/128                 md5
```

No.	Item	Description	Recommended value	Additional explanation
1	TYPE	Connection method	host	
2	DATABASE	Name of database to allow connection	all	Allow all databases to connect with all
3	USER	Name of role to allow connection	all	Allow all roles to connect with all
4	ADDRESS	Name of host, network address, and IP address to allow connection	Set according to environment	
5	METHOD	Authentication method	md5	

Setting example for allowing the following
- Network address: 192.168.1.0/24
- IP address: 192.168.2.1
*Add rows for the settings

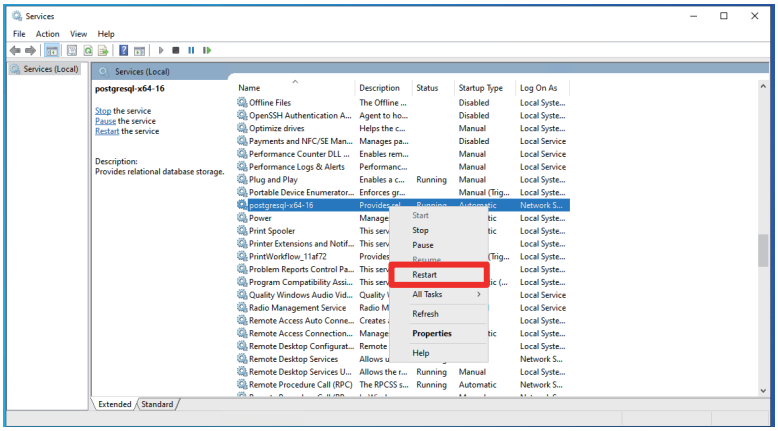
```
# IPv4 local connections:
host    all             all             127.0.0.1/32            md5
host    all             all             192.168.1.0/24          md5
host    all             all             192.168.2.1/32          md5
```

Precautions

- Add rows when editing the setting file and do not change the existing contents.
- When setting multiple ADDRESS to allow connection, add ADDRESS in multiple rows to configure the settings.

(2) Restart PostreSQL service

From the Windows menu, select [Windows Administrative Tools] - [Services].
Right-click the PostgreSQL service row, and select Restart from the menu.

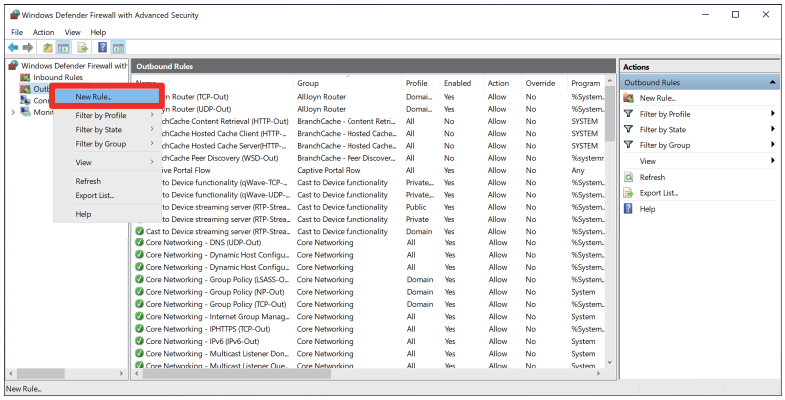


After the dialog is displayed, if the status is "Running" the restart is completed.

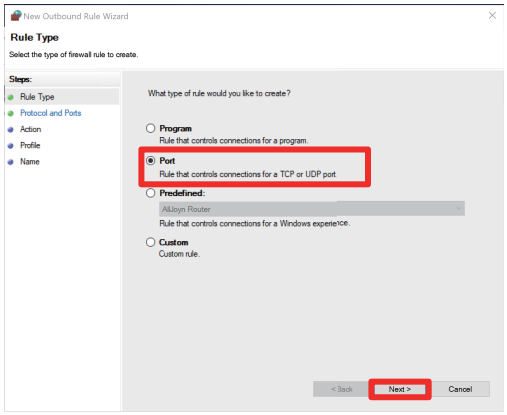
(3) Open port

(a) From the Windows menu, select [Windows Administrative Tools] - [Windows Defender Firewall with Advanced Security].

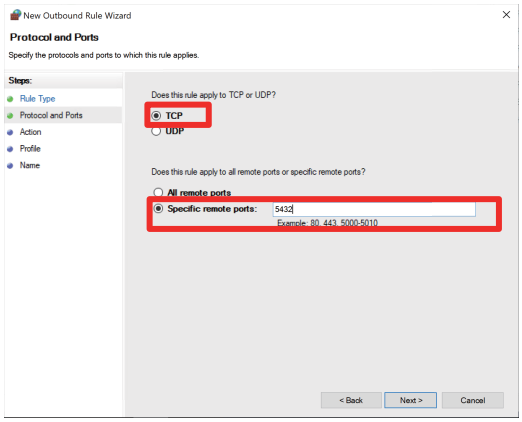
(b) Right-click inbound rules and select New Rule.



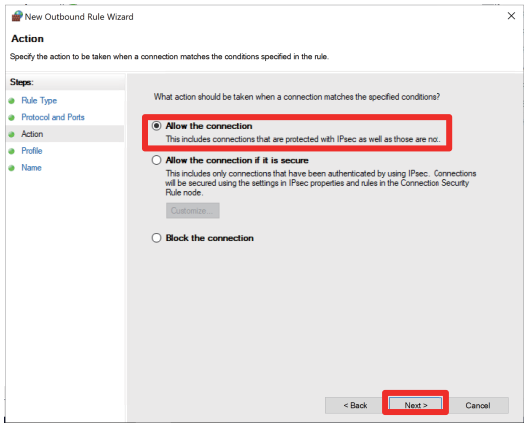
(c) Select [Port] and click the [Next>] button.



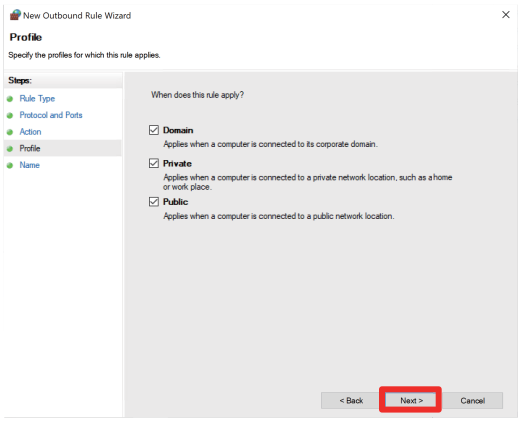
(d) Select [TCP] and [Specific local ports]. Enter the port number that was set when installing PostgreSQL (default: "5432") and click the [Next>] button.



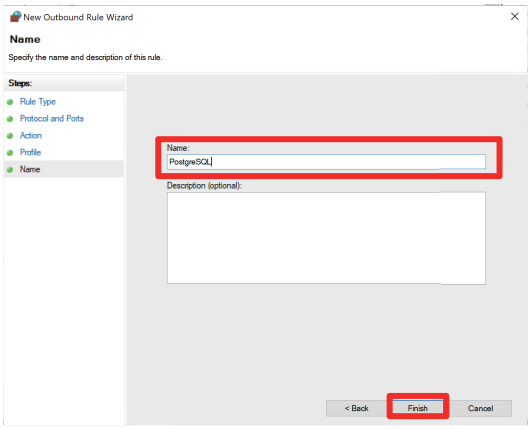
(e) Select [Allow the connection] and click the [Next>] button.



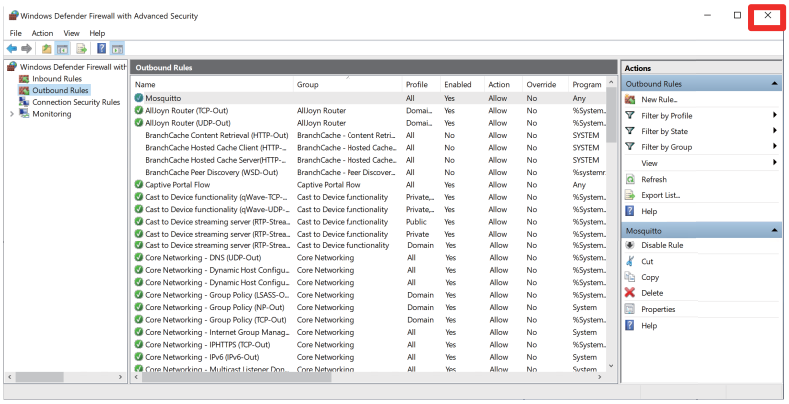
(f) Click the [Next>] button.



(g) Enter "PostgreSQL" in [Name], and click the [Finish] button.



(h) Click the [X] button of the Windows Defender Firewall with Advanced Security window.



10.4 Adding Plants to PostgreSQL

Procedures to add plants to the PostgreSQL set up (installed in the same computer) in chapters 6.3 and 10.3 are as follows. To add a database for a plant to a PostgreSQL installed in a different computer, perform the procedures in chapters 6.3 and 10.3 with the different computer before the procedures in this chapter.

Procedures to add a plant are as follows.
Repeat step (1) to (3) for every plant to be added.

(1) Adding a Database for a Plant (chapter 10.4)
(2) Setting a Configuration File (chapter 10.4)
(3) Setting Up a Database for Another Plant (chapter 10.4)
(4) Editing the Plant (chapter 10.4)

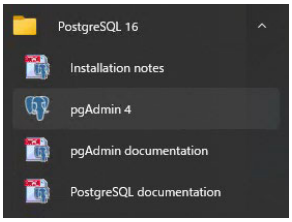
Adding a database for a plant

Any name can be used for a database name. This section shows the procedure when the name of the database to be added is "basesub2". Perform procedures (1) to (4) below with the computer that PostgreSQL is installed.
Database names are different for each plant.

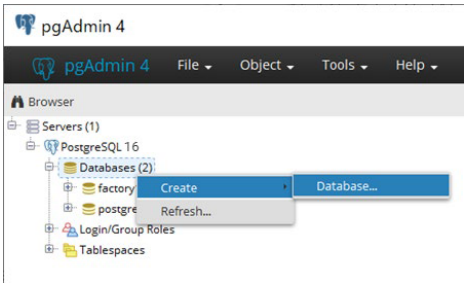
Precautions

- Set a different database name for every plant.
- Repeat this procedure for the number of plants to be added.

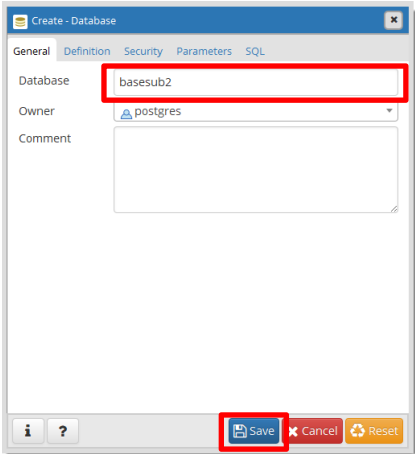
(1) Start pgAdmin4 from the Windows start menu.



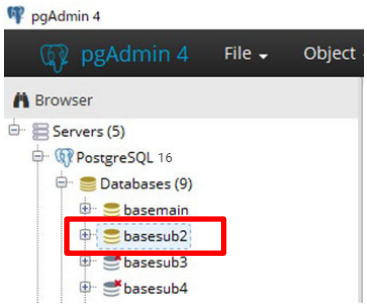
(2) Select [PostgreSQL 16] - [Databases] from the tree, and select [Create] - [Database…] from the right-click menu.



(3) Enter a database name in the dialog box, and press the [Save] button. (The database set in this step will be used in the following settings.)
This figure shows an input example of when "basesub2" is set for the database name.



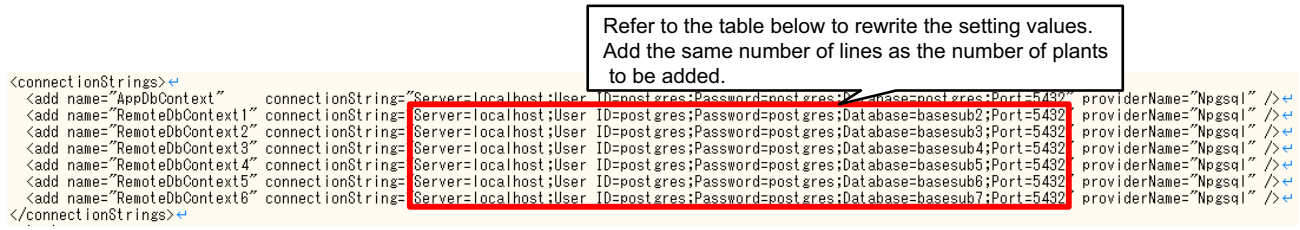
(4) A database for another plant is created. Close pgAdmin4.



Setting a configuration file

(1) Copy "NCMachineToolOptimizer.exe.config" to a folder other than the installation folder of NC Machine Tool Optimizer by the same procedure as step (1) in chapter 10.1, and edit as shown in the following figure. Set the same database name as the database created in "Adding a database for a plant".

(2) Save "NCMachineToolOptimizer.exe.config", and overwrite the file in the installation folder of NC Machine Tool Optimizer.



No.	Editing item	Description	Default value	Additional explanation
1	Server	Host name of PostgreSQL	localhost	
2	User ID	User name of PostgreSQL	postgres	
3	Password	Password of PostgreSQL	postgres	
4	Database	Database name of PostgreSQL	basesub2 to 7	Match the database name with the database created in "Adding a Database for a Plant".
5	Port	Port number of PostgreSQL	5432	The number to be set differs depending on the PC environment.

Precautions

- To create a database of a plant not to be added in the PostgreSQL set in chapter 10.3, but in a PostgreSQL installed in a different computer, check the settings of the PostgreSQL to be connected, and change the settings of No.1 to 5 in the table as necessary.
- Do not make changes to the first line of the settings (name="AppDbContext"). (This is set in Chapter 10.1)
- Add the same number of lines as the number of plants to be added. The other lines can be left as their initial values.

Setting up a database for another plant

A database for another plant can be set by the same procedure as "PostgreSQL Setup".

(1) Edit ".¥tools¥db_setup.bat" stored in the installation folder of NC Machine Tool Optimizer with a text editor.

Precautions

- Copy all the contents of the tools folder in the installation folder of NC Machine Tool Optimizer to another folder.
- The contents need to match the setting contents of "NCMachineToolOptimizer.exe.config" in "Setting a Configuration File".
- Set the name of the database created in "Adding a Database for a Plant" for the database name. (The database name varies for every plant to be added.)

- To create a database of a plant not to be added in the PostgreSQL set in chapter 10.3, but in a PostgreSQL installed in a different computer, copy all the contents of the tools folder to the computer that the PostgreSQL to be connected is installed, and execute ".¥tools¥db_setup.bat". (Specify a different PostgreSQL installation path for the different computer in the installation path (PSQL_PATH)). For DB_USER (user name), DB_HOST (server name), and PGPASSWORD (password), check the settings of PostgreSQL to be connected and set the contents. (The settings need to be the same as No.1 to 3 and 5 of the figure in "Setting a Configuration File" (2).)

(2) After editing, execute ".¥tools¥db_setup.bat" as an administrator. When the operation is completed successfully, the same message as "Setting PostgreSQL" (2) is displayed.
Make sure to execute ".¥tools¥db_setup.bat" for each database added in "Adding a Database for a Plant".

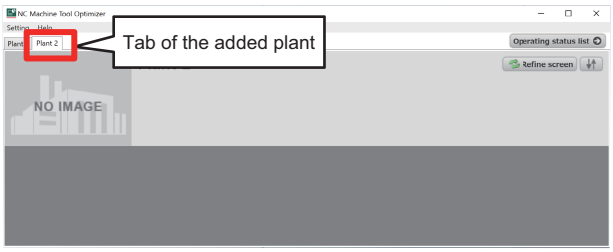
Editing the plant

Set the plant added in chapter 10.4 in the Edit plant screen.
For procedures to edit plants, refer to the following.

NC Machine Tool Optimizer (Pro/Lite) User's Manual

(1) Select the [Setting]-[Add plant] menu in the Plant machines overview screen to display the Add plant screen.
(2) After setting the database name for the plant added in "Setting Up a Database for Another Plant" in Plant name (a), press the Register button (b).

(3) When the plant registration is completed successfully, a plant tab is added in the Plant machines overview screen.



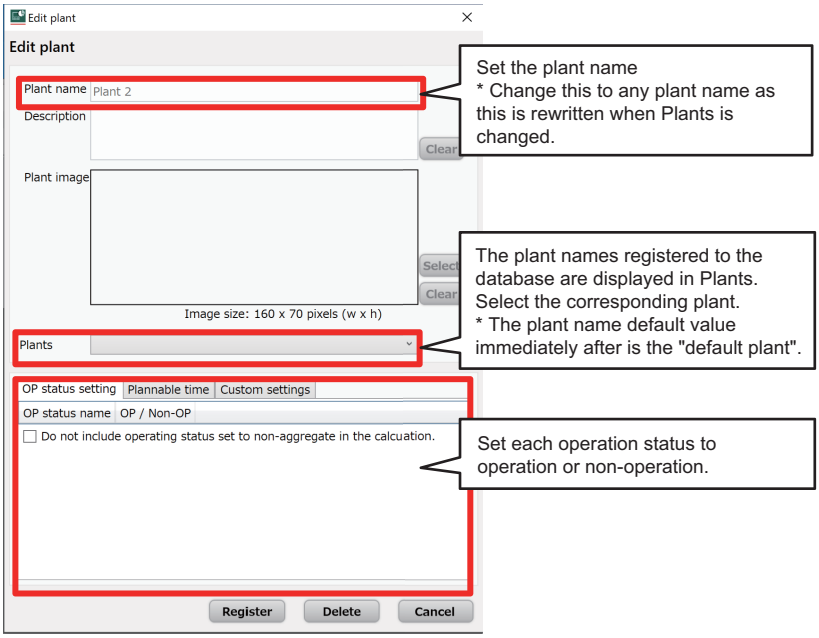
(4) Select the [Setting]-[Plant setting] menu in the Plant machines overview screen with the added plant tab selected to open the Edit plant screen.
(5) Select a plant name as a reference plant name, and press the Register button in the Edit plant screen.
Repeat step (1) to (5) for all the databases for the plants added in step (2) of "Setting Up a Database for Another Plant".
After setting, close the application.

Precautions

- Monitoring machines can be registered for each plant by the procedures in chapter 11.2 to 11.3. However, if the total number of machines in a plant exceeds the number of connectable machines for the respective Lite/Pro licenses, the settings cannot be performed and an error message is displayed. In this case, delete the machine that is already registered, then register a new machine. For deleting procedures of machines, refer to the following.

NC Machine Tool Optimizer (Pro/Lite) User's Manual

The plants constructed for databases with Lite and Pro licenses cannot be used (shared) with a different type of license.



MEMO

11 COLLECTION SETTING PROCEDURES TO CONNECT CNC

The collection setting procedures to collect operation data of machines and start operating NC Machine Tool Optimizer when not using Optimizer Setting Tool are as follows.

Precautions

- The settings in this chapter cannot be changed during monitoring operation in each screen after starting the operation. To change setting contents after starting operation, refer to the procedures in chapter 12.

11.1 Data Collection Settings

The following is an outline procedures for collection settings. The procedures need to be repeated for the number of machines to be connected.
When connecting a previous model of a machine that does not support Ethernet, refer to "When Connecting by OPC UA" (chapter 11.1).

Collection settings when using Mitsubishi Electric CNC

The settings shown in the table below need to be configured to connect Mitsubishi Electric CNC to NC Machine Tool Connector.
In collection settings, the data items to be collected into NC Machine Tool Connector are set by custom API communication with Mitsubishi Electric CNC are set.
In data logging settings, the data items collected with NC Machine Tool Connector that will be stored in a database are set.

	Target software	Setting item	Setting content	Reference
1	NC Machine Tool Connector	Collection settings	The settings of the data items that NC Machine Tool Connector collects from Mitsubishi Electric CNC.	"Setting data items" and “Collection data settings" in "Collection Settings When Using Mitsubishi Electric CNC" (chapter 11.1)
2		Data logging settings	The settings of the data items collected with NC Machine Tool Connector that will be stored in a database.	"Data Logging Settings" (chapter 11.1)
3		Data publishing settings	The settings of the data items collected with NC Machine Tool Connector that will be published in real time to NC Machine Tool Optimizer by MQTT communication.	"MQTT Communication Settings" (chapter 11.2)

Setting data items

The data items that require collection settings with NC Machine Tool Connector when using Mitsubishi Electric CNC are shown in the table below.

When a setting is not configured, the corresponding data item is not displayed in the screen.

For the status definition of each collection data item, refer to the following.

NC Machine Tool Optimizer (Pro/Lite) User's Manual

No	Collection data item		Custom API data number (1st part system)		Collection setting data name (example) (*1)		Operation status screen setting value (status judgment value) (*2)	Data type
	Section	Subsection	Section	Sub-section	Without part system	With part system (*1)		
1	Operating status	Power off	53	3089	Avail_1	Avail_1 (to Avail_3)	0 (*4)	UInt16
2		Running	35	10	Exec_1	Exec_1 to Exec_3	3	UInt16
		In standby (Ready)					2	
3		Stopping					6: Single block 7: Feed hold	
4	Operating detail status	EMG stop					1	
5		In alarm	35	203	Alarm_1	Alarm_1 to Alarm_3	4	UInt16
6	Running program	Main program number	45	101	PrgMain_1 (*1)	PrgMain_1 to Prg-Main_3 (*1)	No settings required	String
7	Operation mode	Automatic/MDI/ Manual etc.	35	11	Mode1_1(*4)	Mode1_1 to Mode3_1 (*4)	No settings required	UInt16
8	Production results	Number of parts produced	126	8002	PartCount_1 (*5)	PartCount_1 (Only one arbitrary part system can be collected.) (*5)	No settings required	Int32

(*1) For the setting format of the collection setting data names, refer to "Collection data settings" in "Collection Settings When Using Mitsubishi Electric CNC" (chapter 11.1). To log the set data, adding the equipment name is necessary. For the setting method, refer to "Collection data settings" in "Collection Settings When Using Mitsubishi Electric CNC" (chapter 11.1). Although arbitrary collection setting names can be set for No.1 to 5, the collection setting names of No.6 to 8 need to be set as the table above. If the collection setting name does not match the data name in the table above, the screen will not be displayed normally.

- Set in the TagSetting "Name" column ("Data registration" tab) in the machine data edit screen of NC Machine Tool Connector.
- Even when the equipment does not have multiple part systems, add the fixed part system number (_1) to the data name. The settings of multiple part systems are optional. However, for equipment that has multiple part systems, add the part system number to the data name even if the data is common to each part system.

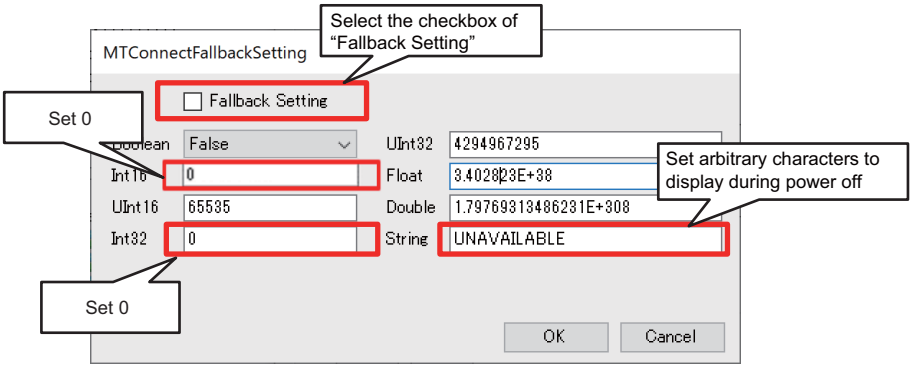
(*2) Always set the operation status of each collection setting data name referring to "Operation Status Settings" in "Machine Editing" (chapter 11.2).

(*3) Always set the setting value during power off in the Operating status setting screen to match the setting value of Int16 type in fallback settings. Always set 0 for the fallback setting value.

(*4) The values collected from the connection destination OPC UA server are displayed in the screen of NC Machine Tool Optimizer as they appear in the OPC UA server.

(*5) Only one part system can be used in NC Machine Tool Optimizer. Although any part system can be collected, set "PartCount_1" for the collection setting name.

The fallback setting contents when connecting Mitsubishi Electric CNC are as follows.



Collection data settings

Configure the collection settings for each CNC to be connected with NC Machine Tool Connector.
Names of the equipment to be connected need to be specified for a logging setting data name. (Data settings can be configured in any order.)

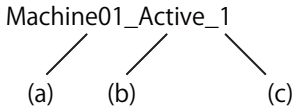
The format of collection setting data names is as follows.

Format: [Equipment name]_[collection setting data name]_[part system number]

Set a number from 1 to 3 for the part system number. When a number other than those is set, data cannot be collected.

(1) For equipment that has only one part system
When the equipment name is “Machine01”, set the collection setting data name as follows.

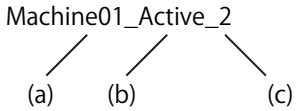
(Example) Collection setting data name:



(a) Add an equipment name and "_" (underscore) before a collection setting data name
(b) A collection setting data name (arbitrary data name)
(c) Add "_1" (fixed) after the collection setting data name

(2) For equipment that has multiple part systems
When the equipment name is “Machine01”, set a collection setting data name as follows.

(Example) Setting of the 2nd part system
Collection setting data name:



(a) Add an equipment name and "_" (underscore) before a collection setting data name
(b) A collection setting data name (arbitrary data name)
(c) Add "_2" (part system number) after the collection setting data name

An outline of the setting procedure with NC Machine Tool Connector is as follows.

(1) Start the configuration tool of NC Machine Tool Connector (NC Machine Tool Configurator), right-click in the Machine list display section without a registered machine selected, and select [Machine settings] to display the machine setting (MachineConfig) screen. Enter the settings of the machines to be connected to add a machine. After adding a machine, select the "Edit machine data" menu.

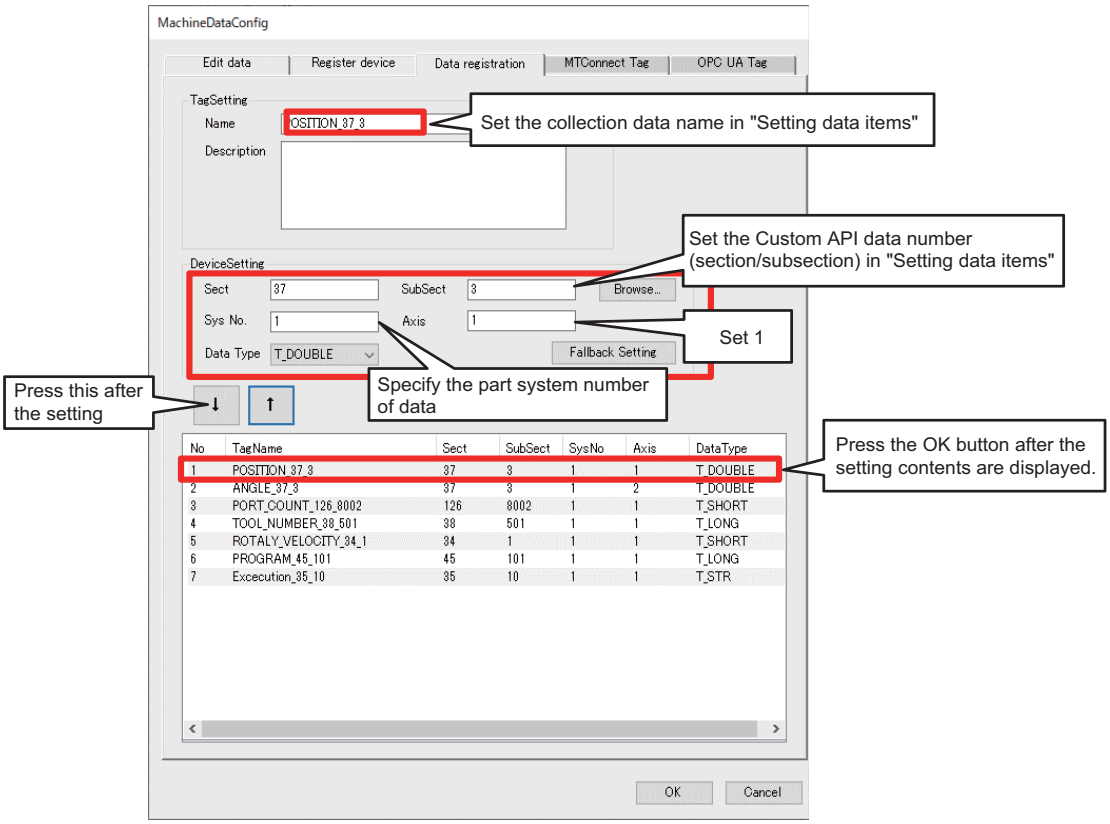
(2) Configure the settings below in the MachineDataConfig screen to match the contents of "Setting data items" in "Collection Settings When Using Mitsubishi Electric CNC" (chapter 11.1).

For MTConnect or OPC UA, set the same settings in the "MTConnect Tag" tab or "OPC UA Tag" tab.

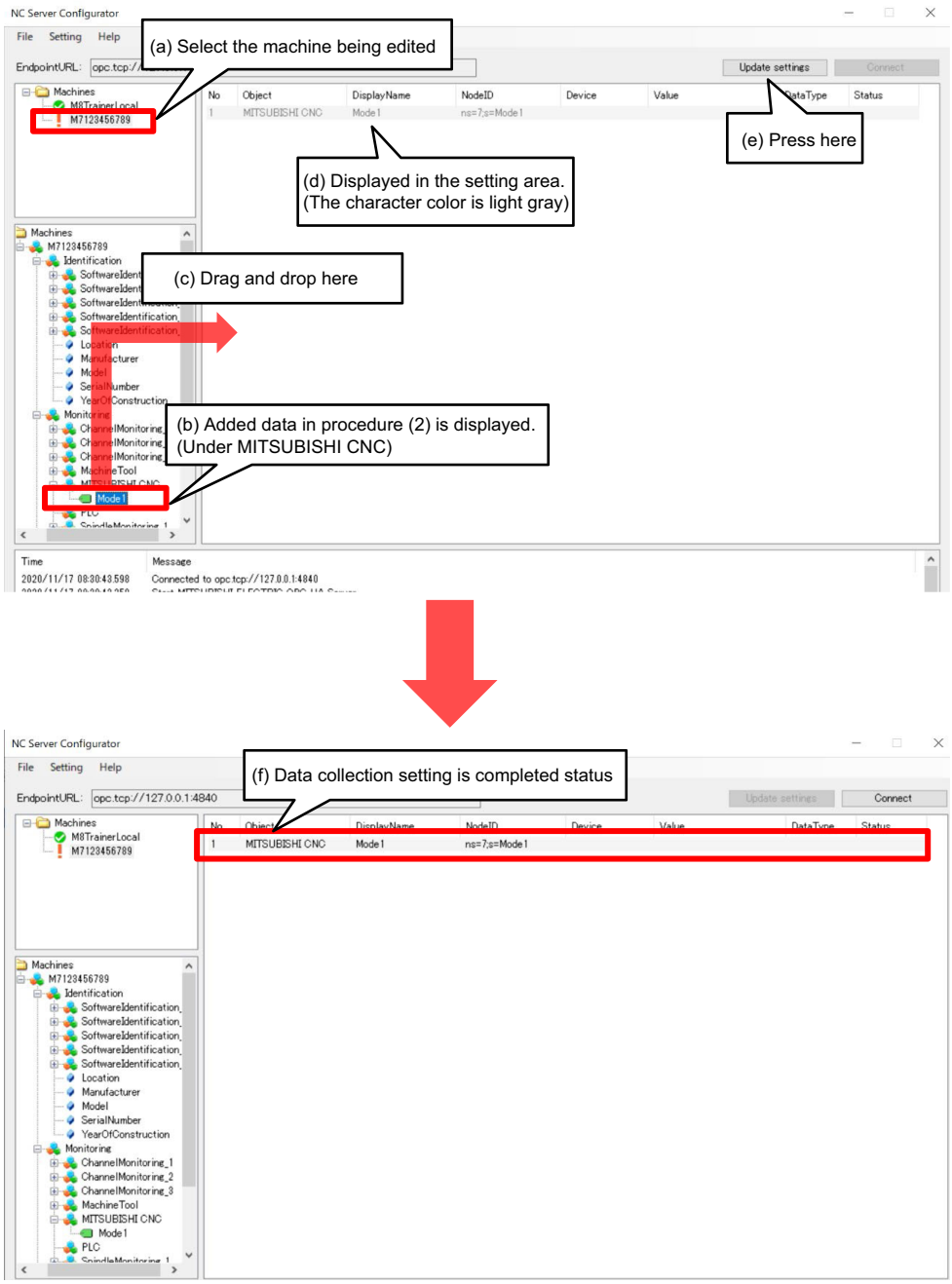
For details on each procedure, refer to the following.

NC Machine Tool Connector User's Manual

[Addition example of an operation mode]



(3) Return to NC Machine Tool Configurator, select the machine being edited, and check the information model display. Drag and drop the added data (Mode_1) to the setting area, and press [Update settings].



(4) Repeat the collection data settings from step (2) for every data item in "Setting data items".

When connecting by MTConnect

The settings shown in the table below need to be configured to connect NC Machine Tool Connector by MTConnect communication.
In collection settings, the data items to be collected into NC Machine Tool Connector are set by MTConnect communication with other manufacturer's CNC.
In data logging settings, the data items collected with NC Machine Tool Connector that will be stored in a database are set.

	Target software	Setting item	Setting content	Reference
1	NC Machine Tool Connector	Collection settings	The settings of the data items that NC Machine Tool Connector collects by MTConnect.	"Setting data items" and "Collection data settings" in "When Connecting by MTConnect" (chapter 11.1)
2		Data logging settings	The settings of the data items collected with NC Machine Tool Connector that will be stored in a database.	"Data Logging Settings" (chapter 11.1)
3		Data publishing settings	The settings of the data items collected with NC Machine Tool Connector that will be published in real time to NC Machine Tool Optimizer by MQTT communication.	"MQTT Communication Settings" (chapter 11.2)

Setting data items

The data items that require collection settings when connecting by MTConnect are shown in the table below.
When a setting is not configured, the corresponding data item is not displayed in the screen.
For the status definition of each collection data item, refer to the following.

NC Machine Tool Optimizer (Pro/Lite) User's Manual

No	Collection data item		MTConnect adapter output value (*1)	MTConnect schema (Device.xml) attribute definition name (*2)		Collection data name (*3) (*4)	Data type
	Section	Subsection		Type attribute	Name attribute		
1	Operating status	Power off	AVAILABLE/ UNAVAILABLE (* 6)	AVAILABILITY	NcAvail1_1	NcAvail_1 (to NcAvail_3)	String
2		Running	ACTIVE	EXECUTION	Exec1_1 to Exec3_1	Exec_1 to Exec_3	String
		In standby	FEED_HOLD				
		In standby (Ready)	READY				
		In alarm	STOPPED				
3	Operating detail status		NORMAL/ FAULT	MOTION_PROGRAM	NcErrSts1_1 to NcErrSts3_1	NcErrSts_1 to NcErrSts_3	String
4		EMG stop	TRIGGERED/ ARMED	EMERGENCY_STOP	Estop1_1	Estop_1 (to Estop_3)	String
5	Running program	Main program name	O number or arbitrary name (only half-width characters)	PROGRAM	PrgMain1_1 to PrgMain3_1	PrgMain_1 to PrgMain_3	String
6	Operation mode	Automatic	AUTOMATIC	CONTROLLER_MODE	Mode1_1 to Mode3_1	Mode_1 to Mode_3	String
		MDI	MANUAL_DATA_INPUT				
		Manual	MANUAL				
7	Production results	(Number of parts produced) (*6)		PART_COUNT	PartA1_1 to PartA3_1	PartCount_1 (*5)	Int32 (*6)

For details on an XML schema (Device.xml) of an MTConnect agent to be set, refer to "Editing Device.xml file".

(*1) The required number of collection data settings differs depending on your MTConnect agent/adapter. For data that cannot be collected, do not configure the settings with NC Machine Tool Connector or NC Machine Tool Optimizer.

(*2) The data that can be collected is defined by an XML schema (Device.xml) of an MTConnect agent. For details, refer to the product manual of your MTConnect.

(*3) For the setting format of the collection setting data names, refer to "Collection data settings" in "Collection Settings When Using Mitsubishi Electric CNC" (chapter 11.1). To log the set data, adding the equipment name is necessary. For the setting method, refer to "Collection data settings" in "Collection Settings When Using Mitsubishi Electric CNC" (chapter 11.1). Although arbitrary collection setting names can be set for No.1 to 4, the collection setting names of No.5 to 7 need to be set as the table above. If the collection setting name does not match the data name in the table above, the screen will not be displayed normally. (For the settings, refer to "Collection data settings" in "Collection Settings When Using Mitsubishi Electric CNC" (chapter 11.1).)

- Set in the TagSetting "Name" column ("MTConnect Tag" tab) in the machine data edit screen of NC Machine Tool Connector.
- Even when the equipment does not have multiple part systems, add the fixed part system number (_1) to the data name. The settings of multiple part systems are optional. However, for equipment that has multiple part systems, add the part system number to the data name even if the data is common to each part system.

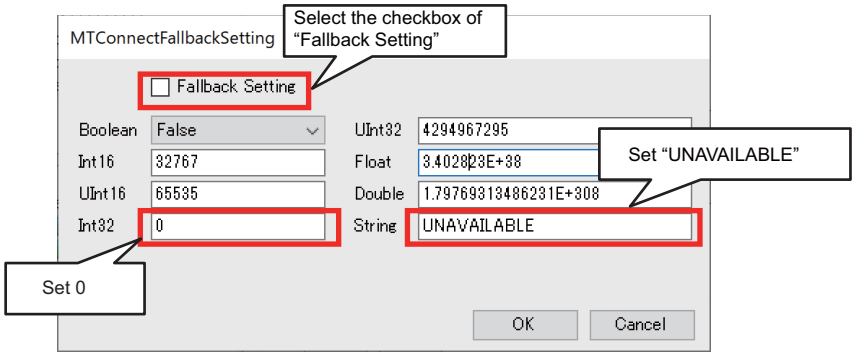
(*4) Always set the operation status of each collection setting data name referring to "Operation Status Settings" in "Machine Editing" (chapter 11.2).

(*5) Only one part system can be used in NC Machine Tool Optimizer. Although any part system can be collected, set "PartCount_1" for the collection setting name.

(*6) Always set the setting value during power off in the Operating status setting screen to match the setting value in fallback settings.

For the example above, always set "UNAVAILABLE" for the fallback setting value during power off (String type) and set 0 for the number of parts produced (Int32 type).

The fallback setting contents when connecting by MTConnect are as follows.



Data items that are not in the table above can be set for collection settings depending on definition contents of an MTConnect schema (Device.xml). However, the data items in the table above need to be set for the data logging settings with NC Machine Tool Connector.

Collection data settings

The specifying method of collection setting names is the same as when connecting Mitsubishi Electric CNC. Refer to "Collection data settings" in "Collection Settings When Using Mitsubishi Electric CNC" (chapter 11.1).
After completing the setup of this product, do not change collection setting names. For details on the setting method, refer to the following.

NC Machine Tool Connector User's Manual

When connecting by OPC UA

The settings shown in the table below need to be configured to connect NC Machine Tool Connector by OPC UA.
In collection settings, the data items to be collected into NC Machine Tool Connector are set by OPC UA communication with other manufacturer's OPC UA server.
In data logging settings, the data items collected with NC Machine Tool Connector that will be stored in a database are set.

	Target software	Setting item	Setting content	Reference
1	NC Machine Tool Connector	Collection settings	The settings of the data items that NC Machine Tool Connector collects by OPC UA.	"Setting data items" and "Collection data settings" in "When Connecting by OPC UA" (chapter 11.1)
2		Data logging settings	The settings of the data items collected with NC Machine Tool Connector that will be stored in a database.	"Data Logging Settings" (chapter 11.1)
3		Data publishing settings	The settings of the data items collected with NC Machine Tool Connector that will be published in real time to NC Machine Tool Optimizer by MQTT communication.	"MQTT Communication Settings" (chapter 11.2)

Setting data items

The data items that require collection settings when connecting by OPC UA are shown in the table below.
When a setting is not configured, the corresponding data item is not displayed in the screen.
For the status definition of each collection data item, refer to the following.

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<table>
<tr><th rowspan="2">No</th><th colspan="3">Collection data item (*1)</th><th colspan="4">OPC UA collection data example</th><th rowspan="2">Collection setting data name (example) (*2)</th><th colspan="2">Setting example of the Operating status setting screen (*3)</th></tr>
<tr><th colspan="2">Section</th><th>Subsection</th><th colspan="2">Connected machine collection data example</th><th>Data type (*4)</th><th>Connection destination OPC UA server output value</th><th>Setting value (Status judgment value)</th><th>Setting data type</th></tr>
<tr><td>1</td><td rowspan="6">Operating status</td><td>Power off</td><td></td><td colspan="2">Power status signal of control equipment</td><td rowspan="6">Boolean (*8)</td><td rowspan="6">True (1) or False (0)</td><td colspan="2">Avail_1 (to Avail_3)</td><td>False (0) (*9)</td><td>Boolean</td></tr>
<tr><td>2</td><td>In standby (Ready) (*1) (*6)</td><td></td><td colspan="2">Servo ready completion signal</td><td rowspan="4">(*5)</td><td>Ready_1 (to Ready_3)</td><td rowspan="4">Exec1 (to Exec_3) (*5)</td><td>True (1)</td><td>Boolean</td></tr>
<tr><td>3</td><td>Running</td><td></td><td rowspan="3">Output signal of machine signal light</td><td>(Green)</td><td>Active_1 (to Active_3)</td><td>True (1)</td><td>Boolean</td></tr>
<tr><td>4</td><td rowspan="2">Stopping</td><td>Single block</td><td>(Yellow)</td><td>Stop_1 (to Stop _3)</td><td>True (1)</td><td>Boolean</td></tr>
<tr><td>5</td><td rowspan="2">In alarm</td><td>In alarm</td><td>(Red)</td><td>Alarm_1 (to Alarm_3)</td><td>True (1)</td><td>Boolean</td></tr>
<tr><td>6</td><td>EMG stop (*1) (*6)</td><td colspan="2">EMG signal</td><td>Estop_1 (to Estop _3)</td><td>True (1)</td><td>Boolean</td></tr>
<tr><td>7</td><td colspan="2">Machining program (*7)</td><td colspan="2">Running program name</td><td>String (*10)</td><td>(Text)</td><td>PrgMain_1 (to PrgMain_3)</td><td colspan="2" rowspan="3">Setting in the operating status setting screen is not required</td></tr>
<tr><td>8</td><td colspan="2">Operation mode (*7)</td><td>Automatic/ MDI/Manual etc.</td><td colspan="2">Operation mode type</td><td>String (*11)</td><td>(Text)</td><td>Mode_1 (to Mode_3)</td></tr>
<tr><td>9</td><td colspan="2">Production results (*7)</td><td colspan="2">Number of parts produced</td><td>Int32</td><td>0 to 2,147,483,647</td><td>PartCount_1 (*12)</td></tr>
</table>

(*1) The required number of collection data settings differs depending on your OPC UA server. For data that cannot be collected with the OPC UA server, do not configure the settings with NC Machine Tool Connector or NC Machine Tool Optimizer. The data that can be collected is defined as an Information model in the connection destination OPC UA server product and arbitrary definition data may be able to be set depending on the product. For the Information model of the OPC UA server, refer to the manual of your product.

(*2) For the settings of data names, refer to "Collection data settings" in "Collection Settings When Using Mitsubishi Electric CNC" (chapter 11.1). To log the set data, adding the equipment name is necessary. For the setting method, refer to "Collection data settings" in "Collection Settings When Using Mitsubishi Electric CNC" (chapter 11.1).
- Set in the "DataItem" column ("OPC UA Tag" tab) in the machine data edit screen of NC Machine Tool Connector. Although arbitrary collection setting names can be set for No.1 to 6, the collection setting names of No.7 to 9 need to be set as the table above. If the collection setting name does not match the data name in the table above, the screen will not be displayed normally. (For the settings, refer to "Collection data settings" in "Collection Settings When Using Mitsubishi Electric CNC" (chapter 11.1).)
- Even when the equipment does not have multiple part systems, add the fixed part system number (_1) to the data name. The settings of multiple part systems are optional. However, for equipment that has multiple part systems, add the part system number to the data name even if the data is common to each part system.

(*3) Always set the operation status of each collection setting data name referring to "Operation Status Settings" in "Machine Editing" (chapter 11.2).

(*4) Always set the data type for each collection setting data name to match the collection data type of the OPC UA server.

(*5) Some data types (Bolean/String/numerical type) for the operating status data can be set to any given combination to match the data contents that the connection destination OPC UA server can output. The settings differ depending on your OPC UA server.
For No.2 to 5, when the data can be collected as numerical type or String type, the collection setting data names can be defined as one data name.
For the setting values, refer to "Setting data items" or "Collection data settings" (settings of Exec_1 to Exec_3) in "Collection Settings When Using Mitsubishi Electric CNC" (chapter 11.1).

(*6) The previous models of machines that do not support Ethernet may not be able to collect because of the input points of OPC UA server products. When data cannot be collected, the EMG stop status is included in the In alarm status.

(*7) For the previous models of machines that do not support Ethernet, output settings for serial communication are necessary. For details, refer to the manual of the corresponding machine.

(*8) For Boolean type data, normally closed contact PLC data can be used. In this case, collect all data in normally closed contact. When Boolean type data is in normally closed contact, invert all the setting values in the operating status settings.

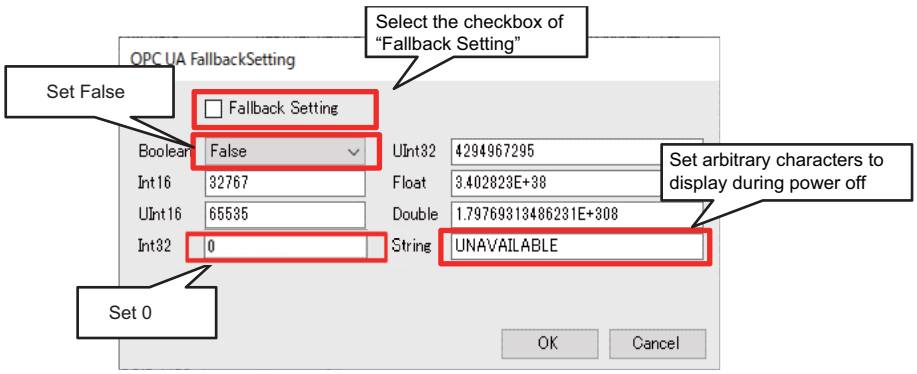
(*9) Always set the setting values during power off in the Operating status setting screen to match the setting values of the Boolean type data in the fallback settings.
For the setting example in the table above, always set 0 for the fallback value.

(*10) When the program name of the connected machine does not include characters other than numerical characters, the data can be collected not as String type, but as Uint16 or Uint32 type data in your OPC UA server.

(*11) Operation mode types that can be collected differ depending on the connected machine. Although numerical type data can be collected, the values collected from the connection destination OPC UA server are displayed in the screen of NC Machine Tool Optimizer as they appear in the OPC UA server.

(*12) Only one part system can be used in NC Machine Tool Optimizer. Although any part system can be collected, set "PartCount_1" for the collection setting name.

The fallback setting contents when connecting by OPC UA communication are as follows.



Collection data settings

The specifying method of collection setting names is the same as when connecting Mitsubishi Electric CNC. Refer to "Collection data settings" in "Collection Settings When Using Mitsubishi Electric CNC" (chapter 11.1).
After completing the setup of NC Machine Tool Optimizer, do not change collection setting names. For details on the setting method, refer to the following.

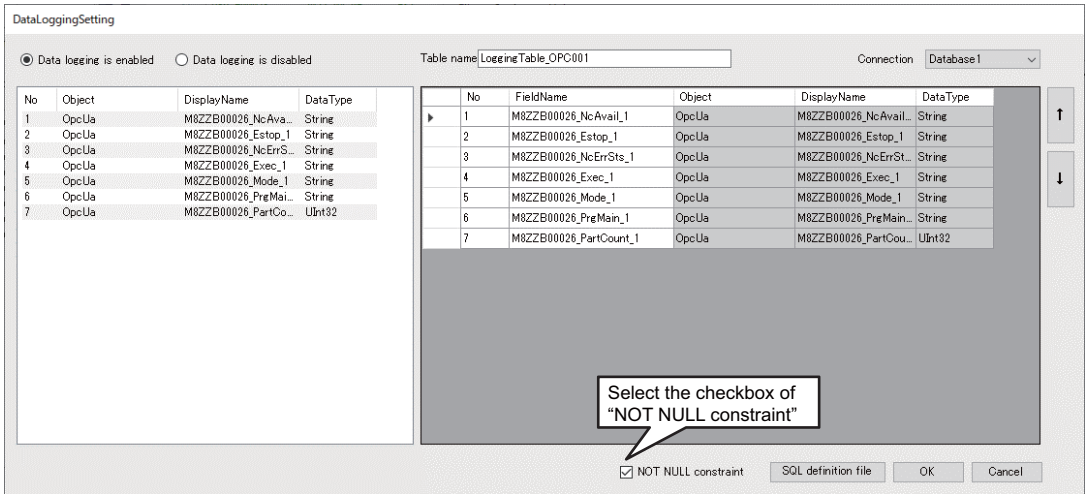
NC Machine Tool Connector User's Manual

Data logging settings

Data collected in NC Machine Tool Connector cannot be stored in a database, and operation monitoring cannot be performed with this product without configuring logging settings after configuring the collection settings according to the communication protocol to be used.
Do not change a field name of a table of a set database after starting the operation of NC Machine Tool Optimizer .
If a data logging setting is changed (added or deleted) after the setup of NC Machine Tool Optimizer, a database needs to be transfered.

An SQL definition file (*.sql) needs to be output in the data logging setting screen of NC Machine Tool Connector. In the screen below, press the [SQL definition file] button with the checkbox of [NOT NULL constraint] selected to output an SQL definition file.
For details on the procedures of data logging settings, refer to the following.

NC Machine Tool Connector User's Manual



Open the output SQL definition file with a text editor and check that "NOT NULL" is added as below.

"NOT NULL" has been added to each data item.

```
DROP TABLE IF EXISTS LoggingTable_M7123456789;
CREATE TABLE LoggingTable_M7123456789("TIME" TIMESTAMP(6),"M7123456789_Alarm_1" smallint NOT NULL,
                                                          "M7123456789_Avail_1" smallint NOT NULL,
                                                          "M7123456789_Exec_1" smallint NOT NULL,
                                                          "M7123456789_Mode_1" smallint NOT NULL,
                                                          "M7123456789_PartCount_1" integer NOT NULL,
                                                          "M7123456789_PrgMain_1" character varying(128) NOT NULL);
```

11.2 Machine Editing

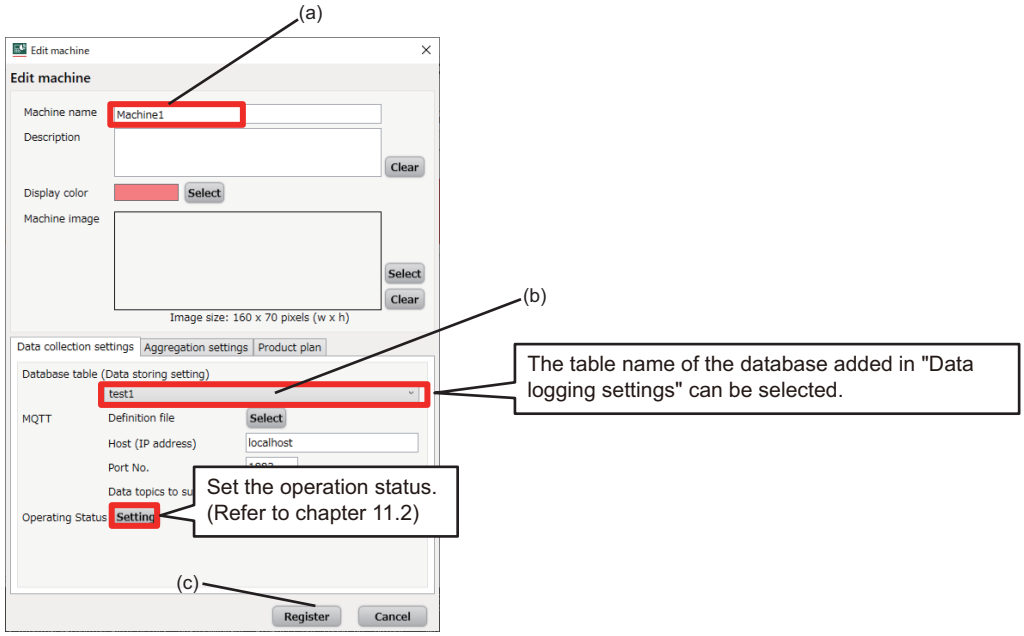
Start NC Machine Tool Optimizer and configure settings to add a machine for each plant.
Close the application after all machines are added.
For details on the procedure in each screen, refer to the following.

NC Machine Tool Optimizer (Pro/Lite) User's Manual

Machine adding settings

(1) Start NC Machine Tool Optimizer, and open the Operating status overview screen from the Plant machines overview screen.

(2) Select a plant in the machine list tree display area, and select the [Add machine] menu from the right-click menu to display the Edit machine screen.
Set the machine name (a) and access table (b), and press the Register button (c).



(3) Repeat adding machines for every machine whose collection settings have been configured.
Make sure that the total number of added machines of each plant does not exceed the number of connectable machines for the respective Lite/Pro license. To add machines for each plant, follow the procedures in chapter 11.3.

Operation status settings

Set the operation status of each machine in the Operating status setting screen (figure below) of NC Machine Tool Optimizer.
When the settings are not configured, operation monitoring cannot be performed with NC Machine Tool Optimizer.
When pressing the cancel button in the Edit machine screen after registering in this screen, the setting contents in this screen will not be saved. Make sure to press the Register button in the Edit machine screen to save the setting contents.
The setting contents will be cleared when the setting of the access table in the Edit machine screen is changed. In this case, set the contents again.
Location settings need to be configured in advance of the data collection settings of a data collector to be used.
For details on the specifications of this screen, refer to the following.

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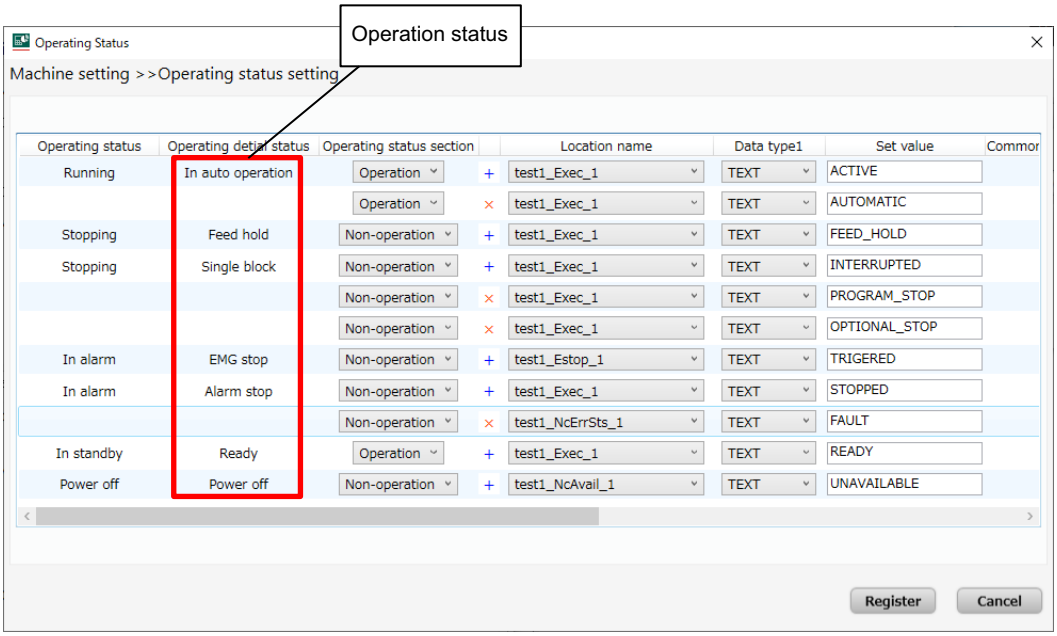

Set (1) to (4) below for the collection data items (in subsection) shown in the table in the section "Setting data items" above.

(1) Location name 1
Select a location name corresponding to the operation status.

(2) Data type 1
The data type to be selected varies depending on the data type specified in location settings of a data collector.
Set the data type according to the following table.

Data type to be selected	Data type specified in location settings
TEXT	STRING, WSTRING
NUMERIC	INT, UINT, DINT, UDINT, LINT, ULINT
BOOLEAN	BOOL

(3) Setting value 1
Set a collection value of (1) location name 1 when the status is enabled.

(Setting example)
When the settings in the following table are configured, and the collection value of the set location data name "FeedHold_1" is "1", the operation status displayed in the Operating status overview screen becomes "Feed hold".

Item	Setting value
Location name	Select "FeedHold_1"
Data type	Select "NUMERIC"
Value	Enter "1"

(4) Location name 2, data type 2, setting value 2
The setting contents are the same as (1) to (3). In order to set these, the checkbox in the "AND" column (logical product condition) needs to be enabled.

MQTT communication settings

NC Machine Tool Optimizer acquires operation data collected from NC Machine Tool Connector via an MQTT broker by MQTT communication and outputs that data to the application screen in order to display operating situation (utilization, operating status) on a dashboard in real-time.
For the MQTT communication, configure the data publishing function settings of NC Machine Tool Connector following procedures (1) to (4) below so that NC Machine Tool Optimizer can receive (subscribe) data (topic) published from NC Machine Tool Connector.
Note that an MQTT broker (Eclipse Mosquitto) that is installed during the NC Machine Tool Optimizer installation is required before configuring this setting.

Operating procedure

(1) Configure the data collection settings described in chapter 11.
(2) Display the Publishing data setting screen of NC Machine Tool Connector. For basic setting procedures of this screen, refer to the following.

NC Machine Tool Connector User's Manual
(3) Set the publishing data, then create a publishing definition file (with the "Publishing Data" button in the DataPublishSetting screen).
(4) Set the file output path of the publishing definition file for each machine to be monitored in the Edit machine screen of NC Machine Tool Optimizer. Configure the MQTT publishing settings in the Edit machine screen after setting the access table in the Edit machine screen. (MQTT settings cannot be configured without setting an access table.) For setting screens and procedures, refer to the following.

NC Machine Tool Optimizer (Pro/Lite) User's Manual

11.3 Machine Adding Settings for Each Plant

This chapter describes the procedures for machine adding settings for each plant set in chapter 10.4.

(1) Copy “NCMachineToolOptimizer.exe.config” to a folder other than the installation folder of NC Machine Tool Optimizer by the same procedures as step (1) in chapter 10.3, and edit the file in the same way as "Setting a Configuration File" (chapter 10.4). Set the same database name as the database created in "Adding a Database for a Plant" (chapter 10.4).

(2) Save “NCMachineToolOptimizer.exe.config”, and overwrite the file in the installation folder of NC Machine Tool Optimizer.

Change the definition of database for additional plants (Change is required again for each site)

```
<connectionStrings>
  <add name="AppDbContext"     connectionString="Server=localhost;User ID=postgres;Password=postgres;Database=basesub2;Port=5432" providerName="Npgsql" />
  <add name="RemoteDbContext1" connectionString="Server=localhost;User ID=postgres;Password=postgres;Database=postgres;Port=5432" providerName="Npgsql" />
  <add name="RemoteDbContext2" connectionString="Server=localhost;User ID=postgres;Password=postgres;Database=basesub3;Port=5432" providerName="Npgsql" />
  <add name="RemoteDbContext3" connectionString="Server=localhost;User ID=postgres;Password=postgres;Database=basesub4;Port=5432" providerName="Npgsql" />
  <add name="RemoteDbContext4" connectionString="Server=localhost;User ID=postgres;Password=postgres;Database=basesub5;Port=5432" providerName="Npgsql" />
  <add name="RemoteDbContext5" connectionString="Server=localhost;User ID=postgres;Password=postgres;Database=basesub6;Port=5432" providerName="Npgsql" />
  <add name="RemoteDbContext6" connectionString="Server=localhost;User ID=postgres;Password=postgres;Database=basesub7;Port=5432" providerName="Npgsql" />
</connectionStrings>
```

No.	Editing item	Description	Default value	Additional explanation
1	Server	Host name of PostgreSQL	localhost	
2	User ID	User name of PostgreSQL	postgres	
3	Password	Password of PostgreSQL	postgres	
4	Database	Database name of PostgreSQL	basesub2 to 7	
5	Port	Port number of PostgreSQL	5432	The number to be set differs depending on the PC environment.

Precautions

- To create a database of a plant not to be added in the PostgreSQL set in chapter 10.3, but in a PostgreSQL installed in a different computer, check the settings of the PostgreSQL to be connected, and change the settings of No.1 to 5 in the table as necessary.

(3) Set machines to be added to plants by the same procedures as "Machine Adding Settings", "Operation Status Settings", and "MQTT Communication Settings" (chapter 11.2).

(4) Repeat step (1) to (3) for every plant added in chapter 10.4.

(5) Close the application, and restore "NCMachineToolOptimizer.exe.config" to the following settings by the same procedures as step (1) to (2).

Change the definition of database

```
<connectionStrings>
  <add name="AppDbContext"     connectionString="Server=localhost;User ID=postgres;Password=postgres;Database=postgres;Port=5432" providerName="Npgsql" />
  <add name="RemoteDbContext1" connectionString="Server=localhost;User ID=postgres;Password=postgres;Database=basesub2;Port=5432" providerName="Npgsql" />
  <add name="RemoteDbContext2" connectionString="Server=localhost;User ID=postgres;Password=postgres;Database=basesub3;Port=5432" providerName="Npgsql" />
  <add name="RemoteDbContext3" connectionString="Server=localhost;User ID=postgres;Password=postgres;Database=basesub4;Port=5432" providerName="Npgsql" />
  <add name="RemoteDbContext4" connectionString="Server=localhost;User ID=postgres;Password=postgres;Database=basesub5;Port=5432" providerName="Npgsql" />
  <add name="RemoteDbContext5" connectionString="Server=localhost;User ID=postgres;Password=postgres;Database=basesub6;Port=5432" providerName="Npgsql" />
  <add name="RemoteDbContext6" connectionString="Server=localhost;User ID=postgres;Password=postgres;Database=basesub7;Port=5432" providerName="Npgsql" />
</connectionStrings>
```

No.	Editing item	Description	Default value	Additional explanation
1	Server	Host name of PostgreSQL	localhost	
2	User ID	User name of PostgreSQL	postgres	
3	Password	Password of PostgreSQL	postgres	
4	Database	Database name of PostgreSQL	postgres	
5	Port	Port number of PostgreSQL	5432	The number to be set differs depending on the PC environment.

Precautions

- In step (4), make sure to add a number of machines that does not exceed the maximum number of connectable machines. When the total number of added machines for each plant exceeds the number of connectable machines for the respective Lite/Pro license, an error message appears when starting NC Machine Tool Optimizer after step (5). When the message appears, delete the machines registered in step (1) to (4). For how to delete a machine, refer to the following.

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MEMO

12 RECONFIGURING PROCEDURE AFTER STARTING OPERATION OF NC Machine Tool Optimizer

The procedure to change settings related to the operation of an application after completing the settings in chapter 3 and starting the operation of NC Machine Tool Optimizer is described below.
The items for which settings are to be changed are as follows. The setting items whose setting operation availability is "Unavailable" cannot be changed during machine monitoring with NC Machine Tool Optimizer.
For items that are not described in this manual, refer to the following.

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No.	Screen in which setting is made		Setting item	Setting item details	Setting operation availability during machine monitoring	Reference (NC Machine Tool Optimizer (Pro/Lite) User's Manual)
	Application screen	Setting screen				
1	Plant machines overview screen	Setting menu	Add plant	Add plant dialog	Unavailable	(1) of "Menu operations" in "Plant machines overview screen" (chapter 4.1)
2			Plant settings	Edit plant screen	Refer to (*1)	(2) of "Menu operations" in "Plant machines overview screen" (chapter 4.1)
3			Display settings	Plant Information Updating dialog	Available	(3) of "Menu operations" in "Plant machines overview screen" (chapter 4.1)
4		Help menu	Language	Switching display language menu	Available	(4) of "Menu operations" in "Plant machines overview screen" (chapter 4.1)
5			Software version	Software version dialog	Available	(5) of "Menu operations" in "Plant machines overview screen" (chapter 4.1)
6		Edit plant screen (*1)	Plant information	Plant name, description, image	Unavailable	"Edit plant sreen" in "Plant machines overview screen" (chapter 4.1)
7			OP status setting	Operation classification (Operation/ Non-operation) setting	Unavailable	(1) of "Edit plant sreen" in "Plant machines overview screen" (chapter 4.1)
8				Non-aggregated status setting	Unavailable	
9			Plannable time	Production plan import setting	Unavailable	(2) of "Edit plant sreen" in "Plant machines overview screen" (chapter 4.1)
10			Custom settings	Custom data 1, 2	Unavailable	
11			(Only for other plants)	Plants to monitor setting	Unavailable	

No.	Screen in which setting is made		Setting item	Setting item details	Setting operation availability during machine monitoring	Reference (NC Machine Tool Optimizer (Pro/Lite) User's Manual)
	Application screen	Setting screen				
12	Operating status overview screen	Setting menu	Group settings	Edit group screen	Refer to (*2)	"Menu operations" in "Operating status overview screen" (chapter 4.1)
13		Menu icon	Add machine	Edit machine screen	Unavailable	(1) of "Menu operations" in "Operating status overview screen" (chapter 4.1)
14			Delete machine	Edit machine screen	Refer to (*3)	(2) of "Menu operations" in "Operating status overview screen" (chapter 4.1)
15			Add group	Add group dialog	Unavailable	(3) of "Menu operations" in "Operating status overview screen" (chapter 4.1)
16			Delete group	-	Unavailable	(4) of "Menu operations" in "Operating status overview screen" (chapter 4.1)
17		Machine tree (right-click menu)	Add machine	Edit machine screen	Refer to (*3)	"Right-click operation" in "Operating status overview screen" (chapter 4.1)
18			Add group	Add group dialog	Unavailable	(3) of "Menu operations" in "Operating status overview screen" (chapter 4.1)
19			Edit machine	Edit machine screen	Refer to (*3)	"Right-click operation" in "Operating status overview screen" (chapter 4.1)
20			Delete group/machine	-	Unavailable	(2) and (4) of "Menu operations" in "Operating status overview screen" (chapter 4.1)
21		Plant operation information view	Plant information	Select plant	Available	Display items in "Operating status overview screen" (chapter 4.1)
22		Machine view	Utilization and availability	Switch between utilization and availability	Available	
23		Edit machine screen (*2)	Machine information	Machine name, description, image	Unavailable	"Edit machine screen" (chapter 4.1)
24			Data collection settings	Data storing setting	Unavailable	Setting items in "Edit machine screen" (chapter 4.1)
25				MQTT setting	Unavailable	
26				Operating Status	Refer to (*4)	
27			Aggregate setting	Aggregation exclusion setting	Unavailable	

No.	Screen in which setting is made		Setting item	Setting item details	Setting operation availability during machine monitoring	Reference (NC Machine Tool Optimizer (Pro/Lite) User's Manual)
	Application screen	Setting screen				
28	Operating status overview screen	Edit machine screen (*2)	Product plan	Planning method	Available	Setting items in "Edit machine screen" (chapter 4.1)
29				Manual input (Planned cycle time, No. of works planned, production period)	Unavailable	
30				Plan folder setting	Unavailable	
31				File setting	Available	
32			Operating Status (*4)	Operation classification (Operation/ Non-operation) setting	Unavailable	Setting items in "Operating status setting screen" (chapter 4.1)
33				Location name	Unavailable	
34				Data type	Unavailable	
35				Common to all part system, AND setting	Unavailable	
36		Edit group screen (*3)	Group information	Group name, description, display color	Unavailable	Setting items in "Edit group screen" (chapter 4.1)
37			Enroll machine	-	Unavailable	
38			Remove machine	-	Unavailable	
39	Production results screen	Aggregate operation button	Production plan setting button	-	Available	Display items in "Production results screen" (chapter 4.2)
40	Achievement output screen	Production results	Machining total tab	Display toggle	Available	"Production results for each plant" in "Achievement output screen" (chapter 4.1)
41				Including non-cycle time	Available	

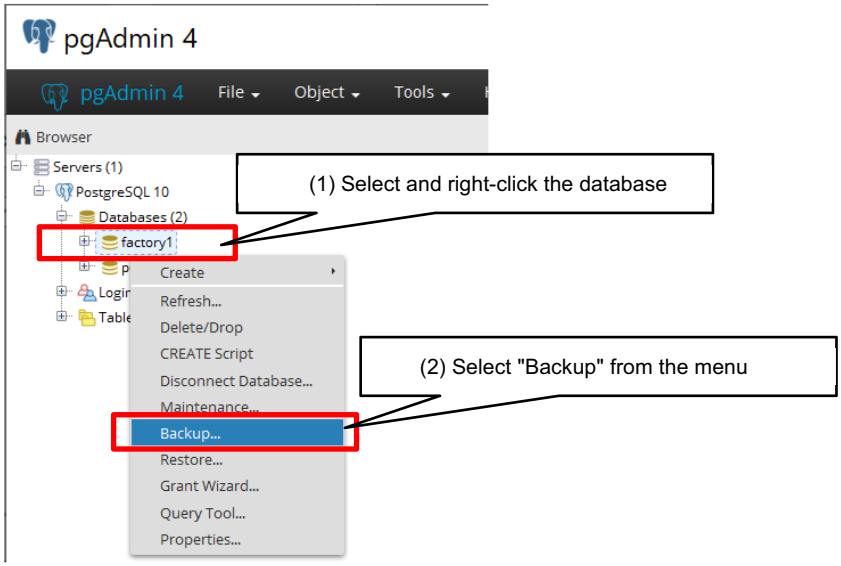
12.1 Procedure to Change Settings

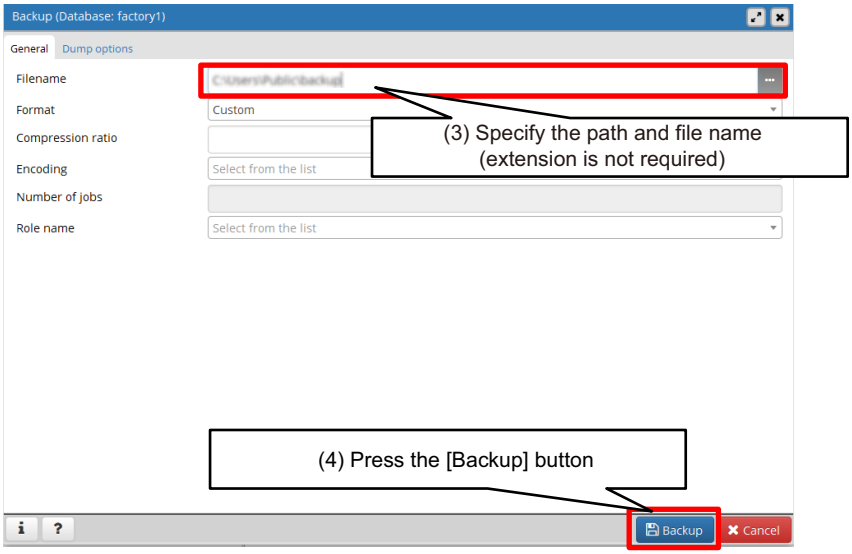
The procedures ((1) to (5)) to change settings (of the setting items whose setting operation availability is "Unavailable" in the table above) after starting operation (machine monitoring) with NC Machine Tool Optimizer are described below.

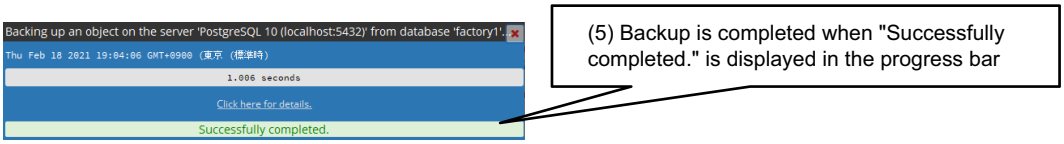
Operating procedure

(1) Close all application screens.

(2) Backup the databases (PostgreSQL) created in chapter 10.3 and 10.4 with PgAdmin4. Backup all the databases with "Backup" in the right-click menu.







(3) Configure the following settings when adding a plant or machine.
   (a) To add a plant, configure the settings in chapter 10.4.
   (b) To add a machine, configure the collection settings in chapter 11.

(4) Restart NC Machine Tool Optimizer, and configure each setting.
   (a) For the setting procedures, refer to the following depending on the setting item.

      NC Machine Tool Optimizer (Pro/Lite) User's Manual

   (b) Do not update the display of the application screen or aggregate during the settings.

(5) After the settings, close all the application screens, and restart them. Machine monitoring or aggregating operation can be performed with the changed setting contents.

MEMO

13 RESTRICTIONS

- After installing an MTConnect adapter, MTConnect agent, or OPC UA server, or changing settings, restart the computer.
- Do not uninstall or overwrite install related software while NC Machine Tool Optimizer or NC Machine Tool Connector is open.

MEMO

14 TROUBLESHOOTING

If NC Machine Tool Optimizer does not operate in accordance with the specifications even after the setup is completed, perform the troubleshooting appropriate for the problems.

No.	Problem	Type	Troubleshooting	Reference
1	The current day's utilization and operating status time series are not display.	Basic items	Check that the latest publishing data definition file for each machine is set on the Edit machine screen.	Setting items in "Edit machine screen" (chapter 4.1 of the following manual) NC Machine Tool Optimizer (Pro/Lite) User's Manual
		When the result of the collection period is not displayed by pressing the Aggregate button.	When a collection error of MTConnect data occurs in NC Machine Tool Connector monitor diagnostics, enable the fallback settings in the MTConnect setting screen.	"MTConnect Setting Screen" (chapter 7.6 of the following manual) NC Machine Tool Connector User's Manual
			Check that the collection data settings are set correctly.	"Setting data items" in "Collection Settings When Using Mitsubishi Electric CNC" (chapter 11.1)
		When the result of the collection period is displayed by pressing the Aggregate button.	Check that MQTT broker (Mosquitto) is started up (running) as a Windows service.	Use the Windows administrative tools (services).
			Check that the MQTT publish settings of NC Machine Tool Connector are set to enabled.	"Data Publish Settings" (chapter 7.10 of the following manual) NC Machine Tool Connector User's Manual
			Check that the settings in "MQTT Communication Settings" (chapter 11.2) are correct.	"MQTT Communication Settings" (chapter 11.2)
2	The result of the collection period is not displayed when pressing the Aggregate button.	Basic items	Check that PostgreSQL is started up (running) as a Windows service.	Use the Windows administrative tools (services).
			Check that the access table (Data storing setting) for each machine is set on the Edit machine screen.	- "Machine Adding Settings" (chapter 11.2) - "Edit machine screen" (chapter 4.1 of the following manual) NC Machine Tool Optimizer (Pro/Lite) User's Manual
		Data logging settings	Check that the data logging settings are enabled in NC Machine Tool Connector.	"Data Logging Settings" in "Data Logging Settings" (chapter 7.9 of the following manual) NC Machine Tool Connector User's Manual
			Check that the PostgreSQL database, account, and password are set correctly in the NC Machine Tool Connector database settings.	"Database Settings" in "Data Logging Settings" (chapter 7.9 of the following manual) NC Machine Tool Connector User's Manual
3	Does not operate correctly after changing the collection data settings.	The set data does not display correctly.	Perform monitor diagnostics in NC Machine Tool Connector. If the collection data is not displayed, perform the procedures in troubleshooting No. 1 and 2 and review all of the settings.	
4	Cannot select other plants (name) in the Edit plant screen.	When the settings of the database for the plant are incorrect	Check that the database (PostgreSQL) created for the plant is correctly specified in the application configuration.	"Editing the Plant" (chapter 10.4)
			Check that the database for the plant is created correctly.	Chapter 10.4
			Temporarily stop the NC Machine Tool Connector service, and restart the PostgreSQL service. After restarting the PostgreSQL service, restart the NC Machine Tool Connector service.	Use the Windows administrative tools (services).
5	Utilization, etc. does not display correctly.	When NC Machine Tool Optimizer and databases are connected to multiple and different computers.	Check that the Windows time and date settings for all computers using NC Machine Tool Optimizer match. Revise the time and date settings if they do not match.	Chapter 2
		The operation statuses of other plants are not displayed in the Operating status overview screen	Select your preferred period, push the Aggregate button, and check if utilization, etc. is displayed correctly in the collection results. If the problem is not resolved, restart NC Machine Tool Optimizer.	-

No.	Problem	Type	Troubleshooting	Reference
6	To update all the contents displayed in the Operating status overview screen to the newest status	When the plant, machine, and group settings have been changed When the update button of the tree display was pushed	Depending on the settings changed, all the contents on the screen may not be updated. Check that the plant, machine, and group information is displayed correctly on the Operating status overview screen. Select your preferred period, push the Aggregate button, and check if utilization, etc. is displayed correctly in the collection results.	"Operating status overview screen" (chapter 4.1 of the following manual) NC Machine Tool Optimizer (Pro/Lite) User's Manual
7	An error message is displayed immediately after starting the application	Error message contents: "Unable to connect to the database."	Check that the database specified in db_setup.bat and the database specified in the application configuration match.	Chapter 10.3 "Messages at startup" in "Operation Specifications" (chapter 3.2 of the following manual) NC Machine Tool Optimizer (Pro/Lite) User's Manual
		Error message contents: "Database hasn't been set up."	db_setup.bat may not be running, or the versions of the contents of the application and the database may be inconsistent. Check that the database has been setup correctly.	
		An error is displayed even when db_setup.bat is executed.	Using pgAdmin, select "Database" on the tree. Right-click, and select "create" from the menu to create the database again. Set up PostgreSQL again by following the procedure in chapter 10.1.	Chapter 10.1 "Messages at startup" in "Operation Specifications" (chapter 3.2 of the following manual) NC Machine Tool Optimizer (Pro/Lite) User's Manual
8	The operation status of the devices connected by MQTT data communication are not displayed correctly.	The devices are always in a power OFF status.	The field name of the access table and the data item may be different. Check that the field name of the access table and the data item match.	"Machine Adding Settings" (chapter 11.2)
9	Other problems and when the application does not operate correctly	-	- Check that the configuration file of the application is correct. - Contact NC Machine Tool Optimizer support.	Chapter 10.1

15 APPENDIX

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(2) Prism
(3) .NET Core Libraries (CoreFX)
(4) M2Mqtt
(5) Npgsql
(6) Unity Container
(7) CommonServiceLocator
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MEMO

REVISIONS

Revision date	Manual No.	Revision details
Aug. 2021	IB(NA)1501673-A	First edition created.
Jan. 2022	IB(NA)1501673-B	Revised the procedures to create an SQL file for data logging. Added the description on OPC UA supporting machines. Corrected errors.
Dec. 2022	IB(NA)1501673-C	Revised the number of connectable machines for the Pro version. Added the description on Optimizer Setting Tool. Added the description on the database data regular deletion tool. Added the description on sub plants. Added the system configuration when connecting maximum of 210 units. Revised INSTALLATION AND SETUP FLOWCHART. Revised the installation procedure for C++ Agent. Revised the installation procedure for Visual C++ Redistributable Packages, PostgreSQL, and NC Machine Tool Optimizer. Added the installation procedure for Mosquitto (MQTT broker). Added the uninstallation procedure for NC Machine Tool Optimizer. Revised the setup procedure for NC Machine Tool Optimizer and PostgreSQL. Added the setup procedure for Mosquitto. Revised the description on Adding Plants to PostgreSQL. Revised the description on MQTT communication settings. Revised the description on Machine Adding Settings for Each Plant. Corrected errors.
Apr. 2024	IB(NA)1501673-D	Fixed bugs in Optimizer Setting Tool. Revised the description on the PostgreSQL version. Corrected errors.

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