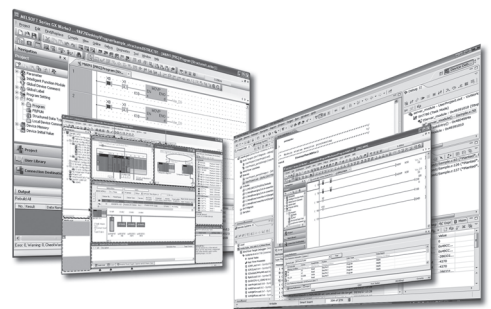


Engineering Software

# MELSOFT MX OPC Server DA Version 7 Operating Manual

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-SW7DND-OPCDAS-E







# SAFETY PRECAUTIONS

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(Read these precautions before using this product.)

Before using this product, please read this manual carefully and pay full attention to safety to handle the product correctly. The precautions given in this manual are concerned with this product only. For the safety precautions for the programmable controller system, refer to the user's manual for the module used and MELSEC iQ-R Module Configuration Manual. In this manual, the safety precautions are classified into two levels: "⚠ WARNING" and "⚠ CAUTION".

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## **WARNING**

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

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## **CAUTION**

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

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

Observe the precautions of both levels because they are important for personal and system safety.

Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

## [Design Precautions]

---

### **WARNING**

- When data change or mode change is performed from a personal computer to a running module, create an interlock circuit outside the programmable controller, motion system, GOT, and robot to ensure that the whole system always operates safely.  
Furthermore, for the online operations performed from a personal computer to a module, the corrective actions against a communication error due to such as a cable connection fault should be predetermined as a system.
- 

## [Startup and Maintenance Precautions]

---

### **CAUTION**

- The online operations performed from a personal computer to a running programmable controller CPU, motion CPU, and GOT (program change while a CPU module is in RUN state, operating status change such as RUN-STOP switching, and remote control operation) have to be executed after the manual has been carefully read and the safety has been ensured.
-

# CONDITIONS OF USE FOR THE PRODUCT

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- (1) Mitsubishi programmable controller ("the PRODUCT") shall be used in conditions;
- i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
  - ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.
- (2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries. MITSUBISHI SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI'S USER, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.

("Prohibited Application")

Prohibited Applications include, but not limited to, the use of the PRODUCT in;

- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

Notwithstanding the above, restrictions Mitsubishi may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTS are required. For details, please contact the Mitsubishi representative in your region.

# INTRODUCTION

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Thank you for purchasing the engineering software, MELSOFT series.

This manual describes the programming and functions required when using MELSOFT MX OPC Server DA.

Before using this product, please read this manual carefully, and develop familiarity with the functions and performance of MELSOFT MX OPC Server DA Configuration Tool to handle the product correctly.

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# RELEVANT MANUALS

Manual name [manual number]	Description	Available form
MELSOFT MX OPC Server DA Version 7 Operating Manual [SH-081860ENG] (this manual)	Explains the system configurations, function descriptions, and usages of a MELSOFT MX OPC Server DA.	PDF
MELSOFT MX OPC Server UA Version 3 Operating Manual [SH-081859ENG]	Explains the system configurations, function descriptions, and usages of a MELSOFT MX OPC Server UA.	e-Manual PDF



e-Manual refers to the Mitsubishi Electric FA electronic book manuals that can be browsed using a dedicated tool.

e-Manual has the following features:

- Required information can be cross-searched in multiple manuals.
- Other manuals can be accessed from the links in the manual.
- Hardware specifications of each part can be found from the product figures.
- Pages that users often browse can be bookmarked.
- Sample programs can be copied to an engineering tool.



# 1 Introduction to MX OPC Server

The MX OPC Server 7.00 is a Mitsubishi I/O driver OPC Data Access (DA) and Alarm/Events (AE) server that provides the interface and communications protocol between a wide range of Mitsubishi hardware and your process control software.

Mitsubishi drivers incorporate the following attributes to provide flexibility and ease-of use:

OLE for Process Control (OPC) compliance.

The MX OPC Server consists of the following components:

- MELSOFT MX OPC Server DA Configuration Tool
- MX Runtime

The MX OPC Server complies with version 3.00 of the OLE for Process Control (OPC) Data Access standard, version 1.01 of the OPC XML Data Access standard, and version 1.10 of the OPC Alarm and Events standard. Any OPC client application can access process hardware data through the I/O Server.

## 1.1 Compatibility with Former Versions

The MX OPC Server 7.00 is fully backward compatible with previous versions (6.09, etc.). The configuration databases from all previous versions can be used. The MX OPC Server 7.00 Configurator provides an automated conversion from the older configuration database into the current structure. All the database content will be preserved and converted into the new structure if needed.

The MX OPC Server 7.00 configuration database cannot be used in the previous versions.

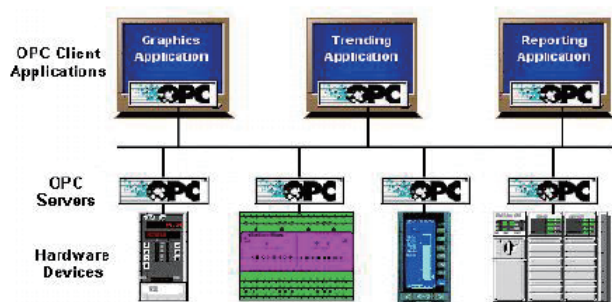
The MX OPC Server does not support importing of CSV configurations generated by a different version. Although this process is partially successful in some versions, the 7.00 version will not import a CSV file created before version 7.00 due to major changes in the database structure.

To preserve the configuration, the user can import the CSV file to a MDB database using the original configurator, upgrade the MDB database using the MX OPC Server 7.00 configurator and then export to CSV.

## 1.2 What Is OLE for Process Control

OLE™ for Process Control (OPC) is a standards-based approach for connecting data sources (e.g., PLCs, controllers, I/O devices, databases, etc.) with HMI client applications (graphics, trending, alarming, etc.). It enhances the interface between client and server applications by providing a universally supported and well-documented mechanism to communicate data from a data source to any client application. Included are not only a detailed guide on how to pass the data, but also specific information on other attributes to supplement those data, such as range information, data type, quality flags, and date and time information. The figure below shows the OPC Architecture, which was introduced by the OPC Foundation.

By following the OPC Architecture, a device needs only one standard driver, which is an OPC-compliant server. All OPC-compliant client applications can then be connected to that device, either locally or over a network. Furthermore, connections can be made to more than one OPC server at the same time.



**OPC-Based Client-Server Architecture**

Any OPC client application can connect to any OPC server. In other words, OPC offers true Plug-and-Play capability in the fields of HMI and industrial automation. OPC server types include OPC Data Access (DA), OPC Alarm and Events (AE), and OPC Historical Data Access (HDA).

## 1.3 MX OPC Runtime

The MX OPC Runtime maintains the driver's communication channels, devices, and data tags, performs all required functions for communicating with the process hardware, and exposes the methods and properties to other applications.

In addition to performance improvements, the MX OPC Runtime provides the following functionality:

- Supports OLE for Process Control (OPC)
- Provides local configuration and control
- Supports telephone modem communication
- Provides phasing
- Enables or disables Individual devices and tags
- Provides QuickFail Logic
- Provides latched data
- Provides a time/date stamp for data and alarms
- Supports individual bit reads
- Provides advanced diagnostics.
- MX Component.

### Restriction

If a remote password is set, values cannot be monitored from MX OPC Server DA.

## Troubleshooting

The following explains common problems and their corrective actions for MX OPC DA Server and Configuration Tool.

Symptom	Check point	Corrective action
Ethernet communication (TCP) is slow on Windows Server.	Is the ECN function enabled in the Windows Server setting when communicating with a MELSEC iQ-R series CPU and RJ71EN71 via Ethernet communication (TCP) in Windows Server 2012?	Disable the ECN function with the following procedure. ❶ Enter 'netsh interface tcp show global' in the command prompt to check the current setting (with administrator authority). ❷ When the ECN function is enabled, enter 'netsh interface tcp set global ecncapability=disabled' to disable the ECN setting.
	Is the CPU or module supported?	Replace the CPU or module with another one as necessary.
	Is the firmware version of MELSEC iQ-R series appropriate?	Upgrade the firmware version of MELSEC iQ-R series to 0.8 or higher.

## 1.4 MELSOFT MX OPC Server DA Configuration Tool

The I/O Driver Configurator is a client application to the I/O Server with a graphical user interface. The MELSOFT MX OPC Server DA Configuration Tool accesses the I/O Server and lets you view and modify properties of communication channels, devices and data tags.

The MELSOFT MX OPC Server DA Configuration Tool provides the following:

- The server connection - only local I/O Server.
- The tree control for an overall view of your system configuration.
- A Statistics View for displaying the statistics of your I/O driver while it is running. Statistics are provided for devices.
- A Configuration View for displaying and modifying device and tag properties.
- A Monitor View for displaying real-time data tag values during runtime mode.
- An interface to the MX Component Communication Setting Wizard for importing or creating new configurations.
- Support for telephone modem communication.
- Templates for configuring default alarm settings.
- Simulation for tags and alarms using a built-in function pattern.

# 1.5 MX OPC Server Quick Start

The objectives of this Quick Start section are to:

1. Start the MELSOFT MX OPC Server DA Configuration Tool.
2. Set up the driver.
3. Set up a communication channel.
4. Create and configure a new device.
5. Create and configure a new data tag.
6. Start the I/O Server driver.

## Starting the MELSOFT MX OPC Server DA Configuration Tool

Once you have installed MX OPC Server, start the MELSOFT MX OPC Server DA Configuration Tool:

### Operating procedure

1. From the Windows Start menu, select [All Programs] ⇒ [MELSOFT] ⇒ [MX OPC DA] ⇒ [MELSOFT MX OPC Server DA Configuration Tool].

Note: The name of the program folder may vary depending on your local settings (e.g. language settings).

2. This opens the Configurator for the MX OPC Server, as shown in the figure below. The screen consists of a split window with a tree control view in the left-hand pane and a configuration view in the right-hand pane. The Configurator provides a default standard configuration database called MXConfigurator.mdb, which contains a sample configuration project.



Configurator Screen

The MELSOFT MX OPC Server DA Configuration Tool is a client of the MX OPC Runtime that accesses the I/O Server and lets you view and modify properties for devices and data tags. The Address Space tree control in the Configurator sets the properties and connection parameters for the following hierarchy of server objects:

- Devices: A device is a hardware device or station that uses the I/O driver to communicate with a client PC. The device item contains the properties and methods that govern the behavior of a device. A device is visible to the OPC client.
- Data tags: A data tag is an object that makes device data accessible to OPC clients. Data tags can be logically organized into groups (folders).

# Setting up the driver

The table below provides a general overview of the steps necessary for setting up your I/O driver.

**1.** Know your process hardware:

- What device does the driver communicate with?
- What type of cable are you using?
- What is the station number for each device?
- What addresses do you want to access and what data do you want to retrieve?

**2.** Know the hardware parameters:

Example for serial communication

- COM Port
- Baud Rate
- Stop Bits
- Data Bits
- Parity

**3.** Choose the method of configuration:

Use the MELSOFT MX OPC Server DA Configuration Tool

**4.** Configure the I/O Driver:

Configuring Communication Channels

Configuring devices

Setting default values for driver, channels, devices and tags

Configuring tags

**5.** Check the I/O Driver Status:

Using monitoring mode

# Creating communication channels

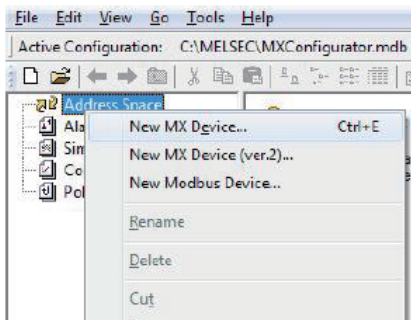
In the following examples, we will create and configure new channels for both the Serial and Ethernet communication paths.

## Serial Communication Channel

To create a new Serial communication path:

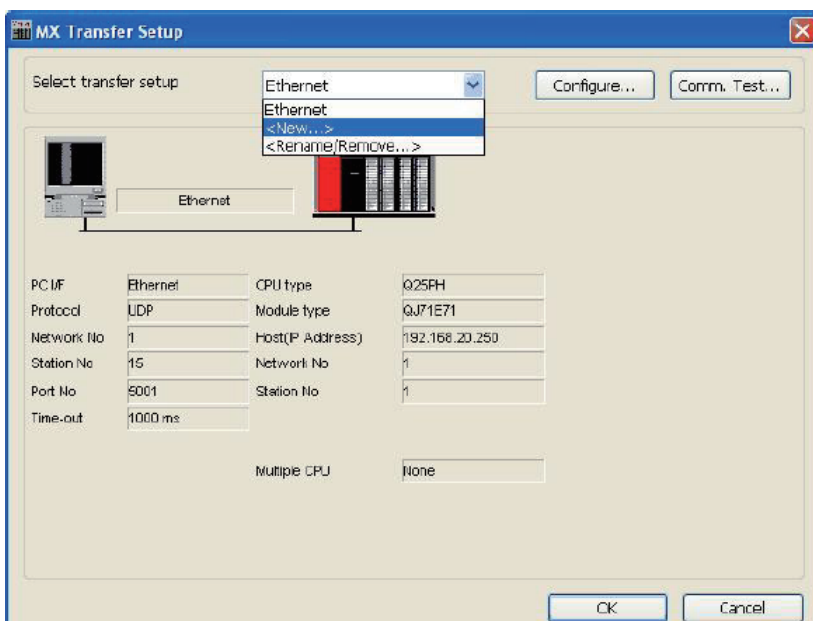
### Operating procedure

1. Right-click the Address Space tree control of the Configurator screen and select New MX Device from the pop-up menu, as shown in the figure below.



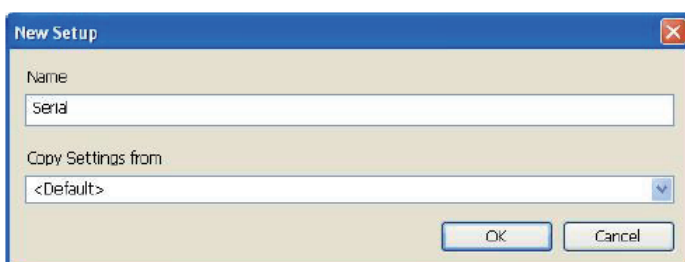
#### Adding a New MX Device

2. The MX Transfer Setup dialog will be shown. You can either select an existing transfer setup, or (as in the example below) select <New...> to create a new transfer setup.



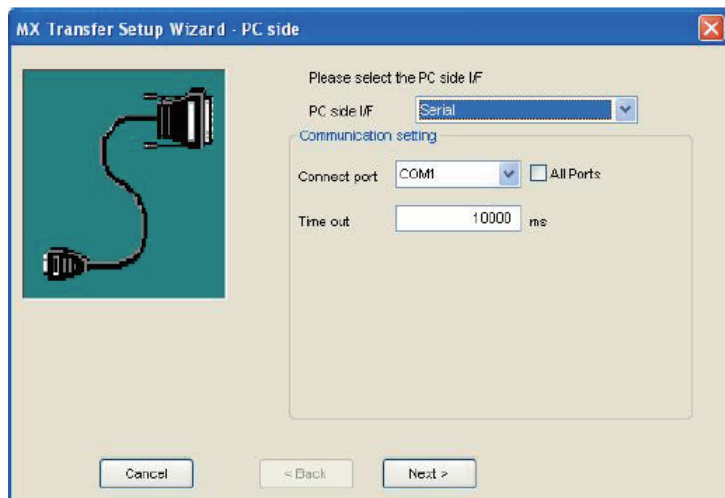
#### MX Transfer Setup dialog

3. The New Transfer Setup dialog will appear. Enter a name for the new transfer setup (Serial in the picture below) and select <Default...> as the template, then click OK.



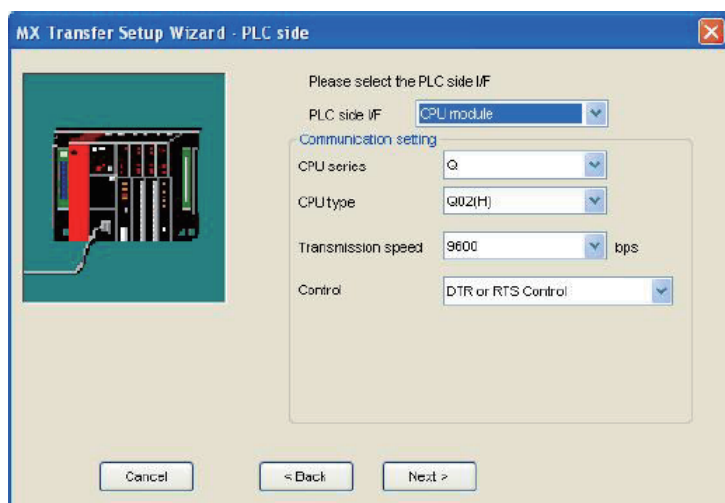
#### Entering a transfer setup name

4. The new transfer setup can now be edited using the Communication Setting Wizard, as shown in the figure below. Specify the communication type to use on the PC side, as shown in the figure below. In the PC Side I/F field, select the Serial connection type from the drop-down list. By default, you will only see the physical COM ports that are actually available on your computer. If you are preparing a configuration to be used on another computer which has different COM ports, check all ports box to show a full list of possible serial ports. After entering the details, click Next to continue.



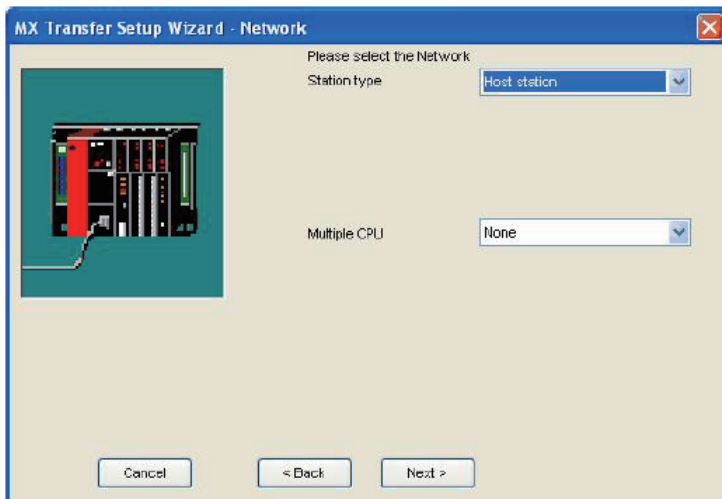
#### Setting up a Connection for the PC Side

5. Now you must specify the communication type to use on the PLC (device) side, as shown in the figure below. In the PLC Side I/F field, select a communication type from the drop-down list as the connection type to use for the selected channel. Click Next to continue.



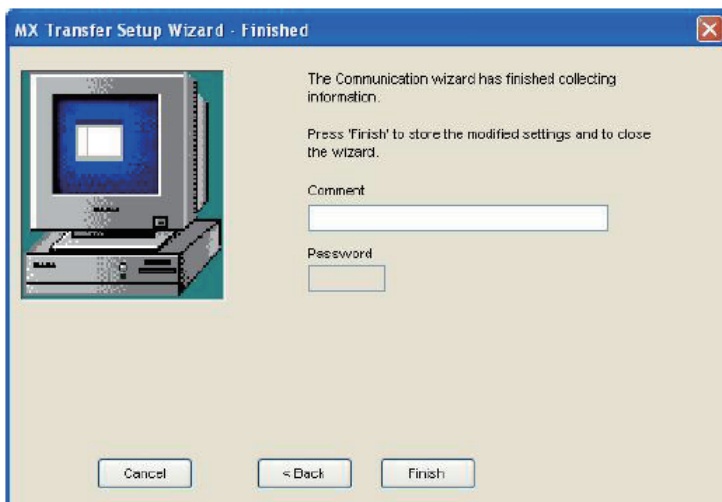
#### Setting up the Connection for the PLC Side

6. Select the network Station Type and CPU Type (if applicable) from the respective drop-down lists, as shown in the figure below. Click Next to continue.



#### Configuring Network Settings

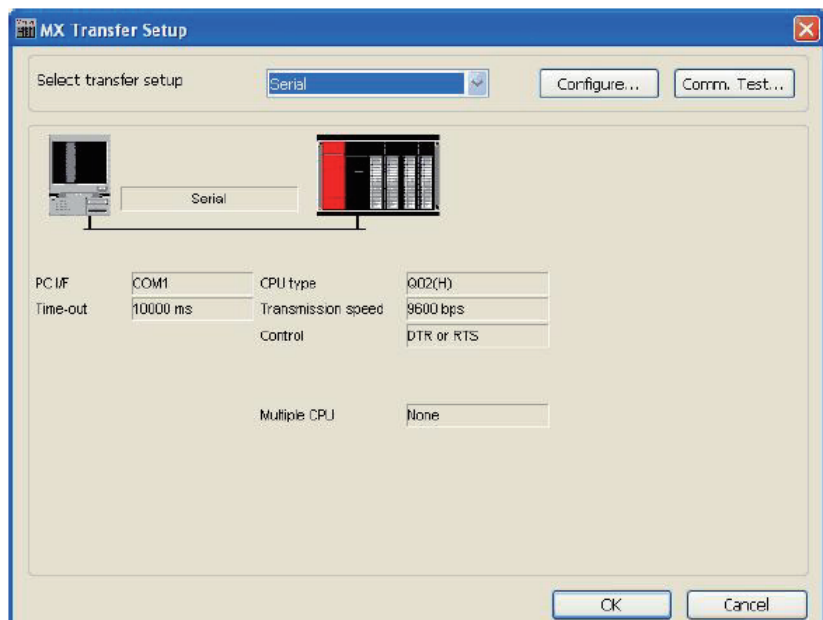
7. Click the Finish button to complete the communication channel setup, as shown in the figure below.



#### Completing Channel Setup



8. The MX Transfer Setup dialog box appears with the new transfer setup selected, as shown in the figure below. Each network node is shown graphically, with the node properties shown under the graphic. The left-hand side of the dialog lists the configuration properties for the PC side. You can double-click the image of a node (or double-click the properties list) to edit the configuration properties. The right-hand side of the dialog lists the configuration properties for the PLC device side. You can double-click the image of the PLC device (or double-click the configuration properties list) to edit the PLC device side configuration properties. You can also click the Configure button to return to the Communication Setting Wizard. Click the OK button to save the changes.



**MX Transfer Setup dialog (configured)**

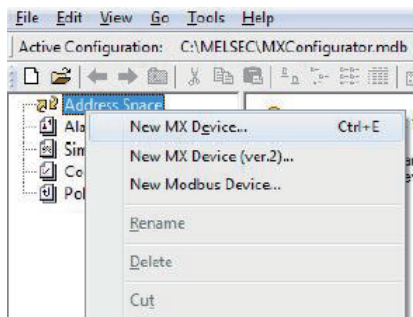
Note: For complete information about channel configuration properties and the Communication Setting Wizard, see "Configuring the address space".

## Ethernet Communication Channel

To create a new Ethernet communication path:

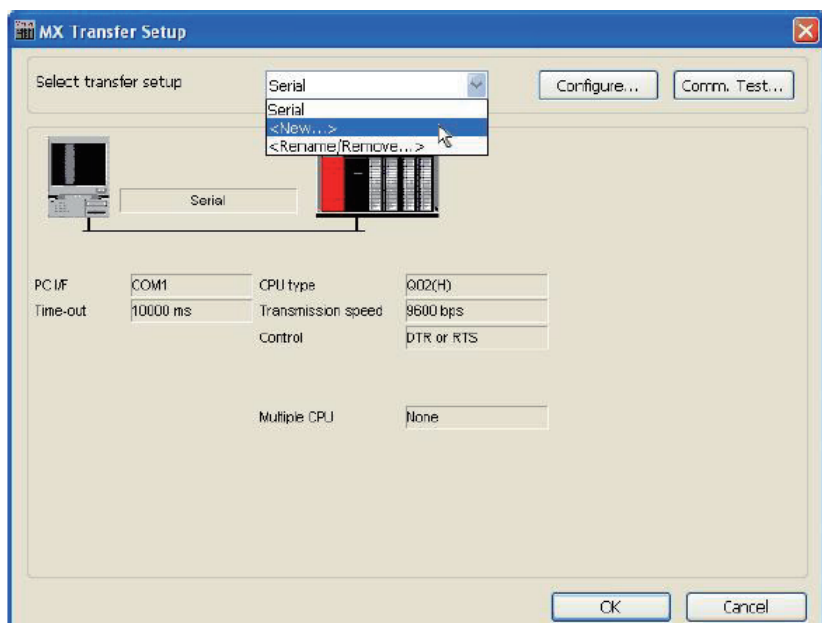
### Operating procedure

1. Right-click the Address Space tree control of the Configurator screen and select New MX Device from the pop-up menu, as shown in the figure below.



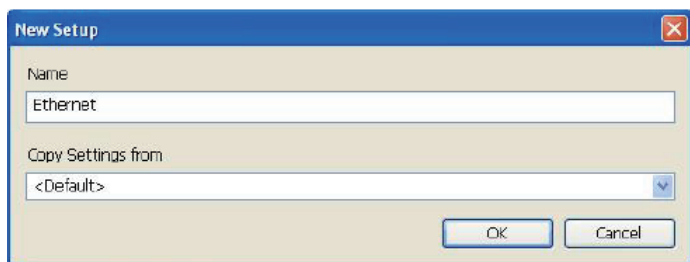
#### Adding a New MX Device

2. The MX Transfer Setup dialog will be shown. You can either select an existing transfer setup, or (as in the example below) select <New...> to create a new transfer setup.



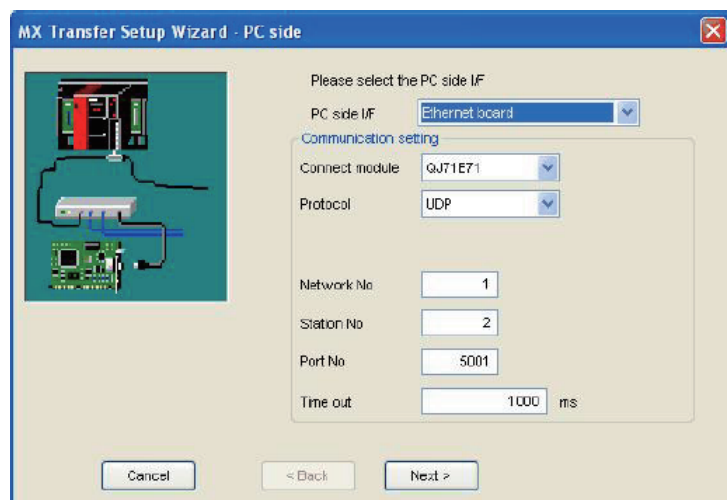
#### MX Transfer Setup dialog

3. The New Transfer Setup dialog will appear. Enter a name for the new transfer setup (Ethernet in the picture below) and select <Default...> as the template, then click OK.



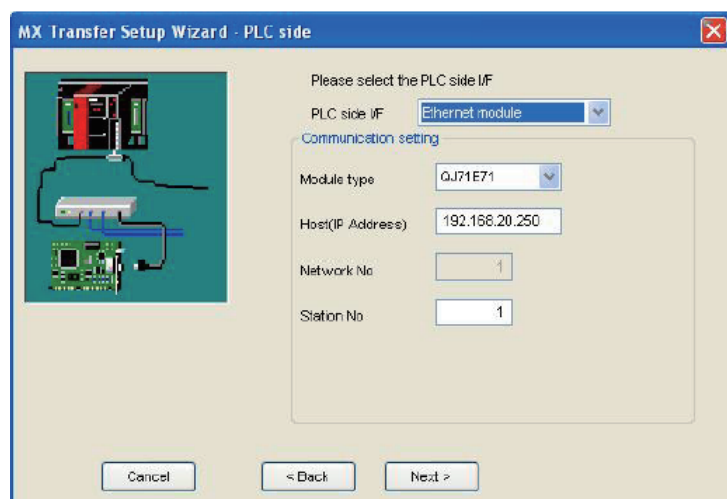
#### Entering a transfer setup name

4. The new transfer setup can now be edited using the Communication Setting Wizard, as shown in the figure below. Specify the communication type to use on the PC side, as shown in the figure below. In the PC Side I/F field, select the Ethernet board connection type from the drop-down list. Select a module number from the Connect module drop-down list. Click Next to continue.



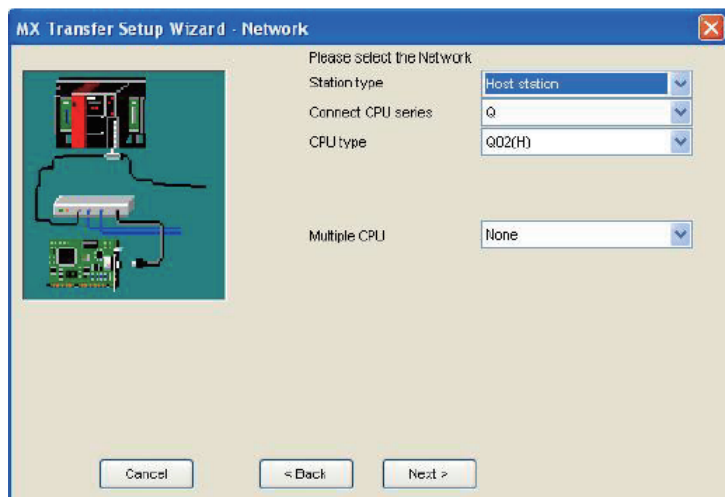
#### Setting up the Connection for the PC Side

5. Now you must specify the communication type to use on the PLC (device) side, as shown in the figure below. In the PLC Side I/F field, select Ethernet module from the drop-down list as the connection type to use for the selected channel. Specify a Host name and a Port number. Click Next to continue.



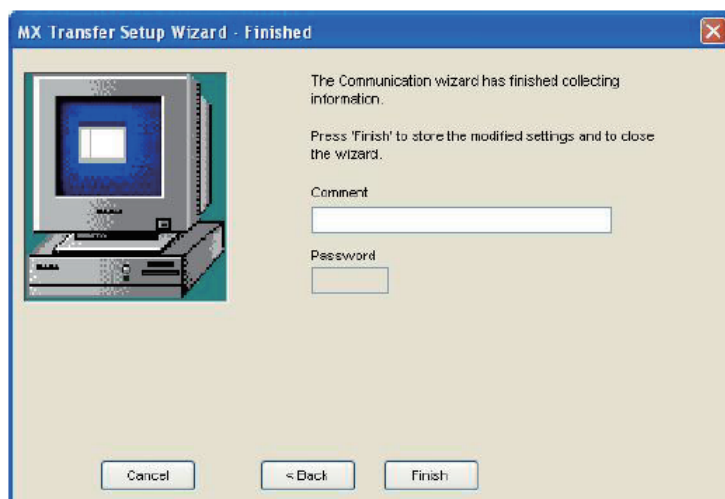
#### Setting up the Connection for the PLC Side

6. Select the network Station Type and CPU Type (if applicable) from the respective drop-down lists, as shown in the figure below. Click Next to continue.



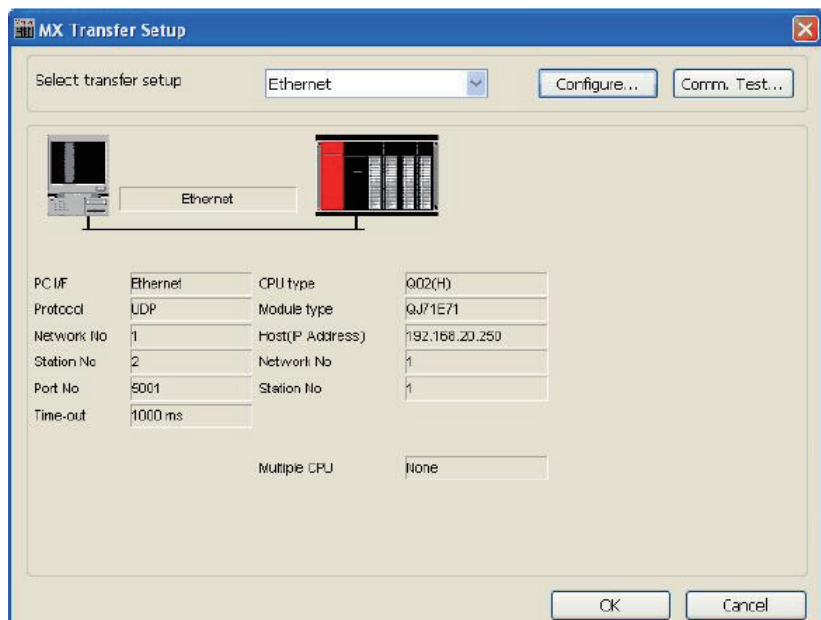
#### Configuring Network Settings

7. Click the Finish button to complete the communication channel setup, as shown in the figure below.



#### Completing Channel Setup

8. The MX Transfer Setup dialog box appears with the new transfer setup selected, as shown in the figure below. Each network node is shown graphically, with the node properties shown under the graphic. The left-hand side of the dialog lists the configuration properties for the PC side. You can double-click the image of a node (or double-click the properties list) to edit the configuration properties. The right-hand side of the dialog lists the configuration properties for the PLC device side. You can double-click the image of the PLC device (or double-click the configuration properties list) to edit the PLC device side configuration properties. You can also click the Configure button to return to the Communication Setting Wizard. Click the OK button to save the changes.



**MX Transfer Setup dialog (configured)**

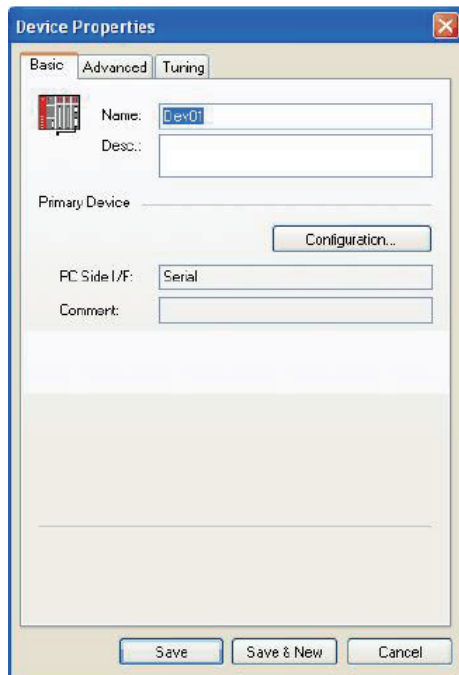
Note: For complete information about channel configuration properties and the Communication Setting Wizard, see "Configuring the address space".

# Configuring a new device

In the previous section, we used the Communication Setting Wizard to set up Serial and Ethernet communication channels between the PC and PLC. Once you have completed the wizard:

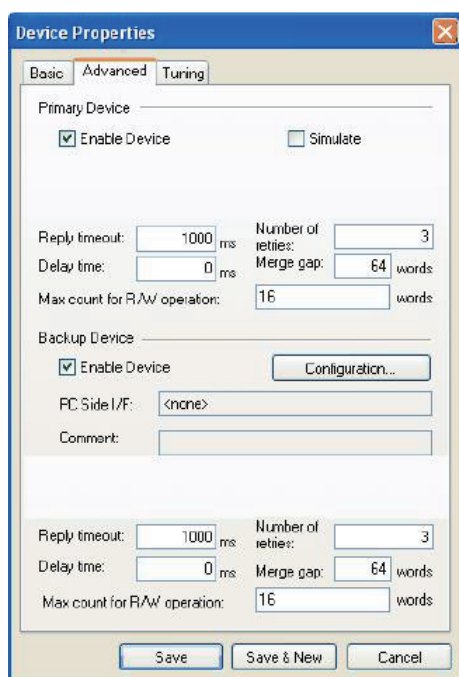
## Operating procedure

1. The Basic tab of the Device Properties dialog box appears, as shown in the figure below. The communication type (e.g. Serial, Ethernet, etc.) is shown in the PC Side I/F field, as shown in the figure below.



Configuring Device Properties

2. In the Name field, type a name for the new device, and type a description for the device (optional). To specify which connection type and which physical connection (COM) port to use for the selected device, click the Configuration button to launch the Communication Setting Wizard for the Primary device.
3. Click on the Advanced tab to set the advanced parameters for the Primary and Backup devices, as shown in the figure below.

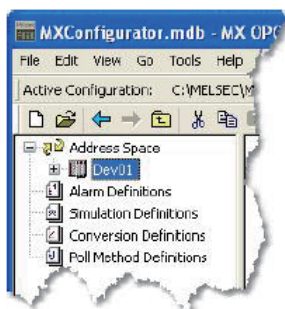


Device Properties: Advanced Tab

4. Check the Enable Device check box to activate the device.

Note: For complete information about device configuration properties, see "Configuring the address space".

5. When you have finished configuring the device properties, click the Save button. The new device appears under the Address Space tree control, as shown in the figure below.



**New Device Created for the Channel**

Note: For complete device configuration properties info, see "Configuring the address space".

## Creating data tags

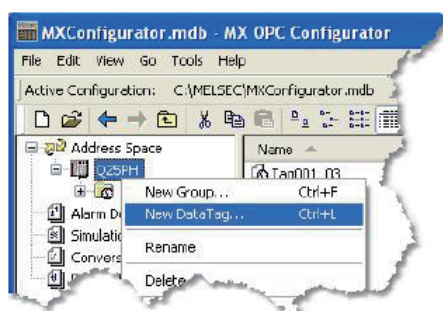
Now you can create a new data tag that the OPC clients can request from the server.

Note: Data tags can be logically organized into groups (folders). You can configure as many folders as required. You can even create sub folders for each group to create a hierarchical organization of tags. See "Groups" for details.

To create a new tag:

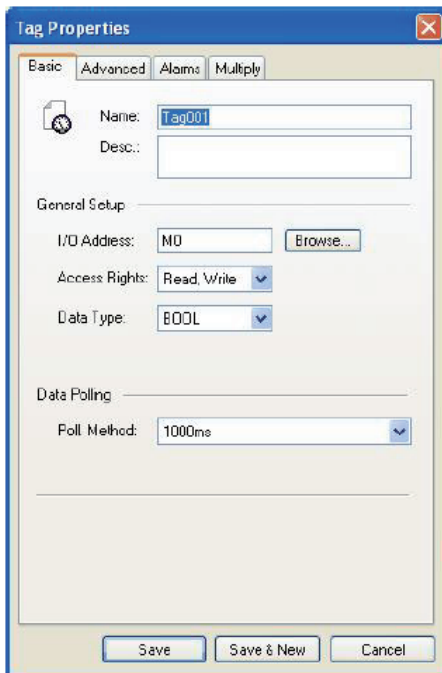
### Operating procedure

1. Right-click on a device in the tree control of the Configurator screen and select New Data Tag from the pop-up menu, as shown in the figure below.



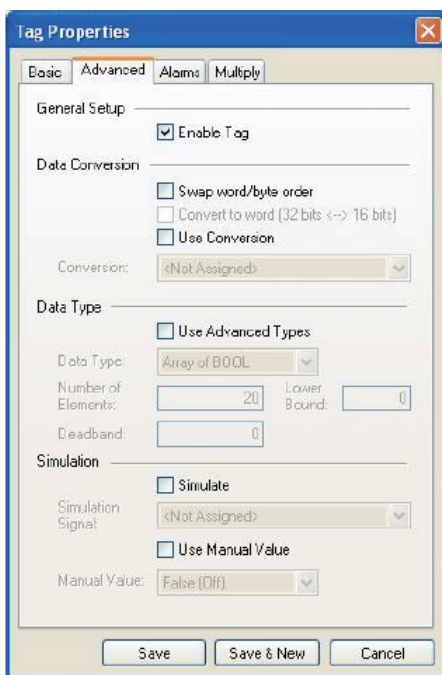
**Adding a New Data Tag**

2. The Basic tab of the Data Tag Properties dialog box appears, as shown in the figure below.



**Configuring Data Tag Properties**

3. In the Name field, type a name for the new tag, and type a description for the tag (optional).
4. Set the parameters for the I/O Address and data Access Rights.
5. Click on the Advanced tab. Check the Enable Tag check box to activate the tag.



**Data Tag Properties: Advanced Tab**

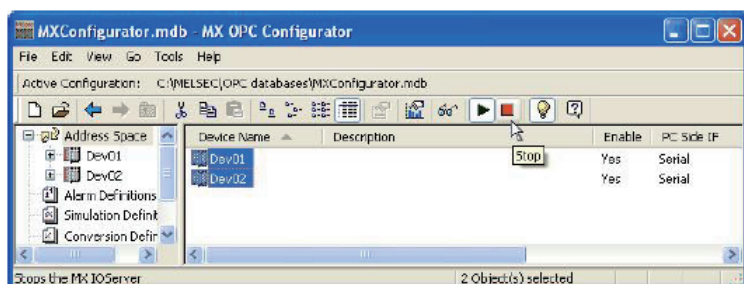
6. Set the Data Conversion and Data Type parameters for the tag.
7. In the Alarms tab of the Tag Properties dialog box, you can check the Generate Alarms check box to make the server generate a limit alarm and/or a digital alarm based on the data item value.
8. When you have finished configuring the tag properties, click the Save button. The new tag appears under the Device tree control.

Note: For complete information about data tag configuration properties, see "Data tags".



## Starting the MX OPC runtime driver

Once you are finished with your device and data tag configuration, you can start the MX OPC Runtime driver by clicking the Start button (green triangle icon) on the Standard toolbar of the MELSOFT MX OPC Server DA Configuration Tool. This enables client/server communication. To stop the driver, click the Stop button (red square icon) on the Standard toolbar, as shown in the figure below.



Starting and Stopping the Driver

# 2 Using the Configurator

This section will describe how to get started with the MELSOFT MX OPC Server DA Configuration Tool, from creating new databases through to the menu and toolbar items available.

## 2.1 Starting the Configurator

To start the MELSOFT MX OPC Server DA Configuration Tool:

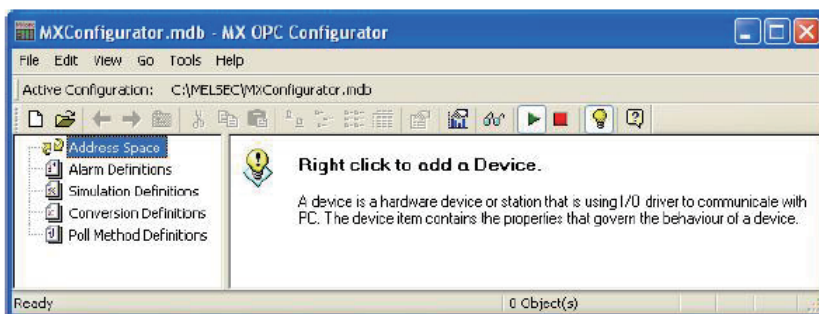
### Operating procedure

1. From the Windows Start menu, select [All Programs] ⇒ [MELSOFT] ⇒ [MX OPC DA] ⇒ [MELSOFT MX OPC Server DA Configuration Tool].

Note: The name of the program folder may vary depending on your local settings (e.g. language settings).

2. This opens the Configurator, as shown in the figure below. The screen consists of a split window with a tree control view in the left-hand pane and a configuration view in the right-hand pane. The Configurator provides a standard format for the configuration database, as well as a sample (default) configuration project. The Configurator also includes a toolbar and menus with many command functions.

Note: When the DisplayHints check box on the General tab of the Options dialog box (see the Tools menu) is checked, helpful tips are displayed in the configuration view, as shown in the figure below.



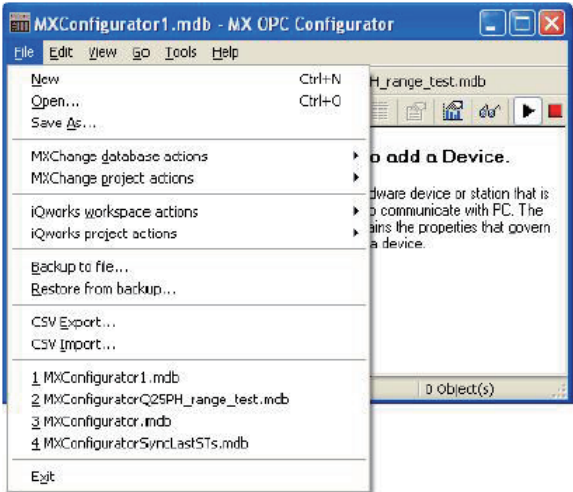
Configurator Screen

# 2.2 Creating Configuration Databases

The Configurator uses Microsoft Access configuration databases. To create a new configuration database in the Configurator:

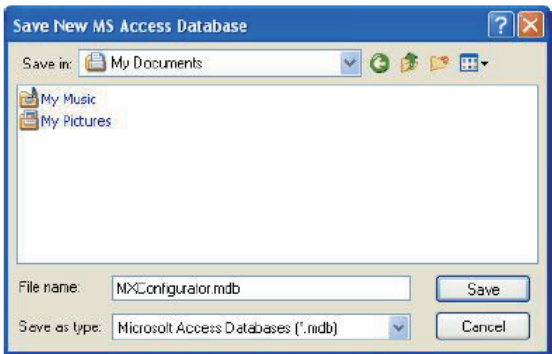
## Operating procedure

1. Select New from the File menu, as shown in the figure below.



### Creating a Configuration Database

2. In the Save New Database dialog box, select the database type from the Save As Type drop-down list, as shown in the figure below. For a Microsoft Access database, the Configurator uses a single.mdb file. Browse for the target directory, give the file a name, and then click the Save button.






















### Saving the New Configuration Database

## 2.3 Toolbars

The Configurator contains two toolbars: a Standard toolbar and a Data Manipulation toolbar.











### Standard toolbar

To show or hide the Standard toolbar, select Toolbars → Standard Buttons from the View menu. The Standard toolbar, shown below, contains the following command buttons.

-  New: Creates a new configuration database.
-  Open: Opens an existing configuration database.
-  Back: Moves the cursor back to the previously selected item.
-  Next: Moves the cursor to the next item in the tree control.
-  Up One Level: Moves up one level in the tree control.
-  Cut: Deletes current selection, sending it to the clipboard.
-  Copy: Copies the current selection to the clipboard.
-  Paste: Pastes the current contents of the clipboard.
-  Large Icons: Displays items as large icons.
-  Small Icons: Displays items as small icons.
-  List: Displays items as a list.
-  Details: Displays items as a list with details.
-  Properties: Shows the properties for the selected item.
-  Statistics Mode: Switches the current dialog view to data statistics mode.
-  Monitor View: Displays OPC server data in a separate pane.
-  Start: Starts the MX I/O server.
-  Stop: Stops the MX I/O server.
-  Make Active: Activates the current configuration for use by the runtime server.
-  Open Manual: Launches the manual for the MX OPC Server DA.

### Data manipulation toolbar

To show or hide the Data Manipulation toolbar, select Toolbars → Data Manipulation Buttons from the View menu. The Data Manipulation toolbar, shown below, contains the following command buttons.

-  New Simulation Definition: Creates a new simulation signal.
-  New Limit Alarm Definition: Creates a new limit alarm definition.
-  New Digital Alarm Definition: Creates a new digital alarm definition.
-  New Conversion Definition: Creates a new conversion definition.
-  New Poll Method Definition: Creates a new poll method definition.
-  New MX Device: Inserts a new MX device under the Address Space tree control.
-  New MX Device (ver. 2): Inserts a new MX Device (ver. 2) under the Address Space tree control.
-  New Modbus Device: Inserts a new Modbus device under Address Space.
-  New Group: Inserts a new group for the selected device.
-  New Data Tag: Inserts a new data tag for the selected device.

## 2.4 Menus

The menu bar of the Configurator contains the following menus:

- File
- Edit
- View
- Go
- Tools
- Help

Note: You can also access many of the menu commands by right-clicking items in the tree control of the Configurator and selecting command functions from the pop-up menus.

### File menu

The File menu commands are listed as follows.

Menu bar	Description
New	Creates a new configuration database.
Open	Opens an existing configuration database Microsoft Access (.mdb) file.
Save As	Saves the current database under a different name as a Microsoft Access (.mdb) file.
iQ Works Workspace Actions	These menu items are used to perform actions on an iQ Works workspace (a group of projects), such as connecting to an iQ Works workspace or removing unused projects from the workspace.
iQ Works Project Actions	These menu items are used to perform actions on the current MX OPC Server project within iQ Works, such as creating new devices by importing the labels from a GX Works2 or GX Works3 project, or synchronising I/O references with the iQ Works workspace.
Backup to File	Saves the present configuration to a new or existing Microsoft Access Database (.mdb).
Restore from Backup	Loads prior configuration from Microsoft Access Database (.mdb).
CSV Export	Exports configuration data from your database to a text file (.txt) or a Microsoft Excel file (.csv). You can specify the delimiters and what to export. For more information, see Exporting configuration data to a CSV file.
CSV Import	Imports data into your configuration database from a text file (.txt) or a Microsoft Excel file (.csv). You can then specify the delimiters and choose from the import settings. This is described in Importing configuration data from a CSV File.
Recent projects	The last four opened projects will be shown in the File menu. Select one of these projects to open it.
Exit	Closes the application. The current configuration database is automatically saved.

### iQ Works workspace actions

These menu items are used to perform actions on an iQ Works workspace (a group of projects), such as opening an iQ Works workspace. For more information, see LINKAGE WITH iQ Works.

The iQ Works workspace actions menu commands are listed as follows.

Menu bar	Description
Open workspace	Open an existing iQ Works workspace and link it to the MX OPC Configurator project. See Connection to a Workspace.
Close workspace	Close the iQ Works workspace and disconnect the current project from iQ Works. For more information, see Disconnection from a Workspace.
Delete unused projects	Select unused MX OPC Configurator projects to be permanently deleted from the workspace. This is described in more detail in Unused project deletion.

## iQ Works project actions








These menu items are used to perform actions on the current MX OPC Configurator project within iQ Works, such as creating new devices by importing the tags from a GX Works2 or GX Works3 project, or synchronising I/O references with the iQ Works workspace. For more information, see [LINKAGE WITH iQ Works](#).

Menu bar	Description
Show changes	Show changes made to linked tags by other applications such as GX Works - see <a href="#">Checking for the Change of a System Label</a> .
Synchronise	Update the MX OPC server configuration and iQ Works workspace with recent changes to labels - see <a href="#">System Label Synchronization</a> .
Import GX Works project	Import one or more PLC projects from the iQ Works workspace as new devices in the MX OPC Configurator project. This is described in <a href="#">Import</a> .
Export devices to GX Works	Export one or more existing MX OPC devices to a GX Works2 or GX Works3 project in the iQ Worksspace. For more information, see <a href="#">Export</a> .
Unlink device	Breaks the link between a local device and a GX Works2 or GX Works3 project in the iQ Works workspace. See <a href="#">Unlinking of an MX Device</a> .
Delete OPC project	Completely deletes the current MX OPC Configurator project from the iQ Works workspace. For more information, see <a href="#">Connected project deletion</a> .
Import CSV	Use this to connect to iQ Works with settings provided by another application. See <a href="#">MXCSV File Import</a> .

## Edit menu

The Edit menu commands are listed in the table below.

Edit Menu Commands

Command	Shortcut Keys	Function
New MX Device		Creates a new MX Device (ver. 1) item.
New MX Device (ver. 2)	—	Creates a new MX Device (ver. 2) item.
New Modbus Device	—	Creates a new Modbus Device item.
New DNP3 Device	—	Creates a new DNP3 Device item.
New IEC 60870-5 Device	—	Creates a new IEC 60870-5 Device item.
Cut		Cuts the selected object from the view and places it on the clipboard.
Copy		Copies the selected object to the clipboard.
Paste		Pastes the last object placed on the clipboard.
Select All		Selects all objects in a list. The selection is shown in the upper-right-hand section of the viewer.
Invert Selection	—	Unselects all selected items and selects all unselected items.
Delete		Deletes the selected object.
Properties		Shows the properties for the selected item.

## Rename

To rename an item, right click on it in the tree view, select Rename from the pop-up menu and type in the new name.

Any application requesting data from the I/O driver uses the device and item names to access points on the device. Each device that the driver communicates with should have a unique device name regardless of the device's channel.

The device name can be up to 32 alphanumeric characters, including underscores ( \_ ) and hyphens ( - ). It cannot begin with a digit.

## View menu

The View menu commands are listed in the table below.

### View Menu Commands

Command	Shortcut Keys	Function
Standard Buttons	—	Display buttons for standard use of application.
Data Manipulation	—	Display buttons related to using data within the application.
Toolbars	—	Shows/hides the Configurator toolbar buttons.
Active Configuration Bar	—	Shows/hides the database bar, which shows the file name and directory path for the active configuration database.
Status Bar	—	Shows/hides the status bar at the bottom of the Configurator window.
Large Icons	[F7]	Displays items as large icons.
Small Icons	[F8]	Displays items as small icons.
List	[F9]	Displays items as a list.
Details	[F10]	Displays items as a list along with detailed information about the configuration of each item.
Statistics Mode	[F11]	Switches the current dialog view to data statistics mode.
Monitor View	[F12]	Displays OPC server data in a separate pane.
Diagnostics	—	Displays Start time, Up time, Last update time, Group count, Server status, Client count, Version and Vendor info.
Sort By	—	Displays a list of options for sorting the columns in the right-hand pane of the screen. The options listed depend on the level within the view.
Show/Hide Columns	—	Displays a list of columns that you can choose to show or hide in the view.
Refresh	[F5]	Refreshes the data for the entire Configurator screen.

## Go menu

The Go menu commands are listed in the table below.

### Go Menu Commands

Command	Shortcut Keys	Function
Back	[Ctrl] + [Alt] + [←]	Moves the cursor back to the previously selected item in the tree control.
Forward	[Ctrl] + [Alt] + [→]	Moves the cursor to the next item in the tree control.
Up One Level	—	Moves the cursor up one level in the tree control.
Next Item	[Alt] + [↓]	Moves the cursor to the next visible item in the tree control.
Previous Item	[Alt] + [↑]	Moves the cursor to the previous visible item in the tree control.
Expand Item	[Alt] + [→]	Expands an item that contains a submenu.
Collapse Item	[Alt] + [←]	Collapses an item that contains a submenu.
Page Up	[Alt] + [PgUp]	Moves the cursor up to the first item in the tree.
Page Down	[Alt] + [PgDown]	Moves the cursor down to the last visible item in the tree.
Home	[Alt] + [Home]	Moves the cursor up to the first item in the tree.
End	[Alt] + [End]	Moves the cursor down to the last visible item in the tree.
Address Space	[F2]	Moves the cursor to the Address Space tree control.
Alarm Definitions	[F3]	Moves the cursor to the Alarm Definitions tree control.
Simulation Definitions	[F4]	Moves the cursor to the Simulation Definitions tree control.
Conversion Definitions	[Shift] + [F3]	Moves the cursor to the Conversion Definitions tree control.
Poll Method Definitions	[Shift] + [F4]	Moves the cursor to the Poll Method Definitions tree control.
Next Pane	[F6]	Moves the cursor to the next pane in the window.
Previous Pane	[Shift] + [F6]	Moves the cursor to the last pane used.

# Tools menu

The Tools menu commands are listed in the table below.

## Tools Menu Commands

Command	Function
Options	Launches the Options dialog box.
Compact/Repair MS Access Database	Opens the Compact/Repair MS Access Database dialog box.

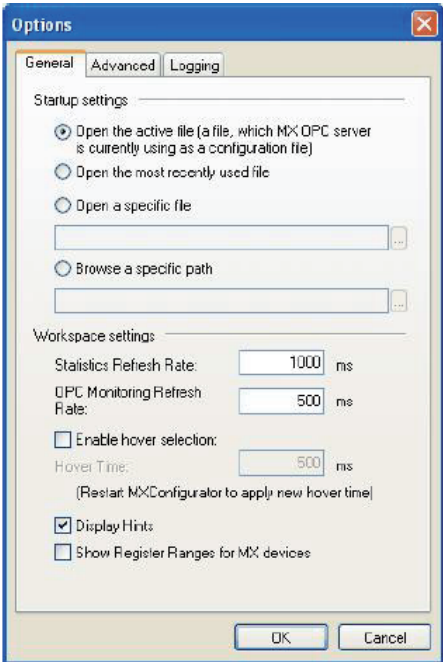
## Options

Selecting Options from the Tools menu opens the Options dialog box, which contains the following tabs:

- General
- Advanced
- Logging

### ■General Tab

The General tab of the Options dialog box, shown in the figure below, sets the startup and workspace parameters for the Configurator.



Options Dialog Box: General Tab

- Startup Settings

Under the Startup Settings section, select one of the following:

Item	Description
Open the active file	Launches the currently active configuration database upon startup.
Open the most recently used file	Launches the recently opened configuration database upon startup.
Open a specific file	Specifies a configuration database to launch upon startup. To select a database, click the ... button next to the text box and browse for the file. When this option is selected, the "active" database is overridden by the specified database.
Browse a specific path	Specifies a file path to launch upon startup. To select a path, click the ... button next to the text box and browse for the path.



- Workspace Settings

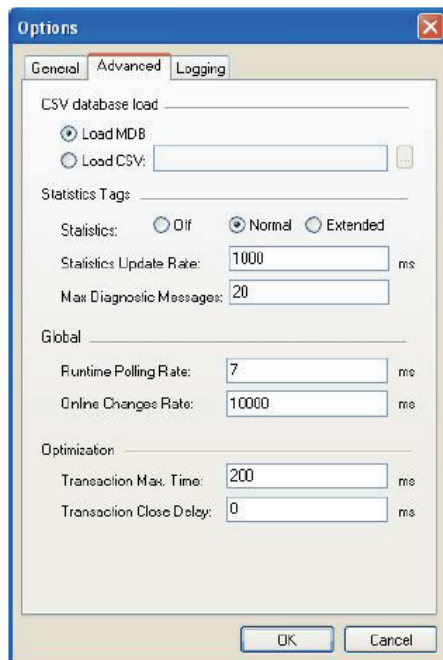
The following Workspace Settings are available:

Item	Description
Statistics Refresh Rate	Specifies the update frequency (in milliseconds) of the items in the Statistics View.
OPC Monitoring Refresh Rate	Specifies the update frequency (in milliseconds) of the items in the Monitor View. The monitor scans the server and displays the tag values at the bottom of the Configurator screen.
Enable hover selection	Checking this option allows you to highlight an item by moving the mouse pointer over that item and keeping it there for a specified Hover Time (in milliseconds). If you change the hover time, the new hover time will be applied when the MELSOFT MX OPC Server DA Configuration Tool is restarted.
Display Hints	When this check box is checked, helpful tips are displayed in the configuration view.
Show Register Ranges for MX devices	The new server runtime will be able to provide the list of possible register ranges of each MX device. This list will be provided to the OPC clients as a special group called "Hints" in the address space of the device containing tags. The names of these tags will be in the form <register><starting address>-<ending address>, where all three items are in the same form as seen in the Supported Devices dialog (clicking Browse from Tag Properties Basic tab). D0.0-7999.15 is a valid example for the FX3U(C) CPU type. This function can be enabled or disabled through the Options dialog.

## ■Advanced Tab

The Advanced tab of the Options dialog box, shown in the figure below, configures the advanced parameters for your driver.

NOTE: Advanced settings are for fine-tuning your driver and should not be changed unless you have an intimate knowledge of how the driver operates and know that you need to make some adjustments.



Options Dialog Box: Advanced Tab

- CSV database load

Item	Description
Load MDB	This selection will load the configuration from the active MS Access database.
Load CSV	If selected, the runtime will load the specified CSV file.

- Statistics tags

In a similar way to the "Hints" described in the 'General tab' section , the MX Runtime can optionally expose statistics tags in a group called "Device Statistics". The options in this section are:

Item	Description
Statistics	This sets the level of detail available, and can be either: <ul style="list-style-type: none"> <li>• Off - no statistics branch is available in the runtime</li> <li>• Normal - basic statistics tags will be available</li> <li>• Extended - detailed statistics tags are available</li> </ul>
Statistics update rate	the rate at which the statistics tags are updated, in milliseconds
Max diagnostics messages	the diagnostics messages queue length.

For a more detailed explanation of the statistics tags, and a list of the tags added for each Statistics level, see Statistical tags in OPC address space.

- Global

In the Global section, you can configure:

Item	Description
Runtime polling rate	This is the rate at which the runtime system looks for new data, in milliseconds. Smaller numbers mean that the checks will be performed more frequently, at a cost of higher CPU usage. Larger numbers mean less frequent checks, but lower CPU usage. This value should normally be left at the default setting.
Online changes rate	This is the rate at which the runtime module looks for changes to the configuration, in milliseconds. As new tags are not often added to a database after it has been configured, a much longer interval is used than the Runtime polling rate. This value should normally be left at the default setting.

- Optimization

The settings in the Optimization section are:

Item	Description
Transaction max time	The maximum duration of one transaction (a set of read/write/request point operations, executed together).
Transaction close delay	The time that the runtime waits for another request before it closes the transaction.

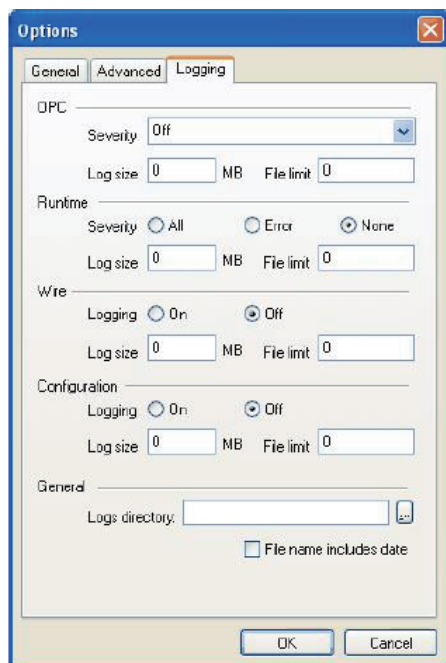
## ■Logging Tab

MELSOFT MX OPC Server DA Configuration Tool allows the logging of diagnostic information to the disk.

The logger is a simple logging tool built in to the Runtime and the Configurator. All changes that are made to the settings on the following option page will affect only diagnostic messages that are generated from this point on. For example if logging is disabled and the user enables it at 12:00, no messages will be stored to the log files that occurred before 12:00, even if they are shown in the Statistics dialog among the Last Transaction Statuses.

The log files are created on demand, i.e. the log file will only be created on the disk the first time a message is logged.

Logging can be enabled from the Logging page of the Options dialog, as shown in the following screenshot:



**Options Dialog Box: Logging Tab, 'General Runtime Diagnostics' Section**

This page is divided into five sections:

- OPC: Logging settings for OPC layer
- Runtime: Logging settings for the runtime module
- Wire: Logs communication with the hardware (also called 'Protocol & Wire' settings in earlier versions of MELSOFT MX OPC Server DA Configuration Tool)
- Configuration: Logging settings for configuration changes to the database such as adding, deleting or modifying items (also called 'User changes logging' in earlier versions of MELSOFT MX OPC Server DA Configuration Tool)
- General: General settings that apply to all types of logging

Item		Description
OPC settings	Severity	<p>The severity of OPC layer messages to log. The possible settings are:</p> <ul style="list-style-type: none"> <li>• Off - Do not log any messages</li> <li>• Severe errors - Very serious errors</li> <li>• Errors - Errors that could affect program operation (e.g. failure to read from the configuration database)</li> <li>• Warnings - Errors that do not stop operation from continuing (e.g. failure to read a list of PLC ranges)</li> <li>• Normal - Normal operations (e.g. opening / closing connections, etc.)</li> <li>• Debug - Debugging information used by developers</li> <li>• Verbose - Very detailed debug information used by developers</li> <li>• All - Show all trace information</li> </ul> <p>These levels are in decreasing order of severity. Each severity level also includes all the log messages for the levels above it. For example, if 'Warnings' is selected, messages at the 'Severe error' and 'Errors' levels will also be logged.</p>
	Log size	Maximum size in MB of one OPC layer log file. A setting of '0' means that the size is not limited.
	File limit	The maximum number of log files from the OPC layer source. If exceeded, the oldest file is deleted. A setting of '0' allows any number of files to be created.

Item		Description
Runtime settings	Severity	The severity of runtime messages to log. The possible settings are: <ul style="list-style-type: none"> <li>• None - Do not log any messages</li> <li>• Error - Errors that could affect program operation</li> <li>• All - Show all trace information</li> </ul> These levels are in decreasing order of severity. Each severity level also includes all the log messages for the levels above it. For example, if 'Warnings' is selected, messages at the 'Severe error' and 'Errors' levels will also be logged.
	Log size	Maximum size in MB of one runtime log file. A setting of '0' means that the size is not limited.
	File limit	The maximum number of log files from the runtime source. If exceeded, the oldest file is deleted. A setting of '0' allows any number of files to be created.
Wire settings	Logging	Either 'On' to enable wire logging, or 'Off' if no wire messages should be logged.
	Log size	Maximum size in MB of one wire log file. A setting of '0' means that the size is not limited.
	File limit	The maximum number of log files from the wire source. If exceeded, the oldest file is deleted. A setting of '0' allows any number of files to be created.
Configuration settings	Logging	Either 'On' to enable configuration change logging, or 'Off' if no configuration change messages should be logged.
	Log size	Maximum size in MB of one configuration changes log file. A setting of '0' means that the size is not limited.
	File limit	The maximum number of log files from the configuration changes source. If exceeded, the oldest file is deleted. A setting of '0' allows any number of files to be created.
General settings	Logs directory	The directory where all the log files will be written. Use the ... button to browse for a directory. The exact file name used for a log will depend on this directory setting and the log type.
	File name includes date	If this check box is selected, the log file name will end with the date in the format 'yyyymmdd'.

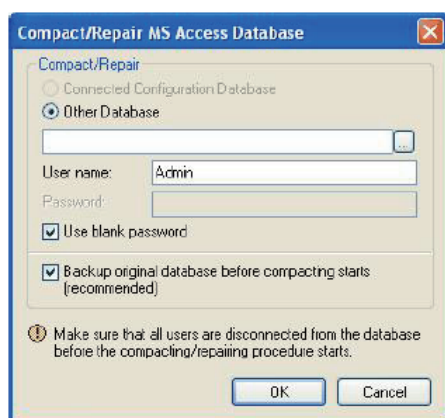
All log files will be written in XML format. A default XSL style sheet is provided to allow the log files to be viewed directly in Internet Explorer.

## Compact/Repair MS Access Database

You can compact Microsoft Access databases, which can be either configuration databases or historical databases, using the Compact/Repair MS Access Database dialog box, shown in the figure below. To open this dialog box, select Compact/Repair MS Access Database from the Tools menu. Microsoft Access–based databases are subject to database fragmentation over time, and the support for the database will compact the target database, reclaim unused space, and drastically improve database performance.

Note: It is critical that no users or client applications are connected to the database at the time of compacting and that, if the Backup Original Database option is selected, there is plenty of available hard disk space. Particularly, it is not possible to compact a database if it is active at the same time. For this reason, the "Connected Configuration Database" option is grayed out when the database is active

By default, the currently Connected Configuration Database is selected. If you want to compact/repair a Microsoft Access database other than the currently connected database, select the Other Database option. Then click the ... button and browse for a .mdb file. If the database you select is protected by Microsoft Access security, you will need to enter the User Name and Password required to gain access to the database. Unchecking the Use Blank Password check box makes the Password field available for editing.



Compact/Repair MS Access Database Dialog Box

# Help menu

The Help menu commands are listed in the table below.

Help Menu Commands

Command	Shortcut Keys	Function
Open Manual	—	Launches the manual for the MX OPC Server DA.
About Application	—	Launches the About Box, which contains information about the product version number and copyright.

## 2.5 Unavailable Characters

The following table shows the characters that cannot be used in MX OPC Server DA.

No.	Item	First character	Second character or later
1	MX device name Group name Tag name	0, 1, 2, 3, 4, 5, 6, 7, 8, 9 Space, !, ", #, \$, %, &, ', (, ), ^, \, @, [, ;, :, ], , , ., /, =, ~,  , `, {, +, *, }, <, >, ?	Space, !, ", #, \$, %, &, ', ^, \, @, [, ;, :, ], , , ., /, =, ~,  , `, {, +, *, }, <, >, ?
2	Other than No.1	\	\

## 3 Configuring the Address Space

The MX I/O Server is the I/O driver core. The I/O Server contains objects and interfaces that:

- Maintain the I/O driver configuration.
- Read and write process hardware data.

The MELSOFT MX OPC Server DA Configuration Tool is a client of the MX OPC Runtime that accesses the I/O Server and lets you view and modify properties for devices and data tags.

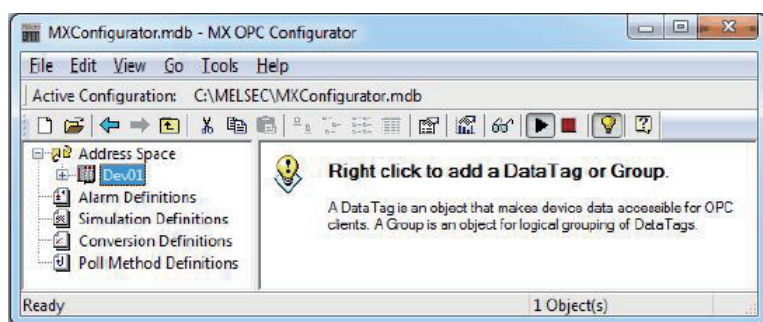
The Address Space tree control in the Configurator sets the properties and connection parameters for the following hierarchy of server objects:

- Devices: A device is a hardware device or station that uses the I/O driver to communicate with a client PC.  
The device item contains the properties and methods that govern the behavior of a device.  
A device is visible to the OPC client.
- Data tags: A data tag is an object that makes device data accessible to OPC clients.  
Data tags can be logically organized into groups (folders).

### 3.1 Tree View

The configuration is shown as a tree view and list view, similar to Windows Explorer.

Selecting an item in the tree view on the left shows the associated items in the list view on the right.



Address Space Tree Control

### 3.2 List View

The List View shows elements (devices, groups, tags, etc.) in either the left or right navigation pane based on name of the element – rather than a large icon, small icon or full detail view.

# 3.3 Devices

Every device is connected to a particular port.  
The device is represented by its symbolic name, and it is uniquely identified by the address value.  
It is impossible to have two devices with the same address connected to one port.  
The following device types are supported:

- MX Device
- MX Device (ver. 2)
- Modbus Device
- DNP3 Device
- IEC 60870-5 Device

## MX Device

### MX Device versions

Two versions of MX Device are available. Although both versions are configured in a similar way, they are not compatible - it is important to select the right version for your system before starting to configure it. It is not possible to copy tags or configuration settings between devices of different versions, or change a device from one version to the other.  
Up to ten MX Devices can be connected to MX OPC DA Server.

#### ■MX Device (ver. 1)

This is the original MX Device used to communicate with Mitsubishi PLCs, and is usually referred to without a version number in the documentation. It can be used to communicate with any Mitsubishi PLC series, but it cannot use dynamic labels (described below).

#### ■MX Device (ver. 2)

The MX Device (ver. 2) is used for the 'Dynamic label' feature introduced in GX Works3 for MELSEC iQ-R PLCs. This reduces configuration effort by taking away the responsibility for address management from engineering tools like MELSOFT MX OPC Server DA Configuration Tool and moving it into the PLC. Only the label name is stored in MELSOFT MX OPC Server DA Configuration Tool, without an address. The address of the label is requested from the PLC at the point when the label is first read or written. Whenever a new program or label configuration is downloaded to the PLC from GX Works3, the addresses will be automatically updated without the need to synchronise them in MELSOFT MX OPC Server DA Configuration Tool as well each time.

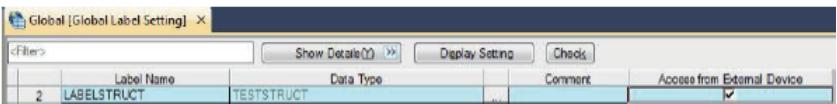
Note: This 'Dynamic label' feature is not related to the 'Dynamic tag' feature in MELSOFT MX OPC Server DA Configuration Tool, which works independently.

In GX Works3, if no address is supplied for a global variable, it will be automatically assigned an address in the GV: device range (label area). This is the easiest way to manage addresses, but it is also possible to assign a specific address in another device range to the label where necessary. Label addresses in the GV: range can be moved at any time by the compiler, so they can only be used with MX Device (ver. 2), and cannot be entered manually.

In MELSOFT MX OPC Server DA Configuration Tool, label names can be entered directly in an MX Device (ver. 2).

Alternatively, the labels can be imported automatically using iQ Works and a system label Ver.2 workspace.

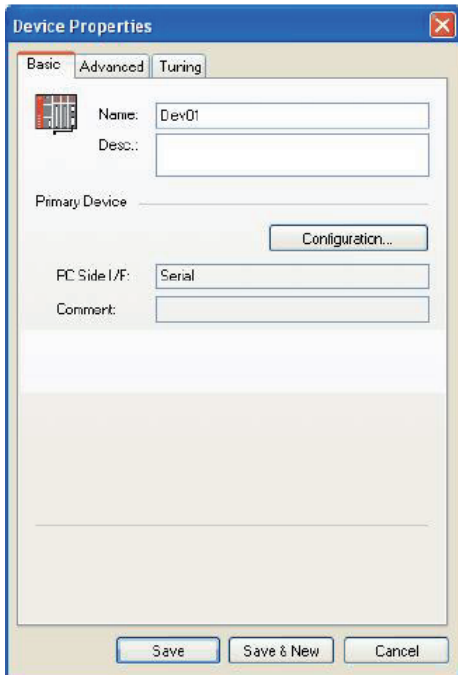
Where the details of the label are entered manually, they must exactly match the label configuration in GX Works3. If the name, data type or array dimensions are different, the label will not be usable. This provides protection from the situations where the label is changed to a different data type (e.g. from UINT to INT) in GX Works3 but the definition has yet not been updated in MELSOFT MX OPC Server DA Configuration Tool, leaving each side with a different idea of the current value. If the data type in GX Works3 is a timer/counter type, the matching native data type (e.g. COUNTER / UCOUNT / LRTIMER etc.) must be used in MELSOFT MX OPC Server DA Configuration Tool. The native timer/counter types are not interchangeable with the equivalent integer types in an MX Device (ver. 2).



"Access from External Device" checkbox in GX Works3

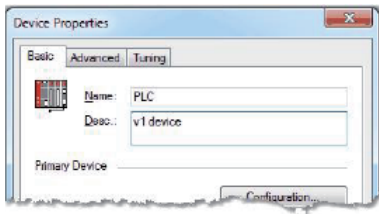
## Basic Device Properties

In the Basic tab of the Device Properties dialog box, shown below, configure the following settings:

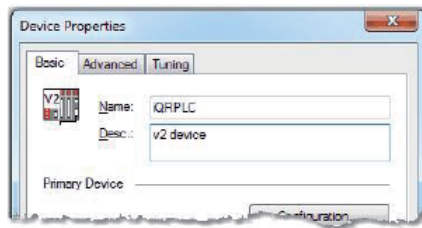


**Device Properties: Basic Tab**

The same dialog is used for MX Device and MX Device (ver. 2). The type of device is indicated by the icon at the top left (as in the example below). The devices otherwise work in the same way, except that MX Device (ver. 2) only supports later PLC series such as the MELSEC iQ-R PLCs.



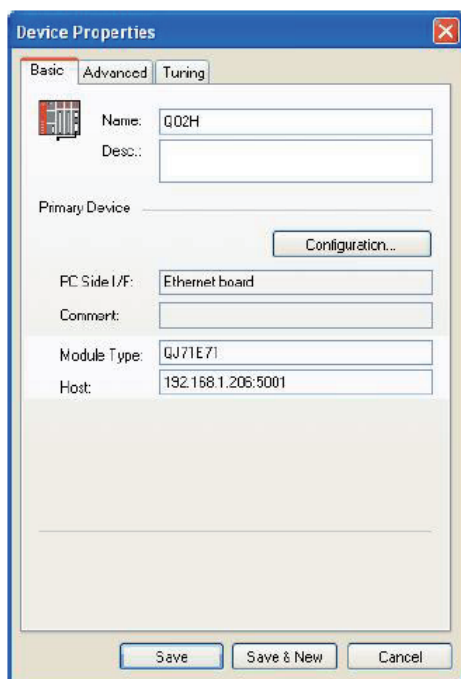
**MX Device**



**MX Device (ver. 2)**



When the MX Device's PC Side I/F is configured as Ethernet board, the Basic page of the Device Properties sheet shows additional information: Module Type and Host IP address with port number, as shown in the screenshot below. These two controls will appear only when I/F is configured as Ethernet board.



**Device Properties: Basic Tab (Ethernet)**

Configure the following basic properties for the device:

Item	Description
Name	Specifies the name of the selected device. Any application requesting data from the I/O driver uses this name to access points on the device. Each device that the driver communicates with should have a unique device name regardless of the device's channel. The name can be up to 32 alphanumeric characters, including underscores ( _ ) and hyphens ( - ). It cannot begin with a digit.
Description	Allows you to enter text about the selected device. Entries in this field can be very helpful when you go back to look at old configuration or report files, or when you need to modify an existing configuration. The more detailed and specific the information you enter in this field, the easier it is to identify the device. The description can be up to 50 alphanumeric characters and symbols.
PC Side I/F	<p>Specifies which connection type and which physical connection (COM) port to use for the selected device. The connection parameters (listed in the tables below) are selected in the Communication Setting Wizard. Click the Configuration button to launch the Communication Setting Wizard.</p> <p>Note: If the transfer setup for this item has been changed since the device was last edited, you will see the warning message below when you try to configure the device. Select either:</p> <ul style="list-style-type: none"> <li>• Yes - to update the stored transfer setup with this name using the properties from this device, or</li> <li>• No - to continue the wizard with the properties in the stored transfer setup. The current device properties will be overwritten when the changes are saved.</li> </ul>
Comment	Displays any comments entered in the Communication Setting Wizard.
Module Type	Shows the connected module, for Ethernet boards only.
Host	Shows the IP address and port number, for Ethernet boards only.

Communication Path	Description
Serial	Communication over a serial link can be either direct CPU or to a serial communications card, e.g. AJ71C24, QJ71C24, LJ71C24.
MELSECNET/10	Communication over MELSECNET/10 is via a special function module.
MELSECNET/H	Communication over MELSECNET/H is via a special function module.
CC-Link board	Communication over CC-Link network.
CC-Link IE board	Communication over CC-Link IE network.
CC-Link IE Field board	Communication over CC-Link IE field wiring.

Communication Path	Description
CC-Link IE Field Ethernet adapter	Communication over CC-Link IE field wiring via Ethernet adapter.
Ethernet board	Communications via Ethernet using TCP/IP or UDP/IP protocols.
CPU board	Communications via a slot PLC.
GOT Transparent	Communication indirectly via a GOT (serial, USB or Ethernet).
Q Series Bus	Communication over Q Series bus is via a back plane.
GX Simulator	Communication over GX Simulator is via GX Developer.
GX Simulator2	Communication over GX Simulator2 uses GX Works2.
MT Simulator2	Communication over MT Simulator2 uses MTWorks2.
Modem	Communication over MODEM is via a special function module.
USB	Communication over a serial link can be direct to the CPU USB port.
SX Controller	Not supported.
COM1 to COM2 (if available)	Computer Ports.
COM3 to COM256	Expansion Ports.

**IMPORTANT:** Verify that the COM port you select is not used by another channel or application. Assigning two channels to the same port results in a communication failure on one of the channels. Assigning a channel to a COM port used by another application (such as an alarm printer) can produce problems with driver communication.

- **Save:** Saves all changes specified in the properties dialog box. The device appears under the Address Space tree control of the configurator.
- **Save & New:** Saves all changes specified in the properties dialog box and immediately starts configuration of a new device.
- **Cancel:** Closes the properties dialog box.

## Advanced Device Properties

In the Advanced tab of the Device Properties dialog box, shown below, configure the following settings:

Device Properties: Advanced Tab

### ■ Primary Device

Item	Description
Enable Device	Enables the driver to poll the channel when the check box is checked. If you clear the check box, the driver does not poll the selected device. You may want to disable one or more devices in the following situations: <ul style="list-style-type: none"> <li>You are swapping hardware for repair or maintenance and do not want to display errors.</li> <li>You do not need to collect data from all your devices and you want to reduce the communications load.</li> <li>You want to isolate a device for debugging.</li> </ul>
Simulate	Simulates polling of the channel by the driver when the check box is checked.
Password	The previous screenshot shows the Advanced page of the MX Device Device Properties sheet configured for a serial PC Side I/F. When the device is configured as a Modem device, the user can also specify a password on the Advanced page.
Reply timeout	The length of time in milliseconds that the driver will wait for a response from the process hardware after sending a request. The retry handling is described in more detail in Setting Device Timing Properties, below.
Number of retries	Specifies how many times the driver resends a failed message to the device before marking the data as failed.
Delay time	After the communication has failed as many times as specified by Number of retries, the driver will wait for this length of time in milliseconds before trying again.
Merge gap	The maximum gap where data blocks can merge together into one read/write operation. For example if this value is 1, it means that a block made of consecutive addresses D20-D50 can be joined with a block D52-D80.
Max count for R/W operation	This is the maximum number of individual register read/writes that can be grouped together into one batch read/write operation. This setting applies to individual registers that are read separately, not to blocks of registers (e.g. D20-D80 as described in Merge gap above). For example, if the device needed to read items D1, D500 and D1000 and this value was set to 2, D1 and D500 would be grouped together into one batch read operation, and D1000 would be included in the next batch operation. If the value was set to 3, all three registers would be read as part of the same batch operation. If your system is working normally, you do not need to change this value. It is not recommended to increase this value above the default.

## ■Backup Device

Item	Description
Enable Device	Enables the backup device.
Comment	Displays any comments entered in the Communication Setting Wizard.
Password	When the backup device is configured as a Modem device, a password can be specified independently from the primary device.
Reply timeout	The length of time in milliseconds that the driver will wait for a response from the process hardware after sending a request. The retry handling is described in more detail in Setting Device Timing Properties, below.
Number of retries	Specifies how many times the driver resends a failed message to the device before marking the data as failed.
Delay time	After the communication has failed as many times as specified by Number of retries, the driver will wait for this length of time in milliseconds before trying again.
Merge gap	The maximum gap where data blocks can merge together into one read/write operation. For example if this value is 1, it means that a block made of consecutive addresses D20-D50 can be joined with a block D52-D80.
Max count for R/W operation	This is the maximum number of individual register read/writes that can be grouped together into one batch read/write operation. This setting applies to individual registers that are read separately, not to blocks of registers (e.g. D20-D80 as described in Merge gap above). For example, if the device needed to read items D1, D500 and D1000 and this value was set to 2, D1 and D500 would be grouped together into one batch read operation, and D1000 would be included in the next batch operation. If the value was set to 3, all three registers would be read as part of the same batch operation. If your system is working normally, you do not need to change this value. It is not recommended to increase this value above the default.
PC Side I/F	Specifies which connection type and which physical connection (COM) port to use for the selected device. The connection parameters (listed in the tables below) are selected in the Communication Setting Wizard. Click the Configuration button to launch the Communication Setting Wizard.

Communication Path	Description
Serial	Communication over a serial link can be either direct CPU or to a serial communications card, e.g. AJ71C24, QJ71C24, LJ71C24.
MELSECNET/10	Communication over MELSECNET/10 is via a special function module.
MELSECNET/H	Communication over MELSECNET/H is via a special function module.
CC-Link board	Communication over CC-Link network.
CC-Link IE board	Communication over CC-Link IE network.
CC-Link IE Field board	Communication over CC-Link IE field wiring.
CC-Link IE Field Ethernet adapter	Communication over CC-Link IE field wiring via Ethernet adapter.
Ethernet board	Communications via Ethernet using TCP/IP or UDP/IP protocols.
CPU board	Communications via a slot PLC.
GOT Transparent	Communication indirectly via a GOT (serial, USB or Ethernet).
Q Series Bus	Communication over Q Series bus is via a back plane.
GX Simulator	Communication over GX Simulator is via GX Developer.
GX Simulator2	Communication over GX Simulator2 uses GX Works2.
GX Simulator3	Communication over GX Simulator3 uses GX Works3.
MT Simulator2	Communication over MT Simulator2 uses MT Works2.
Modem	Communication over MODEM is via a special function module.
USB	Communication over a serial link can be direct to the CPU USB port.
SX Controller	Not supported.
COM1 to COM2 (if available)	Computer Ports.
COM3 to COM256	Expansion Ports.

**IMPORTANT:** Verify that the COM port you select is not used by another channel or application. Assigning two channels to the same port results in a communication failure on one of the channels. Assigning a channel to a COM port used by another application (such as an alarm printer) can produce problems with driver communication.

## ■Setting Device Timing Properties

Reply Timeout, Number of Retries, and Delay Time are the timing properties of the driver and are set for each device.

The timing sequence is as follows:

### Operating procedure

1. The I/O driver sends a message to the process hardware and waits the length of time specified in the Reply Timeout field for the device to respond.
2. If the device does not respond, the driver resends the message for the number of times specified in the Number of Retries field.
3. The driver marks the data as failed after all retries have been sent and the device has not responded.
  - If a back-up device is specified, the driver immediately switches devices, waits the length of time specified in the Delay Time field, and sends the message to read the same data from the back-up device. The timeout and reply process repeats and, if the back-up device fails, the driver switches back to the primary device and starts the messaging cycle again.
  - If a back-up device is not specified, the driver waits for the specified Delay Time and re-initiates the polling process with the selected device.
4. The device may have many items of data to read. In this situation, the driver uses its Quick Fail logic and only performs one cycle through the Timeout, Retries, and Delay process for the messages currently in the Write queue. It then marks all the data on that device as failed and moves on to the next device. The next time the driver attempts to send the message to the failed device, it ignores the Retries and only makes one attempt. If the attempt is successful, the driver recovers all data on the device and marks it as ready for messages.
5. By using Quick Fail, the driver saves time and bypasses the problem device, thereby increasing its efficiency.
  - Example

Reply Timeout = 5000 milliseconds (5 seconds)

Retries = 5

Delay Time = 300,000 milliseconds (5 minutes)

Backup Device = none

The driver attempts to send a message to the process hardware. After 5 seconds, the device still has not responded, so the driver resends the message.

The driver tries to send the message 6 times (the first time and then the 5 retries) with 5-second intervals between each attempt.

Each attempt fails; consequently, the driver marks all the data as failed. If the driver has messages for other data items on the same device, it adds the messages to a queue for the failed device and sends them only once without retries.

The driver waits 5 minutes and starts the message send cycle again unless there is other data defined for the device. If there is other data, the driver fails all data items and goes on to the next device.

Reply Timeout: Specifies how long (in milliseconds) the I/O driver waits for a response from the selected device.

Example

To specify a timeout of...	Enter...
1 second	1000
1 minute	60000
1 hour and 30 minutes	324000000

Number of Retries: Specifies how many times the driver resends a failed message to the device before marking the data as failed and initiating the Delay Time.

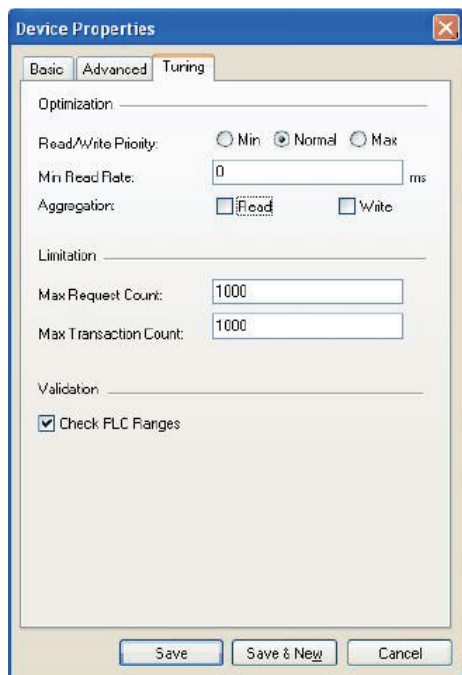
Delay Time: Specifies how long (in milliseconds) the I/O driver waits after all retries, specified in the Retries field, have failed.

Example

To specify a delay of...	Enter...
1 second	1000
1 minute	60000
1 hour and 30 minutes	324000000

## Device tuning

The Tuning tab of the Device Properties dialog box, shown below, can be used to optimize the way that data is read from the device, depending on your application.



Device Properties: Tuning Tab

Item		Description
Optimization	Read/write priority	The priority of read/write operations compared to the update (polling) operations. The options are: <ul style="list-style-type: none"> <li>• Min: Updates have the highest priority</li> <li>• Max: Reads/writes are preferred</li> <li>• Normal: There is a balance between read/write and update operations</li> </ul>
	Min read rate	The shortest time between two PLC reads of the same item. If another request to read the same item is received before this time expires, the read will not take place and instead the last value is returned. After the time expires, the value is read again.
	Aggregation	This setting controls how the runtime deals with read or write requests that are received when there is already a read/write request for the same data in the queue. If aggregation is switched on, the requests are combined. This will usually improve efficiency, but is only acceptable if the device only needs to see the last value that was written. If the device relies on receiving all intermediate values for an item (for example, when the device is counting the on/off transitions for a boolean value), do not use write aggregation.
Limitation	Max request count	Maximum permitted size of the PLC request queue
	Max transaction count	Maximum permitted number of outstanding transactions
Validation		If the 'Check PLC ranges' option is selected, the runtime will test addresses against the device to see if they are valid with its current configuration. If this option is switched off, addresses will only be checked against a local database of valid addresses, which may include addresses that are not valid on the device as it is currently configured.

## Adding a New MX Device

To add a new device:

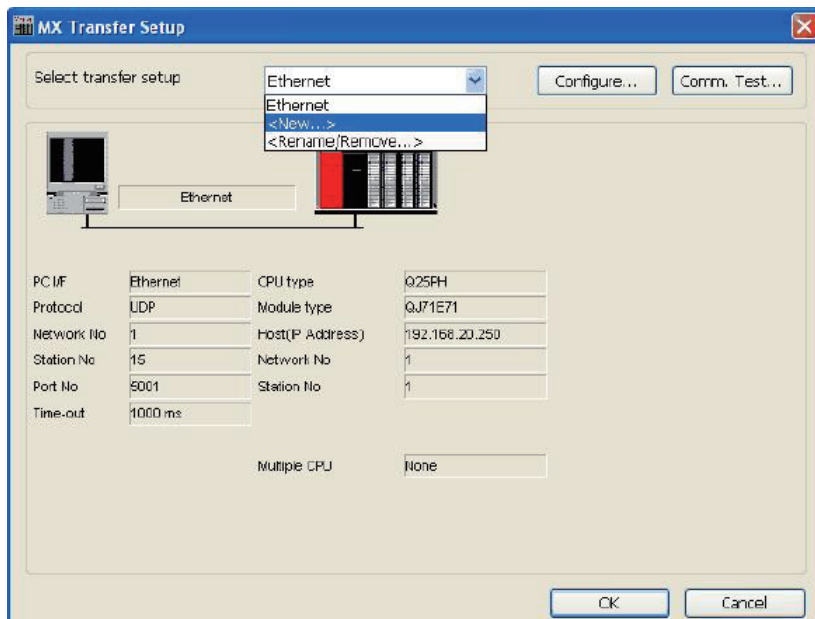
### Operating procedure

1. Right-click the Address Space tree control of the Configurator screen and select either New MX Device or New MX Device (ver. 2) from the pop-up menu, as shown in the figure below. See MX Device versions for an explanation of the differences. The remaining steps are the same for both versions, except that MX Device (ver. 2) will only support later PLC series such as MELSEC iQ-R.



**Adding a New MX Device**

2. The MX Transfer Setup dialog will be shown. You can either select an existing transfer setup, or (as in the example below) select <New...> to create a new transfer setup.



**MX Transfer Setup dialog**

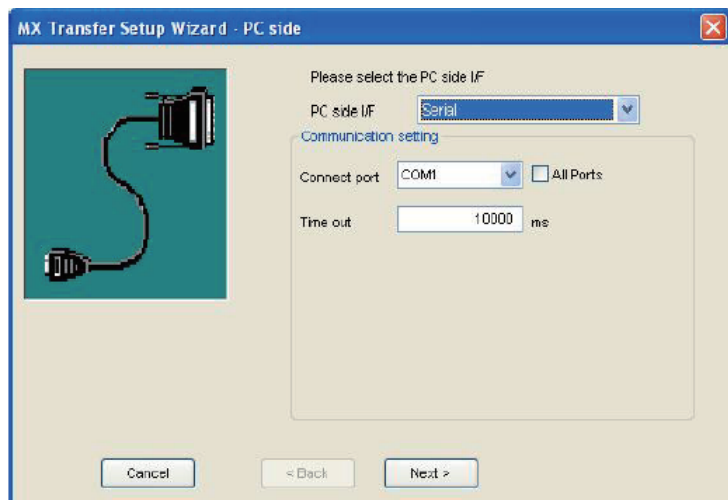
3. The New Transfer Setup dialog will appear. Enter a name for the new transfer setup (Serial in the picture below) and select <Default...> as the template, then click OK.



**Entering a transfer setup name**

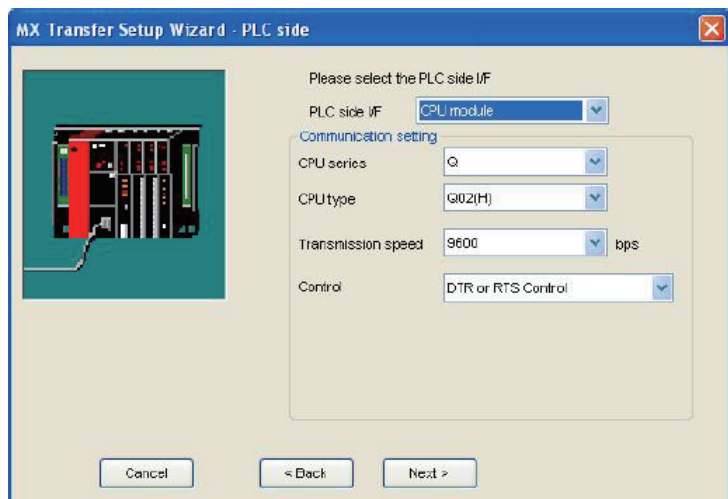
4. The new transfer setup can now be edited using the Communication Setting Wizard, as shown in the figure below. Specify the communication type to use on the PC side, as shown in the figure below. In the PC Side I/F field, select a connection type to use for the selected channel from the drop-down list. Click Next to continue.

Note: For more information, see the "Communication Setting Wizard" section.



#### Setting up the Connection for the PC Side

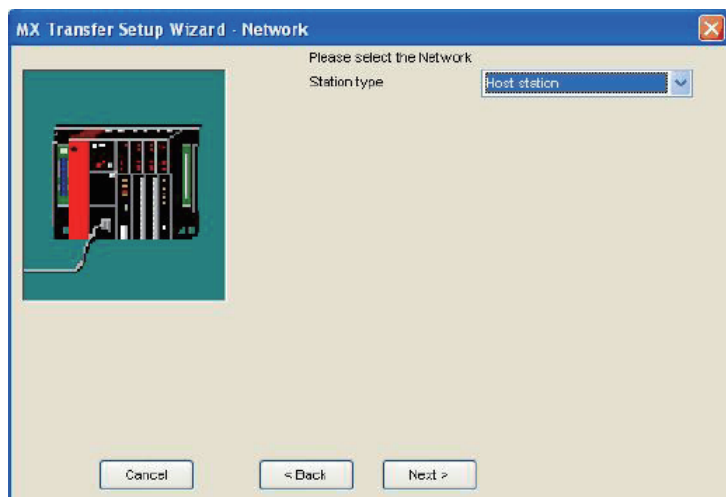
5. Now you must specify the communication type to use on the PLC (device) side, as shown in the figure below. In the PLC Side I/F field, select a communication type from the drop-down list as the connection type to use for the selected channel. Click Next to continue.



#### Setting up the Connection for the PLC Side



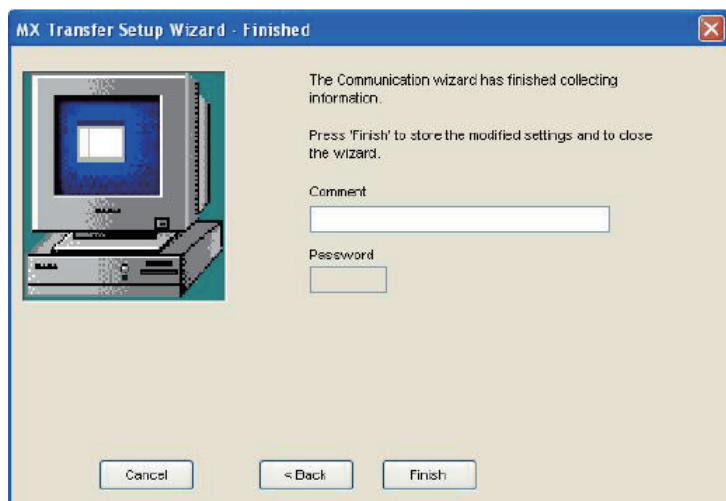
6. Select the network Station Type and CPU Type (if applicable) from the respective drop-down lists, as shown in the figure below. Click Next to continue.



3

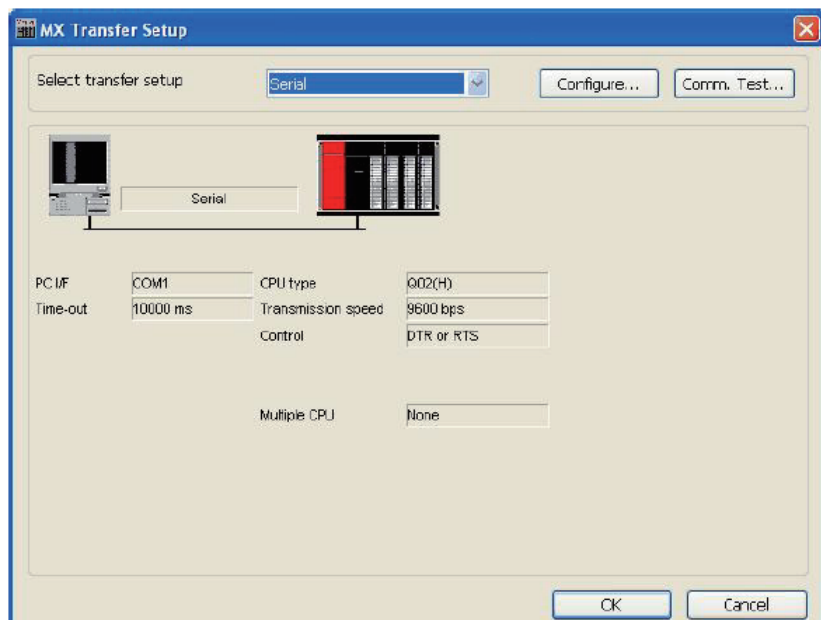
#### Configuring Network Settings

7. Click the Finish button to complete the communication channel setup, as shown in the figure below.



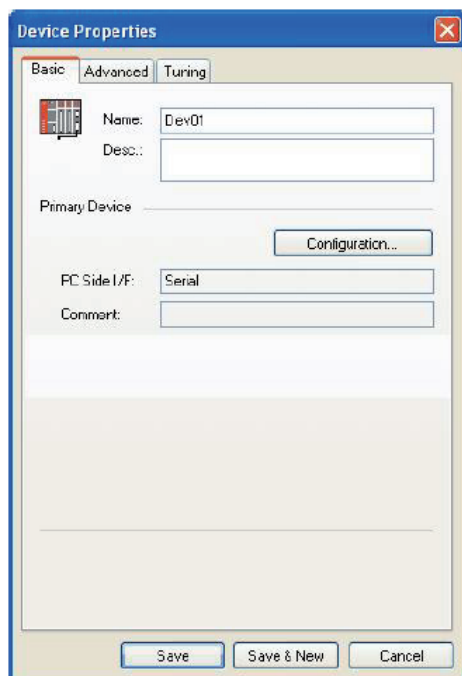
#### Completing Channel Setup

8. The MX Transfer Setup dialog box appears with the new transfer setup selected, as shown in the figure below. Each network node is shown graphically, with the node properties shown under the graphic. The left-hand side of the dialog lists the configuration properties for the PC side. You can double-click the image of a node (or double-click the properties list) to edit the configuration properties. The right-hand side of the dialog lists the configuration properties for the PLC device side. You can double-click the image of the PLC device (or double-click the configuration properties list) to edit the PLC device side configuration properties. You can also click the Configure button to return to the Communication Setting Wizard. Click the OK button to save the changes.



**MX Transfer Setup dialog (configured)**

9. The Basic tab of the Device Properties dialog box appears, as shown in the figure below.



**Configuring Device Properties**

10. In the Name field, type a name for the new device, and type a description for the device (optional). To specify which connection type and which physical connection (COM) port to use for the selected device, click the Configuration button to launch the Communication Setting Wizard for the Primary device.

- 11.** Click on the Advanced tab to set the advanced parameters for the Primary and Backup devices, as shown in the figure below.

**Device Properties**

Basic Advanced **Tuning**

Primary Device

☒ Enable Device ☐ Simulate

Reply timeout: 1000 ms Number of retries: 3  
 Delay time: 0 ms Merge gap: 64 words  
 Max count for R/W operation: 16 words

Backup Device

☐ Enable Device Configuration...

PC Side I/F: <none>  
 Comment:

Reply timeout: 1000 ms Number of retries: 3  
 Delay time: 0 ms Merge gap: 64 words  
 Max count for R/W operation: 16 words

Save Save & New Cancel

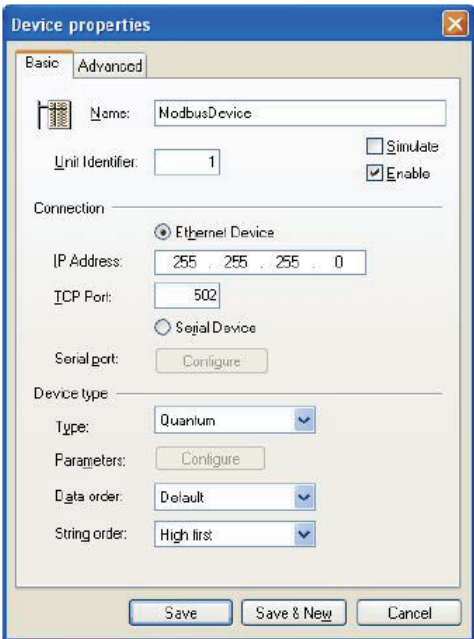
**Device Properties: Advanced Tab**

- 12.** Check the Enable Device check box to activate the device.
- 13.** When you have finished configuring the device properties, click the Save button. The new device appears under the Address Space tree control.

# Modbus device

## Basic Modbus Properties

In the Basic tab of the Device Properties dialog box, shown below, configure the following settings:



**Modbus Device Properties: Basic Tab**

Configure the following basic properties for the device:

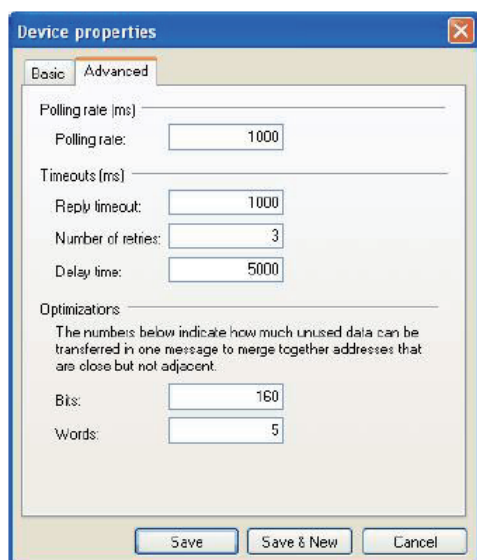
Item	Description
Name	Specifies the name of the selected device. Any application requesting data from the I/O driver uses this name to access points on the device. Each device that the driver communicates with should have a unique device name regardless of the device's channel. The name can be up to 32 alphanumeric characters, including underscores ( _ ) and hyphens ( - ). It cannot begin with a digit.:
Unit identifier	Enter the Unit identifier which provides a unique ID for this device.
Simulate	Simulates polling of the channel by the driver when the check box is selected.
Enable	Enables the driver to poll the channel when the check box is selected. If you clear the check box, the driver does not poll the selected device. You may want to disable one or more devices in the following situations: <ul style="list-style-type: none"><li>• You are swapping hardware for repair or maintenance and do not want to display errors.</li><li>• You do not need to collect data from all your devices and you want to reduce the communications load.</li><li>• You want to isolate a device for debugging.</li></ul>
Connection	Use the radio button to select which connection type to use for the selected device. The connection parameters (listed below) will depend on whether the device connects using Ethernet or a serial port.
IP address	This is the host address for Ethernet devices (enabled only if the Ethernet device radio button has been selected). The default IP address is set at 255.255.255.0.
TCP port	This is the TCP/IP port number for the device (enabled only if the Ethernet device radio button has been selected). The default port is set at 502.
Serial port	If the Serial device radio button is selected, use the Configure button to configure the serial port settings. For a description of the serial port configuration dialog, see Modbus serial port details. <b>IMPORTANT:</b> If you are using a serial connection, verify that the COM port you select is not used by another channel or application. Assigning two channels to the same port results in a communication failure on one of the channels. Assigning a channel to a COM port used by another application (such as an alarm printer) can produce problems with driver communication.
Device type	Choose a Device Type from a range including "Custom, 184, 384, 484, 584, 584L, 884, 984, Micro 84, Quantum, ModCell, Other (any)". A device with the most limited parameters and the lowest performance would be considered "Other (any)". If you select "Custom" as the device type, use the button "Configure" to configure the parameters of your device (see 'Modbus device parameters' for a detailed description). The default Device type is set at Quantum.

Item	Description
Data order	Modbus devices do not use a standard word / byte order - any two Modbus devices can store data in a different order. This can cause values to be read incorrectly, especially for data types that are stored in more than one word (for example DINT, UDINT, REAL, LREAL). The 'Swap bytes' option also affects WSTRINGS. MELSOFT MX OPC Server DA Configuration Tool uses Intel byte order by default, so you will need to change this setting if the order used by the target Modbus device is different. This setting affects all tags read from the device. The available setting values are: <ul style="list-style-type: none"> <li>• Default: Device uses the same byte order as MELSOFT MX OPC Server DA Configuration Tool. No changes needed.</li> <li>• Swap bytes: Swap the bytes within each word.</li> <li>• Swap words: Reverse the order of words within multiple-word data types (DINT, UDINT, REAL, LREAL etc.).</li> <li>• Swap bytes &amp; words: Reverse the order of words within multiple-word data types, and swap the bytes within each word.</li> </ul> For a more detailed explanation and examples, see 'Modbus device data order'.
String order	STRINGS in a Modbus device are stored in words, and can appear in one of two possible byte orders. Select the setting that matches your device. <p>Note: This setting does not affect WSTRINGS.</p> <ul style="list-style-type: none"> <li>• High first: Within each word, the high byte contains the first character of the pair.</li> <li>• Low first: Within each word, the low byte contains the first character of the pair.</li> </ul>
Save	Saves all changes specified in the properties dialog box. The device appears under the Address Space tree control of the configurator.
Save & New	Saves all changes specified in the properties dialog box and immediately starts configuration of a new device.
Cancel	Closes the properties dialog box.

## Advanced Modbus Properties

### Operating procedure

1. Enter the Polling Rate (in milliseconds), as shown in the image below.



#### Modbus Device Properties: Advanced Tab

2. Enter the Reply Timeout.
3. Enter the Number of retries to set the number of consecutive read/write attempts that time out before the OPC server will suspend communication with the device.
4. Enter the Delay time to set the amount of time that the OPC server will wait before attempting to reconnect to the suspended device.

When the server tries to optimize communication with devices by requesting as much data in one message as possible, consecutive registers are merged together into one request for efficiency.

The server can end up reading registers that are not really requested, when allowed to join two blocks of requested registers.

The numbers entered under Optimizations specify the block length of adjacent unused data. Enter Bits to set how many unused bits can be in one message to merge together addresses that are close but not adjacent.

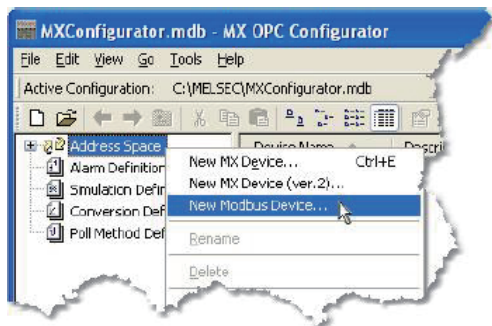
Enter Words to set how many unused words can be in one message to merge together addresses that are close but not adjacent.

## Adding a New Modbus Device

To add a new device:

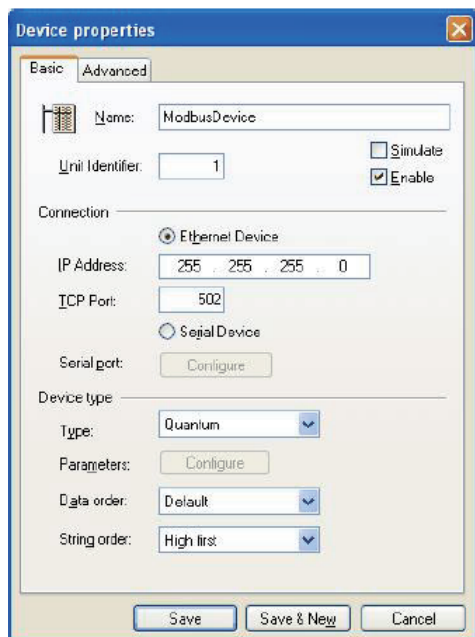
### Operating procedure

1. Right-click the Address Space tree control of the Configurator screen and select New Modbus Device from the pop-up menu, as shown in the figure below.



#### Adding a New Modbus Device

2. This opens the Device properties dialog box, as shown in the figure below. In the Name field, type a name for the new device.



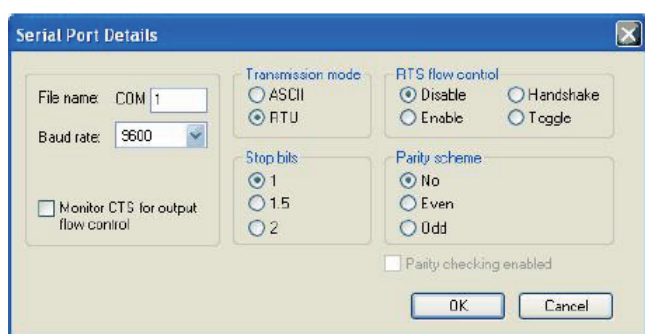
3. Enter the Unit Identifier which provides a unique ID for this device.
4. Select the Simulate (in order to simulate all Data Items on this device) and/or Enable (activate device) check boxes if required.
5. The radio button within the Connection section helps signify if the device is an Ethernet Device or a Serial Device. Default is "Ethernet Device".
6. Enter the IP Address for the Ethernet device. (This section is enabled only if the Ethernet Device radio button has been selected). The default IP address is set at 255.255.255.0.
7. Enter the TCP Port for the Ethernet device. (This section is enabled only if the Ethernet Device radio button has been selected). The default TCP Port is set at 502.
8. Configure the Serial Port for the Serial device. (This section is enabled only if the Serial Device radio button has been selected). See 'Modbus serial port details' for a description of the serial port configuration.

9. Choose a Device Type from a range including "Custom, 184, 384, 484, 584, 584L, 884, 984, Micro 84, Quantum, ModCell, Other (any)". A device with the most limited parameters and the lowest performance would be considered "Other (any)". If you select "Custom" as the device type, use the button "Configure" to configure the parameters of your device (see 'Modbus device parameters' for a detailed description). The default Device type is set at Quantum.
10. Select the Data order for the device if necessary. See 'Modbus device data order' for more information.
11. Select the String order for the device if necessary. Strings can either be stored with the high byte first in each word, or the low byte first.
12. Parameters: Opens a dialog for configuring the parameters of this modbus device. This dialog is described in 'Modbus device parameters'

## Modbus serial port details

The Serial Ports Details dialog (shown below) allows the user to configure the serial port for the current device. It is shown when the connection type for a Modbus device is set to 'Serial' and the user clicks on the Configure button.

When the Parity checking enabled check box is not checked, it will force the server to ignore the parity bits in the message.



Serial Port Details Dialog

## Operating procedure

1. Enter the port name in the File name entry field.
2. Select the Baud rate from the pulldown menu.
3. The Monitor CTS for output flow control checkbox allows users to select whether or not the CTS signal for output flow control should be monitored.
4. Select either ASCII or RTU under Transmission mode.
5. Under RTS flow control, select either Disable, Enable, Handshake or Toggle.
6. Choose the number of Stop bits (1, 1.5 or 2)
7. Check which Parity scheme is to be used (No, Even, or Odd).
8. The Parity checking enabled checkbox allows users to decide whether or not the parity bits should be ignored. This section is enabled when Parity scheme is set to "No".

**IMPORTANT:** If you are using a serial connection, verify that the COM port you select is not used by another channel or application. Assigning two channels to the same port results in a communication failure on one of the channels. Assigning a channel to a COM port used by another application (such as an alarm printer) can produce problems with driver communication.

**Modbus device parameters**

The Modbus Device Parameters dialog lets the user specify custom device parameters. It can be shown by selecting the device type as 'Custom' in the basic properties page for a Modbus device, then clicking on the Parameters button. The meaning of the numbers in the device parameters dialog, shown below, is the maximum amount of data that can be transferred in one message. Setting the value equal to zero forces the server to use single read/write messages only.

Device parameters

The numbers below are maximum amounts of data that can be transferred in one message. Specifying 0 (zero) instructs the server to use single read/writes only

Read

Coils:

Inputs:

Holding registers:

Input registers:

0

0

0

0

Write

Coils:

Holding registers:

0

0

OK

Cancel

Modbus Device Parameters Dialog

Item		Description
READ	Coils	Enter the maximum number of coil bits sent in one message.
	Input	Enter the maximum number of input bits sent in one message.
	Holding registers	Enter the maximum number of holding registers sent in one message.
	Input registers	Enter the maximum number of input registers sent in one message.
WRITE	Coils	Enter the maximum number of coil bits sent in one message for write operations.
	Holding registers	Enter the maximum number of holding registers sent in one message for write operations.

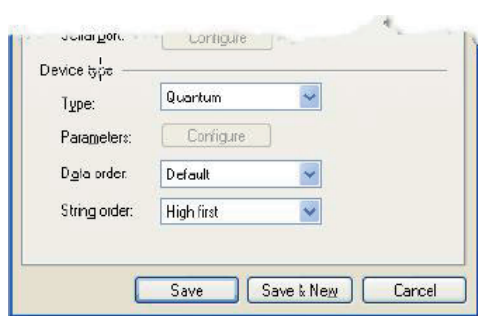


## Modbus device data order

Modbus devices do not all store data in the same order. This is most noticeable when a data type occupies more than one 16-bit word, for example DINT and UDINT which are 32-bit values. The Modbus standard does not specify whether the words should be stored in little-endian order (used by Intel processors), or big-endian order (used by Motorola processors). So for example the UDINT value 12345678h could be stored in two adjacent words in any of the following ways, depending on the device:

Word order	Byte order	Word 1	Word 2
Least significant word first	Normal	5678h	1234h
Least significant word first	Swapped	7856h	3412h
Most significant word first	Normal	1234h	5678h
Most significant word first	Swapped	3412h	7856h

To allow connection to a wide range of Modbus devices, MELSOFT MX OPC Server DA Configuration Tool allows the byte and word order of data read from a Modbus device to be changed. This setting is at the Modbus device level, and will be applied to all tags on the device:



**Modbus device data order setting**

If you are unable to determine the data order used by your Modbus device, but have a way to write values to the device (e.g. through the device's own programming software), you can calculate the data order either by trial and error (starting with 'Default' and 'Swap words' which are the most common settings), or by:

### Operating procedure

1. Writing a fixed value to the device using its native programming/diagnostic software (or by any other means that allows a value to be written in the device's native order).
2. Defining a tag of the appropriate type in MELSOFT MX OPC Server DA Configuration Tool to read the registers at that location.
3. Looking up the value in the table(s) below to find the right setting.

Before this step, make sure that the data order is set to 'Default'.

For devices that support 32-bit data types, write the value 66051 (10203h) to a DWORD register and define a DINT / UDINT tag in MELSOFT MX OPC Server DA Configuration Tool to read the value. The result should be one of the following:

Value	Swap setting to use
66051	Default
16777986	Swap bytes
33751041	Swap words
50462976	Swap bytes & words

If the device does not support 32-bit values, an INT/UINT value can be used to test for byte swapping. Word swapping is not relevant if no data larger than a word is read. For this test, write the value 258 (102h). The result should be one of:

Value	Swap setting to use
258	Default
513	Swap bytes

# Transfer setup

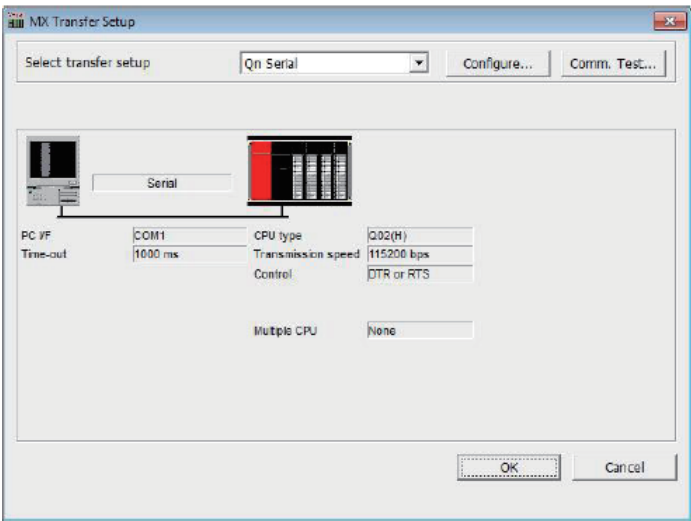
## Configuring Transfer Setups

### ■ Transfer Setup Selection

The main dialog of the transfer setup provides access to the configured transfer setups. The user can

- Add new setups
- Remove existing setups
- Modify a setup
- Select a setup to be used
- Test the communication with a selected setup

The network architecture and settings are displayed with bitmaps representing the network nodes. The parameters associated with a node are listed underneath the respective bitmap.



Name	Description	Choices / Setting range	Default
Select transfer setup	Lists the names of existing transfer setups and the functions 'New' and 'Rename/Remove'	1-32 characters	name of selected transfer setup
Configure	Edit the selected transfer setup	—	—
Comm. Test	Test the connection to the PLC	—	—

Pressing the OK button closes the dialog and uses the settings of the currently selected transfer setup to the device, for which the transfer setup has been opened.

If the dialog is closed by pressing the 'Cancel' button, the transfer settings of the device remain unchanged.

### Point

Please notice that devices using the same transfer setup name are not automatically updated. You need to select each device separately, open the transfer setup dialog and reassign the settings to the device.

## ■ New Transfer Setup

For defining a new transfer setup, the user selects the entry '<New...>' from the selection list.



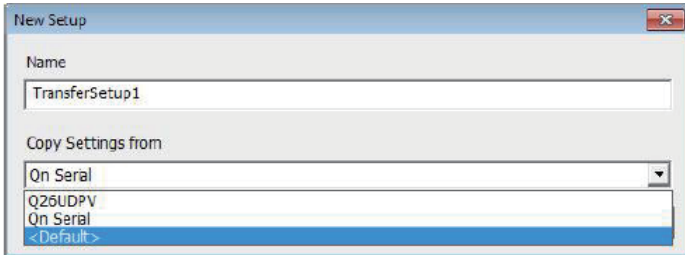
If the maximum number of transfer setups (default is max. 32 setups) has been reached, a message is displayed.



In this case the user must either delete a setup or modify an existing one.

If there is sufficient space for a new transfer setup, a dialog prompts the user to enter the name of the new transfer setup.

The user can select an existing transfer setup, from which the settings are copied, or select '<Default>'.



Name	Description	Choices / Setting range	Default
Name	Name of new transfer setup	1-32 characters	TransferSetup<n>
Copy Settings from	Uses the current settings of the selected setup for the new setup	- existing transfer setup names - <Default>	selected setup

The name assigned to the transfer setup must meet the following restrictions

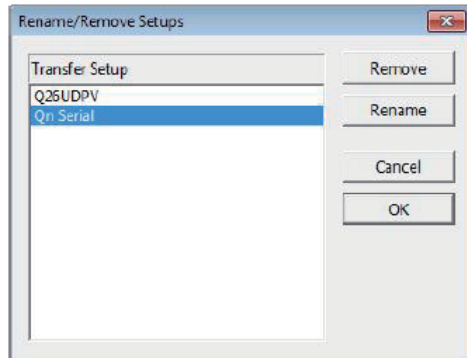
- Must be unique
- Must not be empty
- Must not exceed 32 characters in length
- Must not start or end with blanks (automatically removed)

## ■Rename / Remove Transfer Setup

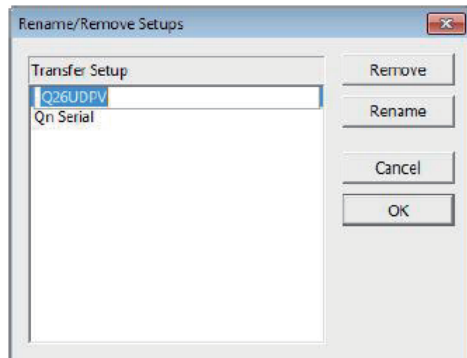
The user can change the name of existing setups or remove them, if they are no longer used.



When the entry '<Rename/Remove...>' is selected, a dialog is displayed, which lists the existing transfer setups.



Pressing the 'Remove' button deletes the currently selected setup. Pressing the 'Rename' button or doubleclicking a setup name in the list opens an editor for the name within the list.



A setup name is rejected, if it does not meet the requirements for setup names.

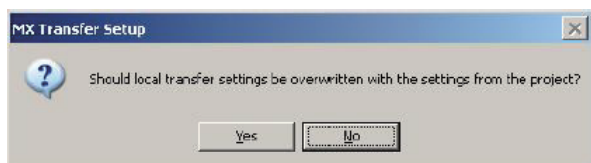
## ■Editing an Existing Transfer Setup

Pressing the 'Configure' button opens the transfer setup wizard for the selected transfer setup.

## ■Replace Transfer Setup Dialog

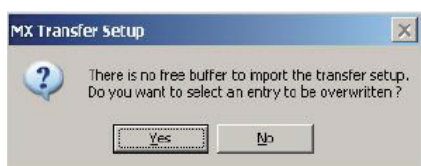
When the transfer setup dialog is opened, it imports the transfer setup of the currently selected device into the local transfer setup database. This database is kept in the Windows™ registry.

If the registry already contains a setup with the same name as the one of the selected device, the settings in the registry are compared with the settings used by the device. In case the settings differ, the user is asked, whether the local settings should be overwritten with the settings from the device.

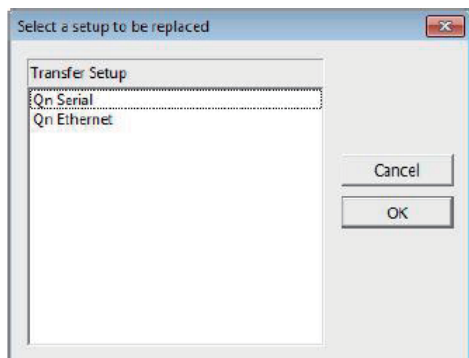


Selecting 'Yes' causes the transfer settings from the device to overwrite the settings currently kept in the registry under the given transfer setup name. Otherwise the settings of the transfer setup in the registry remain unchanged.

If no setup with the name exists, a new setup is added to the database. In case there is insufficient space for a new setup, the following message is displayed.

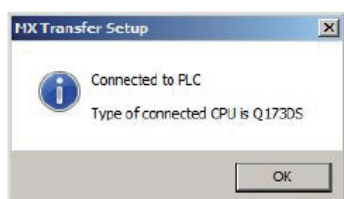


If the user selects 'Yes', a list of existing setups is displayed. The user can select a setup in the list, which is overwritten with the new settings.

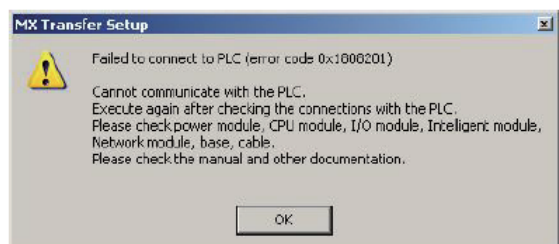


## ■Connection Test

The 'Comm. Test' button uses the settings of the selected transfer setup to connect to the PLC. If the connection can be established, a success message is displayed.



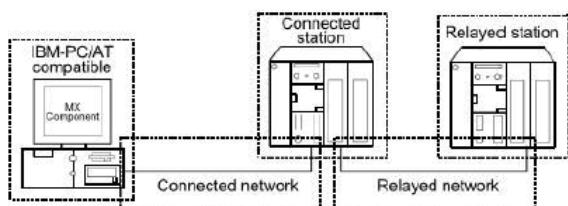
If the connection to the PLC fails, the Easysocket error code is displayed, together with an explanatory message.



## Transfer Setup Wizard

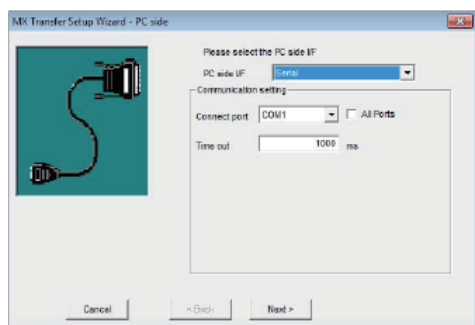
The transfer setup is used for the configuration of communication links from the PC to a PLC system.

The settings for a communication link between PC and PLC are entered in a set of dialogs. These are organized as a series of sequential pages. Moving between adjoining pages is done via the 'Back' and 'Next' buttons.



Screen Name	Description
Wizard 1)	Set the connected network between the IBM-PC/AT compatible and connected station (PLC CPU and module).
Wizard 2)	Set the connected station (PLC CPU and module).
Wizard 3)	Set the relayed network between the connected station (PLC CPU and module) and relayed station (PLC CPU and module).
Wizard 4)	Set the relayed station PLC CPU.
Wizard 5)	Add a comment.

Start the communication setting wizard.

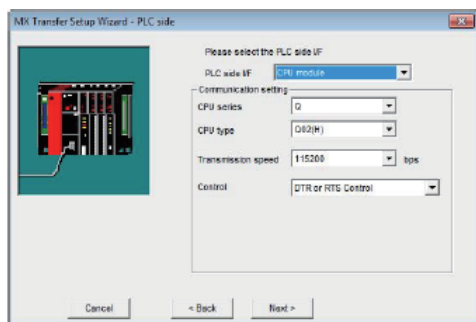


The items shown in the 'Communication setting' box depend on the selected PC side interface.

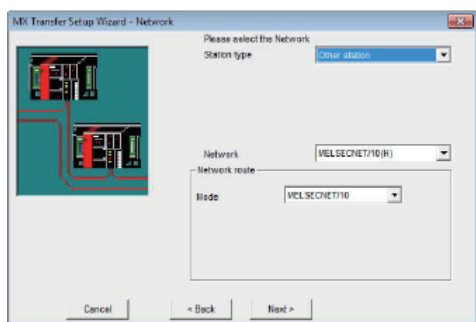
Choose the 'PC side I/F' to communicate with. The available interface types are listed below:

'PC side I/F' Selection	Communication Type
USB	USB communication
USB (via GOT)	USB communication via GOT
Serial	Computer link communication, CPU COM communication, CC-Link G4 communication
Serial (via GOT)	Serial communication via GOT
Ethernet board	Ethernet communication
Ethernet board (via GOT)	Ethernet communication via GOT
Modem	Modem communication
CC-Link IE Control board	CC-Link IE communication
MELSECNET/H board	MELSECNET/H communication
MELSECNET/10 board	MELSECNET/10 communication
CC IE Field board	CC-Link IE Field communication
CC-Link board	CC-Link communication
Q Series Bus	Q Series bus communication
GX Simulator3	GX Simulator3 communication
GX Simulator2	GX Simulator2 communication
GX Simulator	GX Simulator communication
MT Simulator2	MT Simulator2 communication
CPU board	CPU board communication

After setting the parameters continue by pressing the 'Next' button.

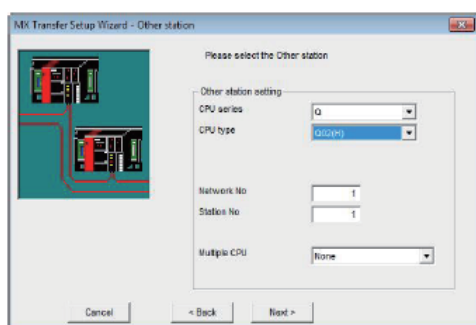


The contents of the 'PLC side I/F' page depend on the selected PC side interface.  
Set all available parameters and click the Next button.

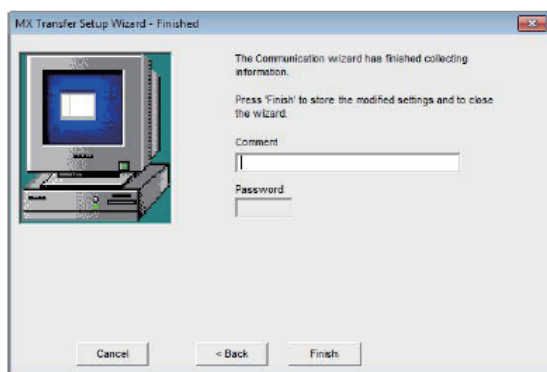


The contents of the 'Network' page depend on the selections in the previous pages.  
Set all available parameters and click the Next button.

Note: when 'Modem' has been selected as 'PC side I/F', the line setting screen appears next. For details of the line setting screen refer to 'Modem Line Settings'.



The contents of the 'Other station' page depend on the selections in the previous pages.  
Set all available setting items and click the Next button.



You can enter an optional comment of up to 32 characters for the connection.  
Pressing the Finish button stores the current settings and closes the wizard.



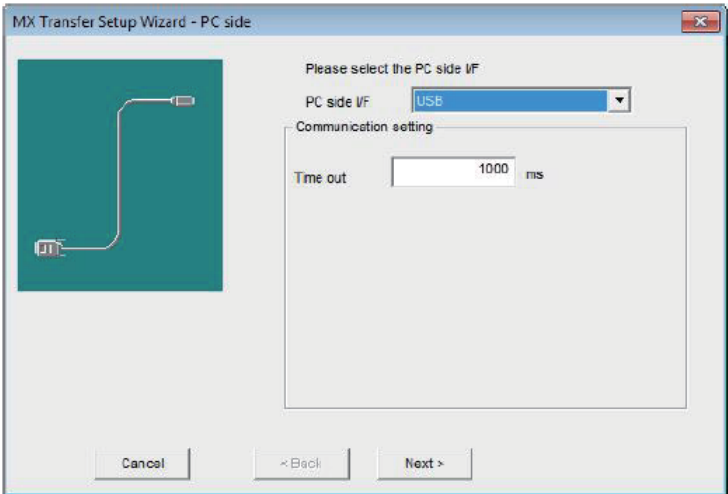
The enclosed sample programs should serve as examples when writing the user program.  
They must be modified to match the specific application requirements.  
The use of code taken from the sample programs is done at the customer's own risk.

■PC Universal Serial Bus (USB) Interface

Configure a connection from an USB port of the PC to a PLC.

- PC side USB parameters

Parameter	Values	Description
Time out	1 - 2147483647	Communication timeout in milliseconds



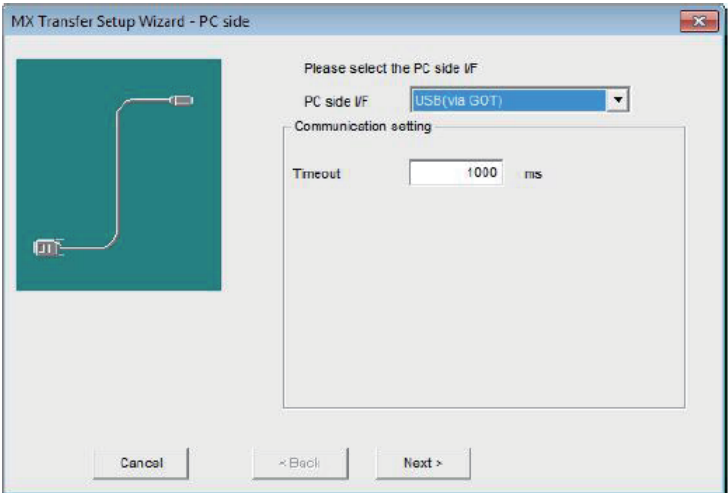
For a description of the editable parameters on the page see PC side USB parameters.  
The connected interface on the PLC side is a CPU module.

■PC Universal Serial Bus (USB) Interface via GOT

Configure a connection from an USB port of the PC to a GOT and from there to a PLC.

- PC side USB parameters

Parameter	Values	Description
Time out	1 - 2147483647	Communication timeout in milliseconds



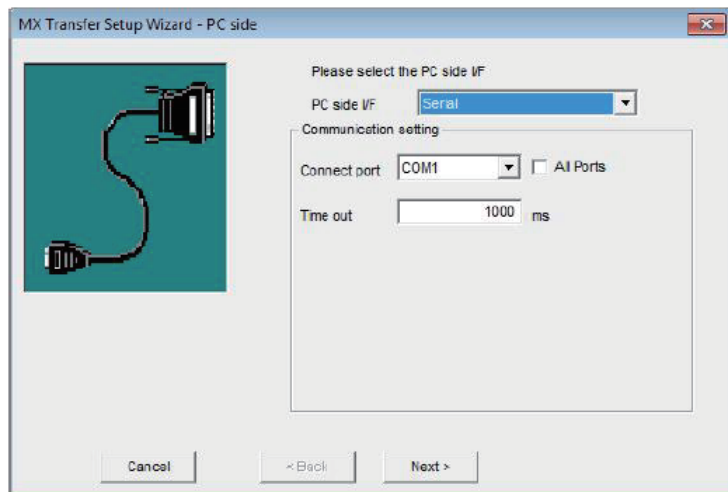
For a description of the editable parameters on the page see PC side USB parameters.  
Pressing the <Next> button opens a page for selecting the PLC side interface of the GOT.



## ■PC RS232 Serial Interface

Configure a serial connection to a PLC.

Parameter	Values	Description
All Ports	—	If cleared, only one of the serial interfaces actually installed in the PC can be selected. If checked, any COM port can be selected. This may be useful when defining a configuration for a different PC.
Connect port	'All Ports' cleared	COM1 - COMn
	'All Ports' checked	COM1 - COM256
Time out	1 - 2147483647	Communication timeout in milliseconds



For a description of the editable parameters on the page see PC side serial parameters.

The connected interface on the PLC side can be

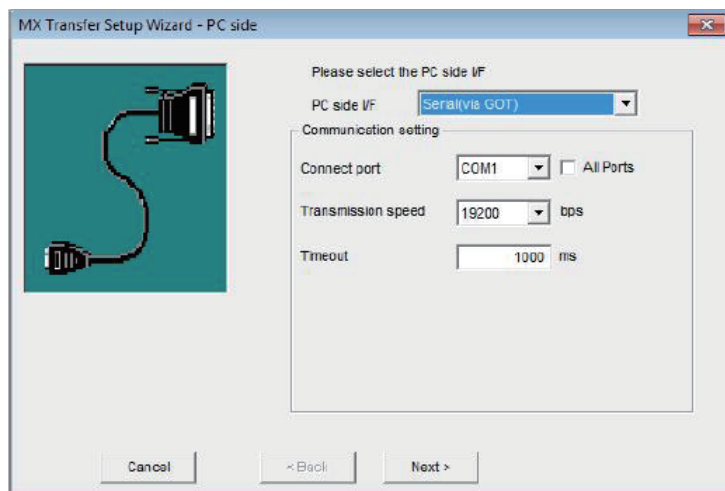
- A CPU module (either RS422 or USB interface)
- A C24 module
- A G4 module
- An FX extended port

## ■PC RS232 Serial Interface via GOT

Configure a serial connection to a GOT and from there to a PLC.

- PC side serial parameters

Parameter	Values	Description
All Ports	—	If cleared, only one of the serial interfaces actually installed in the PC can be selected. If checked, any COM port can be selected. This may be useful when defining a configuration for a different PC.
Connect port	'All Ports' cleared	COM1 - COMn
	'All Ports' checked	COM1 - COM256
Transmission speed	9600, 19200, 38400, 57600, 115200	Baud rate of the serial connection
Time out	1 - 2147483647	Communication timeout in milliseconds



For a description of the editable parameters on the page see PC side serial parameters.

Pressing the <Next> button opens a page selecting the PLC side interface of the GOT.

## ■PC Ethernet Board

Configure the PC side Ethernet interface

- PC side Ethernet parameters

Parameter	Values	Description
Connect module	AJ71E71, AJ71QE71, QJ71E71, RJ71EN71, LJ71E71, GOT, FXENET(-ADP), FX3U-ENETADP, CPU module, CC IE Field Ethernet adapter	Type of PLC Ethernet module
Protocol	UDP, TCP	Connection-less (UDP) or connection-oriented (TCP) protocol Not for FX3U-ENET modules Precautions for use of TCP protocol <ul style="list-style-type: none"> <li>• Provide an interval longer than the sequence scan time of the Ethernet module loaded station from when the Open method is executed until the Close method is executed.</li> <li>• Provide an interval of at least 500ms from when the Close method is executed until the Open method is executed again.</li> </ul>
Packet type	ASCII, Binary	Selects ASCII or binary packet type for communication Only for AJ71E71 and AJ71QE71 modules
Network No	1 - 239	Network number of the E71 Ethernet module, the PC is connected to. The E71 Network number is configured in the 'Network Parameters' of the PLC settings. Only for AJ71QE71(UDP), QJ71E71, LJ71E71 and RJ71EN71 modules
Station No.	1 - 64	Station number of the PC side interface. This number can be freely chosen, but must be unique within the network specified by the network number. Only for AJ71QE71(UDP), QJ71E71, LJ71E71 and RJ71EN71 modules
Port No.	0 - 65535	Free UDP port number on the PC side for data sent by the PLC. Port numbers below 1025 should not be used. Only for UDP protocol and for GOT module
Time out	1 - 2147483647	Communication timeout in milliseconds

### Point

When connecting from several MELSOFT applications to the same E71 module, make the following settings:

- Set the protocol of the communication setting wizard screen to 'UDP'.
- Set "SW2" of the communications setting switches of the E71 module to OFF (binary).

The following restrictions apply to simultaneous connections from multiple PCs to the same E71 module using the TCP/IP protocol:

- For Q series-compatible E71 modules (except QJ71E71-100) the first five digits of the serial number must be '02122' or later and the function version must at least be 'B'
- Select 'MELSOFT connection' in the Ethernet parameter 'open system' (via the network parameters in GID/GD)

### Point

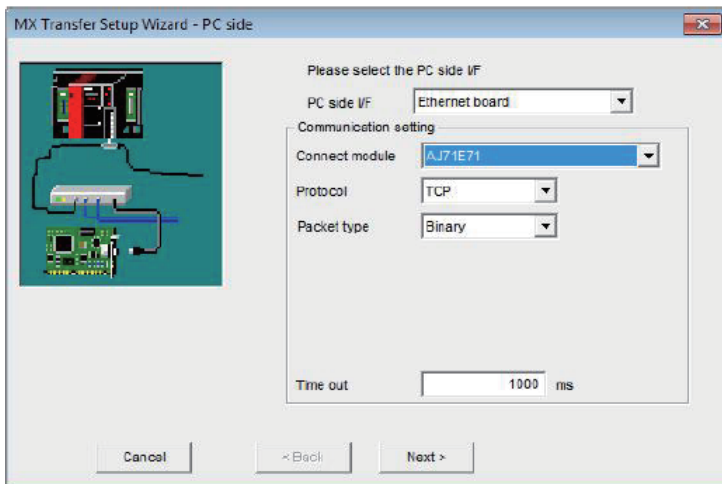
Connecting to the PLC CPU through Ethernet depends on the correct PLC CPU status:

- TCP selected: the target PLC CPU must be in RUN mode
- UDP selected: the target PLC CPU must have been in RUN mode once

### Point

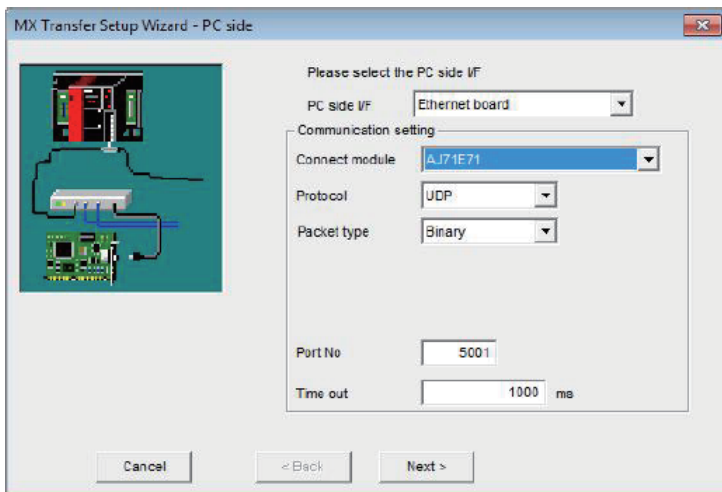
When a QnA-, AnU-, Q- (A mode) or motion controller CPU (via E71) are accessed, the device range is equivalent to that of an AnA CPU.

- AJ71E71



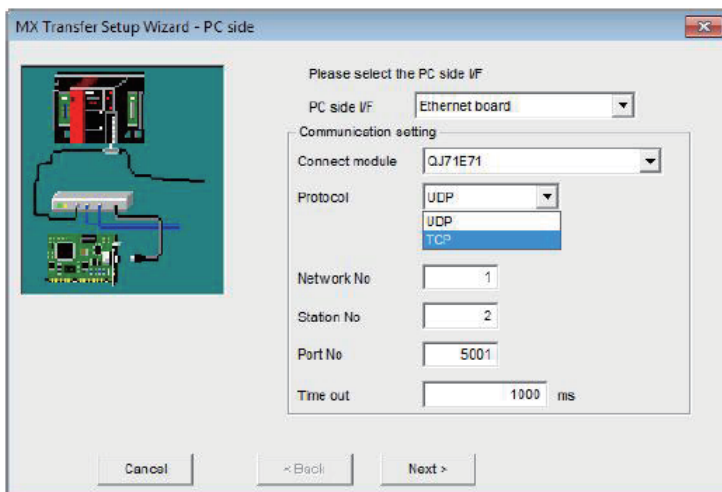
For a description of the editable parameters on the page see PC side Ethernet parameters.  
Pressing the <Next> button opens a page for entering the address of the PLC Ethernet module.

- AJ71QE71



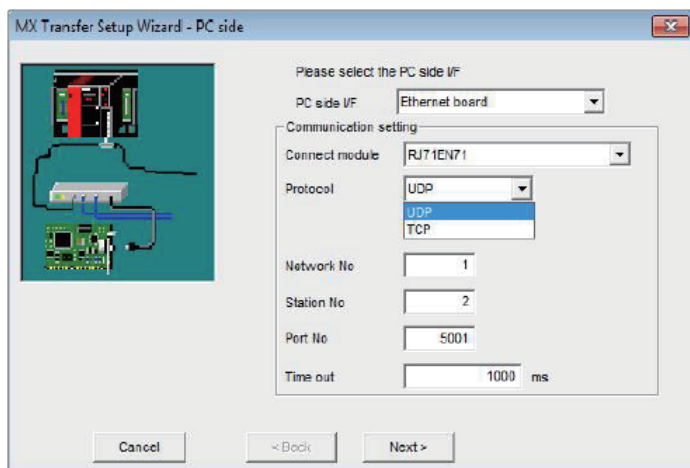
For a description of the editable parameters on the page see PC side Ethernet parameters.  
Pressing the <Next> button opens a page for entering the address of the PLC Ethernet module.

- QJ71E71



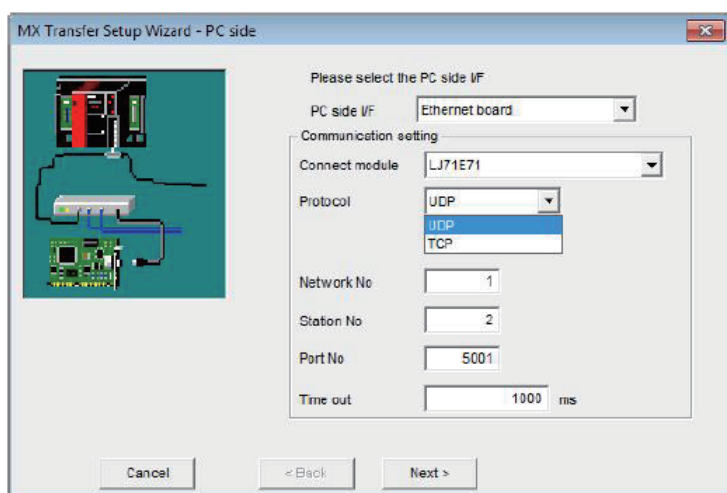
For a description of the editable parameters on the page see PC side Ethernet parameters.  
Pressing the <Next> button opens a page for entering the address of the PLC Ethernet module.

- RJ71EN71



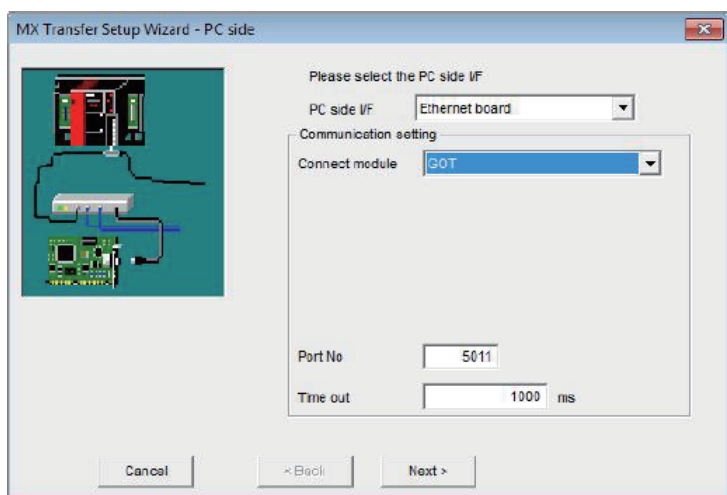
For a description of the editable parameters on the page see PC side Ethernet parameters.  
Pressing the <Next> button opens a page for entering the address of the PLC Ethernet module.  
Note: the option 'Port No' is only visible, if UDP as transport protocol is selected.

- LJ71E71



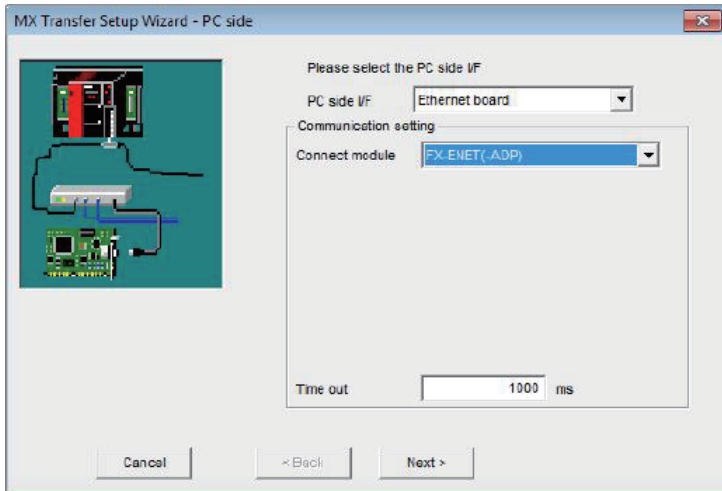
For a description of the editable parameters on the page see PC side Ethernet parameters.  
Pressing the <Next> button opens a page for entering the address of the PLC Ethernet module.  
Note: the option 'Port No' is only visible, if UDP as transport protocol is selected.

- GOT



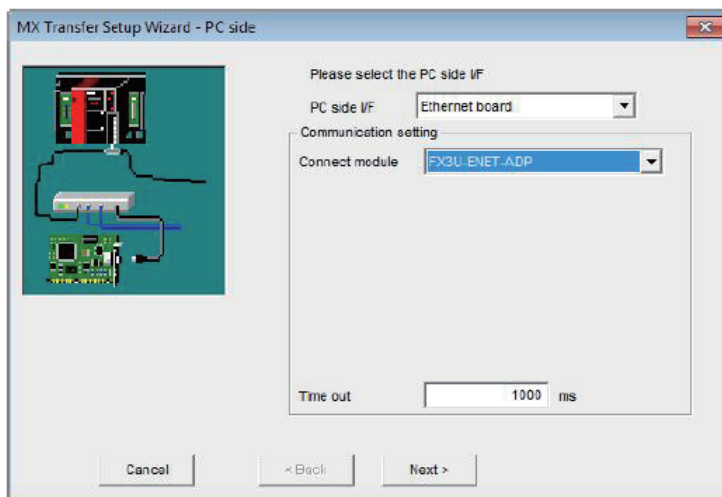
For a description of the editable parameters on the page see PC side Ethernet parameters.  
Pressing the <Next> button opens a page for entering the address of the GOT Ethernet module.

- FX Ethernet Module



For a description of the editable parameters on the page see PC side Ethernet parameters.  
Pressing the <Next> button opens a page for entering the address of the PLC Ethernet module.

- FX3U Ethernet Module

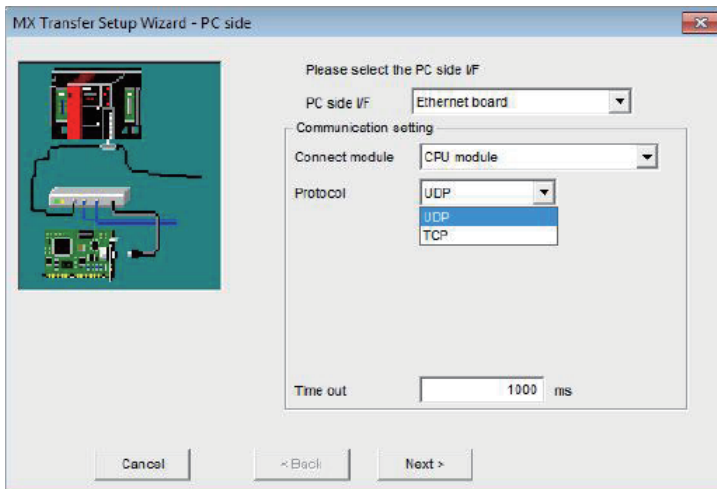


For a description of the editable parameters on the page see PC side Ethernet parameters.  
Pressing the <Next> button opens a page for entering the address of the PLC Ethernet module.

- CPU Module

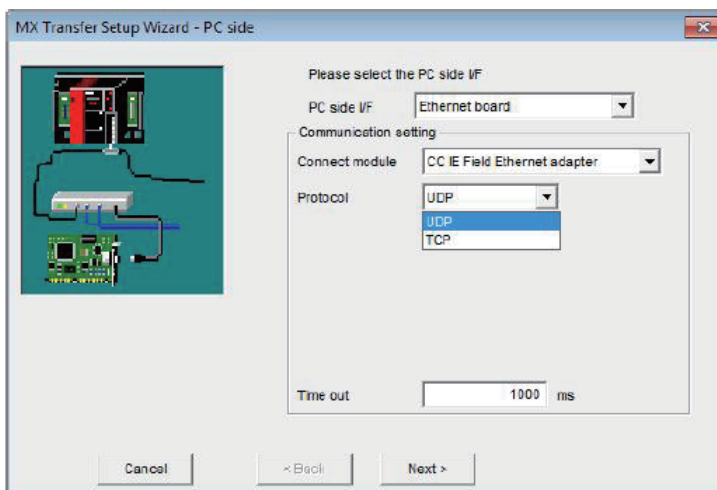
'CPU module' is selected when connecting to a Qn-, Ln-, Rn-, RnSF-, FX3-, FX5- or Q and Rn Motion series CPU with an Ethernet interface.

Note: FX3-series CPUs with Ethernet interface support either TCP protocol or direct UDP protocol connections. UDP protocol connections in a network will be automatically changed to TCP protocol connections.



Pressing the <Next> button opens a page to search for the PLC CPU or to manually enter its IP address.

- CC IE Field Ethernet Adapter



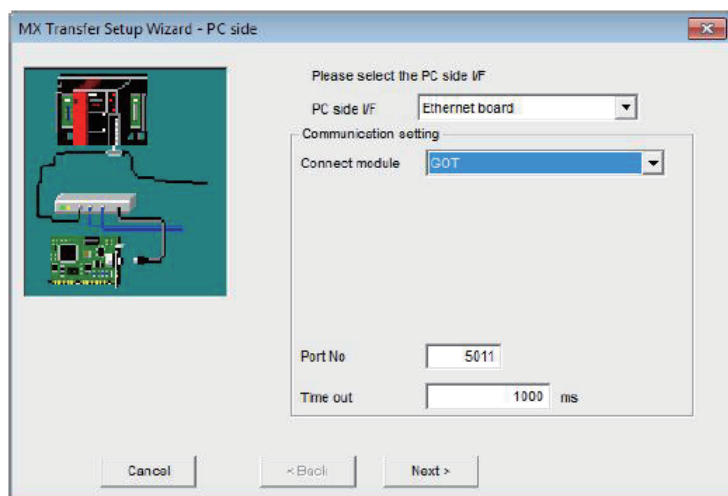
Pressing the <Next> button opens a page for entering the address of the CC-Link IE Field Ethernet adapter.

## ■PC Ethernet Board via GOT

Configure an Ethernet connection to a GOT and from there to a PLC.

- PC side Ethernet parameters

Parameter	Values	Description
Time out	1 - 2147483647	Communication timeout in milliseconds



For a description of the editable parameters on the page see PC side Ethernet parameters.

Pressing the <Next> button opens a page selecting the PLC side interface of the GOT.

## ■PC Modem

Configure a dial-up connection via modem.



It is recommended to configure and test the connection in GX Works3 or GX Works2 before using this wizard.

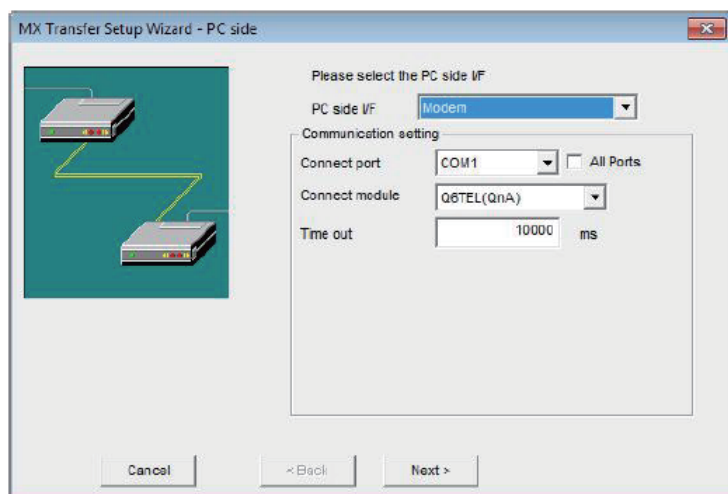
- PC side modem parameters

Parameter	Values	Description
All Ports	—	If cleared, only one of the serial interfaces actually installed in the PC can be selected If checked, any COM port can be selected. This may be useful when defining a configuration to a different PC
Connect port	'All Ports' flag cleared	Selects the serial interface in the PC from a list of serial interfaces found on the PC
	'All Ports' flag checked	Selects the serial interface in the PC from a list of all possible serial interfaces
Connect module	Q6TEL(QnA), FXCPU, AJ71QC24N, QJ71C24, QJ71CMO, LJ71C24	Type of remote PLC module
Time out	1 - 2147483647	Communication timeout in milliseconds



Simultaneous modem communication by several MELSOFT applications is not supported.  
Communication errors, a disconnection of the telephone line or similar problems may occur.





For a description of the editable parameters on the page see PC side modem parameters.

Pressing the <Next> button opens a page for configuring the modem connection (e.g. telephone number etc.).

- Modem Line Settings

Enter the parameters for the modem connection to a remote PLC including the phone number and any AT commands to configure the local modem.

#### Point

- Do not use a call-waiting phone line.

On a call-waiting phone line, data corruption, telephone line disconnection or similar may occur due to interrupt reading sounds.

- Do not connect the line to master/slave phones.

If the slave phone picks up while the telephone line is connecting to the master/slave phones, the telephone line may be disconnected.

- Use an analog 2 wire type telephone line.

When using a digital line, use a terminal adaptor.

When the telephone line is of 4 wire type, the line may not be connected depending on the wiring type of the modular jack.

For the 4 wire type conduct connection tests in advance to check for connection.

#### Point

- Modem for radio communication using a cellular phone

Although the modem name is different depending on the maker, the modem is generically referred to as the cellular phone communication unit in this manual. Select the model of the cellular phone communication unit according to the cellular phone used.

For details, contact the company of your cellular phone.

- Cellular phone without auto answer function

For a cellular phone without auto answer function, use a cellular phone communication unit that has the ANS/ORG/TEL select switch. If the cellular phone communication unit does not have the ANS/ORG/TEL select switch, it is impossible to connect the line. The line connection procedure is different depending on the cellular phone company and cellular phone model.

For details, contact the maker of your cellular phone

- Connect line dialog

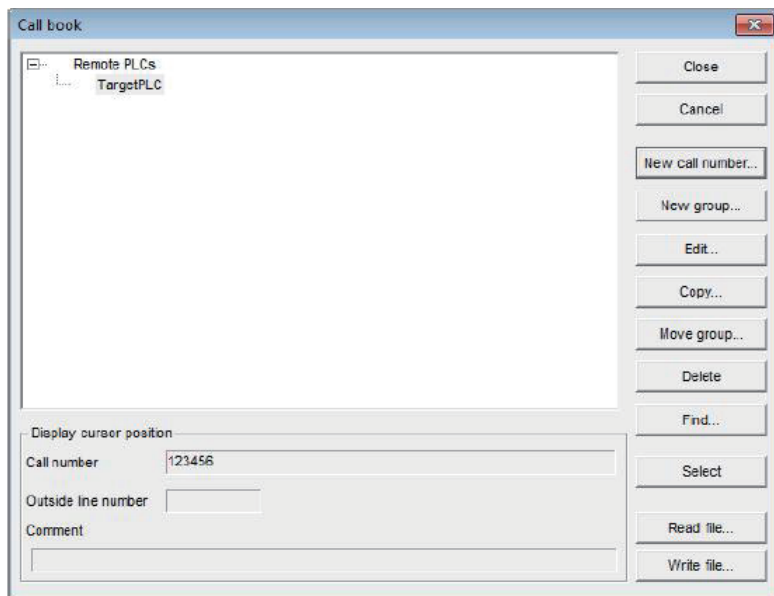
Set the line connection system, telephone line, AT command, etc.



The 'Next' button is disabled, if no number has been entered in the 'Call number' field.

Item		Description
Connect way		Fixed to 'Auto line connect'
Callback number		Not available
Line	Line type	Set the line type (Default: Tone)
	Outside line number	Set the outside line access number. The number must not exceed a length of 10 characters and can consist of 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, -, #
Connection target	Call number	Enter the telephone number of the connection target. When the connection target has been selected on the phone book screen, the telephone number of the connection target appears. The phone number must not exceed a length of 50 characters and can consist of 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, -, #
	Name	An optional name, which has been assigned to the phone number in the phone book
	Browse	Displays the phone book screen. For details see 'Call book dialog'
AT command	Modem standard	When selected the standard AT commands are used
	AT command setting	AT command sequence to initialize the local modem The command must not exceed a length of 70 ASCII characters
	Title	The optional title of the AT command selected in the AT command registration screen
	Browse	Displays the AT command registration screen. For details see 'AT command registration dialog'
	Help of AT command	Displays the AT command help
Details setting		Displays the 'Details setting dialog'

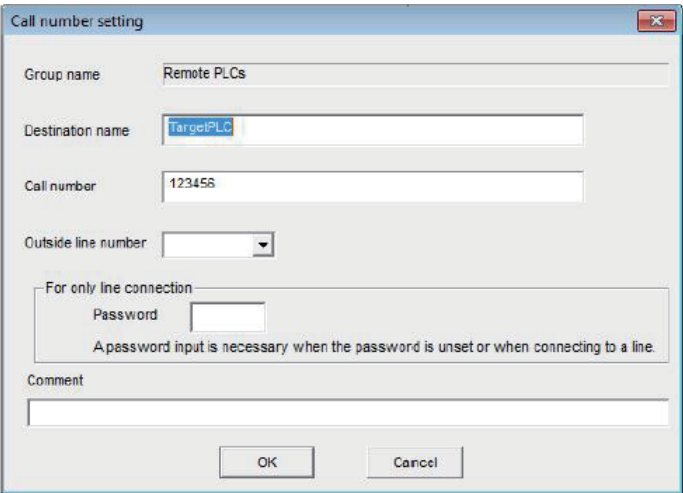
- Call book dialog



Item	Description
Close	Store the edited data and close the phone book dialog
Cancel	Discard the edited data and close the phone book dialog
New call number	Open the 'Call number setting dialog' to enter a new phone number
New group	Create a new group; opens the 'Group setting' dialog for entering the group name
Edit	If a group is selected, the 'Group setting' dialog is opened. Otherwise it opens the 'Call number setting dialog' to edit a phone number
Copy	Copies the selected phone number to a different group (see 'Select phone group name')
Move group	Moves the selected phone number to a different group (see 'Select phone group name')
Delete	Deletes the selected phone number or group. Only empty groups can be deleted. If a group is not empty, the phone numbers must be deleted first.
Find	Used to search phone numbers and associated names (see 'Find a phone number')
Select	Closes the dialog and copies the selected phone number to the line dialog
Read file	Reads phone numbers from a file selected by the user
Write file	Stores the contents of the phone book in a file selected by the user

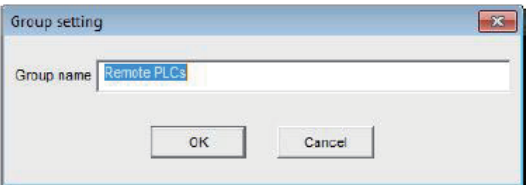
- Call number setting dialog

Set the telephone number to be registered to the phone book.

A dialog box titled "Call number setting" with a close button (X) in the top right corner. It contains several input fields: "Group name" with the text "Remote PLCs", "Destination name" with the text "TargetPLC", "Call number" with the text "123456", and "Outside line number" which is a dropdown menu. Below these is a section titled "For only line connection" containing a "Password" input field and a note: "A password input is necessary when the password is unset or when connecting to a line." At the bottom is a "Comment" text area and two buttons: "OK" and "Cancel".

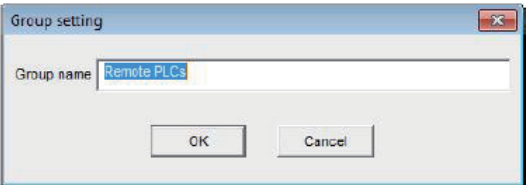
Item	Description
Group name	The group name of the registration destination.
Destination name	Name associated with the phone number
Call number	Enter the telephone number of the connection target. The phone number must not exceed a length of 50 characters and can consist of 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, -, , #
Outside line number	Set the outside line access number. The number must not exceed a length of 10 characters and can consist of 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, -, , #
For only line connection	If a password has been set in A6TEL, Q6TEL or Q series C24 for remote access, the password must be entered here in order to access the target PLC
Comment	An optional comment describing the phone number

- Edit phone group name

A dialog box titled "Group setting" with a close button (X) in the top right corner. It contains a "Group name" input field with the text "Remote PLCs" and two buttons: "OK" and "Cancel".

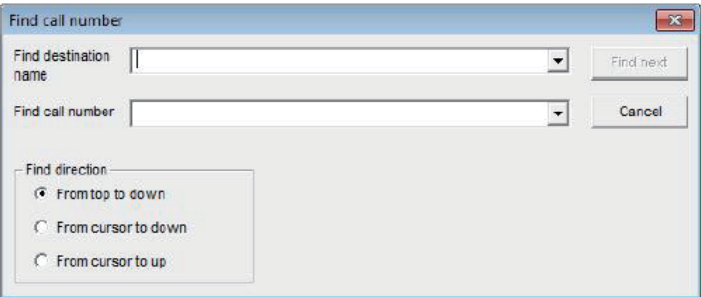
Enter the name for a group of telephone numbers.

- Select phone group name

A dialog box titled "Group setting" with a close button (X) in the top right corner. It contains a "Group name" input field with the text "Remote PLCs" and two buttons: "OK" and "Cancel".

Select the name of the group, where the selected phone number is copied to.

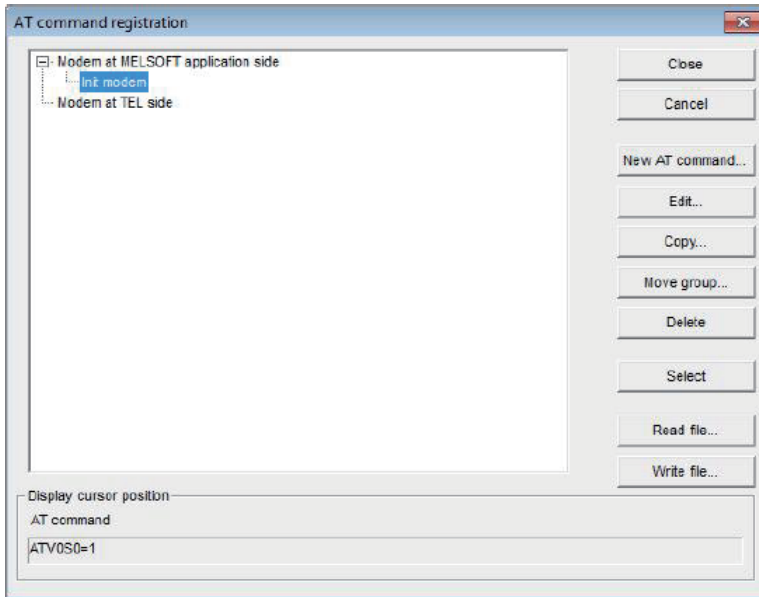
- Find a phone number

A dialog box titled "Find call number" with a close button (X) in the top right corner. It contains two dropdown menus: "Find destination name" and "Find call number". To the right of these are two buttons: "Find next" and "Cancel". Below these is a section titled "Find direction" with three radio buttons: "From top to down" (which is selected), "From cursor to down", and "From cursor to up".

Search the phone book for a given name or number.

- AT command registration dialog

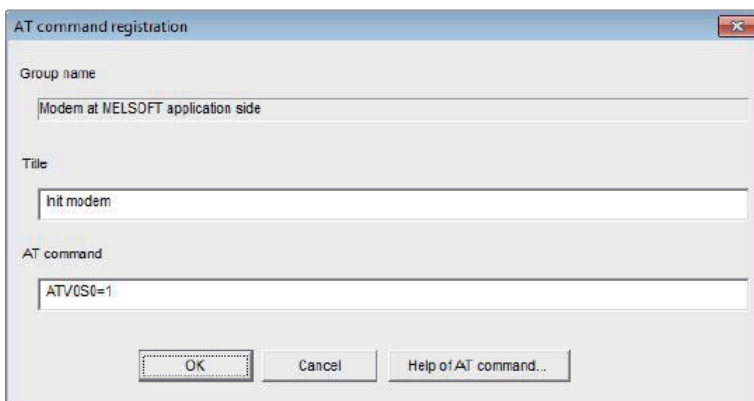
Set the AT commands used on the line setting screen.



Item	Description
Close	Store the edited data and close the AT command registration dialog
Cancel	Discard the edited data and close the AT command registration dialog
New AT command	Define a new AT command. For details see 'AT command edit dialog'
Edit	Edit an existing AT command. For details see 'AT command edit dialog'
Copy	Copy the selected command to a different group (see 'Select AT command group name')
Move group	Move the selected command to a different group (see 'Select AT command group name')
Delete	Delete the selected AT command
Select	Used to display the AT command selected in the AT command display list on the line setting screen.
Read file	Reads AT commands from a file selected by the user
Write file	Stores the AT commands in a file selected by the user

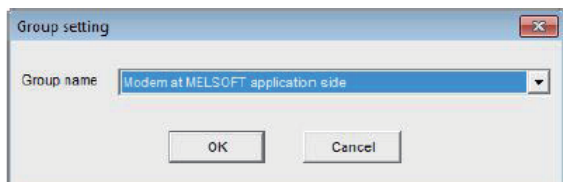
- AT command edit dialog

Register a new AT command and edit the AT command.



Item	Description
Group name	Displays the name of the group to which the AT command is assigned
Title	A name for the AT command (max 60 ASCII characters)
AT command	Enter the AT command for modem initialization (max. 70 ASCII characters)
Help of AT command	Displays the AT command help

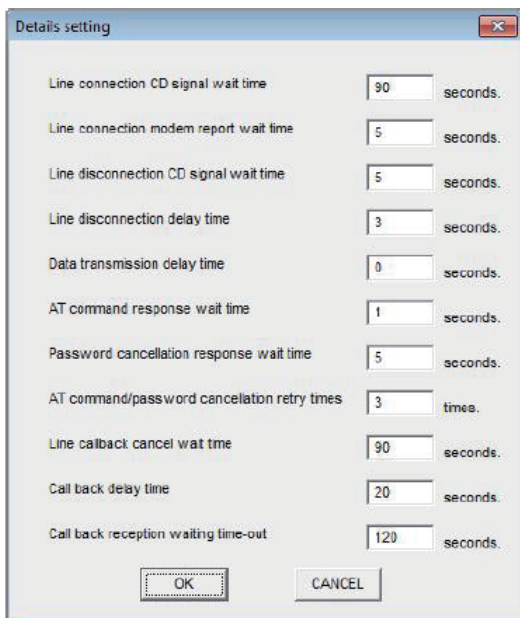
- Select AT command group name



Select the name of the group, where the selected AT command is copied to.

- Details setting dialog

Set details for telephone line connection.



Item	Description
Line connection CD signal wait time	Set the maximum time to wait for the carrier-detect signal to be set (Default: 90) Increase the time, if the CD signal does not turn ON within the set time depending on the line-connected region (example: overseas). Setting range: 1 to 999
Line connection modem report waiting time	Set the line connection modem report wait time. (Default: 5) Increase the set time if the response speed of the modem is low. Setting range: 1 to 999
Line disconnection CD signal wait time	Set the maximum time to wait for the carrier-detect signal to be dropped (Default: 5) Increase the set time if the CD signal does not turn OFF within the preset time depending on the line-connected region (example: overseas). Setting range: 1 to 999
Line disconnection delay time	Set the line disconnection delay time. (Default: 3) Increase the set time if the response speed of the modem is low. Setting range: 1 to 999
Data transmission delay time	Set the data transmission delay time. (Default: 0) Increase the set time if the response speed of the modem is low. Setting range: 1 to 999
AT command response wait time	Set the AT command response wait time. (Default: 1) Increase the set time if the response speed of the modem is low. Setting range: 1 to 999
Password cancellation response wait time	Set the password cancellation response wait time. (Default: 5) Increase the set time if the quality of the line with the other end is low. Setting range: 1 to 999
AT command/password cancellation retry times	Set the AT command/password cancellation retry count. (Default: 3) Increase the set count if the AT command cannot be sent or the password cannot be canceled. Setting range: 1 to 999
Line callback cancel wait time	Set the Line callback cancel wait time. (Default: 90) Increase the set time if the line at the other end (Q series corresponding C24 side) is not disconnected within the set time depending on the line-connected region (example: overseas). Setting range: 1 to 180

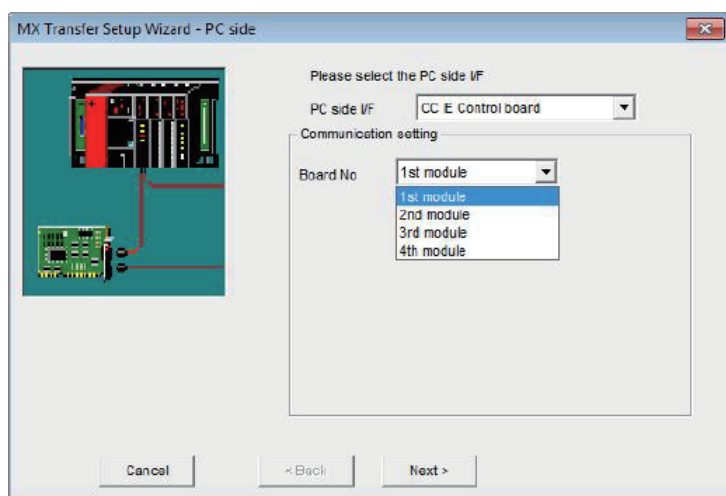
Item	Description
Call back delay time	Set the callback delay time. (Default: 20) Increase the set time if the device for relaying connection to the line (example: modem, etc.) requires the set time for reconnection after line disconnection. Setting range: 1 to 999
Call back reception waiting time-out	Set the callback reception waiting time-out. (Default: 120) Increase the set time if a time-out occurs in a callback receive waiting status. Setting range: 1 to 3600

### ■PC CC-Link IE Control Board

A connection between PC and PLC via CC-Link IE requires the CC-Link IE interface board and the corresponding driver to be installed in the PC.

- PC side CC-Link IE Control parameters

Parameter	Values	Description
Board No.	1st, 2nd, 3rd, 4th module	Selects the interface board in the PC



For a description of the editable parameters on the page see PC side CC-Link IE parameters.

The PLC station, to which a connection is established, can be either

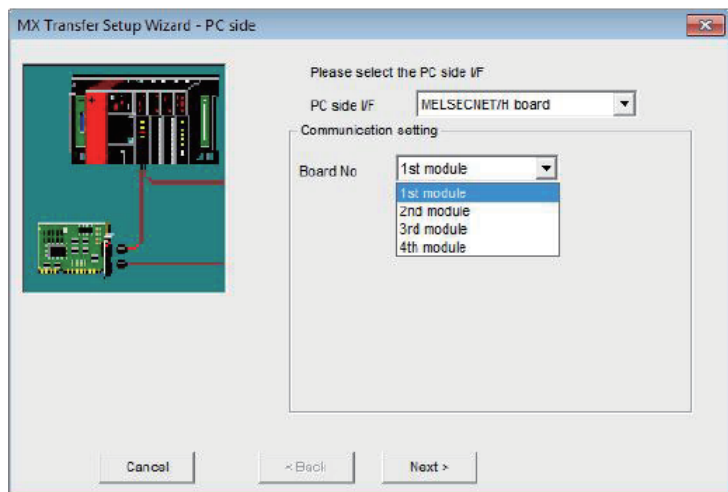
- The host station
- A different station in an attached network
- A different station in a separate network

## ■PC MELSECNET/H Board

A connection between PC and PLC via MELSECNET/H requires the MELSECNET/H interface board and the corresponding driver to be installed in the PC.

- PC side MELSECNET/H parameters

Parameter	Values	Description
Board No.	1st, 2nd, 3rd, 4th module	Selects the interface board in the PC



For a description of the editable parameters on the page see PC side MELSECNET/H parameters.

The PLC station, to which a connection is established, can be either

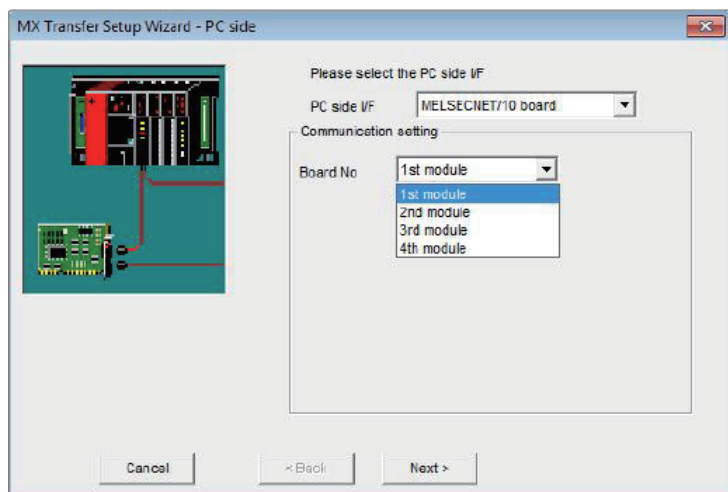
- The host station
- A different station in an attached network
- A different station in a separate network

## ■PC MELSECNET/10 Board

A connection between PC and PLC via MELSECNET/10 requires the MELSECNET/10 interface board and the corresponding driver to be installed in the PC.

- PC side MELSECNET/10 parameters

Parameter	Values	Description
Board No.	1st, 2nd, 3rd, 4th module	Selects the interface board in the PC



For a description of the editable parameters on the page see PC side MELSECNET/10 parameters.

The PLC station, to which a connection is established, can be either

- The host station
- A different station in an attached network
- A different station in a separate network

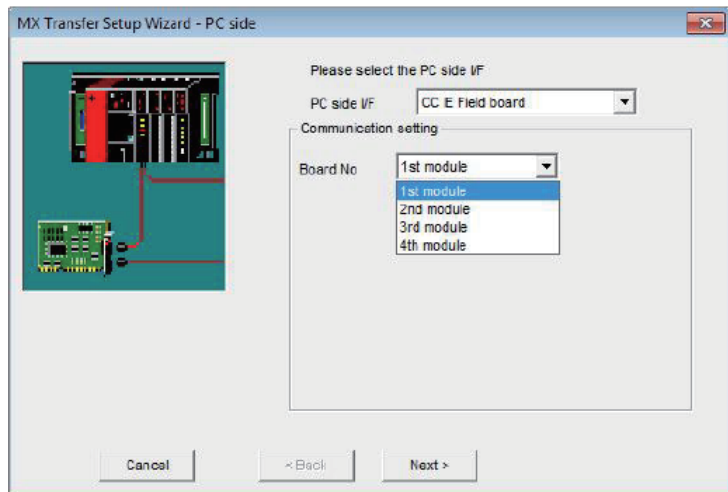


## ■PC CC-Link IE Field Board

A connection between PC and PLC via CC-Link IE Field requires the CC-Link IE Field interface board and the corresponding driver to be installed in the PC.

- PC side CC-Link IE Field parameters

Parameter	Values	Description
Board No.	1st, 2nd, 3rd, 4th module	Selects the interface board in the PC



For a description of the editable parameters on the page see PC side CC-Link IE parameters.

The PLC station, to which a connection is established, can be either

- The host station
- A different station in an attached network
- A different station in a separate network

## ■PC CC-Link Board

A connection between PC and PLC via CC-Link requires the CC-Link interface board and the corresponding driver to be installed in the PC.

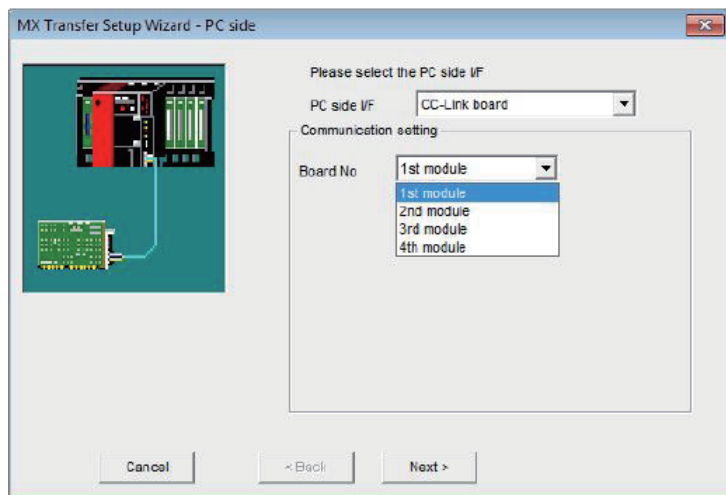
- PC side CC-Link parameters

Parameter	Values	Description
Board No.	1st, 2nd, 3rd, 4th module	Selects the interface board in the PC

### Point

The CC-Link master/local module used in CC-Link communication or CC-Link G4 communication (only when the AJ65BT-G4 is used), must have software version 'N' or later.

Modules with software version 'M' or earlier will not operate properly.



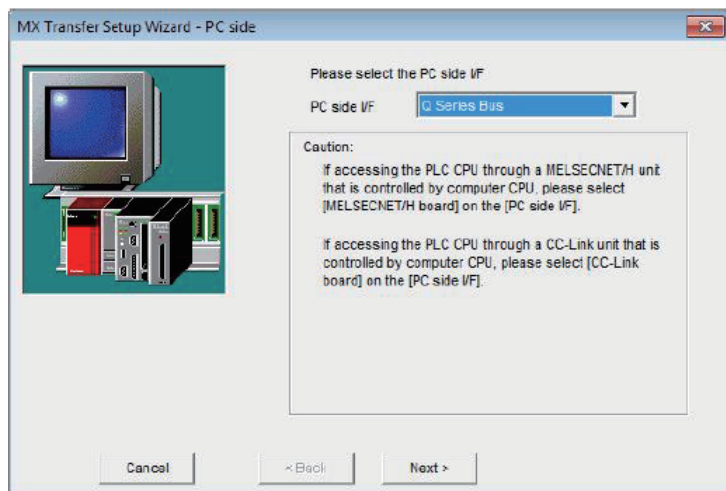
For a description of the editable parameters on the page see PC side CC-Link parameters.

The PLC station, to which a connection is established, can be either

- The host station
- A different station in an attached network
- A different station in a separate network

## ■PC Q Series Bus

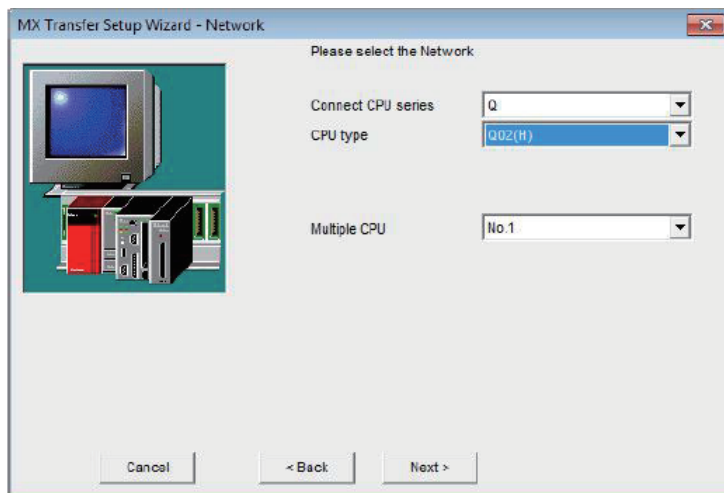
Configure a connection from the PC CPU module installed in a Q series rack to a PLC CPU within the same rack, using the back panel bus. Alternatively the communication between PC CPU and PLC CPU module can use a MELSECNET/H or a CC-Link interface.



Pressing the <Next> button opens a page for selecting the connected CPU type.

- Q Series Bus - Network

Parameter	Values	Description
CPU type	see list of supported CPU types	Type of PLC CPU module
Multiple CPU	No. 1, No. 2, No. 3	Selects the CPU module in the PLC



Pressing the <Next> button opens a page for entering a comment for the connection.

## ■PC GX Simulator

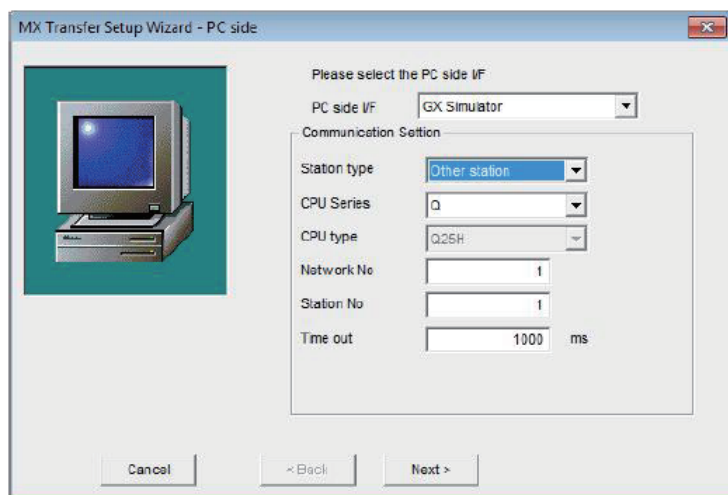
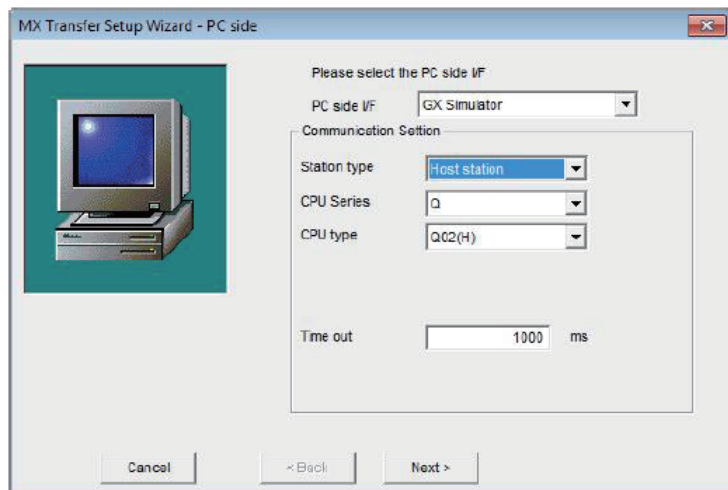
Define a connection to an instance of GX Simulator running on the same computer.

- PC side GX Simulator parameters

Parameter	Values	Description
Station type	'Host station' or 'Other station'	Direct connection or MELSECNET network
CPU series	Q, QnA, A, FX	Series of the CPU type selected in GX Simulator (FX is only available for station type 'Host station')
CPU type	see list of supported CPU types	Type of CPU selected in GX Simulator Not selectable for 'Other station' as 'Station type'
Network No	1 - 239	Network number of the E71 Ethernet module, the PC is connected to. The E71 Network number is configured in the 'Network Parameters' of the PLC settings. Only for 'Other station' as 'Station type'
Station No.	1 - 64	Station number of the PC side interface. This number can be freely chosen, but must be unique within the network specified by the network number. Only for 'Other station' as 'Station type'
Time out	1 - 2147483647	Communication timeout in milliseconds

### Point

Before configuring the connection please make sure that GX Simulator and GX Developer are operating. In addition, do not terminate GX Simulator and GX Developer while the user program is running. If you do so, you will not be able to terminate the user program normally.



For a description of the editable parameters on the page see PC side GX Simulator parameters. Pressing the <Next> button opens a page for entering a comment for the connection.

# PC GX Simulator2

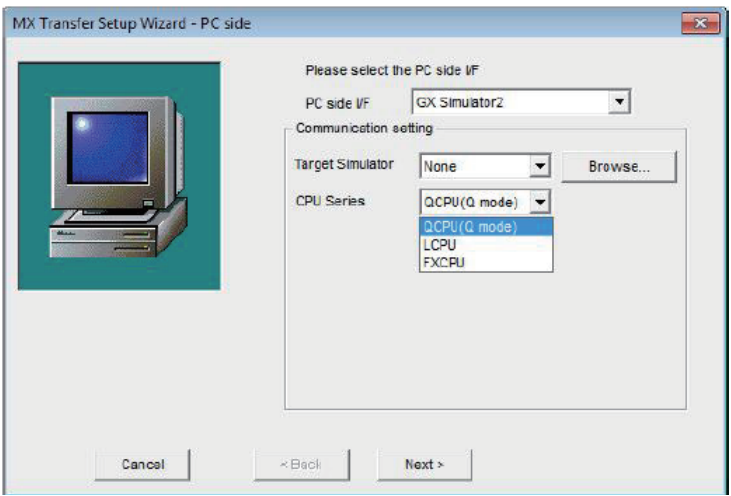
Define a connection to an instance of GX Simulator2 running on the same computer.

- PC side GX Simulator2 parameters

Parameter	Values	Description
Target simulator	<ul style="list-style-type: none"> <li>• None</li> <li>• Simulator A</li> <li>• Simulator B</li> <li>• Simulator C</li> <li>• Simulator D</li> </ul>	Simulator instance to connect to (for FX series projects at present only one simulation can be executed at a time) If the simulation is currently running, pressing the 'Browse' button opens the 'Find GX Simulator2 Runtime' dialog to view additional information of the available targets, e.g. the GX Works2 project name
CPU series	Q, L, FX	Series of the CPU type selected in GX Simulator2

## Point

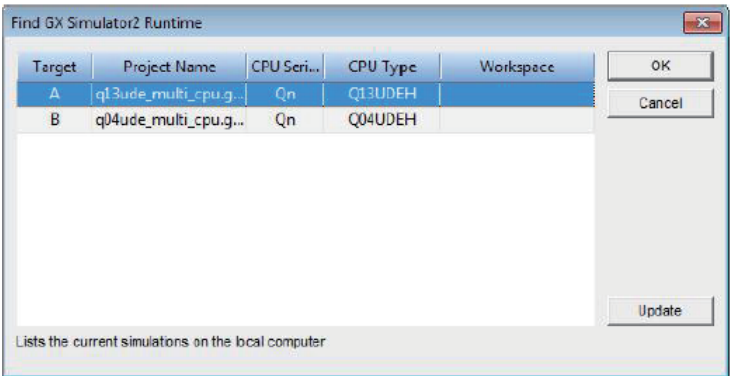
Before configuring the connection please make sure that GX Simulator2 is operating.  
 In addition, do not terminate GX Simulator2 while the user program is running. If you do so, you will not be able to terminate the user program normally.



For a description of the editable parameters on the page see PC side GX Simulator2 parameters.  
 Pressing the <Next> button opens a page for entering a comment for the connection.

- 'Find GX Simulator2 Runtime' Dialog

This dialog shows the list of locally active GX Simulator2 runtimes.



For each runtime the following items are displayed:

Column	Description
Target	Marks the instance of the runtime, if multiple runtimes are active
Project Name	File name of the GX Works2 project
CPU Series	Family of the CPU type set in the GX Works2 project
CPU Type	CPU type set in the GX Works2 project
Workspace	The GX Works2 workspace of the project, if it is part of a workspace

The table contents are not automatically refreshed, when a runtime is started or stopped. To update the list of runtimes press the <Update> button.

Pressing <OK> sets the 'Target Simulator' selection in the transfer setup wizard to the simulation, which has been selected in the table.

### ■PC GX Simulator3

Define a connection to an instance of GX Simulator3 running on the same computer.

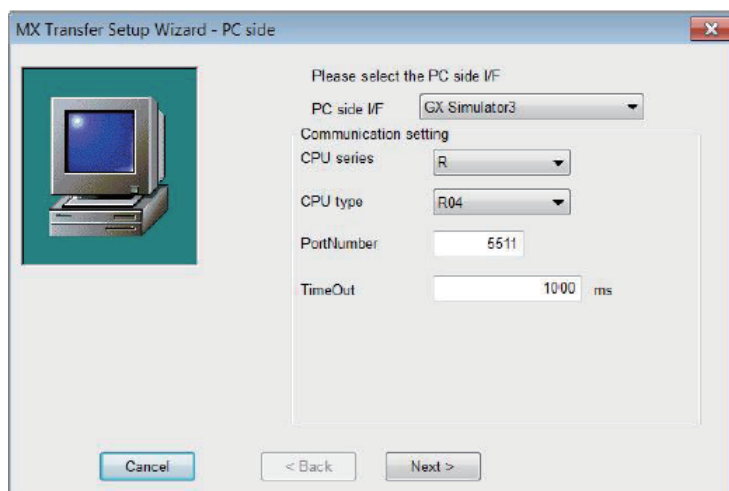
- PC side GX Simulator3 parameters

Parameter	Values	Description
CPU series	R, R Safety	Series of the CPU type selected in GX Simulator3
CPU type	see list of supported CPU types	Type of CPU selected in GX Simulator
Port Number	5511 - 5594	TCP port number of the GX Simulator3 instance to connect to.
Timeout	1-2147483647	Connection timeout in milliseconds.

#### Point

Before configuring the connection please make sure that GX Simulator3 is operating.

In addition, do not terminate GX Simulator3 while the user program is running. If you do so, you will not be able to terminate the user program normally.



For a description of the editable parameters on the page see PC side GX Simulator3 parameters.

Pressing the <Next> button opens a page for entering a comment for the connection.

# PC MT Simulator2

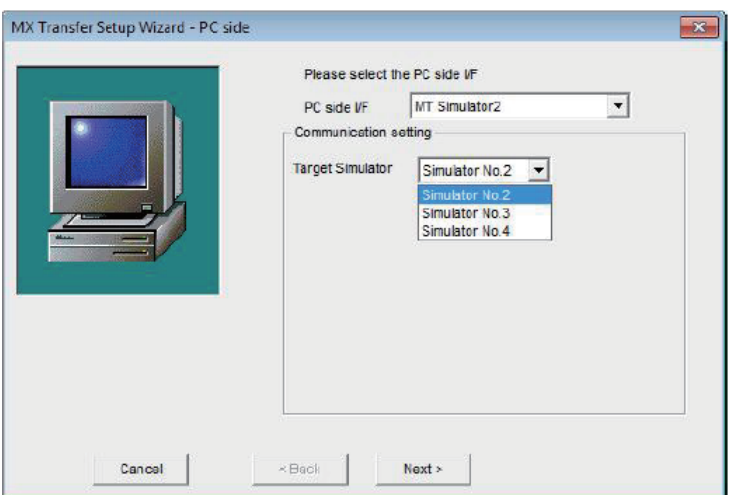
Define a connection to an instance of MT Simulator2 running on the same computer. MT Simulator2 simulates only motion CPUs which are supported by MT Developer2. The simulator runtime can be controlled with MT Developer2.

- PC side MT Simulator2 parameters

Parameter	Values	Description
Target simulator	<ul style="list-style-type: none"> <li>• Simulator No. 2</li> <li>• Simulator No. 3</li> <li>• Simulator No. 4</li> </ul>	Simulator instance to connect to

Before configuring the connection please make sure that MT Simulator2 is operating.

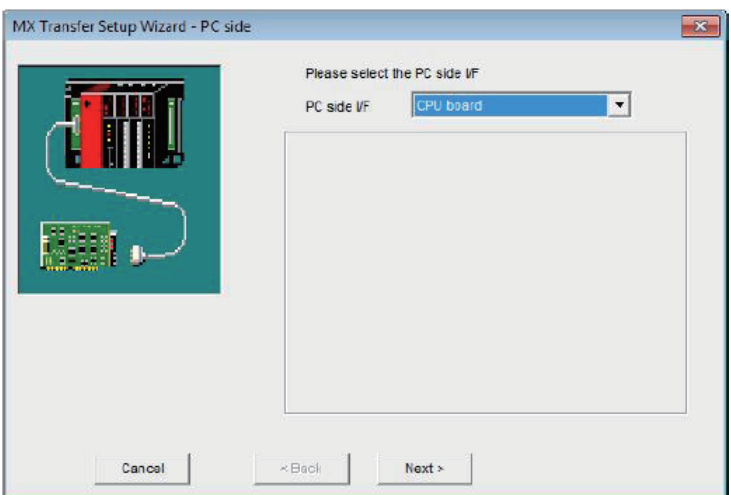
In addition, do not terminate MT Simulator2 while the user program is running. If you do so, you will not be able to terminate the user program normally.



For a description of the editable parameters on the page see PC side MT Simulator2 parameters. Pressing the <Next> button opens a page for entering a comment for the connection.

# PC CPU Board

A connection between PC and PLC using a CPU board requires the CPU board and the corresponding driver to be installed in the PC.



The PLC station, to which a connection is established, can be either

- The host station
- A different station in an attached network

## ■PLC CPU Interface

Enter the settings for the serial interface of a PLC CPU module.

- PLC side CPU interface parameters

Parameter	Values	Description
CPU series	Q, QnA, A, FX, L, Q Motion, R, R Motion, R Safety	Series of the CPU type selected in serial PC side interface (R-series is not available for 'Serial' as PC side I/F)
CPU type	see list of supported CPU types	Type of PLC CPU module
Transmission speed	300 - 115200	Baudrate on the serial link (only available for 'Serial' as PC side I/F)
Control	DTR only, RTS only, DTR and RTS, DTR or RTS	Handshake signals (only available for 'Serial' as PC side I/F)

### Point

Note for Q00J/Q00/Q01 CPUs:

If the baudrate set in the PC differs from the baudrate in the CPU module, the actual baudrate is fixed at 9600 bps. To increase the communication speed, match the personal computer side transmission speed with the Q00J/Q00/Q01CPU side transmission speed.

### Point

Supported transmission speeds:

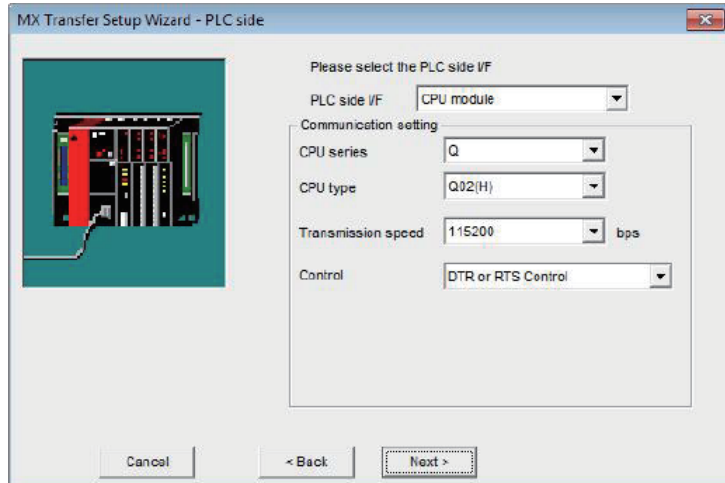
As the transmission speed of the QCPU(Q mode) and QCPU(A mode), you can set 9600bps, 19200bps, 38400bps, 57600bps or 115200bps.

For the QnACPU of version 9707B or later, you can set the transmission speed of 9600bps, 19200bps or 38400bps.

For the QnACPU of other versions, you can set 9600bps or 19200bps.

The transmission speeds of the ACPU (except A2USHCPU-S1), FXCPU and motion controller CPU are fixed to 9600bps. (The A2USHCPU-S1 may be set to 19200bps.)

- PLC CPU Standard Serial Interface (RS 422)



For a description of the editable parameters on the page see PLC side CPU interface parameters.

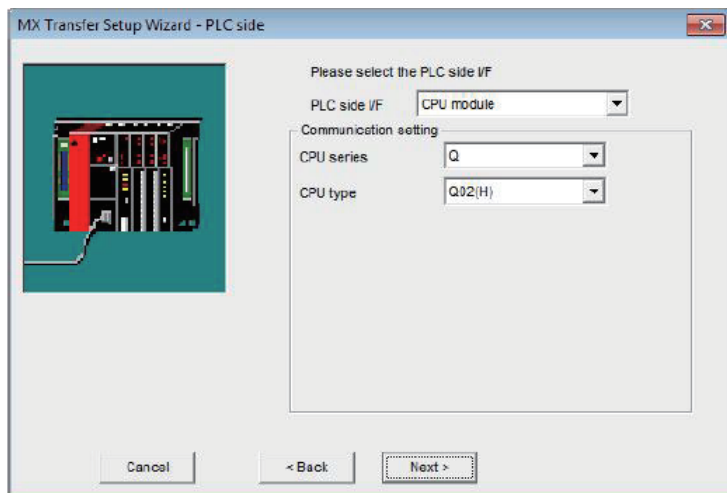
Pressing the <Next> button opens a page for entering a comment for the connection

- PLC CPU Universal Serial Bus Interface (USB)



- PLC side CPU USB interface parameters

Parameter	Values	Description
CPU series	Q, R, FX, L, Q Motion, R Motion, R Safety	Series of the CPU type
CPU type	See list of supported CPU types	Type of PLC CPU module



For a description of the editable parameters on the page see PLC side CPU USB interface parameters.

Pressing the <Next> button opens a page for entering a comment for the connection.

#### Point

Frequently disconnecting/reconnecting the USB cable or resetting or powering ON/OFF the PLC CPU during communications with the PLC CPU may cause a communication error which cannot be recovered.

If it is not recovered, completely disconnect the USB cable once and then reconnect it after 5 or more seconds have elapsed.

- PLC Ethernet CPU

Please see PLC Ethernet Interface.

## ■ PLC C24 Interface

Enter the settings for a serial interface module in the PLC.

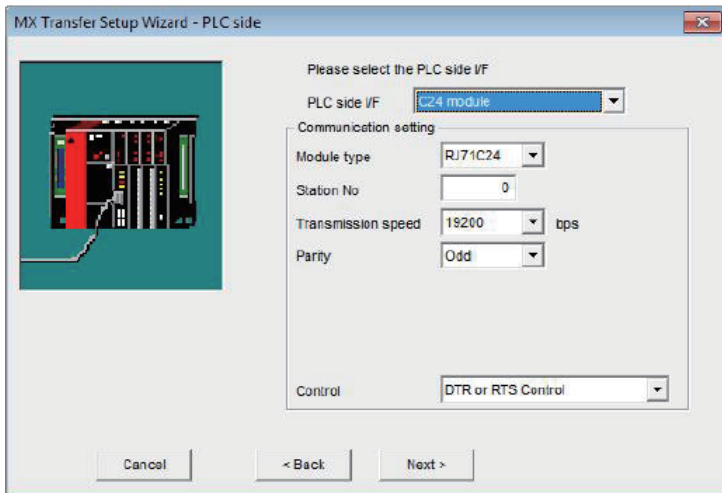
- PLC side C24 module parameters

Parameter	Values	Description
Module type	RJ71C24 , AJ71C24 , AJ71UC24 , AJ71QC24 , QJ71C24 , LJ71C24	Type of PLC C24 module
Station No.	0 - 31	Station number of the PC side interface. This number can be freely chosen, but must be unique within the network specified by the network number.
Transmission speed	300 - 115200	Baudrate on the serial link
Parity	Odd, None, Even	Parity
Data bit	7, 8	Number of data bits in a byte Only for AJ71C24 and AJ71UC24
Stop bit	1, 2	Number of stop bits Only for AJ71C24 and AJ71UC24
Sum check	Existence, None	Enable/disable sumcheck Only for AJ71C24 and AJ71UC24
Control	DTR only, RTS only, DTR and RTS, DTR or RTS	Handshake signals

#### Point

In any connection form (direct coupling, relaying), where the target station of the UC24 or C24 is the QnACPU, an error is returned, if clock data read/write is executed.

- RJ71C24



MX Transfer Setup Wizard - PLC side

Please select the PLC side I/F

PLC side I/F: C24 module

Communication setting

Module type: RJ71C24

Station No: 0

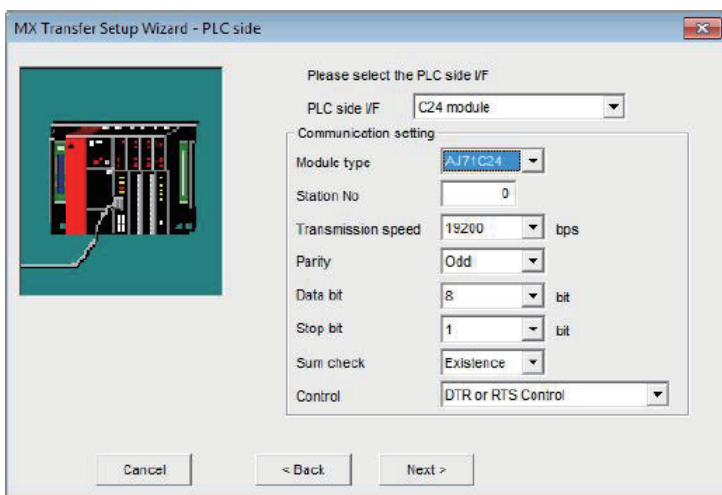
Transmission speed: 19200 bps

Parity: Odd

Control: DTR or RTS Control

Buttons: Cancel, < Back, Next >

- AJ71C24 / AJ71UC24



MX Transfer Setup Wizard - PLC side

Please select the PLC side I/F

PLC side I/F: C24 module

Communication setting

Module type: AJ71C24

Station No: 0

Transmission speed: 19200 bps

Parity: Odd

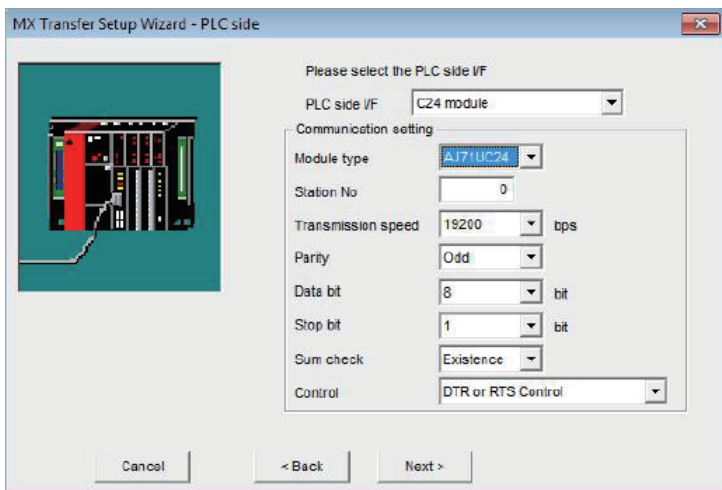
Data bit: 8 bit

Stop bit: 1 bit

Sum check: Existence

Control: DTR or RTS Control

Buttons: Cancel, < Back, Next >



MX Transfer Setup Wizard - PLC side

Please select the PLC side I/F

PLC side I/F: C24 module

Communication setting

Module type: AJ71UC24

Station No: 0

Transmission speed: 19200 bps

Parity: Odd

Data bit: 8 bit

Stop bit: 1 bit

Sum check: Existence

Control: DTR or RTS Control

Buttons: Cancel, < Back, Next >

For a description of the editable parameters on the page see PLC side C24 module parameters.  
Pressing the <Next> button opens a page for specifying an optional additional network layer.

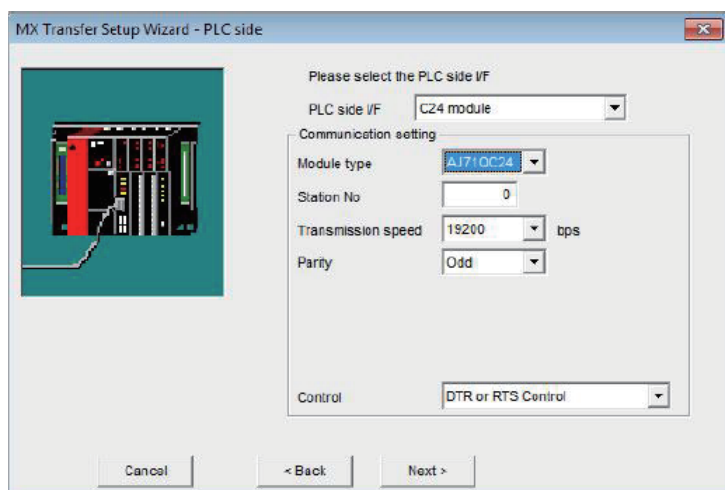
If the connected station CPU is the AnUCPU and the computer link module is the UC24 for computer link connection, remote operation will result in an error when access is made to the AnNCPU, AnACPU or QnACPU via the MELSECNET/10.

Switch <sup>*1</sup>		Settings		
		For 1:1 communication	For 1:n communication	
			Module 1)	Module 2)
Mode setting switch		1 (format 1)	A (format 1)	5 (format 1)
Station number setting switches		0	As set by user	
Transmission specifications setting switches	Main channel setting	OFF (RS-232)	OFF (RS-232)	ON (RS-422)
	Data bit setting	As set by user	As set by user <sup>*2</sup>	
	Transmission speed setting	As set by user	As set by user <sup>*2</sup>	
	Parity bit yes/no setting	As set by user	As set by user <sup>*2</sup>	
	Stop bit setting	As set by user	As set by user <sup>*2</sup>	
	Sum check yes/no setting	As set by user	As set by user <sup>*2</sup>	
	Online change enable/disable setting	As set by user		
Computer link/multidrop setting		ON (computer link)	ON (computer link)	ON (computer link)

\*1 For switch numbers, refer to the computer link module manual.

\*2 Make the same settings to Module 1 and Module 2.

• AJ71QC24



For a description of the editable parameters on the page see PLC side C24 module parameters.

Pressing the <Next> button opens a page for specifying an optional additional network layer.

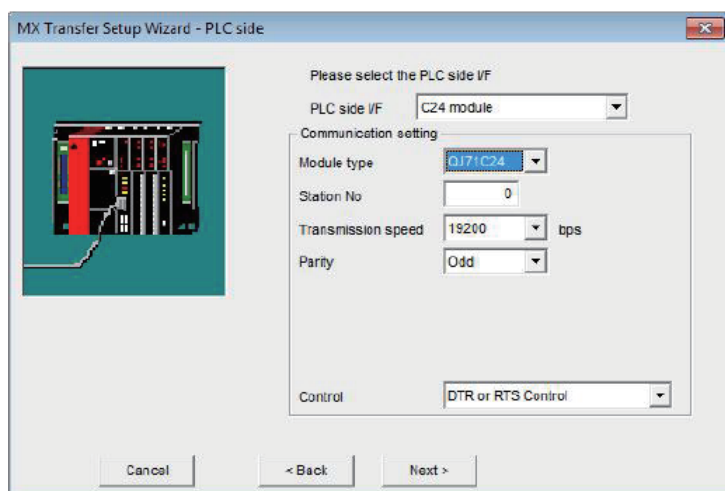
For the QC24, note that the illegal case of specifying the first I/O number of a nonexistent module and reading/writing U \G will not return an error if the software version of the module is 'k' or earlier.  
With AJ71QC24-R2, A1SJ71QC4-R2, AJ71QC24N-R2 or A1SJ71QC24N-R2 modules only CH1 can be used.

Switch (Switch Number)		Settings					
		For 1:1 communication		For 1:n communication			
				Module 1)		Module 2)	
		CH1 side	CH2 side	CH1 side	CH2 side	CH1 side	CH2 side
Mode setting switch		5 (format 5)		0 or 5 (format 5)	5 (format 5)	5 (format 5)	
Station number setting switch		0		As set by user			
Transmission specifications setting switches	Operation setting switch (SW01)	OFF (independent operation)		OFF (independent operation)	ON or OFF* <sup>1</sup>	OFF (independent operation)	
	Data bit setting (SW02)	ON (8 bit)					
	Parity bit yes/no setting (SW03)	As set by user		As set by user* <sup>2</sup>			
	Even parity/odd parity setting (SW04)	As set by user		As set by user* <sup>2</sup>			
	Stop bit setting (SW05)	OFF (1 bit)					
	Sum check yes/no setting (SW06)	ON (yes)					
	Online change enable/disable setting (SW07)	As set by user					
	Setting change enable/disable setting (SW08)	As set by user		As set by user* <sup>2</sup>			
	Transmission speed setting (SW09 to SW12)	As set by user		As set by user* <sup>2</sup>			
—(SW13 to SW15)		All OFF					

\*1 Set to ON if the CH1 side mode setting switch setting is 0 or to OFF if the setting is 5 (format 5).

\*2 Make the same settings to Module 1 and Module 2.

• QJ71C24



For a description of the editable parameters on the page see PLC side C24 module parameters.

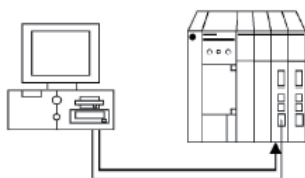
Pressing the <Next> button opens a page for specifying an optional additional network layer.



When QJ71C24-R2 of function version A is used, only either of CH1 and CH2 can be used.

When the MELSOFT product, such as GX Works2 or GOT, is using one channel, the application cannot use the other channel.

When the QJ71C24-R2 of function version B is used, the application can use both channels.



Item	Settings		Set Value
	b15 to b8	b7 to b0	
Switch 1	CH1 communication speed	CH1 transmission setting <sup>*1</sup>	0000H
Switch 2	—	CH1 communications protocol	0000H
Switch 3	CH2 communication speed	CH2 transmission setting <sup>*1</sup>	0000H
Switch 4	—	CH2 communications protocol	0000H
Switch 5	Module station number		0000H

\*1 Settings of CH1 and CH2 are indicated below.

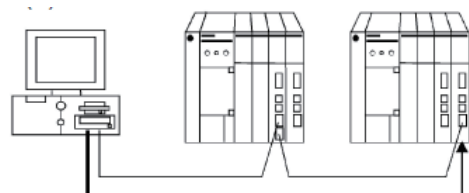
Bit	Description	CH1 transmission setting	CH2 transmission setting
b0	Operation setting	0 (independent)	0 (independent)
b1	Data bit	0 (7)	0 (7)
b2	Parity bit	0 (no) <sup>*2</sup>	0 (no) <sup>*2</sup>
b3	Odd/even parity	0 (odd) <sup>*2</sup>	0 (odd) <sup>*2</sup>
b4	Stop bit	0 (1)	0 (1)
b5	Sum check code	0 (no)	0 (no)
b6	Online change <sup>*1</sup>	0 (disable)	0 (disable)
b7	Setting change	0 (disable)	0 (disable)

\*1 When the communication protocol is set to GX Works2 connection (0H), the online change bit (b6) setting is made invalid to enable online change regardless of the online change setting.

\*2 Set the followings to odd: "Parity bit" of the communication setting utility/"ActParity" of the ActQJ71C24 control property.

Setting CH1/CH2 communication protocol to GX Works2 connection (0H) makes the communication speed/ transmission settings to 0H (all OFF).

Refer to the Q series-compatible C24 manual for details.



Module 1)

Item	Settings		Set Value
	b15 to b8	b7 to b0	Synchronous operation
Switch 1	CH1 communication speed	CH1 transmission setting <sup>*1</sup>	0726H
Switch 2	—	CH1 communications protocol	0008H
Switch 3	CH2 communication speed	CH2 transmission setting <sup>*1</sup>	0727H
Switch 4	—	CH2 communications protocol	0000H
Switch 5	Module station number		As set by user

\*1 Settings of CH1 and CH2 are indicated below.

Bit	Description	Settings Synchronous operation	
		CH1 transmission setting	CH2 transmission setting
b0	Operation setting	Match to module 2) setting.	
b1	Data bit	Match to module 2) setting.	
b2	Parity bit	Match to module 2) setting.	
b3	Odd/even parity	Match to module 2) setting.	
b4	Stop bit	Match to module 2) setting.	
b5	Sum check code	Match to module 2) setting.	

Bit	Description	Settings Synchronous operation	
		CH1 transmission setting	CH2 transmission setting
b6	Online change	Match to module 2) setting.	
b7	Setting change	Match to module 2) setting.	

Module 2)

Item	Settings		Set Value
	b15 to b8	b7 to b0	Synchronous operation
Switch 1	CH1 communication speed	CH1 transmission setting <sup>*1</sup>	0726H
Switch 2	—	CH1 communications protocol	0008H
Switch 3	CH2 communication speed	CH2 transmission setting <sup>*1</sup>	0727H
Switch 4	—	CH2 communications protocol	0000H
Switch 5	Module station number		As set by user

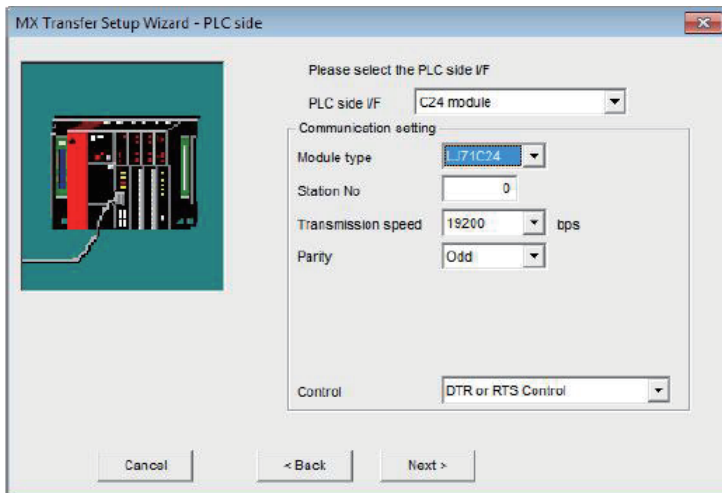
\*1 Settings of CH1 and CH2 are indicated below.

Bit	Description	CH1 transmission setting	CH2 transmission setting
b0	Operation setting	0 (independent)	1 (synchronous)
b1	Data bit	1 (8)	1 (8)
b2	Parity bit	1 (yes)	1 (yes)
b3	Odd/even parity	0 (odd)	0 (odd)
b4	Stop bit	0 (1)	0 (1)
b5	Sum check code	1 (yes)	1 (yes)
b6	Online change <sup>*1</sup>	0 (disable)	0 (disable)
b7	Setting change	0 (disable)	0 (disable)

\*1 When the communication protocol is set to GX Works2 connection (0H), the online change bit (b6) setting is made invalid to enable online change regardless of the online change setting.  
Refer to the Q series-compatible C24 manual for details.

Switch (Switch Number)		Settings			
		Module 1)		Module 2)	
		CH1 side	CH2 side	CH1 side	CH2 side
Mode setting switch		0	5 (format 5)	5 (format 5)	
Station number setting switches		1		3	
Transmission specifications setting switches	Operation setting switch (SW01)	OFF (independent operation)	ON (synchronous operation)	OFF (independent operation)	
	Data bit setting (SW02)	ON (8 bit)		ON (8 bit)	
	Parity bit yes/no setting (SW03)	ON (yes)		ON (yes)	
	Even parity/odd parity setting (SW04)	OFF (odd)		OFF (odd)	
	Stop bit setting (SW05)	OFF (1 bit)		OFF (1 bit)	
	Sum check yes/no setting (SW06)	ON (yes)		ON (yes)	
	Online change enable/disable setting (SW07)	ON (enable)		ON (enable)	
	Setting change enable/disable setting (SW08)	OFF (disable)		OFF (disable)	
	Transmission speed setting (SW09 to SW12)	19200bps		19200bps	
		SW	Setting	SW	Setting
		SW09	OFF	SW09	OFF
		SW10	ON	SW10	ON
		SW11	ON	SW11	ON
		SW12	OFF	SW12	OFF
	—(SW13 to SW15)	All OFF		All OFF	

- LJ71C24



For a description of the editable parameters on the page see PLC side C24 module parameters. Pressing the <Next> button opens a page for specifying an optional additional network layer.

### ■ PLC FX Extended Port

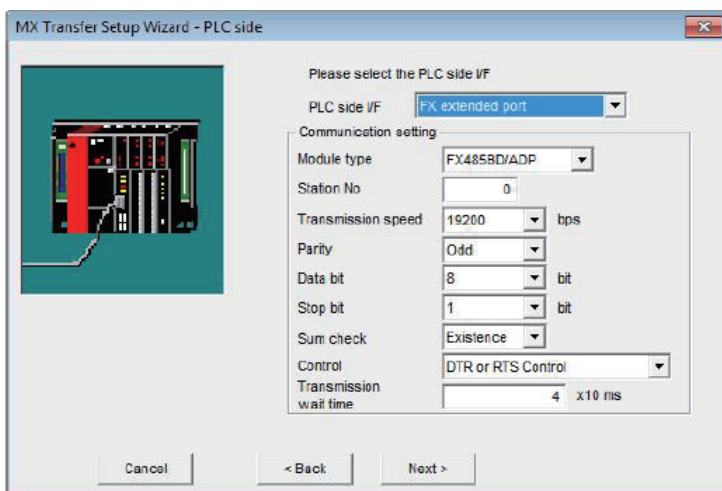
Enter the settings for the serial port of an FXCPU.

- PLC side FX port parameters

Parameter	Values	Description
Module type	FX485BD/ADP	Type of PLC C24 module
Station No.	0 - 15	Station number of the PLC side interface
Transmission speed	300 - 19200	Baudrate on the serial link
Parity	Odd, None, Even	Parity
Data bit	7, 8	Number of data bits in a byte
Stop bit	1, 2	Number of stop bits
Sum check	Existence, None	Enable/disable sumcheck
Control	DTR only, RTS only, DTR and RTS, DTR or RTS	Handshake signals
Transmission wait time	1 - 65535	Transmission timeout as multiple of 10 milliseconds



The FX extended port is required when using C24 communication with FX0N, FX1S, FX1N(C), FX2N(C), FX3U(C), FX3G (C/E), FX3S CPU.



For a description of the editable parameters on the page see PLC side FX port parameters.  
Pressing the <Next> button opens a page for specifying an optional additional network layer.  
Before use the FX extended port must be configured for communication. There are two ways of configuring the FX extended port module:

1. Use PLC parameters
2. Write values to special data registers (D8120, D8121, D8129) in a sequence program. This is the only approach for FX0N CPUs.
  - Set PLC parameters

Start GX Works2 and select [Parameter]-[PLC parameter] in the project list. Then select the "PLC system (2)" tab.

Item	Setting value
Operate communication setting	Check the corresponding check box.
Protocol	Dedicated protocol
Data length	As set by user.
Parity	As set by user.
Stop bit	As set by user.
Transmission speed	As set by user.
H/W type	RS-485
Sum check	As set by user.
Transmission control procedure	Form1
Station number setting	00H to 0FH
Time out judge time	1 to 255

- When communication setting is made, power the FX CPU again after writing to the PLC.
- When performing multi-drop connection, make the same communication settings for the devices. However, make sure that the station numbers do not overlap.



- Special data registers

#### 1) D8120 (Communication format)

Bit	Description	Setting details																																								
b0	Data length	0: 7 bit 1: 8 bit																																								
b1	Parity	<table><tr><td></td><td>b2</td><td>b1</td></tr><tr><td>None</td><td>0</td><td>0</td></tr><tr><td>Odd number</td><td>0</td><td>1</td></tr><tr><td>Even number</td><td>1</td><td>1</td></tr></table>		b2	b1	None	0	0	Odd number	0	1	Even number	1	1																												
			b2	b1																																						
None			0	0																																						
Odd number	0		1																																							
Even number	1	1																																								
b2																																										
b3	Stop bit	0: 1 bit 1: 2 bit																																								
b4	Transmission speed	<table><tr><td></td><td>b7</td><td>b6</td><td>b5</td><td>b4</td></tr><tr><td>300bps</td><td>0</td><td>0</td><td>1</td><td>1</td></tr><tr><td>600bps</td><td>0</td><td>1</td><td>0</td><td>0</td></tr><tr><td>1200bps</td><td>0</td><td>1</td><td>0</td><td>1</td></tr><tr><td>2400bps</td><td>0</td><td>1</td><td>1</td><td>0</td></tr><tr><td>4800bps</td><td>0</td><td>1</td><td>1</td><td>1</td></tr><tr><td>9600bps</td><td>1</td><td>0</td><td>0</td><td>0</td></tr><tr><td>19200bps</td><td>1</td><td>0</td><td>0</td><td>1</td></tr></table>		b7	b6	b5	b4	300bps	0	0	1	1	600bps	0	1	0	0	1200bps	0	1	0	1	2400bps	0	1	1	0	4800bps	0	1	1	1	9600bps	1	0	0	0	19200bps	1	0	0	1
			b7	b6	b5	b4																																				
300bps			0	0	1	1																																				
600bps			0	1	0	0																																				
1200bps			0	1	0	1																																				
2400bps	0		1	1	0																																					
4800bps	0		1	1	1																																					
9600bps	1	0	0	0																																						
19200bps	1	0	0	1																																						
b5																																										
b6																																										
b7																																										
b8	—	0																																								
b9	—	0																																								
b10	H/W type	<table><tr><td></td><td>b11</td><td>b10</td></tr><tr><td>RS-485</td><td>0</td><td>0</td></tr></table>		b11	b10	RS-485	0	0																																		
			b11	b10																																						
RS-485	0	0																																								
b11																																										
b12	—	0																																								
b13	Sum check	0: N/A 1: Available																																								
b14	Communication protocol	1: Computer link																																								
b15	Transmission control procedure	0: Form 1																																								

#### 2) D8121 (Station No. setting)

Specify the station No. in the range of 00H to 0FH

#### 3) D8129 (Time out judge time setting)

Specify the FX CPU timeout as a multiple of 10ms. The range depends on the CPU type:

CPU Type	Range
FX0N, FX1S and FX1N(C)	1 to 255 (10 to 2550ms)
FX2N(C)	1 to 3276 (10 to 32760ms)

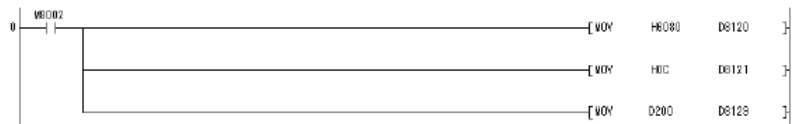
A value of 0 corresponds to 100ms.

#### Point

- When communication settings have been downloaded, reset the FX CPU
- When setting up a multi-drop connection, apply the same communication settings for all devices. However make sure that the station numbers do not overlap.

REMARK

The following shows an example of setting values to the special data registers by using GX Works2.



The following shows the setting details of each special data register in the above program.

D8120	Transmission control procedure	Form 1
	Communication protocol	Computer link
	Sum check	Available
	H/W type	RS-485
	Transmission speed	9600bps
	Stop bit	1
	bit Parity	N/A
	Data length	7 bit
D8121	Station No.	12
D8129	Time out time	200ms

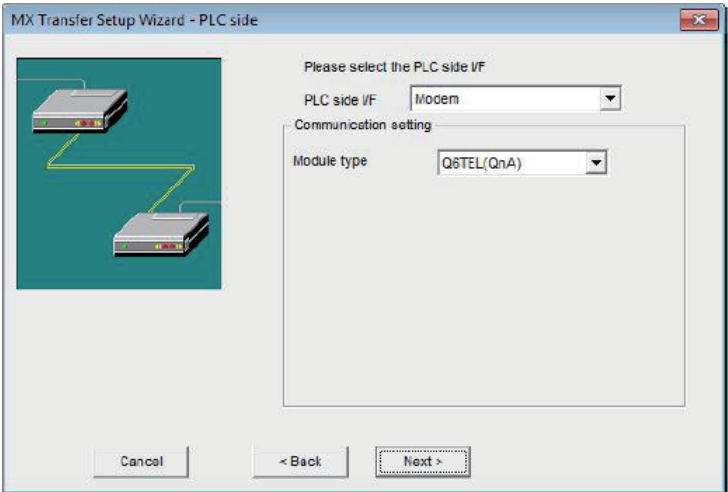
■PLC Modem

Enter the settings for a modem interface module in the PLC.

- PLC side modem parameters

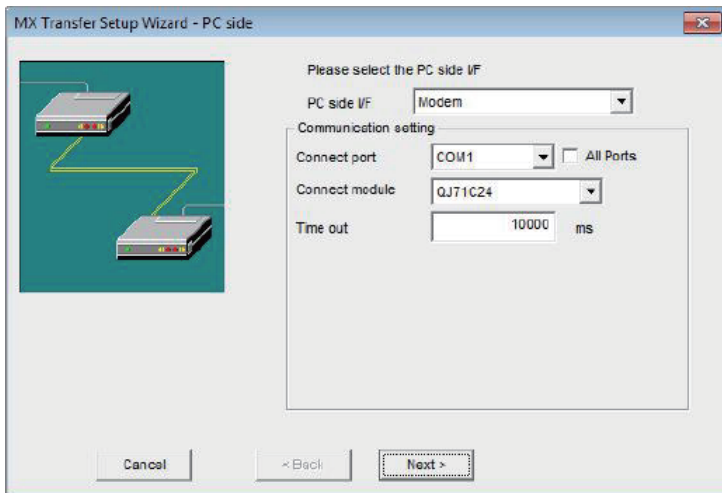
Parameter	Values	Description
Module type	Q6TEL(QnA), FXCPU, AJ71QC24N, QJ71C24, QJ71CMO, LJ71C24	Type of PLC modem or serial interface module
Station No.	0 - 31	Station number of the PLC side interface Only for AJ71QC24N, QJ71C24, QJ71CMO
Transmission speed	300 - 115200	Baudrate on the serial link Only for AJ71QC24N, QJ71C24, QJ71CMO

- Q6TEL



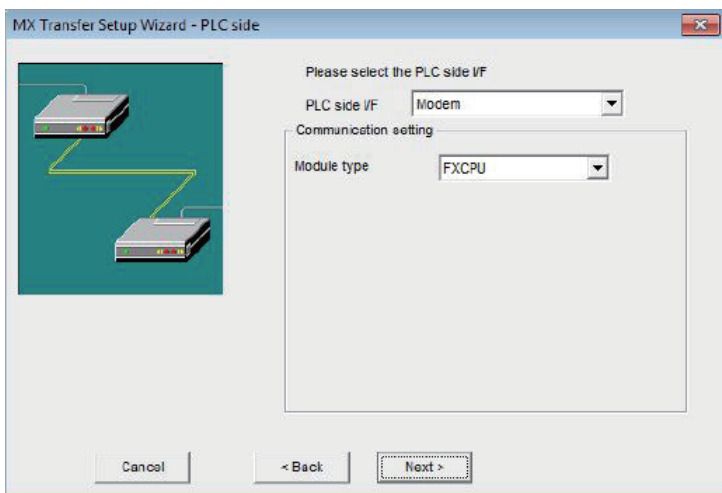
For a description of the editable parameters on the page see PLC side modem parameters.  
Pressing the <Next> button opens a page for specifying an optional additional network layer.

- AJ71QC24N / QJ71C24 / QJ71CMO



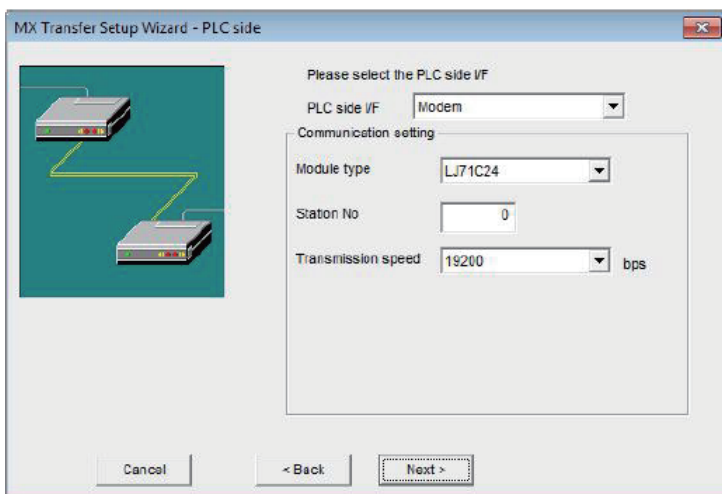
For a description of the editable parameters on the page see PLC side modem parameters. Pressing the <Next> button opens a page for specifying an optional additional network layer.

- FX CPU



For a description of the editable parameters on the page see PLC side modem parameters. Pressing the <Next> button opens a page for specifying an optional additional network layer.

- LJ71C24



For a description of the editable parameters on the page see PLC side modem parameters. Pressing the <Next> button opens a page for specifying an optional additional network layer.

## ■PLC Ethernet Interface

Enter the settings for an Ethernet module in the PLC.

- PLC side Ethernet module parameters

Parameter	Values	Description
Connect module	AJ71E71, AJ71QE71, QJ71E71, RJ71EN71, LJ71E71, GOT, FX-ENET(-ADP)*1, FX3U-ENET-ADP, CPU module, CC IE Field Ethernet Adapter	Type of PLC Ethernet module
Host (IP address)	nnn.nnn.nnn.nnn	IP address of the PLC side interface. This value must equal the address, which has been configured in the 'Network Parameters' of the PLC settings.
Network No	1 - 239	Network number of the E71 Ethernet module. This value can only be edited in the 'PC Ethernet board' page. Only for AJ71QE71, QJ71E71 and RJ71EN71 modules
Station No.	1 - 64	Station number of the PLC side interface. This value must equal the station number, which has been configured in the 'Network Parameters' of the PLC settings. Only for AJ71QE71, QJ71E71 and RJ71EN71 modules
Port No.	1 - 65535	Free UDP port number on the PC side for data sent by the PLC. Port numbers below 1025 should not be used. Only for AJ71E71 (UDP and TCP), AJ71QE71 (TCP), FX3U-ENET modules
CPU time out	1 - 65535	CPU timeout as multiple of 250 milliseconds Only for AJ71E71 modules

\*1 When using FX3U-ENET, select "FX-ENET(-ADP)".

### Point

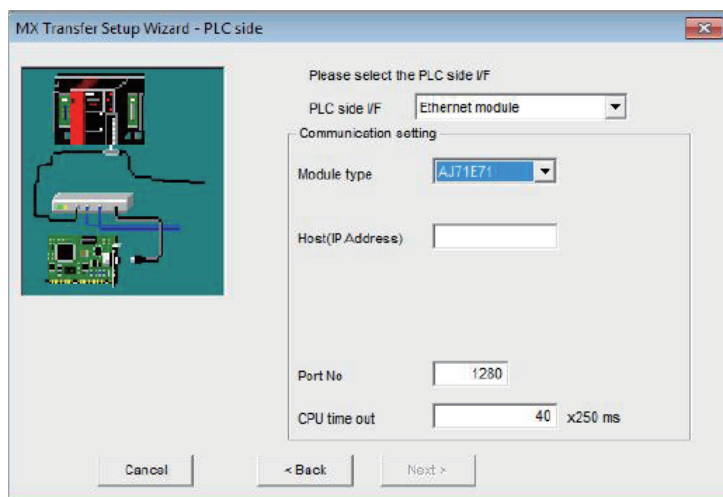
The 'Next >' button is disabled, if no IP address has been entered.

### Point

#### Replacement of Ethernet modules

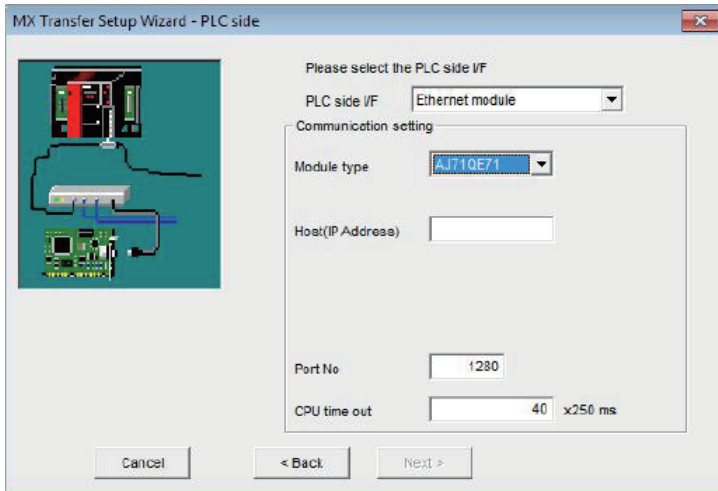
If the PLC Ethernet module has been replaced during Ethernet communication, the communication on the PC must be restarted, because Ethernet (MAC) address is different.

- AJ71E71



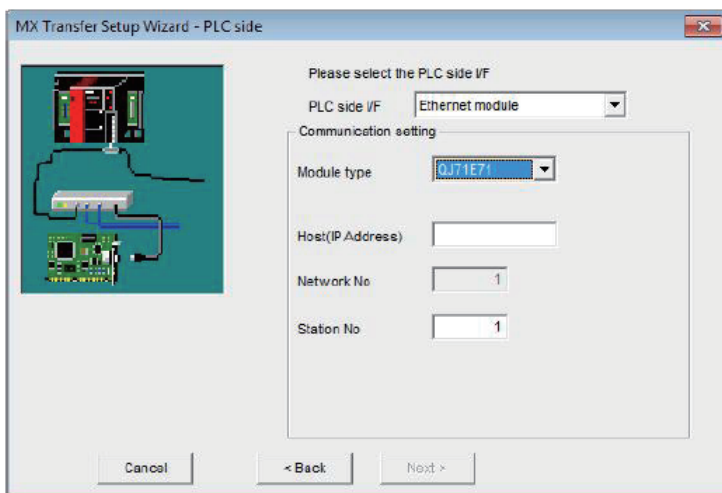
For a description of the editable parameters on the page see PLC side Ethernet module parameters. Pressing the <Next> button opens a page for specifying an optional additional network layer.

- AJ71QE71



For a description of the editable parameters on the page see PLC side Ethernet module parameters. Pressing the <Next> button opens a page for specifying an optional additional network layer.

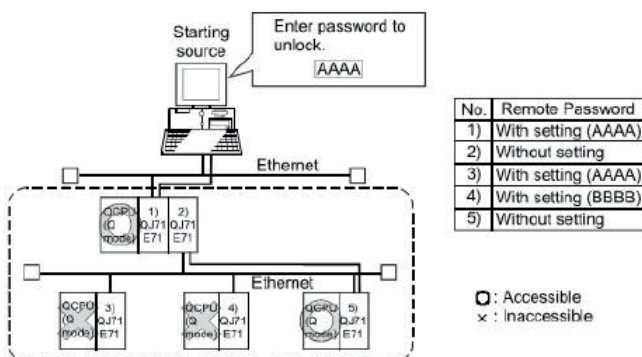
- QJ71E71



For a description of the editable parameters on the page see PLC side Ethernet module parameters. Pressing the <Next> button opens a page for specifying an optional additional network layer.

- Unlocking password when using QJ71E71

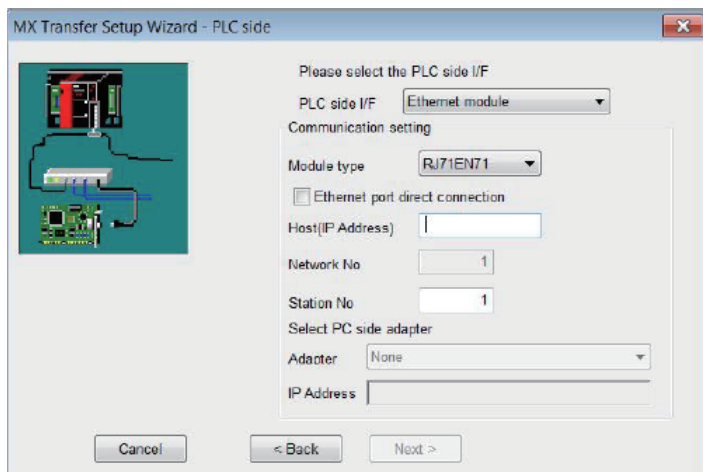
If a password has been set in a QJ71E71 for remote access, the corresponding PLC cannot be accessed as target PLC. A password has however no effect, when the E71 module is used as a relay.



- Use of Q4AR CPU

For using UDP/IP protocol the manufacture date (year and month) of the Q4AR CPU must be "0012" or later and the function version must be 'B' at least.

- RJ71EN71

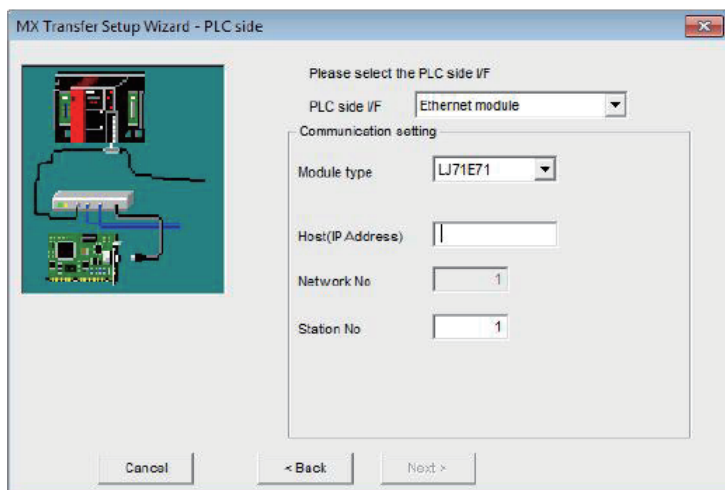


For a description of the editable parameters on the page see PLC side Ethernet module parameters.

Pressing the <Next> button opens a page for specifying an optional additional network layer.

Note: the option 'Ethernet port direct connection' and 'Select PC side adapter' controls are only visible, if 'UDP' has been selected for the 'Protocol' parameter on the previous 'PC side' page. Where the PC has more than one Ethernet adapter installed, the adapter to use can be selected from a drop-down list. The IP address of the adapter is shown for confirmation.

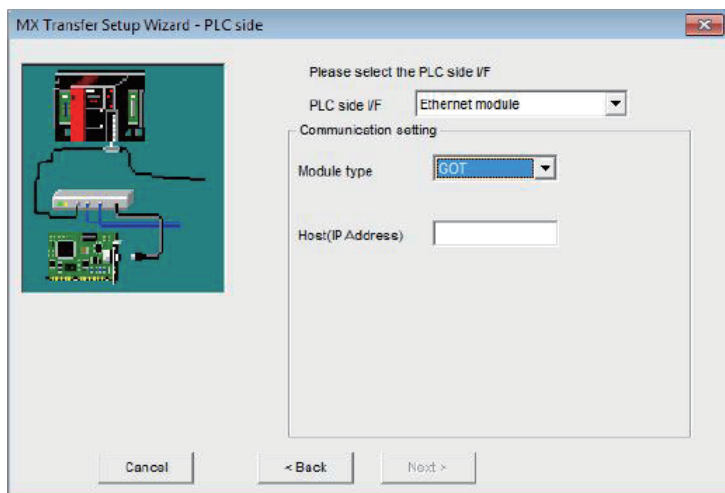
- LJ71E71



For a description of the editable parameters on the page see PLC side Ethernet module parameters.

Pressing the <Next> button opens a page for specifying an optional additional network layer.

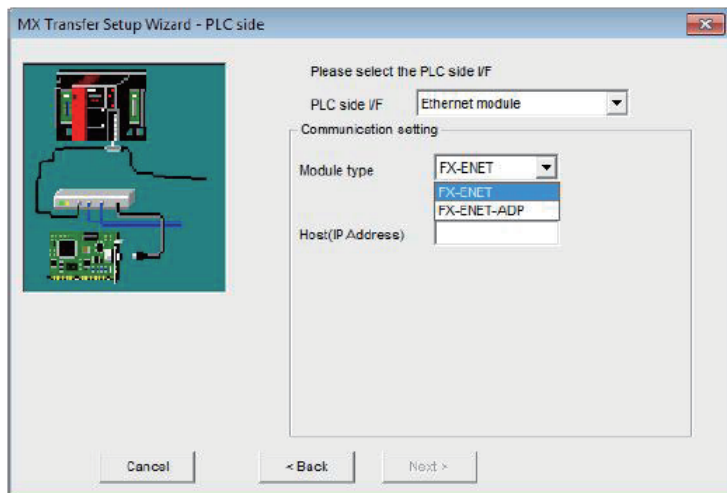
- GOT



For a description of the editable parameters on the page see PLC side Ethernet module parameters.

Pressing the <Next> button opens a page for specifying an optional additional network layer.

- FX Ethernet Module

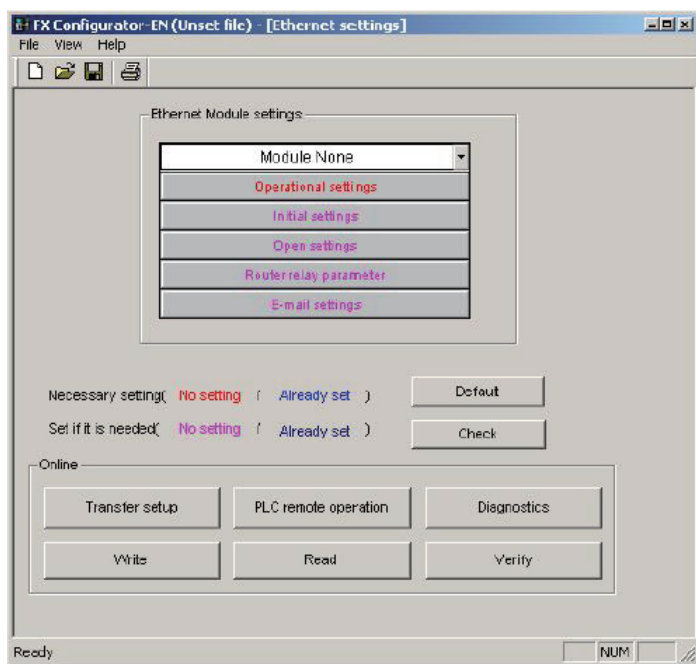


For a description of the editable parameters on the page see PLC side Ethernet module parameters.

Pressing the <Next> button opens a page for specifying an optional additional network layer.

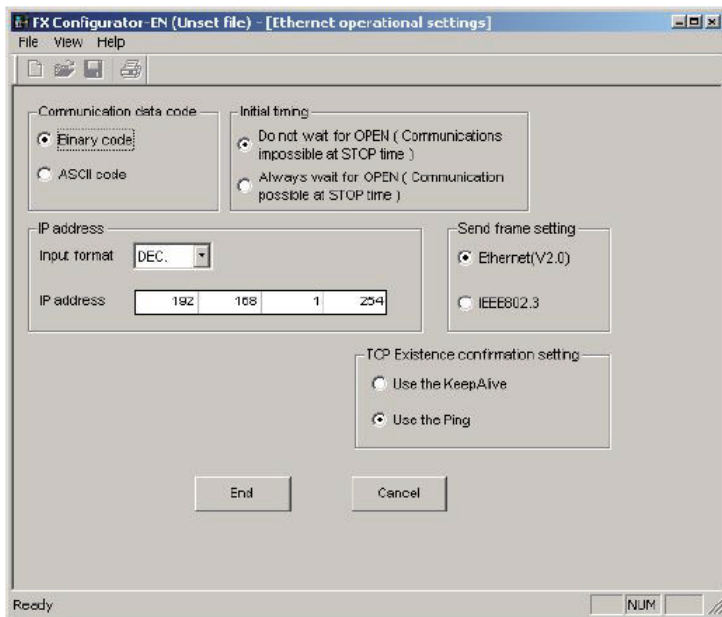
The communication parameters of following modules can be set in FX Configurator-EN or GX Works2.

- FX3U-ENET: FX Configurator-EN
- FX3U-ENET-ADP: GX Works2

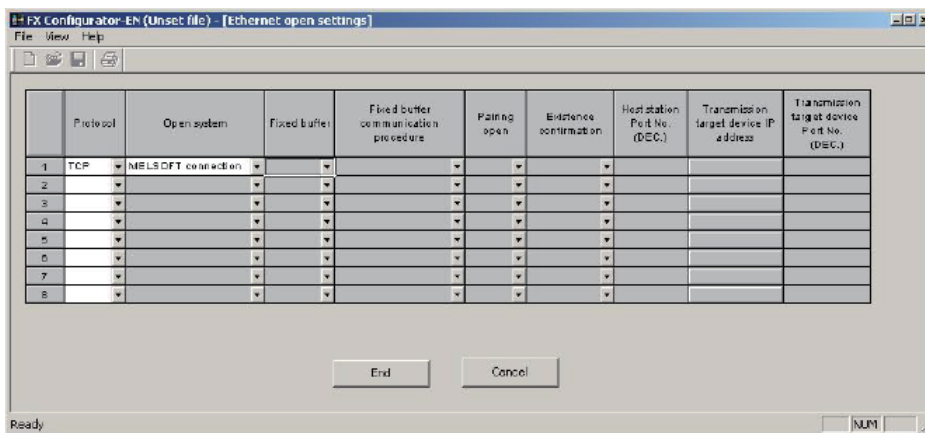


## Operating procedure

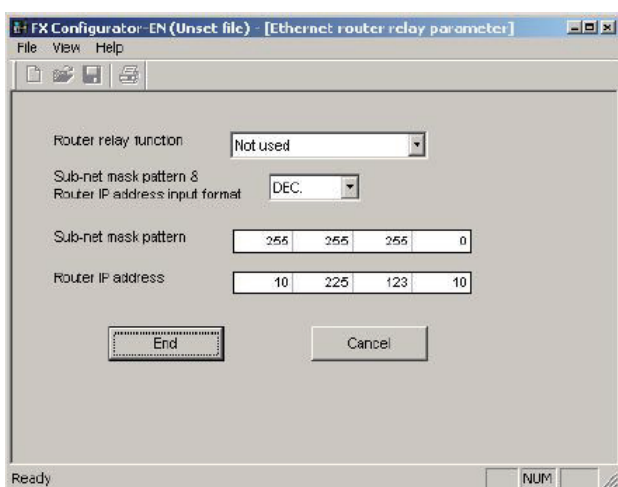
1. Select the module, up to 8 modules can be selected.
2. Dialog to select the operational setting:



3. Set the Ethernet open setting:



4. Dialog to select the router:



5. Transfer setup is used to download the Ethernet parameter to the FX3U-ENET. The transfer happens through the PLC, so that the corresponding setting should be selected, for example serial communication to transfer the Ethernet parameters.



The Ethernet communication via FX3U-ENET for FX1S, FX1N(C) and FX2N(C) is configured through settings in special PLC devices.

Set the Ethernet parameters to nine data registers from D1000 to D1008. If these data registers are used for any other purpose, the Ethernet parameters can be set to nine registers 'D' starting from D2000, D3000, D4000, D5000, D6000 or D7000.

Data registers	Setting Item	Default parameter	Description
Dn000, Dn001	Header	—	Set H454E4554 ("ENET")
Dn002, Dn003	IP address	192.168.0.100	Set the IP address of the FX3U-ENET module
Dn004, Dn005	subnet mask	255.255.255.0	Set the sub net mask of the FX3U-ENET module
Dn006, Dn007	Gateway address	192.168.0.1	Set the gateway address of the FX3U-ENET module
Dn008	TCP port number	1024	Set the TCP port number within the range from 1024 to 65535

n: Choose any number in the range between 1 and 7

- When a PLC program is used to set the Ethernet parameters

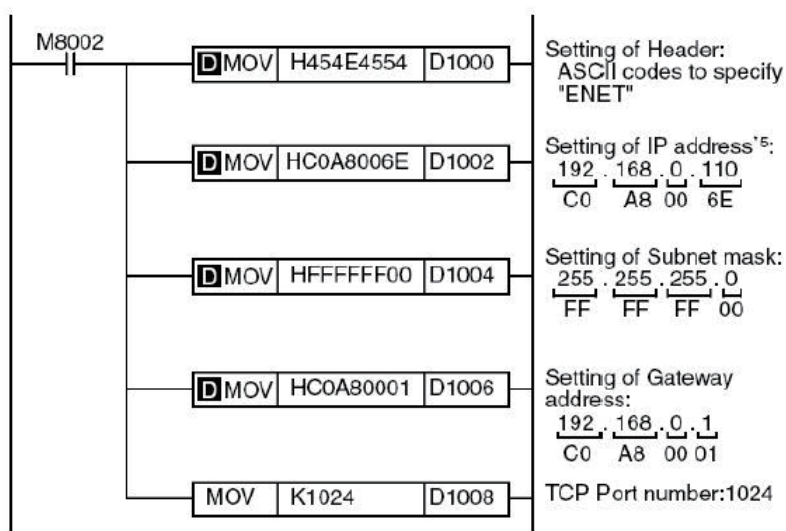
The Ethernet parameters for the FX3U-ENET can be set using the PLC program below:

### Point

In the FX3U-ENET the Ethernet parameters become valid only when the power is turned ON and the setting data is stored in specified data registers.

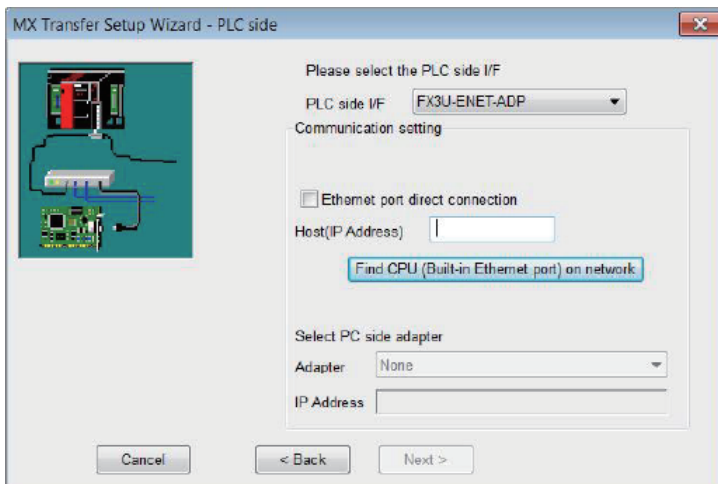
In any of the following cases, turn off the power of the PLC once, and turn it on again.

- When a parameter is set for the first time
- When the setting of a parameter is changed during operation



- FX3 Ethernet Module

Use this setting to connect to FX3 CPUs equipped with either a built-in Ethernet port or an ADP module attached. Alternatively the connection can be configured using the CPU module setting as described in the next section.



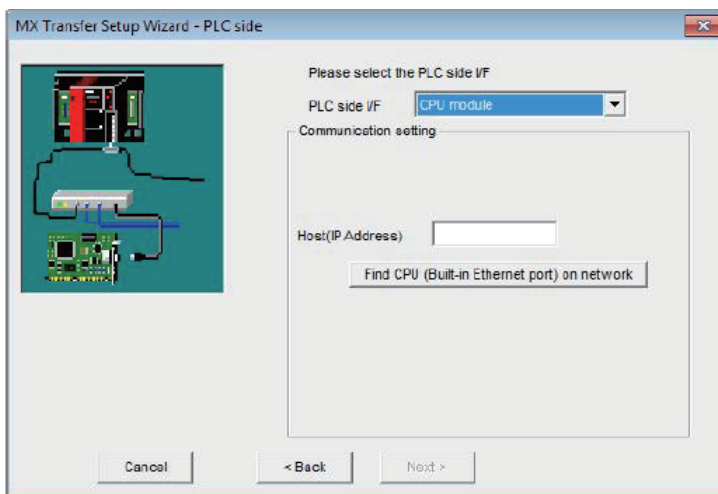
For a description of the editable parameters on the page see PLC side Ethernet module parameters.

If the option 'Ethernet port direct connection' has been selected, the Ethernet interfaces of PC and PLC CPU must be connected point-to-point with a single cable. The IP address is not required for this type of connection and the corresponding input field is therefore disabled. Where the PC has more than one Ethernet adapter installed, the adapter to use can be selected from a drop-down list. The IP address of the adapter is shown for confirmation.

Pressing the <Next> button opens a page for specifying an optional additional network layer.

- PLC Ethernet CPU

If TCP has been selected in the previous page, the following page is displayed:

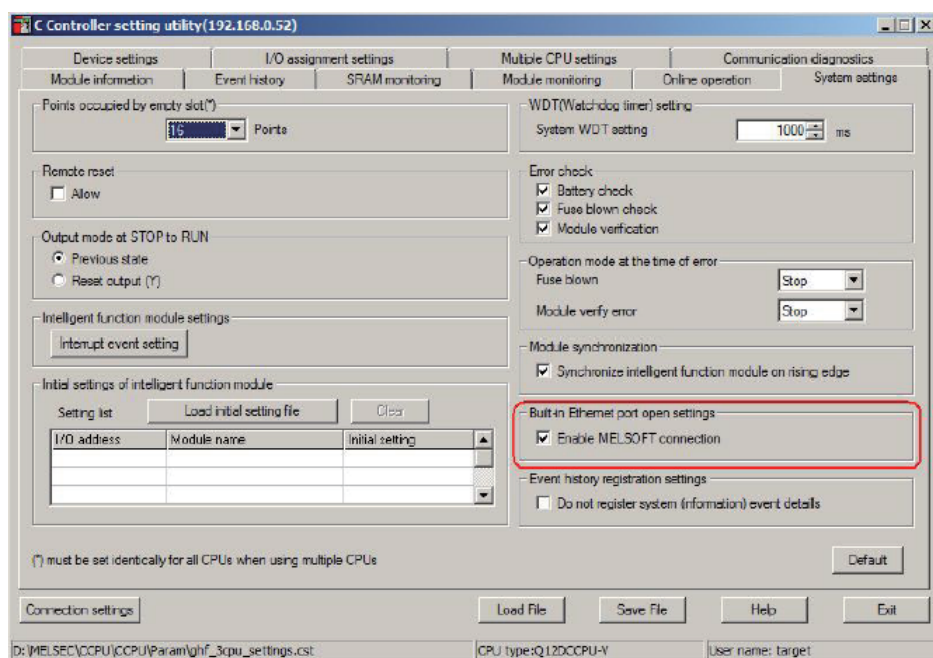


The IP address of the Ethernet interface can be manually entered or looked up online.

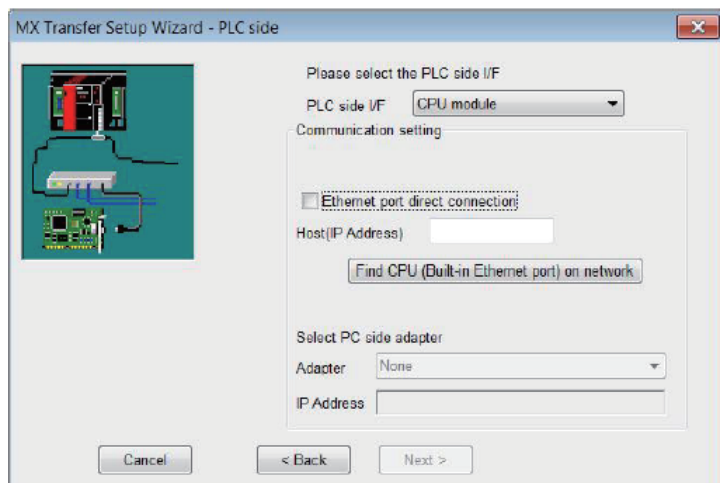
Pressing the 'Find CPU' button opens the 'Find CPU' dialog, in which the QnUDE, L-series and FX3- series CPUs in the local network are listed.

- Connections to C-Controller (Q12DCCPU-V)

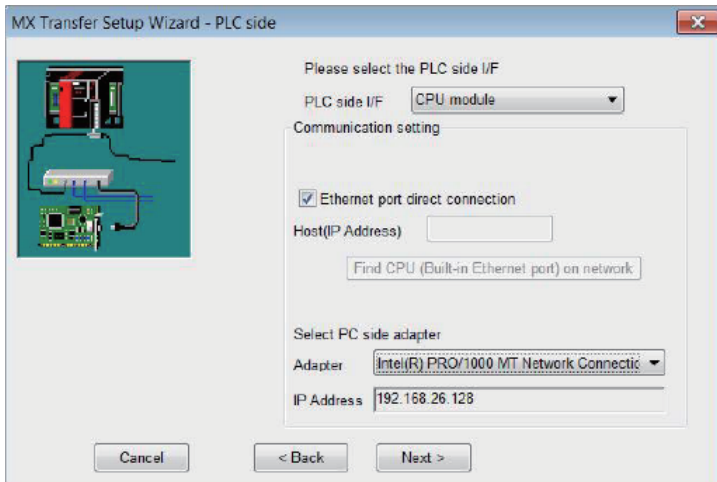
The 'Find CPU' function Q12DCCPU-V does not show Q12DCCPU units in the network. Their IP-address must be entered manually and MELSOFT connections must be explicitly enabled with the 'C-Controller Setting Utility'.



If UDP has been selected in the previous page, the additional controls 'Ethernet port direct connection' and 'Select PC side adapter' are displayed.

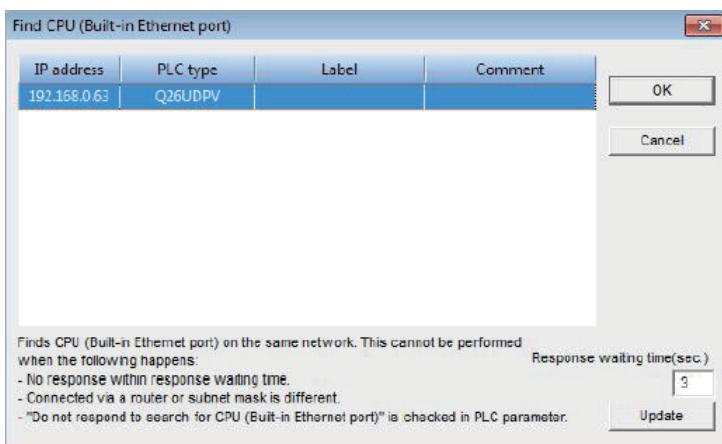


If the option 'Ethernet port direct connection' has been selected, the Ethernet interfaces of PC and PLC CPU must be connected point-to-point with a single cable. The IP address is not required for this type of connection and the corresponding input field is therefore disabled. Where the PC has more than one Ethernet adapter installed, the adapter to use can be selected from a drop-down list. The IP address of the adapter is shown for confirmation.



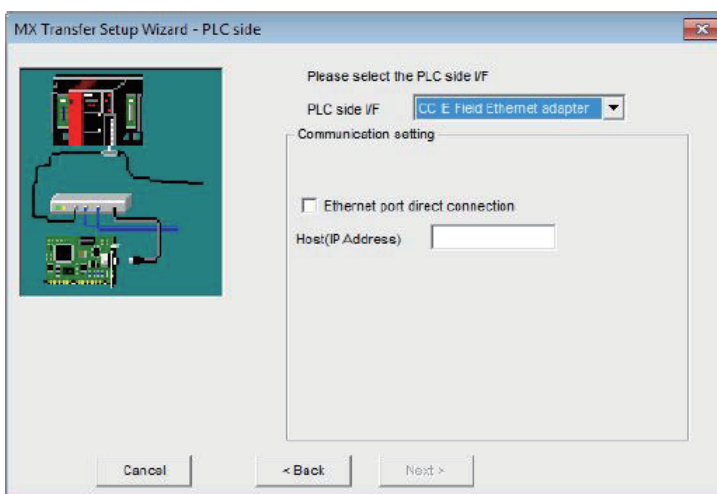
Pressing the <Next> button opens a page for specifying an optional additional network layer.

- Find CPU



This dialog lists the QnUDE, QnUDV, L-series, Q Motion series and FX3-series CPUs found in the local Ethernet network. When a CPU in the list is selected and the OK button pressed, the IP address of the selected CPU is copied to the 'Host(IP Address)' field. By pressing 'Update' the local Ethernet network is scanned again for QnUDE, QnUDV, L-series and Q Motion series CPUs and the list is updated. The time to wait for CPUs to respond during the search is entered in the field 'Response waiting time'.

- CC IE Field Ethernet Adapter



If UDP has been selected in the previous page, the additional option 'Ethernet port direct connection' is displayed.

# ■PLC G4 Module

Enter the settings for a G4 module connected to the PC.

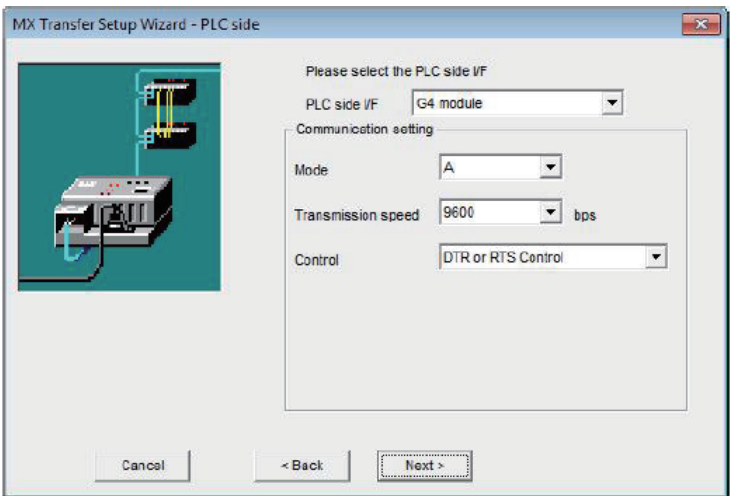
- PLC side G4 module parameters

Parameter	Values	Description
Mode	A, QnA, Q	Type of PLC C24 module
Transmission speed	9600 - 115200	Baudrate on the serial link Available baudrates depend on selected mode
Control	DTR only, RTS only, DTR and RTS, DTR or RTS	Handshake signals

## Point

The CC-Link G4 module used in CC-Link G4 communication (only when the AJ65BT-G4 is used) must have software version 'D' or later. Modules with software version 'C' or earlier will not operate properly.

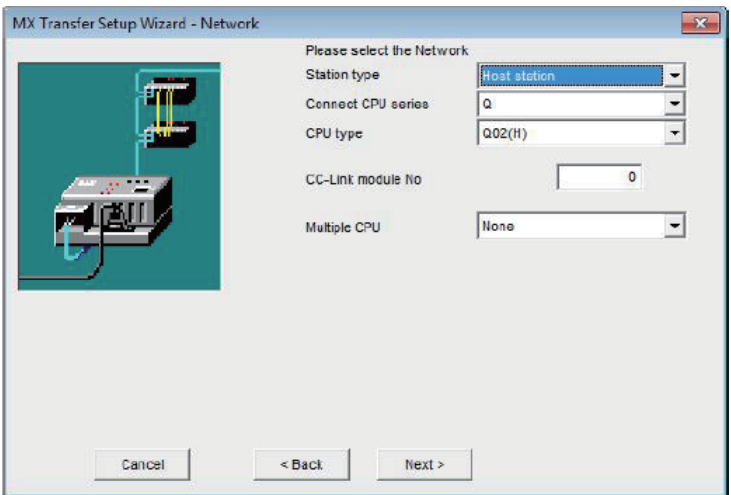
- G4 Module connected to PC



For a description of the editable parameters on the page see PLC side G4 module parameters.

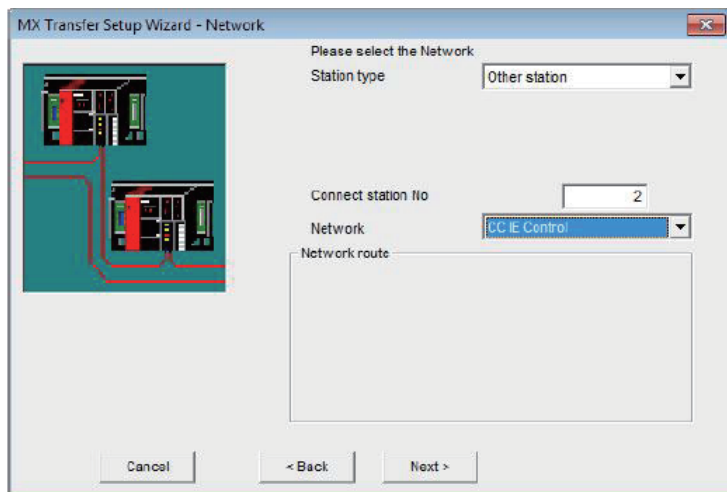
Pressing the <Next> button opens a page for specifying an optional additional network layer.

- Host station attached to G4 module

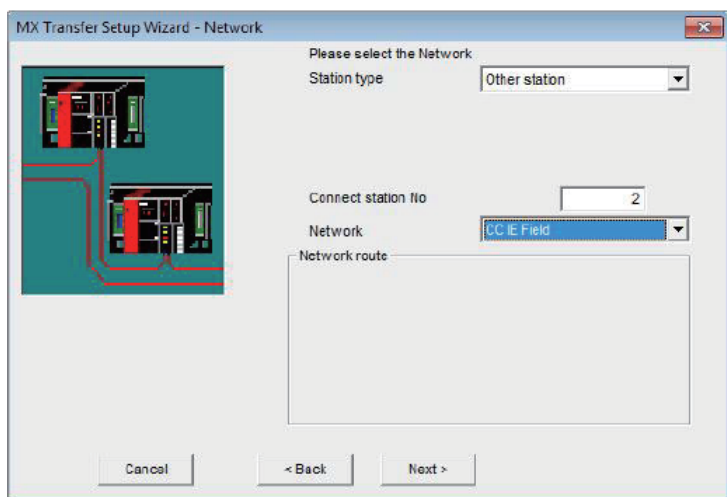


Pressing the <Next> button opens a page for entering a comment for the connection.

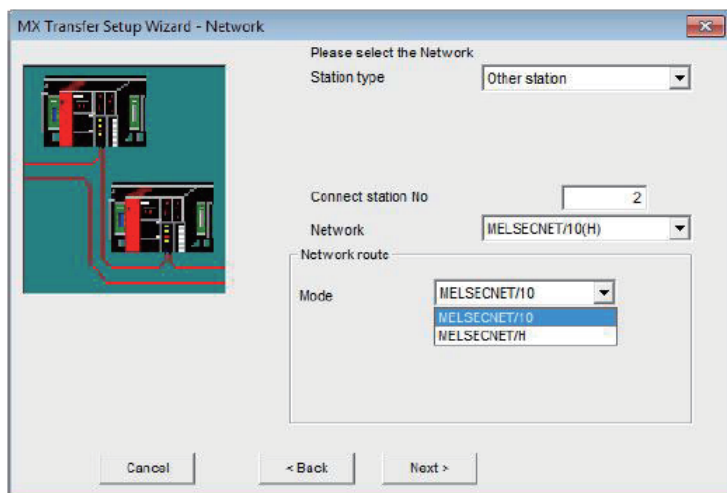
- Other station in a network attached to G4 module
- In a CC IE Control network



- In a CC IE Field network

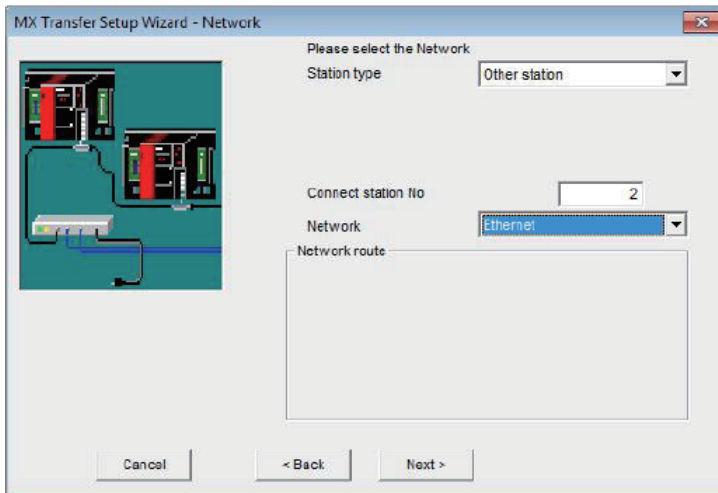


- In a MELSECNET/10 network



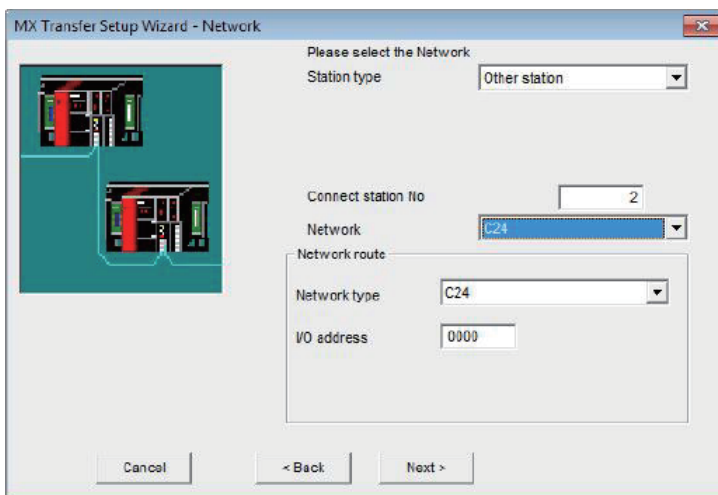
Pressing the <Next> button opens a page for specifying the station type and address.

- In an Ethernet network



Pressing the <Next> button opens a page for specifying the station type and address.

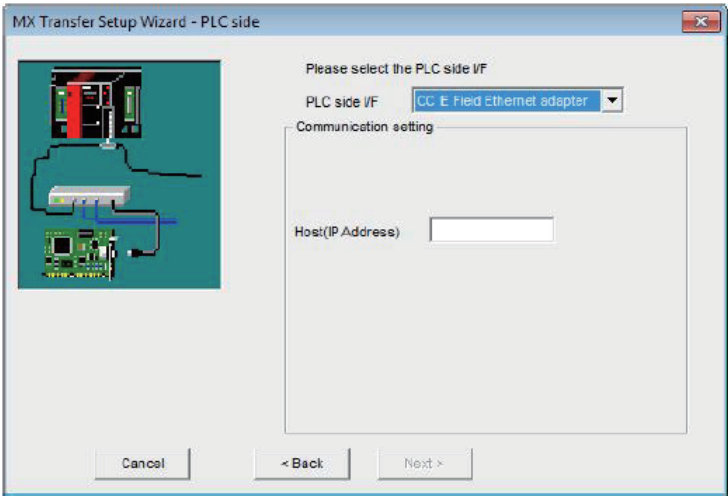
- In a C24 network



Pressing the <Next> button opens a page for specifying the station type and address.

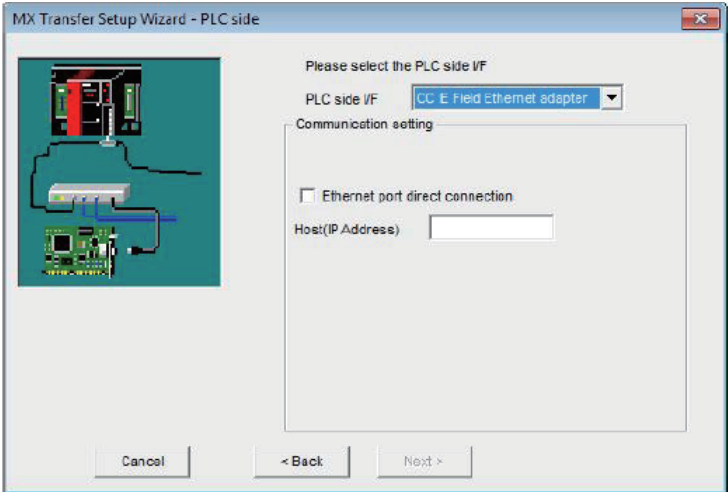
■PLC CC-Link IE Field Ethernet Adapter

If TCP has been selected in the previous page, the following page is displayed. Enter the IP address or host name of the CC-Link IE Field adapter.

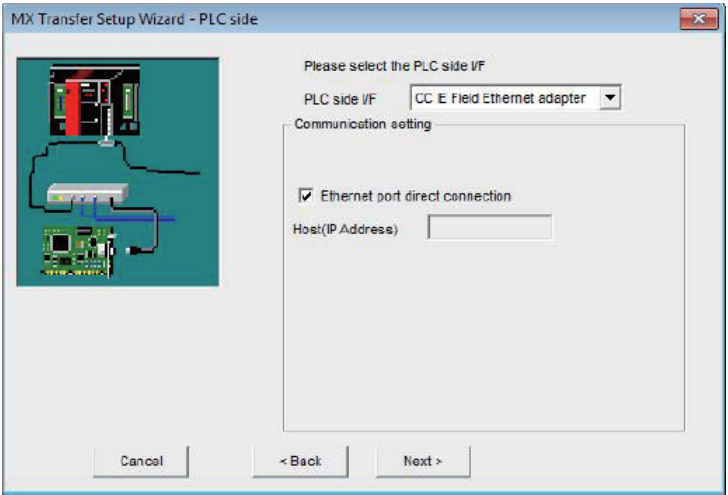


Parameter	Values	Description
Host (IP Address)	IP address or host name	IP address of the CC-Link IE Field Ethernet interface

If UDP has been selected in the previous page, the additional option 'Ethernet port direct connection' is displayed.



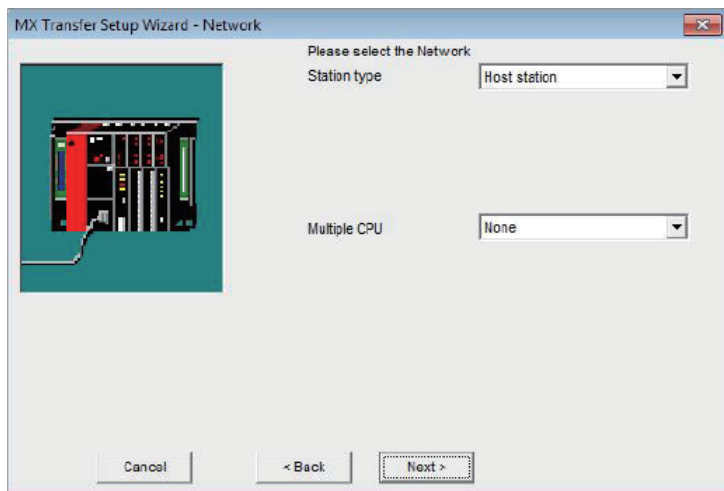
If the option 'Ethernet port direct connection' has been selected, the Ethernet interfaces of PC and PLC CPU must be connected point-to-point with a single cable. The IP address is not required for this type of connection and the corresponding input field is therefore disabled.





## ■Network

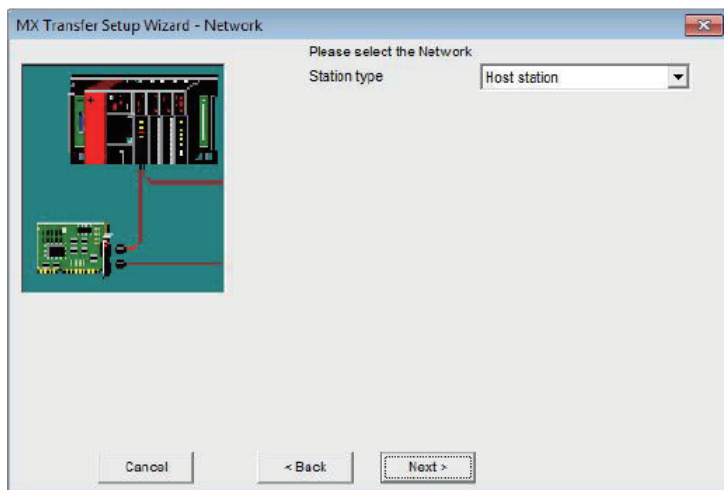
- Host station for CPU connections



If the target PLC contains multiple CPUs, the number of the target CPU must be selected in the 'Multiple CPU' parameter. For details see 'Appendix Multi-CPU'.

Pressing the <Next> button opens a page for entering a comment for the connection.

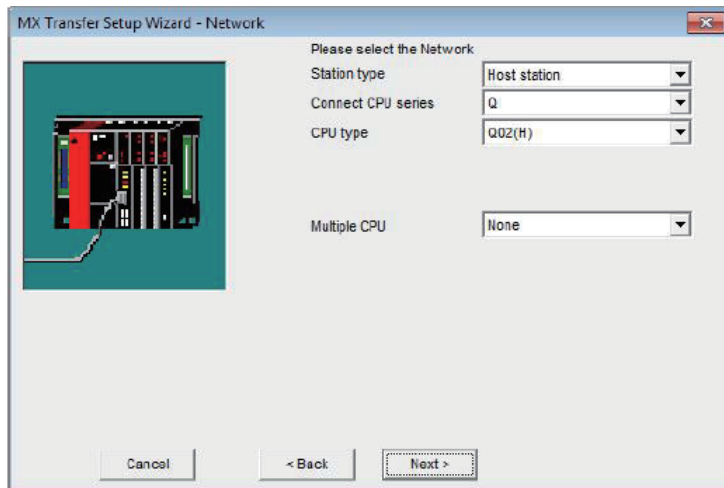
- Host station for MELSECNET and CC-Link connections



When using a PC interface board for MELSECNET or CC-Link connections, the dialog differs from that for serial and USB connections. For details see 'Appendix Multi-CPU'.

Pressing the <Next> button opens a page for entering a comment for the connection.

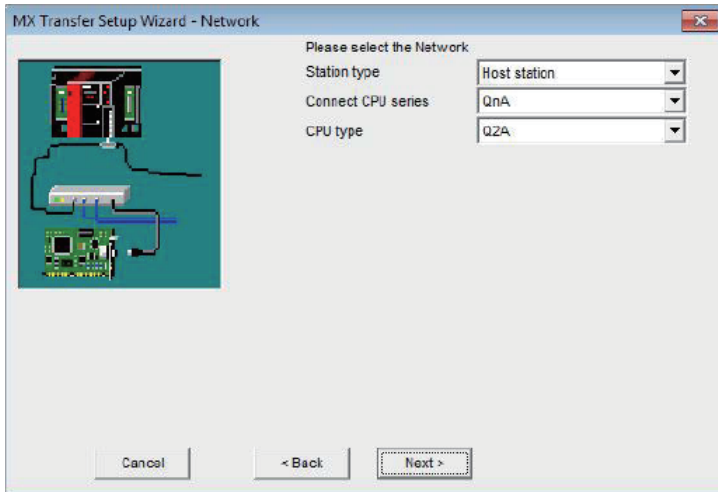
- Host station for C24 connections



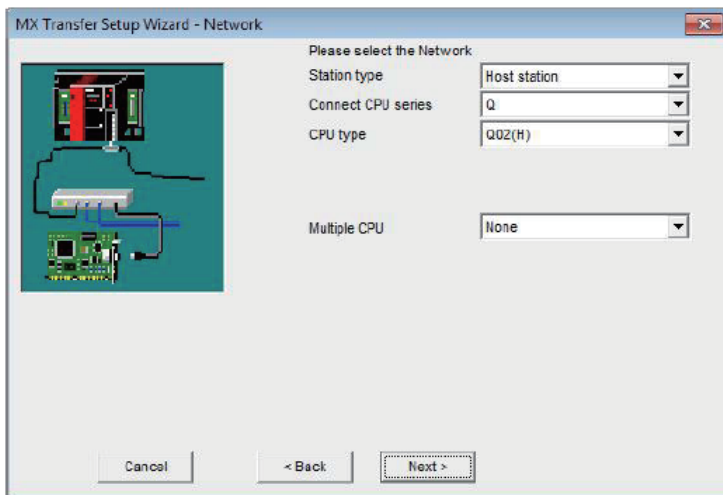
Select the type of the target CPU. If the target PLC contains multiple CPUs, the number of the target CPU must be selected in the 'Multiple CPU' parameter. For details see 'Appendix Multi-CPU'.

Pressing the <Next> button opens a page for entering a comment for the connection.

- Host station for Ethernet connections

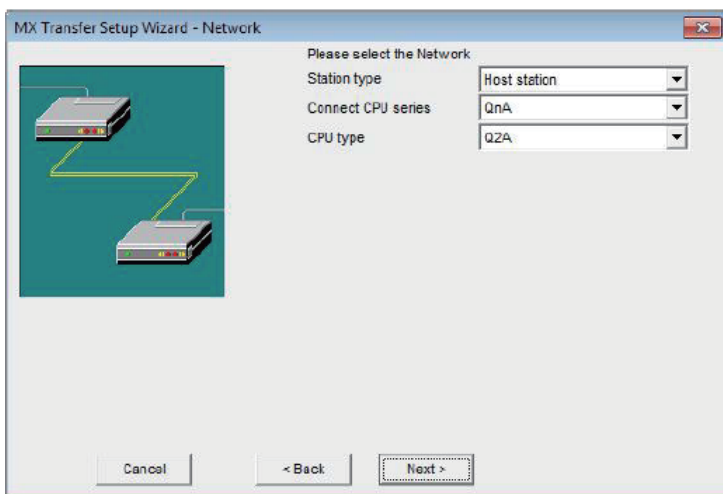


For PLCs, which support multiple CPUs, the index of the CPU in a multi-CPU system can optionally be selected.



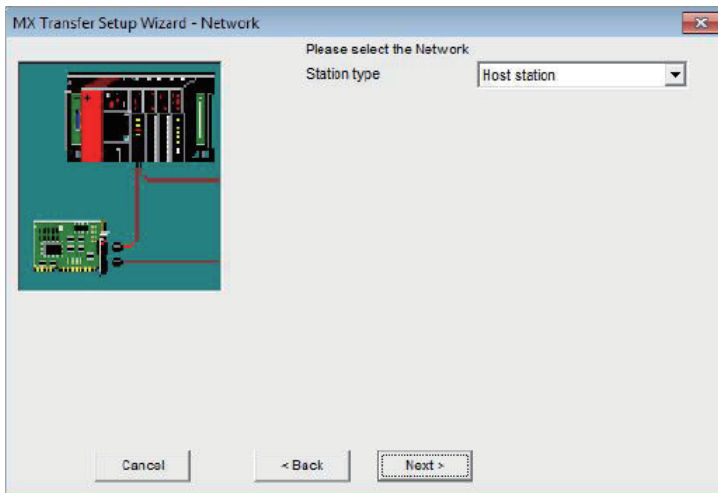
Select the type of the target CPU and press the <Next> button to open a page for entering a comment for the connection.

- Host station for modem connections

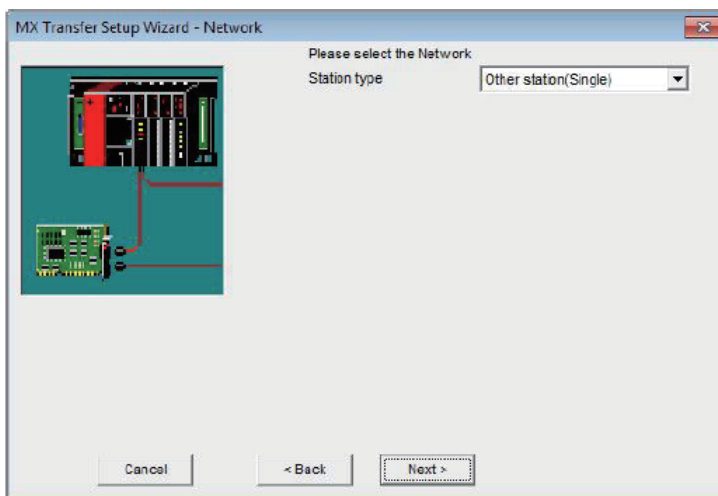


Pressing the <Next> button opens a page for entering a comment for the connection.

- Host Station for CPU Board Connections

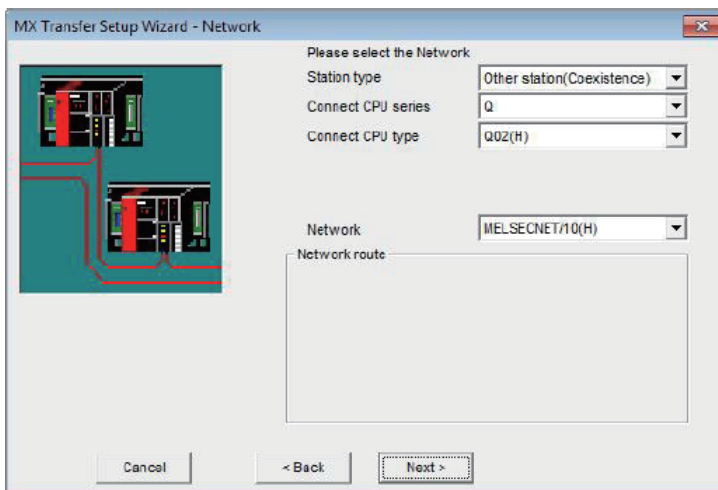


- Station in single network



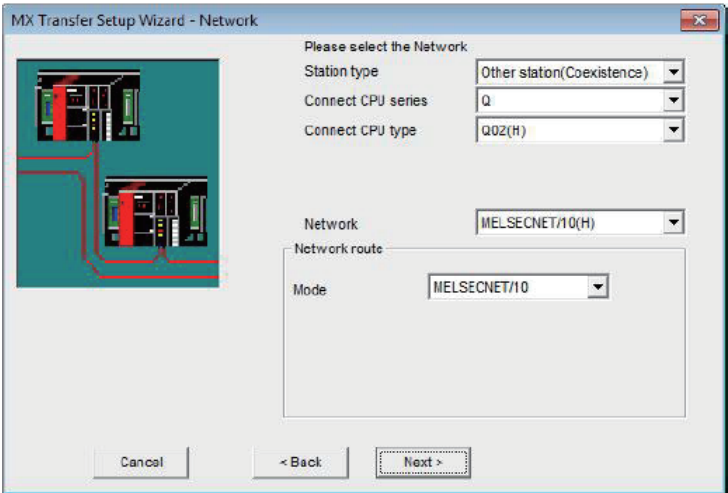
Pressing the <Next> button opens a page for entering the MELSECNET address of the target PLC.

- Station in coexisting network
- For MELSECNET/10 interfaces



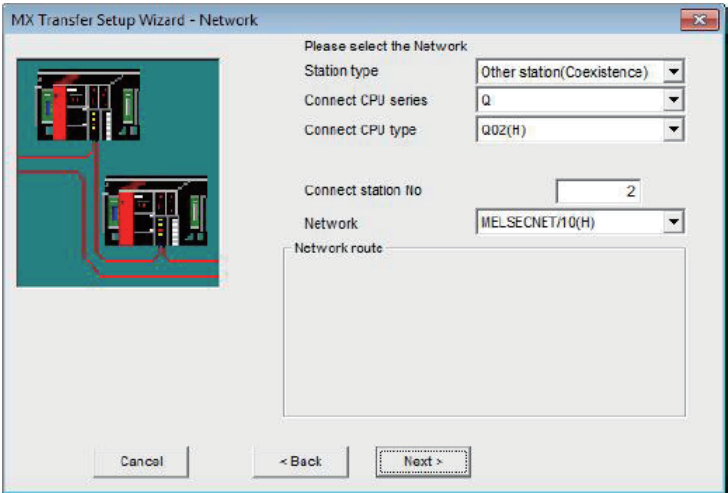
Select the type of the coexisting network and press the <Next> button to open a page for entering parameters of the target PLC in the coexisting network.

- For MELSECNET/H interfaces



Select the type of the coexisting network and press the <Next> button to open a page for entering parameters of the target PLC in the coexisting network.

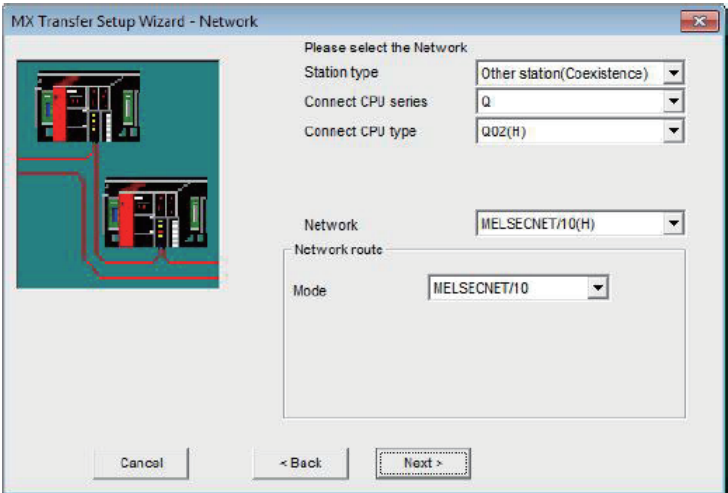
- For CC-Link interfaces



Parameter	Values	Description
Connect station no.	0 - 64	Station number of the CC-link module in the target station

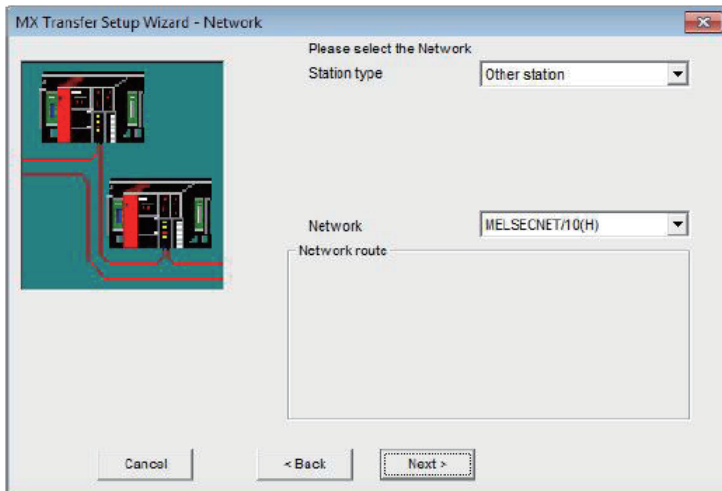
Select the type of the coexisting network and press the <Next> button to open a page for entering parameters of the target PLC in the coexisting network.

- For CC-Link IE interfaces

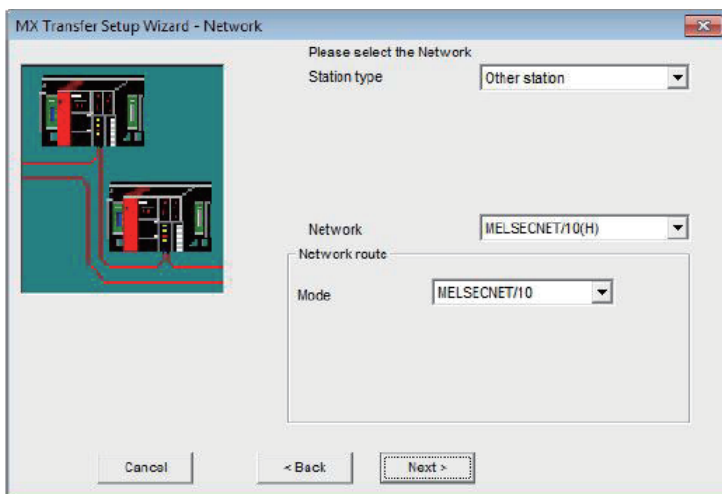


Select the type of the coexisting network and press the <Next> button to open a page for entering parameters of the target PLC in the coexisting network.

- Station in MELSECNET/10 network

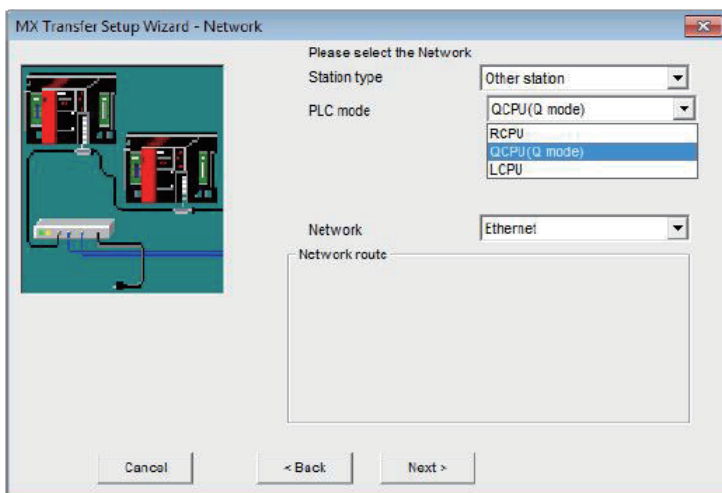


Select the type of the network, to which the target PLC is connected. Additionally the mode may also be selectable.

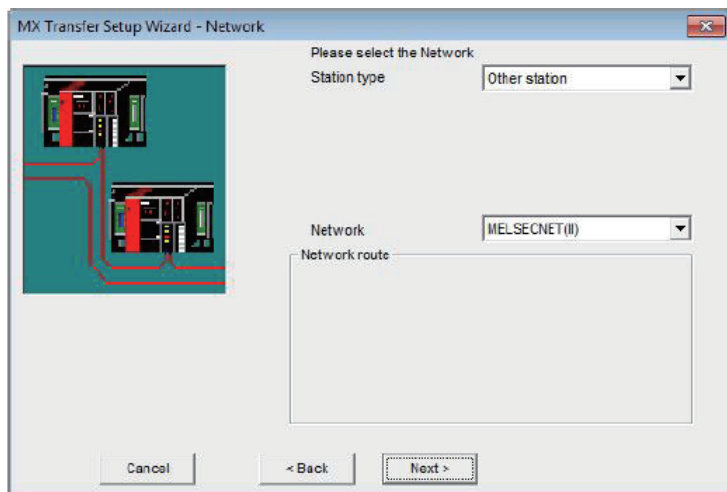


Pressing the <Next> button opens a page 180 for entering the MELSECNET address of the target PLC.

- Station in Ethernet network



- Station in MELSECNET(II) network

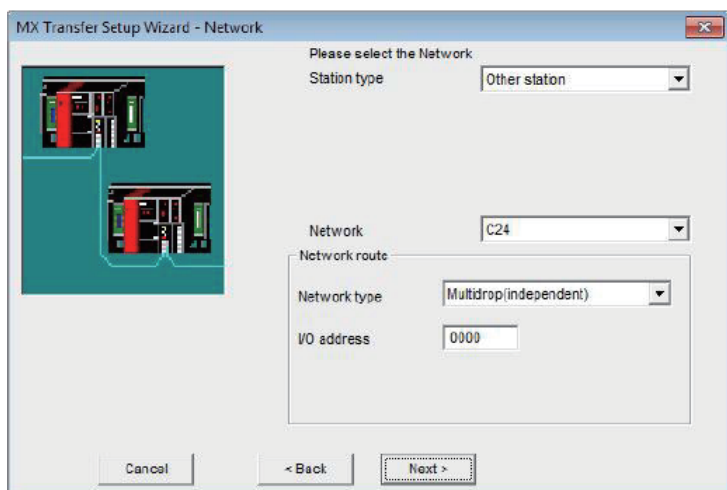


Pressing the <Next> button opens a page for entering the MELSECNET address of the target PLC.

### Point

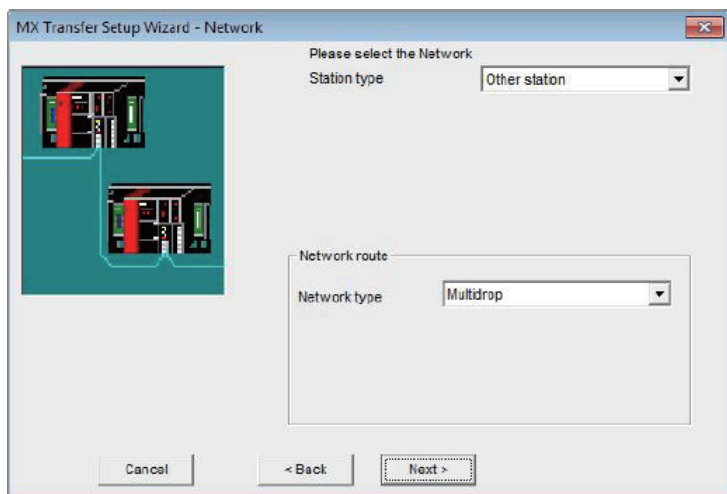
When access is made to the QnACPU, AnUCPU, QCPU (A mode) or motion controller CPU via the MELSECNET(II), the device range is equivalent to that of the AnACPU.

- Station in C24 multi drop network



Pressing the <Next> button opens a page for entering the station address of the target PLC in multi drop network.

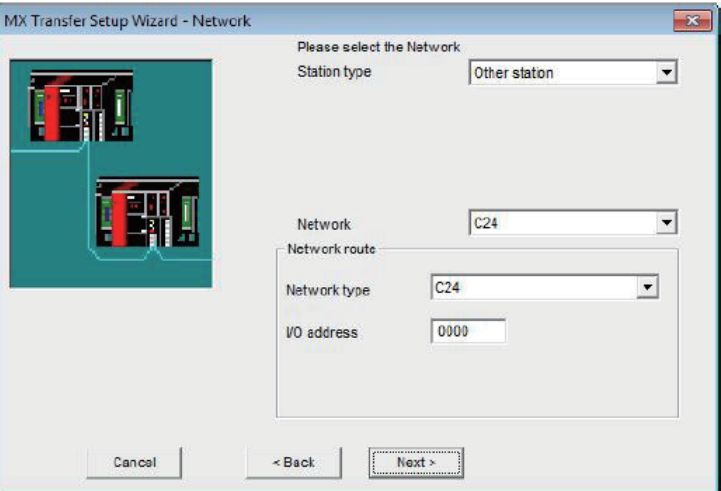
- Station in FX multi drop network



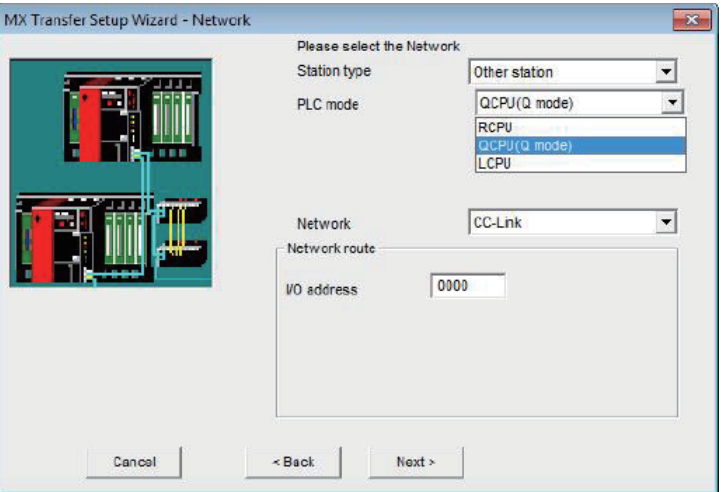
Pressing the <Next> button opens a page for entering the station address of the target PLC in multi drop network.

• Network with C24 station

Parameter	Values	Description
Network type	C24	Fixed
I/O address	I/O number divided by 0x10	Module I/O address of connected station

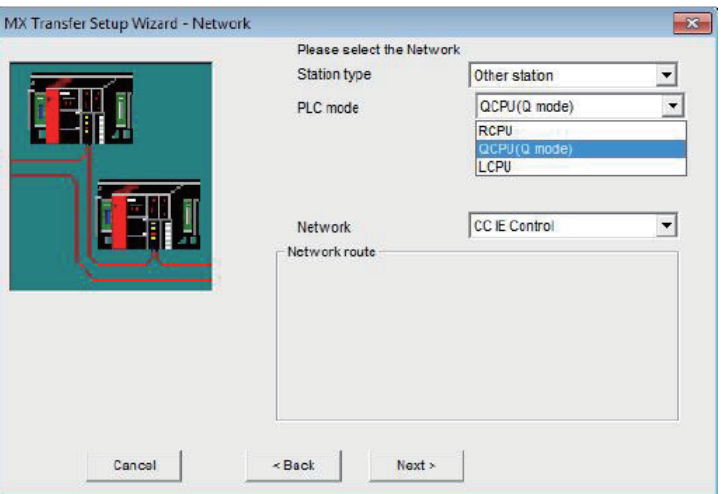


• Network with CC-Link station

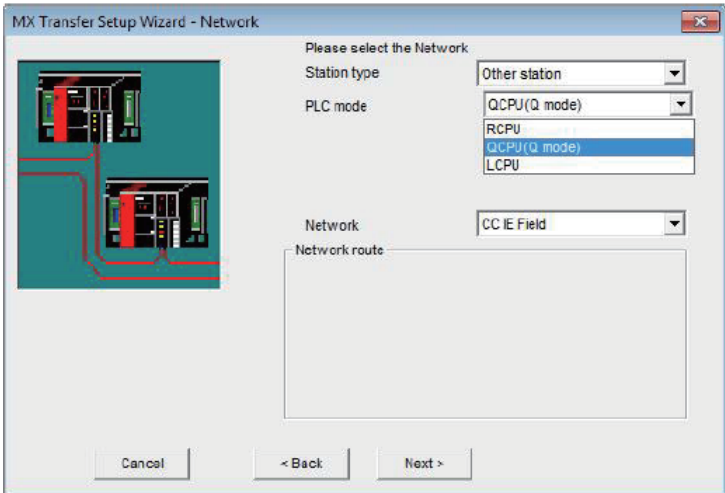


Parameter	Values	Description
I/O address	I/O number divided by 0x10	Module I/O address of connected station

• Network with CC-Link IE Control



- Network with CC-Link IE Field

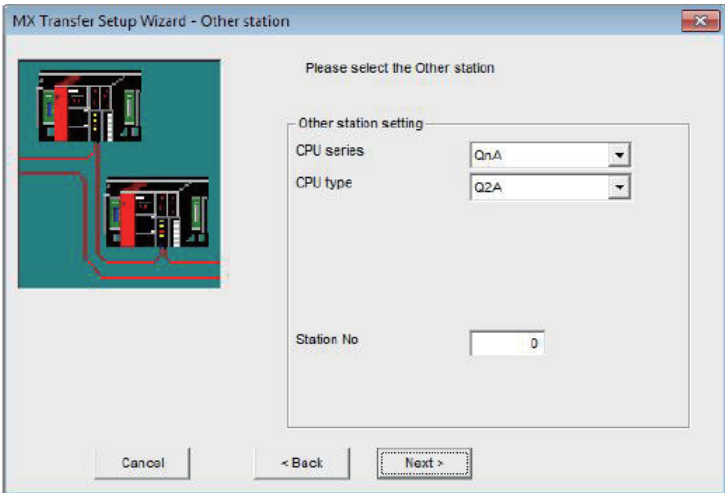


### ■Other Station

This page is used to provide type and network address information of the target PLC in a multi-layered network.

Parameter	Values	Description
CPU series	Q, QnA, A, FX, R, L and Q, R Motion and R Safety depending on previous choices	Series of the CPU type
CPU type	see list of supported CPU types	Type of PLC CPU module
Network No	1 - 239	Network number of the target interface
Station No.	1 - 64	Station number of the target interface, limits may be different for certain protocols
Station No. for CC-Link network	0 - 63	Station number of the target interface, 0 is not available for FX CPUs

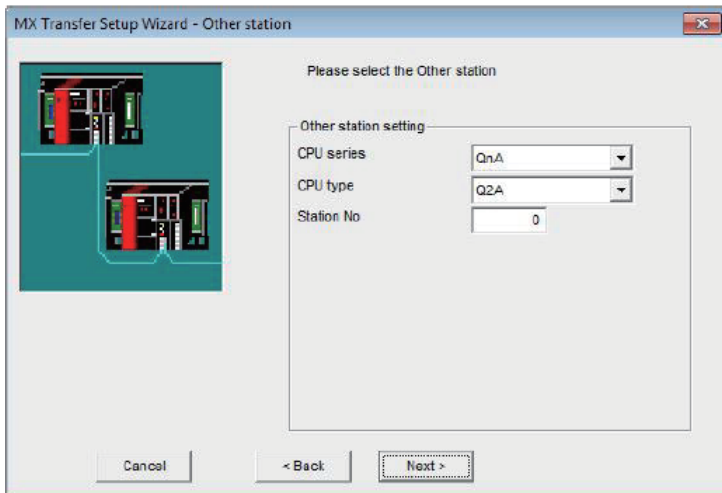
- Station in same network for MELSECNET(II)



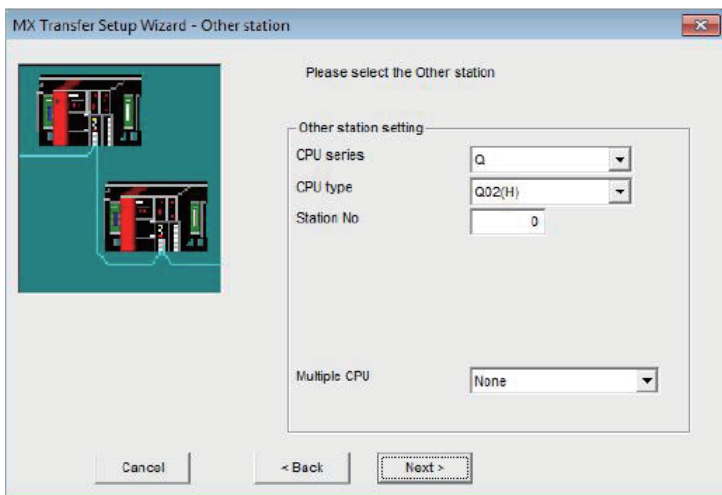
Pressing the <Next> button opens a page for entering a comment for the connection.



- Station in same network for C24 or FX

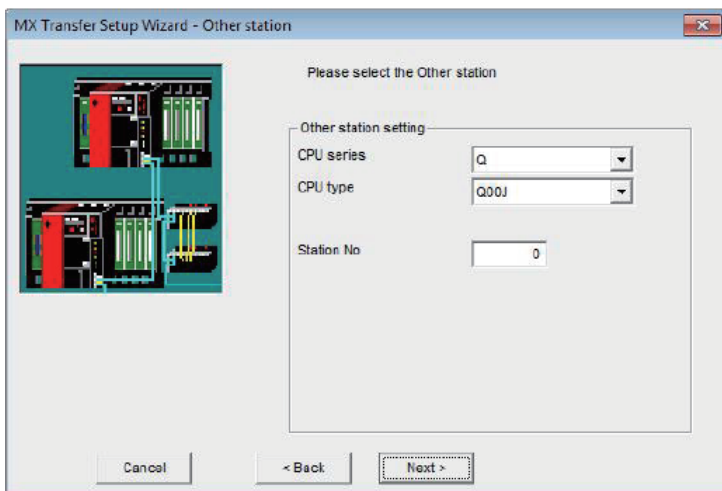


For PLCs, which support multiple CPUs, the index of the CPU in a multi-CPU system can optionally be selected.

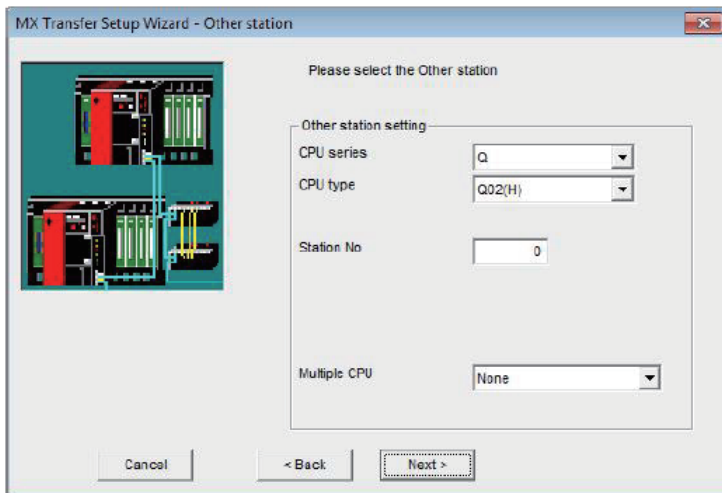


Pressing the <Next> button opens a page for entering a comment for the connection.

- Station in same network for CC-Link

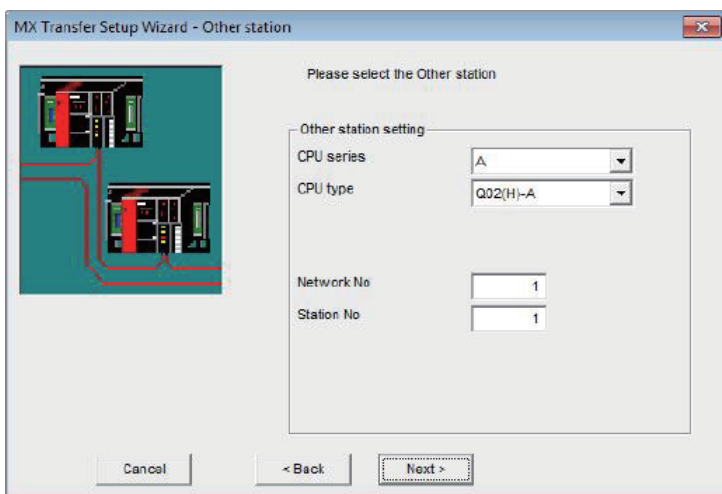


For PLCs, which support multiple CPUs, the index of the CPU in a multi-CPU system can optionally be selected.

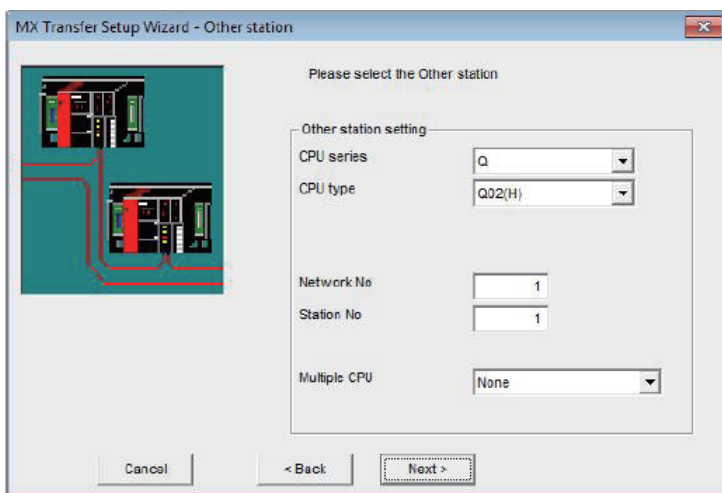


Pressing the <Next> button opens a page for entering a comment for the connection.

- Station in same or different network



For PLCs, which support multiple CPUs, the index of the CPU in a multi-CPU system can optionally be selected.



If the target PLC is in a different network, the network number of that network must be provided additionally to the station number of the target PLC.

Pressing the <Next> button opens a page for entering a comment for the connection.

## ■ GOT Side Settings

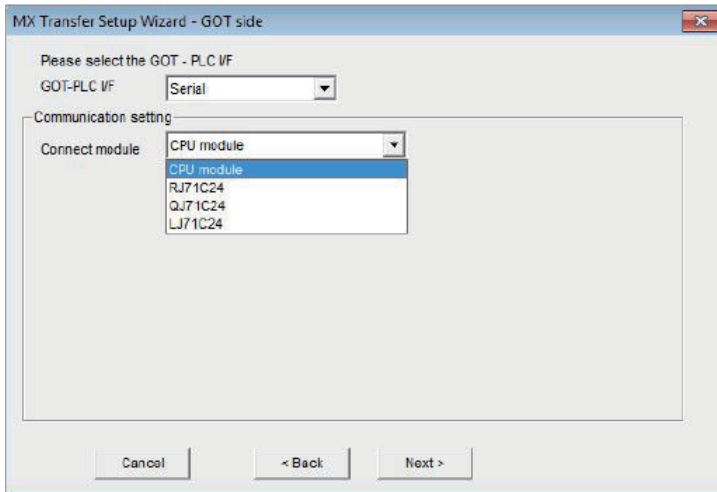
- PC Serial Interfaces (USB and RS232)

For USB and RS232 serial connections between PC and GOT the following interfaces of the GOT can be used to connect to the PLC

- GOT Serial Interface
- GOT Bus Interface
- GOT Ethernet Interface

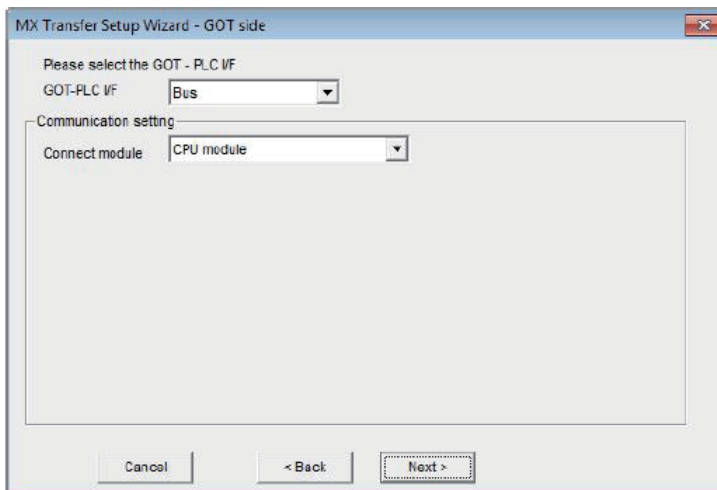
The interfaces, which are actually available on the GOT, depend on the specified GOT hardware used.

- GOT Serial Interface



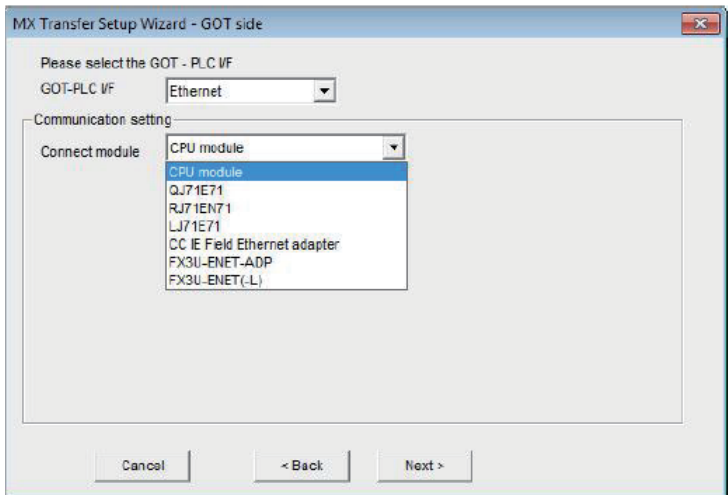
Parameter	Values	Description
Connect module	CPU module RJ71C24 QJ71C24 LJ71C24	Type of connected unit on the PLC side

- GOT Bus Interface



Parameter	Values	Description
Connect module	CPU module	Type of connected unit on the PLC side (fixed)

- GOT Ethernet Interface



Parameter	Values	Description
Connect module	CPU module QJ71E71 RJ71EN71 LJ71E71 CC IE Field Ethernet adapter FX3U-ENET-ADP FX3U-ENET(-L)	Type of connected unit on the PLC side

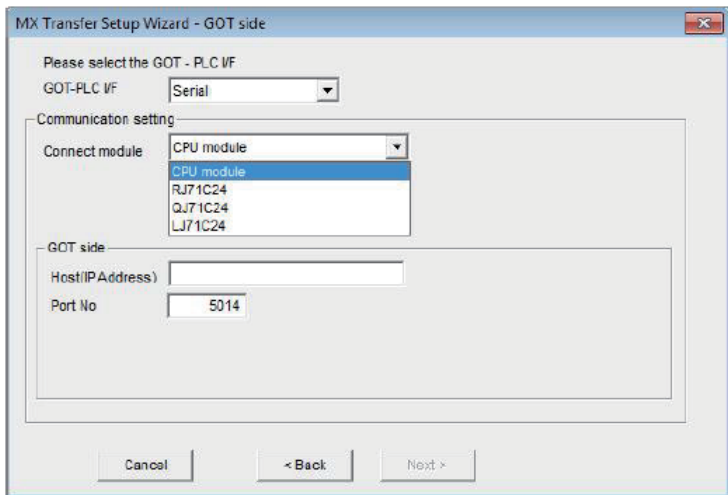
- PC Ethernet Interface

For Ethernet connections between PC and GOT the following interfaces of the GOT can be used to connect to the PLC

- GOT Serial Interface
- GOT Bus Interface

The interfaces, which are actually available on the GOT, depend on the specified GOT hardware used.

- GOT Serial Interface



Parameter	Values	Description
Connect module	CPU module RJ71C24 QJ71C24 LJ71C24	Type of connected unit on the PLC side
Host (IP Address)	IP address or host name	IP address of the GOT Ethernet interface
Port No	1024 - 65534	Port number on the GOT for the PC connection

• GOT Bus Interface

MX Transfer Setup Wizard - GOT side

Please select the GOT - PLC I/F

GOT-PLC I/F

Communication setting

Connect module

GOT side

Host/IP Address

Port No

Parameter	Values	Description
Connect module	CPU module	Type of connected unit on the PLC side
Host (IP Address)	IP address or host name	IP address of the GOT Ethernet interface
Port No	1024 - 65534	Port number on the GOT for the PC connection

■Enter Comment

Enter a comment to describe the configured PLC connection and test the PLC connection with the current settings.

MX Transfer Setup Wizard - Finished

The Communication wizard has finished collecting information.

Press 'Finish' to store the modified settings and to close the wizard.

Comment

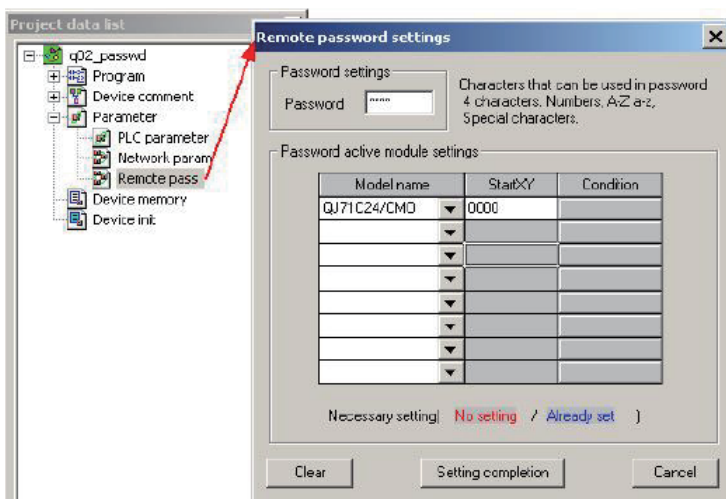
Password

For modem connections to QJ71C24 and QJ71CMO modules a password may be required in order to gain access to the CPU. Enter the password, which has been set in the CPU parameters. For other connection types the password input field is disabled.

The password must not exceed four characters and can consist of alphanumerical characters and standard signs. Blanks are not allowed.

- Remote access password

The password for remote access via QJ71E71 and QJ71C24 is assigned in the CPU parameters of a GX Works2 project and downloaded to the target PLC. Passwords set in any relaying units have no effect.



Enter the same password in the 'Password' input field for the connection to gain access to the target PLC.

- Validating TransferSetups

If 'Finish' is pressed, it is checked, whether the transfer setup is supported by the software using the transfer settings. If the transfer settings are not supported, an error message is displayed and the settings cannot be stored.



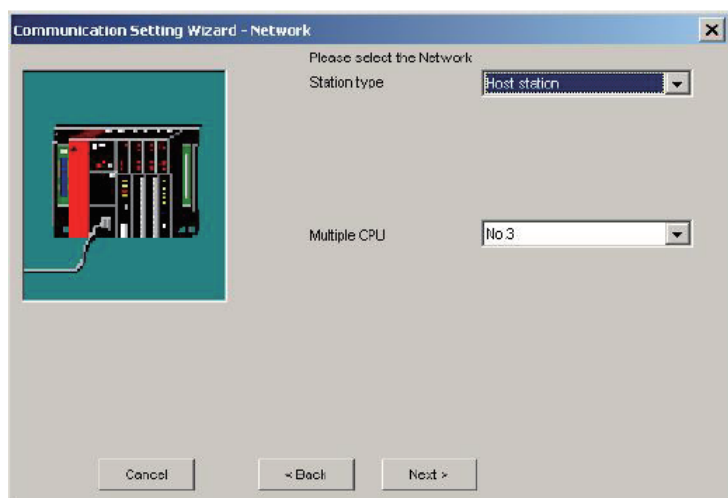
## Special Setups

### ■Communication with Multi-CPU Systems

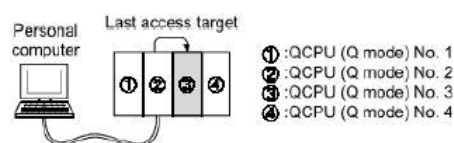
For a multi-CPU system the user must specify the CPU number of the target CPU, i.e. the last accessed station.

When making access to the non-control CPU of the relay module on the accessed station, use the modules of function version B as the relay modules and Q-CPU's (Q mode) on the own station, all relay stations and accessed station.

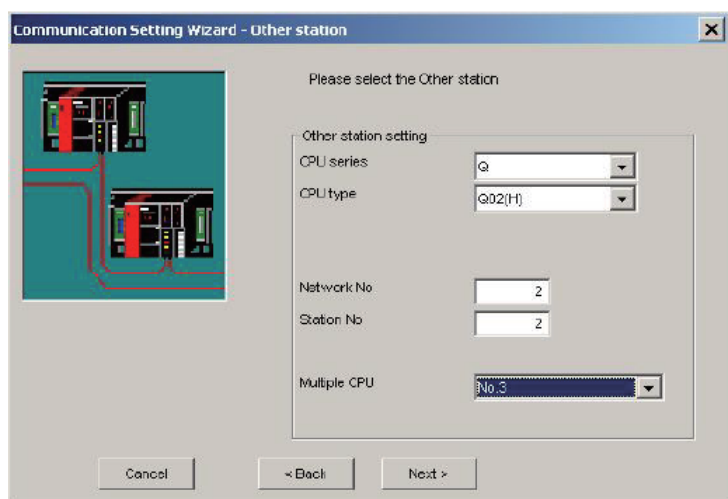
- (Example 1) CPU COM communication



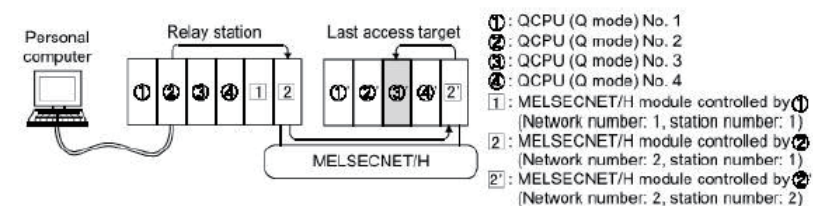
When the user has selected 'No. 3' (0x3E2) in the 'Multiple CPU' field, the connection is established to the third CPU in the rack, marked as (3) in the following figure.



- (Example 2) CPU COM communication (via MELSECNET/H)



When the user has selected 'No. 3' (0x3E2) in the 'Multiple CPU' field and entered '2' for network and station number, the connection is established to the third CPU in the 'Last access target' rack, marked as (3)' and grayed in the following figure. The CPU number in the 'Relay station' rack cannot be specified. Therefore, if '1' has been entered as network number for the sample below, an error will occur, because the network number controlled by the CPU (2) is only '2'.

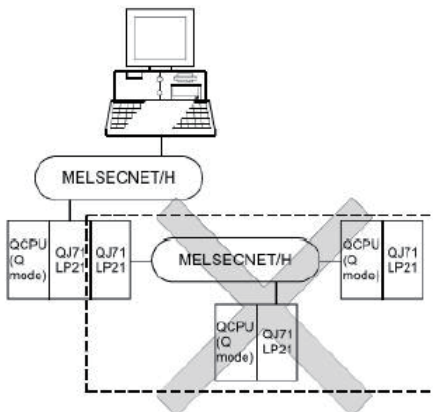
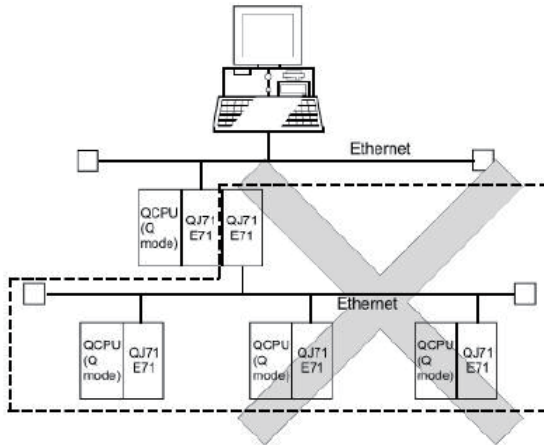


## ■Restrictions with Q00, Q00J and Q01 CPUs

The number of network modules is restricted for Q00J, Q00 and Q01 CPUs.

Type of Network Module	Max. Number of Modules
MELSECNET/H module	1 module
Ethernet module	1 module
CC-Link module(Function version B or later)	2 modules

The following figures mark network architectures for Ethernet and MELSECNET/H, which are not supported in combination with Q00J, Q00 and Q01 CPUs.



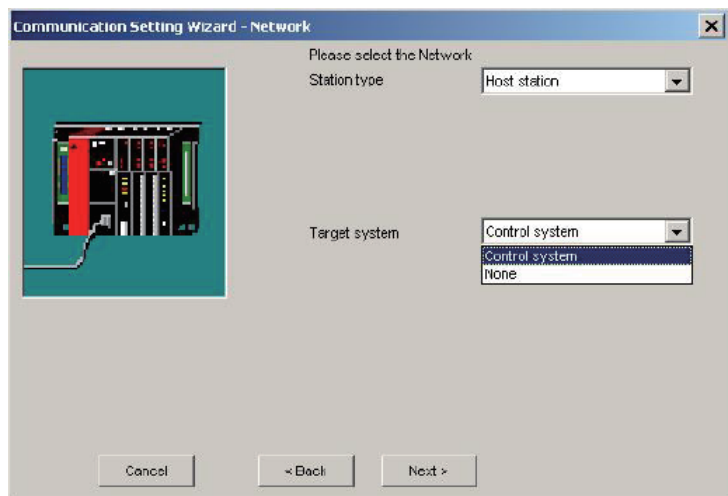


## ■ Redundant CPUs

- Q-series

The following text describes the configuration for accessing redundant Q series PLC systems, i.e. Q12PRH and Q25PRH.

### 1. Target system



As 'Target system' either 'Control system' or 'None' can be selected.

Parameter	Values	Description
Target system	Control system	Connects to the control system and maintains access to the control system after switching control and standby CPU
	None	Connects to the target PLC CPU independently of whether it is control or standby system

Note: to determine which CPU in the redundant PLC system is being accessed, the following special relays can be checked.

- To distinguish, whether system A or B are accessed

SM1511	System A identification flag	<ul style="list-style-type: none"> <li>• Identifies system A/system B of a redundant system.</li> <li>• Remains ON/OFF even if the tracking cable is disconnected while the redundant system is running.</li> </ul>
SM1512	System B identification flag	

	System A	System B	during TRK.CABLE ERR. (= code 6120) (System not determined)
SM1511	ON	OFF	OFF
SM1512	OFF	ON	OFF

When checking the operation system status

SM1515	Control/ Standby system status	<ul style="list-style-type: none"> <li>• Indicates the CPU module operation status</li> <li>• Remains ON/OFF even if the tracking cable is disconnected while the redundant system is running.</li> </ul>
SM1516		

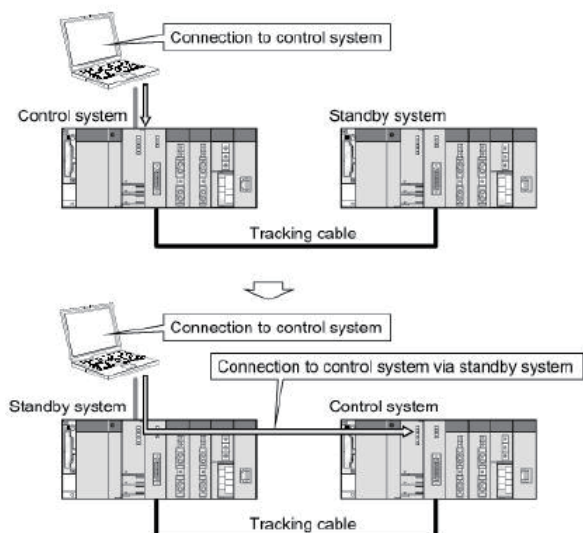
	Control system	Standby system	during TRK.CABLE ERR. (= code 6120) (System not determined)
SM1515	ON	OFF	OFF
SM1516	OFF	ON	OFF

## 2. Operation at occurrence of system switching

When system switching occurs during access to the redundant CPU and 'Control system' has been selected as target system, access is continued as described below.

- Connection via other than MELSECNET/H or Ethernet

Access to the control system after system switching is continued.

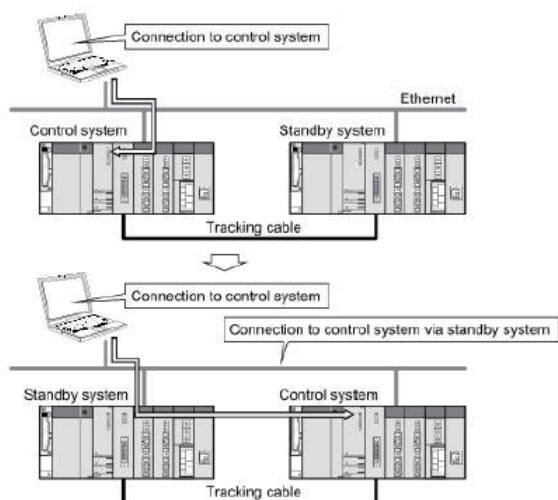


- Connection to MELSECNET/H or Ethernet

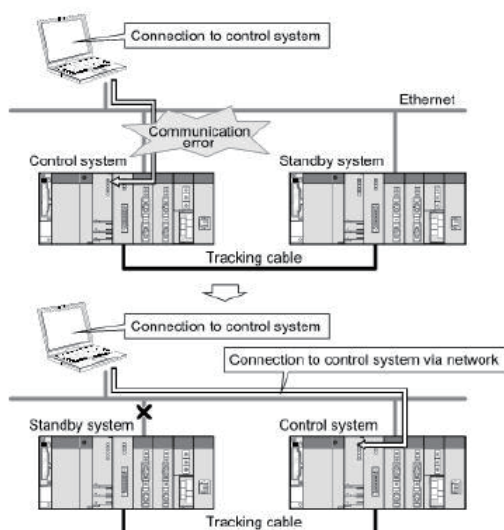
Access to the control system after system switching is continued as shown below, depending on whether a communication error occurs or not.

The following shows an example of Ethernet connection.

<When communication is normal>



<When communication error occurs>



Note: in the case of Ethernet connection, it may take time from when a communication error occurs until communication starts after connection to the control system.

### 3. Automatic switching of communication route

If a communication error occurs during access to the redundant CPU via a MELSECNET/H or Ethernet network, the communication route is automatically switched to continue access to the control system.

In the following text this automatic switching of the communication route is referred to as 'route switching'.

The following describes the route switching conditions, how to check for route switching occurrence, and examples of access by route switching.

#### • Route switching conditions

When access is being made under the following conditions, access to the Redundant CPU is continued by route switching if a communication error occurs.

Mode	Conditions for continued access
Operation mode	Backup mode, Separate mode
Target system	Control system

However, if a tracking error had already occurred at a start of communication (caused for example by power off or reset of the redundant system), access to the control system is not continued by route switching even if tracking is recovered after that.

#### • How to check for route switching occurrence and examples of access by route switching

How to check whether route switching occurred or not

Special devices and registers allow to detect whether route switching has occurred.

SM1600 <sup>*1</sup>	SD1590 <sup>*2</sup>	SD1690 <sup>*2</sup>	Possibility of route switching	Reference
OFF	either one is other than 0		Since a system switching request from the network module was detected, route switching may have been executed.	see example 1
ON	0	0	Since an other system fault occurred, route switching may have been executed.	see example 2
ON	either one is other than 0		Since an other system fault occurred or a system switching request from the network module was detected, route switching may have been executed.	see example 1 and 2

\*1 even if SM1600 is ON, route switching does not occur when the CPU is not accessed via the tracking cable.

\*2 when using SM1600, SD1590 and SD1690 to estimate whether route switching has occurred or not for the Redundant CPU connected to Ethernet, check the following items in the redundant setting of the network parameter dialog box of GX Works2.

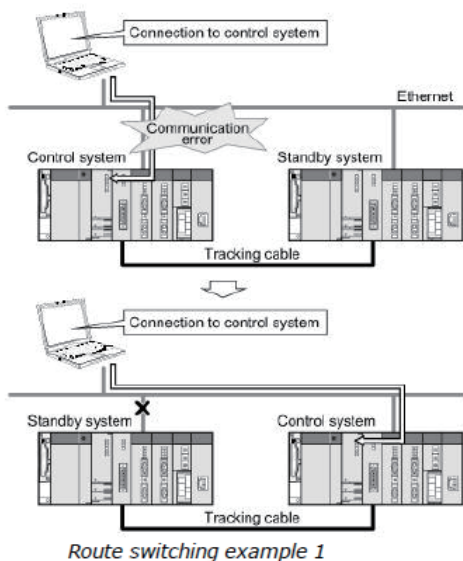
- Issue a system switching request at disconnection detection.
- Issue a system switching request at communication error.

Check the following based on the states of the above special relay and special registers and remove the error cause.

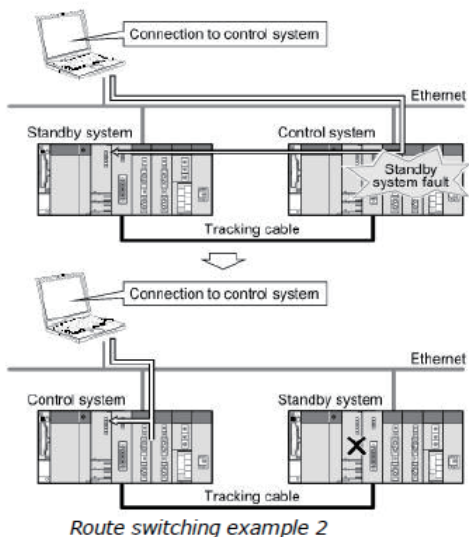
- Check the Redundant CPU for an error.
- Check the tracking cable status and whether the tracking cable is correctly connected.
- Check the relevant network module for an error and the network where the relevant network module is connected for an error.

## Examples of access by route switching

The following shows examples of route switching during access to the control system by Ethernet connection. When system switching occurs at communication error:

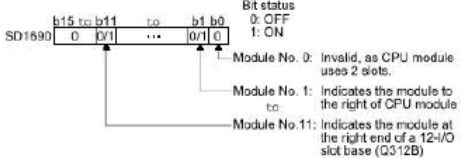


When standby system fault occurs:



Note: the following table indicates details of the special relay and special registers to be monitored when estimating whether route switching occurred or not.

Device	Meaning	Explanation
SM1600	Other system error flag OFF: No error ON: Error	<ul style="list-style-type: none"> <li>Turns on when an error occurs during redundant system error check. (Turns on when either of bits for SD1600.)</li> <li>Remains off when no errors are present.</li> </ul>
SD1590	Module no. for network module requesting route switching in host system	<ul style="list-style-type: none"> <li>Any of the following bits turns on corresponding to module No. for network module requesting route switching in host system.</li> <li>Turns off by the system after recovery from error of the relevant module by user.</li> </ul> <div style="text-align: center;"> <p>SD1590 bit diagram showing bits b15 to b11, b10, b9, b8, b7, b6, b5, b4, b3, b2, b1, b0. Bit status: 0: OFF, 1: ON. Module No. 0: Invalid, as CPU module uses 2 slots. Module No. 1: Indicates the module to the right of CPU module. Module No. 11: Indicates the module at the right end of a 12-I/O slot base (Q312B).</p> </div> <ul style="list-style-type: none"> <li>Refer to SD1690 for module No. for network module requesting route switching in other system.</li> </ul>

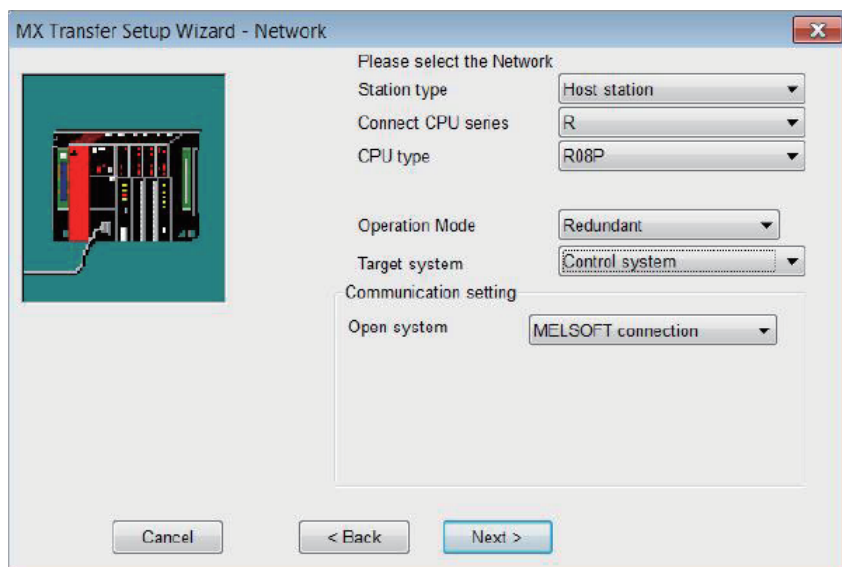
Device	Meaning	Explanation
SD1690	Module no. for network module requesting route switching in other system	<ul style="list-style-type: none"> <li>Any of the following bits turns on corresponding to module No. for network module requesting route switching in other system.</li> <li>Turns off by the system after recovery from error of the relevant module by user.</li> </ul>  <ul style="list-style-type: none"> <li>Refer to SD1590 for module no. for network module requesting route switching in host system.</li> </ul>

- R-series

The following text describes the configuration for accessing RnP CPUs (e.g. R120P) in redundant mode. Two RnP CPUs can be combined with an R6RFM module to form a redundant PLC system.

- Operation mode

The redundant operation mode can be selected from the network page.



The 'Operation Mode' selects whether redundant mode is enabled or not.

Parameter	Values	Description
Operation mode	Redundant	Use redundant mode.
	None	Do not use redundant mode, instead a multiple CPU target can be selected.

As 'Target system' either 'Control system' or 'None' can be selected.

Parameter	Values	Description
Target system	Control system	Connects to the control system and maintains access to the control system after switching control and standby CPU.
	None	Connects to the target PLC CPU independently of whether it is control or standby system.

The 'Open system' setting selects how the connection is made.

Parameter	Values	Description
Open system	MELSOFT connection	Connect with a standard MELSOFT connection. Note: Other connection methods may be available in later versions.

## ■Connection Types for Q24DHCCPU-V C-Controllers

The user interface of the transfer setup offers connection types for Q24DH CCPUs, which are not supported by this software.

The supported connection types are:

- PC (USB) - Q24DHCCPU-V
- PC (Ethernet) - Q24DHCCPU-V
- PC (USB) via GOT (Bus) - Q24DHCCPU-V
- PC (USB) via GOT (Ethernet) - Q24DHCCPU-V
- PC (Ethernet) via GOT (Bus) - Q24DHCCPU-V

The following connection types can be selected in the transfer setup, but are presently not supported by the hardware:

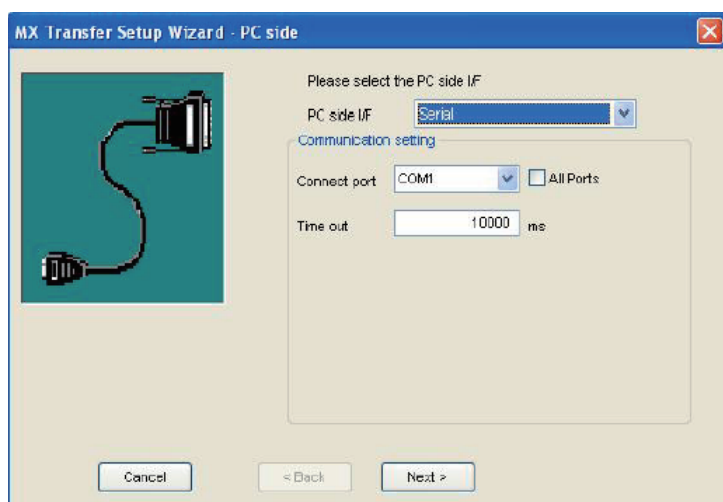
- PC (Serial) - Q24DHCCPU-V
- PC (C24) - Q24DHCCPU-V
- PC (MELSECNET/H) - Q24DHCCPU-V
- PC (CC-Link) - Q24DHCCPU-V
- PC (CC-Link G4) - Q24DHCCPU-V
- PC (CC-Link IE Control) - Q24DHCCPU-V
- PC (CC-Link IE Field) - Q24DHCCPU-V
- PC (Serial) - GOT (Serial) - Q24DHCCPU-V
- PC (Serial) - GOT (C24) - Q24DHCCPU-V
- PC (Serial) - GOT (Bus) - Q24DHCCPU-V
- PC (Serial) - GOT (Ethernet) - Q24DHCCPU-V
- PC (USB) - GOT (Serial) - Q24DHCCPU-V
- PC (Ethernet) - GOT (Serial) - Q24DHCCPU-V

## Communication setting wizard

A channel is equivalent to a physical port in the computer. To correctly configure a channel means to set up the specific communication parameters for the port like the serial channel speed (Baud rate) and protocol characteristics: Transmission mode (ASCII or RTU), RTS flow control, Stop bits and Parity scheme. When configuring a device, the channel communication properties are configured in the Communication Setting Wizard to set up the communication between the PC and the PLC device.

### Communication Settings on the PC Side

First you will specify the communication type to use on the PC side, as shown in the figure below.



Setting up the Connection for the PC Side

PC Side I/F: Specifies which connection type and which physical connection (COM) port to use for the selected device. The connection parameters (listed in the following tables) are selected in the Communication Setting Wizard. Click the Configuration button to launch the Communication Setting Wizard.

Note: The configuration parameters vary depending on which connection type is selected in the PC Side I/F field.

Communication Path	Description
Serial	Communication over a serial link can be either direct CPU or to a serial communications card, e.g. AJ71C24, QJ71C24, LJ71C24.
MELSECNET/10	Communication over MELSECNET/10 is via a special function module.
MELSECNET/H	Communication over MELSECNET/H is via a special function module.
CC-Link board	Communication over CC-Link network.
CC-Link IE board	Communication over CC-Link IE network.
CC-Link IE field board	Communication over CC-Link IE field wiring.
CC-Link IE field Ethernet adapter	Communication over CC-Link IE field wiring via Ethernet adapter.
Ethernet board	Communications via Ethernet using TCP/IP or UDP/IP protocols.
CPU board	Communications via a slot PLC
GOT transparent	Communication indirectly via a GOT (serial, USB or Ethernet).
Q Series Bus	Communication over Q Series bus is via a back plane.
GX Simulator	Communication over GX Simulator is via GX Developer.
GX Simulator2	Communication over GX Simulator2 uses GX Works2.
GX Simulator3	Communication over GX Simulator3 uses GX Works3.
MT Simulator2	Communication over MT Simulator2 uses MT Works2.
Modem	Communication over MODEM is via a special function module.
USB	Communication over a serial link can be direct to the CPU USB port.
SX Controller	Not supported.

Connect Port: Specifies which physical COM port to use for the selected channel. You can specify as many channels as needed for communication with your hardware.

COM1 to COM2 (if available)	Computer Ports
COM3 to COM256	Expansion Ports

By default, you will only see the physical COMports that are actually available on your computer. If you are preparing a configuration to be used on another computer which has different COMports, check the All ports box to show a full list of possible serial ports.

Item	Description
IMPORTANT	Verify that the COM port you select is not used by another channel or application. Assigning two channels to the same port results in a communication failure on one of the channels. Assigning a channel to a COM port used by another application (such as an alarm printer) can produce problems with driver communication.
Board Number	Specifies the module (1-4) of the selected board.
Connect Module	Select a unit type from the drop-down list.
Protocol	Specifies the primary device's communication protocol as the Transmission Control Protocol (TCP) or the User Datagram Protocol (UDP). This selection must match the protocol used by your process hardware.
Packet Type	Select Binary or ASCII from the drop-down list.
Port Number	This is the port address to be used when connecting to a MELSEC Ethernet module. Valid range is 256-65535. The Ethernet module must be configured to accept connections through this port.
Time out	Specify a connection time out (in milliseconds). Note: If you are using UDP connections to a PLC, and the OPC server and the PLC are connected through a network with a large volume of traffic, you may experience a high number of connection timeouts. This is due to the nature of the UDP protocol, which drops network 'packets' under high load conditions without informing the sending application that the data was lost. To solve this problem, either improve the quality of the connection (for example by ensuring that there is enough bandwidth in the network, or that the two systems are connected through a single network switch), or change the connection to use the TCP/IP protocol instead. TCP/IP is designed to guarantee that data sent is eventually received, even when the underlying network link sometimes loses individual 'packets'.
Network Number	The Network Number (1-255) only applies to MELSECNET/10, and is the number given to a MELSECNET/10 network using the network module's rotary switches.

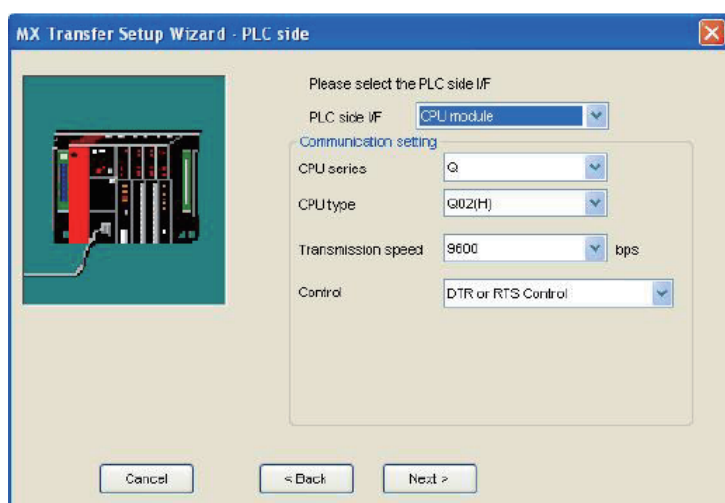


Item	Description
Station Number	<p>Specifies the station number (0-64 and 255) for the selected device. The station number is the number given to a PLC connected to a second tier network. This is a PLC station number on a Mitsubishi MELSEC Network, such as NetB, NetII or Net10.</p> <p>For A and Q PLCs, the setting range is 0-64 and 255. The range 0-64 can be set on the appropriate Network modules rotary switches.</p> <p>For MELSECNET/B the setting range is 0-31 where Zero is the master.</p> <p>For MELSECNET/II the setting range is 0-64 where Zero is the master.</p> <p>For MELSECNET/10 the setting range is 1-64 (master-less network).</p> <p>Notes:</p> <ul style="list-style-type: none"> <li>• A setting of 255 (FF Hex) is the default for a PLC when no network is connected.</li> <li>• Station number has no meaning for FX range of PLC's.</li> <li>• This setting is often referred to as PC number in other documentation and drivers.</li> </ul>

## Communication Settings on the PLC Side

Now you must specify the communication type to use on the PLC (device) side, as shown in the figure below.

PLC Side I/F: In the PLC Side I/F field, select a communication module from the drop-down list. (The module types listed depend on the communication type you specified for the PC side.)



### Setting up the Connection for the PLC Side

Note: The configuration parameters vary depending on which connection type is selected in the PLC Side I/F field.

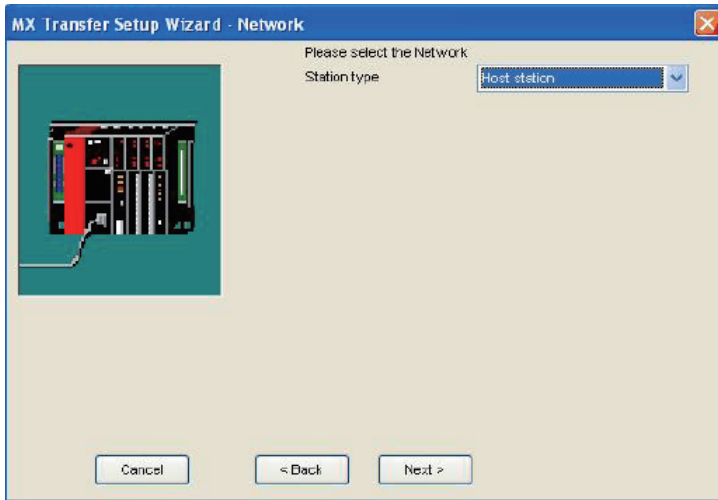
Item	Description
CPU type	<p>Specifies the CPU type of the selected device. Select a CPU type from the drop-down list.</p> <p>Process hardware, such as programmable controllers and interface modules, has specific values for the baud rate, data bits, stop bits, and parity. These properties are the language of the devices – how they communicate with each other. In order for the I/O driver to communicate with these devices, it must speak the same language. Consequently, when configuring a driver, enter and verify that the driver uses the same baud rate, data bits, stop bits, and parity that your process hardware devices use. If you specify incorrect values, you can never establish communication between driver and hardware. Refer to your hardware vendor for correct values.</p>
Transmission Speed	<p>Specifies the baud rate for the selected channel. Baud rate is a characteristic of serial communication. It indicates the number of electrical impulses (data bits) transferred to the communications line per second. For example, transmitting a raw 8-bit code at the rate of 1200 characters-per-second is expressed as 9600 baud.</p> <p>The baud rate you enter in this field must match the baud rate of the device that the driver is communicating with. The device cannot respond to requests or communicate if you enter an incorrect baud rate. Refer to your hardware documentation for the correct baud rate setting.</p> <p>The Transmission Speed field lets you select from a set of applicable baud rates:</p> <ul style="list-style-type: none"> <li>• 300</li> <li>• 600</li> <li>• 1200</li> <li>• 2400</li> <li>• 4800</li> <li>• 9600</li> <li>• 19200</li> <li>• 38400</li> <li>• 57600</li> <li>• 115200</li> </ul>



Item	Description
Control	<p>Request to Send (RTS) and Data Terminal Ready (DTR) are signals that control the flow of process data for serial communications. Your process hardware may not require these signals, but all devices on a channel must use the same RTS and DTR signal settings. The driver uses the flow control signal as follows:</p> <ul style="list-style-type: none"> <li>• RTS: Raises the RTS line high when the driver starts. The signal remains high while the driver runs.</li> <li>• DTR: Raises the DTR line high when the driver starts. The signal remains high while the driver runs.</li> </ul>
Station Number	<p>Specifies the station number (0-64 and 255) for the selected device. The station number is the number given to a PLC connected to a second tier network. This is a PLC station number on a Mitsubishi MELSEC Network, such as NetB, NetII or Net10.</p> <p>For A and Q PLCs, the setting range is 0-64 and 255. The range 0-64 can be set on the appropriate Network module's rotary switches.</p> <p>For MELSECNET/B the setting range is 0-31 where Zero is the master.</p> <p>For MELSECNET/II the setting range is 0-64 where Zero is the master.</p> <p>For MELSECNET/10 the setting range is 1-64 (master-less network).</p> <p>Notes:</p> <ul style="list-style-type: none"> <li>• A setting of 255 (FF Hex) is the default for a PLC when no network is connected.</li> <li>• Station number has no meaning for FX range of PLC's.</li> <li>• This setting is often referred to as PC number in other documentation and drivers.</li> </ul>
Network Number	<p>The Network Number (1-255) only applies to MELSECNET/10, and is the number given to a MELSECNET/10 network using the network module's rotary switches.</p>
Data Bits	<p>Specifies the number of data bits for the selected channel. Data bits are a characteristic of serial communications. The unit of data that is passed along a serial data line consists of data bits, parity, and stop bits. The data bits comprise the actual message being communicated.</p> <p>The number of data bits used for communication can differ between devices. Devices may use 7-bit, or 8-bit code. The number specified in this field must match the number of data bits used by the device that the driver communicates with or communication cannot be established. Refer to your hardware documentation for the correct data bits value. Valid entries are 7 or 8.</p>
Stop Bits	<p>Specifies the number of stop bits for the selected channel. Stop bits are a characteristic of serial communications. The unit of data that is passed along a serial data line consists of data bits, parity, and stop bits. The stop bits indicate the end of a unit of data.</p> <p>The number of stop bits varies between devices. Some devices require two stop bits while others only require one. The number specified in this field must match the number of stop bits for the device that the channel is communicating with. Refer to your hardware documentation for the correct stop bits setting. A defective stop bit generates a framing error. Valid entries are 1 or 2.</p>
Parity	<p>Specifies the selected channel's parity. Parity is a characteristic of serial communications. The unit of data that is passed along a serial data line consists of data bits, parity, and stop bits. Parity is an error-checking method for a unit of data on a serial data line. A parity bit is added to a unit of data to ensure that the unit of data conforms to the particular parity rule.</p> <p>The type of parity specified for the channel must match the parity of the device it communicates with. Refer to your hardware documentation for the correct parity setting.</p> <ul style="list-style-type: none"> <li>• None: The parity bit is not used and no parity is specified.</li> <li>• Odd: If odd parity is in effect and an even number of 1s is received, an error is detected.</li> <li>• Even: If even parity is in effect and an odd number of 1s is received, an error is detected.</li> </ul>
Sum Check	<p>Does the message type require a checksum?</p> <ul style="list-style-type: none"> <li>• None: The check sum is not used.</li> <li>• Existence: The check sum is used.</li> </ul>
Module Type	<p>Select a unit type from the drop-down list.</p>
Port Number	<p>This is the port address to be used when connecting to a MELSEC Ethernet module. Valid range is 256-65535. The Ethernet must be configured to accept connections through this port.</p>
Transmission wait time	<p>Specify a connection time out (in milliseconds).</p>
Mode	<p>Specify a mode for the selected communication module.</p>

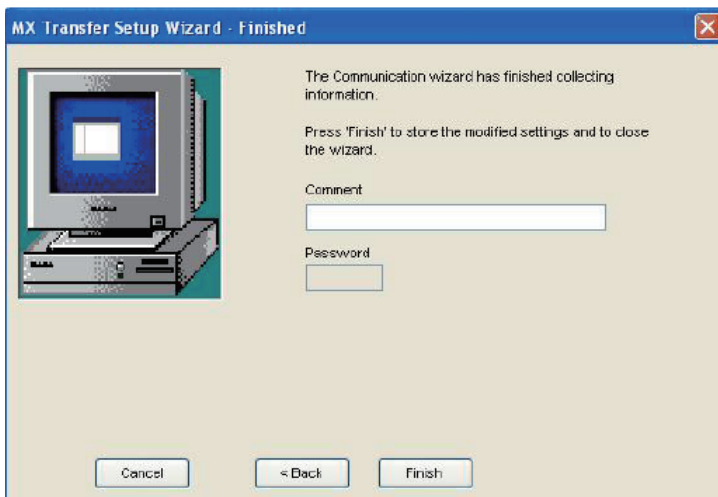
## Specifying the Network Station Type

Select the network Station Type (host or other) and CPU Type (if applicable) from the respective drop-down lists, as shown in the figure below.



### Configuring Network Settings

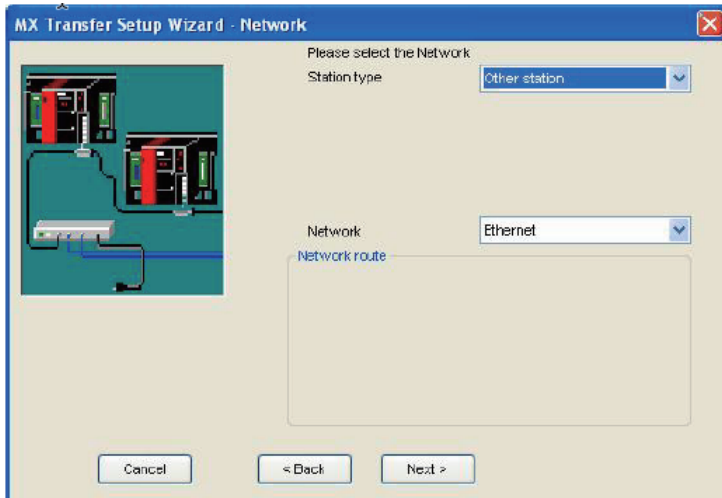
Click the Finish button to complete the communication channel setup, as shown in the figure below.



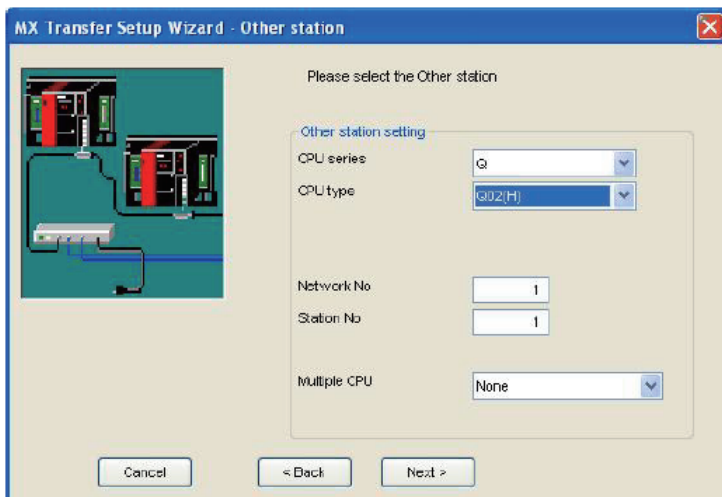
### Completing Channel Setup

## Properties for Station Type "Other Station"

If you select Other Station under network Station Type in the Communication Setting Wizard, the Other Station properties dialog appears, as shown in the figure below. Select a Station Type from the drop-down list, and specify the other parameters (which will depend on the Station Type). For some station types there may be another page of parameters. Click the Next button when you are finished. Then click the Finish button to complete the communication channel setup.



Properties for "Other" Station



Additional properties for "Other" Station type "Ethernet"

# Modem support

MX OPC Server 7.00 has MODEM configurations:

## 1. MODEM in Device Configuration Wizard:

- PC Side I/F: MODEM
- Connect Module: Q6TEL, A6TEL, FXCPU, AJ71QC24N, QJ71C24, LJ71C24

## 2. MODEM in Device Advanced Setting:

- PC Side I/F: Serial
- PLC Side I/F: CPU module or C24 module (AJ71C24, AJ71UC24, AJ71QC24N, QJ71C24, LJ71C24)
- Advanced setting in device modem: tone or pulse

PLC	Connection Type	Connection Hardware	Mitsubishi Modem	Non- Mitsubishi Modem	Results	Comments
Q06	MODEM 1	QJ71C24	○	—	—	—
Q06	MODEM 1	QJ71C24	—	○	○	Code required in the PLC
Q06	MODEM 2	QJ71C24	○	—	○	Note B
Q06	MODEM 2	QJ71C24	—	○	—	—
Q06	MODEM 2	Prog. Port	○	—	—	—
Q06	MODEM 2	Prog. Port	—	○	—	—
FX2N	MODEM 1	Prog. Port or 232BD	○	—	○	AT%ADP=3 at both ends
FX2N	MODEM 1	Prog. Port or 232BD	—	○	○	—
FX2N	MODEM 2	Prog. Port or 232BD	○	—	○	AT%ADP=3 at both ends
FX2N	MODEM 2	Prog. Port or 232BD	—	○	○	—
Q2AS	MODEM 1	Q6 TEL	○	—	○	No available settings that will work
Q2AS	MODEM 1	Q6 TEL	—	○	○	DIP switch 1 ON in Q6 TEL.
Q2AS	MODEM 1	QC24	○	—	○	AT%ADP=Q at PLC end & AT%ADP=D at PC end
Q2AS	MODEM 1	QC24	—	○	—	—
Q2AS	MODEM 2	HMI to Prog. Port	○	—	—	—
Q2AS	MODEM 2	HMI to Prog. Port	—	○	—	—
Q2AS	MODEM 2	Q6 TEL	○	—	—	—
Q2AS	MODEM 2	Q6 TEL	—	○	—	—
Q2AS	MODEM 2	QC24	○	—	—	—
Q2AS	MODEM 2	QC24	—	○	—	—
A2AS	MODEM 1	Q/A6 TEL	○	—	—	—
A2AS	MODEM 1	Q/A6 TEL	—	○	○	All DIP switches off in A/Q6 TEL
A2AS	MODEM 2	C24	○	—	○	AT%ADP=2 at PLC end & AT%ADP=0 at PC end
A2AS	MODEM 2	C24	—	○	—	—
A2AS	MODEM 2	HMI to Prog. Port	○	—	—	—
A2AS	MODEM 2	HMI to Prog. Port	—	○	—	—
A2AS	MODEM 2	Q/A6 TEL	○	—	—	—
A2AS	MODEM 2	Q/A6 TEL	—	○	—	—

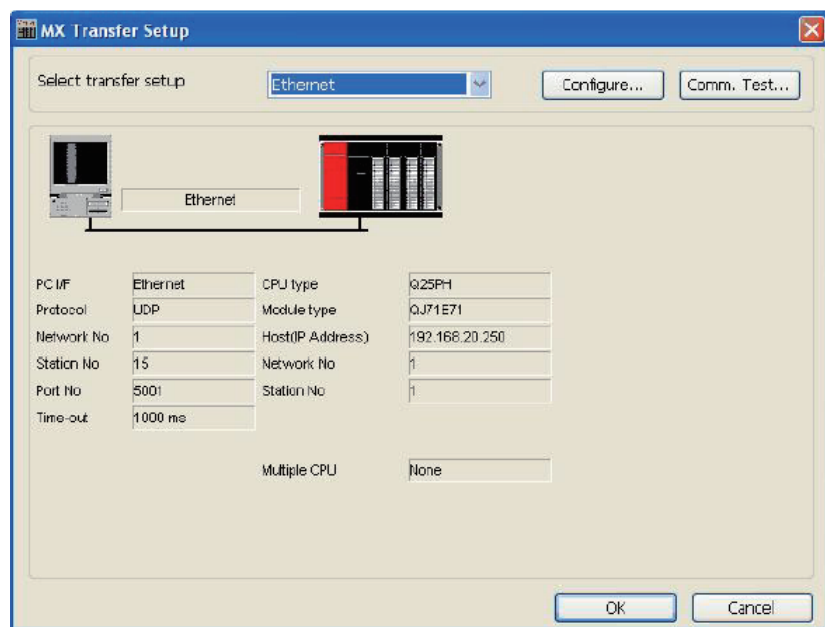
## NOTES:

- A: For all non-Mitsubishi modems it is mandatory that the setting &C1 is set and saved in the modem before it is used, e.g. AT&C1&W.
- B: All settings throughout this connection method must be 9600 Baud, no Parity, 8 data bits, 1 stop bit and checksum on. For both modems this means that AT%ADP=T,9600,8,N,1 must be set.
- C: The Q6 TEL must be configured for default settings such as the Modem initialisation string. The only way found to do this was by using features available in GX Works2 i.e. from the TOOLS menu use 'Set Tel Data' and its sub-menu.

## Transfer setup management

When new MX devices are added to the MX OPC project, the communication type (e.g. Ethernet, Serial etc.) and details (e.g. serial port number, host address etc.) must be set up so that the runtime module knows how to communicate with the device. Once you have configured the communication details for a device, it can be useful to recall them instantly without having to enter all of the details again. In MELSOFT MX OPC Server DA Configuration Tool, these transfer details are handled using the MX Transfer setup dialog.

When you configure the connections for a device, the MX Transfer setup dialog will be shown, as in the figure below.



MX Transfer setup dialog

The network architecture and settings for the selected transfer setup are displayed with graphics representing each network node. The parameters associated with a network node are shown under the graphic. The PC side connection is shown on the left, and the PLC side connection on the right.

Using this dialog, you can:

- Add new transfer setups
- Rename existing transfer setups
- Remove existing transfer setups
- Modify a transfer setup
- Select a transfer setup to be used for the device
- Test the communication with a selected transfer setup

The controls on this dialog are:

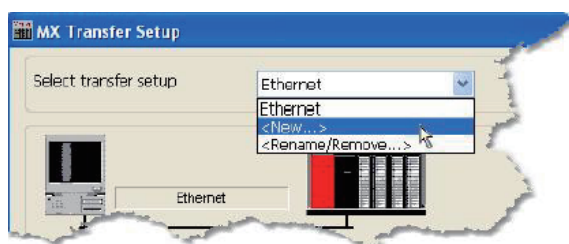
Item	Description
Select transfer setup	This list contains the previously configured transfer setups, along with the entries: <ul style="list-style-type: none"> <li>• &lt;New...&gt; - select this to show the New Setup dialog, to create a new transfer setup definition.</li> <li>• &lt;Rename/Remove...&gt; - select this to rename or delete other entries in the list.</li> </ul>
Configure	If an existing transfer setup is selected in the Select transfer setup list, the Communication Setting Wizard is shown to modify it. If <New...> is selected, the New Setup dialog is displayed.
Comm. test	Attempt a connection to the device using the selected transfer setup details, and confirm whether or not the connection was successful.
OK	Accept the changes and continue
Cancel	Exit to the previous screen

You can also double-click on a network node graphic or on the properties to edit the properties for that node in the Communication Setting Wizard.

The transfer setup details are stored in the local configuration database. If you have moved the configuration database from one computer to another, the connection details for a named transfer setup may be different from those stored locally. If this happens, you may be prompted to overwrite the local settings when you first edit the device on the new computer. If there is not enough space to store the new settings, you will be prompted to select another transfer setup to overwrite.

## Creating new transfer setups

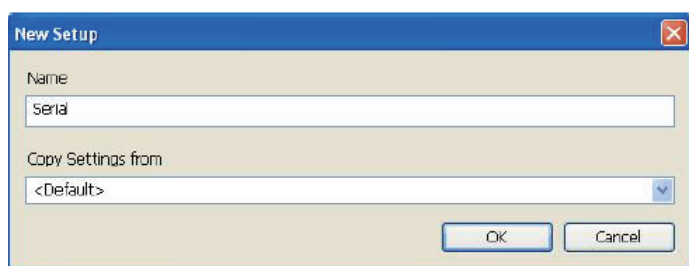
To create a new transfer setup, select <New...> from the Select transfer setup list, as shown in the picture below:



**Creating a new transfer setup**

Note: A maximum of 32 different transfer setups can be stored. If this number is exceeded, an error message will be shown, and you will need to either delete one of the existing transfer setups to make space for the new one, or modify another existing setup instead.

You will be prompted for the name of the new transfer setup, and given the option to copy its settings from another transfer setup. To use default settings, select <Default>, as in the example figure below:

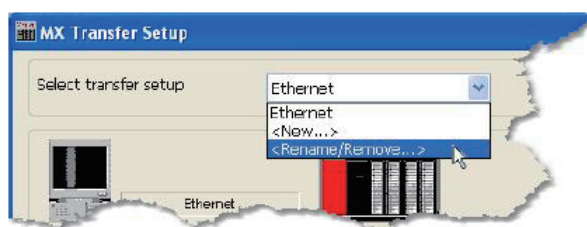


**New transfer setup**

After you click OK, the Communication Setting Wizard will be shown to edit the details of the new connection.

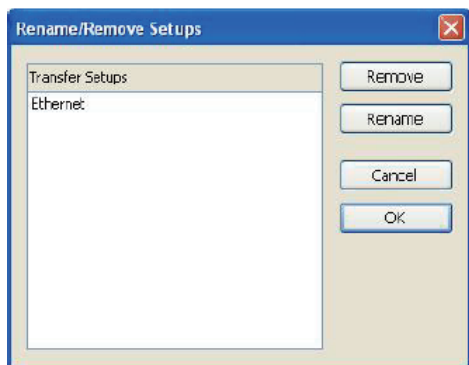
## Renaming/removing transfer setups

To rename or remove an existing transfer setup, select <Rename/Remove...> from the Select transfer setup list, as shown in the picture below:



**Renaming or removing an existing transfer setup**

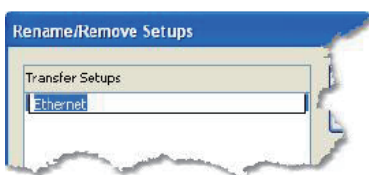
A list of existing transfer setups will appear:



**Rename/remove transfer setups dialog**

The controls on this dialog are:

- Remove: Delete the selected transfer setup from the list. You will not be prompted to confirm this, but if you accidentally delete the wrong entry pressing Cancel will undo the change.
- Rename: Change the name of the selected entry. Modify the name in-place (as in the picture below) then press Enter. You can also rename an item by double-clicking on it in the list.

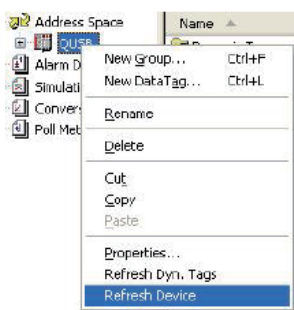


**Renaming a transfer setup**

- Cancel: Exit without saving the changes.
- OK: Save changes and close the dialog.

## Refresh device

To refresh a device, select 'Refresh Device' from the device context menu.



**Refresh device menu**

This will reset ('refresh') the device and start communication again.

Any tags monitored on the device may lose their values until the connection is re-established and they have been read again.

## 3.4 Data Tags

Data tags represent an OPC data item, a register in the device or a range of registers.

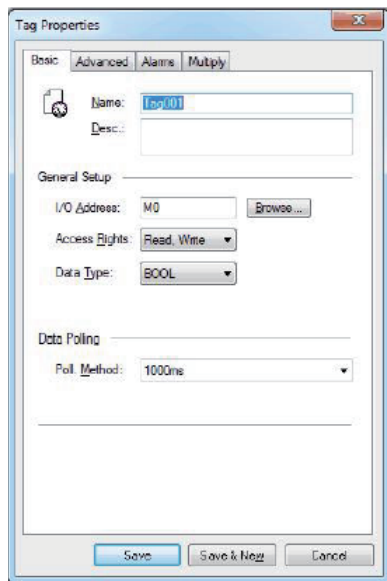
A symbolic name and description is associated with each tag. An OPC client can obtain the tag description.

### Basic MX data tag properties

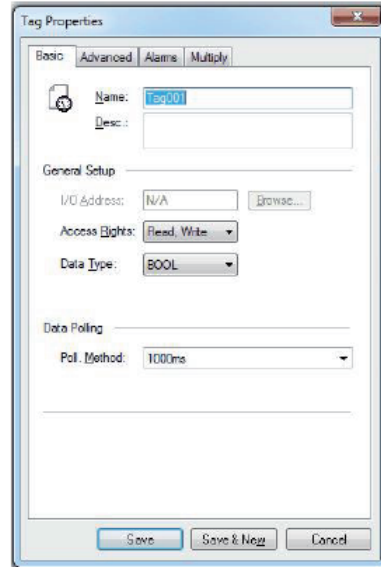
The examples below show the Basic Tab of the MX Tag Properties dialog for a tag in an MX Device and an MX Device (ver. 2).

Tags in an MX Device (ver. 2) do not use the I/O Address field.

Up to 10000 data tags can be created for one MX Device.



Tag in MX Device: Basic Tab



Tag in MX Device (ver. 2): Basic Tab

The following settings can be configured:

- **Name:** Enter a logical name for the data item. In an MX Device (ver. 2) this must exactly match the label name in GX Works3, and the label name must have been configured with the 'Allow external access' checkbox enabled. The tag name must be no more than 34 characters in an MX Device, or 255 characters in an MX Device (ver. 2).
- **Description:** Allows you to enter text about the tag. Entries in this field can be very helpful when you go back to look at old configuration or report files, or when you need to modify an existing configuration. The more detailed and specific the information you enter in this field, the easier it is to identify the tag. The description can be up to 128 alphanumeric characters and symbols.
- **I/O Address:** Indicates the data starting address - not used for tags in an MX Device (ver. 2). This may be edited to access a bit within a word for certain register types. For example, if you enter the address 'D100.0' the Data Type will automatically change to BOOL and the tag will reference bit 0 within the word at address D100. The bit numbers are always entered in decimal.

Use the Browse button to see a list of supported device types and maximum ranges for your hardware. There will be an additional BIT entry in this list for word registers that support access to bits within a word.

Note: You can also read bit values from a word by using the 'dot' notation when defining the item in the client. For more information, see Accessing bits.

Label addresses in the GV: range (label area) are assigned automatically by the compiler and could be moved at any time, so they cannot be entered manually in an MX Device (ver. 1). Instead, use an MX Device (ver. 2) to access this address range.

- **Access Rights:** Enables/disables Read, Write, or Read/Write operations.

Note: If a tag is defined with only "Write" access, its value will appear as "?" in the monitor view, and it will not be possible to read the tag's value from any other application.

Note: Some devices (such as the SA\\* safety registers) are always read only, so when they are used Write and Read/Write will not be available.



- **Data Type:** Specifies which type of data the tag will expose to OPC clients.

Data Type	Description
INT	Signed 16-bit integer.
UINT, WORD	Unsigned 16-bit integer.
REAL	32-bit floating point (IEEE).
LREAL	64-bit floating point (IEEE).
BOOL	Digital, one bit.
UDINT, DWORD	Unsigned 32-bit integer.
DINT	Signed 32-bit integer.
COUNTER	Signed 16-bit integer (Counter).
TIMER	Signed 16-bit integer (Timer).
RTIMER	Signed 16-bit integer (Retentive timer).
UTIMER	Unsigned 16-bit integer (Unsigned timer).
UCOUNTER	Unsigned 16-bit integer (Unsigned counter).
URTIMER	Unsigned 16-bit integer (Unsigned retentive timer).
LTIMER	Unsigned 32-bit integer (Long timer).
LCOUNTER	Unsigned 32-bit integer (Long counter).
LRTIMER	Unsigned 32-bit integer (Long retentive timer).

The available types will depend on the I/O address and the PLC series. For example, timers can only be used in address ranges such as 'TN', and later PLC series such as MELSEC iQ-R do not use signed timers.

To use other types (e.g. STRING, WSTRING and ARRAY types), the data type must be selected in the Advanced tag properties.

The data types available for use in the PLC programming software will vary depending on the PLC series and the software version.

In an MX Device (ver. 2), tags that were defined in GX Works3 with a native timer/counter type must be entered with the same native data type. The tag cannot be read using an equivalent integer type such as UINT, INT or DINT.

The following devices, data types and ranges are supported:

Note: The device ranges listed in the table below are the maximum ranges possible on any PLC. The actual range supported depends on the type of PLC used and the configuration (as ranges can often be resized in the PLC using the programming software). The Browse button next to the I/O Address field can be used to view the typical maximum supported ranges for your hardware.

Device	Device	Data Type	Device Range	Size Bits
Link relay	B	BOOL	0-EFFFh	1
Counter coil	CC	BOOL	0-32767	1
Counter Present value	CN	WORD, UINT, INT, COUNTER/UCOUNTER	0-32767	16
Counter Contact	CS	BOOL	0-32767	1
Data register	D	DWORD, WORD, UDINT, UINT, DINT, INT, REAL, LREAL, STRING, WSTRING, BOOL	0-4910079	16
GOT register	EG	DWORD, WORD, UDINT, UINT, DINT, INT, REAL, LREAL	0-32767	16
Annunciator	F	BOOL	0-32767	1
Free run timer	FT	DWORD, UDINT, DINT	—	32
Global label	GV:	DWORD, WORD, UDINT, UINT, DINT, INT, REAL, LREAL, STRING, WSTRING, BOOL	800h-5A5FFFh	32
Latch relay	L	BOOL	0-32767	1
Long counter coil	LCC	BOOL	0-2784543	1
Long counter current value	LCN	DWORD, UDINT, DINT, REAL, LREAL, LCOUNTER	0-2784543	32
Long counter contact	LCS	BOOL	0-2784543	1
Long retentive timer coil	LSTC	BOOL	0-1479295	1
Long retentive timer current value	LSTN	DWORD, UDINT, DINT, REAL, LREAL, LRTIMER	0-1479295	32
Long retentive timer contact	LSTS	BOOL	0-1479295	1
Long timer coil	LTC	BOOL	0-1479295	1
Long timer current value	LTN	DWORD, UDINT, DINT, REAL, LREAL, LTIMER	0-1479295	32

Device	Device	Data Type	Device Range	Size Bits
Long timer contact	LTS	BOOL	0-1479295	1
Internal relay	M	BOOL	0-61439	1
Motion device	#	WORD	0-12287	16
File register	R	DWORD, WORD, UDINT, UINT, DINT, INT, REAL, LREAL, STRING, WSTRING, BOOL	0-32767	16
Safety link relay	SAIB	BOOL	0h-9BFFFh	1
Safety counter contact	SAICC	BOOL	0-35487	1
Safety counter current value	SAICN	WORD, UINT, INT	0-35487	16
Safety counter coil	SAICS	BOOL	0-35487	1
Safety data register	SAID	WORD, UINT, INT, DWORD, UDINT, DINT, REAL, LREAL, STRING, WSTRING, BOOL	0-39935	16
Safety internal relay	SAIM	BOOL	0-638975	1
Safety special register	SAISD	WORD, UINT, INT, DWORD, UDINT, DINT, REAL, LREAL, STRING, WSTRING	0-4095	16
Safety special relay	SAISM	BOOL	0-4095	1
Safety retentive timer coil	SAISTC	BOOL	0-35487	1
Safety retentive timer current value	SAISTN	WORD, UINT, INT	0-35487	16
Safety retentive timer contact	SAISTS	BOOL	0-35487	1
Safety timer coil	SAITC	BOOL	0-35487	1
Safety timer current value	SAITN	WORD, UINT, INT	0-35487	16
Safety timer contact	SAITS	BOOL	0-35487	1
Safety link register	SAIW	WORD, UINT, INT, DWORD, UDINT, DINT, REAL, LREAL, STRING, WSTRING	0h-9BFFFh	16
Safety input relay	SAIX	BOOL	0h-1FFFFh	1
Safety output relay	SAIY	BOOL	0h-1FFFFh	1
Link special relay	SB	BOOL	0-7FFFh	1
Special register	SD	DWORD, WORD, UDINT, UINT, DINT, INT, REAL, LREAL, STRING, WSTRING	0-2255	16
Special relay	SM	BOOL	0-2255	1
Retentive Timer Coil	STC	BOOL	0-32767	1
Retentive Timer Present value	STN	WORD, UINT, INT, RTIMER/URTIMER	0-32767	16
Retentive Timer Contact	STS	BOOL	0-32767	1
Link special register	SW	DWORD, WORD, UDINT, UINT, DINT, INT, REAL, LREAL, STRING, WSTRING	0-7FFFh	16
Timer Coil	TC	BOOL	0-32767	1
Timer Present value	TN	WORD, UINT, INT, TIMER/UTIMER	0-32767	16
Timer Contact	TS	BOOL	0-32767	1
Shared device	U3En\G	BOOL, DWORD, WORD, UDINT, UINT, DINT, INT, REAL, LREAL, STRING, WSTRING	10000-24335	16
Link register	W	DWORD, WORD, UDINT, UINT, DINT, INT, REAL, LREAL, STRING, WSTRING	0-49FFFFh	16
CC-Link input register	WR	DWORD, WORD, UDINT, UINT, DINT, INT, REAL, LREAL	0-255	16
CC-Link output register	WW	DWORD, WORD, UDINT, UINT, DINT, INT, REAL, LREAL	0-255	16
Input relay	X	BOOL	0-1FFFFh	1
Output relay	Y	BOOL	0-1FFFFh	1
File register	ZR	DWORD, WORD, UDINT, UINT, DINT, INT, REAL, LREAL, STRING, WSTRING, BOOL	0-16777215	16

- Polling Method: Select a polling method from the drop-down list, which lists all polling methods configured in the Polling Method Definitions tree control of the Configurator.
- Save: Saves all changes specified in the properties dialog box. The data tag appears in the list view for the selected device.
- Save & New: Saves all changes specified in the properties dialog box and immediately starts configuration of a new data tag.
- Cancel: Closes the properties dialog box.

## Addressing

Note: Addresses are handled automatically in MX Device (ver. 2), and not displayed in MELSOFT MX OPC Server DA Configuration Tool.

ER:MemoryBlock:Address – Where the memory block is between addresses 1-256, the MELSOFT MX OPC Server DA Configuration Tool will address ER linear in a decimal format.

Note: ZR registers must be addressed in a decimal format.

- Address Ranges

The address ranges available will depend on the PLC type and the hardware parameters that have been configured. For details of the addresses, refer to the hardware manual. To check the maximum possible addresses for a new data tag, use the Browse button in the Basic MX Data Tag Properties page.

- Starting Address

Specifies the location in the device where the selected data block begins.

- Valid Data Block Registers

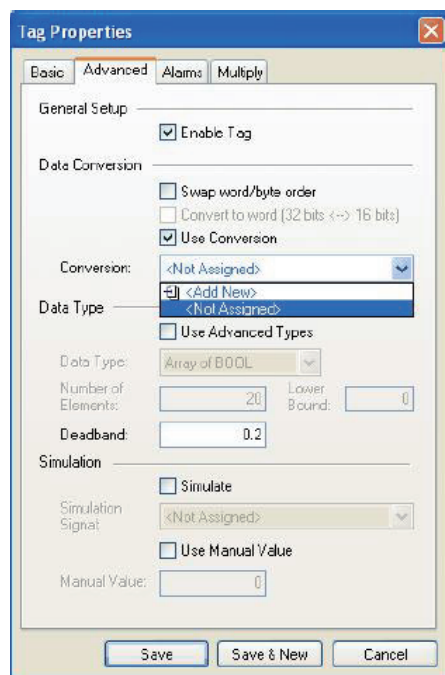
B, CC, CN, CS, D, ER, F, FT, GV:, L, LCC, LCN, LCS, LTC, LTN, LTS, LSTC, LSTN, LSTS, M, R, SA\B, SA\CC, SA\CN, SA\CS, SA\D, SA\M, SA\SD, SA\SM, SA\STC, SA\STN, SA\STS, SA\TC, SA\TN, SA\TS, SA\W, SA\X, SA\Y, SB, SD, SM, SW, STC, STN, STS, TC, TN, TS, U3En\G, W, WR, WW, X, Y, Z, ZR, #

- Ending Address

Specifies the location in the device where the selected data block ends.

## Advanced MX data tag properties

In the Advanced tab of the Tag Properties dialog box, shown below, configure the following settings:



**MX Data Tag Properties: Advanced Tab**

To modify a tag, the tag must first be enabled by checking the Enable Tag check box. Once the tag is enabled, all configuration fields can be modified.

- Save: Saves all changes specified in the properties dialog box. The data tag appears in the list view for the selected device.
- Save & New: Saves all changes specified in the properties dialog box and immediately starts configuration of a new data tag.
- Cancel: Closes the properties dialog box.

## Data Conversions

To get the data value converted to another form, choose one of the predefined or user-defined conversions. MX OPC Server includes the following conversions:

### 1. Swap word/byte order

- WORD conversion B1/B2  $\Leftrightarrow$  B2/B1
- DWORD conversion B1/B2 B3/B4  $\Leftrightarrow$  B4/B3 B2/B1

### 2. Convert to Word (32bits $\Leftrightarrow$ 16bits)

If an OPC client requests a VT\_I4 (DINT), where the tag is defined in the MELSOFT MX OPC Server DA Configuration Tool as a VT\_I2 (INT), the MX OPC Server will reduce it to VT\_I2 when writing and expand it to VT\_I4 when reading. The sign of the data will be taken into account.

### 3. Use Conversion

To select a conversion definition, check the Use Conversion check box and then select a conversion definition from the drop-down list, which lists all conversion definitions configured in the Conversion Definitions tree control of the Configurator.

## Data Types

Checking the Use Advanced Types check box enables the fields under the Data Types section. The Data Type field specifies which type of data the tag will expose to OPC clients.

Data Type	Description
STRING	Text stored internally as a 16-bit integer (ASCII, 2 x 8-bit characters per word).
WSTRING	Text stored internally as a 16-bit integer (UNICODE, 1 x 16-bit character per word).
Array of INT	Array of signed 16-bit integers.
Array of UINT, Array of WORD	Array of unsigned 16-bit integer.
Array of REAL	Array of 32-bit floating point (IEEE).
Array of LREAL	Array of 64-bit floating point (IEEE).
Array of BOOL	Array of digital (bit) values.
Array of UDINT, Array of DWORD	Array of unsigned 32-bit integers.
Array of DINT	Array of signed 32-bit integers.

To use other types (e.g. non-array types), uncheck Use Advanced Types and change the type in the Basic tag properties 214. The following devices, data types and ranges are supported:

Note: The device ranges listed in the table below are the maximum ranges possible on any PLC. The actual range supported depends on the type of PLC used and the configuration (as ranges can often be resized in the PLC using the programming software). The Browse button next to the I/O Address field on the Basic tab can be used to view the maximum supported ranges for your hardware.

Device	Device	Data Type	Device Range	Size Bits
Link relay	B	BOOL	0-EFFFh	1
Counter coil	CC	BOOL	0-32767	1
Counter Present value	CN	WORD, UINT, INT, COUNTER/UCOUNTER	0-32767	16
Counter Contact	CS	BOOL	0-32767	1
Data register	D	DWORD, WORD, UDINT, UINT, DINT, INT, REAL, LREAL, STRING, WSTRING, BOOL	0-4910079	16
GOT register	EG	DWORD, WORD, UDINT, UINT, DINT, INT, REAL, LREAL	0-32767	16
Annunciator	F	BOOL	0-32767	1
Free run timer	FT	DWORD, UDINT, DINT	—	32
Global label	GV:	DWORD, WORD, UDINT, UINT, DINT, INT, REAL, LREAL, STRING, WSTRING, BOOL	800h-5A5FFFh	32
Latch relay	L	BOOL	0-32767	1
Long counter coil	LCC	BOOL	0-2784543	1
Long counter current value	LCN	DWORD, UDINT, DINT, REAL, LREAL, LCOUNTER	0-2784543	32
Long counter contact	LCS	BOOL	0-2784543	1
Long retentive timer coil	LSTC	BOOL	0-1479295	1

Device	Device	Data Type	Device Range	Size Bits
Long retentive timer current value	LSTN	DWORD, UDINT, DINT, REAL, LREAL, LRTIMER	0-1479295	32
Long retentive timer contact	LSTS	BOOL	0-1479295	1
Long timer coil	LTC	BOOL	0-1479295	1
Long timer current value	LTN	DWORD, UDINT, DINT, REAL, LREAL, LTIMER	0-1479295	32
Long timer contact	LTS	BOOL	0-1479295	1
Internal relay	M	BOOL	0-61439	1
Motion device	#	WORD	0-12287	16
File register	R	DWORD, WORD, UDINT, UINT, DINT, INT, REAL, LREAL, STRING, WSTRING, BOOL	0-32767	16
Safety link relay	SA\B	BOOL	0h-9BFFFh	1
Safety counter contact	SA\CC	BOOL	0-35487	1
Safety counter current value	SA\CN	WORD, UINT, INT	0-35487	16
Safety counter coil	SA\CS	BOOL	0-35487	1
Safety data register	SAID	WORD, UINT, INT, DWORD, UDINT, DINT, REAL, LREAL, STRING, WSTRING, BOOL	0-39935	16
Safety internal relay	SAIM	BOOL	0-638975	1
Safety special register	SA\SD	WORD, UINT, INT, DWORD, UDINT, DINT, REAL, LREAL, STRING, WSTRING	0-4095	16
Safety special relay	SA\SM	BOOL	0-4095	1
Safety retentive timer coil	SA\STC	BOOL	0-35487	1
Safety retentive timer current value	SA\STN	WORD, UINT, INT	0-35487	16
Safety retentive timer contact	SA\STS	BOOL	0-35487	1
Safety timer coil	SA\TC	BOOL	0-35487	1
Safety timer current value	SA\TN	WORD, UINT, INT	0-35487	16
Safety timer contact	SA\TS	BOOL	0-35487	1
Safety link register	SA\W	WORD, UINT, INT, DWORD, UDINT, DINT, REAL, LREAL, STRING, WSTRING	0h-9BFFFh	16
Safety input relay	SA\X	BOOL	0h-1FFFFh	1
Safety output relay	SA\Y	BOOL	0h-1FFFFh	1
Link special relay	SB	BOOL	0-7FFFh	1
Special register	SD	DWORD, WORD, UDINT, UINT, DINT, INT, REAL, LREAL, STRING, WSTRING	0-2255	16
Special relay	SM	BOOL	0-2255	1
Retentive Timer Coil	STC	BOOL	0-32767	1
Retentive Timer Present value	STN	WORD, UINT, INT, RTIMER/URTIMER	0-32767	16
Retentive Timer Contact	STS	BOOL	0-32767	1
Link special register	SW	DWORD, WORD, UDINT, UINT, DINT, INT, REAL, LREAL, STRING, WSTRING	0-7FFFh	16
Timer Coil	TC	BOOL	0-32767	1
Timer Present value	TN	WORD, UINT, INT, TIMER/UTIMER	0-32767	16
Timer Contact	TS	BOOL	0-32767	1
Shared device	U3En\G	BOOL, DWORD, WORD, UDINT, UINT, DINT, INT, REAL, LREAL, STRING, WSTRING	10000-24335	16
Link register	W	DWORD, WORD, UDINT, UINT, DINT, INT, REAL, LREAL, STRING, WSTRING	0-49FFFFh	16
CC-Link input register	WR	DWORD, WORD, UDINT, UINT, DINT, INT, REAL, LREAL	0-255	16
CC-Link output register	WW	DWORD, WORD, UDINT, UINT, DINT, INT, REAL, LREAL	0-255	16
Input relay	X	BOOL	0-1FFFFh	1
Output relay	Y	BOOL	0-1FFFFh	1
File register	ZR	DWORD, WORD, UDINT, UINT, DINT, INT, REAL, LREAL, STRING, WSTRING, BOOL	0-16777215	16

## Deadband

The Deadband feature is added to the tag properties and is enabled only for REAL / LREAL tags. It specifies the maximum acceptable data fluctuation in an exception-based tag. Entering a Deadband value prevents the tag's current value from changing when there is only a slight fluctuation in data.

Example:

Suppose the current value of a tag is 50.0 and you set a deadband of 20.0. MX OPC Server updates the exception-based tag when incoming values are less than or equal to 30.0 or greater than or equal to 70.

## Simulation

To test the client functionality, check the Simulate check box and then choose a Simulation Signal from the drop-down list. Checking the Use Manual Value check box enables the fields under the Manual Value section. The Manual Value field specifies with which value the simulated tag will be initialized.

## MX tag properties: Alarms

In the Alarms tab of the Tag Properties dialog box, shown below, you can check the Generate Alarms check box to make the server generate a limit alarm and/or a digital alarm based on the data item value. The Message Prefix parameter is the text of the message for this data item; it will be followed by the text configured for a particular alarm type. The second part of the alarm message will contain the Message Body string (see Alarm Definitions). The server allows having any number of Alarm Definitions (templates) predefined. You can then combine one of them with the specific tags.

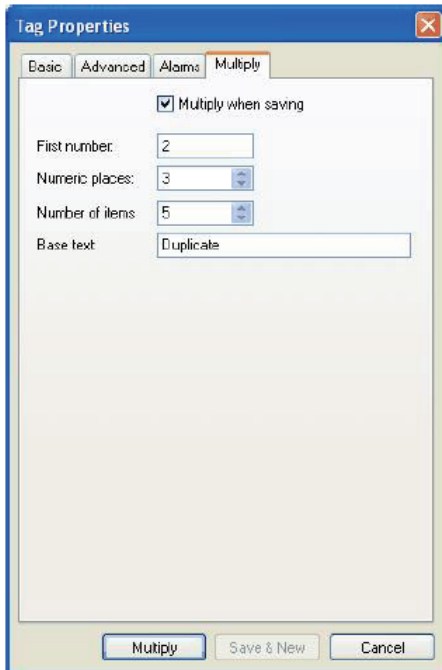
- Digital Alarm: Select a Digital Alarm Definition from the drop-down list.
- Limit Alarm: Select a Limit Alarm Definition from the drop-down list.
- Save: Saves all changes specified in the properties dialog box. The data tag appears in the list view for the selected device.
- Save & New: Saves all changes specified in the properties dialog box and immediately starts configuration of a new data tag.
- Cancel: Closes the properties dialog box.



MX Data Tag Properties: Alarms Tab

## Multiply pages on Tag dialogs

This feature is available from the MX Tag property sheets, and can be used to add many tags at the same time. It replaced the 'Multiply' item on the main menu and pop-up menus in earlier versions of MX OPC server. The following screenshots show the Multiply tab on the Tag property sheets.



The Multiply when saving checkbox changes the text on the Save button to "Multiply" and disables the Save & New button. When the user now clicks the Multiply button, the tag is saved and multiplied.

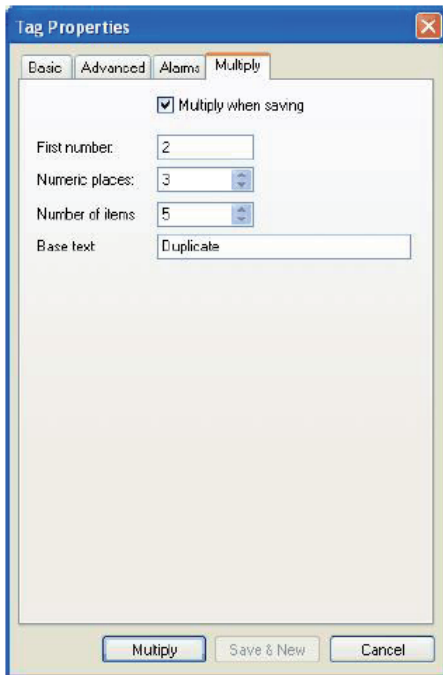
All the items on this property page (except the Multiply when saving checkbox) are enabled if and only if the Multiply when saving checkbox is checked.

The new tags will be created with addresses immediately following the existing tag [except in MX Device (ver. 2) where the address is not used], and with other details (such as data type) unchanged. The name is formed from the base text followed by an incrementing number. The fields are:

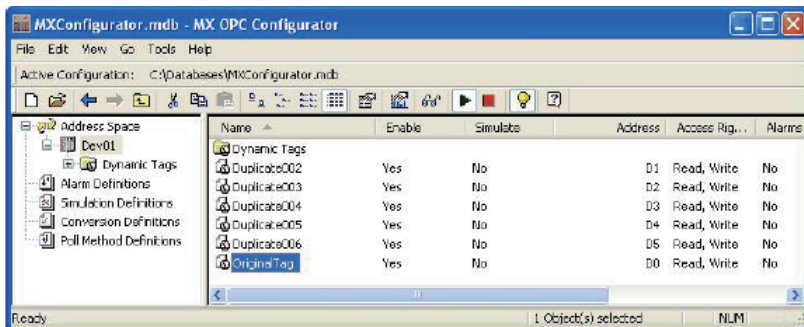
- First number - the value to be used for the number part of the first tag
- Numeric places - the number of digits to add in the number. For example, if you will be creating 10000 tags with the same base text, using 5 numeric places will ensure that the numbers are sorted as expected in the list.
- Number of items - the number of new tags to create (in addition to the original tag which is being saved).
- Base text - the text used for the start of the new tag names.

### Example

Let's assume the user has an MX device in his configuration with no items. Then he adds a new item, names it "OriginalTag", configures it, but before he closes the window with the "Save" button, he changes to the Multiply tab and sets it up as on the next screenshot:



Now, when he pushes "Multiply", the tag is saved and five duplicates created.



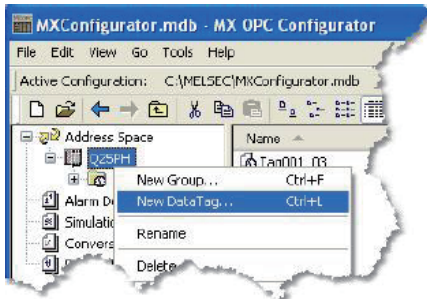


## Adding a new MX data tag

To add a new data tag:

### Operating procedure

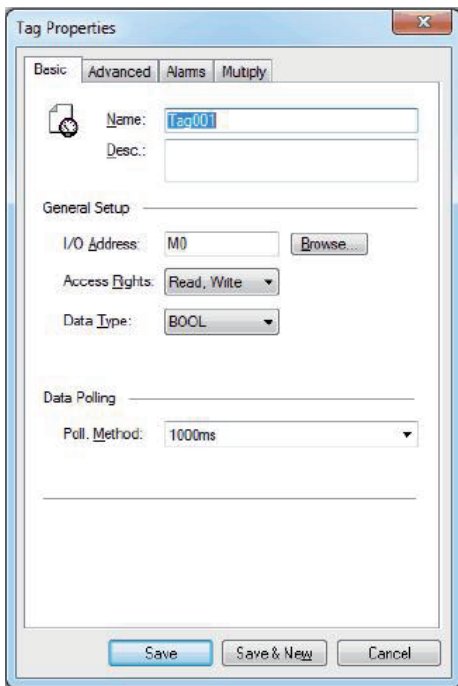
1. Right-click a device on the tree control of the Configurator screen and select New Data Tag from the pop-up menu, as shown in the figure below.



Adding a New MX Data Tag

2. The Basic tab of the Data Tag Properties dialog box appears, as shown in the figure below.

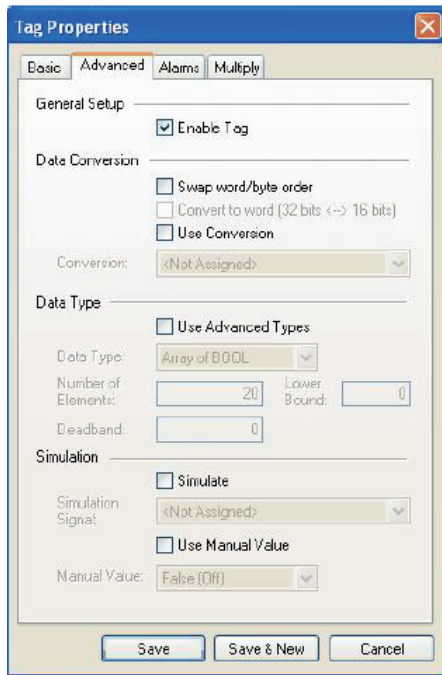
Note: For a tag in an MX Device (ver. 2), the I/O Address will not be available.



Configuring MX Data Tag Properties

3. In the Name field, type a name for the new tag, and type a description for the tag (optional).
4. Set the parameters for the I/O Address (except for tags in an MX Device (ver. 2)) and data Access Rights.

5. Click on the Advanced tab. Check the Enable Tag check box to activate the tag.



**MX Data Tag Properties: Advanced Tab**

6. Set the Data Conversion and Data Type parameters for the tag.
7. In the Alarms tab of the Tag Properties dialog box, you can check the Generate Alarms check box to make the server generate a limit alarm and/or a digital alarm based on the data item value.
8. When you have finished configuring the tag properties, click the Save button. The new tag appears under the device tree control.

## Basic Modbus data tag properties

In the Basic tab of the Tag Properties dialog box, shown below, configure the following settings.

**Basic Modbus tag properties**

- **Name:** Enter a logical name for the data item.
- **Description:** Allows you to enter text about the tag. Entries in this field can be very helpful when you go back to look at old configuration or report files, or when you need to modify an existing configuration. The more detailed and specific the information you enter in this field, the easier it is to identify the tag. The description can be up to 50 alphanumeric characters and symbols.
- **Location type:** Location type is a type of a register in the device. The register types are read as Input (1 bit long) or Input Register (16 bits), or written to as Coil (1 bit) or Holding Register (16 bits). The table below explains the name conventions used:

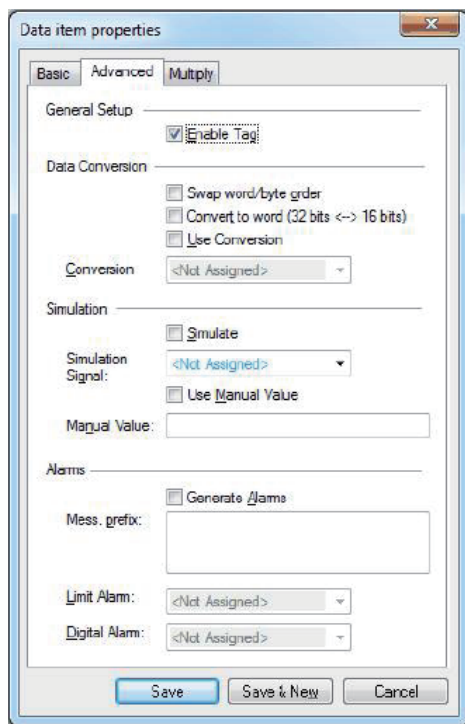
Bit	Read Only	Read / Write
1 bit	Input	Coil
16 bit	Input Register	Holding Register

When the Location type is set as Input or Coil, the only possible Modbus Type is BOOL, Bit Field is off and disabled.

- **Modbus type:** Allows you to choose how the location type (device data) will be understood as Modbus type (OPC data type). Modbus data type also depends on the Location type selected.
- **Data Length (chars):** String length in characters, enabled only when Modbus type is set to STRING or WSTRING
- **Starting address:** Specifies the data item address (register number) in the device data space.
- **Array:** Whether to handle this data item as a vector of values. When Modbus type is set to BOOL, STRING or WSTRING, it is disabled and off.
- **Number of elements:** How many items the vector comprises of. Only enabled when Array checked.
- **Bit field:** It is possible to extract bits from the register and use them as a Boolean or integer value (this functionality is read-only). Enabled only for the BOOL, UDINT and UINT Modbus Types when Location Type is set to Input Register or Holding Register.
- **Bit num:** The Boolean bit field starts at this bit position. Enabled only when Bit Field checked.
- **Count:** The length of the bit field. Enabled only when Bit Field checked.

## Advanced Modbus data tag properties

In the Advanced tab of the Tag Properties dialog box, shown below, configure the following settings:



**Advanced Modbus tag properties**

To modify a tag, the tag must first be enabled by checking the Enable Tag check box. Once the tag is enabled, all configuration fields can be modified.

- Save: Saves all changes specified in the properties dialog box. The data tag appears in the list view for the selected device.
- Save & New: Saves all changes specified in the properties dialog box and immediately starts configuration of a new data tag.
- Cancel: Closes the properties dialog box.

### Data Conversions

To get the data value converted to another form, choose one of the predefined or user-defined conversions. MX OPC Server includes the following conversions:

1. Swap word/byte order
  - WORD conversion B1/B2  $\Leftrightarrow$  B2/B1
  - DWORD conversion B1/B2 B3/B4  $\Leftrightarrow$  B4/B3 B2/B1

2. Convert to Word (32bits  $\Leftrightarrow$  16bits)

If an OPC client requests a VT\_I4 (DINT), where the tag is defined in the MELSOFT MX OPC Server DA Configuration Tool as a VT\_I2 (INT), the MX OPC Server will reduce it to VT\_I2 when writing and expand it to VT\_I4 when MELSOFT MX OPC Server DA Configuration Tool reading. The sign of the data will be taken into account.

3. Use Conversion

To select a conversion definition, check the Use Conversion check box and then select a conversion definition from the drop-down list, which lists all conversion definitions configured in the Conversion Definitions tree control of the Configurator.

### Simulation

To test the client functionality, check the Simulate check box and then choose a Simulation Signal from the drop-down list. Checking the Use Manual Value check box enables the fields under the Manual Value section. The Manual Value field specifies with which value the simulated tag will be initialized. A warning will be shown if the value is not suitable for the tags data type.

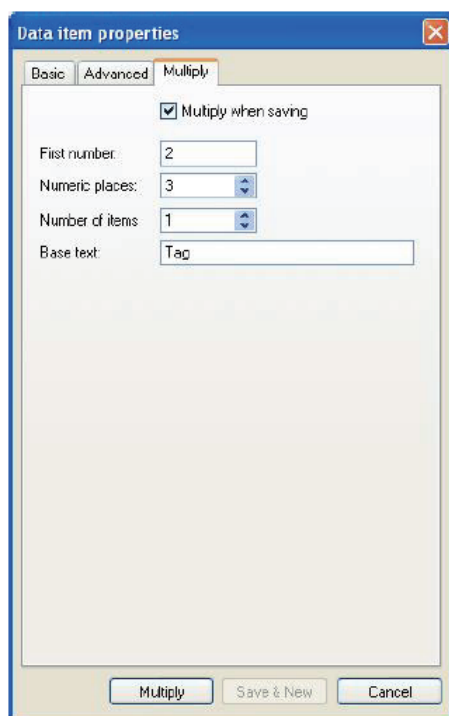
## Alarms

To test the client functionality, check the Simulate check box and then choose a Simulation Signal from the drop-down list.

- **Generate Alarms:** Check the Generate Alarms check box to make the server generate alarms based on the data item value. When Modbus type is set to STRING/WSTRING, it is disabled and off.
- **Mess. Prefix:** The Message Prefix parameter is the text of the message for this data item; it will be followed by the text configured for a particular alarm type. The second part of the alarm message will contain the Message Body string from the alarm definition. Enabled only when Generate alarms checked.
- **Limit Alarm:** Choose one of the previously defined limit alarms or create a new one. Enabled only when Generate alarms checked and Modbus type is not set to BOOL.
- **Limit Alarm:** Choose one of the previously defined digital alarms or create a new one. Enabled only when Generate alarms checked and Modbus type is set to BOOL.

## Multiply pages on Modbus Tags

This feature is available from the Modbus Tag property sheets, and can be used to add many tags at the same time. It replaces the 'Multiply' item on the main menu and pop-up menus in earlier versions of MX OPC Server. The screen below shows the Multiply tab on the Tag property sheet.



**Data item properties dialog**

The Multiply when saving checkbox changes the text on the Save button to "Multiply" and disables the Save & New button. When the user now clicks the Multiply button, the tag is saved and multiplied.

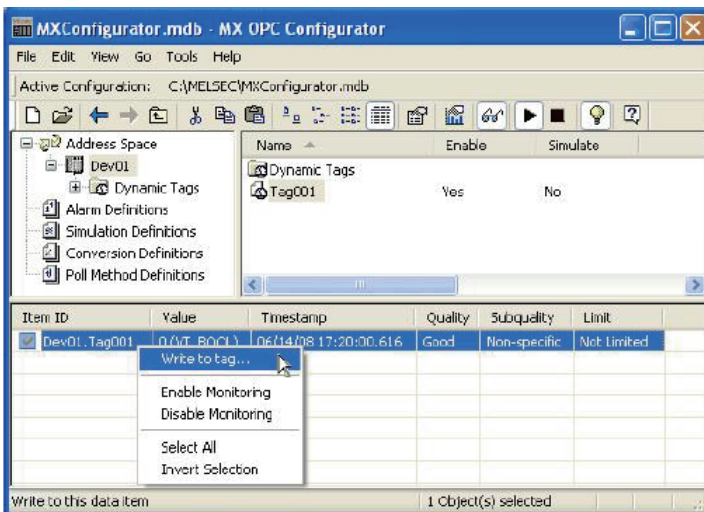
All the items on this property page (except the Multiply when saving checkbox) are enabled if and only if the Multiply when saving checkbox is checked.

The new tags will be created with addresses immediately following the existing tag, and with other details (such as data type) unchanged. The name is formed from the base text followed by an incrementing number. The fields are:

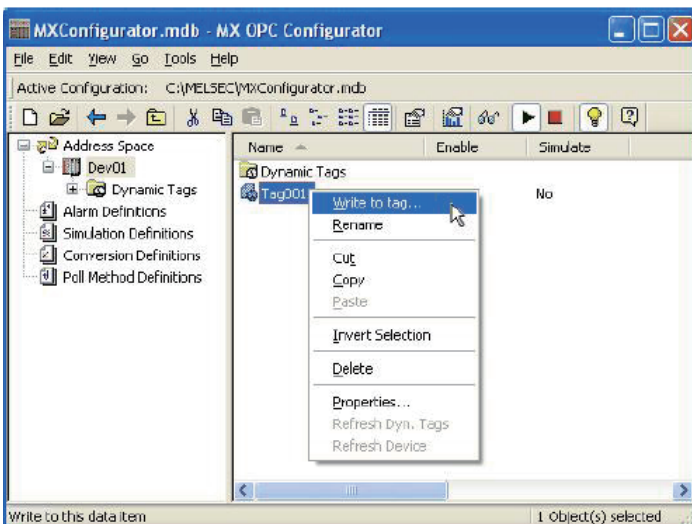
- **Base text** - the text used for the start of the new tag names.
- **First number** - the value to be used for the number part of the first tag
- **Numeric places** - the number of digits to add in the number. For example, if you will be creating 10000 tags with the same base text, using 5 numeric places will ensure that the numbers are sorted as expected in the list.
- **Number of items** - the number of new tags to create (in addition to the original tag which is being saved).

## Writing to tags

Right clicking on a tag in the Monitor view or List view will open a context menu offering the possibility to write into the tag:

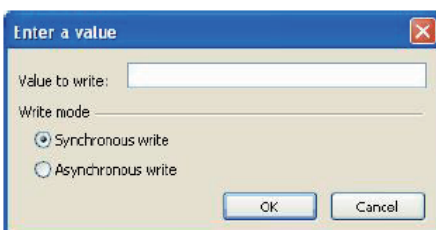


The "Write to tag" menu item is enabled only if exactly one writable item is selected, that is when an MX or Modbus data tag is selected in the Monitor view or the List view.



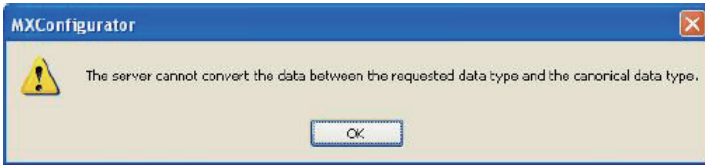
Clicking the new menu item will open a dialog box, as seen below.

The values accepted depend on the value type of the tag, that the value is written into. For all numeric data types, the value of the number is checked if it is in range of the tag's data type. The radix character for real numbers will depend on the current locale (e.g. '1.0' in English or '1,0' in Germany).



To write data to arrays, simply separate the elements by commas or semicolons, e.g. writing to an array of floats: 0.1, 0.2, 0.3 or 0.1; 0.2; 0.3 (for 'German (Germany)' locale where the comma replaces the decimal point, use '0,1;0,2;0,3'). When a semicolon is found in the input value, the configurator assumes that values are separated by semicolons; otherwise it assumes that commas are used as a separator.

Writing to string tags is simple; write the string directly to the edit box. The length of the string is not constrained. When any of the previous formatting requirements are not met, a dialog box appears showing the error, as in the example below.

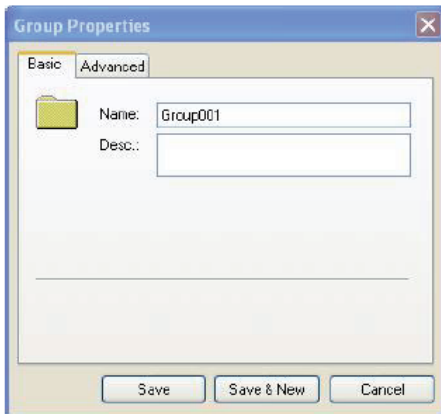


## 3.5 Groups

Data tags can be logically organized into groups (folders). You can configure as many folders as required. You can even create subfolders for each group to create a hierarchical organization of tags. The use of folders is optional; tags can be defined under the device level without using folders at all.

### Basic group properties

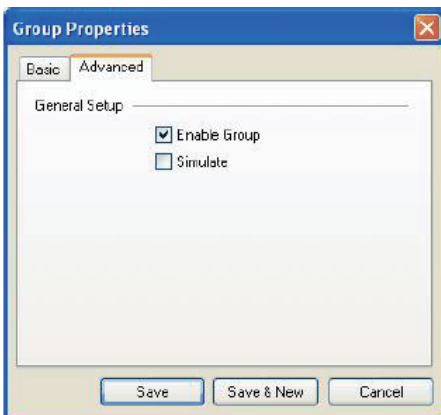
In the Basic tab of the Group Properties dialog box, shown below, type a name for the group and a description for the group (optional).



Group Properties: Basic Tab

### Advanced group properties

In the Advanced tab of the Group Properties dialog box, shown below, check the Enable Group check box to activate the group. Check the Simulate check box if you want to simulate data for the data tags contained within the group.



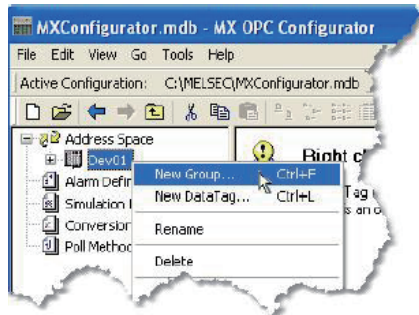
Group Properties: Advanced Tab

# Adding a new group

To add a new group:

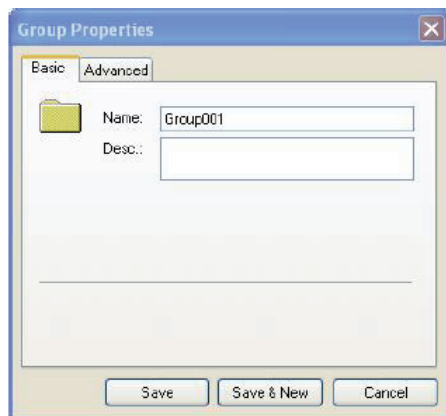
## Operating procedure

1. Right-click a device on the tree control of the Configurator screen and select New Group from the pop-up menu, as shown in the figure below.



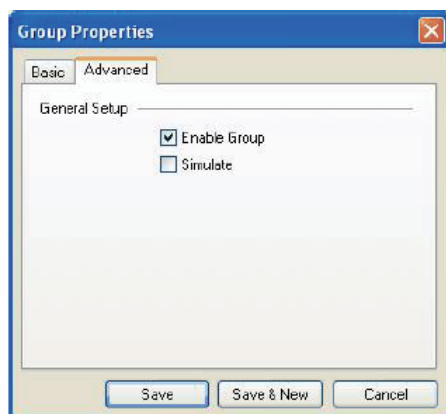
Adding a New Group

2. The Basic tab of the Group Properties dialog box appears, as shown in the figure below.



Configuring Group Properties

3. In the Name field, type a name for the new group, and type a description for the group (optional).
4. Click on the Advanced tab. Check the Enable Group check box to activate the group.



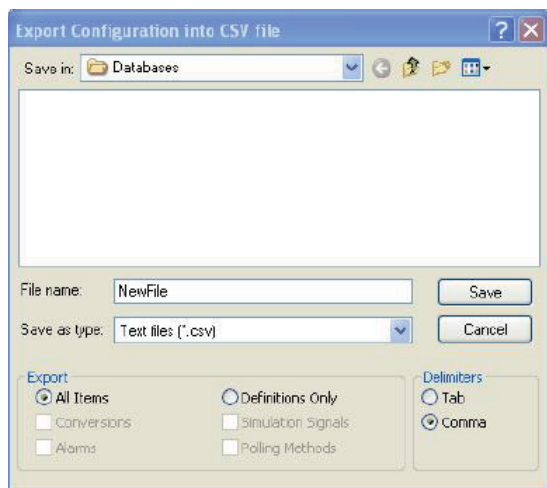
Group Properties: Advanced Tab



## 3.6 Exporting Configuration Data to a CSV File

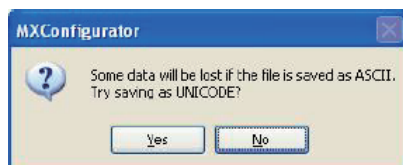
The Configurator offers the flexibility of exporting data from your configuration database to a text (.txt) file or a Microsoft Excel (.csv) file. To export data, select CSV Export from the File menu. You can export all data, or you can choose to export only alarms and simulation signal data. This opens the Export Configuration into CSV File dialog box, as shown in the figure below. By default All Items are selected for export, but you can also select to export Definitions Only (Conversions, Alarms, Simulation Signals, or Polling Methods).

You can then specify the delimiters for exporting the data. Unless you specify delimiters in the Export Configuration Data to File dialog box, the file uses Commas as delimiters by default. Each group contains headings and columns that provide information about each item, such as descriptions and associated translations and expressions. It also provides the "tree" pathway for each item. Choose the directory to which you want to export the data from your database. In the Save As Type field, choose the file type (.txt or .csv) that you would like to save.



**Exporting Configuration Data**

Depending on the regional settings on the PC, it may not be possible to save all the text in the configuration to a normal ASCII file. If some text data has been lost due to the conversion to ASCII, the warning below will be shown:



**Conversion warning**

Select either:

- Yes - replace the file with an export in UNICODE format instead, preserving the original text.
- No - leave the saved file as ASCII. Some of the text will be missing and replaced by a default character (usually '?', depending on the Windows settings).

You may also be able to work around this problem by changing the regional settings on the PC to a locale that more closely matches the language used for the data in the configuration, and then exporting again.

The regional settings on the PC will also affect the format used for floating point numbers in the exported file. For example the same value could be exported as '1.0' with the locale set to 'English (UK)', but as '1,0' with the locale set to 'German (Germany)'. The settings used for export and import must match for the file to be imported correctly.

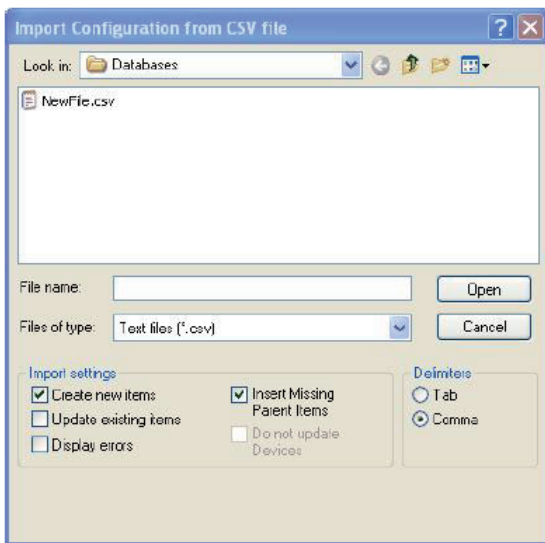
### Precautions

Do not edit an exported CSV file in a text editor or Excel etc. The format will be changed and a CSV file cannot be imported.

## 3.7 Importing Configuration Data from a CSV File

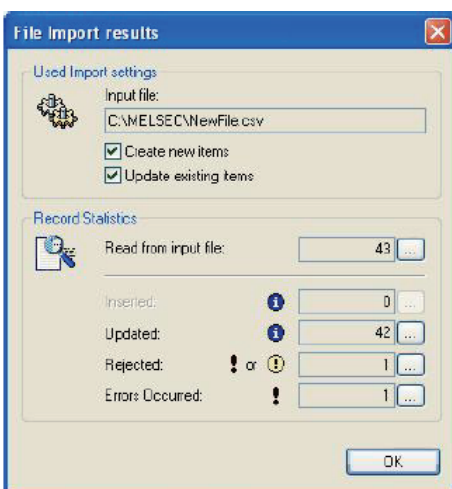
The Configurator offers the flexibility of importing data from a text (.txt) file or a Microsoft Excel (.csv) file to your configuration database. To import data, select CSV Import from the File menu. This opens the Import Configuration From CSV File dialog box, shown below. You can then specify the delimiters and choose from the following import settings:

- Create new items: When the import file contains items that are not yet in the configuration database, then it creates them. Otherwise it skips these items.
- Update existing items: When the import file contains items that are in the configuration database, then it updates them using data from the import file. Otherwise it skips these items.  
Note: Either Create new items or Update existing items must be selected. Otherwise there is nothing to import.
- Display errors: When this item is checked, the Configurator shows a dialog box if an error occurs, and then asks you if you want to proceed with the import. When it is not checked, it skips all items where an error occurred.
- Insert Missing Parent Items: When the import file contains parent items that are not yet in the configuration database, then it creates them with the tree control structure of the database. This item is checked by default.



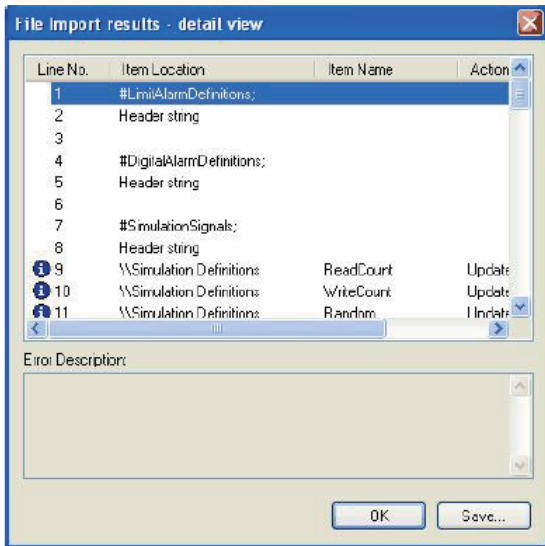
**Importing Configuration Data**

When you have selected a file to import, click Open. When the import is completed, the File Import Results dialog box opens, as shown below. This shows the import settings, including the input file name. It also provides a summary of the import, including how many items were inserted, updated, or rejected, and shows how many errors occurred.



**File Import Results Dialog Box**

Click the ... button to the right of each field to get the details view of the import results, as shown in the figure below. This view shows the specific items that were inserted, updated, or rejected, as well as a description of any errors that occurred.



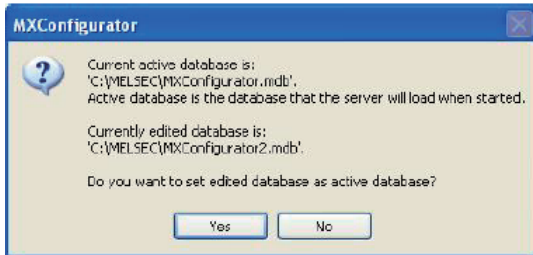
**File Import Results Details**

## 3.8 Activating the Database

Once your configuration is complete, you need to make sure that it is the active database. The database that is currently active is the one that the server uses. To make the current database active, click the Make Active button (light bulb icon) on the Standard Toolbar.

Note: If the button is depressed and the light bulb is yellow, then the current database is already the active database.

A dialog box appears showing both the current active database and database that is currently being edited, as shown in the figure below. To set the edited database as the active database, click the Yes button. Next time the server goes into runtime, it will use this active database for all of its operations.



**Activating the Database**

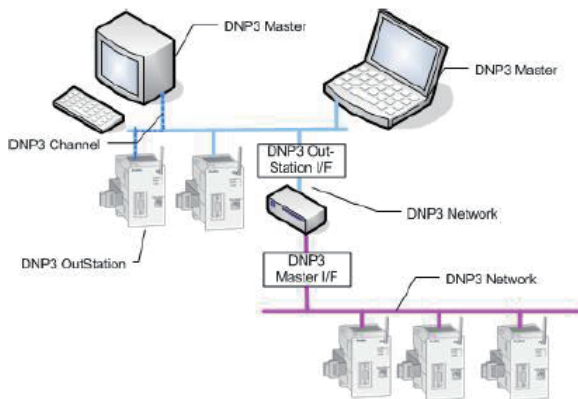
# 4 DNP3 Device

## DNP3 Communication

DNP3 is a communication protocol, which is widely used especially by utilities (electricity, water, gas). It is controlled by an independent 'DNP User Group' and has become an IEEE standard. DNP3 has similarities with the international standard IEC 60870-5.

### ■DNP3 Network

The physical layer can be either serial (frequently combined with modems) or Ethernet with TCP/IP, which allows applying DNP3 in a wide range of environments. A DNP3 network consists of at least one master and one or more slaves. So-called 'OutStations'. Different DNP3 networks can be combined in a hierarchy, where an outstation (slave) on a higher level network is also a master on a lower level DNP3 network.



DNP3 differs from other fieldbus communication protocols in a number of characteristics:  
especially reliable data transfer

- Detection of transmission errors
- Authentication
- VPN connections
- Time synchronization

The reliable communication is a task of the DNP3 stack, which is accessed by the OPC server. The DNP3 data transfer is hidden from the user by the OPC interface, except for the configuration of the communication properties (see 'DNP3 Channel Properties').

event-driven communication

- Event detection in DNP3 station
- Unsolicited data without polling
- Time-stamped events

The OPC interface is already event-driven, even if the underlying communication is a classical polling-based protocol.

Therefore these features are hidden from the user by the internal implementation of the OPC server.

Multiple masters

- 'select-before operate' to synchronize access to 'out' values

This feature distinguishes DNP3 from other single-master Fieldbus protocols. During operation it must be considered, which output data could be written by another master in the network.

flexibility/extensibility

- Message segmentation (i.e. split a message over several frames)
- User-defined data objects
- File transfer

DNP3 can be extended from the pre-defined data objects by adding user-defined objects. The size of an object is not restricted by the size of the transport frame. However only the object types (DNP3 groups) listed in section "can be accessed. Support for user-defined objects will be added at a later stage.

## ■DNP3 Terms and Types

The following terms are frequently used in combination with DNP3:

DNP3 Term	Description	OPC
Channel	Network connection between a DNP3 master and the network interface of one or multiple remote 'OutStation(s)'.	Transfer settings for connection between MXOPC and DNP3 station
Group	Identifies the type of an I/O point, e.g. binary input, analog output. There are several pre-defined groups. On some stations user-specific groups can be defined as well.	OPC tag address
Point Object	Data item, which is identified by its numerical ID within the respective group. The ID equals the sequential index of the data point within the group.	OPC tag address
Master	Controls the communication with an 'OutStation'	OPC server
Network	Either serial multi-drop or standard Ethernet connection between one or multiple masters and one or many 'OutStations'.	Fieldbus network
OutStation	Term used for a DNP3 slave network node, which serves the communication. The 'OutStation' must be attached to a 'Channel' and is identified by channel and DNP3 station address. Several stations can share the same channel, provided that they have different DNP3 addresses.	OPC device
Session	Term used for the connection between a master and an 'OutStation' via a specific channel. In most cases there is a 1-1 relation between session and channel.	Connection between OPC server and device
Station address	Numerical value, which in combination with the channel identifies the network node (master or outstation).	Part of transfer settings
Sub type	Selects the attribute of a point object to be accessed, e.g. the value, timestamp etc.	OPC tag value or property
Variation	Format of a point object, e.g. the bit size, additional flags etc.	OPC tag address

## ■DNP3 Data Model

The data is presented in a point-list, where a point is identified by its group or type and its ID within the group. Standard groups for points are for example:

- Binary inputs
- Binary outputs
- Double binary inputs
- Analog inputs
- Analog outputs
- Counters
- Time and date

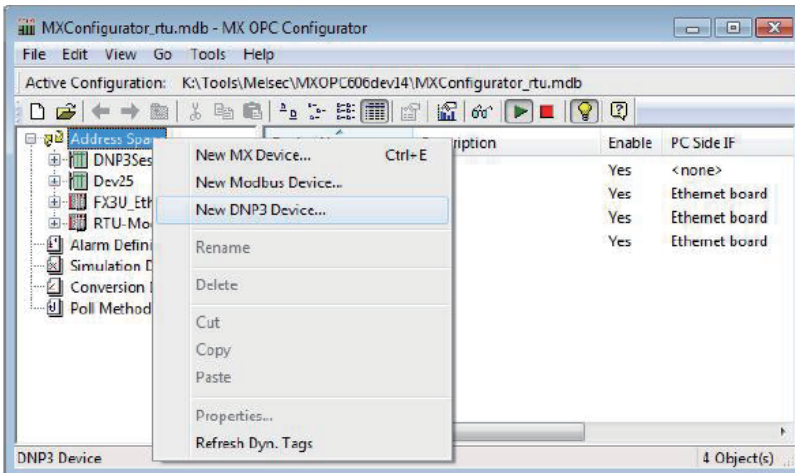
Points of different types can be combined in the same message. Additionally to the predefined object types user definable objects are also supported. A point may exist in different formats, in DNP3 named 'variations'. To identify a point within an outstation DNP3 defines the following notation:

<Group>.<Variation>.<Item ID>[.<Sub Attribute>]

Group	Variation	Item	Sub Attribute
Type of a set of items group no. in the range [1,254]	Representation/format of the data point number in the range [0, 255]	Addressed with its ID, i.e. index in group range is [0, 65535]	Part of the data point to access, e.g. 'Value' or 'Flags'

## 4.1 Adding DNP3 Device

Support of DNP3 outstations is implemented in a new type of device, which is included in the context menu of the 'Address Space' node. The menu item 'New DNP3 Device...' opens the 'DNP3 Device Properties - General' dialog.



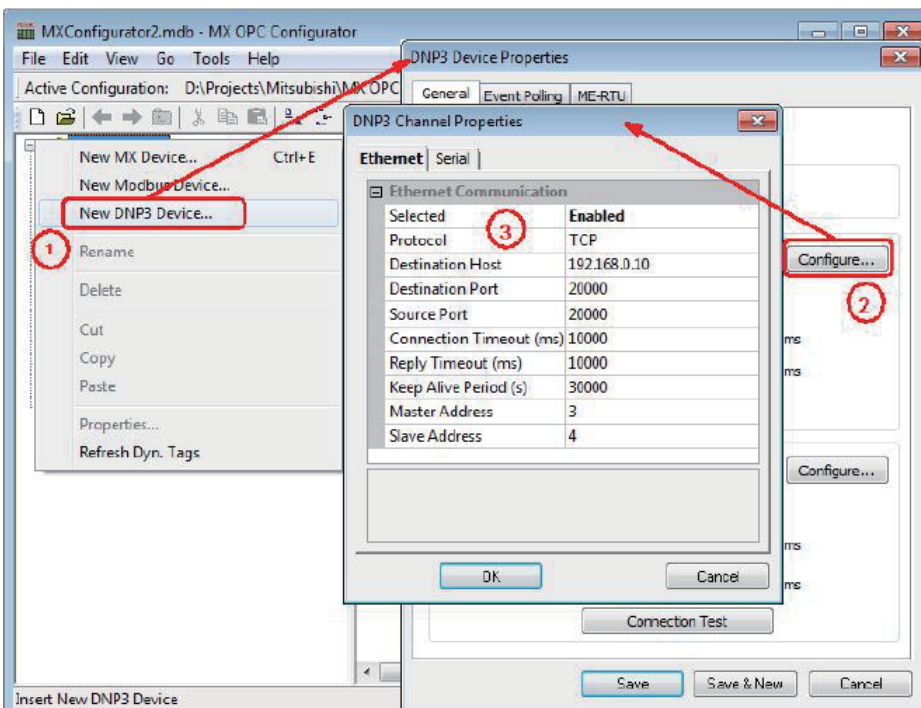
4

### Steps to Add a DNP3 Device

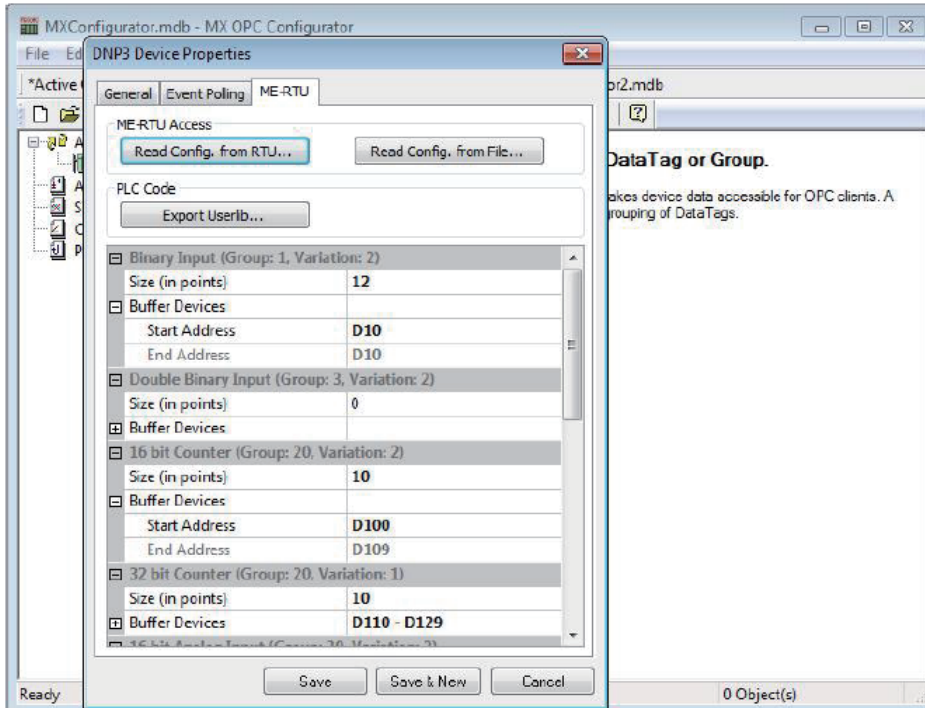
The following steps show the configuration in MXConfigurator to access a DNP3 station.

#### Operating procedure

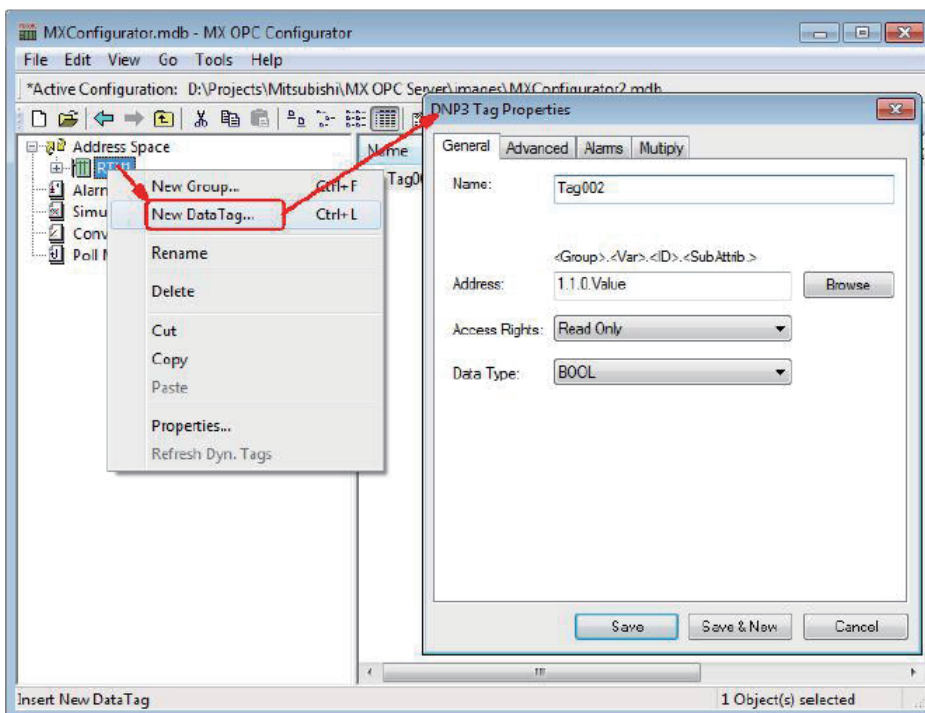
1. Select the item 'New DNP3 Device' from the 'Address Space' context menu.
2. Define a 'DNP3' channel (i.e. network connection) by pressing 'Configure'.
3. Configure an Ethernet or a serial connection.



4. Assign CPU buffer devices for the data exchange between the ME-RTU and the host CPU (ME-RTU only; for other types of DNP3 stations this is outside the MX OPC server!)

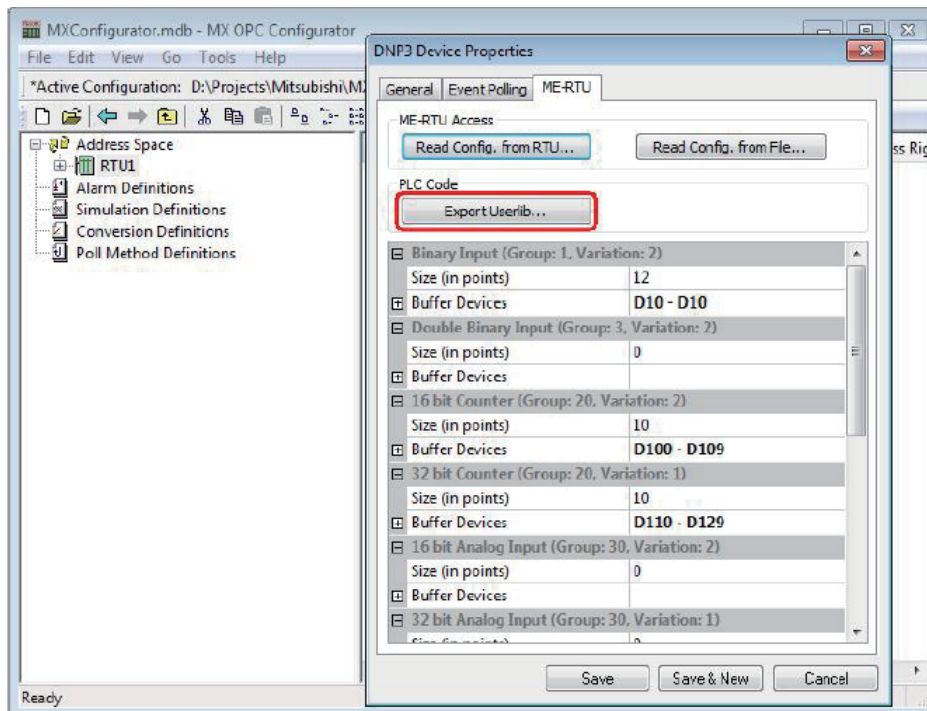


5. Close 'Device Properties' and select item 'New Data Tag' from the device context menu.





6. When using the PLC code generation the user library must be updated each time I/O layout or CPU buffer devices have changed.



## 4.2 DNP3 Device Properties - General

The 'DNP3 Device Properties - General' dialog provides access to the settings for the connection between MX OPC Server and the DNP3 OutStation. Both serial and Ethernet connections are supported.

DNP3 Device Properties

General | Event Polling | ME-RTU

Device Name: DeviceDNP

DNP3 Channel: tcp://192.168.0.10:20000 [Configure...]

Number of Retries: 3

Delay Time: 0 ms

Polling rate: 1000 ms

[Connection Test]

DNP3 Backup Channel

☐ Enable

Number of Retries: 3

Delay Time: 0 ms

Polling rate: 1000 ms

[Connection Test]

[Save] [Save & New] [Cancel]

Parameter	Type	Range	Description
Device Name	String	Max 32 characters, must be unique	identifier chosen by user
DNP3 Channel	String	Read-only	identifier of associated primary channel (see section 'Channel Identifier ' below on how the identifier is constructed)
Configure	Button	—	opens the dialog 'DNP3 Channel Properties'
Number of Retries	Long	0 – 16, 3 (default)	number of communication retries before the communication is aborted or handed over to backup channel
Delay Time	Long	0 – 99999, 0 (default)	time in ms to wait in between two communication retries
Polling rate	Long	1 – 2147483647 1000 (default)	Interval in ms to check for updates of DNP3 tags with explicitly sending requests
Connection Test	Button	—	Performs a connection test with the configured channel parameters, see section Connection Test
Enable	Bool	Checked or unchecked (default)	if selected, the backup channel will be used in case the primary channel fails (for details see section 'Backup Channel ')
DNP3 Backup Channel	String	Read-only	identifier of associated backup channel , which will be activated if primary fails (see section 'Channel Identifier ' below on how the identifier is constructed)

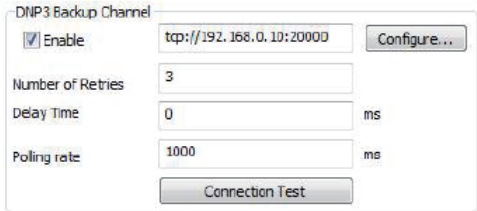
## Channel Identifier

The identifier of the configured communication link (i.e. 'DNP3 channel') is constructed from the current settings:

Ethernet connection	<protocol>://<IP address>:<port number>
Serial connection	COM<serial port number>

### Backup Channel

The backup channel is a second set of connection settings, which are used to automatically establish an alternative communication link to the device in case the primary connection fails. If the 'Enable' checkbox is set, the 'Configure' button is enabled and opens the same dialog for editing the connection settings as for the primary channel.

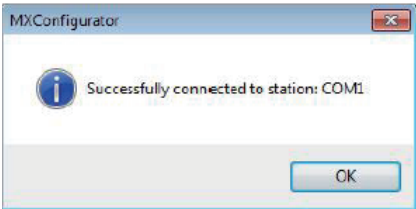


### Connection Test

Pushing this button performs a connection test using the configured channel parameters. Additionally DNP3 connectivity is checked also. If the connection test succeeded, the message box shows the text "Successfully connected to station:", followed by the channel identifier as defined in section 'Channel Identifier '. For a TCP connection the message box may look like



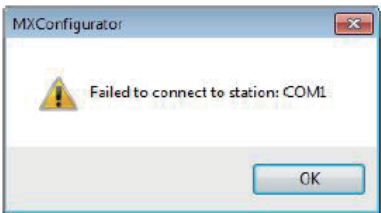
For a serial connection the message box may look like:



In case of failure the message box shows the text "Failed to connect to station:" followed by the channel identifier, for example:



A similar message box appears if the serial connection test failed:



## DNP3 channel properties

A DNP3 channel represents the Ethernet (TCP/UDP) or serial connection between a DNP3 master and one or several outstations. Multiple outstations can share the same channel, provided they have different DNP3 IDs.

The DNP3 device driver supports the following connection types:

- Ethernet
- Serial

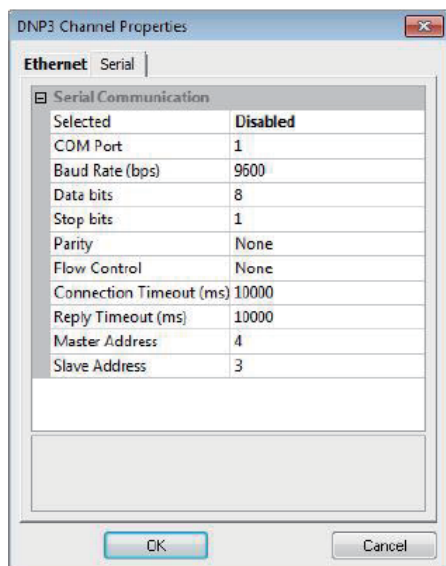
### Ethernet Channel Properties

The screenshot shows the 'DNP3 Channel Properties' dialog box with the 'Ethernet' tab selected. The 'Ethernet Communication' section is expanded, showing a list of properties. The 'Selected' property is set to 'Enabled'. Other properties include Protocol (TCP), Destination Host (192.168.0.10), Destination Port (20000), Source Port (20000), Connection Timeout (ms) (10000), Reply Timeout (ms) (10000), Keep Alive Period (ms) (30000), Master Address (4), and Slave Address (3). The dialog has 'OK' and 'Cancel' buttons at the bottom.

Ethernet Communication	
Selected	Enabled
Protocol	TCP
Destination Host	192.168.0.10
Destination Port	20000
Source Port	20000
Connection Timeout (ms)	10000
Reply Timeout (ms)	10000
Keep Alive Period (ms)	30000
Master Address	4
Slave Address	3

Parameter	Type	Range	Description
Selected	Boolean	Enabled (default)/Disabled	True: the connection type is active False: the connection type is inactive
Protocol	Enumeration	TCP (default), UDP	Type of IP communication, either stream- (TCP) or datagram- (UDP) based
Destination Host	ANSI string	String (chars for valid host name) or IPv4 address (decimal dot notation) default: 192.168.0.10	Network identifier or address of outstation
Destination Port	Unsigned long	1 - 65535 default: 20000	TCP or UDP port number of the outStation
Source Port	Unsigned long	1 - 65535 default: 20000	UDP port number on the master (i.e. OPC server) side
Connection Timeout	Unsigned long	1-99999 ms default: 10000 ms	Time in milliseconds, in which station must have responded to a connect request usually longer than request timeout
Reply Timeout	Unsigned long	1-99999 ms default: 10000 ms	Time in milliseconds, in which station must have responded to any request except a connect request
Keep Alive Period	Unsigned long	0 – 86400 ms default: 30000 ms	Interval in milliseconds for the periodical status check of the TCP/ IP connections
DNP3 master address ID	Unsigned long	0 – 65519 default: 4	DNP3-specific address of master
DNP3 slave address ID	Unsigned long	0 – 65519 default: 3	DNP3-specific address of outStation

## Serial Channel Properties



Parameter	Type	Range	Description
Selected	Boolean	Enabled/Disabled (default)	True: the connection type is active False: the connection type is inactive
COM Port	List (integers)	1 – 65535 default: 1	List contains the ports existing on the local system on the first places, then all other port numbers up to 99
Baud Rate	List (integers)	<div> 300 600 1200 2400 4800 9600 14400 19200 28800 38400 56000 57600 115200 128000 256000 </div> Default: 9600	Transfer rate on serial interface
Data bits	List (integers)	7, 8 (default)	Number data bits
Stop bits	List (integers)	1 (default), 2	Number stop bits
Parity	List	None (default), odd, even	Data parity
Flow Control	List	None (default), DTR, RTS, RTS+DTR, RTS Always	Flow control/handshake Note: If the 'Flow Control' option on the ME-RTU is set to 'Hardware', select 'RTS Always'
Connection Timeout	Unsigned long	1-99999 ms default: 10000 ms	Time in milliseconds, in which station must have responded to a connect request usually longer than request timeout
Reply Timeout	Unsigned long	1-99999 ms default: 10000 ms	Time in milliseconds, in which station must have responded to any request except a connect request
DNP3 master address ID	Unsigned long	0 – 65519 Default: 4	DNP3-specific address of master
DNP3 slave address ID	Unsigned long	0 – 65519 Default: 3	DNP3-specific address of outStation

### ■DNP3 Backup Connection

Additionally to the settings of the channel for normal communication the user can specify a second connection, which is used, if the first connection fails. This handling corresponds to the backup connection mechanism, which exists for MELSOFT (MX) devices.

## 4.3 DNP3 Device Properties - Event Polling

DNP3 Device Properties

General Event Polling ME-RTU

☒ Event Polling

Class 1 Event Polling Interval (ms)	5000
Class 2 Event Polling Interval (ms)	5000
Class 3 Event Polling Interval (ms)	5000
Integrity Poll Interval (ms)	3600000

☒ Unsolicited Events

Class 1 unsolicited updates	Automatic
Class 2 unsolicited updates	Automatic
Class 3 unsolicited updates	Automatic
Enable unsolicited updates after connect	Disabled

☒ Time Synchronization

Time synchronization interval (s)	600
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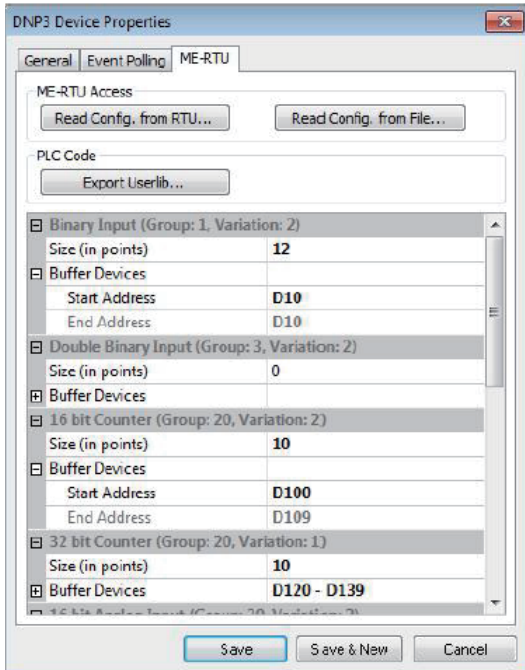
Save Save & New Cancel

Parameter	Type	Range	Description
Class 1 Event Polling interval	Unsigned long	0 – 86400000, 5000 (default)	Interval in milliseconds in which to check for new events of the respective class 0 means no polling for the respective class
Class 2 Event Polling interval			
Class 3 Event Polling interval			
Integrity Poll Interval	Unsigned long	0 – 86400000, 3600000 (default)	Interval in milliseconds in which to request class 0/1/2/3 data 0 means no integrity polling
Class 1 unsolicited updates	Choice	Automatic (default), Enabled, Disabled	Set, whether the outstation can send unsolicited data updates
Class 2 unsolicited updates			
Class 3 unsolicited updates			
Enable unsolicited updates after connect	Bool	Enabled, Disabled (default)	If set, the outStation will send the current data to the master without a change of the data or a request from the master
Time synchronization interval	Unsigned long	0 – 2592000 Default: 600	Interval in seconds, in which the internal clock of the outstation is synchronized

## 4.4 DNP3 Device Properties - ME-RTU

The 'ME-RTU' device properties page allows to configure parameters specifically for the ME-RTU DNP3 module. The following options are supported:

- Configuring CPU Buffer Devices
- Reading ME-RTU Configuration File
- Export UserLib



Parameter	Type	Range	Description
Read Config. from RTU	Button	—	<ul style="list-style-type: none"> <li>• Opens a dialog to provide the login information for the ME-RTU</li> <li>• Establishes a SFTP connection and downloads the configuration file 'settings.xml' from the file system of the ME-RTU</li> <li>• Displays a file 'Save As' dialog to select the file path, where the uploaded ME-RTU configuration will be stored</li> <li>• Shows the buffer sizes as set in the RTU</li> </ul> See section 'Reading ME-RTU Configuration File'
Read Config. from File	Button	—	<ul style="list-style-type: none"> <li>• Opens a dialog to select the file with the MERTU configuration ('settings.xml')</li> <li>• Shows the buffer sizes as set in the RTU</li> </ul>
Export Userlib	Button	—	<ul style="list-style-type: none"> <li>• Displays a file dialog to select the file path for the user library (.sul)</li> <li>• Queries for the target PLC software, for which the user library should be generated</li> <li>• Checks, whether a user library can be generated from the DNP3 configuration</li> <li>• If the configuration is valid, a user library is generated in the given directory with global variables for access to RTU I/O points</li> </ul> See section 'Export Userlib'
[DNP3 Group Name] Size (in points)	Number	0 – <max point ID> (see table below), default: 0	The size of the respective area in points Each buffer can hold 512 words (1024 bytes) of points as maximum. Therefore the max number of points is specific to the respective buffer.
[DNP3 Group Name] Start Address	CPU device address	D and R devices (see table below)	Valid CPU device address (no bit indices, bit devices must be word-aligned)

Parameter	Type	Range	Description
[DNP3 Group Name] End Address	CPU device address	Read-only	The end addresses is calculated by adding the buffer size to the start address. The buffer size is determined from the number of points set for the respective group. Note: If there are no tags defined in the respective group, the end address of the buffer device block is shown as 'N/A', because the buffer is not used.

## Configuring CPU Buffer Devices

In order to facilitate the integration of DNP3 I/Os into the PLC application, each DNP point group must have a PLC device address assigned. The contents of these devices are copied to/from the shared memory addresses in the RTU, which are fixed for each point group.

The following word device types are supported as buffer devices:

Device Type	Address Range
D	0 - 4891647
R	0 - 32767

Note: this limited range is based on the facts that the device types must be supported by all CPUs, which can interact with the ME-RTU (Q,L and FX).

The ME-RTU exchanges DNP3 protocol data from or to the PLC via shared buffer memory. The different data types (DNP3 object groups) are associated with different BFM start addresses. The following table shows the BFM layout of the RTU modem for data exchange with the PLC:

Data direction	Basic data type	Group	Variation	Max number points	BFM address	
					Start	End
Input Data	Binary Input	1	2	8192	1024	1535
	Double Binary Input	3	2	4096	5632	6143
	16 – bit Counters	20	2	512	8192	8703
	32 – bit Counters	20	1	256	8960	9471
	16 – bit Analog Input	30	2	512	9600	10111
	32 – bit Analog Input	30	1	256	10368	10879
	Short float Analog Input	30	5	256	11008	11519
Output Data	Binary Output	10	2	8192	16384	16895
	16 – bit Analog Output	40	2	512	20992	21503
	32 – bit Analog Output	40	1	256	22272	22783
	Short float Analog Output	40	3	256	23424	23935

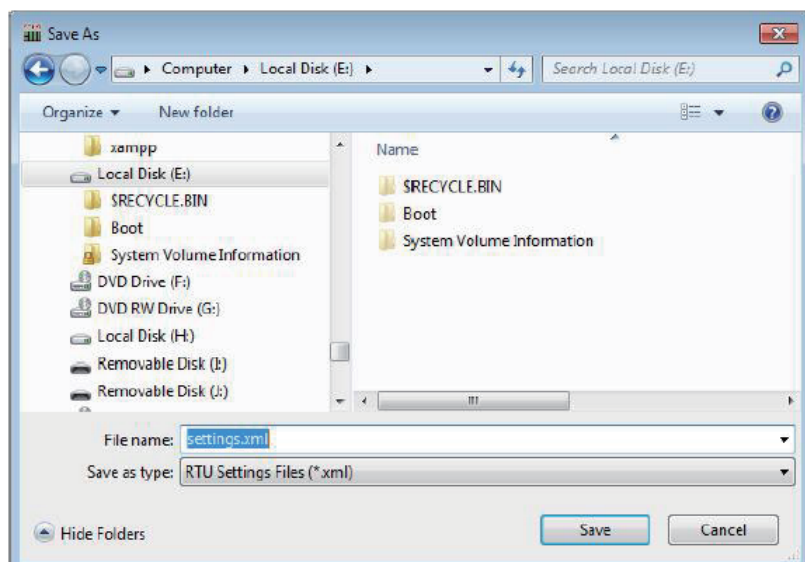
Note: for further information on the buffer structures in the ME-RTU please consult the user's manual of the RTU.

## Reading ME-RTU Configuration File

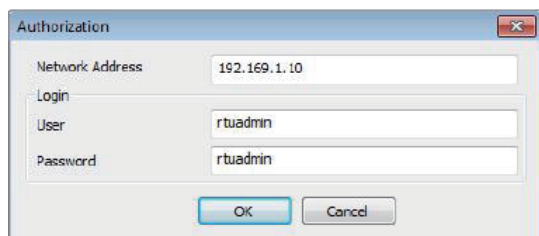
The ME-RTU can be configured with a text file in XML format. This file can be read from the RTU using the separate command line utility 'rtuscp'. Pressing the 'Read Config. from RTU' button does the same as the command line tool, but more comfortable. It opens a 'File Save As' dialog to select the path, where the configuration file is stored.

Note: the file is not imported by MX OPC Server. The main purpose of this function is to read the configuration file without using the separate 'rtuscp' command line executable. Optionally the user can view the available point IDs, which result from the RTU configuration.





After the file dialog has been closed by pressing 'Save', the 'Authorization' dialog is displayed. Here the user must provide the valid login information as it has been configured in the ME-RTU.



Parameter	Type	Range	Default	Description
Network Address	Text	Either host name or IPv4 address	Host address as set in the primary DNP3 channel	Host name or IP address of the MERTU
User	Text	—	"rtuadmin" (default)	User ID as configured in the ME-RTU
Password	Text	—	"rtuadmin" (default)	Password as configured in the MERTU
OK	Button	—	—	Closes the dialog and attempts to connect to the ME-RTU and to upload the configuration file.
Cancel	Button	—	—	Cancel the upload attempt

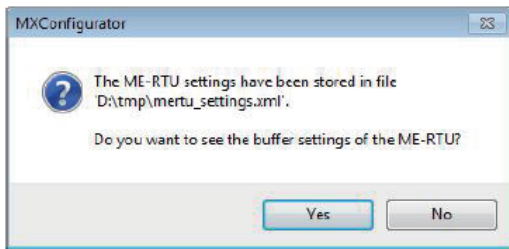
If the given login is correct, the file is read from the ME\_RTU and stored in the selected path.

The file contains an XML document with the settings of the ME-RTU. The format is specific to the ME-RTU, but can be viewed with a standard text editor or a web browser.

Excerpt of a sample configuration file:

```
<?xml version="1.0"?>
<Settings xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <GeneralSettings>
    <RTUOperatingMode>SlaveOnly</RTUOperatingMode>
    <!-- SlaveOnly or MasterAndSlave -->
    <PLCInputDataWriteAccess>Enable</PLCInputDataWriteAccess>
    <!-- Enable or Disable -->
    <PLCtype>FX</PLCtype>
    <!-- FX or Q_L -->
    <UsedProtocol>DNP3</UsedProtocol>
    <ProtocolCommPath>Ethernet</ProtocolCommPath>
    <!-- Ethernet or Serial -->
    <DataRetentionEnable>Disable</DataRetentionEnable>
```

The user is informed that the file has been stored in the selected file path and can choose to view the point buffer configuration of the RTU.



If the user presses 'Yes', the settings file is analyzed and the available point buffers are listed in an HTML document displayed with the default browser. This HTML document assists the user when specifying DNP3 addresses on the ME-RTU for OPC tags.

Buffer	Group	Variation	Nr. Points	Point IDs	DNP Addresses	BFM Address
Binary Inputs	1	2	32	0 - 31	1.2.{0 - 31}	1024
Double Binary Inputs	3	2	7	0 - 6	3.2.{0 - 6}	5632
16-bit Counters	20	2	5	0 - 4	20.2.{0 - 4}	8192
32-bit Counters	20	1	20	5 - 24	20.1.{5 - 24}	8960
16-bit Analog Inputs	30	2	8	0 - 7	30.2.{0 - 7}	9600
32-bit Analog Inputs	30	1	8	8 - 15	30.1.{8 - 15}	10368
Short Float Analog Inputs	30	5	8	16 - 23	30.5.{16 - 23}	11008
Binary Outputs	10	2	8	0 - 7	10.2.{0 - 7}	16384
16-bit Analog Outputs	40	2	8	0 - 7	40.2.{0 - 7}	20992
32-bit Analog Outputs	40	1	8	8 - 15	40.1.{8 - 15}	22272
Short Float Analog Outputs	40	3	8	16 - 23	40.3.{16 - 23}	23424

Column	Description
Buffer	Name of buffer contents
Group	DNP group number
Variation	DNP variation number
Nr. Points	Size of the respective buffer in points
Point IDs	Possible point ID numbers, which can be used with that group and variation Note: The DNP3 point IDs must be unique within the respective group over all variations. Therefore the ME-RTU assigns consecutive IDs for the different buffers of group 20 (counters), 30 (analog inputs) and 40 (analog outputs)
DNP Addresses	Possible DNP addresses (the brackets '{ }' mark a range of values)
BFM Address	BFM address where the actual values of the respective DNP3 object group (column Buffer) starts at

## Export Userlib

The OPC tags of DNP3 devices refer to DNP3 data points. These data points are related to addresses in the buffer memory of the ME-RTU and depend on the respective configuration of the RTU. A PLC program, which interacts with the ME-RTU, will use CPU devices for exchanging the contents of the data points. To ease addressing the individual data points, a user library can be generated.

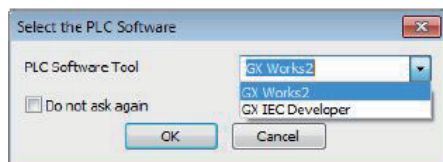
This user library contains:

1. A global variable of type 'ARRAY OF WORD' for each supported DNP3 group and variation combination, which has the same size as the corresponding DNP3 buffer. This GV is mapped to the device address, which the user has assigned to the buffer.
2. A global variable for each OPC item, which is related to a specific item ID and variation and with the subattribute 'Value'. OPC items, which refer to other subattributes of DNP3 points (e.g. 'Flags'), are not included in the user library.

Note: the user library does not include code for exchanging the contents of CPU devices with buffer memory in the ME-RTU. This part depends on the specific PLC type used and must be implemented in the PLC application program.

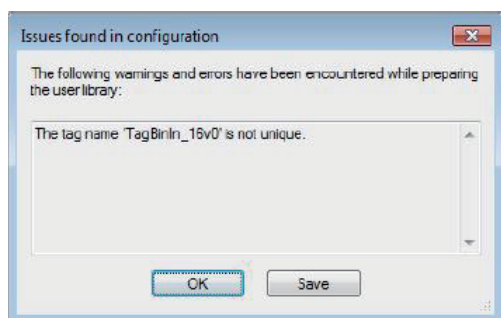
The exact contents of the user library must be adjusted for the PLC software, in which the user library should be imported.

The user must therefore first select the PLC software.

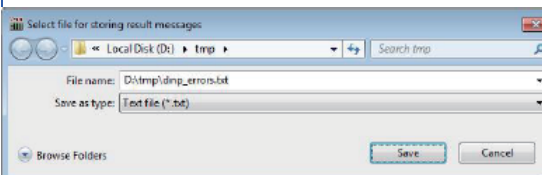


Control	Type	Range	Description
PLC Software Tool	Selection	<ul style="list-style-type: none"> <li>GX Works2</li> <li>GX IEC Developer</li> </ul>	Supported MELSOFT software packages for PLC programming
Do not ask again	Checkbox	checked/unchecked (default)	If checked, the message is not displayed again until MX Configurator is restarted; the user library is generated for the chosen PLC software
OK	Button	—	Closes the dialog; the user library is generated for use with the chosen PLC software
Save	Button	—	Closes the dialog without exporting a user library

Before the user library is generated, the configuration of the OPC tags and the DNP3 settings are checked against certain restrictions imposed by either the ME-RTU or the generated IL PLC code. Warnings and/or errors found during these checks are displayed in a dialog. In case of errors the user library is not exported.



Control	Type	Range	Description
OK	Button	—	Closes the dialog; the user library is not generated
Save	Button	—	Opens a file dialog to select the path, where the error messages are stored



The following 'warning' issues are checked:

1. Device addresses do not overlap
2. Group and variation is supported by ME-RTU
3. Point ID within the range set for the respective group and variation
4. Number of tags in user library does not exceed the limit imposed by GX Works2 (i.e. 20480)

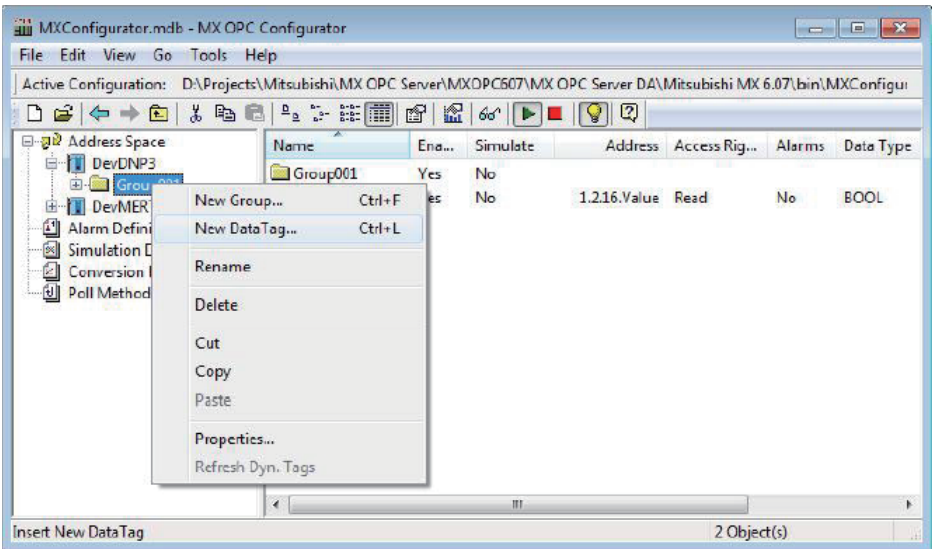
The following 'error' issues are checked:

1. Each tag name must be unique
2. Tag identifiers must not exceed 32 characters

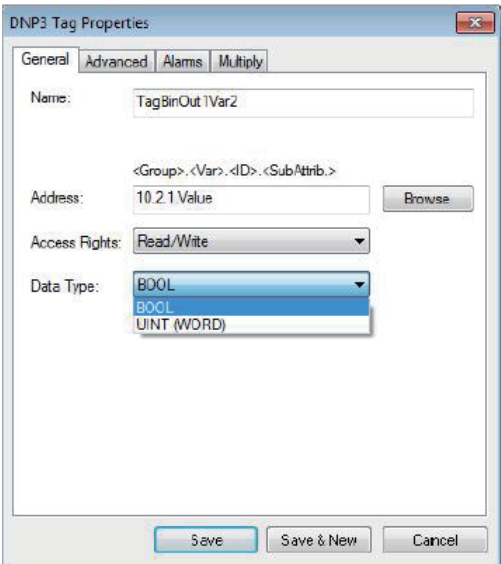
Note: OPC tag names must be unique within the respective OPC group. Therefore the same tag name can exist in different groups. As the OPC tag name is used as identifier for the corresponding global variable in the user library, tags with identical names would create a conflict in the user library.

# 4.5 Adding DNP3 Data Tag

To define an OPC tag the context menu of the device node contains an entry 'New Data Tag'. This follows the standard procedure for other device types.



Selecting the menu item opens the 'DNP3 Tag Properties' dialog.



This dialog holds several tab pages described in the following sections ( DNP3 Tag Properties - General). The buttons displayed below the tab pages have the same meaning independently of the selected tab page.



Button	Description
Save	Close the dialog and store the tag settings in the database
Save & New	Close the dialog and store the settings for the currently edited tag immediately start configuration of a new tag with default settings
Cancel	Close the dialog and discard the changes

## 4.6 DNP3 Tag Properties - General

The definition of an OPC tag for a DNP3 data point includes specifying the OPC identifier and data type as for MX and Modbus devices. The DNP3 data point is entered in the standard address format as described in section 'Data model'.

The following sub sections are available:

- DNP3 Address Validation
- Supported DNP3 Groups and Variations
- Different Variations for Binary Inputs and Outputs

Parameter	Type	Range	Description
Name	String	1-32 characters	Descriptive name of the this tag
Address	String	<group number> <.variation> <.item ID> <.sub attribute> Default: empty See '3.4.1.4' for details	Address string format must be follow DNP3 specification which is the following group.variation.index.attribute (e.g. 40.0.0.Value) For the ranges see restrictions imposed by DNP3 for group, item ID and variation in section 'Supported DNP3 Groups and Variations'
Browse	—	—	Displays offline valid address string formats for supported DNP3 data points
Access rights:	Read/Write (default) and Read Only	Depending on the DNP3 data point address	Access rights of the OPC tag will be checked against access rights of DNP3 data point
Data Type	—	BOOL UINT (WORD) DUINT (DWORD) INT DINT REAL Disabled by default	Data type of the OPC item, the available data types are restricted by the variation selected Note: Here only basic data types can be assigned. For more complex types (arrays), the 'Advanced'tab must be opened.

The 'Browse' button opens a list of the supported DNP3 groups and variations.

DNP3 Tag Hints							
Group	Group Name	Variation	Min. ID	Max. ID	Subattr.	Data Type	Access
1	Binary Inputs default	0	0	65535	Value	bool	R
1	Binary Inputs packed Format	1	0	65535	Value	bool	R
1	Binary Inputs with Flags	2	0	65535	Value	uint8	R
1	Binary Inputs with Flags	2	0	65535	Value	bool	R
1	Binary Inputs	0, 1, 2	0	65535	Flags	uint8	R
3	Double Binary Inputs default	0	0	65535	Value	uint8	R
3	Double Binary Inputs packed For ...	1	0	65535	Value	uint8	R
3	Double Binary Inputs with Flags	2	0	65535	Value	uint8	R
3	Double Binary Inputs	0, 1, 2	0	65535	Flags	uint8	R
10	Binary Outputs default	0	0	65535	Value	bool	R/W
10	Binary Outputs packed Format	1	0	65535	Value	bool	R/W
10	Binary Outputs with Flags	2	0	65535	Value	uint8	R/W
10	Binary Outputs with Flags	2	0	65535	Value	bool	R/W
10	Binary Outputs	0, 1, 2	0	65535	Flags	uint8	R

Column	Description	
Group	DNP3 group number	
Group Name	Name of the DNP3 group	
Variation	DNP3 variation	
Min. ID	minimum point ID	
Max. ID	maximum point ID	
Subattr.	DNP3 sub attribute (see 'Subattributes')	
Data Type	Data type according to DNP conventions This type is translated to an OPC tag data type as:	
	■ DNP Data Type	■ OPC Tag Default Type
	bool	BOOL
	int8, int16	INT
	uint8, uint16	UINT (WORD)
	int32	DINT
	uint32	DUINT (DWORD)
	float32	REAL
Access	R: read-only, W: write-only, RW: read- and writable	

The following entries are displayed in the table:



Group	Group Name	Variation	Min. ID	Max. ID	Subattr.	Data Type	Access
1	Binary Inputs default	0	0	65535	Value	bool	R
1	Binary Inputs packed Format	1	0	65535	Value	bool	R
1	Binary Inputs with Flags	2	0	65535	Value	uint8	R
1	Binary Inputs with Flags	2	0	65535	Value	bool	R
1	Binary Inputs	0,1,2	0	65535	Flags	uint8	R
3	Double Binary Inputs default	0	0	65535	Value	uint8	R
3	Double Binary Inputs packed Format	1	0	65535	Value	uint8	R
3	Double Binary Inputs with Flags	2	0	65535	Value	uint8	R
3	Double Binary Inputs	0,1,2	0	65535	Flags	uint8	R
10	Binary Outputs default	0	0	65535	Value	bool	R/W
10	Binary Outputs packed Format	1	0	65535	Value	bool	R/W
10	Binary Outputs with Flags	2	0	65535	Value	uint8	R/W
10	Binary Outputs with Flags	2	0	65535	Value	bool	R/W
10	Binary Outputs	0,1,2	0	65535	Flags	uint8	R
12	Binary Outputs (SO) default	0	0	65535	Value	bool	R/W
12	Binary Outputs (SO) packed Format	1	0	65535	Value	bool	R/W
12	Binary Outputs (SO) with Flags	2	0	65535	Value	uint8	R/W
12	Binary Outputs (SO) with Flags	2	0	65535	Value	bool	R/W
12	Binary Outputs (SO)	0,1,2	0	65535	Flags	uint8	R
20	Counters default	0	0	65535	Value	uint32	R
20	Counters with Flags	1	0	65535	Value	uint32	R
20	Counters with Flags	2	0	65535	Value	uint16	R
20	Counters without Flags	5	0	65535	Value	uint32	R
20	Counters without Flags	6	0	65535	Value	uint16	R
20	Counters	0,1,2,5,6	0	65535	Flags	uint8	R
21	Frozen Counters default	0	0	65535	Value	uint32	R
21	Frozen Counters with Flags	1	0	65535	Value	uint32	R
21	Frozen Counters with Flags	2	0	65535	Value	uint16	R
21	Frozen Counters with Flags and Time	5	0	65535	Value	uint32	R
21	Frozen Counters with Flags and Time	6	0	65535	Value	uint16	R
21	Frozen Counters without Flags	9	0	65535	Value	uint32	R
21	Frozen Counters without Flags	10	0	65535	Value	uint16	R
21	Frozen Counters	0,1,2,5,6,9,10	0	65535	Flags	uint8	R
30	Analog Inputs with Flags	1	0	65535	Value	int32	R
30	Analog Inputs with Flags	2	0	65535	Value	int16	R
30	Analog Inputs without Flags	3	0	65535	Value	int32	R
30	Analog Inputs without Flags	4	0	65535	Value	int16	R
30	Analog Inputs with Flags	5	0	65535	Value	float32	R
30	Analog Inputs	1,2,3,4,5	0	65535	Flags	int8	R
40	Analog Outputs with Flags	1	0	65535	Value	int32	R/W
40	Analog Outputs with Flags	2	0	65535	Value	int16	R/W
40	Analog Outputs with Flags	3	0	65535	Value	float32	R/W
40	Analog Outputs	1,2,3	0	65535	Flags	int8	R
41	Analog Outputs (SO) with Flags	1	0	65535	Value	int32	R/W
41	Analog Outputs (SO) with Flags	2	0	65535	Value	int16	R/W
41	Analog Outputs (SO) with Flags	3	0	65535	Value	float32	R/W
41	Analog Outputs (SO)	1,2,3	0	65535	Flags	int8	R

## DNP3 Address Validation

The input in the 'Address' edit field will be validated against the supported DNP3 groups and variation, data point ID and sub attribute by every key stroke. If the address is validated successfully the text color will be set to default, otherwise if an invalid address string is entered the text color will turn to red.

Address:

## Supported DNP3 Groups and Variations

DNP3 distinguishes I/O data according to its function into groups. A DNP3 I/O point can be accessed in different formats, which in DNP3 are called 'variations'. Depending on the group and variation data may be read-only or writable.

The following table lists the groups and formats, which are supported by the first version of the DNP3 OPC server. The default data type of the corresponding OPC tag is also listed.

DNP3 Group No.	Group No. for Events	Group Name	Access	Variations	OPC Type
1	2	Binary Inputs	R	0: slave-default	BOOL
				1: packed	BOOL
				2: with flags	BOOL UINT
3	4	Double Binary Inputs	R	0: slave-default	UINT
				1: packed	UINT
				2: with flags	UINT

DNP3 Group No.	Group No. for Events	Group Name	Access	Variations	OPC Type
10	—	Binary Outputs (status)	R/W	0: slave-default	BOOL
				1: packed	BOOL
				2: with flags	BOOL UINT
12	—	Binary Outputs (command)	R/W	0: slave-default	BOOL
				1: packed	BOOL
				2: with flags	BOOL UINT
20	22	Counters	R	0: slave-default	DUINT
				1: 32-bit w/ flag	DUINT
				2: 16-bit w/ flag	UINT
				5: 32-bit w/o flag	DUINT
				6: 16-bit w/o flag	UINT
21	23	Frozen Counters	R	0: slave-default	DUINT
				1: 32-bit w/ flag	DUINT
				2: 16-bit w/ flag	UINT
				5: 32-bit w/ flag and time	DUINT
				6: 16-bit w/ flag and time	UINT
				9: 32-bit w/o flag	DUINT
				10: 16-bit w/o flag	UINT
30	32	Analog Inputs	R	1: 32-bit w/ flag	DINT
				2: 16-bit w/ flag	INT
				3: 32-bit w/o flag	DINT
				4: 16-bit w/o flag	INT
				5: 32-bit float w/ flag	REAL
40	—	Analog Outputs (status)	R/W	1: 32-bit w/ flag	DINT
				2: 16-bit w/ flag	INT
				3: 32-bit float w/ flag	REAL
41	—	Analog Outputs (command)	R/W	1: 32-bit w/ flag	DINT
				2: 16-bit w/ flag	INT
				3: 32-bit float w/ flag	REAL

## ■ DNP3 Event Groups

If modified points are reported as events, DNP3 uses a different group number than for normal read access. However the MX OPC Server stores the point data always under the group number used for explicit read requests. The event groups are not relevant to the OPC client.

The group numbers 10 and 40 for binary respectively analog outputs are destined only for reading the current value of the respective output, thus read-only. The write access uses the group number 12 or 41 respectively. However MXOPC automatically changes the group number, if the OPC client attempts to write to groups 10 or 40.

## ■ Subattributes

The following subattributes are available for DNP3 points, provided, that the selected variation supports it.

Subattribute Identifier	Description
.Value	The value of the item (this is default)
.Flags	Flags according to DNP3, if variation is 'w/ flag' Note: Flags of outputs cannot be written by the DNP3 master (here: OPC server), but only the PLC application, that controls the MERTU.
.Freeze	Writing to a tag with the group ID 21 ('frozen counters) and this subattribute causes a DNP3 'Freeze' command to be sent to out station for the respective counter. The counter value can be read via another OPC tag with the same point ID and the subattribute '.Value'.

The subattribute 'TimeStamp' will be translated into the time stamp property of the OPC tag.

Note: To access via OPC a point in a different variation, a new OPC tag must be defined. This OPC tag has the same DNP3 group number and point ID as the original tag, but a different index for the variation.



Note: The flags content depends on the object group and for a definition of its meaning external DNP3 specification documents may be consulted.

## ■ Different Variations for Binary Inputs and Outputs

The following tables show how the same binary input with ID 16 is accessed using different variations and data types. The tags with their respective DNP addresses:

Name	Address	Data Type	Access Rights
TagBinIn16Var0	1.0.16.Value	BOOL	Read
TagBinIn16Var1	1.1.16.Value	BOOL	Read
TagBinIn16Var2	1.2.16.Value	BOOL	Read
TagBinIn16Var2_uint	1.2.16.Value	WORD	Read

The tag values in the monitoring view:

Item ID	Value	Timestamp	Quality
DevMERTU.TagBinIn16Var0	1 (VT_BOOL)	11/25/14 17:42:49.165	Good
DevMERTU.TagBinIn16Var1	1 (VT_BOOL)	11/25/14 17:42:49.165	Good
DevMERTU.TagBinIn16Var2	1 (VT_BOOL)	11/25/14 17:42:49.165	Good
DevMERTU.TagBinIn16Var2_uint	1 (VT_UINT)	11/25/14 17:42:49.165	Good

The following tables show how the same binary output with ID 1 is accessed using different variations and data types. The output tags with their respective DNP3 addresses:

Name	Address	Data Type	Access Rights	Enable
TagBinOut1Var0	10.0.1.Value	BOOL	Read, Write	Yes
TagBinOut1Var1	10.1.1.Value	BOOL	Read, Write	Yes
TagBinOut1Var2	10.2.1.Value	BOOL	Read, Write	Yes
TagBinOut1Var_uint	10.2.1.Value	WORD	Read, Write	Yes

The tag values in the monitoring view:

Item ID	Value	Timestamp	Quality	Subquality
RTU1.BinOut2.TagBinOut1Var0	1 (VT_BOOL)	11/26/14 09:32:45.852	Good	Non-specific
RTU1.BinOut2.TagBinOut1Var1	1 (VT_BOOL)	11/26/14 09:32:45.852	Good	Non-specific
RTU1.BinOut2.TagBinOut1Var2	1 (VT_BOOL)	11/26/14 09:32:45.852	Good	Non-specific
RTU1.BinOut2.TagBinOut1Var_uint	1 (VT_UINT)	11/26/14 09:32:45.852	Good	Non-specific

# 4.7 DNP3 Tag Properties - Advanced

DNP3 Tag Properties

General

Advanced

Alarms

Multiply

☒ Use Array Type

Data Type:

Array of BOOL

Number of Elements:

20

Lower Bounds:

0

Save

Save & New

Cancel

Name	Type	Range	Description
Use Array Type	Checkbox	Checked/not checked (default)	If clicked enables the usage of array as OPC tag
Data Type	Choice list	Array of BOOL Array of UINT (WORD) Array of DUINT (DWORD) Array of INT Array of DINT Array of REAL Entry depends on data type selected in the 'DNP3 Tag Properties – General' page	Data type of the array container
Number of Elements	Integer	1 – 254 Default: 20	Number of elements in array
Lower Bounds	Integer	0 – 254, default: 0	First index in the array Note: The global array variables exported in the user library will always start with index 0 as 'Lower Bounds'.

# 4.8 DNP3 Tag Properties - Alarms

DNP3 Tag Properties

General

Advanced

Alarms

Multiply

General Setup

☒ Generate Alarms

Message prefix:

Limit Alarm:

LimAlarm001

Digital Alarm:

<Not Assigned>

Save

Save & New

Cancel

Name	Type	Range	Description
Generate Alarms	Bool	Checked/unchecked (default)	If checked, the OPC server will automatically generate a limit and/or digital alarm based on the data item value
Message prefix	Text	—	First part of the alarm message for this data item
Limit Alarm	Selection	Existing limit alarm definitions	Select a definition for limit alarms from the list
Digital Alarm	Selection	Existing digital alarm definitions	Select a definition for digital alarms from the list

## 4.9 DNP3 Tag Properties - Multiply

The screenshot shows the 'DNP3 Tag Properties' dialog box with the 'Multiply' tab selected. The dialog has four tabs: 'General', 'Advanced', 'Alarms', and 'Multiply'. The 'Multiply' tab contains the following fields and controls:

- Multiply when saving:** A checked checkbox.
- First Number:** A text input field containing the value '5'.
- Numeric places:** A spin box set to '3'.
- Number of items:** A spin box set to '1'.
- Base Text:** A text input field containing the value 'Tag'.
- Address:** A text input field containing the value '40.0.0.Value'.

At the bottom of the dialog are three buttons: 'Multiply' (highlighted in blue), 'Save & New', and 'Cancel'.

The multiply page allows creating multiple tags using a template which is assembled from text and numeric range items. When clicking the 'Multiply' button the tags will be created, if the template is able to construct valid OPC identifiers and DNP3 address strings.

Name	Type	Range	Description
Multiply when saving	Bool	Checked/unchecked (default)	If checked allows to insert multiple OPC tags
First number	Integer	0 – 1.000.000.000, default depends on tag counter from database	Start number to append to base text for building the OPC tag name Note: The upper limit is based on the max number of numeric places
Numeric places	Integer	1-10	Number of digits in resulting OPC tag name
Number of items	Integer-	1-65535	Number of tags to be created
Base Text	String	Max 34 chars, default: empty	Starting Name of the tag
Address	DNP3 address	Read only	DNP3 address which will be multiplied. For each new tag the DNP3 address is constructed by incrementing the point ID in the given address, until the max possible DNP3 point ID number of 65535 is reached.

Note: the default values for 'Numeric places' and 'Number of items' are the last values, the respective user has entered in the 'Multiply' dialog for a tag of any of the supported devices.

## 4.10 iQ Works Integration (User Library)

In order to provide access to DNP3 interfaces the MX OPC server does not have to communicate with the host PLC of the RTU or to interact with iQ Works. However a good integration of the DNP3 RTU into iQ Works will be the major advantage for customers compared to solutions, where a standard DNP3 OPC server is used with any other PLC. The automatic code generation brings down engineering and service costs. The experience gained from existing PLC code generators for PROFIBUS, PROFINET and CC-Link proves helpful in designing an integration of the DNP ME-RTU modules.

The following sections describe the iQ Works integration in detail:

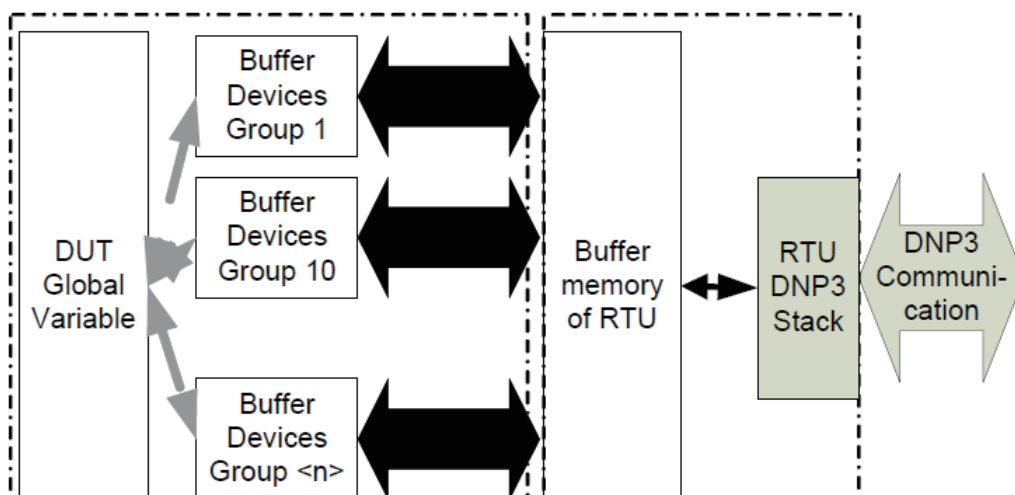
- Purpose of User Library
- Contents of User Library
- Generating the User Library

### Purpose of User Library

The DNP3 RTU must interact with the PLC application running on the respective CPU. The data for DNP3 inputs must be copied from CPU devices to the shared memory of the RTU. For FX3 CPUs the data can be transferred via the CPU bus connection. For Qn- and Ln-CPU's the data is transferred via a 'Simple Socket'-connection.

There is already a collection of function blocks specifically for the ME-RTU. The function blocks encapsulate the data exchange with the ME-RTU. The library contains different function blocks for FX3- and for Qn-/Ln-CPU's.

The following diagram shows the data exchange between global variables used in the PLC program via buffer devices and the DNP3 protocol to the OPC data model consisting of groups and items.



The DNP3 firmware fetches the data from the shared memory to send it via DNP to the DNP3 master, which in this case is identical to the OPC server. In the opposite direction the outputs, which are set by the master, are stored in the shared memory of the RTU, from where they are copied to CPU devices used by the PLC program.

Note: the 'I/O Mapping' functionality is only provided for the 'ME-RTU' model as DNP3 outstation. If the OPC server is connected to a 3rd party DNP3 station, these functions cannot be provided, as they are vendor-specific.

## Contents of User Library

A DNP3 user library contains the definitions and code for a single ME-RTU. At first the use of multiple RTUs connected to the same CPU is not supported, as it is rather unlikely for real applications.

The user library consists of:

1. A global variable of type 'ARRAY OF WORD' for each supported DNP3 group+variation combination, which has the same size as the corresponding DNP3 buffer. This GV is mapped to the device address, which the user has assigned to the buffer.
2. A global variable for each OPC item, which is related to a specific item ID and variation and with the subattribute '.Value'. OPC items, which refer to for example 'Flags' of DNP3 points, are not included in the user library. The corresponding DNP3 identifier (<group>.<variation>.<item ID>.<sub\_attribute>) is added as comment.
3. The global variables for DNP3 outputs are presently only exported for the group numbers 10 (binary) and 40 (analog) and only for the command values, not for the status areas.

The data types of global variables for OPC items are derived from the OPC tag type, except for the following groups:

Group No.	Group Identifier	Fixed Variable Type
1	Binary Inputs	BOOL
3	Double Binary Inputs	ARRAY [0..1] OF BOOL
10	Binary Outputs	BOOL

Note: the user library does not include the copy instructions to exchange the buffer device blocks with the corresponding shared memory areas in the ME-RTU. This part must be added by the user.

### Example

```

1  (* SOFTCONTROL:P3scŽqAâ
2  VERSION:7.00.03 *)
3
4  TYPE
5  END_TYPE
6
7  PROGRAM DNP3_4
8  (**)
9  (**)
10 'IL'
11 BODY
12 WORKSPACE
13   NETWORK LIST TYPE := NWTYPEIL ;
14   ACTIVE_NETWORK := 0 ;
15 END_WORKSPACE
16
17 END_BODY
18 END_PROGRAM
19
20 CONFIGURATION scConfiguration GVL_INP3_4
21   RESOURCE scResource ON scResourceType
22     VAR GLOBAL
23       gvDNPGrp20Var2 AT @'D100': ARRAY [0..9] OF WORD;
24       gvDNPGrp20Var1 AT @'D120': ARRAY [0..19] OF WORD;
25       gvDNPGrp30Var2 AT @'D200': ARRAY [0..0] OF WORD;
26       gvDNPGrp30Var1 AT @'D250': ARRAY [0..99] OF WORD;
27       gvDNPGrp10Var2 AT @'D50': ARRAY [0..0] OF WORD;
28       gvDNPGrp40Var2 AT @'D300': ARRAY [0..0] OF WORD;
29       gvDNPGrp40Var1 AT @'D350': ARRAY [0..39] OF WORD;
30       TagAI_16bit AT @'D201': INT;
31       TagAI_32bit AT @'D330': DINT;
32       TagAO_16bit AT @'D301': INT;
33       TagAO_32bit AT @'D370': DINT;
34       TagDI_1bit AT @'D10': WORD;
35       TagDO_1bit AT @'D50': WORD;
36     END_VAR
37   END_RESOURCE
38 END_CONFIGURATION

```

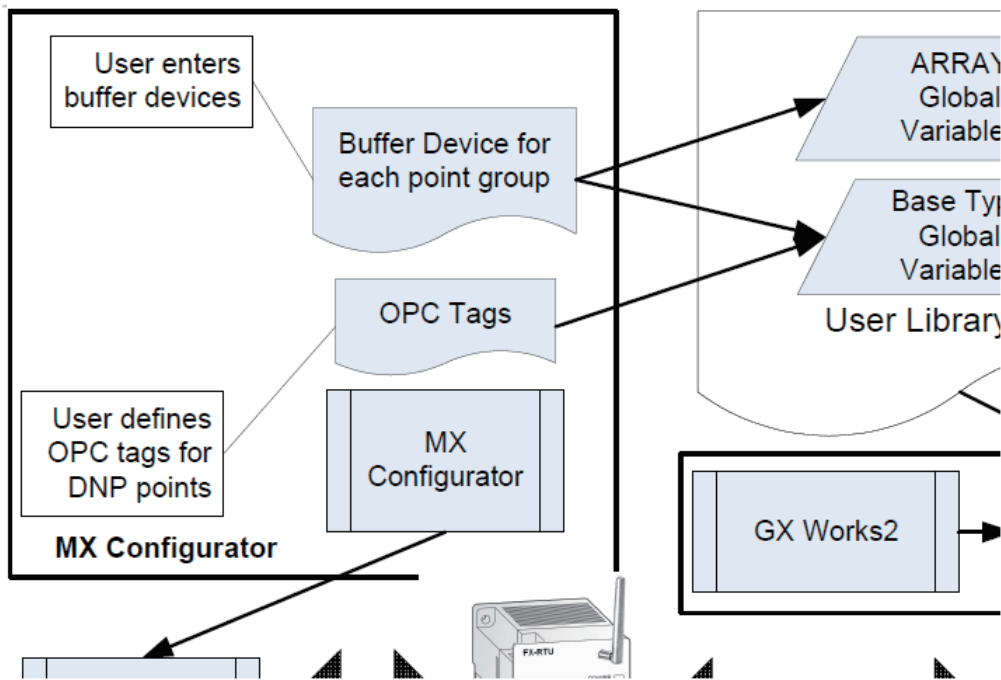
Variables for transfer

Variables for OPC tags

The listing shows the contents of an example user library with the DNP3 global variable definitions as described in section 'Contents of User Library'.

# Generating the User Library

The next diagram contains the PLC program objects, which are generated by MX OPC Server (actually the MX Configurator component) for the PLC application. The user library must first be manually imported into the respective PLC program, before it can be used.



# 4.11 OPC Alarms and Events

OPC Alarms & Events for DNP3 devices allows AE clients to receive condition events generated by the OPC servers. The OPC server supports the following filtering options for Condition Events for AE clients:

Event	Condition.	
Category	Filter by server-defined categories. Each event is assigned to one category. Descriptions of the categories are as follows:	
	Level Alarms	Events that are generated by process level conditions. The following levels will be supported: <ul style="list-style-type: none"><li>• high and highhigh, for example, tank level &gt; high &gt; highhigh</li><li>• low and lowlow, for example, LowLow &lt; Low &lt; tank level</li></ul>
	Deviation Alarms	Events that are generated by deviation conditions (deadband), For example, tank level +/- 10.
Severity	Filter by severity level. Levels range from 0 to 1000; 1000 is the most severe. Each event is assigned a severity.	
Source	All events are related to OPC DA server tags. Filter by source gets events only from the related DA server tag.	

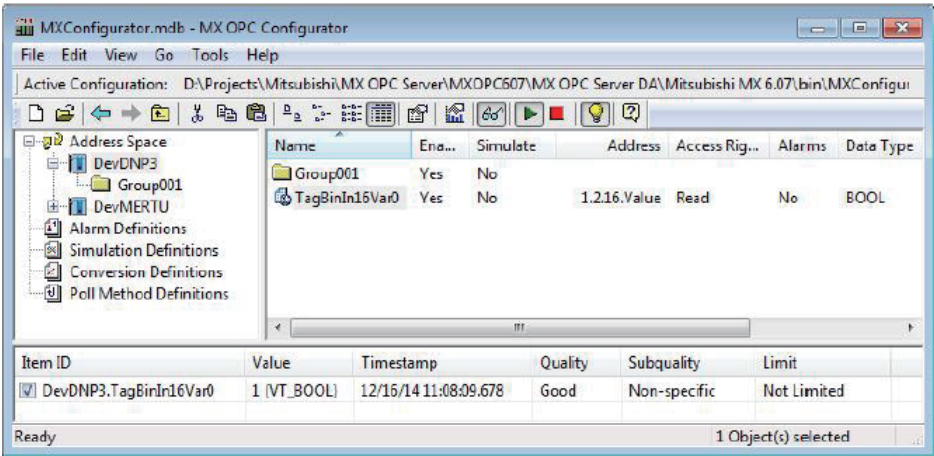
In a later step it will be possible to not only configure events that are related to OPC tags but also simple events such as information, warning and error reported by an outstation.

The user interface to create limit alarms is already specified in MX OPC server and will be supported by the DNP3 device type. No online monitoring of OPC events will be supported as it is the same for all device types supported by MX OPC server.



# 4.12 Online Monitoring of OPC DNP3 Tags

Online monitoring of OPC DNP3 tags is enabled for each item with a check mark next to it. To enable/disable monitoring for an item, you can click on the box to the left of the item. A check mark inside the box means the item is enabled for monitoring. If there is no check mark, then the item is disabled.

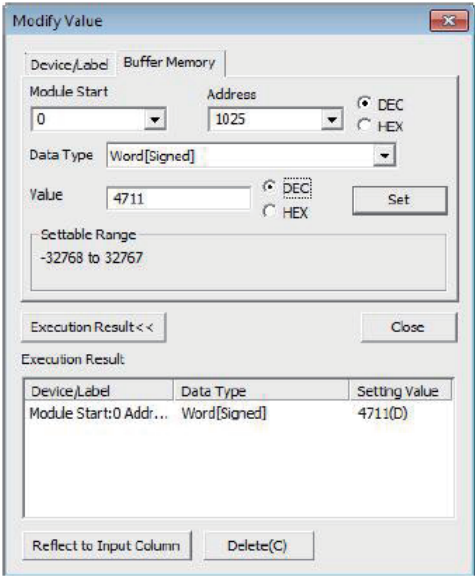


Note: after a reset of the ME-RTU the status of all inputs is 'Bad' except for the first bits of group 1, which are hardwired to the input pins on the RTU front. Only after the first write to the buffer memory either from the PLC program or via the 'Modify Value' function in GX Works2, the input status changes to 'Good'.

Initial Status

Item ID	Value	Timestamp	Quality	Subquality	Limit
<input checked="" type="checkbox"/> DevDNP3.TagBinIn16Var0	???	12/16/14 11:01:28.101	Bad	Out of Service	Not Limited

Write to RTU Buffer Memory



Tag Status Good

Item ID	Value	Timestamp	Quality	Subquality	Limit
<input checked="" type="checkbox"/> DevDNP3.TagBinIn16Var0	1 [VT_BOOL]	12/16/14 11:08:09.678	Good	Non-specific	Not Limited

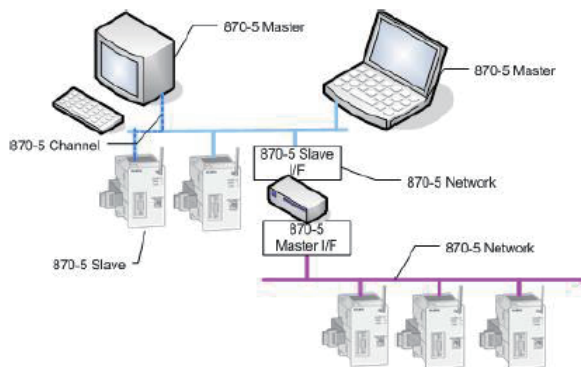
# 5 IEC 60870-5 Device

## IEC 60870-5 Communication

The international standard IEC 60870-5 is a communication protocol, which is widely used especially by utilities (electricity, water, gas).

## IEC 60870-5 Network

The physical layer can be either serial (sub standard '-101') or Ethernet with TCP/IP (sub standard '-104'), which allows applying IEC 60870-5 in a wide range of environments. An IEC 60870-5 network consists of at least one master and one or more slaves. Different IEC 60870-5 networks can be combined in a hierarchy, where a slave on a higher level network is also a master on a lower level IEC 60870-5 network.



IEC 60870-5 differs from other fieldbus communication protocols in a number of characteristics:

especially reliable data transfer

- Detection of transmission errors
- Authentication
- VPN connections
- Time synchronization
- Test procedure

The reliable communication is a task of the IEC 60870-5 stack, which is accessed by the OPC server. The IEC 60870-5 data transfer is hidden from the user by the OPC interface, except for the configuration of the communication properties (see 'IEC 60870-5 Channel Properties').

event-driven communication

- Event detection in IEC 60870-5 station
- Unsolicited data without polling
- Time-stamped events

The OPC interface is already event-driven, even if the underlying communication is a classical polling-based protocol.

Therefore these features are hidden from the user by the internal implementation of the OPC server.

Multiple masters

- 'select-before operate' to synchronize access to 'out' values

This feature distinguishes IEC 60870-5 from other single-master Fieldbus protocols. During operation it must be considered, which output data could be written by another master in the network.

flexibility/extensibility

- Message segmentation (i.e. split a message over several frames)
- User-defined data objects
- File transfer

IEC 60870-5 can be extended from the pre-defined data objects by adding user-defined objects. The size of an object is not restricted by the size of the transport frame. However in the first edition only the ASDU types (IEC 60870-5 type IDs) listed in 'Supported IEC 60870-5 Type IDs (ASDU Types)' can be accessed.

## IEC 60870-5 Terms and Types

The following terms are frequently used in combination with IEC 60870-5:

IEC 60870-5 Term	Description	OPC
Channel	Network connection between a IEC 60870-5 master and the network interface of one or multiple remote slaves.	Transfer settings for connection between MXOPC and IEC 60870-5 station
Type ID	Identifies the type of an I/O point, e.g. binary input, analog output. There are several pre-defined groups. On some stations user-specific groups can be defined as well.	OPC tag address
Point Object, IOA	Information Object Address (IOA) addresses a Data item, which is identified by its numerical ID within the respective sector.	OPC tag address
Master	Controls the communication with a slave	OPC server
Network	Either serial multi-drop or standard Ethernet connection between one or multiple masters and one or many slaves.	Fieldbus network
Slave	Term used for a IEC 60870-5 slave network node, which serves the communication. The 'slave' must be attached to a 'Channel' and is identified by channel and IEC 60870-5 station address. Several stations can share the same channel, provided that they have different IEC 60870-5 addresses.	OPC device
Session	Term used for the connection between a master and a slave via a specific channel. In most cases there is a 1-1 relation between session and channel.	Connection between OPC server and device
Station address	Numerical value, which in combination with the channel identifies the network node (master or slave).	Part of transfer settings
Sub type	Selects the attribute of a point object to be accessed, e.g. the value, timestamp etc.	OPC tag value or property
Sector	A device can be divided into several sectors to allow for grouping related data. It has its own Information Object Address( IOA) space. In the OPC server a session/sector pair is represented as server devices for each channel.	OPC tag address

## Data Model

The data is presented in a point-list, where a point is identified by its ASDU type (type ID) and its IOA within the sector. Standard type IDs for points are for example:

- M\_SP binary inputs
- C\_SP binary outputs
- M\_SE\_FV analog inputs
- C\_SE\_FV analog outputs
- M\_IT counters

Points of different types can be combined in the same message. To identify a point within a slave IEC 60870-5 defines the following notation:

<Type ID>.<IOA>[.<Sub-Type>].[Optional]

Type ID	IOA	Sub-Type	Optional
The ASDU type	Addressed with its ID, i.e. unique index in sector Range is [0, 16777215]	Attribute of the data point to access, e.g. 'Value' or 'QualityDesc'	Attribute which is not required, e. g. 'Short Pulse'

## 5.1 Adding IEC 60870-5 Device

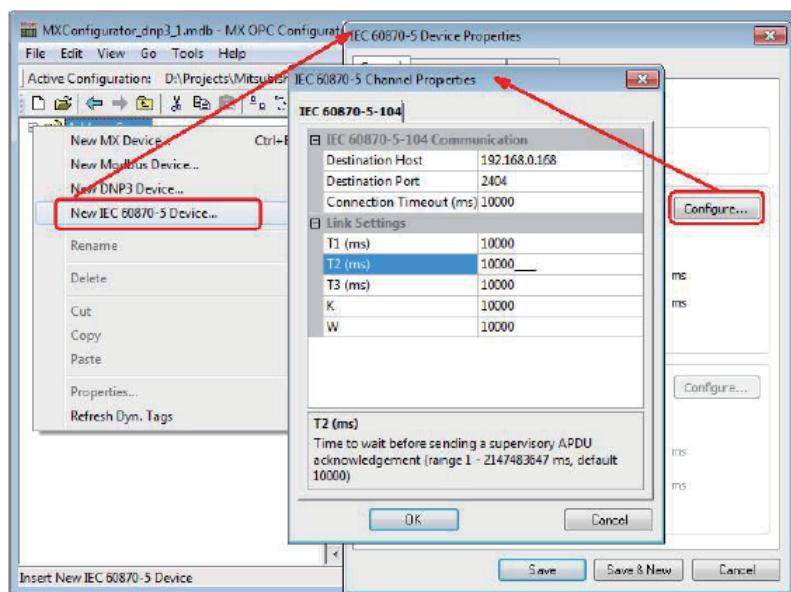
Support of IEC 60870-5 slaves is implemented in a new type of device, which is included in the context menu of the 'Address Space' node. The menu item 'New IEC 60870-5 Device...' opens the 'IEC 60870-5 Device Properties' dialog.

### Steps to Add a IEC 60870-5 Device

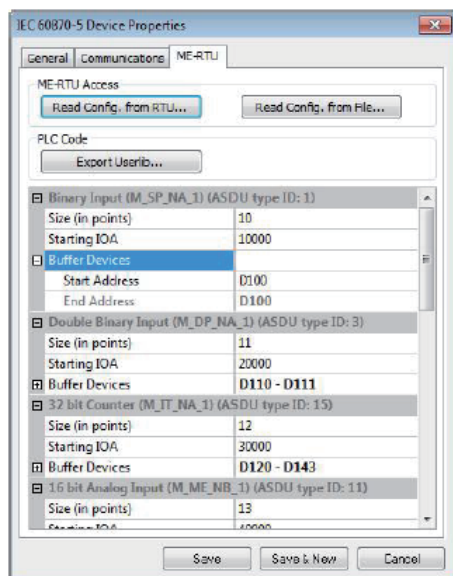
The following steps show the configuration in MXConfigurator to access a IEC 60870-5 station.

#### Operating procedure

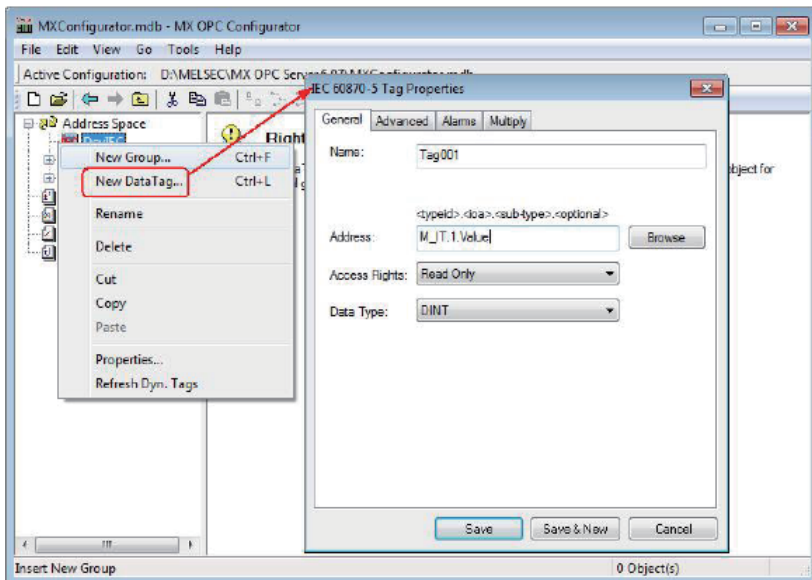
1. Select the item 'New IEC 60870-5 Device' from the 'Address Space' context menu.
2. Define a 'IEC 60870-5' channel (i.e. network connection) by pressing 'Configure'.
3. Configure an Ethernet connection.



4. Assign CPU buffer devices for the data exchange between the ME-RTU and the host CPU (ME-RTU only; for other types of IEC 60870-5 stations this is outside the MX OPC server!)

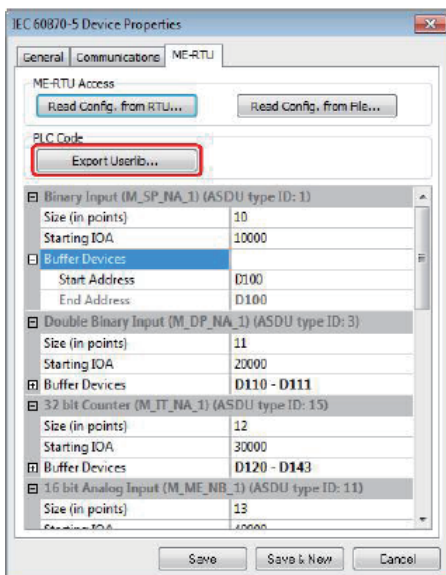


5. Close 'Device Properties' and select item 'New Data Tag' from the device context menu.



5

6. When using the PLC code generation the user library must be updated each time I/O layout or CPU buffer devices have changed.



## 5.2 IEC 60870-5 Device Properties - General

The 'IEC 60870-5 Device Properties - General' dialog provides access to the settings for the connection between MX OPC Server and the IEC 60870-5 OutStation. The Ethernet connection -104 is supported.

Parameter	Type	Range	Description
Device Name	String	Max 32 characters, must be unique	Identifier chosen by user
IEC 60870-5 Channel	String	Read-only	Identifier of associated primary channel (see section 'Channel Identifier ' below on how the identifier is constructed)
Configure	Button	—	Opens the dialog 'IEC 60870-5 Channel Properties'
Number of Retries	Long	0 – 16, 3 (default)	Number of communication retries before the communication is aborted or handed over to backup channel
Delay Time	Long	0 – 99999, 0 (default)	Time in ms to wait in between two communication retries
Polling rate	Long	1 – 2147483647 1000 (default)	Interval in ms to check for updates of IEC 60870-5 tags by explicitly sending read requests
Connection Test	Button	—	Performs a connection test with the configured channel parameters, see section Connection Test
Enable	Bool	Checked or unchecked (default)	If selected, the backup channel will be used in case the primary channel fails (for details see section 'Backup Channel')
IEC 60870-5 Backup Channel	String	Read-only	Identifier of associated backup channel , which will be activated if primary fails (see section 'Channel Identifier' below on how the identifier is constructed)

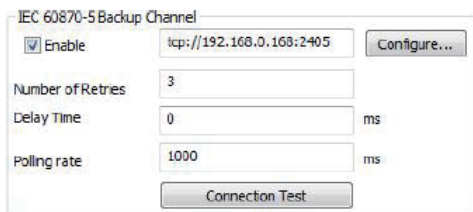
### Channel Identifier

The identifier of the configured communication link (i.e. 'IEC 60870-5 channel') is constructed from the current settings:

Ethernet connection	<protocol>://<IP address>:<port number>
---------------------	---

## Backup Channel

The backup channel is a second set of connection settings, which are used to automatically establish an alternative communication link to the device in case the primary connection fails. If the 'Enable' checkbox is set, the 'Configure' button is enabled and opens the same dialog for editing the connection settings as for the primary channel.



IEC 60870-5 Backup Channel

☒ Enable    tcp://192.168.0.168:2405    Configure...

Number of Retries: 3

Delay Time: 0 ms

Polling rate: 1000 ms

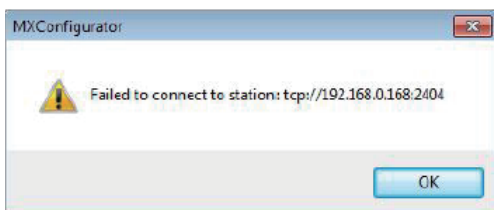
Connection Test

## Connection Test

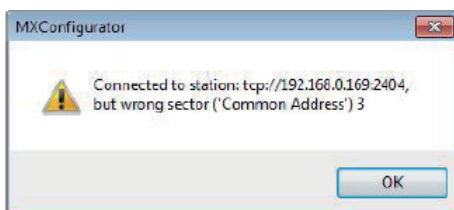
Pushing this button performs a connection test using the configured channel parameters. Additionally IEC 60870-5-104 connectivity is checked also. If the connection test succeeded, the message box shows the text "Successfully connected to station:", followed by the channel identifier as defined in section 'Channel Identifier'. For a TCP connection the message box may look like:



In case of failure the message box shows the text "Failed to connect to station:" followed by the channel identifier, for example:



If the connection test with the channel parameters was successful, but the IEC 60870-5-104 connectivity has not been successfully (i.e. wrong sector address (Common Address)) the following message box is displayed:





## IEC 60870-5 channel properties

An IEC 60870-5-104 channel represents the TCP/UDP connection between an IEC 60870-5 master and one or several slaves. Multiple slaves can share the same channel, provided they have different IEC 60870-5 ASDU IDs (Common Addresses).

### IEC 60870-5 Ethernet Channel Properties

IEC 60870-5 Channel Properties

IEC 60870-5-104

☐ IEC 60870-5-104 Communication

Destination Host: 192.168.0.168

Destination Port: 2404

Connection Timeout (ms): 10000

☐ Address Settings

Originator Address: 0

☐ Link Settings

T1 (ms): 15000

T2 (ms): 10000

T3 (ms): 20000

K: 12

W: 8

**Originator Address**

This parameter specifies the second byte of the Cause of Transmission (COT) field, which is used by a dual-mode device to route responses from a slave to the correct master. The valid range is 0 to 254. The default setting is 0.

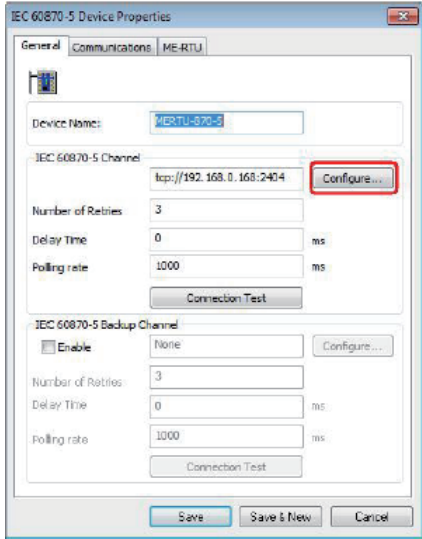
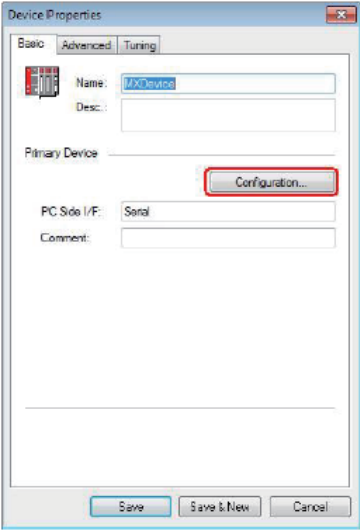
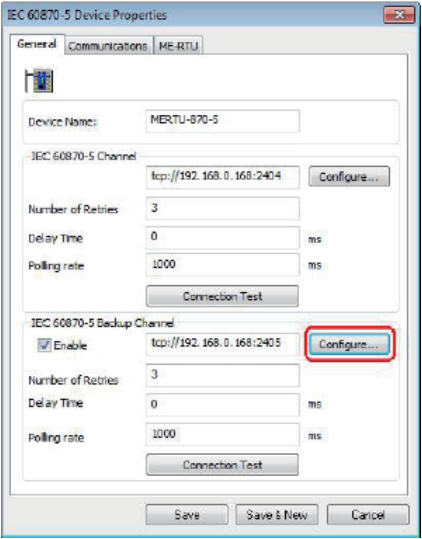
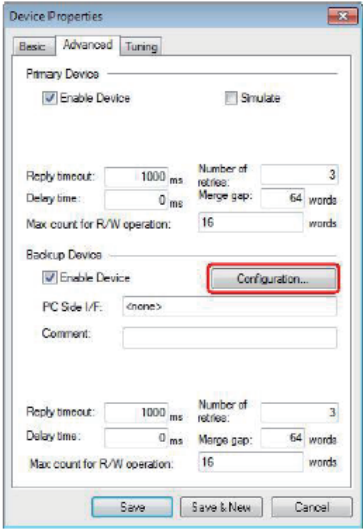
OK Cancel

Parameter	Type	Range	Description
Destination Host	ANSI string	String (chars for valid host name) or IPv4 address (decimal dot notation) Default: 192.168.0.10	Network identifier or address of slave
Destination Port	Unsigned long	1 - 65535 Default: 2404	TCP or UDP port number of slave
Connection Timeout	Unsigned long	1-99999 ms Default: 10000 ms	Time in milliseconds, in which station must have responded to a connect request Usually longer than request timeout
Originator Address	Unsigned short	0 – 254 Default: 0	This parameter specifies the second byte of the Cause of Transmission (COT) field, which is used by a dualmode device to route responses from a slave to the correct master.
T1	Unsigned long	1 - 2147483647 ms Default: 15000 ms	Time to wait for acknowledgement to a transmitted APDU
T2	Unsigned long	1 – 2147483647 ms Default: 20000 ms	Time to wait before sending a supervisory APDU acknowledgement
T3	Unsigned long	1 – 2147483647 ms Default: 20000 ms	Idle time before sending TEST APDU
K	Unsigned long	1 – 32767 Default: 12	Maximum unacknowledged transmitted APDUs. The master does not send more APDUs if the maximum number of APDUs have been transmitted and have not been acknowledged.
W	Unsigned long	1 - 32767 Default: 8	Maximum unacknowledged received APDUs. This setting works in conjunction with T2 to limit how often the master acknowledges APDUs. Increasing this setting can reduce bandwidth required for acknowledging



## IEC 60870-5 Backup Connection

Additionally to the settings of the channel for normal communication the user can specify a second connection, which is used, if the first connection fails. This handling corresponds to the backup connection mechanism, which exists for MELSOFT (MX) devices. However the access to the backup connection settings differs between both device types, as the following comparison shows.

	IEC 60870-5 Device	MELSOFT MX Device
Standard connection		
Backup connection		

## 5.3 IEC 60870-5 Device Properties - Communications

IEC 60870-5 Device Properties

General Communications ME-RTU

☒ Address Settings

Common Address 3

☒ General Interrogation

General Interrogation Period 0

General Interrogation at start-up Disabled

☒ Incremental Totals Interrogation

Counters Interrogation Period 0

Counters Interrogation at start-up Disabled

☒ Unsolicited Messages

Unsolicited Messages Disabled

☒ Time Synchronisation

Time Synchronization Disabled

Time Synchronization Period 0

☒ Test Procedure Settings

Test Procedure Period 0

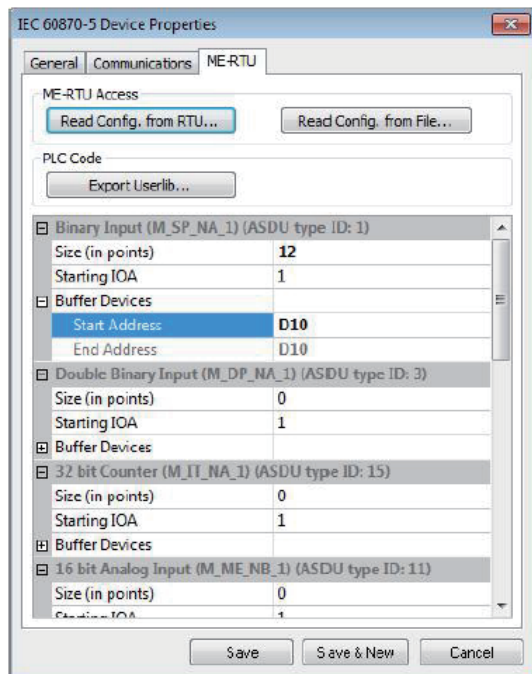
Save Save & New Cancel

Parameter	Type	Range	Description
Common Address	Unsigned Short	1 – 65534, default is 3	This parameter specifies whether to permit the addressing of the whole station and, optionally, a particular sector within a station. A station represents a physical device; a sector represents a set of data within a device. Sectors are commonly used by passthrough devices (which must separate data from the multiple devices they represent, i.e. ME-RTU) and by devices that want to segment their data based on type.
General Interrogation Period	Unsigned long	0 – 2147483647, default is 0	Configures the master to perform a General Interrogation based on a specified time interval. The specified period elapses. Specifying an interval of 0 disables periodic GI
General Interrogation at startup	Bool	Enabled, Disabled, default is Disabled	Commit General Interrogation after connection is established
Counters Interrogation Period	Unsigned long	0 – 2147483647, default is 0	Configures the master to perform a Counter Interrogation based on a specified time interval. The specified period elapses. Specifying an interval of 0 disables periodic CI
Counters Interrogation at startup	Bool	Enabled, Disabled, default is Disabled	Commit Counter Interrogation after connection is established
Unsolicited Messages	Bool	Enabled, Disabled, default is Disabled	Send command to outstation to enable/ disable sending unsolicited messages after connection is established
Time Synchronization	Bool	Enabled, Disabled, default is Disabled	Time synchronization at start-up
Time Synchronization Period	Unsigned long	0 – 2147483647, default is 0	Commit time synchronization periodically. Specifying an interval of 0 disables time period time synchronization
Test Procedure Period	Unsigned long	0 – 2147483647, default is 0	Send test procedure periodically to outstation. Specifying an interval of 0 disables period test procedure generation

## 5.4 IEC 60870-5 Device Properties - MERTU

The 'ME-RTU' device properties page allows to configure parameters specifically for the ME-RTU IEC 60870-5 module. The following options are supported:

- Configuring CPU Buffer Devices
- Reading ME-RTU Configuration File
- Export UserLib



Parameter	Type	Range	Description
Read Config. from RTU	Button	—	<ul style="list-style-type: none"> <li>• Opens a dialog to provide the login information for the ME-RTU</li> <li>• Establishes a SFTP connection and downloads the configuration file 'settings.xml' from the file system of the ME-RTU</li> <li>• Displays a file 'Save As' dialog to select the file path, where the uploaded ME-RTU configuration will be stored</li> <li>• Shows the buffer sizes as set in the RTU</li> <li>• See section 'Reading ME-RTU Configuration File'</li> </ul>
Read Config. from File	Button	—	<ul style="list-style-type: none"> <li>• Opens a dialog to select the file with the MERTU configuration ('settings.xml')</li> <li>• Shows the buffer sizes as set in the RTU</li> </ul>
Export Userlib	Button	—	<ul style="list-style-type: none"> <li>• Displays a file dialog to select the file path for the user library (.sul)</li> <li>• Queries for the target PLC software, for which the user library should be generated</li> <li>• Checks, whether a user library can be generated from the IEC 60870-5 configuration</li> <li>• If the configuration is valid, a user library is generated in the given directory with global variables for access to RTU I/O points</li> <li>• See section 'Export Userlib'</li> </ul>
IEC 60870-5 Type ID] Size (in points)	Number	0 – <max point ID> (see table below), default: 0	The size of the respective area in points each buffer can hold 512 words (1024 bytes) of points as maximum. Therefore the max number of points is specific to the respective buffer.
[IEC 60870-5 Type ID] Starting IOA	Number	1 - 16777215	The 'Information Object Address' of the first point in the respective group. This setting must match that of the RTU.
[IEC 60870-5 Type ID] Start Address	CPU device address	D and R devices (see table below)	Valid CPU device address (no bit indices, bit devices must be word-aligned)
[IEC 60870-5 Type ID] End Address	CPU device address	Read-only	<p>The end addresses is calculated by adding the buffer size to the start address. The buffer size is determined from the number of points set for the respective group.</p> <p>Note: If there are no tags defined in the respective group, the end address of the buffer device block is shown as 'N/A', because the buffer is not used.</p>

## Configuring CPU Buffer Devices

In order to facilitate the integration of IEC 60870-5 I/Os into the PLC application, each DNP point group must have a PLC device address assigned. The contents of these devices are copied to/from the shared memory addresses in the RTU, which are fixed for each point group.

The following word device types are supported as buffer devices:

Device Type	Address Range
D	0 - 4891647
R	0 - 32767

Note: this limited range is based on the facts that the device types must be supported by all CPUs, which can interact with the ME-RTU (Q, L and FX).

The ME-RTU exchanges IEC 60870-5 protocol data from or to the PLC via shared buffer memory. The different data types (IEC 60870-5 type IDs) are associated with different BFM start addresses. The following table shows the BFM layout of the RTU modem for data exchange with the PLC:

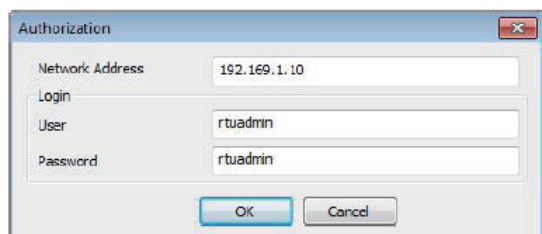
Data direction	Basic data type	IEC 60870-5 Type ID	Max number points	BFM address	
				Start	End
Input Data	Binary Input	M_SP, Single point Information	8192	1024	1535
	Double Binary Input	M_DP, Double point Information	4096	5632	6143
	32 – bit Counters	M_IT, Integrated Totals	256	8960	9471
	16 – bit Analog Input	M_SE_SV, Measured Value, Scaled value	512	9600	10111
	32 – bit Analog Input	M_BO, Bit String of 32 bit, does not support bit indexing	256	10368	10879
	Short float Analog Input	M_SE_FV, Measured Value, Short Floating Point Number	256	11008	11519
Output Data	Binary Output	C_SP, Single Point Command	8192	16384	16895
	Double Binary Output	C_DP, Double point Command	4096	24576	25087
	16 – bit Analog Output	C_SE_SV, Set Point Command, Scaled Value	512	20992	21503
	32 – bit Analog Output	C_BO, Bit string of 32 bits, does not support bit indexing	256	22272	22783
	Short float Analog Output	C_SE_FV, Set Point Command, Short Floating Point Number	256	23424	23935

Note: for further information on the buffer structures in the ME-RTU please consult the user's manual of the RTU.

## Reading ME-RTU Configuration File

The ME-RTU can be configured with a text file in XML format. This file can be read from the RTU using the separate command line utility 'rtuscp'. Pressing the 'Read Config. from RTU' button does the same as the command line tool, but more comfortable. It opens a 'File Save As' dialog to select the path, where the configuration file is stored.

Note: the file is not imported by MX OPC Server. The main purpose of this function is to read the configuration file without using the separate 'rtuscp' command line executable. Optionally the user can view the available point IDs, which result from the RTU configuration. In a future version the configuration file can however be used to validate the IEC 60870-5 addresses of the OPC tags and the POU-related settings.



Parameter	Type	Range	Default	Description
Network Address	Text	Either host name or IPv4 address	Host address as set in the primary IEC 60870-5-104 channel	Host name or IP address of the MERTU
User	Text	—	"rtuadmin" (default)	User ID as configured in the ME-RTU
Password	Text	—	"rtuadmin" (default)	Password as configured in the MERTU
OK	Button	—	—	Closes the dialog and attempts to connect to the ME-RTU and to upload the configuration file.
Cancel	Button	—	—	Cancel the upload attempt

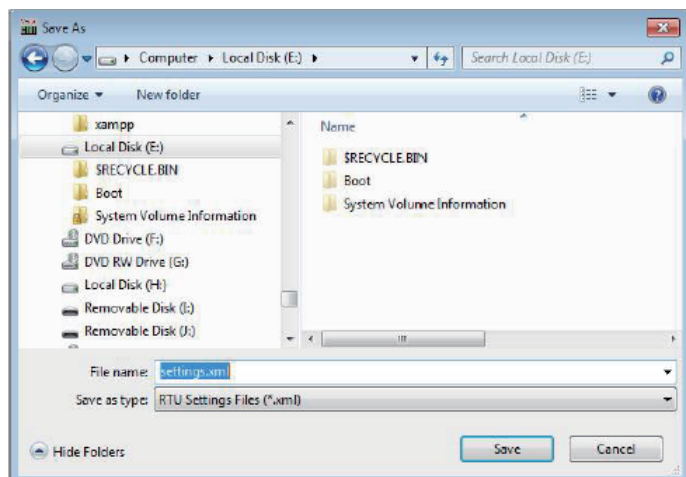
If the given login is correct, the file is read from the ME-RTU.

The file contains an XML document with the settings of the ME-RTU. The format is specific to the ME-RTU, but can be viewed and edited with a standard text editor as well as specific XML editors.

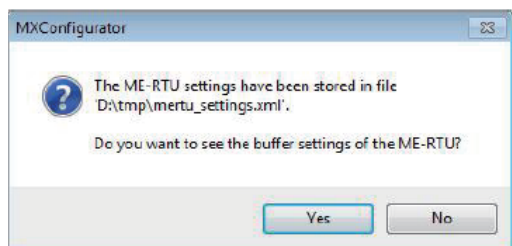
Excerpt of a sample configuration file:

```
<?xml version="1.0"?>
<Settings xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <GeneralSettings>
    <!-- FX or Q_L -->
    <PLCtype>FX</PLCtype>
    <!-- SlaveOnly or MasterAndSlave -->
    <RTUOperatingMode>SlaveOnly</RTUOperatingMode>
    <!-- Enable or Disable -->
    <PLCInputDataWriteAccess>Disable</PLCInputDataWriteAccess>
    <UsedProtocol>IEC60870</UsedProtocol>
    <!-- Ethernet or Serial -->
    <ProtocolCommPath>Ethernet</ProtocolCommPath>
    <DataRetentionEnable>Enable</DataRetentionEnable>
  </GeneralSettings>
</Settings>
```

After the configuration file is read from the ME-RTU, the 'Save' dialog is displayed. Here the user must select a file where to store the configuration information from the RTU.



The user is informed that the file has been stored in the selected file path and can choose to view the point buffer configuration of the RTU.



If the user presses 'Yes', the settings file is analyzed and the available point buffers are listed in an HTML document displayed with the default browser. This HTML document assists the user when specifying IEC 60870-5 addresses on the ME-RTU for OPC tags.

Buffer	ASDU Type	Nr. Points	IOA IDs	104 Addresses	BFM Address
Binary Inputs	M_SP	1040	10000 - 11039	M_SP.{10000 - 11039}	1024
Double Binary Inputs	M_DP	512	20000 - 20511	M_DP.{20000 - 20511}	5632
32-bit Counters	M_IT	4	30000 - 30003	M_IT.{30000 - 30003}	8960
16-bit Analog Inputs	M_ME_SV	4	40000 - 40003	M_ME_SV.{40000 - 40003}	9600
32-bit Analog Inputs	M_BO	4	90000 - 90003	M_BO.{90000 - 90003}	10368
Short Float Analog Inputs	M_ME_FV	4	50000 - 50003	M_ME_FV.{50000 - 50003}	11008
Binary Outputs	C_SC	1040	60000 - 61039	C_SC.{60000 - 61039}	16384
Double Binary Outputs	C_DC	600	110000 - 110599	C_DC.{110000 - 110599}	24576
16-bit Analog Outputs	C_SE_SV	4	70000 - 70003	C_SE_SV.{70000 - 70003}	20992
32-bit Analog Outputs	C_BO	4	100000 - 100003	C_BO.{100000 - 100003}	22272
Short Float Analog Outputs	C_SE_FV	4	80000 - 80003	C_SE_FV.{80000 - 80003}	23424

Column	Description
Buffer	Name of buffer contents
Type ID	IEC 60870-5 ASDU type string
Nr. Points	Size of the respective buffer in points
Point IDs	Possible point ID numbers, which can be used with that ASDU type Note: The IEC 60870-5 point IDs must be unique within the respective sector. Therefore the ME-RTU assigns consecutive IDs for the different buffers of all ASDU types
IEC 60870-5 Addresses	Possible IEC 60870-5 addresses (the brackets '{}' mark a range of values)
BFM Address	BFM address where the actual values of the respective IEC 60870-5 ASDU type (column Buffer) starts at

## Export Userlib

The OPC tags of IEC 60870-5 devices refer to IEC 60870-5 data points. These data points are related to addresses in the buffer memory of the ME-RTU and depend on the respective configuration of the RTU. A PLC program, which interacts with the ME-RTU, will use CPU devices for exchanging the contents of the data points. To ease addressing the individual data points, a user library can be generated.

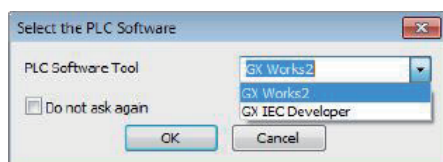
This user library contains:

1. A global variable of type 'ARRAY OF WORD' for each supported IEC 60870-5 ASDU type, which has the same size as the corresponding IEC 60870-5 buffer. This GV is mapped to the device address, which the user has assigned to the buffer.
2. A global variable for each OPC item, which is related to a specific item ID (IOA) and with the subtype 'Value'. OPC items, which refer to other subtypes of IEC 60870-5 points (e.g. 'QualDescr'), are not included in the user library.

Note: The user library does not include code for exchanging the contents of CPU devices with buffer memory in the ME-RTU. This part depends on the specific PLC type used and must be implemented in the PLC application program.

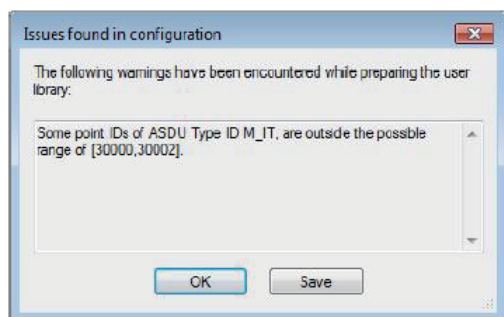
The exact contents of the user library must be adjusted for the PLC software, in which the user library should be imported.

The user must therefore first select the PLC software.

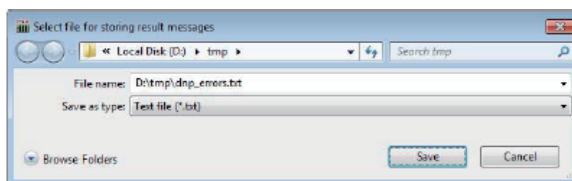


Control	Type	Range	Description
PLC Software Tool	Selection	<ul style="list-style-type: none"> <li>• GX Works2</li> <li>• GX IEC Developer</li> </ul>	Supported MELSOFT software packages for PLC programming
Do not ask again	Checkbox	checked/unchecked (default)	If checked, the message is not displayed again until MX Configurator is restarted; the user library is generated for the chosen PLC software
OK	Button	—	Closes the dialog; the user library is generated for use with the chosen PLC software
Save	Button	—	Closes the dialog without exporting a user library

Before the user library is generated, the configuration of the OPC tags and the IEC 60870-5 settings are checked against certain restrictions imposed by either the ME-RTU or the generated IL PLC code. Warnings and/or errors found during these checks are displayed in a dialog. In case of errors the user library is not exported.



Control	Type	Range	Description
OK	Button	—	Closes the dialog; the user library is not generated
Save	Button	—	Opens a file dialog to select the path, where the error messages are stored



The following 'warning' issues are checked:

- Device addresses do not overlap
- ASDU type ID is supported by ME-RTU

- Point ID within the range set for the respective ASDU type ID
- Number of tags in user library does not exceed the limit imposed by GX Works2 (i.e. 20480)

The following 'error' issues are checked:

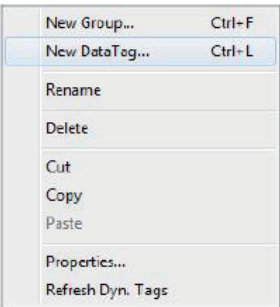
- Each tag name must be unique
- Tag identifiers must not exceed 32 characters

Note: OPC tag names must be unique within the respective OPC group. Therefore the same tag name can exist in different groups. As the OPC tag name is used as identifier for the corresponding global variable in the user library, tags with identical names would create a conflict in the user library.

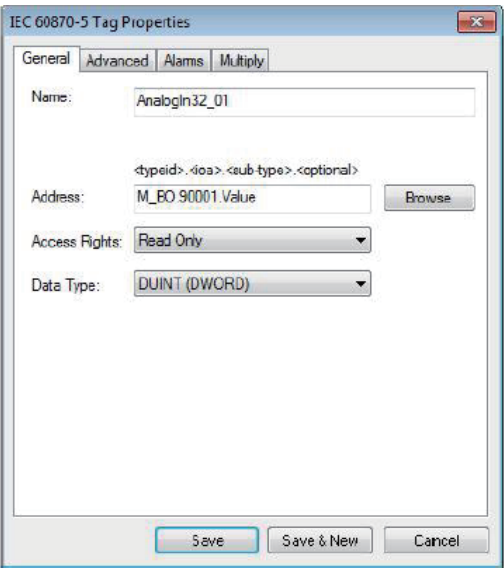


# 5.5 Adding IEC 60870-5 Data Tag

To define an OPC tag the context menu of the device node contains an entry 'New Data Tag'. This follows the standard procedure for other device types.



Selecting the menu item opens the 'IEC 60870-5 Tag Properties' dialog:



This dialog holds several tab pages described in the following sections (IEC 60870-5 Tag Properties - General). The buttons displayed below the tab pages have the same meaning independently of the selected tab page.



Button	Description
Save	Close the dialog and store the tag settings in the database
Save & New	Close the dialog and store the settings for the currently edited tag Immediately start configuration of a new tag with default settings
Cancel	Close the dialog and discard the changes

## 5.6 IEC 60870-5 Tag Properties - General

The definition of an OPC tag for a IEC 60870-5 data point includes specifying the OPC identifier and data type as for MX and Modbus devices. The IEC 60870-5 data point is entered in the standard address format as described in section 'Data model'.

The following sub sections are available:

- IEC 60870-5 Tag Properties - General
- IEC 60870-5 Address Validation
- Supported IEC 60870-5 Type IDs (ASDU Types)

IEC 60870-5 Tag Properties

General | Advanced | Alarms | Multiply

Name: AnalogIn32\_01

Address: <typeid>.<ioa>.<sub-type>.<optional>  
M\_BO 90001.Value [Browse]

Access Rights: Read Only

Data Type: DUINT (DWORD)

[Save] [Save & New] [Cancel]

Parameter	Type	Range	Description
Name	String	1-32 characters	Descriptive name of the this tag
Address	String	<Type ID> .<IOA> .<Sub-Type> .<Optional> Default: empty	Address string format must be follow IEC 60870-5 specification which is the following TypeID.IOA.Sub-Type.Optional (e.g. C_BO.100001.Value.LongPulse)
Browse	—	—	Displays offline valid address string formats for supported IEC 60870-5 data points
Access rights:	Read/Write (default) and Read Only	Depending on the IEC 60870-5 data point address	Access rights of the OPC tag will be checked against access rights of IEC 60870-5 data point
Data Type	—	BOOL UINT (WORD) DUINT (DWORD) INT DINT REAL Disabled by default	Data type of the OPC item, the available data types are restricted by the Type ID selected Note: Here only basic data types can be assigned. For more complex types (arrays), the 'Advanced' tab must be opened.

The 'Browse' button opens a list of the supported IEC 60870-5 ASDU types (type ID).

ASDU type	Type ID	Description	Min. IOA	Max. IOA	Sub-Type	Optional	Data Type	Access
1,30	M_SP	Single-Point-Information	1	16777215	Value	-	bool	R
1,30	M_SP	Single-Point-Information	1	16777215	QualityDesc	-	uint8	R
3,31	M_DP	Double-Point-Information	1	16777215	Value	-	int8	R
3,31	M_DP	Double-Point-Information	1	16777215	QualityDesc	-	uint8	R
5,32	M_ST	Step Position Information	1	16777215	Value	-	int8	R
5,32	M_ST	Step Position Information	1	16777215	QualityDesc	-	uint8	R
7,33	M_BO	Bit string of 32 bit	1	16777215	Value	-	uint32	R
7,33	M_BO	Bit string of 32 bit	1	16777215	QualityDesc	-	uint8	R
9,21,34	M_ME_NV	Measured Value, Normalized Value	1	16777215	Value	-	float32	R
9,21,34	M_ME_NV	Measured Value, Normalized Value	1	16777215	QualityDesc	-	uint8	R
110	P_ME_NV	Parameter of Measured Value, Normalized Value	1	16777215	Value	-	float32	R
110	P_ME_NV	Parameter of Measured Value, Normalized Value	1	16777215	QualityDesc	-	uint8	R

Column	Description														
ASDU type	'Application Service Data Unit'														
Type ID	Specifies the type of I/O point														
Min. IOA	Minimum point ID ('Information Object Address')														
Max. IOA	Maximum point ID ('Information Object Address')														
Sub-Type	IEC 60870-5 sub attribute (see 'Sub-Types')														
Optional	IEC 60870-5 optional type (see 'Optional-Types')														
Data Type	Data type according to DNP conventions This type is translated to an OPC tag data type as: <table> <tr> <th>IEC 60870-5 Data Type</th><th>OPC Tag Default Type</th></tr> <tr> <td>bool</td><td>BOOL</td></tr> <tr> <td>int8, int16</td><td>INT</td></tr> <tr> <td>uint8, uint16</td><td>UINT (WORD)</td></tr> <tr> <td>int32</td><td>DINT</td></tr> <tr> <td>uint32</td><td>DUINT (DWORD)</td></tr> <tr> <td>float32</td><td>REAL</td></tr> </table>	IEC 60870-5 Data Type	OPC Tag Default Type	bool	BOOL	int8, int16	INT	uint8, uint16	UINT (WORD)	int32	DINT	uint32	DUINT (DWORD)	float32	REAL
IEC 60870-5 Data Type	OPC Tag Default Type														
bool	BOOL														
int8, int16	INT														
uint8, uint16	UINT (WORD)														
int32	DINT														
uint32	DUINT (DWORD)														
float32	REAL														
Access	R: read-only, W: write-only, RW: read- and writable														

The following entries are displayed in the table:

ASDU type	Type ID	Description	Min. IOA	Max. IOA	Sub-Type	Optional	Data Type	Access
1,30	M_SP	Single-Point-Information	1	16777215	Value	-	bool	R
1,30	M_SP	Single-Point-Information	1	16777215	QualityDesc	-	uint8	R
3,31	M_DP	Double-Point-Information	1	16777215	Value	-	int8	R
3,31	M_DP	Double-Point-Information	1	16777215	QualityDesc	-	uint8	R
5,32	M_ST	Step-Position-Information	1	16777215	Value	-	int8	R
5,32	M_ST	Step-Position-Information	1	16777215	QualityDesc	-	uint8	R
7,33	M_BO	Bit-string-of-32-bit	1	16777215	Value	-	uint32	R
7,33	M_BO	Bit-string-of-32-bit	1	16777215	QualityDesc	-	uint8	R
9,21,34	M_ME_NV	Measured Value, Normalized Value	1	16777215	Value	-	float32	R
9,21,34	M_ME_NV	Measured Value, Normalized Value	1	16777215	QualityDesc	-	uint8	R
110	P_ME_NV	Parameter of Measured Value, Normalized Value	1	16777215	Value	-	float32	R
110	P_ME_NV	Parameter of Measured Value, Normalized Value	1	16777215	QualityDesc	-	uint8	R
11,35	M_ME_SV	Measured Value, Scaled Value	1	16777215	Value	-	int16	R
11,35	M_ME_SV	Measured Value, Scaled Value	1	16777215	QualityDesc	-	uint8	R
111	P_ME_SV	Parameter of Measured Value, Scaled Value	1	16777215	Value	-	int16	RW
111	P_ME_SV	Parameter of Measured Value, Scaled Value	1	16777215	QualityDesc	-	uint8	R
13,36	M_ME_FV	Measured Value, Short Floating Point	1	16777215	Value	-	float32	RW
13,36	M_ME_FV	Measured Value, Short Floating Point	1	16777215	QualityDesc	-	uint8	R
112	P_ME_FV	Parameter of Measured Value, Short Floating Point	1	16777215	Value	-	float32	RW
112	P_ME_FV	Parameter of Measured Value, Short Floating Point	1	16777215	QualityDesc	-	uint8	R
15,37	M_IT	Integrated Totals	1	16777215	Value	-	int32	R
15,37	M_IT	Integrated Totals	1	16777215	QualityDesc	-	uint8	R
15,37	M_IT	Integrated Totals	1	16777215	SQ	-	int8	R
45	C_SC_NA	Single Command	1	16777215	Value	-	bool	W
45	C_SC_NA	Single Command	1	16777215	Value	ShortPulse	uint8	W
45	C_SC_NA	Single Command	1	16777215	Value	LongPulse	uint8	W
45	C_SC_NA	Single Command	1	16777215	Value	Persistent	uint8	W
58	C_SC_TA	Single Command with time	1	16777215	Value	-	bool	W
58	C_SC_TA	Single Command with time	1	16777215	Value	ShortPulse	uint8	W
58	C_SC_TA	Single Command with time	1	16777215	Value	LongPulse	uint8	W
58	C_SC_TA	Single Command with time	1	16777215	Value	Persistent	uint8	W
46	C_DC_NA	Double Command	1	16777215	Value	-	uint8	W
46	C_DC_NA	Double Command	1	16777215	Value	ShortPulse	uint8	W
46	C_DC_NA	Double Command	1	16777215	Value	LongPulse	uint8	W
46	C_DC_NA	Double Command	1	16777215	Value	Persistent	uint8	W
59	C_DC_TA	Double Command with time	1	16777215	Value	-	uint8	W
59	C_DC_TA	Double Command with time	1	16777215	Value	ShortPulse	uint8	W
59	C_DC_TA	Double Command with time	1	16777215	Value	LongPulse	uint8	W
59	C_DC_TA	Double Command with time	1	16777215	Value	Persistent	uint8	W
47	C_RC_NA	Regulating Step Command	1	16777215	Value	-	int8	W
47	C_RC_NA	Regulating Step Command	1	16777215	Value	ShortPulse	int8	W
47	C_RC_NA	Regulating Step Command	1	16777215	Value	LongPulse	int8	W
47	C_RC_NA	Regulating Step Command	1	16777215	Value	Persistent	int8	W
60	C_RC_TA	Regulating Step Command with time	1	16777215	Value	-	int8	W
60	C_RC_TA	Regulating Step Command with time	1	16777215	Value	ShortPulse	int8	W
60	C_RC_TA	Regulating Step Command with time	1	16777215	Value	LongPulse	int8	W
60	C_RC_TA	Regulating Step Command with time	1	16777215	Value	Persistent	int8	W
48	C_SE_NA	Set Point Command, Normalised Value	1	16777215	Value	-	float32	W
54	C_SE_TA	Set Point Command, Normalised Value with time	1	16777215	Value	-	float32	W
49	C_SE_NB	Set Point Command, Scaled value	1	16777215	Value	-	int16	W
62	C_SE_TB	Set Point Command, Scaled value with time	1	16777215	Value	-	int16	W
50	C_SE_NC	Set Point Command, Short Floating Point Number	1	16777215	Value	-	float32	W
63	C_SE_TC	Set Point Command, Short Floating Point Number with time	1	16777215	Value	-	float32	W
51	C_BO_NA	Bit-string-of-32-bits	1	16777215	Value	-	uint32	W
64	C_BO_TA	Bit-string-of-32-bits-with-time	1	16777215	Value	-	uint32	W

## IEC 60870-5 Address Validation

The input in the 'Address' edit field will be validated against the supported IEC 60870-5 ASDU type, data point ID (IOA), sub-type and optional type by every key stroke. If the address is validated successfully the text color will be set to default, otherwise if an invalid address string is entered the text color will turn to red.

Address: C\_BO.100000002.QualityDesc

## Supported IEC 60870-5 Type IDs (ASDU Types)

IEC 60870-5 distinguishes I/O data according to its function into ASDU types (Type ID). Depending on the ASDU type points may be read-only, writable or both.

The following table lists the ASDU type and formats, which are supported by the IEC 60870-5 OPC server. The default data type of the corresponding OPC tag is also listed. IEC 60870-5 distinguishes I/O data according to its function into ASDU types (Type ID). The default data type of the corresponding OPC tag is also listed.

IEC 60870-5 Type ID	ASDU type for Events <sup>*1</sup>	Group Name	Access	Optional	OPC Type
1	30	Binary Inputs	R	—	BOOL
3	31	Double Binary Inputs	R	—	UINT
5	—	Step information	R	—	INT
15	37	Counters	R	—	DUINT
11	35	Analog Inputs (16bit)	R	—	INT
7	33	Analog Inputs (32bit)	R	—	DUINT
13	36	Analog Inputs (Float)	R	—	REAL
1	30	Binary Outputs (status)	R	—	BOOL
45	—	Binary Outputs (command)	W	—	BOOL
				Short Pulse	UINT
				Long Pulse	UINT
				Persistent	UINT
3	31	Double Binary Outputs (status)	R	—	UINT
46	—	Double Binary Outputs (command)	W	—	UINT
				Short Pulse	UINT
				Long Pulse	UINT
				Persistent	UINT
47	—	Regulating Step (command)	W	—	UINT
				Short Pulse	UINT
				Long Pulse	UINT
				Persistent	UINT
11	35	Analog Outputs (16bit)(status)	R	—	INT
49	—	Analog Outputs (16bit)(command)	W	—	INT
7	33	Analog Outputs (32bit)(status)	R	—	DUINT
51	—	Analog Outputs (32bit) (command)	W	—	DUINT
13	36	Analog Outputs (Float) (status)	R	—	REAL
50	—	Analog Outputs (Float) (command)	W	—	REAL
111	—	Analog Inputs (16bit) Threshold Parameter	R/W	—	INT UINT
112	—	Analog Inputs (Float) Threshold Parameter	R/W	—	REAL

<sup>\*1</sup> see section below for details

### ■ IEC 60870-5 Event Types

If modified points are reported as events, IEC 60870-5 uses a different group number than for normal read access. However the MX OPC Server stores the point data always under the group number used for explicit read requests. The event groups are not relevant to the OPC client.

## ■ IEC 60870-5 Sub-Types

The following sub types are available for IEC 60870-5 points, provided, that the selected ASDU type supports it.

Sub Type Identifier	Description
.Value	The value of the item (this is default)
.QualityDesc	Quality Descriptors according to IEC 60870-5 Note: Flags (Quality Descriptors) cannot be written by the IEC 60870-5 master (here: OPC server), but only the PLC application, that controls the ME-RTU.

The sub-type 'TimeStamp' will be translated into the time stamp property of the OPC tag.

Note: The flags (Quality Descriptors) content depends on the ASDU type and for a definition of its meaning external IEC 60870-5 specification documents may be consulted.

## ■ IEC 60870-5 Optional-Types

The following optional types are available for IEC 60870-5 points, provided that the selected ASDU type supports it.

- .ShortPulse
- .LongPulse
- .Persistent

# 5.7 IEC 60870-5 Tag Properties - Advanced

IEC 60870-5 Tag Properties

General Advanced Alarms Multiply

☒ Use Array Type

Data Type: Array of DUINT (DWORD)

Number of Elements: 20

Lower Bounds: 0

Save Save & New Cancel

Name	Type	Range	Description
Use Array Type	Checkbox	Checked/not checked (default)	If clicked enables the usage of array as OPC tag
Data Type	Choice list	Array of BOOL Array of UINT (WORD) Array of DUINT (DWORD) Array of INT Array of DINT Array of REAL Entry depends on data type selected in the 'IEC 60870-5 Tag Properties – General' page	Data type of the array container
Number of Elements	Integer	1 – 254 Default: 20	Number of elements in array
Lower Bounds	Integer	0 – 254, default: 0	First index in the array Note: The global array variables exported in the user library will always start with index 0 as 'Lower Bounds'.

## 5.8 IEC 60870-5 Tag Properties - Alarms

The screenshot shows the 'IEC 60870-5 Tag Properties' dialog box with the 'Alarms' tab selected. The 'General Setup' section contains a checked 'Generate Alarms' checkbox, an empty 'Message prefix' text box, a 'Limit Alarm' dropdown menu showing 'AnaOut32Limit1', and a 'Digital Alarm' dropdown menu showing '<Not Assigned>'. At the bottom are 'Save', 'Save & New', and 'Cancel' buttons.

Name	Type	Range	Description
Generate Alarms	Bool	Checked/unchecked (default)	If checked, the OPC server will automatically generate a limit and/or digital alarm based on the data item value
Message prefix	Text	—	First part of the alarm message for this data item
Limit Alarm	Selection	Existing limit alarm definitions	Select a definition for limit alarms from the list
Digital Alarm	Selection	Existing digital alarm definitions	Select a definition for digital alarms from the list



## 5.9 IEC 60870-5 Tag Properties - Multiply

The multiply page allows creating multiple tags using a template, which is assembled from text and numeric range items. When clicking the 'Multiply' button, the tags will be created, if the template is able to construct valid OPC identifiers and IEC 60870-5 address strings.

Name	Type	Range	Description
Multiply when saving	Bool	Checked/unchecked (default)	If checked allows to insert multiple OPC tags
First number	Integer	0 – 1.000.000.000, default depends on tag counter from database	Start number to append to base text for building the OPC tag name Note: The upper limit is based on the max number of numeric places
Numeric places	Integer	1-10	Number of digits in resulting OPC tag name
Number of items	Integer-	1-16777215	Number of tags to be created
Base Text	String	Max 32 chars, default: empty	Starting Name of the tag
Address	IEC 60870-5 address	Read only	IEC 60870-5 address which will be multiplied. For each new tag the IEC 60870-5 address is constructed by incrementing the point ID in the given address, until the max possible IEC 60870-5 point ID number of 16777215 is reached.

Note: the default values for 'Numeric places' and 'Number of items' are the last values, the respective user has entered in the 'Multiply' dialog for a tag of any of the supported devices.

## 5.10 iQ Works Integration (User Library)

In order to provide access to IEC 60870-5 interfaces the MX OPC server does not have to communicate with the host PLC of the RTU or to interact with iQ Works. However a good integration of the IEC 60870-5 RTU into iQ Works will be the major advantage for customers compared to solutions, where a standard IEC 60870-5 OPC server is used with any other PLC. The automatic code generation brings down engineering and service costs. The experience gained from existing PLC code generators for PROFIBUS, PROFINET and CC-Link proves helpful in designing an integration of the DNP ME-RTU modules. The following sections describe the iQ Works integration in detail:

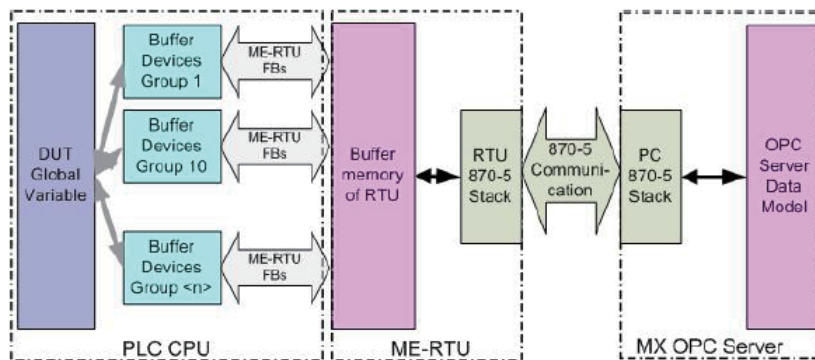
- Purpose of User Library
- Contents of User Library
- Generating the User Library

### Purpose of User Library

The IEC 60870-5 RTU must interact with the PLC application running on the respective CPU. The data for IEC 60870-5 inputs must be copied from CPU devices to the shared memory of the RTU. For FX3 CPUs the data can be transferred via the CPU bus connection. For Qn- and Ln-CPU's the data is transferred via a 'Simple Socket'-connection.

There is already a collection of function blocks specifically for the ME-RTU. The function blocks encapsulate the data exchange with the ME-RTU. The library contains different function blocks for FX3- and for Qn-/Ln-CPU's.

The following diagram shows the data exchange between global variables used in the PLC program via buffer devices and the IEC 60870-5 protocol to the OPC data model consisting of groups and items.



The IEC 60870-5 firmware fetches the data from the shared memory to send it via IEC 60870-5 protocol to the IEC 60870-5 master, which in this case is identical to the OPC server. In the opposite direction the outputs, which are set by the master, are stored in the shared memory of the RTU, from where they are copied to CPU devices used by the PLC program.

Note: the 'I/O Mapping' functionality is only provided for the 'ME-RTU' model as IEC 60870-5 slave. If the OPC server is connected to a 3rd party IEC 60870-5 station, these functions cannot be provided, as they are vendorspecific.

## Contents of User Library

An IEC 60870-5 user library contains the definitions and code for a single ME-RTU. At first the use of multiple RTUs connected to the same CPU is not supported, as it is rather unlikely for real applications.

The user library consists of:

1. A global variable of type 'ARRAY OF WORD' for each supported IEC 60870-5 ASDU type, which has the same size as the corresponding IEC 60870-5 buffer. This GV is mapped to the device address, which the user has assigned to the buffer.
2. A global variable for each OPC item, which is related to a specific ASDU type and with the subattribute 'Value'. OPC items, which refer to for example 'QualityDesc' of IEC 60870-5 points, are not included in the user library.
3. The global variables for IEC 60870-5 outputs are presently only exported for the ASDU types 45, 46 (binary) and 49, 50 and 51 (analog).

The data types of global variables for OPC items are derived from the OPC tag type, except for the following groups:

ASDU Type ID	ASDU Type Identifier	Fixed Variable Type
1	Binary Inputs (Single Point)	BOOL
3	Double Binary Inputs (Double Point)	ARRAY [0..1] OF BOOL
45	Binary Outputs (Single Command)	BOOL
46	Double Binary Outputs (Double Command)	ARRAY [0..1] OF BOOL

Note: the user library does not include the copy instructions to exchange the buffer device blocks with the corresponding shared memory areas in the ME-RTU. This part must be added by the user.

### ■ Example

```

1  (* SOFTCONTROL:P380ZQA
2  VERSION:7.00.03 *)
3
4  TYPE
5  END_TYPE
6
7
8  PROGRAM MERTU104_5
9  (**)
10 (**)
11 'IL'
12 BODY
13 WORKSPACE
14     NETWORK_LIST_TYPE := NWTYPEIL ;
15     ACTIVE_NETWORK := 0 ;
16 END_WORKSPACE
17
18 END_BODY
19 END_PROGRAM
20
21 CONFIGURATION scConfiguration GVL_MERTU104_5
22 RESOURCE scResource ON scResourceType
23     VAR GLOBAL
24         gv104ASDU1: ARRAY [0..64] OF WORD;
25         gv104ASDU15 AT @'%MW0.100': ARRAY [0..7] OF WORD;
26         gv104ASDU11: ARRAY [0..3] OF WORD;
27         gv104ASDU7 AT @'%MW0.110': ARRAY [0..7] OF WORD;
28         gv104ASDU13 AT @'%MW0.130': ARRAY [0..7] OF WORD;
29         AnaInpFlt32_01 AT @'%MD0.130': REAL;
30         AnaInpFlt32_02 AT @'%MD0.132': REAL;
31         AnaInpFlt32_03 AT @'%MD0.134': REAL;
32         AnaInpFlt32_04 AT @'%MD0.136': REAL;
33         Counter32_01 AT @'%MD0.100': DINT;
34         Counter32_02 AT @'%MD0.102': DINT;
35         Counter32_03 AT @'%MD0.104': DINT;
36         Counter32_04 AT @'%MD0.106': DINT;
37     END_VAR
38 END_RESOURCE
39 END_CONFIGURATION
40

```

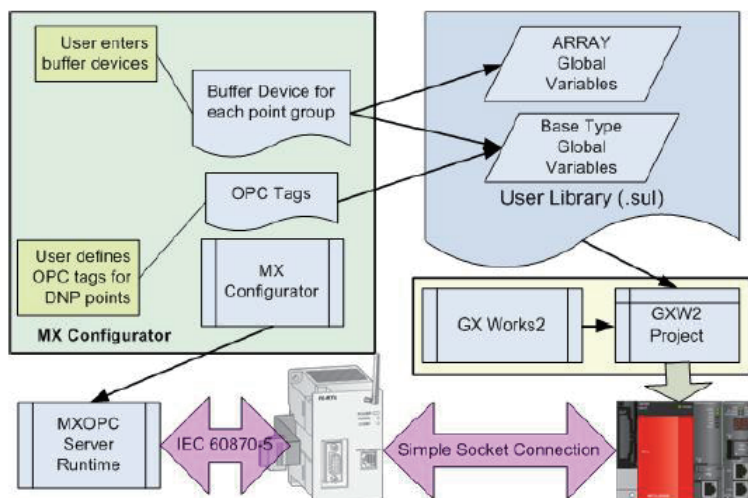
Variables for transfer

Variables for OPC tags

The listing shows the contents of an example user library with the IEC 60870-5 global variable definitions as described in section 'Contents of User Library'.

## Generating the User Library

The next diagram contains the PLC program objects, which are generated by MX OPC Server (actually the MX Configurator component) for the PLC application. The user library must first be manually imported into the respective PLC program, before it can be used.



## 5.11 OPC Alarms and Events

OPC Alarms & Events for IEC 60870-5 devices allows AE clients to receive condition events generated by the OPC servers. The OPC server supports the following filtering options for Condition Events for AE clients:

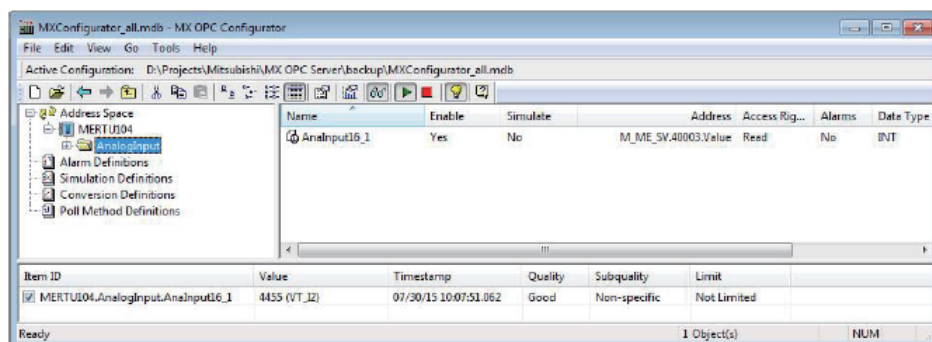
Item		Description
Event		Condition.
Category	Level Alarms	Filter by server-defined categories. Each event is assigned to one category. Events that are generated by process level conditions. The following levels will be supported: • high and highhigh, for example, tank level > high > highhigh • low and lowlow, for example, LowLow < Low < tank level
	Deviation Alarms	Filter by server-defined categories. Each event is assigned to one category. Events that are generated by deviation conditions (deadband), For example, tank level +/- 10.
Severity		Filter by severity level. Levels range from 0 to 1000; 1000 is the most severe. Each event is assigned a severity.:
Source		All events are related to OPC DA server tags. Filter by source gets events only from the related DA server tag.:

In a later step it will be possible to not only configure events that are related to OPC tags but also simple events such as information, warning and error reported by an outstation.

The user interface to create limit alarms is already specified in MX OPC server and will be supported by the IEC 60870-5 device type. No online monitoring of OPC events will be supported as it is the same for all device types supported by MX OPC server.

## 5.12 Online Monitoring of IEC 60870-5 Tags

Since the IEC 60870-5 device type uses the existing configuration database format of MX OPC server it will be possible to online monitor OPC IEC 60870-5 tags.



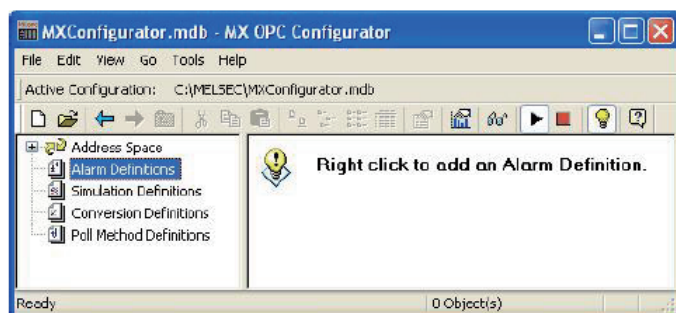
Note: please note that after a reset of the ME-RTU the buffer memory of inputs must first be written to by the PLC program or from the device memory diagnostics function in GX Works2, before the status of the tag can become 'Good'.

# 6 Configuring Alarm Definitions

The MX OPC Server is an OPC Alarm and Events server that supports the following alarm types:

- Limit (High High, High, Low, Low Low)
- Digital

Alarm parameters are set up in the Configurator under the Alarm Definitions tree control, shown in the figure below, which is divided into two alarm template types: Digital alarm definitions and Limit (analog) alarm definitions. Digital alarms can be defined for a data item of "BOOL" type only, while Limit alarms can be defined for all other types except for the "String" data type. Default alarm definitions are provided in the "MXConfigurator.mdb" database.



**Alarm Definitions Tree Control**

## 6.1 Limit AlarmDefinitions

A limit alarm sets the values for four levels of alarms: LoLo, Lo, Hi, and HiHi. Limit alarm parameters can have subranges within the data item amplitude. Every subrange definition includes a Message Body that will be appended to the alarm message, the Severity of the alarm, and the Req. Ack. flag for alarm acknowledgement.

### Basic limit alarm properties

In the Basic tab of the Limit Alarm Properties dialog box, shown below, configure the following settings:

The screenshot shows the 'Limit Alarm Properties' dialog box with the 'Basic' tab selected. The 'Name' field contains 'LinAlarm002'. Under 'Limit Alarm Setup', there are five rows for different alarm levels: HiHi, Hi, Return to normal, Lo, and LoLo. Each row has a checkbox, a 'Value' field, a 'Message Body' field, a 'Severity' field, and a 'Req. Ack.' checkbox. The 'Return to normal' row has a 'Return to Normal' button. At the bottom are 'Save', 'Save & New', and 'Cancel' buttons.

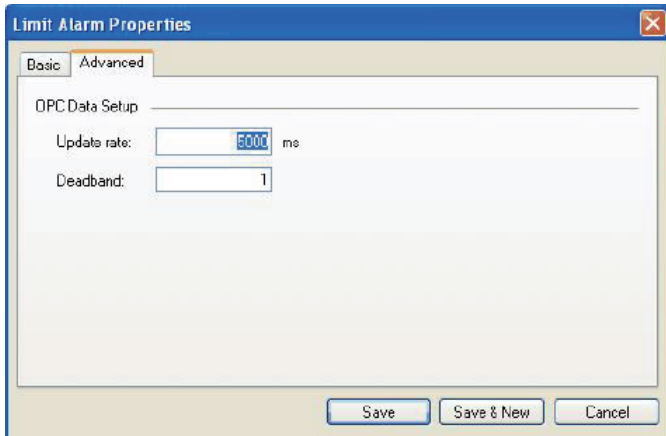
Limit	Value	Message Body	Severity	Req. Ack.
<input checked="" type="checkbox"/> HiHi	100	HiHi Level Alarm	850	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Hi	90	Hi Level Alarm	500	<input checked="" type="checkbox"/>
<input type="checkbox"/> Return to normal		Return to Normal		
<input checked="" type="checkbox"/> Lo	10	Lo Level Alarm	500	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> LoLo	0	LoLo Level Alarm	850	<input checked="" type="checkbox"/>

**Limit Alarm Properties: Basic Tab**

- In the Name field, type a name for the new limit alarm.
- The Value field is used to calculate the state of the input fields. For example, a value of 10 for LoLo is compared with the value of the input to determine if the alarm is in LoLo state.
- In the Message Body field, enter the warning message that will appear when the alarm is sent. The message can be any text string.
- In the Return to Normal field, check the check box and then enter the text that will appear when the alarm is taken care of (e.g. has been acknowledged). The message can be any text string.  
Note: It is not necessary to enter a message text or a base text. The Server will default to the OPC subcondition name and the OPC condition name. For example, a LoLo alarm will post a description of LoLo limit.
- Severity is the OPC-defined value for alarm Priority. The valid OPC severity range is 0 (lowest) to 1000 (highest).
- The Requires Ack field is used for OPC condition alarms to determine whether the alarm needs a user acknowledgement. If the Requires Ack field is checked, then the alarm requires a user acknowledgement. If the value is not checked, then the alarm is posted as already acknowledged.  
Note: Changes to the alarm property fields (HiHi, LoLo, Hi, Lo, Message Text, etc.) in runtime through an OPC tag update will be automatically saved to the database, over-writing any values specified in configuration mode.
- Save: Saves all changes specified in the properties dialog box. The alarm definition appears in the list view.
- Save & New: Saves all changes specified in the properties dialog box and immediately starts configuration of a new alarm definition.
- Cancel: Closes the properties dialog box.

## Advanced limit alarm properties

In the Advanced tab of the Limit Alarm Properties dialog box, shown below, configure the following settings:



**Limit Alarm Properties: Advanced Tab**

- **Update Rate:** Defines the frequency of checking the data item value (in milliseconds), and possibly responding by sending the alarm message.
- **Deadband:** Prevents the server from generating a huge amount of alarm messages and overloading the clients when the signal oscillates around one of the limits specified. The deadband value extends the limit zone. It results in sending only one alarm message even if the signal oscillates. Deadband indicates the deadband value to apply to the converted analog values. The deadband value is required and is calculated on borderline alarming limit values to prevent repeated alarm cycles.
- **Save:** Saves all changes specified in the properties dialog box. The alarm definition appears in the list view.
- **Save & New:** Saves all changes specified in the properties dialog box and immediately starts configuration of a new alarm definition.
- **Cancel:** Closes the properties dialog box.

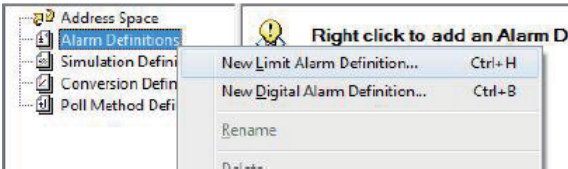


# Creating a new limit alarm definition

To create a new limit alarm definition:

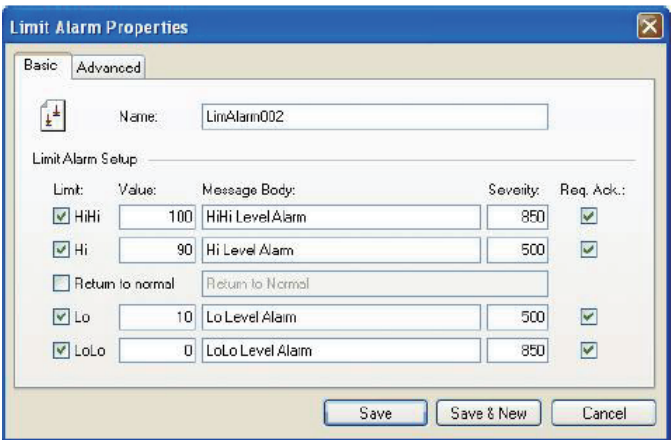
## Operating procedure

1. Right-click the Alarm Definitions folder on the tree control of the Configurator screen and select New Limit Alarm Definition from the pop-up menu, as shown in the figure below.



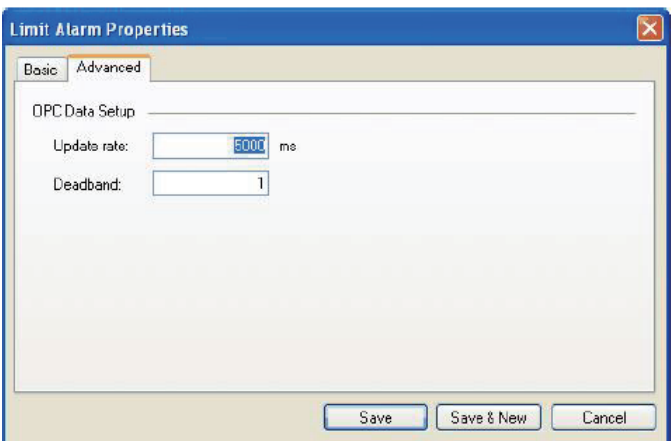
Creating a New Limit Alarm Definition

2. The Basic tab of the Limit Alarm Properties dialog box appears, as shown in the figure below.



Limit Alarm Properties: Basic Tab

3. In the Name field, type a name for the new alarm definition.
4. Specify the limits, values, and severity levels for the alarm.
5. Click on the Advanced tab, as shown in the figure below. Specify a server Update Rate (in milliseconds) as well as a Deadband value.



Limit Alarm Properties: Advanced Tab

6. When you have finished configuring the alarm definition properties, click the Save button. The new configuration appears under the Alarm Definitions tree control.

## 6.2 Digital AlarmDefinitions

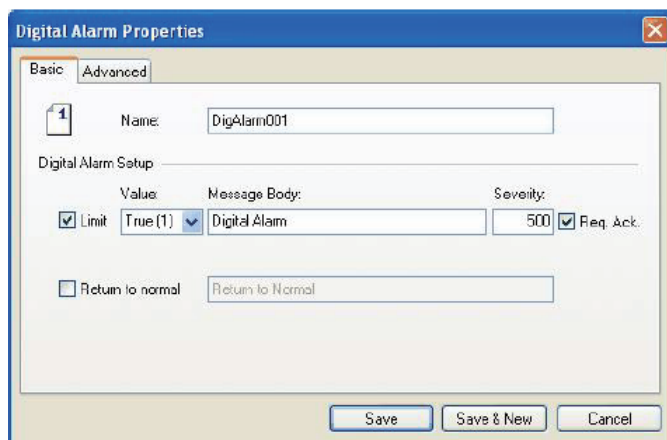
A digital alarm sets an alarm if the comparison between the Alarm State Value and the input state is TRUE.

### Basic digital alarm properties

In the Basic tab of the Digital Alarm Properties dialog box, shown below, configure the following settings:

- In the Name field, type a name for the new digital alarm.
- The Limit check box enables or disables alarm condition checking.
- Specify a Value for the digital alarm (True or False).
- In the Message Body field, enter the warning message that will appear when the alarm is sent. The message can be any text string.
- In the Return to Normal field, check the check box and then enter the text that will appear when the alarm is taken care of (e.g. has gone back to its normal value). The message can be any text string.

Note: It is not necessary to enter a message text or a base text. The Server will default to the OPC subcondition name and the OPC condition name.



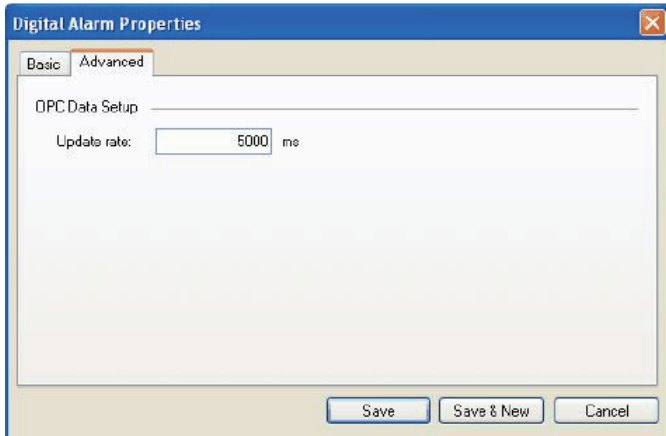
**Digital Alarm Properties: Basic Tab**

- Severity is the OPC-defined value for alarm Priority. The valid OPC severity range is 0 (lowest) to 1000 (highest).
- The Requires Ack field is used for OPC condition alarms to determine whether the alarm needs a user acknowledgement.
- Save: Saves all changes specified in the properties dialog box. The alarm definition appears in the list view.
- Save & New: Saves all changes specified in the properties dialog box and immediately starts configuration of a new alarm definition.
- Cancel: Closes the properties dialog box.

## Advanced digital alarm properties

In the Advanced tab of the Digital Alarm Properties dialog box, shown below, specify the Update Rate, which defines the frequency of checking the data item value (in milliseconds), and possibly responding by sending the alarm message.

- Save: Saves all changes specified in the properties dialog box. The alarm definition appears in the list view.
- Save & New: Saves all changes specified in the properties dialog box and immediately starts configuration of a new alarm definition.
- Cancel: Closes the properties dialog box.



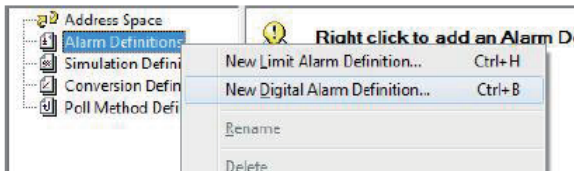
Digital Alarm Properties: Advanced Tab

## Creating a new digital alarm definition

To create a new digital alarm definition:

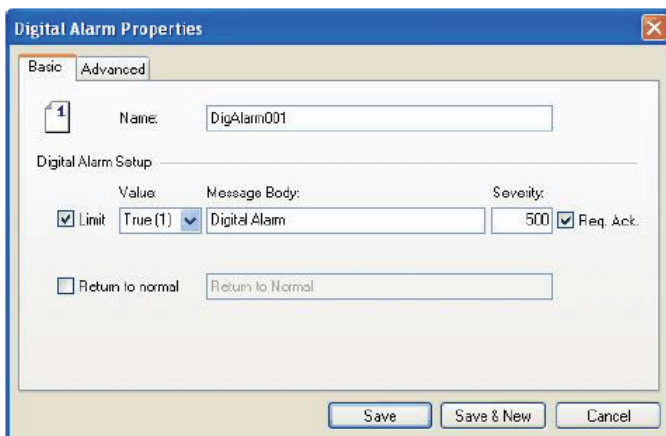
### Operating procedure

1. Right-click the Alarm Definitions folder on the tree control of the Configurator screen and select New Digital Alarm Definition from the pop-up menu, as shown in the figure below.



Creating a New Digital Alarm Definition

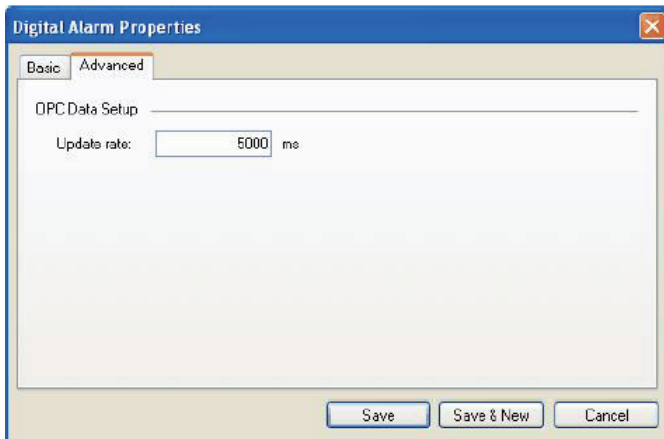
2. The Basic tab of the Digital Alarm Properties dialog box appears, as shown in the figure below.



Digital Alarm Properties: Basic Tab

3. In the Name field, type a name for the new alarm definition.
4. Specify the value and severity level for the alarm.

5. Click on the Advanced tab, as shown in the figure below. Specify a server Update Rate (in milliseconds).

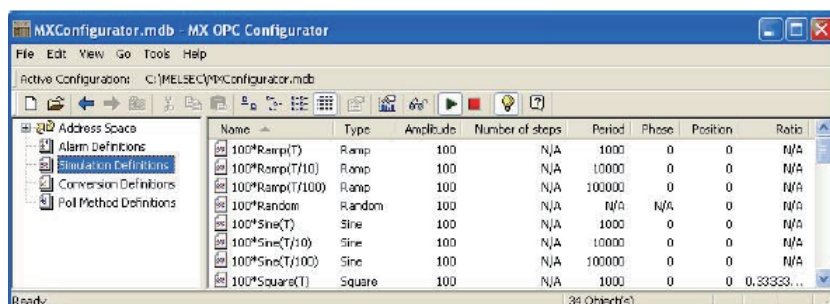


**Digital Alarm Properties: Advanced Tab**

6. When you have finished configuring the alarm definition properties, click the Save button. The new configuration appears under the Alarm Definitions tree control.

# 7 Configuring Simulation Signals

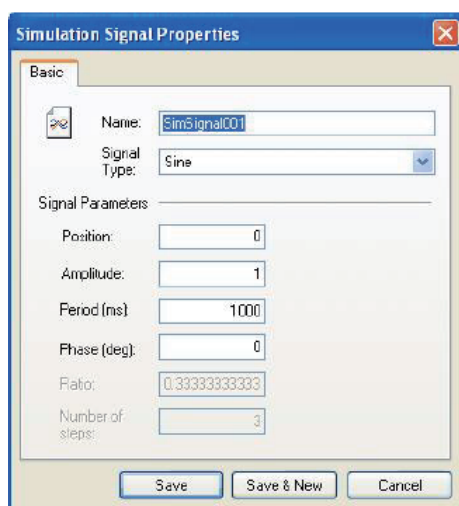
The Configurator offers a wide range of OPC data items in the Simulation Definitions tree control, as shown in the figure below.



Simulation Definitions Tree Control

## 7.1 Basic Simulation Signal Properties

In the Basic tab of the Simulation Signal Properties dialog box, shown below, configure the following settings:



Simulation Signal Properties: Basic Tab

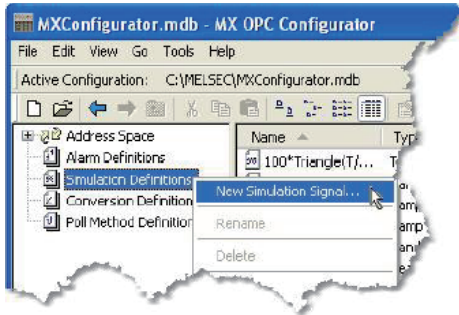
Item	Description
Name	Specifies the name of the selected simulation signal. The name can be up to 50 alphanumeric characters, including underscores ( _ ) and hyphens ( - ).:
Signal Type	For each signal, you can select one of the following signal types from the drop-down list: <ul style="list-style-type: none"> <li>Read Count is incremented by one when any item using the same simulation signal definition is read.</li> <li>Write Count increments when any item using the same simulation signal definition is written.</li> <li>Random generates random value within the Amplitude range starting with Position.</li> <li>Ramp, Sine, Square, Triangle and Step are periodical signals. Their time behavior is influenced by Period and Phase parameters. Period specifies the signal frequency (in milliseconds), while Phase moves the signal origin on the time axis (in degrees).</li> <li>Square and Triangle have one additional parameter: Ratio. Ratio defines Triangle signal steepness, or Square signal H/L proportions.</li> </ul>
Number of Steps	The Number of Steps parameter of the Step signal defines the number of steps into which the signal amplitude will be divided.
Save	Saves all changes specified in the properties dialog box. The simulation signal appears in the list view.:
Save & New	Saves all changes specified in the properties dialog box and immediately starts configuration of a new simulation signal.
Cancel	Closes the properties dialog box.

## 7.2 Creating a New Simulation Signal

To create a new simulation signal:

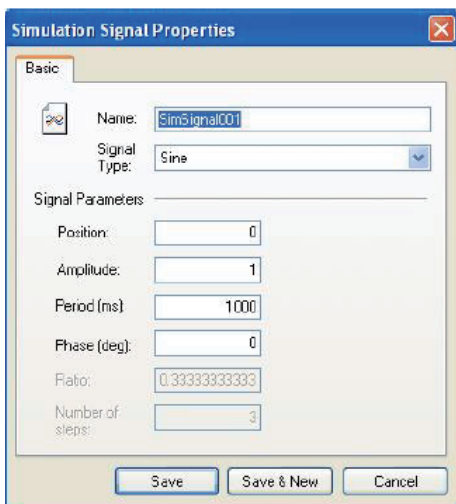
### Operating procedure

1. Right-click the Simulation Definitions tree control and select New Simulation Signal from the pop-up menu, as shown in the figure below.



#### Creating a New Simulation Signal

2. The properties dialog box for the new configuration appears in the right-hand pane of the Configurator, as shown in the figure below.



#### Setting the Properties for the New Simulation Signal

3. In the Name field, type a name for the new signal.
4. Choose a Signal Type from the drop-down list.
5. When you have finished configuring the simulation signal properties, click the Save button. The new configuration appears under the Simulation Definitions tree control.

# 8 MX OPC Server Runtime Module

The MX OPC Server is the actual runtime module. The OPC Server is responsible for accessing the data on the OPC clients' requests. The OPC server has no user interface. It will be started automatically when any OPC client connects to the server. The runtime module operates directly with the database. Read and write operations are performed directly with no intermediate cache level. It has the effect that every client works with accurate data. In normal situations, the data in the database will be accessed (read/write) by OPC clients. The OPC Server refreshes (with a configurable delay) its tags in order to inform the OPC clients of changes through some external application.

One of the basic concepts of the OPC server is that monitored data are relatively stable in time. By default, the runtime database is located in the same directory in which the runtime module resides.

Note: Please ensure that the runtime database exists prior to connecting OPC clients to the OPC server.

The I/O Server is the I/O driver core. The I/O Server contains objects and interfaces that:

- Maintain the I/O driver configuration.
- Read and write process hardware data.

The MELSOFT MX OPC Server DA Configuration ToolMELSOFT MX OPC Server DA Configuration Tool is a client of the MX OPC Runtime that accesses the I/O Server and lets you view and modify properties for devices and tags. The Address Space tree control in the Configurator sets the properties and connection parameters for the following hierarchy of server objects:

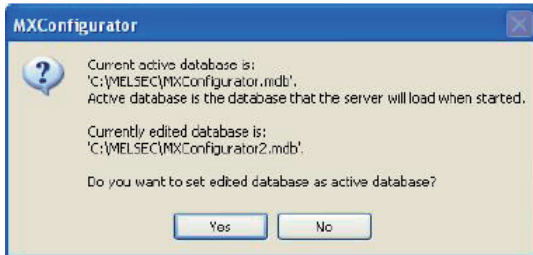
- Devices: A device is a hardware device or station that uses the I/O driver to communicate with a client PC. The device item contains the properties and methods that govern the behavior of a device. A device is visible to the OPC client.
- Data tags: A data tag is an object that makes device data accessible to OPC clients. Data tags can be logically organized into groups (folders).

## 8.1 Activating the Database

Once your configuration is complete, you need to make sure that it is the active database. The database that is currently active is the one that the server uses. To make the current database active, click the Make Active button (light bulb icon) on the Standard Toolbar.

Note: If the button is depressed and the light bulb is yellow, then the current database is already the active database.

A dialog box appears showing both the current active database and database that is currently being edited, as shown in the figure below. To set the edited database as the active database, click the Yes button. Next time the server goes into runtime, it will use this active database for all of its operations.

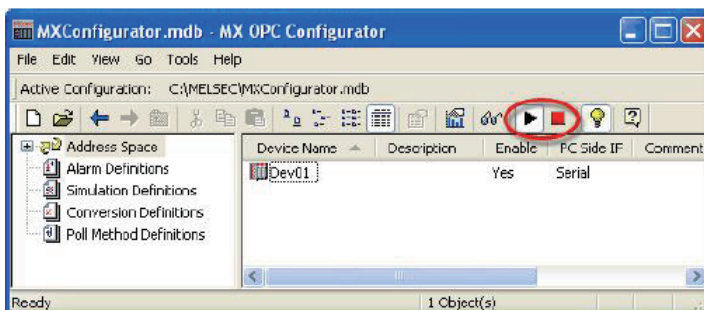


Activating the Database

## 8.2 Starting and Stopping the Driver

The I/O Server maintains the driver's device and data tags, performs all required functions for communicating with the process hardware, and exposes the methods and properties to other applications. This server provides a software layer between all client applications and the Mitsubishi ActiveX Communication support Tool (MX Component). The MX Component tool handles all the low-level communication details by providing a set of interfaces that the I/O Server uses.

To enable client/server communication, you must start the driver by clicking the Start button (green triangle icon) on the Standard toolbar of the MELSOFT MX OPC Server DA Configuration Tool. To stop the driver, click the Stop button (red square icon) on the Standard toolbar, as shown in the figure below.



Starting and Stopping the Driver

### Precautions

Do not change the date and time of the personal computer while MX OPC DA Server is acquiring data of the device.

If you change it to one out of the range of 49 days before and after the current date and time, MX OPC DA Server may stop. When changing it, stop MX OPC DA Server.

In addition, time stamps and data values may be updated at shorter intervals than usual in the screen of a client.

In this case, perform any of the following operations.

- Reopen the screen being monitored.
- Click [View] ⇒ [Refresh] to update the screen of Configuration Tool.
- Restart MX OPC DA Server.



# 8.3 Statistics Mode

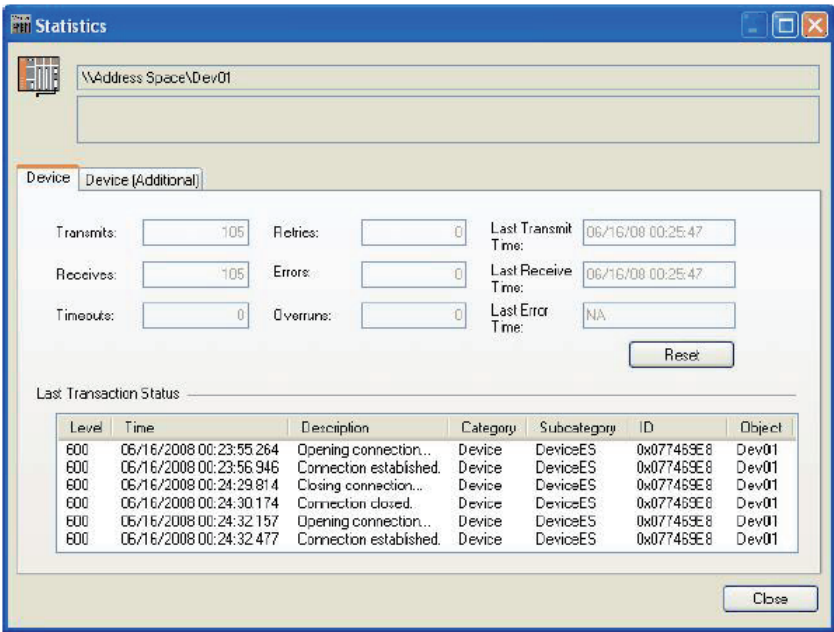
The MELSOFT MX OPC Server DA Configuration Tool includes a Statistics Mode for viewing the data statistics of your I/O driver while it is running. Statistics are provided for the following:

- Devices
- Data tags

To change to statistics mode:

## Operating procedure

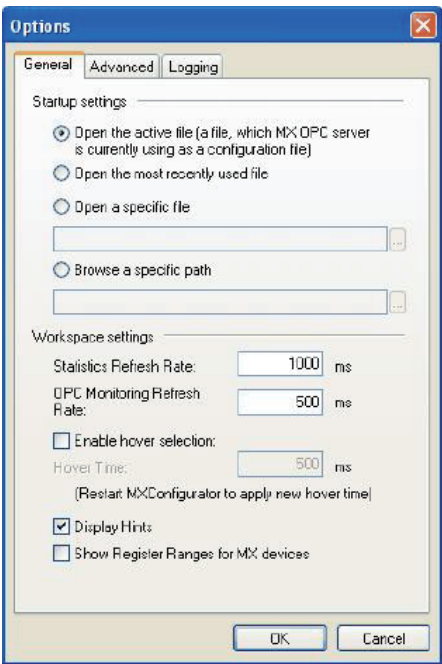
1. Select Statistics from the View menu.
2. The Configurator switches the current dialog view to data statistics mode, as shown in the figure below.



Statistics Mode View

# Setting the Statistics Mode Refresh Rate

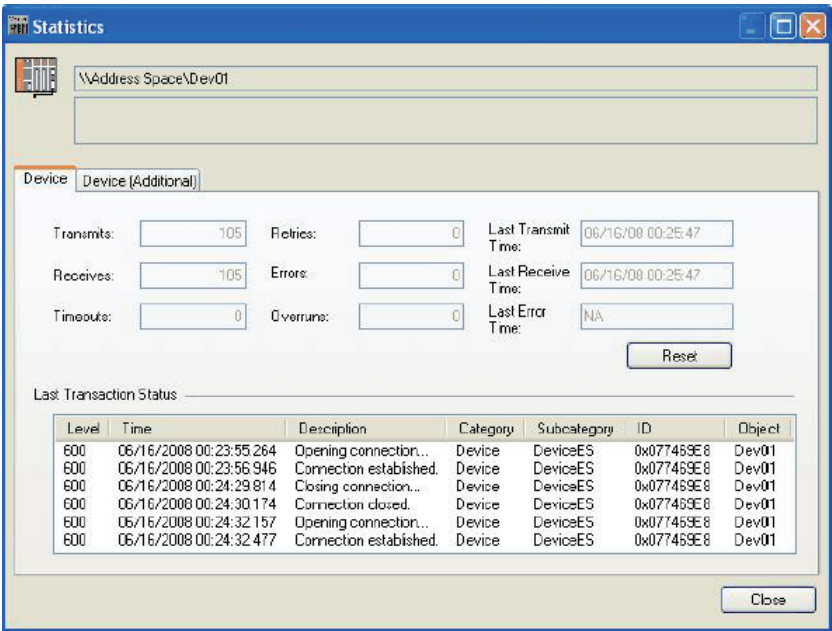
To set the Statistics Mode Refresh Rate (in milliseconds), select Options from the Tools menu and click on the General tab of the Options dialog box, as shown in the figure below.



Options Dialog Box: General Tab

## Device statistics

To view device statistics in statistics mode, click on a device or tag under the Address Space tree control, as shown in the figure below.



Viewing Runtime Data Statistics for Devices

Transmits: Displays the number of messages sent to the process hardware from the selected device.

Example

- Number of data blocks configured for the driver = 8
- Number of messages sent from DataBlock1 = 5
- Number of messages sent from DataBlock2 = 6
- Number of messages sent from DataBlock3 = 3

- Number of messages sent from DataBlock4 = 12
- Number of messages sent from DataBlock5 = 16
- Number of messages sent from DataBlock6 = 6
- Number of messages sent from DataBlock7 = 6
- Number of messages sent from DataBlock8 = 6
- Total number of messages sent = 60
- Transmits field displays: 60

**Receives:** Displays the total number of messages the device received from the process hardware. The Receives field includes both valid and invalid messages. Use the Errors field for the number of invalid messages.

**Timeouts:** Displays the total number of messages sent to the process hardware from the selected device that did not receive a reply. Timeouts result from the device property Reply Timeout. This property specifies the length of time that the I/O driver waits for a response from the process hardware. If the driver sends a message to the hardware and does not receive a response within the specified Reply Timeout value, a timeout occurs and increments the Timeouts field.

Modem transmissions are particularly vulnerable to timeouts because of the length of time it takes to establish communication. If you have a high timeout count:

- Try increasing the value for the Reply Timeout property.
- Check your cable. You may have a bad connection.
- Verify that your channel properties match the process hardware. If you don't know your hardware settings, refer to your process hardware documentation.

**Retries:** Displays the total number of messages resent to the process hardware because of errors. A value in the Retries field for a device does not indicate a communication problem. It may, for example, indicate that the process hardware is slow replying to driver requests.

Retries are a timing property that you set for each device. The driver uses the value you enter to determine how many times to resend a request after a timeout occurs. Possible reasons for the driver timing out include:

- Checksum errors from communication line interference
- Busy PLCs. PLCs may not reply if they are involved in another task.
- Hardware problems such as a faulted PLC. The hardware cannot recover unless you clear the fault.

**Errors:** Displays the total number of protocol errors that were sent from the process hardware and received by the selected device. Protocol errors occur when:

- The process hardware receives a message with a checksum error. Typically, interference or a loose connection can cause checksum errors.
- The driver requests data from a register that does not exist in the process hardware.

For more information on the cause of the error, check the Last Error field for all data blocks configured for the driver.

**Overruns:** Displays the total number of overruns for the device. An overrun occurs when the driver sends more messages to a data block than it can process at one time. A high number in the Overruns field indicates that your driver cannot poll all of the enabled data blocks at the rate specified. It also indicates that your data is not updating at the specified poll rate.

**Note:** Setting the poll rate to zero forces the driver to run at its maximum rate. Overruns are disabled for poll rates equal to 0. Set the poll rate equal to 0 if it is more important that the driver run at its maximum speed than detect overruns.

**Last Transmit Time:** The last time data was sent to the device.

**Last Receive Time:** The last time data was successfully received from the device.

**Last Error Time:** The last time an error was observed on the device, including connection errors.

**Reset:** Resets all data statistics.

## Device statistics (Additional)

To view additional device statistics in statistics mode, click on a device or tag under the Address Space tree control, and then select the "Device (additional)" tab, as shown in the picture below.

The screenshot shows a window titled "Statistics" with a tree view at the top showing "\\Address Space\\Dev05". Below the tree view are two tabs: "Device" and "Device (Additional)". The "Device (Additional)" tab is active, displaying a grid of statistics. The statistics are as follows:

Consecutive Faults:	15	Poll Count:	0	Number of Data Blocks:	0
Add Point Calls:	12	Block Poll Count:	0	Number of Points:	0
Remove Point Calls:	12	Read Poll Count:	0	Last Read Time:	NA
Write Point Calls:	0	Write Poll Count:	0	Last Write Time:	NA
Read Point Calls:	0	Update Count:	0		

A "Close" button is located at the bottom right of the window.

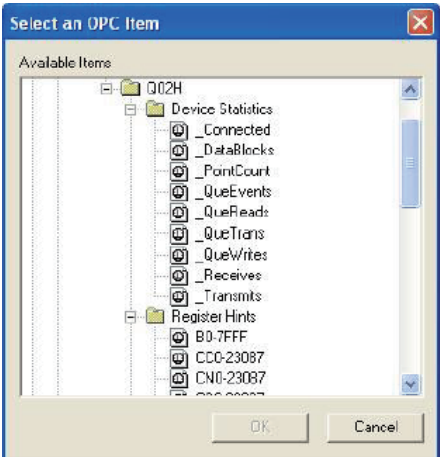
### Viewing Runtime Data Statistics for Devices (Additional)

The additional statistics are:

Item	Description
Consecutive Faults	Displays the total number of faults without an interposing success on this device.
Add Point Calls	The total number of points added during the lifetime of this device. Note that the device lifetime is not the same as the running time of the server, as the server may release the device altogether, if no points are requested.
Remove Point Calls	Similar to Add Point Calls
Write Point Calls	The count of sync/async write calls; similar to Add Point Calls
Read Point Calls	Count of sync read calls; similar to Add Point Calls
Poll Count	How many times the internal calendar triggered polling of blocks. One or more blocks can be polled per one Poll Count increase (see Block Poll Count).
Block Poll Count	How many blocks were polled during regular update. Extra read requests and write requests do not increase this counter.
Write Poll Count	Counts the blocks created during writes to the device.
Update Count	The total number of tags that were processed in the Block Polls, Read Polls and Write Polls.
Number of Data Blocks	The total number of data blocks this device uses. Data blocks are allocated automatically by the runtime module depending on the values set for the advanced device properties.
Number of Points	The total number of tags that the device manages currently.
Last Read Time	The last time any data was explicitly read from the device.
Last Write Time	The last time data was written to the device.

# Statistical tags in OPC address space

In a similar way to the "Hints", the MX Runtime can optionally expose statistics tags in a group called "Device Statistics", as seen on the next screenshot:



Which tags are shown will depend on the settings in the Advanced tab of the Options dialog . The possible settings are:

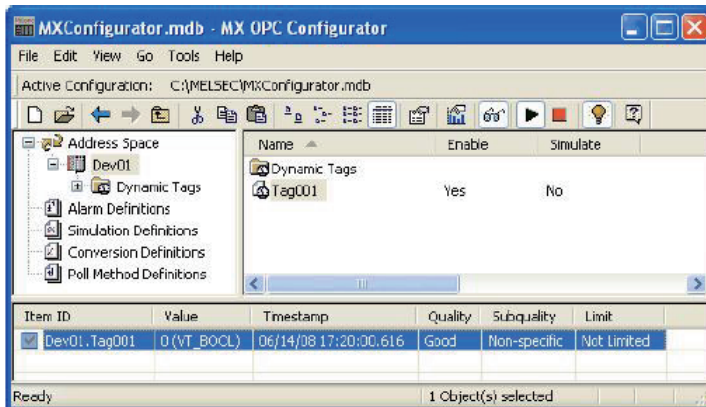
Setting	Tags shown
Off	None - the 'Device statistics' branch will not appear.
Normal	<ul style="list-style-type: none"><li>• Connected: Returns a number indicating whether the runtime is connected to the device or not. 1 means connected, 0 not connected.</li><li>• Receives: Number of receives. The same as the statistical counter "Receives" in the statistics dialog.</li><li>• Transmits: Number of transmits. The same as the statistical counter "Transmits" in the statistics dialog.</li></ul>
Extended	<ul style="list-style-type: none"><li>• Connected: Returns a number indicating whether the runtime is connected to the device or not. 1 means connected, 0 not connected.</li><li>• Receives: Number of receives. The same as the statistical counter "Receives" in the statistics dialog.</li><li>• Transmits: Number of transmits. The same as the statistical counter "Transmits" in the statistics dialog.</li><li>• DataBlocks: Number of data blocks. The total number of data blocks this device uses. Data blocks are configured automatically by the Runtime module depending on the advanced settings for the device.</li><li>• PointCount: Number of points. The total number of tags that the device manages currently.</li><li>• QueTrans: Queued transactions. The number of transactions queued.</li><li>• QueReads: Queued reads. The number of reads remaining in the queue.</li><li>• QueWrites: Queued writes. The number of writes remaining in the queue.</li><li>• QueEvents: Queued events. The number of future events scheduled for the queue</li></ul>

## 8.4 Monitor View

Monitoring is enabled for each item with a check mark next to it. To enable/disable monitoring for an item, you can click on the box to the left of the item. A check mark inside the box means the item is enabled for monitoring. If there is no check mark, then the item is disabled.

The monitoring view of the Configurator has been optimized for a smoother, better user experience. Monitoring of thousands of tags will not hinder operators from using the Configurator.

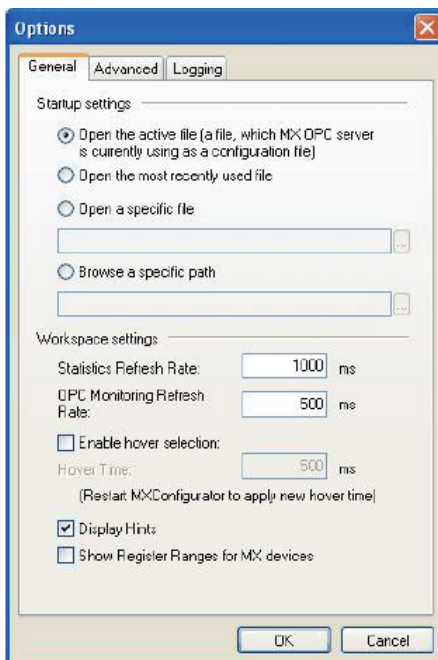
The MELSOFT MX OPC Server DA Configuration Tool includes a runtime monitor for viewing server data. To change to the monitor view, select Monitor View from the View menu. The runtime monitor appears in the bottom pane of the Configurator screen, as shown in the figure below. During runtime, the monitor scans the server and displays the tag values and other statistics such as date, time, and quality.



Runtime Monitor View

### Setting the monitor view refresh rate

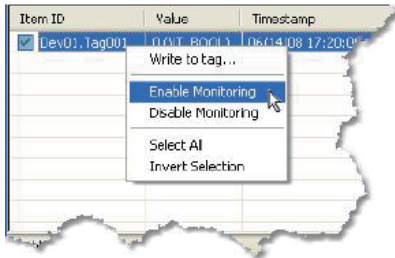
To set the OPC Monitoring Refresh Rate (in milliseconds), select Options from the Tools menu and click on the General tab of the Options dialog box, as shown in the figure below.



Options Dialog Box: General Tab

## Enable monitoring

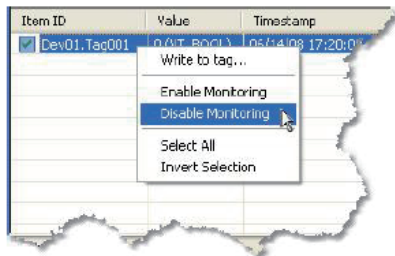
Monitoring is enabled for each item with a check mark next to it. To enable/disable monitoring for an item, you can click on the box to the left of the item. A check mark inside the box means the item is enabled for monitoring. If there is no check mark, then the item is disabled. To enable monitoring for an unchecked item in the monitor view, you can also right-click on the item and select Enable Monitoring from the pop-up menu, as shown in the figure below.



Enabling Monitoring for an Item

## Disable monitoring

To disable monitoring for a checked item in the monitor view, you can also right-click on the item and select Disable Monitoring from the pop-up menu, as shown in the figure below.

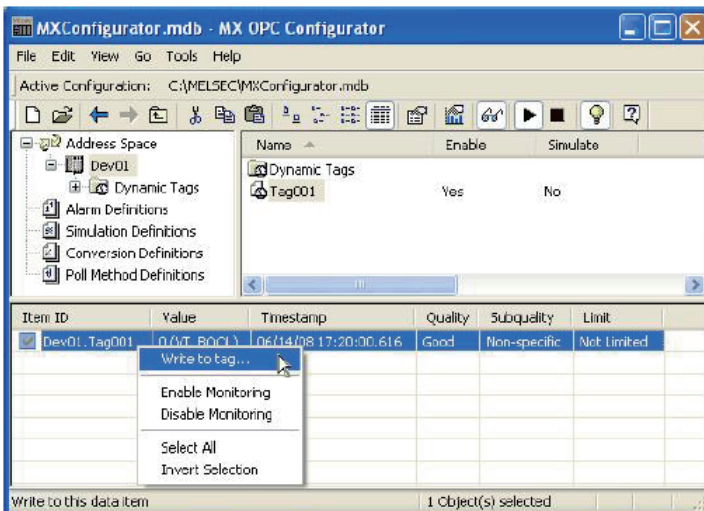


Disabling Monitoring for an Item

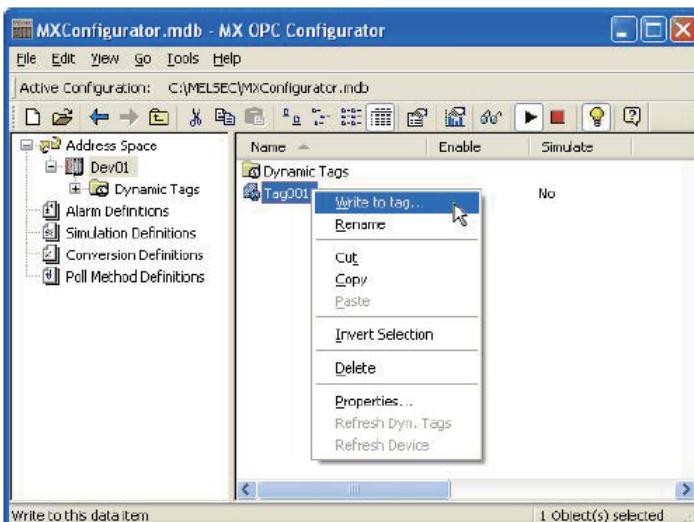


## 8.5 Writing to Tags

Right clicking on a tag in the Monitor view or List view will open a context menu offering the possibility to write into the tag:

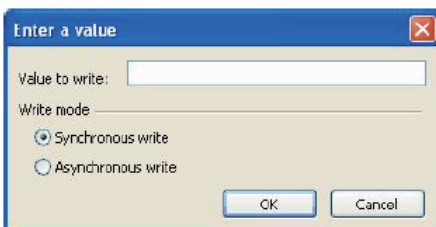


The "Write to tag" menu item is enabled only if exactly one writable item is selected, that is when an MX or Modbus data tag is selected in the Monitor view or the List view.



Clicking the new menu item will open a dialog box, as seen below.

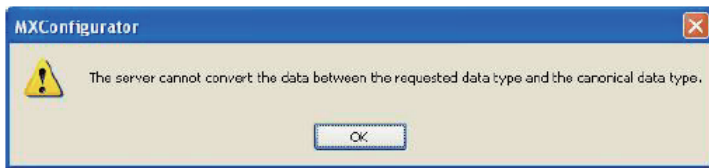
The values accepted depend on the value type of the tag, that the value is written into. For all numeric data types, the value of the number is checked if it is in range of the tag's data type. The radix character for real numbers will depend on the current locale (e.g. '1.0' in English or '1,0' in Germany).



To write data to arrays, simply separate the elements by commas or semicolons, e.g. writing to an array of floats: 0.1, 0.2, 0.3 or 0.1; 0.2; 0.3 (for 'German (Germany)' locale where the comma replaces the decimal point, use '0.1;0.2;0.3'). When a semicolon is found in the input value, the configurator assumes that values are separated by semicolons; otherwise it assumes that commas are used as a separator.



Writing to string tags is simple; write the string directly to the edit box. The length of the string is not constrained. When any of the previous formatting requirements are not met, a dialog box appears showing the error, as in the example below.



## 8.6 Special Itemnames

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As well as allowing defined tags to be read, the MX OPC Runtime module can read other details using special item names.

### Accessing array items

---

If your client application does not support reading single array elements, you may still be able to read them by changing the name of the item that you add.

A client can address a single element of an array tag using the item syntax:

- 'arraytag[elemNr]'
- e.g. arraytag[2] for element 2 of arraytag.

If the item is of "Array" type, single items representing the array elements will be also created. These items cannot be browsed (they are hidden for browsing), but can be monitored (added to OPC client).

Let's say we have an array item:

- TagArray
- array of WORDS
- Number of Elements: 20
- LowerBound: 10.

Then, in the server, aside from the 'TagArray' item that is visible, will also exist the hidden items 'TagArray[10]', 'TagArray[11]', ..., 'TagArray[29]'. The tags can be added from an OPC client, if the OPC client knows about its existence (other than via browsing).

### Accessing bits

---

If your client application does not support reading a single bit within a word, you may still be able to use this feature by changing the name of the item that you add.

To read a single bit within a larger type (such as INT, WORD etc.), the easiest way is to define a new tag for the item in MELSOFT MX OPC Server DA Configuration Tool. For instance, if you set the address of a new tag as 'D0.2' and the type as BOOL, the tag will read/write bit 2 from address D0. The bits are numbered starting from 0 for the least significant bit.

Alternatively, most clients will allow you to read bits from other types using dot notation, with the syntax:

- "tagname.bitNr"
- e.g. tagname.0 for bit 0 of tagname.

With this "Bit access" feature, if the item is of a type other than BOOL, STRING, WSTRING, REAL or LREAL, you can access its single bits. They are implemented as custom "OPC Properties", and also can be accessed that way. However, it is not possible to write bit values this way as the properties are read-only. If you need to write to the bit, define a new tag for it (as described above).

Examples:

- TagD0, type WORD
- You can access 'TagD0', but also its properties:
- 'TagD0.0', 'TagD0.0', ..., 'TagD0.15'

## 8.7 Dynamic Tag Support

The MELSOFT MX OPC Server DA Configuration Tool has a special folder "Dynamic Tags" in each MX Device where these dynamic tags show up. This folder cannot be modified and is present all the time, even if no dynamic tags are present.

Dynamic tags are like normal tags, but as the name suggests, they are added dynamically and can be used without having to first define them in the configurator database. When an OPC client application requests a dynamic tag, it will be added temporarily and removed again when there are no longer any OPC client applications using it. This can be useful when (for example) setting up a display screen in a SCADA package which the user will only view occasionally. By using dynamic tags to read the values on the screen, the tags will only be created and polled while the screen is in use. When the screen is not in use, there is no additional load on the system.

Dynamic tags have a fixed name format, which MX OPC Server uses to determine the device, address and data type of each tag. Each tag has a name such as:

- <Device>[\<Group>]Item

The backslash ('\') separator is used to identify dynamic tags – parts of other item IDs are separated by period (.) characters. If you are writing your own client application, this means that when programmatically browsing the OPC server hierarchy for dynamic tags (for example, in Visual Basic – See "Using OPC from Visual Basic", the item path and item ID can be different, for example, the path "Dev01.Dynamic Tags.D0.I.4" would have item ID "Dev01\D0.I.4".

The '<Device>' part must match the name of an MX device which is already configured in the database; devices cannot be created dynamically.

The '<Group>' section is optional, and works in a similar way to the normal OPC server groups, although only one level is allowed for dynamic tags.

The '<Item>' part can be in one of two formats, either:

- <Register><StartAddr>[.<bit>[.<Type>[.<ArraySize>]]]

which specifies 'bit-within-word' addressing to read starting from the bit number specified (decimal format), similar to addressing bits within a tag using the 'Tag.1' syntax, or the alternative format:

- <Register><StartAddr>[.<Type>[.<ArraySize>]]

The <Register> part gives the device register within the address, e.g. 'D' for 'D0', 'X' for 'X1A', 'Y' for 'Y5' etc. For devices that contain a backslash ('\') e.g. U3E1\G, the backslash should be removed from the device name to prevent it being used as an item name separator - e.g. specify 'U3E2G' instead of 'U3E2\G'.

The <StartAddr> part gives the numeric element of the address, e.g. '0' for 'D0', '1A' for 'X1A', etc. Depending on the PLC type and register selected, this may be in decimal, hexadecimal or octal – this will match the address entry in the configurator.

The <Type> part is optional, and specifies the data type of the tag (see list below). If this is not specified, a suitable default type will be used based on the device register.

The <ArraySize> part is used to define array tags, and specifies the number of elements in the array (except for strings where it gives the length instead – see note below). The <Type> part must always be supplied as well when an array size is used.

Possible values for the <Type> part and their abbreviations are:

<Type> Part	Abbreviation
BOOL	B
WORD	W
DWORD	DW
INT	I
DINT	DI
REAL	R
LREAL	LR
STRING	S
WSTRING	WS

For strings, the <ArraySize> must be supplied and gives the string length in characters.

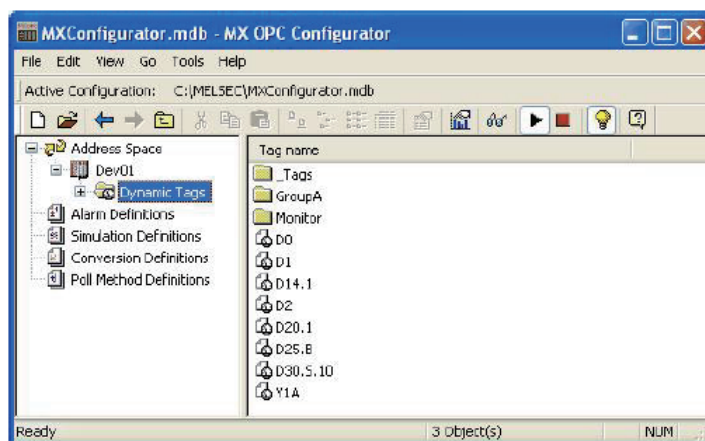
Some example item names for dynamic tags using this format are shown below, for a device called 'PLC'.

PLC\D20	Address D20, default type
PLC\D20.W	Address D20, read as word type
PLC\D20.1	Bit 1 of address D20 (will be Boolean)
PLC\GroupA\D40	Address D40, within a group called 'GroupA'
PLC\D41.Dint	DINT at address D41
PLC\X1A	Address X1A, in a register type that uses hexadecimal addressing on this PLC
PLC\D50.I.10	Array[10] of int
PLC\D100.S.10	String of length 10
PLC\M10.B.5	Array [5] of bool at M10
PLC\D100.12.B.8	Array [8] of bool at D100.12
PLC\U3E1G10000.I	Shared word device in CPU 2 as integer

The following special dynamic tag names can also be defined:

- RefreshDeviceCommand - this is a write-only boolean tag that will refresh the device if a non-zero value is written to it, in the same way as if the 'Refresh device' menu item had been selected.

The "Dynamic Tags" folder can hold tags directly or the tags can be grouped, depending on the way the client created the tags. Only one level of groups is allowed and dynamic tag group names have the same restrictions as normal groups, i.e. the group name must contain only standard letters, numbers, underscores, hyphens and parentheses, and the name must start with a letter, hyphen or underscore. The maximum name length is 32 characters.



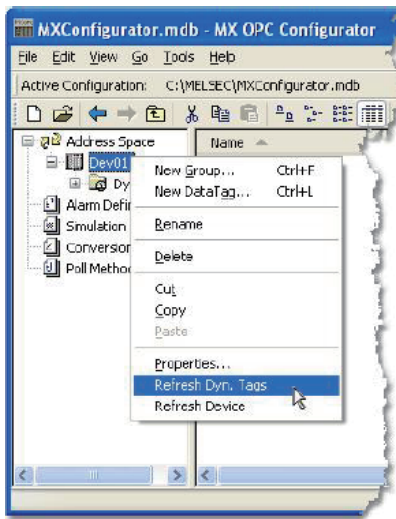
**Example.mdb dialog**

Dynamic tags will also show in the Monitor view and the Statistics dialog, the Monitor view can be used to write into existing dynamic tags.

The dynamic tags for a device are read from the server when the user clicks on the Dynamic Tags folder for the first time. Also all tags that are in a group (like GroupA) are read in when the user clicks on that group for the first time.

## Refresh dynamic tags

To re-read (or refresh) tags in a particular group, or device, simply right click on that item and choose the new item: Refresh Dyn. Tags.



**Refresh dynamic tags menu**

This new item is available for the Address Space, MX Devices and the Dynamic Tags folder in each device, and for individual dynamic tag groups. Refreshing each of the items has the following results:

Address space - Refreshes all the tags and all groups in all MX Devices, which were previously read in at least once, that means the user clicked on them at least once in the past.

MX Device - Refreshes all tags and groups of this device, which were previously read at least once.

The Dynamic Tags folder - Same effect as refreshing the parent MX Device

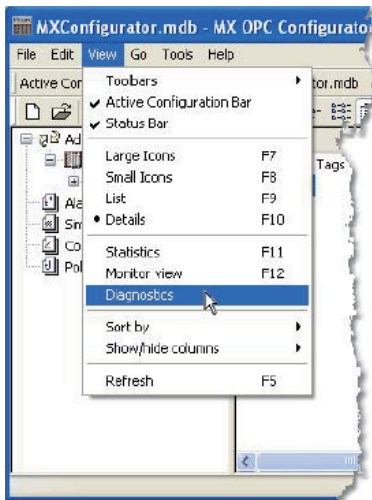
A Dynamic Group - Refreshes all tags in this group.

## 8.8 Automatic Backup

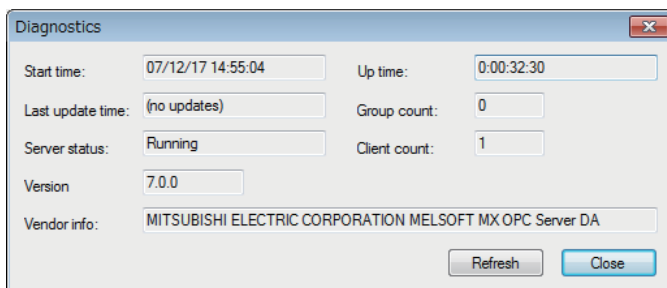
Each time MELSOFT MX OPC Server DA Configuration Tool starts up, it now makes a backup copy of the opening database to the same folder where the original resides. The name of the backed-up database is the original database name but with the extension "bak" added. The resulting filename will be for example "MXConfigurator.mdb.bak".

## 8.9 Diagnostics

As shown in the screenshot below, MELSOFT MX OPC Server DA Configuration Tool includes an item in the main menu called Diagnostics:



Selecting this item will show a window with diagnostic information from the connected OPC server. You can still use other windows normally while this information is shown.



Diagnostic information

- Start time: The time the server started in format mm/dd/yy hours:minutes:seconds
- Up time: The time the server is running, formatted as days:hours:minutes:seconds
- Last update time: The time the server sent the last data value update to this client. This value is maintained on an instance basis. Formatted in the same way as start time.
- Group count: The total number of groups being managed by the server.
- Server status: Possible server states include Running, Failed, and No configuration
- Client count: The connected client count
- Version: The version of the server
- Vendor info: The vendor info as reported by the server
- Refresh: Reload this dialog data from the server
- Close: Closes the window

The runtime will also support various diagnostics on various abstraction levels and log these diagnostics using TraceWorX into an XML file. The Configurator will not show or parse these XML files in version 7.00. These options are described in "Options - Logging Tab".

## 8.10 Showing Register Ranges

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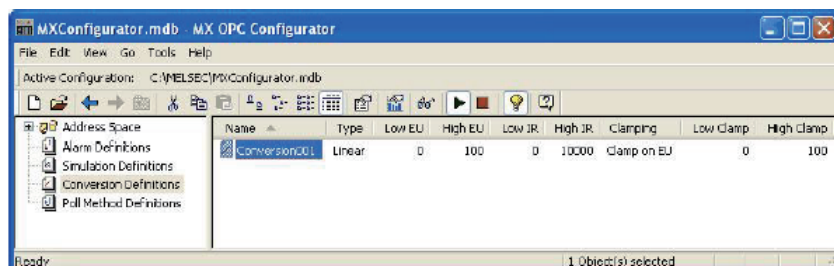
The new server runtime can provide the list of possible register ranges of each MX device. This list is provided to the OPC clients as a special group called "Hints" in the address space of the device containing tags.

The names of these tags are in the form <register><starting address>-<ending address>, where all three items are in the same form as seen in the Supported Devices dialog (clicking Browse from Tag Properties Basic tab). D0.0-7999.15 is a valid example for the FX3U(C) CPU type.

This function can be enabled or disabled through the Options dialog. It is switched off by default.

# 9 Configuring Conversion Definitions

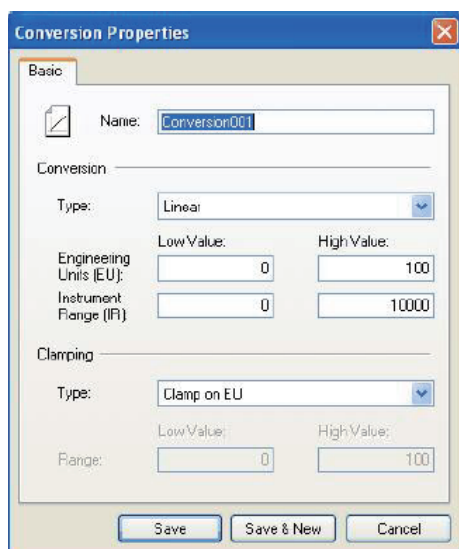
The Conversion Definitions tree control, shown in the figure below, allows you to configure conversion settings for data tags. Conversion settings can be associated with a data tag via the tag properties dialog box.



Conversion Definitions Tree Control

## 9.1 Basic Conversion Properties

In the Basic tab of the Conversion Properties dialog box, shown below, configure the following settings:



Conversion Properties: Basic Tab

Item	Description
Name	Specifies the name of the conversion definition. The name can be up to 50 alphanumeric characters, including underscores ( _ ) and hyphens ( - ).
Conversion Type	For each conversion definition, select one of the following conversion types from the drop-down list: <ul style="list-style-type: none"> <li>• None (make float): Converts the data into float data type, but does not change the value itself. When this option is selected, the Engineering Units and Instrument Range fields are disabled.</li> <li>• Linear: Keeps a linear relation between EU and IR.</li> <li>• Square Root: Keeps a square root relation between EU and IR.</li> </ul>
Engineering Units (EU)	Client scale; specify low and high values for the engineering units (if applicable).
Instrument Range (IR)	Device scale; specify low and high values for the instrument range (if applicable).
Clamping	If clamping is enabled, the data value will be limited to its High Value/EU High Value when it exceeds the upper limit, and similarly to its Low Value/Low EU Value parameter when it exceeds the bottom limit. Select one of the following clamping types from the drop-down list: <ul style="list-style-type: none"> <li>• None: No clamping type is specified.</li> <li>• Clamp on EU: Clamps on the specified low and high engineering units (EU) values.</li> <li>• As Specified: Clamps on a specified range of low and high values.</li> </ul>
Range	Specify low and high values for the range.
Save	Saves all changes specified in the properties dialog box. The conversion definition appears in the list view.
Save & New	Saves all changes specified in the properties dialog box.
Cancel	Closes the properties dialog box.

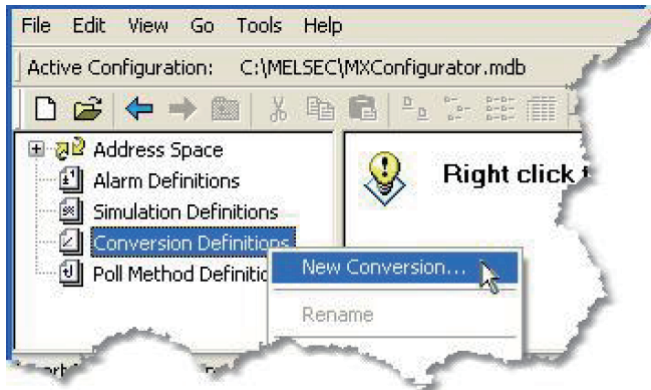


## 9.2 Creating a New Conversion Definition

To create a new conversion definition:

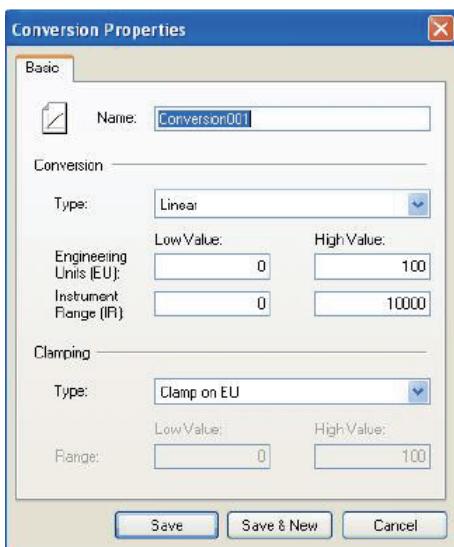
### Operating procedure

1. Right-click the Conversion Definitions tree control and select New Conversion from the pop-up menu, as shown in the figure below.



### Creating a New Conversion Definition

2. The properties dialog box for the new configuration appears, as shown in the figure below.

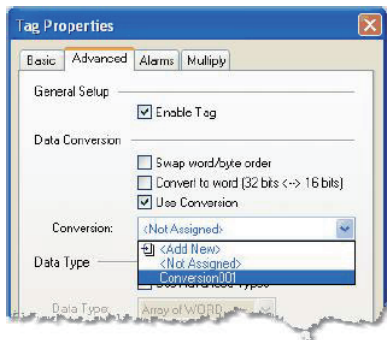


### Setting the Properties for the New Conversion Definition

3. In the Name field, type a name for the new conversion definition.
4. Choose a Conversion Type from the drop-down list and specify low and high values for engineering units and instrument range (if applicable).
5. Choose a Clamping Type from the drop-down list and specify low and high values for the range.
6. When you have finished configuring the conversion definition properties, click the Save button. The new configuration appears under the Conversion Definitions tree control.

## 9.3 Assigning Conversion Definitions to Tags

Conversion settings can be associated with a data tag via the Advanced tab of the Tag Properties dialog box, as shown in the figure below.



Data Tag Properties: Advanced Tab

To get the data value converted to another form, choose one of the predefined or user-defined conversions. MX OPC Server includes the following conversions:

- 1.** Swap word/byte order
  - WORD conversion B1/B2  $\Leftrightarrow$  B2/B1
  - DWORD conversion B1/B2 B3/B4  $\Leftrightarrow$  B4/B3 B2/B1
- 2.** Convert to Word (32bits  $\Leftrightarrow$  16bits)

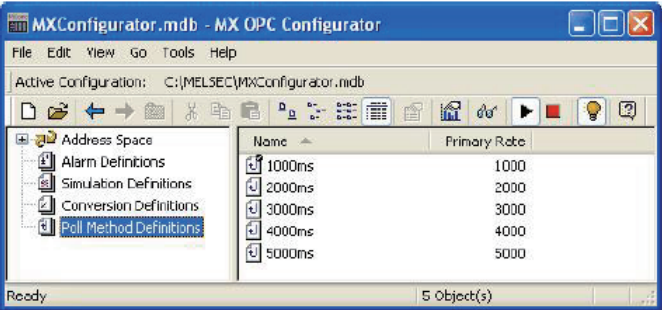
If an OPC client requests a VT\_I4 (DINT), where the tag is defined in the MELSOFT MX OPC Server DA Configuration Tool as a VT\_I2 (INT), the MX OPC Server will reduce it to VT\_I2 when writing and expand it to VT\_I4 when reading. The sign of the data will be taken into account.

- 3.** Use Conversion

To select a conversion definition, check the Use Conversion check box and then select a conversion definition from the drop-down list, which lists all conversion definitions configured in the Conversion Definitions tree control of the Configurator.

# 10 Configuring Poll Method Definitions

The Poll Method Definitions tree control, shown in the figure below, allows you to configure polling method settings for data tags. Polling methods can be associated with data tags via the tag properties dialog box. The configurator provides several preconfigured polling methods.

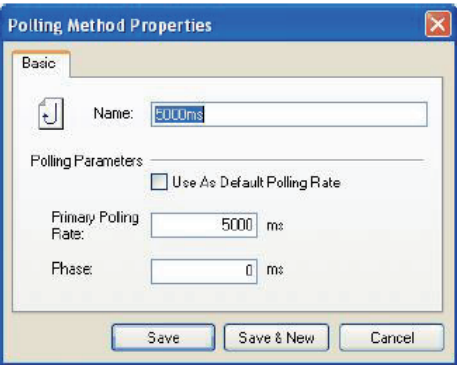


Poll Method Definitions Tree Control

## 10.1 Basic Poll Method Properties

In the Basic tab of the Poll Method Properties dialog box, shown below, configure the following settings:

Item	Description
Name	Specifies the name of the poll method definition. The name can be up to 50 alphanumeric characters, including underscores ( _ ) and hyphens ( - ).
Use As Default Polling Rate	You can designate one poll method definition as the default polling rate for the configuration database. The default poll method definition appears with a check mark icon in the list view.
Primary Polling Rate	The driver polls the data at the specified primary polling rate (in milliseconds). For example, if you enter 2,000 milliseconds (2 seconds) in the Primary Polling Rate field, the driver polls data every 2 seconds.
Phase	The Phase setting can be used to spread the load on the server when reading a large number of tags, by adding an additional delay after the polling time before the tags are read. As an example, if two poll methods are defined as 'Polling rate 10000, phase 10000' and 'Polling rate 10000, phase 5000', these will be read at the same interval, but at different times within the 10 second polling period.
Save	Saves all changes specified in the properties dialog box. The poll method definition appears in the list view.
Save & New	Saves all changes specified in the properties dialog box.
Cancel	Closes the properties dialog box.



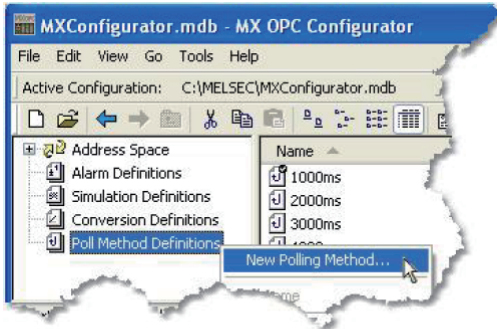
Polling Method Properties: Basic Tab

## 10.2 Creating a New Poll Method Definition

To create a new poll method definition:

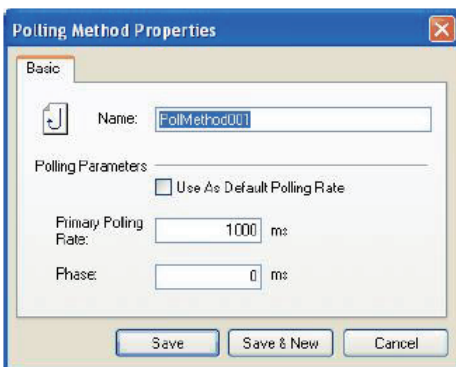
### Operating procedure

1. Right-click the Poll Method Definitions tree control and select New Polling Method from the popup menu, as shown in the figure below.



Creating a New Poll Method Definition

2. The properties dialog box for the new configuration appears, as shown in the figure below.

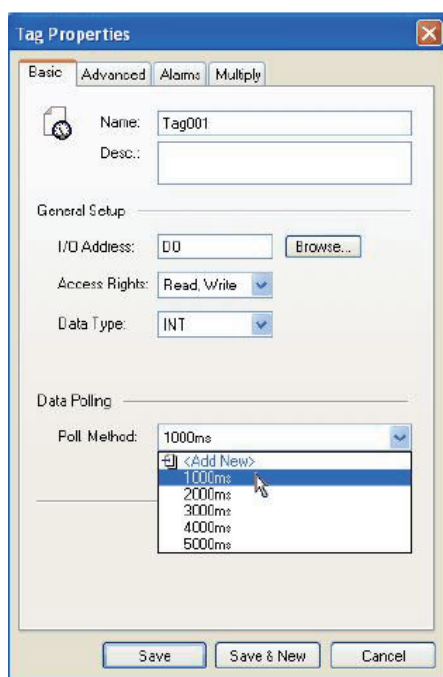


### Setting the Properties for the New Polling Method

3. In the Name field, type a name for the new polling method.
4. Specify a Primary Polling Rate (in milliseconds). The driver polls the data at the specified primary polling rate. For example, if you enter 2,000 milliseconds (2 seconds) in the Primary Polling Rate field, the driver polls data every 2 seconds.
5. Check the Enable Primary Rate check box to activate the polling method.
6. When you have finished configuring the poll method definition properties, click the Save button. The new configuration appears under the Poll Method Definitions tree control.

## 10.3 Assigning Poll Method Definitions to Tags

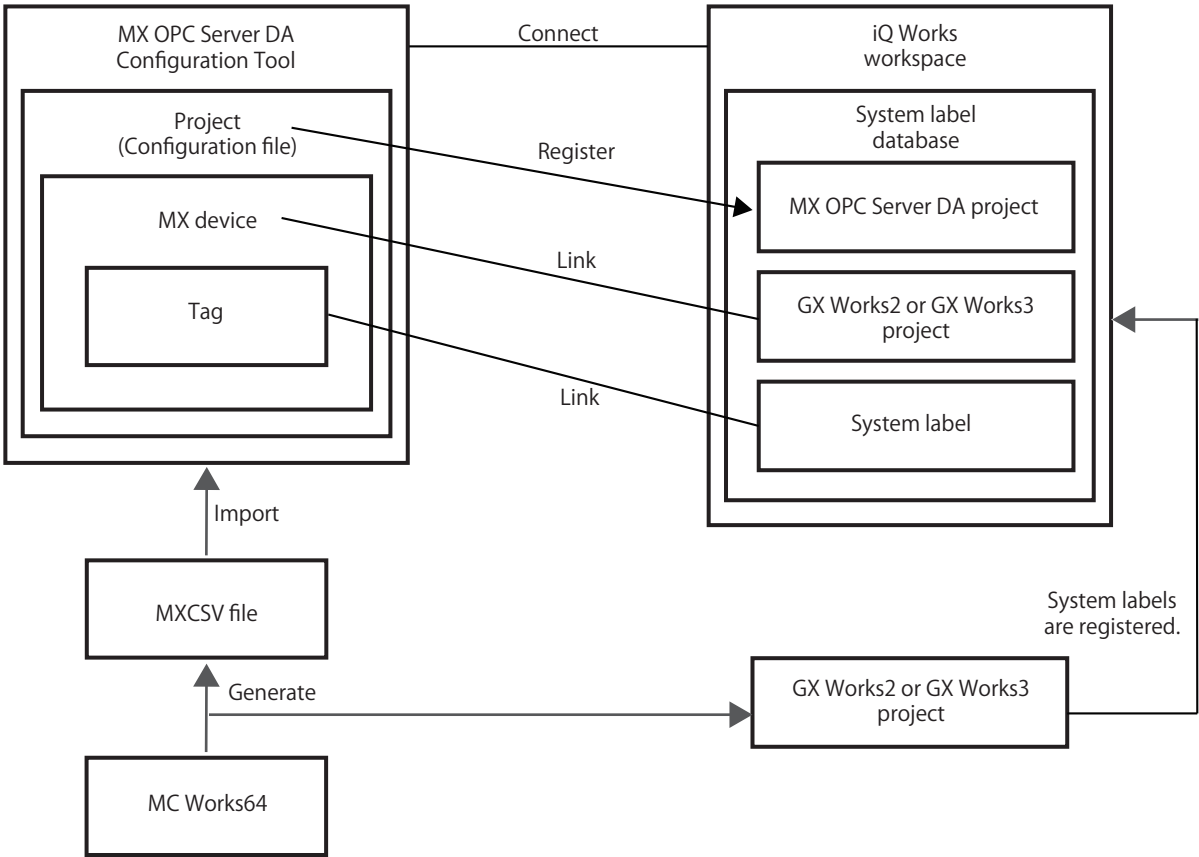
Polling methods can be associated with data tags via the Basic tab of the Tag Properties dialog box, as shown in the figure below. Select a polling method from the Polling Method drop-down list, which lists all polling methods configured in the Polling Method Definitions tree control of the Configurator.



Data Tag Properties: Basic Tab

# 11 LINKAGE WITH iQ Works

A system label registered in a workspace of MELSOFT iQ Works can be imported in Configuration Tool as a tag. When importing as a tag, link with a GX Works2 or GX Works3 project. The following shows the relation between data in Configuration Tool and that in a workspace.



Data in Configuration Tool	Data in a workspace
Project (configuration file)	MX OPC Server DA project
MX device	GX Works2 or GX Works3 project
Tag	System label

For details on system label, refer to MELSOFT Navigator Help.

## Precautions

Do not use a configuration file that was open when the iQ Works linkage function was used in Configuration Tool version 7.01B or earlier. An MX device or a tag cannot be edited.

## 11.1 Procedure to Register System Labels for the First Time

### When linking with an MX device in Configuration Tool based on a GX Works2 or GX Works3 project

1. Connect to a workspace. (📖 Page 255 Connection to a Workspace)
2. Link an MX device in Configuration Tool with a GX Works2 or GX Works3 project. (📖 Page 257 Import)

### When linking with a GX Works2 or GX Works3 project based on an MX device in Configuration Tool

1. Create a GX Works2 or GX Works3 project to link with a project in Configuration Tool.

For the method for creating a GX Works2 or GX Works3 project in a workspace, refer to the following manual.

📖 Let's start iQ Works Version 2

2. Connect to a workspace. (📖 Page 255 Connection to a Workspace)
3. Link an MX device in Configuration Tool with a GX Works2 or GX Works3 project. (📖 Page 259 Export)

## 11.2 Connection to a Workspace

By connecting Configuration Tool to a workspace, a system label can be imported as a tag.

A workspace can be connected by opening it in Configuration Tool.

### Connection to a workspace on a local computer

The following shows the procedure to connect to a workspace on a local computer.

#### Operating procedure

1. Select [File] ⇒ [iQ Works workspace actions] ⇒ [Open workspace].
  2. Click the [Browse workspaces] button.
  3. Select a workspace, and click the [OK] button.
- If there is no MX OPC Server DA project in the selected workspace, create one according to the message.
4. When there is a GX Works2 or GX Works3 project that can be imported in the workspace, import it to Configuration Tool.
- For details on the import, refer to the following section.

📖 Page 257 Import

5. When there is an MX device that can be exported, export it to the workspace. (Except when a new MX OPC Server DA project is created in step 3.)

For details on the export, refer to the following section.

📖 Page 259 Export

6. When connecting to the workspace, the name of the connected workspace appears in the database bar.

## Connection to a workspace on a remote computer

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The following shows the procedure to connect to a workspace on a remote computer.

### Operating procedure

**1.** Select [File] ⇒ [iQ Works workspace actions] ⇒ [Open workspace].


**2.** Click the [Browse network] button.

**3.** Select a workspace, and click the [OK] button.\*1

When a target remote computer is on a different subnet, enter the IP address in "Other subnet address" and click the [Refresh list] button.


If there is no MX OPC Server DA project in the selected workspace, create one according to the message.

**4.** When there is a GX Works2 or GX Works3 project that can be imported in the workspace, import it to Configuration Tool. For details on the import, refer to the following section.

 Page 257 Import

**5.** When there is an MX device that can be exported, export it to the workspace. (Except when a new MX OPC Server DA project is created in step 3.)

For details on the export, refer to the following section.

 Page 259 Export

**6.** When connecting to the workspace, the names of the connected remote computer and the workspace appear in the database bar.

\*1 To display a workspace in a remote computer in the list, the workspace must be open in MELSOFT Navigator on the target remote computer.

## 11.3 Disconnection from a Workspace

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A workspace is disconnected by closing it.

An MX OPC Server DA project in a workspace is not deleted even after disconnection.

### Operating procedure

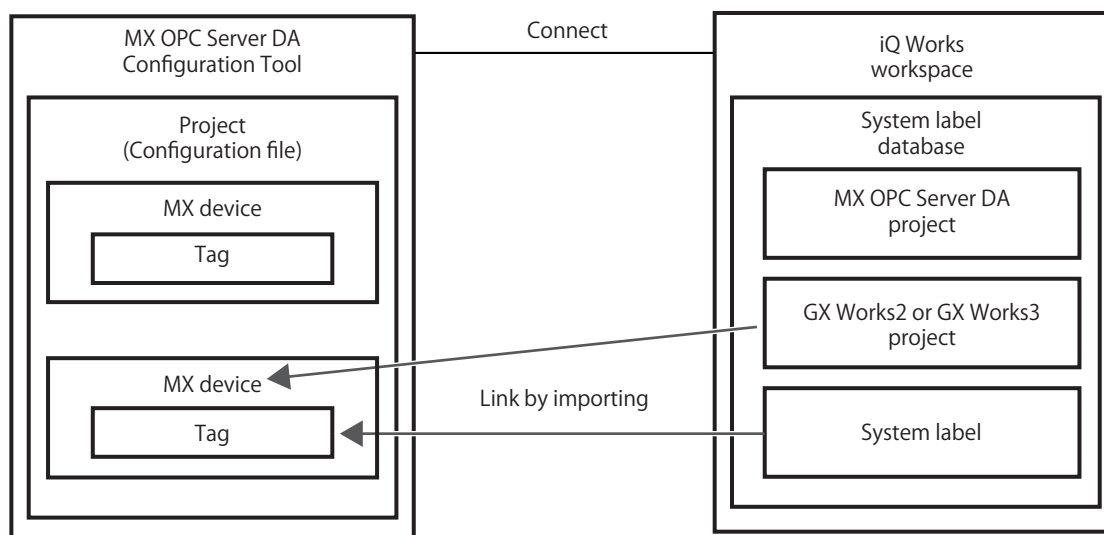
Select [File] ⇒ [iQ Works workspace actions] ⇒ [Close workspace].



# 11.4 Import

This section shows the procedure to import a GX Works2 or GX Works3 project in a workspace of iQ Works to Configuration Tool as an MX device.

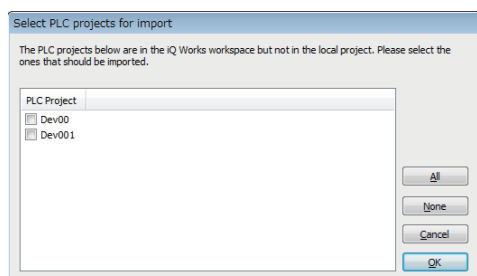
An MX device and a GX Works2 or GX Works3 project are linked by importing.



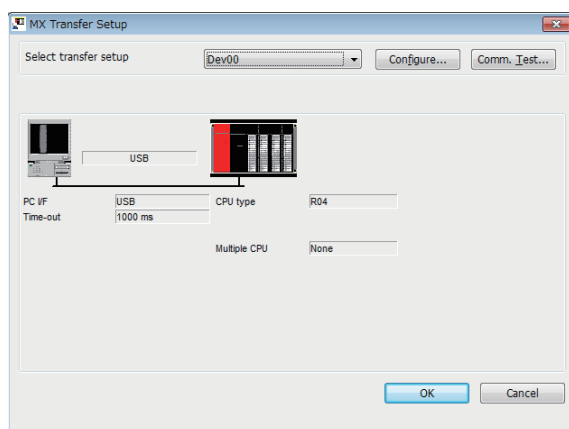
11

## Operating procedure

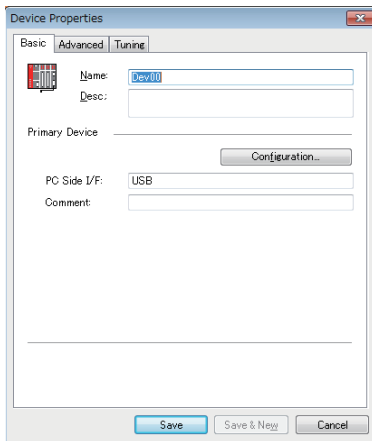
1. Select [File] ⇒ [iQ Works project actions] ⇒ [Import GX Works project].
2. Select a project to import, and click the [OK] button.



3. Check and edit the connection destination setting, and click the [OK] button.



4. Set each item in the "Device Properties" screen, and click the [Save] button.\*<sup>1</sup>



5. When 10000 or more system labels are registered in the project to be imported, the confirmation message to continue the import processing appears.
6. The confirmation message appears after the import is completed.
7. The message whether to save the setting appears. Click the [Yes] button.

\*<sup>1</sup> The name of a GX Works2 or GX Works3 project that is imported is set for the name of an MX device. It cannot be changed in Configuration Tool.

## Precautions

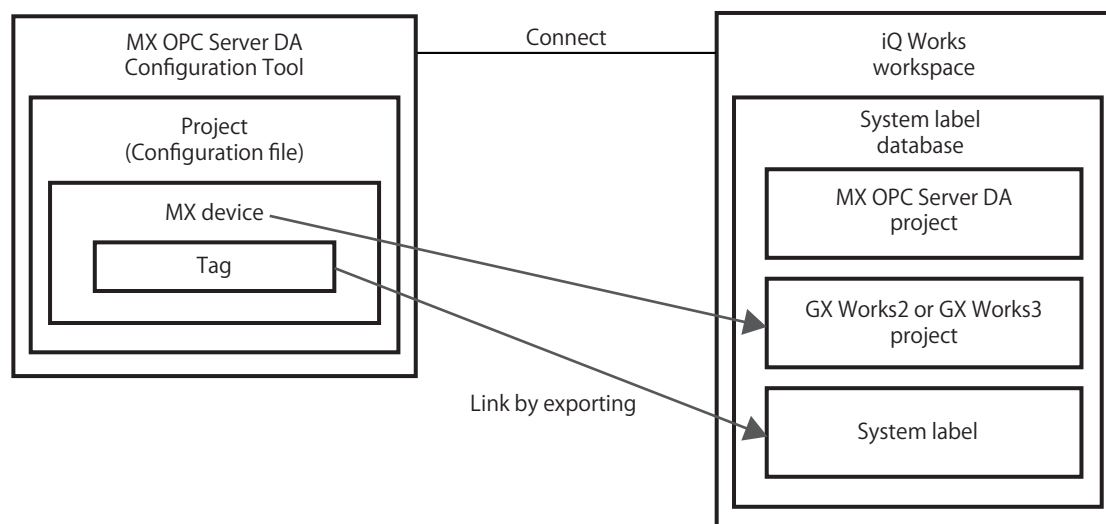
Labels that the data type is structure are not supported.

If they are imported, a group with the same name as the label is created and a member of a structure is created in the group as a tag.

# 11.5 Export

This section shows the procedure to export a setting of an MX device or a tag created in Configuration Tool to a GX Works2 or GX Works3 project in a workspace of iQ Works.

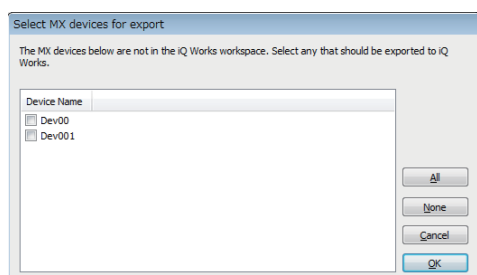
A GX Works2 or GX Works3 project and an MX device are linked by exporting.



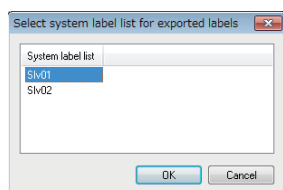
11

## Operating procedure

1. Select [File] ⇒ [iQ Works project actions] ⇒ [Export devices to GX Works].
2. Select an MX device to export, and click the [OK] button.



3. If there are multiple system label lists in a workspace, select the system label in an export destination.



4. When 10000 or more system labels are registered in the project to be exported, the confirmation message to continue the export processing appears.
5. The confirmation message appears after the export is completed.
6. The message whether to save the setting appears. Click the [Yes] button.

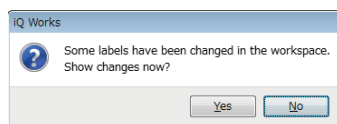
## 11.6 Checking for the Change of a System Label

This section shows the procedure to check the change when a system label in a workspace of iQ Works is edited.  
If a system label is changed while connecting to a workspace, the notification message will appear on Configuration Tool.

### Operating procedure

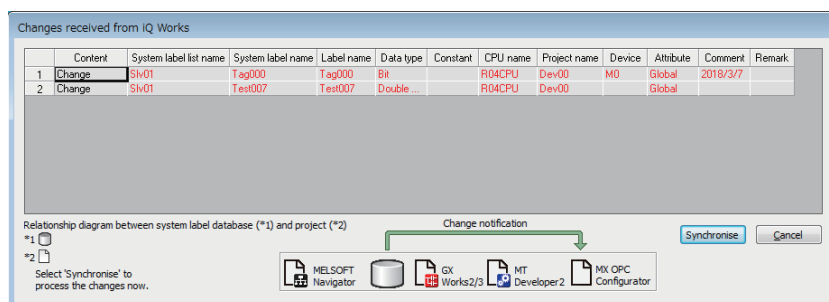
#### ■When checking with a received notification message

Select [Yes] according to the message.



#### ■When checking at any timing

Select [File] ⇒ [iQ Works project actions] ⇒ [Show changes].



Click the [Synchronise] button to apply the change contents to a project in Configuration Tool.

### Precautions

If a system label is changed to one not supported by Configuration Tool, the change contents will be blank.

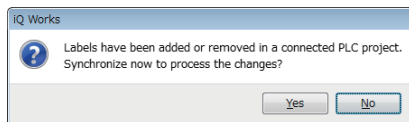
## 11.7 System Label Synchronization

This section shows the procedure to synchronize a tag in Configuration Tool with a system label in a workspace of iQ Works. If a system label is added or deleted while connecting to a workspace, the notification message will appear on Configuration Tool.

### Operating procedure

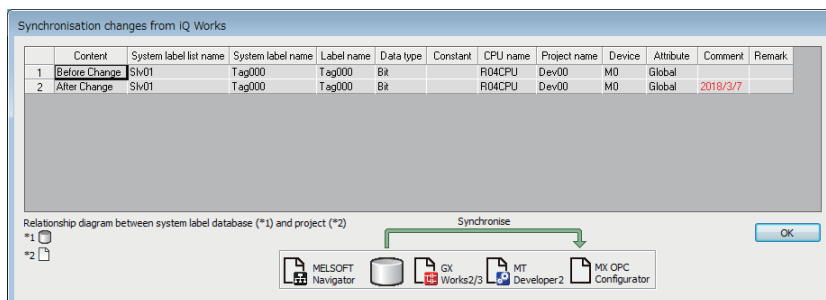
#### ■When synchronizing with a received notification message

Select [Yes] according to the message.



#### ■When synchronizing at any timing

Select [File] ⇒ [iQ Works project actions] ⇒ [Synchronize].

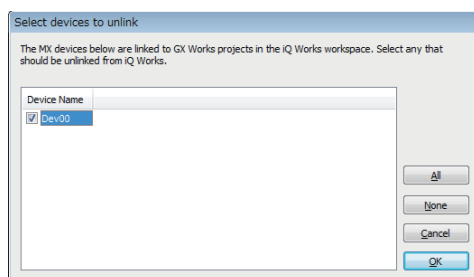


## 11.8 Unlinking of an MX Device

This section shows the procedure to unlink a GX Works2 or GX Works3 project in a workspace for each MX device. Tag information of each MX device can be edited by unlinking.

### Operating procedure

1. Select [File] ⇒ [iQ Works project actions] ⇒ [Unlink device].
2. Select an MX device to unlink, and click the [OK] button.



## 11.9 Adding Tags to a Linked MX Device

A tag can be added to a linked MX device.

1. Select a target MX device, and select [Edit]⇒[New iQ Works label].
2. Enter information of a tag, and click the [Save] button.

# 11.10 MXCSV File Import

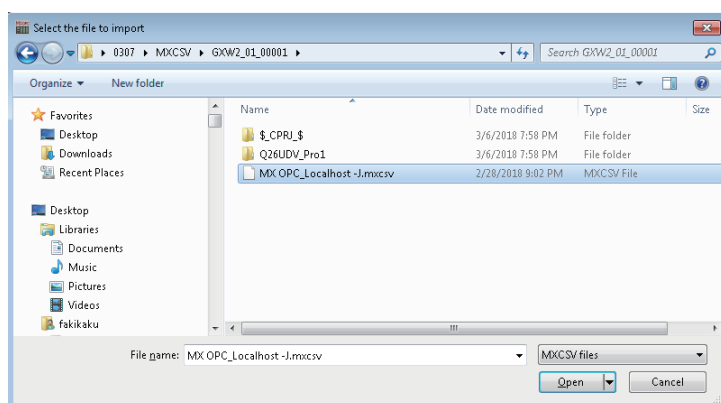
This section shows the procedure to connect to a workspace of iQ Works by importing a setting (MXCSV file) provided by MC Works64.

## Precautions

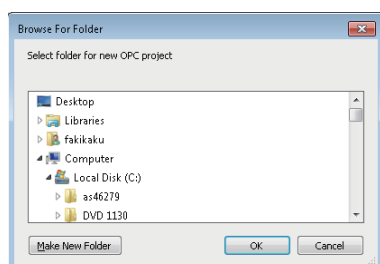
A system label in a GX Works2 or GX Works3 project to import must be registered in the system label database of a workspace in advance.

## Operating procedure

1. Select [File] ⇒ [iQ Works project actions] ⇒ [Import CSV].
2. Select an MXCSV file to import, and click the [Open] button.



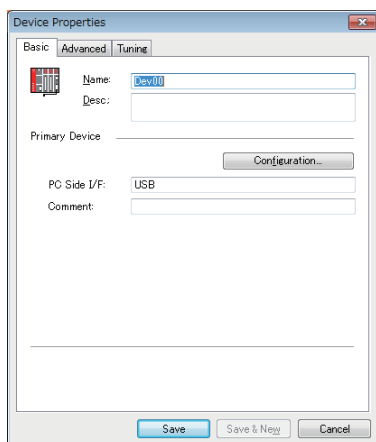
3. Select a folder to save a configuration file, and click the [OK] button.



4. If there is no MX device with the same name as the GX Works2 or GX Works3 project in the MXCSV file, the "Device Properties" screen will appear.

Set the communication setting by clicking the [Configuration] button as necessary, and click the [Save] button.

When there are multiple projects, the "Device Properties" screen appears again after saving and the next MX device setting starts.



If there is an MX device with the same name as the GX Works2 or GX Works3 project in the MXCSV file, only tag information of the device will be updated.

The MX device links with iQ Works and a label is imported from each GX Works series project.

## 11.11 MX OPC Server DA Project Deletion

An MX OPC Server DA project in a workspace of iQ Works is not displayed in the project list of MELSOFT Navigator. Therefore, delete it in Configuration Tool.

A system label in a workspace is not deleted even when an MX OPC Server DA project is deleted.

### Precautions

A project deleted from a workspace cannot be restored.

## Connected project deletion

The following shows the procedure to delete an MX OPC Server DA project in a connected workspace.

### Operating procedure

Select [File] ⇒ [iQ Works project actions] ⇒ [Delete OPC project].

## Unused project deletion

The following shows the procedure to delete an unused MX OPC Server DA project in a workspace.

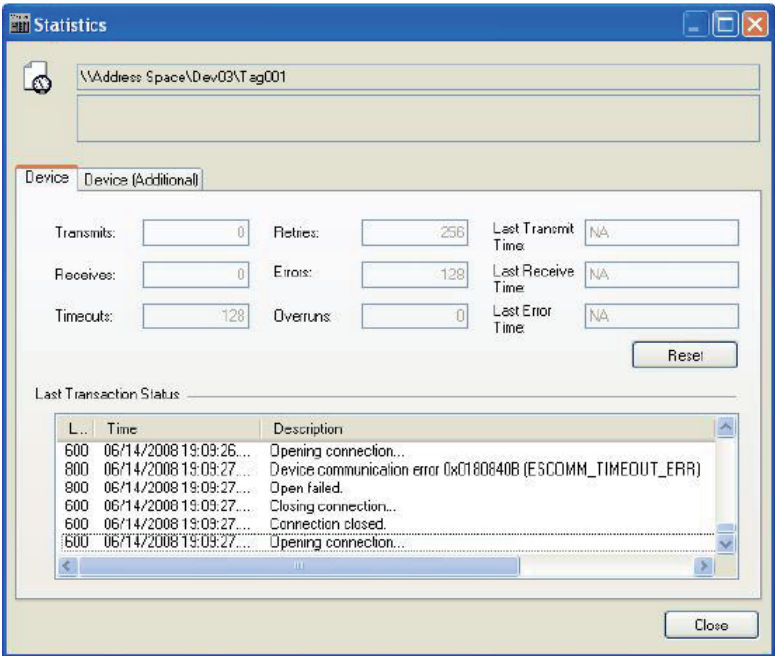
### Operating procedure

1. Select [File] ⇒ [iQ Works workspace actions] ⇒ [Delete unused projects].
2. Select a project to delete, and click the [OK] button.

# APPENDIX

## Appendix 1 Understanding Server Error Codes

When there are problems with the communication to an MX device, the statistics window may show a more detailed error code, as shown in the example screenshot below.



Statistics window showing error number

This appendix will describe the error codes that may be returned for MX devices when using the MX Component communications layer. These error codes are divided into three main types:

- HRESULT error codes, which are general failure codes and do not necessarily indicate a problem with the device – see "HRESULT error codes"
- Server error codes, returned by the communications layer – see "Server error codes"
- CPU, module and network board error codes, returned by a particular device – see "CPU, module and network board errors"

### HRESULT error codes

These are general ActiveX errors, which are not necessarily related to the device settings or status.

Value	Name	Type	Description
0x00000000	S_OK	Normal termination	Function processing terminated normally.
0x00000001	S_FALSE	Normal termination	Function processing (as ActiveX control) terminated normally, but operation (access to PLC) failed.
0x80004003	E_POINTER	Abnormal termination	The pointer passed to the function is invalid.
0x80070006	E_HANDLE	Abnormal termination	A supplied handle value was invalid.
0x8007000E	E_OUTOFMEMORY	Abnormal termination	Memory allocation or object creation failed.
0x80070057	E_INVALIDARG	Abnormal termination	An incorrect argument was provided.
0x80070005	E_ACCESSDENIED	Abnormal termination	Insufficient permissions to use the object.
0x8000FFFF	E_UNEXPECTED	Abnormal termination	An unexpected error occurred.
0x80004005	E_FAIL	Abnormal termination	An unspecified error occurred.



## Server error codes

These error codes will often help to diagnose connection problems, as they can show issues such as the wrong parameters being set for the connection.

Error code	Error Definition	Action
0x01802002	Device number error. The device character string number specified in the method is an unauthorised device number.	Review the device number.
0x01802003	Program Type Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802004	Sumcheck error. The sumcheck value of the received data is abnormal.	Check the module side sumcheck setting. Check the sumcheck property of the control. Check the cable. Exit the program and restart the computer. Reinstall MX Component.
0x01802005	Size error. The number of points specified in the method is unauthorised.	Check the number of points specified in the method. Confirm that the address range being read does not exceed the range configured in the PLC. Review the system, e.g. PLC CPU, module setting and cable status. Exit the program and restart the computer. Reinstall MX Component.
0x01802006	Block number error. The block specifying number in the device character string specified in the method is unauthorised.	Review the block specifying number in the device character string specified in the method.
0x01802007	Receive data error. The data received is abnormal.	Review the system, e.g. PLC CPU, module setting and cable status. Check the cable. Exit the program and restart the computer.
0x01802008	Write Protect Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802009	Reading Parameters error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180200A	Writing Parameters error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180200B	PLC type mismatch The CPU type set to the property and the CPU type set on the communication settings utility do not match the CPU type on the other end of communication.	Set the correct CPU type as the CPU type of the property. Set the correct CPU type on the communication settings utility. Review the system, e.g. PLC CPU, module setting and cable status.
0x0180200C	Request Cancel Error. The request was cancelled while being processed.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180200D	Drive Name Error. The specified drive name is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180200E	Beginning Step Error. The beginning step specified is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180200F	Parameter Type Error. The parameter type is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802010	File Name Error. The file name is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802011	Status Error. The status of Registration / Cancellation / Setting is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802012	Detailed Condition Field Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802013	Step Condition Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802014	Bit Device Condition Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802015	Parameter Settings Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802016	Error in specifying telephone exchange number. Method does not support the operations corresponding to the specified telephone exchange number.	Check the telephone exchange number. Check if the method being executed is supported or not. Check the system configuration such as PLC, unit, etc.
0x01802017	Keyword Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802018	Read/Write Flag Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802019	Refresh Method Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.

Error code	Error Definition	Action
0x0180201A	Buffer Access Method Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180201B	Start Mode/Stop Mode Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180201C	Written clock data error. Clock data specified for write cannot be written properly since that data is in error.	Review the clock data to be written.
0x0180201D	Online clock data write error. Write of clock data failed. Clock data cannot be written since the PLC CPU is in RUN.	Place the PLC CPU in the STOP status.
0x0180201E	ROM drive Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180201F	While Tracing error. Invalid operation was carried out during trace.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802020	First I/O number error. The first I/ O number specified in the method is an unauthorised value.	Check the value of the first I/O number specified in the method. Using the GPP function, check the PLC CPU parameters (I/O assignment). Exit the program and restart the computer.
0x01802021	First address error. The buffer address specified in the method is an unauthorised value.	Check the value of the buffer address specified in the method. Exit the program and restart the computer.
0x01802022	Pattern Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802023	SFC Block No. Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802024	SFC Step No. Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802025	Step No. Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802026	Data Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802027	System Data Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802028	Error in number of TC settings Value	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802029	Clear Mode Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180202A	Signal Flow Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180202B	Version Control Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180202C	Monitor Not Registered error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180202D	PI Type Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180202E	PI No Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180202F	Error in Number of Pls	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802030	Shift Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802031	File Type Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802032	Specified Unit error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802033	Error check flag Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802034	Step RUN operation error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802035	Step RUN data error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.

Error code	Error Definition	Action
0x01802036	During Step RUN error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802037	Write error while running program corresponding to E2PROM	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802038	Clock data read/write error The clock data read/write method was executed for the PLC CPU which does not have the clock devices.	Do not execute clock data read/write.
0x01802039	Trace not completed error	Do not execute clock data read/write.
0x0180203A	Registration Clear Flag Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180203B	Operation error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180203C	Error in the number of exchanges	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180203D	Error in number of loops specified	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180203E	Retrieve data selection	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180203F	Error in number of SFC cycles	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802040	Motion PLC Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802041	Motion PLC Communication error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802042	Fixed execution time setting error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802043	Error in number of functions	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802044	System information specification error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802045	Registration Condition Not Formed error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802046	Function No. Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802047	RAM drive error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802048	ROM drive error at the booting side	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802049	Transfer mode specification error at the booting side	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180204A	Insufficient memory error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180204B	Back up drive ROM error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180204C	Block size error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180204D	Detached during RUN state error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180204E	Unit Already Registered error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0180204F	Password Registration Data Full error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802050	Password Not Registered error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802051	Remote Password Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802052	IP Address Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802053	Timeout value out of range error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.

Error code	Error Definition	Action
0x01802054	Command not detected error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802055	Trace execution type error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802056	Version error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01802057	Tracking cable error. The tracking cable is faulty. The PLC CPU status is error.	Reexamine the system such as the PLC CPU, module setting and cable status.
0x0180205C	Keyword protection error PLC is protected by the key word.	Disable the keyword and execute again.
0x0180205D	Keyword disable error. The inputted keyword is wrong.	Input a correct keyword.
0x0180205E	Keyword protecting error. PLC did not accept the protecting command.	Execute again or re-switch the power of the PLC.
0x0180205F	Keyword entry error. An illegal character is included in the inputted keyword.	Input a correct keyword.
0x01802060	Keyword deletion error. The inputted keyword is wrong.	Input a correct keyword.
0x01808001	Multiple Open Error. Open method was executed while it was open	Exit the program and restart the computer. Execute any method other than Open.
0x01808002	Channel number specifying error. The port number set to the property and the port number set on the communication settings utility are unauthorised values.	Set the correct value to the port number of the property. Make communication settings again on the communication settings utility.
0x01808003	Driver not yet started. The network board driver is not started.	The network board driver is not started. Start the driver.
0x01808004	Error in overlap event generation	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01808005	MUTEX generation error. Creation of MUTEX to exercise exclusive control failed.	Exit the program and restart the computer. Reinstall MX Component.
0x01808006	Error in socket object generation. Socket object could not be created	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01808007	Socket object generation error. Creation of the Socket object failed.	Check for a running application which uses the same port number. Retry after changing the port number value of the property. Retry after changing the port number value on the communication settings utility. Make Ethernet board and protocol settings on the control panel of the OS. Exit the program and restart the computer.
0x01808008	Port connection error. Establishment of connection failed. The other end does not respond.	Review the IP address and port number values of the properties. Review the port number value on the communication settings utility. Review the system, e.g. PLC CPU, module setting and cable status. Exit the program and restart the computer.
0x01808009	COM port handle error. The handle of the COM port cannot be acquired. The COM port object cannot be copied. The SOCKET object cannot be copied.	Check for an application which uses the COM port. Exit the program and restart the computer.
0x0180800A	Buffer size setting error. Setting of the COM port buffer size failed.	Check for an application which uses the COM port. Make COM port setting on the control panel of the OS. Exit the program and restart the computer.
0x0180800B	DCB value acquisition error. Acquisition of the COM port DCB value failed.	Check for an application which uses the COM port. Make COM port setting on the control panel of the OS. Exit the program and restart the computer.
0x0180800C	DCB setting error. Setting of the COM port DCB value failed.	Check for an application which uses the COM port. Make COM port setting on the control panel of the OS. Exit the program and restart the computer.
0x0180800D	Time-out value setting error. Setting of the COM port time-out value failed.	Review the time-out value of the property. Review the timeout value on the communication settings utility. Check for an application which uses the COM port. Make COM port setting on the control panel of the OS. Exit the program and restart the computer.
0x0180800E	Shared memory open error. Open processing of shared memory failed.	Check whether the GX Simulator has started. Exit the program and restart the computer.
0x01808101	Duplex close error	Exit the program and restart the computer.
0x01808102	Handle close error. Closing of the COM port handle failed.	Exit the program and restart the computer.
0x01808103	Driver close error. Closing of the driver handle failed.	Exit the program and restart the computer.
0x01808104	Overlap Event Close Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.

Error code	Error Definition	Action
0x01808105	Mutex Handle Close Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01808106	COM Port Handle Close Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01808201	Send error Data send failed.	Review the system, e.g. PLC CPU, module setting and cable status. Make COM port setting on the control panel of the OS. Make Ethernet board and protocol settings on the control panel. Retry the method. Exit the program and restart the computer.
0x01808202	Send data size error. Data send failed.	Exit the program and restart the computer.
0x01808203	Queue clear error. Clearing of the COM port queue failed.	Exit the program and restart the computer. Perform Close once and execute Open again.
0x01808301	Receive error. Data receive failed.	Review the system, e.g. PLC CPU, module setting and cable status. Review the time-out value of the property. Review the time-out value on the communication settings utility. Retry the method. Exit the program and restart the computer.
0x01808302	Not Sent error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01808303	Error in retrieving Overlap Event	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01808304	Receive buffer size shortage. Receive data was larger than the receive buffer size prepared for the system.	Exit the program and restart the computer.
0x01808401	Control error. Changing of the COM port communication control failed.	Exit the program and restart the computer.
0x01808402	Signal Line Control Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01808403	Signal line specifying error. Changing of the COM port communication control failed.	Exit the program and restart the computer.
0x01808404	Open not yet executed	Execute Open. Exit the program and restart the computer.
0x01808405	Communication parameter error. The data bit and stop bit combination of the properties is unauthorised.	Review the data bit and stop bit values of the properties. Set them again on the communication settings utility.
0x01808406	Transmission speed value specifying error. The transmission speed of the property is unauthorised.	Review the transmission speed value of the property. Set it again on the communication settings utility.
0x01808407	Data length error. The data bit value of the property is unauthorised.	Review the data bit value of the property. Set it again on the communication settings utility.
0x01808408	Parity specifying error. The parity value of the property is unauthorised.	Review the parity value of the property. Set it again on the communication settings utility.
0x01808409	Stop bit specifying error. The stop bit value of the property is unauthorised.	Review the stop bit value of the property. Set it again on the communication settings utility.
0x0180840A	Communication control setting error. The control value of the property is unauthorised.	Review the control value of the property. Set it again on the communication settings utility.
0x0180840B	Time-out error. Though the timeout period had elapsed, data could not be received.	Review the time-out value of the property. Set it again on the communication settings utility. Review the system, e.g. PLC CPU, module setting and cable status. Perform Close once and execute Open again. Exit the program and restart the computer.
0x0180840C	Connect error	Exit the program and restart the computer.
0x0180840D	Duplex connect error	Exit the program and restart the computer.
0x0180840E	Attach failure. Attaching of the socket object failed.	Exit the program and restart the computer.
0x0180840F	Signal line status acquisition failure. Acquisition of the COM port signal line status failed.	Exit the program and restart the computer.
0x01808410	CD signal line OFF. The CD signal on the other end of communication is in the OFF status.	Review the system, e.g. PLC CPU, module setting and cable status. Exit the program and restart the computer.
0x01808411	Password mismatch error	Check the remote password of the property.
0x01808412	TEL Communication Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01808501	USB driver load error. Loading of the USB driver failed.	Exit the program and restart the computer. Reinstall MX Component.
0x01808502	USB driver connect error. Connection of the USB driver failed.	Exit the program and restart the computer. Reinstall MX Component.

Error code	Error Definition	Action
0x01808503	USB driver send error. Data send failed.	Review the system, e.g. PLC CPU, module setting and cable status. Make USB setting on the control panel (device manager) of the OS. Retry the method. Exit the program and restart the computer.
0x01808504	USB driver receive error. Data receive failed.	Review the system, e.g. PLC CPU, module setting and cable status. Make USB setting on the control panel (device manager) of the OS. Retry the method. Exit the program and restart the computer.
0x01808505	USB Driver Timeout Error	Recheck the timeout value. Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x01808506	USB driver initialisation error. Initialisation of the USB driver failed.	Make USB setting on the control panel (device manager) of the OS. Exit the program and restart the computer.
0x01808507	Other USB error. Error related to data send/receive occurred.	Disconnect the cable once, then reconnect. Exit the program and restart the computer. Reinstall MX Component.
0x02000001	Points Exceeded error. The number of points registered in the monitoring server is very high.	Reduce the no. of points registered by the monitor. Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x02000002	Shared memory creation error. Failed in creating shared memory.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x02000003	Shared memory access error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x02000004	Memory Secure error. Failed in securing memory for the monitoring server.	Close the other applications. Increase the system memory. Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x02000005	Device Not Registered error. Monitor has not been registered	Register the monitor in the monitoring server. Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x02000006	Monitoring Server Startup Error. Monitoring Server is not started.	Start the Monitoring Server. Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x02000010	Yet to retrieve Device Value error. Monitoring is not yet completed	Try to retrieve the value again after waiting for a fixed amount of time. Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03000001	Command not Supported. Command is not supported.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03000002	Memory Lock Error Failed while locking memory.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03000003	Error Securing Memory. Failed in securing the memory.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03000004	DLL read error. Failed in reading DLL.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03000005	Error in securing Resources. Failed in securing the resources.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03010001	File Creation Error. Failed in creating the file.	Check the filename. Check if the file exists or not. Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03010002	File Open Error. Failed to open the file.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03010003	Buffer Size Error. The buffer size specified is either incorrect or not enough.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03010004	SIL Sentence formation error. SIL sentence formation is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03010005	Filename Error. The specified filename is too long.	Specify a shorter filename. Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03010006	File does not exist error. The specified file does not exist.	Check the filename. Check if the file exists or not. Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03010007	File Structure Error. The data structure in the specified file is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03010008	File already exists error. The specified file already exists.	Check the filename. Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03010009	File does not exist error. The specified file does not exist.	Check the filename. Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0301000A	File Deletion Error. The specified file could not be deleted.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0301000B	Multiple Open Error. The specified project has been opened twice.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.



Error code	Error Definition	Action
0x0301000C	Filename Error. The specified filename is incorrect.	Check the filename. Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0301000D	File Read Error. Failed in reading the file.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0301000E	File Write Error. Failed in writing the file.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0301000F	File Seek Error. File seek failed.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03010010	File Close Error. Failed while closing the file.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03010011	Folder Creation Error. Failed while creating the folder.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03010012	File Copy Error. Failed while copying the file.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03010013	Project Path Error. The length of the project path is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03010014	Project Type Error. The project type is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03010015	File Type Error. The file type is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03010016	Sub-File Type Error. The sub-file type is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03010017	Insufficient Disk space error. The disk space is insufficient.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03020002	Multiple Open Error. Tried to open DBProduct more than once.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03020003	Not Opened error. DBProduct is not opened.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03020004	Extract Error. DBProduct is not extracted.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03020010	Parameter Error. The parameters of DBProduct are incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03020011	Language Error. The language parameter is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03020012	Error in specifying Maker. The maker parameter is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03020013	Error in specifying Unit. The unit parameter is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03020014	SQL Parameter Error SIL, SQL Parameter of DBProduct is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03020015	SIL Sentence formation error. SIL sentence formation is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03020016	Field Key Input Error. The field key entered is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03020050	Record Data Construction Error. Failed in reconstructing the record data of DBProduct.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03020060	Error Retrieving Record Data. Failed while retrieving DBProduct record data.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03020061	Last Record error. Cannot retrieve the next record since the current record is the last record.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03FF0000	Initialization error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03FF0001	Not Initialized error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03FF0002	Multiple Initialization error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03FF0003	Workspace Initialization Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03FF0004	Database Initialization Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.

Error code	Error Definition	Action
0x03FF0005	Recordset Initialization Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03FF0006	Error Closing Database	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03FF0007	Error Closing Recordset	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03FF0008	Database Not Opened error. Database is not opened.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03FF0009	Recordset Not Opened error. Recordset is not opened.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03FF000A	Table Initialization Error. Failed in initializing TtableInformation table	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03FF000B	Table Initialization Error. Failed in initializing TfieldInformation table	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03FF000C	Table Initialization Error. Failed in initializing TrelationInformation table	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03FF000D	Table Initialization Error. Failed in initializing Tlanguage table	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03FF000E	Table Initialization Error. Failed in initializing Tmaker table	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03FF000F	Table Initialization Error. Failed in initializing TOpenDatabase table	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03FF0010	Field Value Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03FF0011	Field Value Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03FF0012	Exit Error. Failed to exit the database.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03FF0100	Moving Record error. Failed while moving the record.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03FF0101	Retrieving Record Count Error. Failed to retrieve the record count.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03FF0110	Retrieving Field Value Error. Failed in retrieving the field value.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03FF0111	Setting Field Value Error. Failed in setting the field value.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x03FFFFFF	Other Errors	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04000001	No command error. The specified CPU type cannot be used to perform processing.	Check the CPU type set to ActCpuType. Check whether the system configuration is supported or not. Exit the program and restart the computer. Reinstall MX Component.
0x04000002	Memory lock error. Failed in locking memory.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04000003	Securing Memory Error. Failed in securing the memory.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04000004	Internal server DLL load error. Start of the internal server failed.	Check for the deleted or moved installation file of MX Component. Exit the program and restart the computer. Reinstall MX Component.
0x04000005	Securing Resources Error. Failed in securing the resources.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04000006	Error Loading Main Object. Failed in reading the file.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04000007	Error Loading Conversion Table. Failed in reading table data.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04000100	Incorrect Intermediate Code Size error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04010001	Intermediate Code Not Converted error. The converted machine code for one command is more than 256 bytes.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04010002	Intermediate Code Completion Error. Intermediate code area of the code to be converted ended abruptly.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.



Error code	Error Definition	Action
0x04010003	Insufficient Intermediate Code error. The intermediate code of the code to be converted was insufficient.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04010004	Intermediate Code Data Error. The intermediate code to be converted is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04010005	Intermediate Code Structure Error. The number of steps in the intermediate code is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04010006	Error in Number of Steps. The number of steps in comment intermediate code is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04010007	Insufficient Storage Space for Machine Code error. The storage space for machine code is insufficient.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04010008	Other Errors (Other errors generated during the conversion of Intermediate code to machine code.)	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04011001	Machine Code Not Converted error. The converted intermediate code for one command is more than 256 bytes.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04011002	Machine Code Completion Error. The machine code area to be converted ended abruptly.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04011003	Abnormal Machine Code. Could not convert since the machine code to be converted was abnormal.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04011004	Insufficient Storage Space for Intermediate Code error. The storage area for intermediate code is insufficient.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04011005	Other Errors. Other errors generated while converting machine code to Intermediate code.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04020001	Text Code Not Converted error. The converted intermediate code for one command is more than 256 bytes.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04020002	No Input error. The input list code is insufficient.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04020003	Command Error. The command name of list code to be converted is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04020004	Device Error. The device name of list code to be converted is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04020005	Device Number Error. The device number of the list code to be converted is out of range.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04020006	Conversion Error. The list code to be converted conversion could not be identified.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04020007	Text Data Error. The list code to be converted is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04020008	Error in SFC Operation Output. The output command of SFC operation is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04020009	SFC Shift Condition Error. SFC shift condition command is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0402000A	Error in Statements between lines. The statements entered between lines are incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0402000B	P.I Statement Error. The P.I statement entered is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0402000C	Note Error. The Note entered is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0402000D	Comment Error. The comment entered is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0402000E	Other Errors (Other errors generated during the conversion of list to Intermediate code)	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.

Error code	Error Definition	Action
0x04021001	Intermediate Code Not Converted error. The converted list code for one command has exceeded 256 bytes.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04021002	Intermediate Code Area Full error. Intermediate code area to be converted is full.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04021003	Command Error. The command specified by the intermediate code to be converted is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04021004	Device Error. The device specified in the intermediate code to be converted is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04021005	Intermediate Code Error. The structure of intermediate code to be converted is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04021006	Insufficient List Storage Space error. The space for storing the converted list code is insufficient.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04021007	Other Errors (Other errors generated during the conversion of intermediate code to list)	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04030001	Not Converted error. The storage space for converted intermediate code is insufficient.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04030002	Bad Circuit Creation error. The character memory circuit is not completed in a sequence.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04030003	Specified Circuit Size Exceeded. Specified circuit size is too big.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04030004	Incorrect Return Circuit error. There is no consistency before and after the return circuit. The setting for the return circuit is too high.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04030005	Other Errors (Other errors generated while converting from Character Memory to Intermediate Code)	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04031001	Not Converted error. The size (vertical/horizontal) of the character memory specified is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04031002	Abnormal Command Code error. The command intermediate code to be converted is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04031003	Bad Circuit Creation error. Could not be converted to Sequence Circuit. There is no END command.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04031004	Specified Circuit Size exceeded error. Specified circuit size is too big.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04031005	Fatal Error. Fatal Error has occurred.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04031006	Insufficient number of storage blocks error. The space to store the converted character memory circuit blocks is not sufficient.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04031007	Circuit Block Search Error. Data is broken off in the circuit block.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04031008	Other Errors (Other errors generated during the conversion of intermediate code to character memory)	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04040001	CAD Data Error. There is no CAD data to be converted. The CAD data format is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04040002	Output Data Error. The input CAD data type and the output CAD data type are not matching.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04040003	Library Load Error. Failed to load the library.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.

Error code	Error Definition	Action
0x04040004	Storage Space Secure Error. The space secured to store the converted data is not sufficient.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04040005	No END Command error. There is no END command in the CAD data to be converted.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04040006	Abnormal Command Code. There is abnormal command code in the CAD data to be converted.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04040007	Device No. Error. The device number is out of range.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04040008	Step No. Error. The step number is out of range.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04040009	The specified circuit size exceeded error. 1 circuit block is too big.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0404000A	Return Circuit Error. The return circuit is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0404000B	Bad Circuit Creation error. The circuit data is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0404000C	SFC Data Error. The SFC data to be converted is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0404000D	List Data Error. The list data to be converted is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0404000E	Comment Data Error. The comment data to be converted is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0404000F	Statement Error. The statement data to be converted is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04040010	Other Errors (Other errors generated during the conversion of CAD code to Intermediate code.)	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04041001	Intermediate Code Data Error. There is no intermediate code to be converted. The format of the intermediate code is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04041002	CAD Data Type Error. The input CAD data type and the output CAD data type are not matching.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04041003	Library Error. Failed to load the library.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04041004	Insufficient Input Data error. Data to be converted is insufficient.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04041005	Insufficient Storage Space error. There is not enough space to store the CAD data to be converted.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04041006	No END Command error. There is no END command in the CAD data to be converted.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04041007	Abnormal Command Code. There is abnormal command code in the CAD data to be converted.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04041008	Device No. Error. The device number is out of range.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04041009	Step No. Error. The step number is out of range.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0404100A	The specified circuit size exceeded error. 1 circuit block is too big.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0404100B	Return Circuit Error. The return circuit is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0404100C	Bad Circuit Creation error. The circuit data is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0404100D	SFC Data Error. The SFC data to be converted is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0404100E	List Data Error. The list data to be converted is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.

Error code	Error Definition	Action
0x0404100F	Comment Data Error. The comment data to be converted is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04041010	Statement Error. The statement data to be converted is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04041011	Other Errors (Other errors generated during the conversion of Intermediate code to CAD code.)	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x040A0001	Insufficient Intermediate Code Storage Space. The space to store the data after conversion is insufficient.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x040A0002	The space to store addition SFC information is not sufficient	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x040A0003	Conversion Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x040A0004	Non-SFC Program Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x040A1001	Step Not Used / No Output error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x040A1002	Step No out of range error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x040A1003	Step Not Used / No Output error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x040A1004	Transition No out of range.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x040A1005	Maximum Number Exceeded error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x040A1006	Microcontroller Program space Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x040A1007	Non-SFC Program Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x040B0001	Insufficient Intermediate Code Storage Space. The space to store the data after conversion is insufficient.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x040B0002	Conversion Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x040B1001	Failed in creating Step Start position table	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x040B1002	Error Reading Step Information	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x040B1003	Step No. Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x040B1004	Failed in reading the output of operation/ Transition condition intermediate code error.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x040B1005	Securing Internal Work Area Failed error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x040B1006	Error in setting the maximum value of X direction for character memory	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x040B1007	Insufficient Internal Work Area error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x040B1008	Stack Overflow, Abnormal Character Memory	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x040B1009	Insufficient No of Storage Blocks error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x040B100A	Non-SFC Program Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04050001	Abnormal Character String Specified error. Device character string specified is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04050002	Device Points Error. Device points are out of range	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.

Error code	Error Definition	Action
0x04050003	Other Errors (The errors generated during the conversion of the Device Character String to Device Intermediate Code)	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04051001	Device Name Error. The classification specified for the device intermediate code is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04051002	Device Name Error. The classification specified for the extended specification device intermediate code is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04051003	Other Errors (The errors generated during the conversion of the Device Intermediate Code to Device Character String)	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04052001	Abnormal Character String Specified error. Device character string specified is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04052002	Device Points Error. Device points are out of range.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04052003	Other Errors (The errors generated during the conversion of the Device Character String to Device Representation Code)	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04053001	Device Representation Error. The classification specified for the device intermediate code is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04053002	Device Representation Error. The classification specified for the extended specification device intermediate code is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04053003	Device Representation Error. The rectification part specified for the device is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04053004	Device Representation Error. The rectification part specified for the extended device is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04053005	Other Errors (The errors generated during the conversion of the Device Representation Code to Device Character String)	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04064001	Abnormal Device Intermediate Code error. The intermediate code for the device is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04064002	Other Errors (Other errors generated during the conversion of the Intermediate code for the Device to Device Name)	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04065001	Abnormal Device Name error. The classification specified for the intermediate code of the device is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04065002	Abnormal Device Name error. The classification for the intermediate code of the extended specification device is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04065003	Other Errors (Other errors generated during the conversion of the device name to intermediate code)	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04066001	Device Intermediate Code Error. The intermediate code for the device is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04066002	Other Errors (Other errors generated during the conversion of the device intermediate code to device representation code.)	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04067001	Device Representation Error. The classification specified for the intermediate code of the device is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04067002	Device Representation Error. The classification for the intermediate code of the extended specification device is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04067003	Device Representation Error. The rectification part specified for the device is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.

Error code	Error Definition	Action
0x04067004	Device Representation Error. The rectification part specified for the extended device is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04067005	Other Errors (Other errors generated during the conversion of device representation code to the device intermediate code)	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04070001	Common Data Conversion Error. The input data of the device comment conversion is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04070002	Insufficient Common Data. The data to be converted is insufficient.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04070003	Insufficient Storage Area. The area where the conversion data is stored is insufficient.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04071001	Error in PLC Data Conversion. The input data of the device comment conversion is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04071002	Insufficient PLC Data error. The data to be converted is insufficient.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04071003	Insufficient Storage Area. The area where the conversion data is stored is insufficient.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04072001	Open Error. Failed in creating conversion object	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04072002	PLC Type Error. The specified PLC type does not exist.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04072003	Not Converted error. Converted object does not exist	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04072004	Input Data Error. The input data is incorrect	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04073001	Program Common Data Conversion Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04073002	Program Common Data Conversion Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04073101	Program PLC Data Conversion Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074001	Common Data Parameter Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074002	Network Parameter Common Data Error. The parameter block exists, but the data inside is not set.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074101	Parameter PLC Data Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074102	Network Parameter PLC Data Error. The parameter block exists, but the data inside is not set.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074103	Offset Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074201	Error in Specifying Network Type. The PLC specified does not support the network type.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074202	Parameter Block Number Error. The Block corresponding to the parameter block number specified does not exist.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074203	Parameter Block Content Error. It is different from the content supported by the specified.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074204	Parameter Block Information Error. The specified block number does not exist.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074205	Default Parameter Block is Abnormal. The specified block number does not exist.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074301	Error in Conversion of the Common Parameter Block	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074302	Error in Common Parameter Block No. 1001. The value of the RUN-PAUSE settings existence flag is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.



Error code	Error Definition	Action
0x04074303	Error in Common Parameter Block No. 1003	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074304	Error in Common Parameter Block No. 1008	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074305	Error in Common Parameter Block No. 1100	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074306	Error in Common Parameter Block No. 2001 The device intermediate code specified does not exist.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074307	Error in Common Parameter Block No. 3000	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074308	Error in Common Parameter Block No. 3002	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074309	Error in Common Parameter Block No. 3004. The settings for the annunciator display mode is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407430A	Error in Common Parameter Block No. 4000. I/O Allotment Data is not created.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407430B	Error in Common Parameter Block No. 5000. The specified network is not supported.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407430C	Error in Common Parameter Block No. 5001. Valid unit No is not set while accessing other exchange.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407430D	Error in Common Parameter Block No. 5002	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407430E	Error in Common Parameter Block No. 5003	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407430F	Error in Common Parameter Block No. 5NM0	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074310	Error in Common Parameter Block No. 5NM1	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074311	Error in Common Parameter Block No. 5NM2	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074312	Error in Common Parameter Block No. 5NM3	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074313	Error in Common Parameter Block No. 6000	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074314	Error in Common Parameter Block No. FF18. Link parameter Capacity is not set.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074315	Error in Common Parameter Block No. FF25. Calculation circuit check is not set.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074316	Error in Common Parameter Block No. FF30. Sampling Trace Data is not created.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074317	Error in Common Parameter Block No. FF31. Status latch data is not created.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074318	Error in Common Parameter Block No. FF42. Timer processing points are not set.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074319	Error in Common Parameter Block No. FF30. Setting value device for specified extended timer does not exist.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407431A	Error in Common Parameter Block No. FF44	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407431B	Error in Common Parameter Block No. FF45	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407431C	Error in Common Parameter Block No. FF60. Terminal Settings are not set.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407431D	Error in Common Parameter Block No. FF70. User Release area is not set.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04074401	Error in Conversion of PLC Parameter Block	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.





Error code	Error Definition	Action
0x04075003	Common Data Conversion Error. Device memory data portion did not exist.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04075101	PLC Data Conversion Error. Failed while converting the settings portion of the device memory.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04075102	PLC Data Conversion Error. Failed while converting the data portion of the device memory.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04076001	Common Data Conversion Error. Failed while converting the settings portion of the device comments.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04076002	Common Data Conversion Error. Failed while converting the data portion of the device comments.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04076101	PLC Data Conversion Error. Failed while converting the settings portion of the device comments.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04076102	PLC Data Conversion Error. Failed while converting the settings portion of the device comments.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04077001	Common Data Conversion Error. Failed during the conversion of sampling trace settings portion.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04077002	Common Data Conversion Error. Failed during the conversion of sampling trace data portion.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04077101	PLC Data Conversion Error. Failed during the conversion of sampling trace settings portion.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04077102	PLC Data Conversion Error. Failed during the conversion of sampling trace data portion.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04078001	Common Data Conversion Error. Failed in the conversion of the status latch settings portion.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04078002	Common Data Conversion Error. Failed in the conversion of the status latch data portion.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04078101	PLC Data Conversion Error. Failed in the conversion of the status latch settings portion.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04078102	PLC Data Conversion Error. Failed in the conversion of the status latch data portion.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04079101	Failure history PLC Data Conversion error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407A101	File List PLC Data Conversion Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407B101	Error Information PLC Data Conversion Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407C001	Error in Conversion of Indirect Address to Device Name. The device name storage area is not secured.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407C002	Error in Conversion of Device Name to Indirect Address. Indirect Address storage area is not secured.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407C003	Error in Conversion of Indirect Address to Device Representation. The device representation storage area is not secured.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407C004	Error in Conversion of Device Representation to Indirect Address. Indirect Address storage area is not secured.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.

Error code	Error Definition	Action
0x0407C005	Error in Conversion of Indirect Address to Device Character String. Device Character String storage area is not secured.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407C006	Error in Conversion of Device Character String to Indirect Address. Indirect Address storage area is not secured.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407C007	Error in Conversion of Intermediate Code to Device Name. Device Name storage area is not secured.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407C008	Error in Conversion of Device Name to Intermediate Code. Intermediate Code storage area is not secured.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407C009	Error in Conversion of Intermediate Code to Device representation. Device Representation storage area is not secured.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407C00A	Error in Conversion of Device Representation to Intermediate Code. Intermediate Code storage area is not secured.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407C00B	Error in Conversion of Intermediate Code to Indirect Address. Indirect Address storage area is not secured.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407C00C	Error in Conversion of Indirect Address to Intermediate Code. Intermediate Code storage area is not secured.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407C00D	PLC Type Error The specified PLC type is not supported.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407C00E	Device Character String Error. The specified device is not supported.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407C00F	Device Character String Error. The specified device character string, type is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407C010	Device Error. The specified device is not supported by the specified PLC	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407C011	PLC Type Error. The specified PLC is not supported.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407C012	Device out of Range Error. For AnA system, a device out of AnA system range was specified.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407D001	Common Data Conversion Error. Error in Conversion of SFC trace condition settings portion.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407D002	Common Data Conversion Error. Error in Conversion of SFC trace condition data portion.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407D101	PLC Data Conversion Error. Error in Conversion of SFC trace condition settings portion.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x0407D102	PLC Data Conversion Error. Error in Conversion of SFC trace condition data portion.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04080001	Intermediate Code classification out of range error. The intermediate code classification specified is out of range.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04080002	Extended specification Intermediate Code classification out of range error. The extended specification intermediate code specified is out of range.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04080003	Device Points check absent error. The device does not check the device points.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04090001	GPP Project Error. The specified PLC type and GPP project type are not matching.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04090002	File Type Error. The specified GPP project type and file type are not matching.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.

Error code	Error Definition	Action
0x04090010	Insufficient GPP Data to be converted. There is no data to be converted. The data size specified is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04090011	Insufficient Storage Space for Converted Data. The space for storing converted data is insufficient.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04090012	Error in GPP Data to be converted. The GPP data to be converted is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04090110	Insufficient Data to be converted error. There is no data to be converted. The data size specified is insufficient.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04090111	Insufficient Storage Space for Converted Data error. The storage space for converted data is insufficient.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04090112	Error in data to be converted. The data to be converted is incorrect.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x04FFFFFF	Other Errors	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000001	No Command error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000002	Start of communication DLL of MX Component failed.	Exit the program and restart the computer. Reinstall MX Component.
0x10000003	Open failed. (DiskDrive)	Exit the program and restart the computer. Reinstall MX Component.
0x10000004	Duplex open error	Exit the program and restart the computer.
0x10000005	File Access Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000006	Incorrect Folder Name error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000007	File Access Denied error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000008	Disk Full Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000009	File Delete Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x1000000A	Incorrect File Name error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x1000000C	Execution failed since another application or thread is making a request.	Execute again after some time. Perform programming according to the multithread rules of COM and ActiveX. Exit the program and restart the computer.
0x1000000D	Folder Creation Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x1000000E	Folder/ File Type Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x1000000F	Offset Address Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000010	Request Cancel. Cancel Process has occurred.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000011	Memory securing error	Exit the program and restart the computer. Reinstall MX Component.
0x10000012	Open not yet executed	Exit the program and restart the computer.
0x10000013	Attach Not Executed error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000014	Object Invalid error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000015	Request Cancel Failed error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000016	Failed in Reading Status error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000017	The specified size (number of devices) is unauthorised.	Check the number of points specified in the method. Exit the program and restart the computer.
0x10000018	There is no registered device.	Exit the program and restart the computer.
0x10000019	Dataset Not Executed	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.

Error code	Error Definition	Action
0x1000001A	Read Not Executed error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x1000001B	Incorrect Create Flag error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x1000001C	Operation Over Access	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x1000001D	Redundant Device error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x1000001E	Registry search failed.	Exit the program and restart the computer. Exit other programs and secure free memory area. Reinstall MX Component.
0x1000001F	File Type Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000020	Device Memory Type Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000021	Program Range Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000022	TEL Type Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000023	TEL Access Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000024	Cancel Flag Type Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000030	Multiple Device Registration Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000031	Device Not Registered error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000032	Specified device error	Review the specified device data. Exit the program and restart the computer. Exit other programs and secure free memory area.
0x10000033	Specified device range error	Review the specified device data. Exit the program and restart the computer. Exit other programs and secure free memory area.
0x10000034	File Write Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000040	Server start failed.	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000041	Server Stop Error. Failed while stopping the server	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000042	Server Started Twice error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000043	Server Not Started error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000044	Resource Timeout Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000045	Server Type Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000046	Failed to Access Server error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000047	Server Already Accessed error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000048	Failed in Simulator Startup	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x10000049	Failed in exiting Simulator	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x1000004A	Simulator Not Started error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x1000004B	Simulator Type Error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x1000004C	Simulator Not Supported error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0x1000004D	Simulator Started Twice error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.

Error code	Error Definition	Action
0x1000004E	Shared Memory Not Started error	Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0xF0000001	No-license error. The license is not given to the IBM-PC/AT compatible.	Using the license FD, give the license to the IBM-PC/AT compatible.
0xF0000002	Set data read error. Reading of the set data of the logical station number failed.	Specify the correct logical station number. Set the logical station number on the communication settings utility.
0xF0000003	Already open error. The Open method was executed in the open status.	When changing the communication target CPU, execute the Open method after performing Close.
0xF0000004	Not yet open error. The Open method is not yet executed.	After executing the Open method, execute the corresponding method.
0xF0000005	Initialisation error. Initialisation of the object possessed internally in MX Component failed.	Exit the program and restart the computer. Reinstall MX Component.
0xF0000006	Memory securing error. Securing of MX Component internal memory failed.	Exit the program and restart the computer. Exit other programs and secure free memory area.
0xF0000007	Function non-support error. The method does not support.	Can not use because the corresponding method is not supported.
0xF1000001	Character code conversion error. Character code conversion (UNICODE ASCII code or ASCII code UNICODE) failed.	Check the character string specified in the method. The ASCII character string acquired from the PLC CPU is abnormal. Review the system, e.g. PLC CPU, module setting and cable status. Exit the program and restart the computer. Retry the GetCpuType method.
0xF1000002	First I/O number error. The first I/ O number specified is an unauthorised value. A matching first I/O number does not exist.	Check the value of the first I/O number specified in the method. Using the GPP function, check the PLC CPU parameters (I/O assignment).
0xF1000003	Buffer address error. The buffer address specified is an unauthorised value. The buffer address is outside the range.	Check the value of the buffer address specified in the method.
0xF1000004	Buffer read size error. As a result of buffer read, the specified size could not be acquired.	Perform reopen processing. Review the system, e.g. PLC CPU, module setting and cable status. Retry. Exit the program.
0xF1000005	Size error. The size specified in the read/write method is abnormal. The read/write first number plus size exceeds the device or buffer area.	Check the size specified in the method.
0xF1000006	Operation error. The operation specified for remote operation is an abnormal value.	Check the operation specifying value specified in the method.
0xF1000007	Clock data error. The clock data is abnormal.	Check the clock data specified in the method. Set the correct clock data to the clock data of the PLC CPU.
0xF1000008	Monitored device registration count excess. The number of device points registered in the EntryDeviceStatus method was 0 or less. The number of device points registered in the EntryDeviceStatus method was more than 20.	Register the device points between 1 and 20 in the EntryDeviceStatus method.
0xF1000009	Monitored device data registration error	After making deregistration in the FreeDeviceStatus method, execute the EntryDeviceStatus method again.
0xF1000010	Device status monitor processing failed to start. Device status monitor processing failed to end.	Start/end the device status monitor processing again in the EntryDeviceStatus method.
0xF1000011	The VARIANT argument data type is wrong.	Reexamine the data type specified for the VARIANT argument. • Check whether the array variable size is large enough. • Check whether the data type specified in the corresponding method has been set.
0xF1000012	The device status monitoring time interval is a value outside the range 1 second to 1 hour (1 to 3600).	Specify the device status monitoring time between 1 and 3600.
0xF1000013	Already Connected error. Connect was executed again after it was executed for the same object.	Execute the Connect method after executing the Disconnect method.
0xF1000014	Invalid Telephone Number error. Characters other than "0123456789-#" that are allowed for telephone numbers are included.	Rectify the Telephone number and try to Connect again.

Error code	Error Definition	Action
0xF1000015	Exclusive Control Failure error. There was failure in the exclusive control process while executing the Connect and Disconnect method.	In case if Connect/Disconnect method is being executed for any other object, execute the failed method (Connect/ Disconnect) again after the completion of the Connect/ Disconnect method of that object. If the Connect/Disconnect process is in progress only for the self object, perform the following. Exit the program. Restart the computer. Reinstall MX Component.
0xF1000016	While connecting to the telephone line error. The telephone line is connected to some other application, other than the one using MX Component.	Try Connecting again after disconnecting the application that is using the telephone line.
0xF1000017	Telephone line not connected error. Telephone line is not connected. Connect was executed and the telephone line was connected, but it got disconnected due to some reason.	(When Connect method has failed) Execute Connect again after executing Disconnect method. (When method other than Connect has failed) Execute Disconnect method, Execute Connect and connect to the telephone line. After connecting, execute the method that failed once again.
0xF1000018	No Telephone number error. The telephone No. is not set. The telephone No. or call back No. is not set, if the connection method is Automatic (when specifying the call back No.), call back connection (when specifying the number), or call back Request (when specifying the number).	In case of program settings type, set the telephone No. to the property ActDialNumber. (Set the telephone No. to the properties ActDialNumber and ActCallbackNumber, if the connection method is automatic (when specifying the call back No.), call back connection (when specifying the telephone No.), or call back request (when specifying the number).) In case of utility settings type, set the telephone No. using the wizard. (Set the telephone No. and call back No. , if the connection method is automatic (when specifying the call back No.), call back connection (when specifying the telephone No.), or call back request (when specifying the number).)
0xF1000019	Not Closed error. Disconnect was executed while in Open state.	Try Disconnect again after executing Close.
0xF100001A	Target telephone line connection mismatch error. Connect was tried for a different telephone number using the port which is already connected to a telephone line. (When the method of connection is a callback reception, it is considered that the telephone number is different from methods of connection in other than the callback reception.)	If you want to connect to a different telephone number, Execute Disconnect with respect to the telephone line that is already connected and executes Connect after it gets disconnected. In case of connecting the telephone line with callback reception, use the Connect of the connection method that is executed at the earliest in the same port as callback reception.
0xF100001B	Control Type Mismatch error. An object, whose control type is different from that of the object already connected to the telephone line, tried to Connect.	Execute Disconnect for the object currently connected to the telephone line and execute Connect once again after the telephone line gets disconnected.
0xF100001C	Not Disconnected error. When Disconnect method is executed for the object connected to the telephone line, it is found that other objects are in connected state.	Execute Disconnect for all the Connected objects. Try Disconnect again for the object that actually performed the telephone line connection.
0xF100001D	Not Connected error. Open was executed before Connect Or, Disconnect was executed.	Execute Open again after executing Connect. Or execute Disconnect again after executing Connect.
0xF100001E	Fatal Error.	Exit the program. Restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0xF100001F	Open time setting error. There is some difference in telephone number and the port number settings used during Connect and Open. There is some error in Connect way.	Check the telephone number and the port number. Check the Connect way.
0xF2000002	There is an error response from the target telephone. Normally caused by a communication error.	Check the value of the properties set in case of program settings type and check the contents of the detailed settings that were set using the wizard in case of utility settings type.
0xF2000003	Invalid data was received. Causes can include an incorrect data packet received due to noise, or communicating with a device other than A(Q)6TEL/C24.	Retry. Check the communication device used at the other end.
0xF2000004	There is no response from the modem. Causes can include abnormality in the modem, or the wrong telephone number.	Check the status of the modem. Check the telephone number. If the problem persists even after checking the above points, change the value of the properties set (Properties such as ActConnectionCDWaitTime etc. , which set the timings) in case of program settings type and change the contents of the detailed settings that were set using the wizard in case of utility settings type.
0xF2000005	There are chances that the line is not disconnected.	Check the line.



Error code	Error Definition	Action
0xF2000006	The PC modem did not receive the AT command. Causes can include specifying an invalid AT command, or an abnormality in the modem.	Check the contents of the AT command. Check the status of the modem.
0xF2000007	Modem did not respond properly to the standard escape command.	Check the modem. Confirm whether the value of the time-out is too small. ( 5000ms or more is recommended. )
0xF2000009	Modem does not respond properly to the line Disconnect command.	Check the modem.
0xF200000A	Target did not receive the signal. The Receive settings of the modem at the other end may be incorrect, the other end may be busy or the telephone number may be incorrect.	Check the Receive settings of the modem at the other end. Check if the other end is busy. Check the telephone number.
0xF200000B	Timeout reached for the call back receive waiting time.	Increase the call back receive waiting time ActCallbackReceptionWaitingTimeOut and execute connect again.
0xF200000C	Password of A6TEL, Q6TEL, QJ71C24 units could not be resolved.	Set the password to ActPassword property and execute the failed method again.
0xF2010001	The callback line disconnect wait time is other than 0 -180 Seconds. The callback execution delay time is other than 0 -1800 Seconds. The telephone number is more than 62 characters.	Check whether the callback line disconnect wait time is with in 0 – 180 Seconds. Check whether the callback execution delay time is with in 0 - 1800 Seconds. Check whether the telephone number is less than or equal to 62 characters. Exit the program and restart the computer. Reinstall MX Component. If the problem cannot be solved, contact technical support.
0xF2010002	QJ71C24 did not receive the specified connection method. Causes can include an incorrect Connection method or an incorrect telephone number for Call back.	Check whether the settings of QJ71C24 and the MX Component are matching.
0xF2010003	QJ71C24 does not permit the automatic connection (during fixed Call back or when the number is specified.)	Check the settings of QJ71C24.
0xF2100005	There are chances that the line is not disconnected.	If there is no problem with the modem or the telephone line, change the value of the properties set (Properties like ActConnectionCDWaitTime etc. , which set the timings) in case of program settings type and change the contents of the detailed settings that were set using the wizard in case of utility settings type.
0xF2100008	There was no response from the modem for the data sent from the PC.	Change the value of the properties set (Properties such as ActConnectionCDWaitTime etc. , which set the timings) in case of program settings type and change the contents of the detailed settings that were set using the wizard in case of utility settings type.
0xF2100006	Modem did not receive the startup command AT.	Change the settings of the property ActATCommand. In case of program settings type and change the command AT that were set using the wizard in case of utility settings type.
0xF2100007	The PC modem does not respond to the Escape command.	If there is no problem with the modem or the telephone line, change the value of the properties set (Properties like ActConnectionCDWaitTime etc., which set the timings) in case of program settings type and change the contents of the detailed settings that were set using the wizard in case of utility settings type.
0xF21000**	There is no response from the modem. Causes can be the following. Abnormality in the modem. Wrong telephone number.	Check the status of the modem. Check the telephone number. If the problem persists even after checking the above points, change the value of the properties set (Properties such as ActConnectionCDWaitTime etc., which set the timings) in case of program settings type and change the contents of the detailed settings that were set using the wizard in case of utility settings type.
0xF21001**	There is no response from A(Q) 6TEL/C24. Causes can be the following. Setting mistake w.r.t. A(Q)6TEL/C24 A(Q)6TEL/C24 got connected to a non-existent modem.	Re-examine the settings of A(Q)6TEL/C24. Confirm whether the modem exists. If the problem persists even after checking the above points, change the value of the properties set (Properties such as ActConnectionCDWaitTime etc., which set the timings) in case of program settings type and change the contents of the detailed settings that were set using the wizard in case of utility settings type.
0xF202****	There was a communication failure. Following causes can be considered depending on the status. Communication time over (Break in cable, the specified port not supported, a mistake in specifying the COM port) Modem's power is switched OFF.	Check whether the cable is broken. Check whether the specified port is not supported. Check whether correct COM port is set. Check if the modem power is switched OFF. For detailed troubleshooting, please refer to the details of the Error Code got after replacing the first four digits with "0x0180". e.g. In case of "0xF202480B", please refer to the code "0x0180480B".

## CPU, module and network board errors

In addition to the error codes in the previous sections, there are additional error codes relating to specific hardware modules. These error codes are separated into two parts; the upper two bytes of the error number give the module where the error was reported, and the lower two bytes give the error number within that module. These error numbers can then be found in the manual of the device that reported the error.

Error Code	Module which reported the error
0x01010000 to 0x0101FFFF	QCPU (A mode), ACPU, motion controller CPU [see also Server error codes]
0x01020000 to 0x0102FFFF	QnACPU
0x01030000 to 0x0103FFFF	C24
0x01040000 to 0x0104FFFF	QC24(N)
0x01050000 to 0x0105FFFF	E71
0x01060000 to 0x0106FFFF	QE71
0x01070000 to 0x0107FFFF	MELSECNET/H, MELSECNET/10, CC-Link or CPU board
0x01090000 to 0x0109FFFF	FXCPU
0x010A0000 to 0x010AFFFF	QCPU (Q mode)
0x010B0000 to 0x010BFFFF	Q series-compatible C24
0x010C0000 to 0x010CFFFF	Q series-compatible E71
0x010D0000 to 0x010DFFFF	PC CPU module
0x010F0000 to 0x010FFFFF	GOT

Note: The module number calculated from the above table may be incorrect if the device settings were incorrect, for example if the wrong CPU type is specified in the settings, the number for that (incorrect) CPU type may appear in the error number. Another possible exception with these error codes is if the AJ71E71 or AJ71QE71 communication module is used. If the two lower bytes of the error number do not appear in the E71 or QE71 manual, this may mean that DIP switch SW2 on the front of the E71 or QE71 module is not correctly set. This switch controls whether the packet data is transmitted in ASCII or binary format, and when the wrong format is used it may not be possible to return an accurate error number.

When the driver is used to access another station (e.g. MELSECNET/H, ELSETNET/10, CC-Link, Ethernet etc.), it is also possible that the error code was returned by another module elsewhere in the network, which encountered an error while trying to relay the data. If it is not possible to find the two lower bytes of the error number in the expected manual, it may be that the error code can be found in the manual of another CPU, relayed network module or network board that is between the driver and the target device.



# Appendix 2 DCOM Configuration

This appendix will explain the changes that need to be made to the configuration on the client and server PCs to use DCOM. The server PC and the client PC must both be configured correctly, so that the connection works in both directions.

## Introduction

When connecting to the MX OPC server from a client application (such as a SCADA package or a Visual Basic program), it is not normally necessary to use DCOM. Typically the server and client components will be on the same computer anyway, or there will be a better way to pass the data from the OPC server across the network, such as using an Ethernet connection to the PLC, or passing the data between computers using a SCADA package's own built-in networking. However, there are some situations where DCOM is a suitable way to pass data from the OPC server between PCs, such as reading data from a Visual Basic program on another computer when there is only a single serial link connection available to the PLC.

## Security considerations

Configuring DCOM almost always involves a compromise in the level of security on the client and server PCs, as security settings have to be 'opened up' to allow DCOM to communicate between the PCs in both directions – with the callback mechanisms, the OPC server also behaves as a client, and the OPC client also behaves as a server.

DCOM is not recommended for use to connect two computers over an internet connection; XML-DA is more suitable for this and does not have the same incompatibilities that DCOM has with the network address translation (NAT) used in most internet firewalls and routers.

Before setting up DCOM in a corporate environment, you will need to discuss the changes to the security configuration with your network administrator or IT department, to make sure that the settings are consistent with your company's security policy. If the OPC server and client PCs are both on the same network and isolated from other PCs and the internet, you may be able to use a simpler security configuration than if the PCs are connected across a corporate network.

## Compatibility

Some of the changes that need to be made to the DCOM configuration will affect all applications using DCOM on the computer, not just the MX OPC server.

It is recommended that you make a note of the original settings before making changes, so that if another application using DCOM (such as another OPC server) stops working, the original settings can be restored.

## Before you begin

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Before you start to make changes to the DCOM configuration, please ensure that:

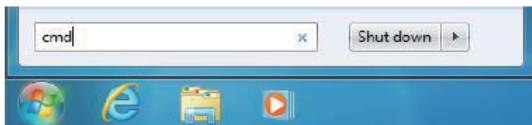
- The client and server PCs are up to date with service packs and security fixes. There are some known problems with DCOM that are fixed by service packs, and applying the latest security fixes will reduce the risks introduced when the security configuration is changed.
- You are logged on to the PC(s) using a local administrator account
- There is a working TCP/IP network connection between the client and server PCs. One way to test this is by using the 'ping' command:

### Operating procedure

1. Open a command prompt as follows:

Windows 10, Windows 8, Windows 7 or Windows Server 2008 R2

Click the Windows icon or start button, then enter 'cmd' in the search box and press enter.



2. In the command window that appears, enter 'ping <otherpc>', where <otherpc> is the name of the other computer e.g. 'ping SCADAserver'. A computer's network name can normally be found by rightclicking on 'My computer', selecting 'properties' then clicking on the 'Computer name' tab. If in doubt, ask your network administrator for assistance.
3. After pressing return, you should normally see a message such as 'Pinging <address> with 32 bytes of data' (where <address> is the IP address such of the other PC, for example 192.168.200.100) followed by four response messages from the other computer. If no address is shown, there may be a problem in finding the other computer by name – ask your network administrator to check the PCs settings. If the address is found but there are no responses, this may mean that the connection is not working, or it can sometimes indicate that a third-party firewall on one of the computers is preventing the ping request from being sent or the ping response from being received.

## User accounts

For the highest level of security, it is safest to assign DCOM access rights to specific user accounts instead of assigning full access rights to all users.

The best way to set up security depends on your network configuration and the client software you will be using, but some typical ways in which the account security can be configured are:

Creating a new account for the OPC server connection – a single account is created and always used for the OPC connection. This is useful in situations where the OPC server is always used unattended or used by a client application that runs as a service on another computer. The MX OPC server service can be configured to run 'as' the new user.

Adding access rights for each remote user individually.

Creating a group for OPC users – this is useful when many different named users need access to the server, and has the advantage that when another user needs to be given access, they can be simply added to the group without having to go through all of the configuration steps again.

Allowing all users to access the server, by adding permissions for the group 'Everyone'. This is only advisable if you are using a separate, isolated network and if there have been problems connecting to the OPC server with the other options.

There are some other built-in accounts that may need to be given access rights depending on your application:

SYSTEM – most system services run under this account by default, unless they have been manually configured to run under a specific user account. If a system service is acting as an OPC client, you may need to give access rights to the 'SYSTEM' user.

INTERACTIVE – this account represents the currently logged-on user. Some applications may operate in a way that requires access rights to be assigned to this account.

ANONYMOUS LOGON – this represents a connected user whose details are not available, which may be a result of connecting with authentication set to 'None' (described later).

Distributed COM users - this security group may be available on later operating systems to simplify assigning DCOM rights to users.

### Domain issues

Depending on whether the client and server PCs are members of a domain, you may need to make some additional configuration changes.

Domain status	Notes
Client and server PCs are in the same Domain	When adding a new account or group for the OPC server connection, it can be added to the domain and will then be available on both PCs.
Client and server PCs are in different Domains	Each domain must be configured to trust user accounts from the other domain. You will need to contact the administrator of each domain to confirm that this change is permitted by your corporate security policy.
Neither of the computers is in a domain	Whether adding a new account for the OPC server connection, or assigning access rights to named users, there must always be an account with the same username and password set up in both PCs independently. If the account details do not match, the connection will not work, so if you change the password on one of the PCs, it must be changed on the other PC as well.
Only one of the PCs is in a domain	For this configuration to work, it may be necessary to configure DCOM on the server to allow all users full access rights. In general, this configuration should be avoided.

It is also recommended that the same operating system (e.g. Windows 7 or later) is used on both computers.

## Configuring DCOM on Windows 7 or later

This section contains instructions specific to Windows 7 and Windows Server 2008 R2. The configuration for these operating systems is very similar, although there may be slight differences in the appearance of the dialogs.

Most of the changes in this section must be made on both the server PC and the client PC, so that the connection works in both directions.

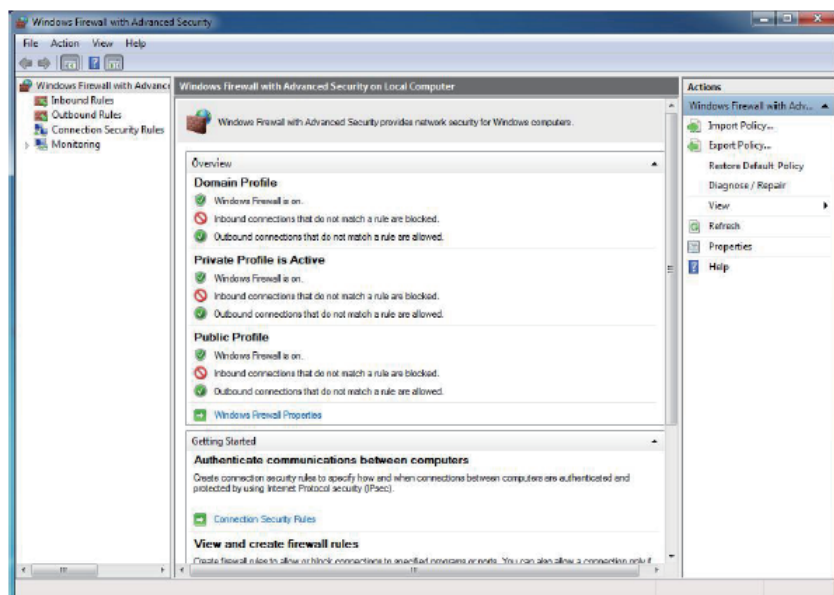
### Configuring the Windows firewall

If you are using the Windows firewall, you will need to configure it to allow DCOM network traffic to pass through. If you are using a third party software firewall, please refer to the manual to find out how to make the equivalent configuration changes. If DCOM does not work when your third-party firewall is enabled, but works when it is switched off, the problem is likely to be with the firewall configuration.

To edit the windows firewall settings, click on the Windows icon (or start button), and enter 'wf.msc' in the search box before pressing enter.

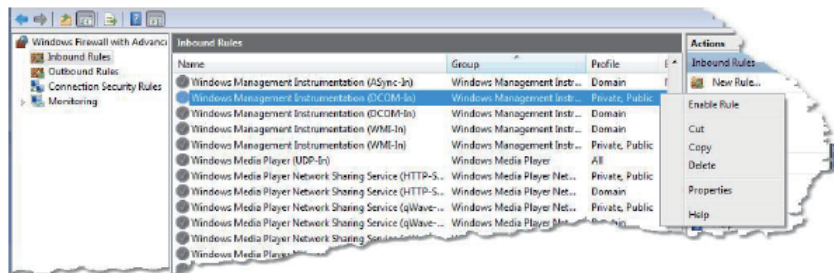


This will show the firewall advanced settings page, as in the sample below.



#### Advanced firewall settings

Click on 'Inbound Rules' and find 'Windows Management Instrumentation (DCOM-In)'. If the 'enabled' column for the rule does not already show 'Yes', right click on the rule and select 'Enable rule' for the menu. The rule may appear more than once for different profiles, so it will need to be enabled in any profile where it will be used.

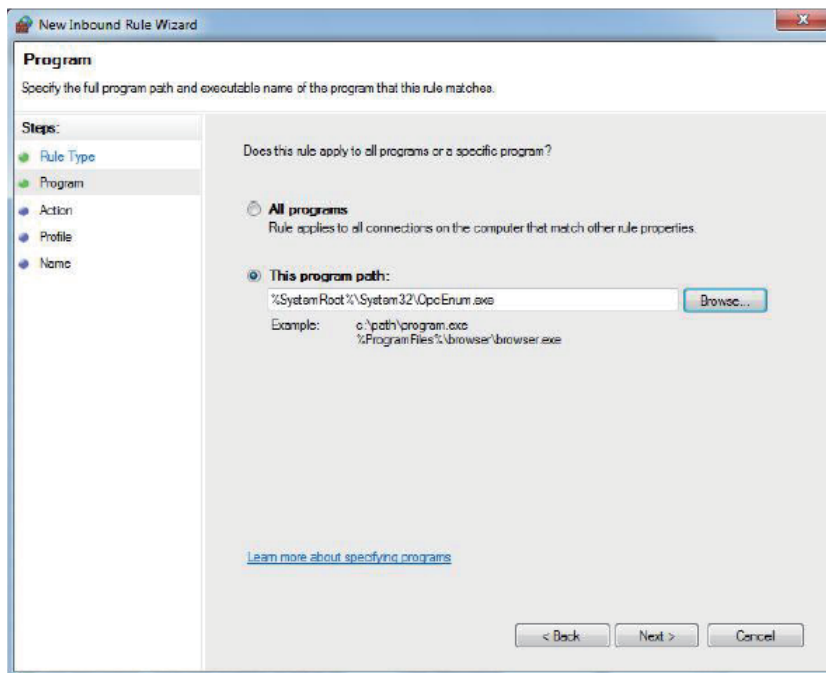


#### Enabling DCOM inbound rule

Every program that will use DCOM must now be added to the exceptions list. These programs include:

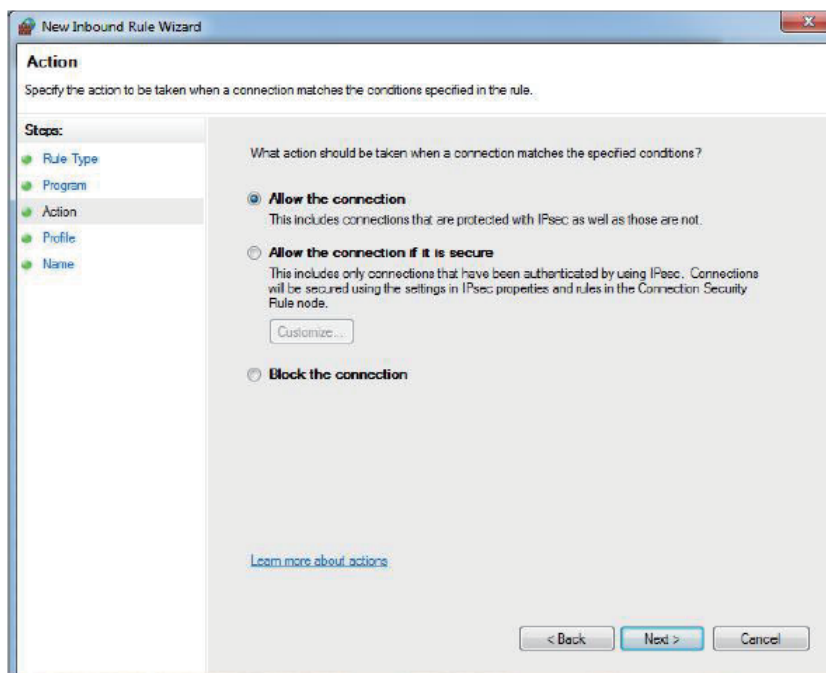
- The OPC server itself (on the server PC)
- The 'OPCenum' service (on the server PC)





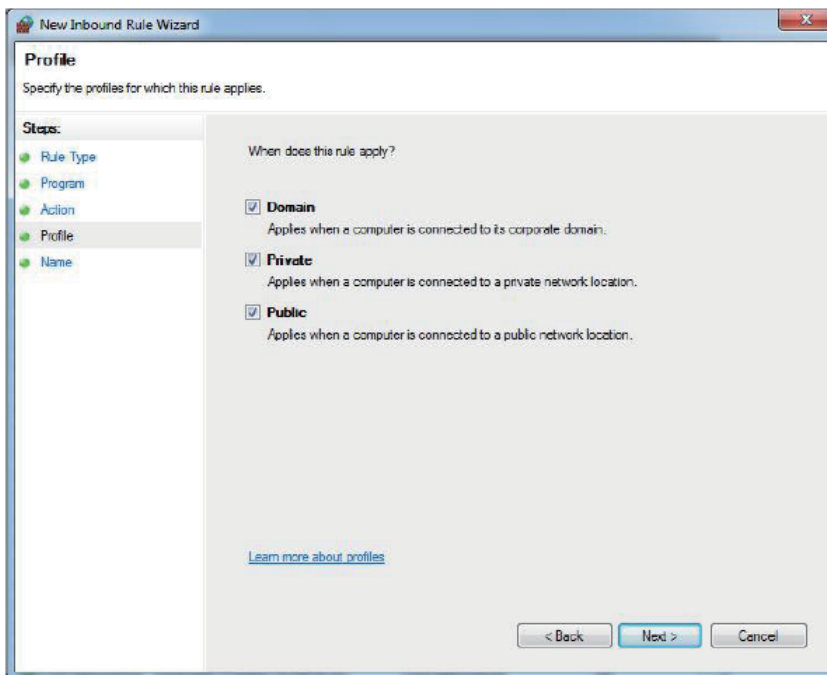
#### Select program path

Click 'Next' to show the 'Action' page. Select 'Allow the connection' (or alternatively if you have configured IPsec, select 'Allow the connection if it is secure').



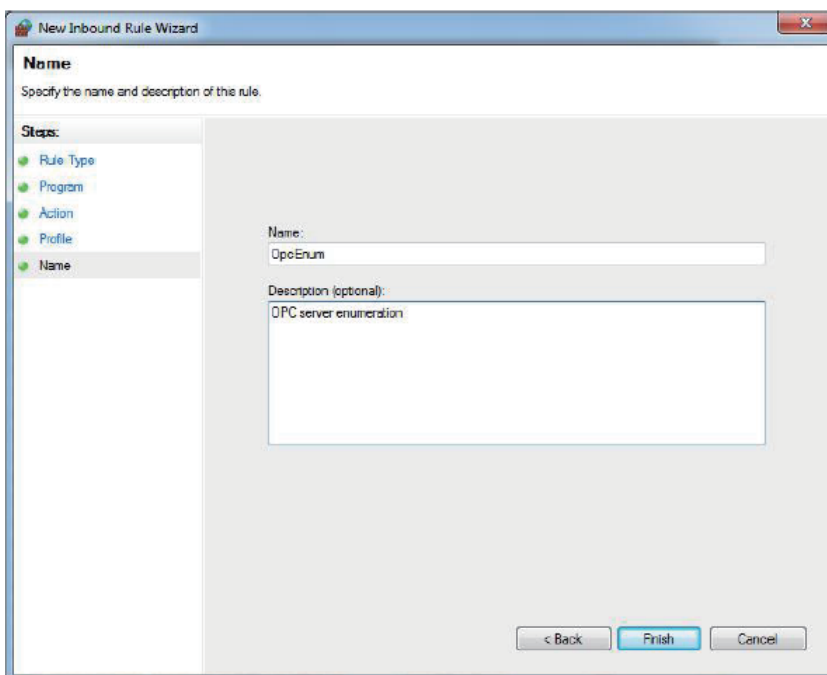
#### Select action

Click 'Next' to show the 'Profiles' page. Make sure there is a check mark next to all the profiles that should use this rule.



#### Select profiles

Click 'Next' to show the screen below, where a name and description can be entered for the new rule.



#### Enter description

When you click 'Finish', the new rule will appear in the incoming rules list.

Repeat the above steps to add the OPC server itself (normally located in 'C:\Program Files (x86)\MELSOFT\MX OPC Server\MXOPC.exe', but it will depend on the path selected during installation).

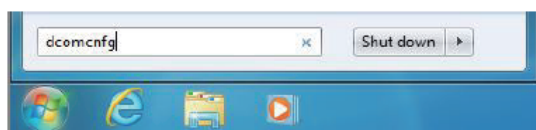
On the client PC, it may be necessary to perform this step for each client application.

When all applications that will use DCOM have been added, select 'File' ⇒ 'Exit' to close the firewall settings screen.

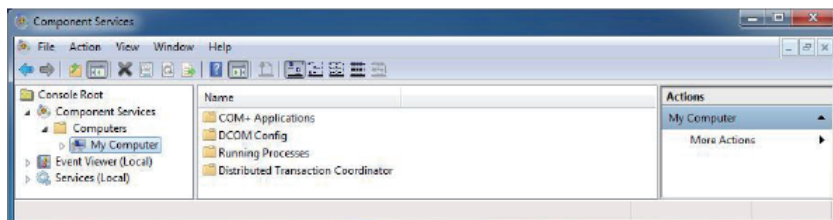


## Configuring DCOM security

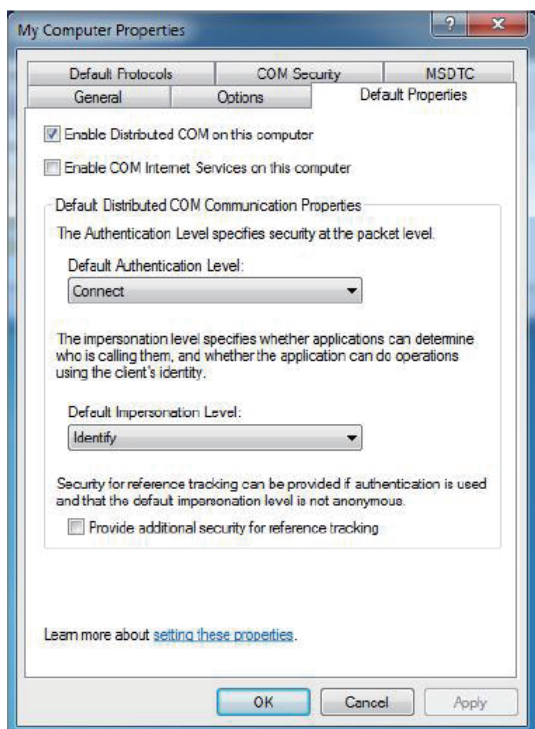
Click on the Windows icon or 'Start' button, then in the search box type 'dcomcnfg' and press enter.



In the first window that appears (see example below), click on the 'Component services' and 'Computers' items in the left hand pane to expand them, so that 'My Computer' is shown.



Right click on 'My computer' and select 'Properties' from the pop-up menu. In the next window, click on the 'Default properties' tab and a window similar to the one below will be shown:



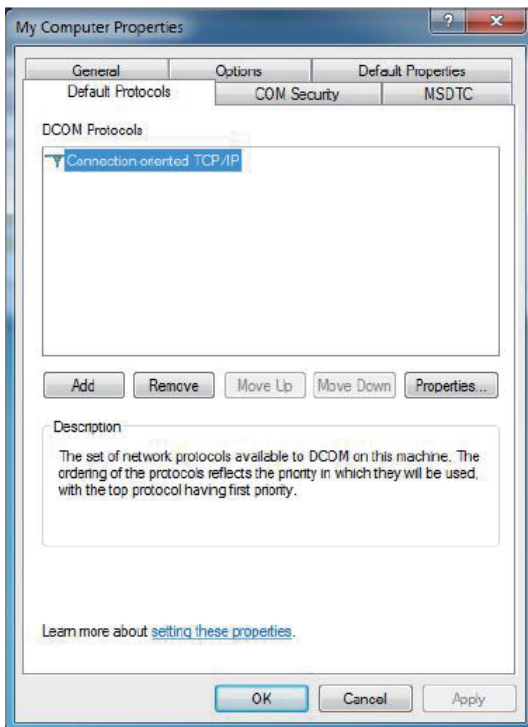
Make sure that 'Enable distributed COM on this computer' is checked.

The 'Default authentication level' should normally be set to 'Connect', which checks the user's details once when a connection is first made. If there are problems with the connection, the minimal security option 'None' can be used (Note: this requires that the 'Anonymous login' user is given access rights, as described later).

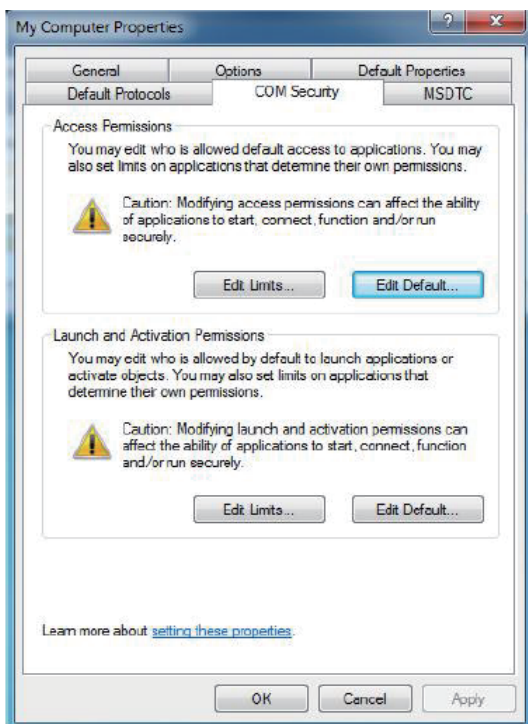
The 'Default impersonation level' should normally be set to 'Identify'. If you are having problems connecting, this can be changed to 'Impersonate'.

Switch to the 'Default protocols' tab. In this dialog (see example picture below), make sure that the 'Connection oriented TCP/IP' protocol appears at the top of the list. If there are any other protocols in the list which you are not using, remove them.



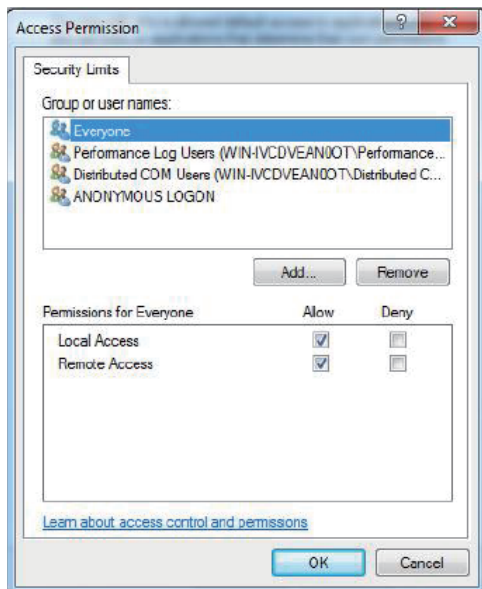


Click on the 'COM security' tab to show the dialog below:



The 'Limits' on this page will override the COM security settings for individual components, and if the settings are too restrictive DCOM will not be able to access an OPC server remotely.

In the 'Access permissions' section, click 'Edit limits' to display the window below.

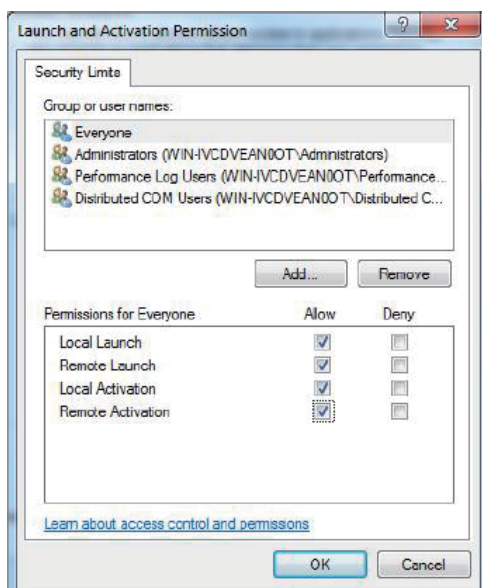


If 'ANONYMOUS LOGON' does not already appear in the list, add it – this is required to allow enumeration of OPC servers by remote PCs, and for applications where minimal security is being used due to other connection issues. If you do not need to fetch a list of available OPC servers from other PCs, you may be able to increase the server's security by leaving remote access for 'Anonymous logon' switched off.

In the example above, DCOM can be used by all users (the 'Everyone' group). Alternatively, if you are enabling DCOM for specific users or a group of users, the accounts can be added to this list individually.

Any user accounts in this list that need to use DCOM must have the 'Allow' checkbox set for both 'Local access' and 'Remote access'.

Click 'OK' to save the changes, then on the 'COM security' screen click the 'Edit limits' button in the 'Launch and Activation Permissions' section to show the window below:



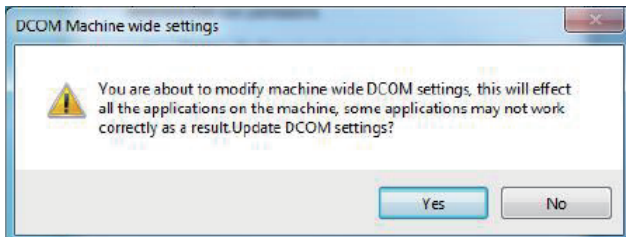
Ensure that all the 'Allow' checkboxes are set for each user or group that will access the server remotely. In the above picture, the 'Everyone' group has been enabled, but for a more secure configuration, you can add only the user(s) or group(s) that will actually use DCOM.

Click 'OK' to return to the 'COM security' window. The 'Edit defaults' settings for 'Access permissions' and 'Launch permissions' on this page are used to set the default permissions for COM applications. An application can either use the default settings, or can set customized security permissions (described later). These dialogs have the same format as the 'Edit limits' screens above.

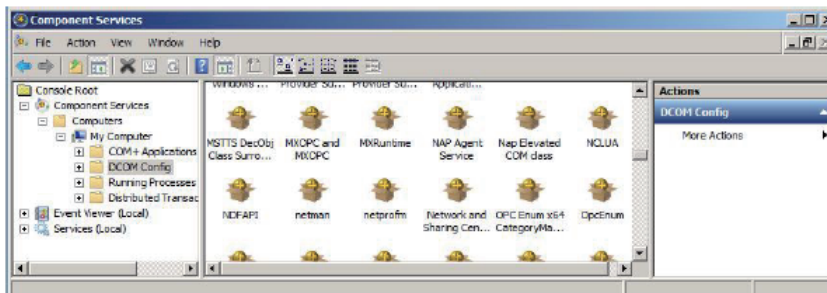
In the 'Edit defaults' setting for 'Access permissions', add the users or groups that will need OPC access, and ensure that the 'Allow' box is checked for both local and remote access. For a minimal security configuration, the 'Everyone' user can be given these rights.

Repeat this step for the 'Edit defaults' setting for 'Launch and activation permissions', ensuring that all of the 'allow' check boxes are set.

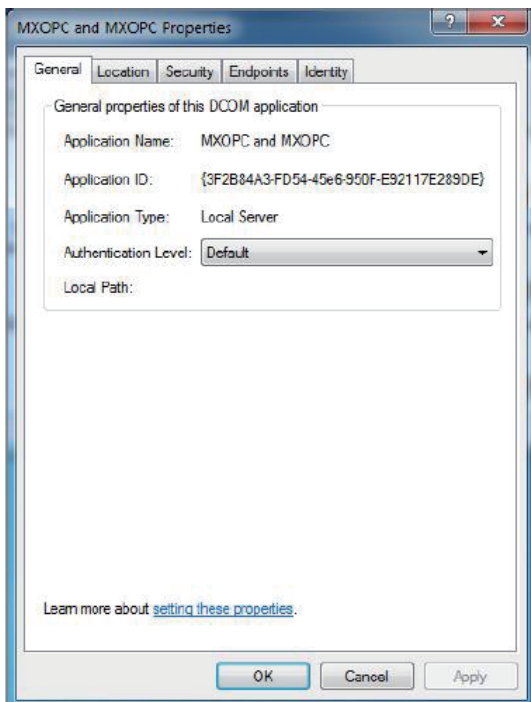
When you have finished, click 'OK' to return to the 'Component Services' dialog. You may see a warning message like the one below, in which case answer 'Yes'.



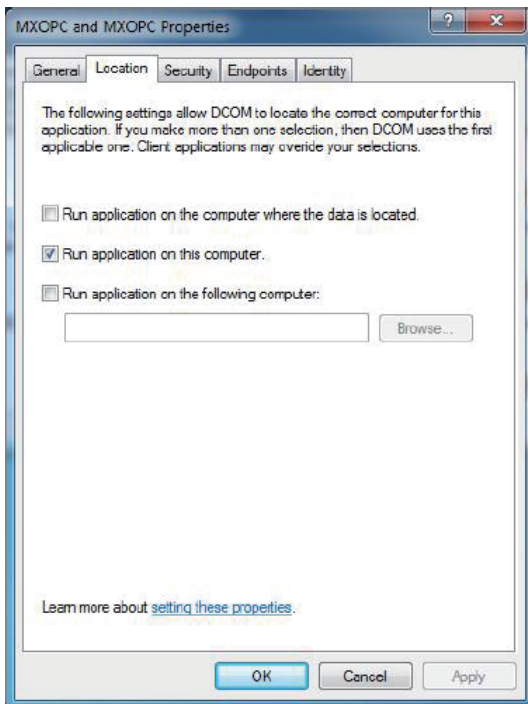
For the server PC configuration (only), you will need to configure the security on the MX OPC server, MX Runtime and OPC enumeration services. To do this, double-click on the 'DCOM config' entry, and find 'MXOPC', 'MXRuntime' and 'OpEnum' in the list, as shown in the picture below. Depending on your operating system and installation, these items may not be visible in the window at the same time, and there may also be an 'OPC Enum x64 CategoryManager' item.



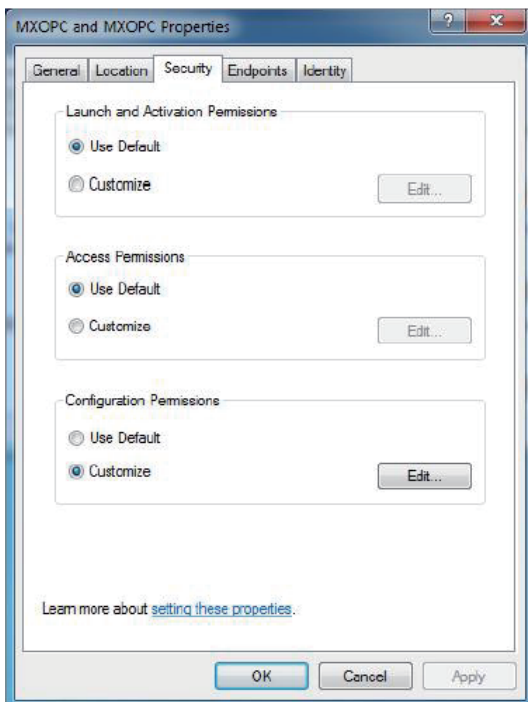
This step will need to be repeated for each item in turn – 'MXOPC' will be used for this example. Right click on the 'MXOPC' icon and select 'properties'. The window below should appear; confirm that the authentication level setting is 'Default'.



Switch to the 'Location' tab as shown below. Confirm that the 'Run application on this computer' check box is selected.

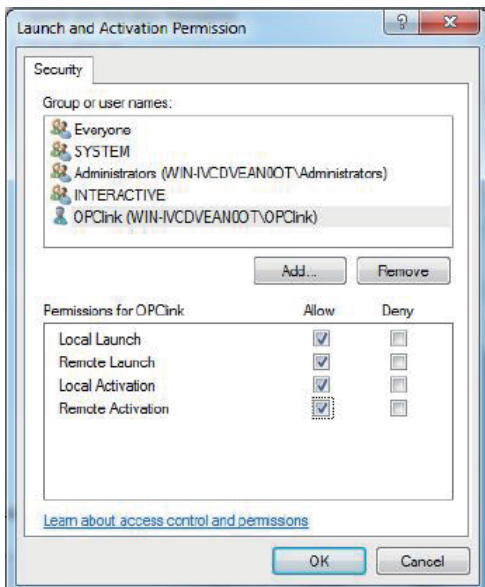


Now switch to the 'Security tab'.

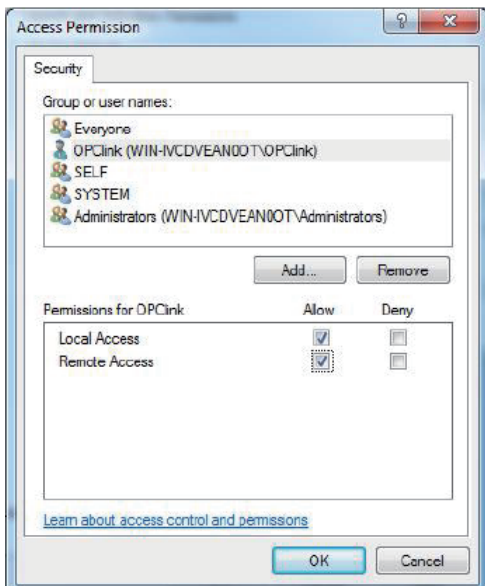


The 'Launch and activation permissions' and 'Access permissions' can both be left as 'Default' to use the default security settings configured earlier. Alternatively, they can be customized to allow more control over the users that can start and use each server. To do this, select 'customise' for each option and select 'Edit'.

A sample 'Launch and activation permissions' edit window is shown below, in which a named user 'OPClink' has been added. As with the 'edit defaults' settings, all four 'allow' check boxes must be set for users requiring access through DCOM.

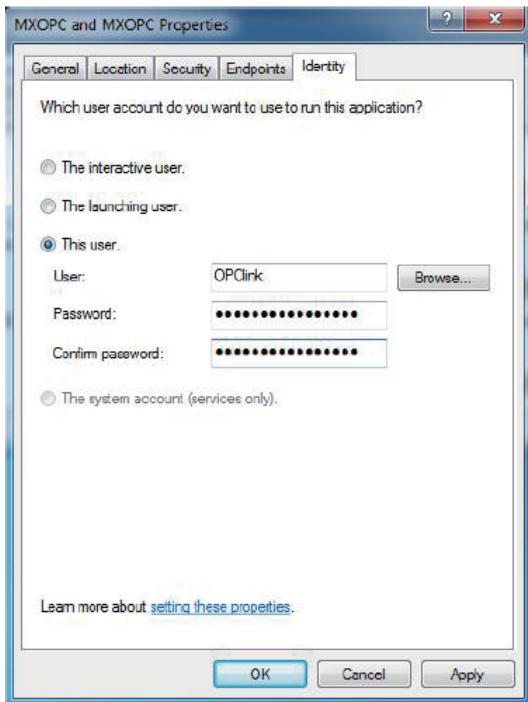


The 'Access permissions' configuration screen is shown below, with a named user 'OPClink' added.



After changing the settings on the security tab (if required), select the 'Identity' tab. In the sample screen below, the server has been configured to run as a named user.

A



The options on this screen are:

- The interactive user – the user who is currently logged on to the machine. This can cause problems with DCOM, as there is no guarantee of which user (if any) will be logged on when the server is accessed from another computer.
- The launching user – the user who accessed the server, causing it to be started.
- A named user – the server runs as a specified user, whose name and password are provided. This option allows the server to be configured independently of the user that started the server and the user that is logged on, and works well for unattended computers.
- The system account, when the server is configured to run as a service.

Press 'OK' to return to the 'Component settings' page, which can then be closed.

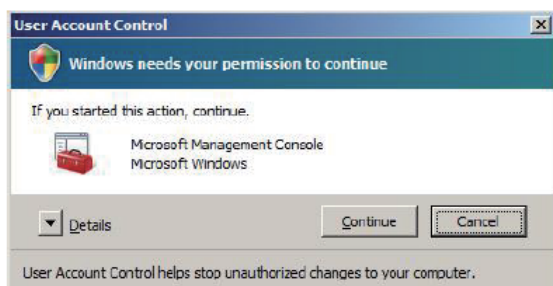
## Configuring services to use a specific user account

When the OPC server is installed as a service, it can be useful to configure it to run using a specific user account. The 'OPC enumeration' EXE is also installed as a service. In this section, the 'OPC enumeration' EXE will be used as an example, but the same method applies when the OPC server settings are changed.

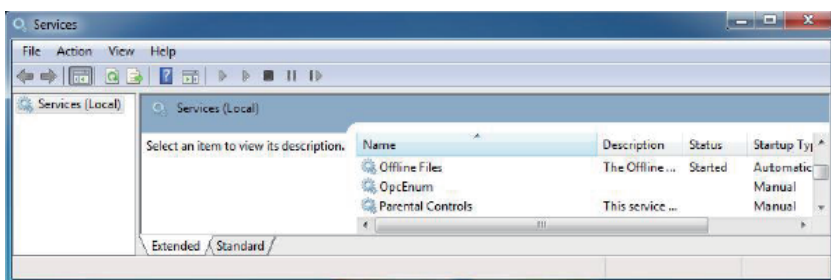
To open the 'services' page, click on the Windows icon (or 'Start' button) then type 'Services.msc' in the search box before pressing enter.



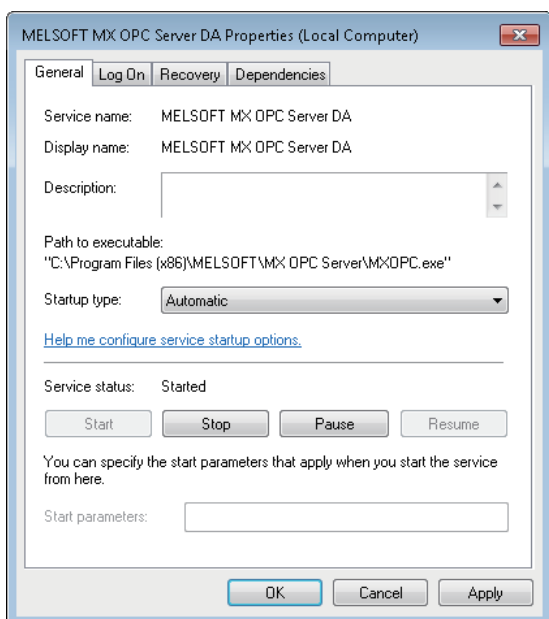
If the warning below appears, select 'Continue' or 'Yes'.



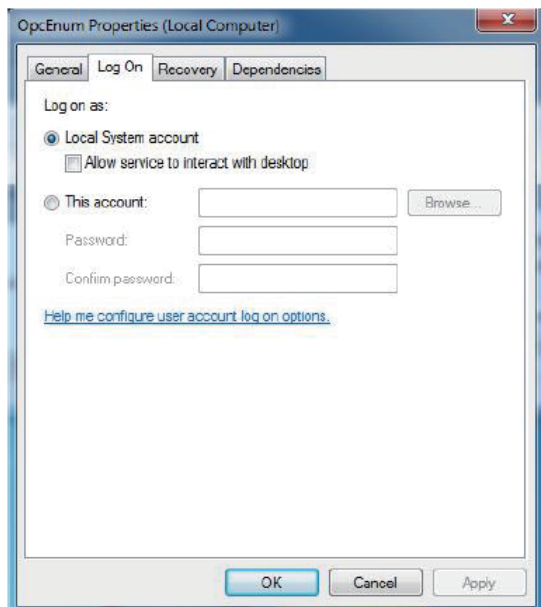
Find the service to be changed in the list. The sample screen below shows the OPC enumeration service. You may also need to change the settings for the 'MELSOFT MX OPC Server DA' service.



Right click on the service name and select 'Properties'. The service configuration screen (below) will be shown.



Switch to the 'Log On' tab, select 'This account' and enter the username and password of the user to run as.



Now select 'OK' and close the services window.



# Appendix 3 Using XML-DA

The XML-DA web service wrapper for OPC servers provides an interface to OPC servers using modern web technologies such as SOAP and XML. These technologies make it easier to access OPC data on other operating systems which have limited support for Windows or COM. The implementation as a 'wrapper' means that existing OPC servers can be enabled for web service access without any modifications to the software.

When connecting to the MX OPC server from a client application (such as a SCADA package or a Visual Basic program), it is not normally necessary to use XML-DA. Often the server and client components will be on the same computer anyway, or there will be a better way to pass the data from the OPC server across the network, such as using an Ethernet connection to the PLC, or passing the data between computers using a SCADA package's own built-in networking. However, there are some situations where XML-DA (like DCOM) is a suitable way to pass data from the OPC server between PCs, such as reading data from a Visual Basic or Visual C# program on another computer when there is only a single serial link connection available to the PLC. XML-DA is easier to configure than DCOM, and unlike DCOM it can be used to pass data across firewalls which use network address translation (NAT). However, it is more difficult to restrict user access to an XML-DA server.

This section will explain how to configure XML-DA with MX OPC Server. It is assumed that you are familiar with some COM and OPC terminology, and with the use of Internet Explorer and Microsoft Windows.

## Security considerations

Unlike DCOM, XML-DA relies on the security settings on the server PC only. This means that it does not have the same issues when connecting between domains, or between computers running different operating systems. The disadvantage is that it is harder to check user credentials before allowing access to the OPC server.

XML-DA can be used to read data over an internet connection or across a network. Any computer which can reach the server PC using TCP/IP can connect to XML-DA if the firewall is set up to permit this. However, it is still not advisable to allow external internet traffic to access the XML-DA port on the server PC, as any newlydiscovered vulnerability in either Internet Information Server (IIS) or XML-DA itself could allow an attacker to remotely control the server computer. Instead, if you need to connect to OPC-DA from another site using an internet connection, the safest way is to set up a virtual private network (VPN) to pass encrypted TCP/IP traffic between the two sites, and use this protected connection to connect to the XML-DA server.

Before setting up XML-DA in a corporate environment, you will need to discuss the changes to the security configuration with your network administrator or IT department, to make sure that the settings are consistent with your company's security policy. In these instructions it is assumed that XML-DA and the web server will be installed on the same computer as the OPC server. If this is not the case and DCOM is used to connect from the OPC XML-DA wrapper to the server, you will need to set up DCOM security to allow a connection to the OPC server – see "DCOM configuration" for instructions on how to do this. This will also affect your choice of the user account which is used to access the OPC server.

Some typical security options for XML-DA are shown in the following table.

Option	Notes
1.	<p>Fixed user name and password in the Web.config file within the virtual directory</p> <p>This method accesses the OPC server under an account with a fixed username and password, which are entered in plain text in the 'Web.config' file in the wrapper directory (described in more detail later in "Configuring the XML-DA wrapper" ). This is easy to set up, but means that the plain text password can be read by anyone with local access to the computer. With some extra configuration, the password can be hidden in a partially encrypted form in the registry, but it is still recoverable in a readable form by a determined attacker.</p> <p>The user account selected for this must have sufficient COM or DCOM access rights to use the OPC server. You may also find that the policy settings on the computer prevent you from using an account with a blank password.</p> <p>If you are using this option, it may be sensible to create a new user account especially for this purpose and assign it COM access rights to the MX OPC server (described later in section "COM configuration" ). You may also wish to prevent the account being used to log on locally (i.e. when the computer is started). To do this on a PC which is not in a domain, select 'Start -&gt; Run', type 'gpedit.msc', then click 'OK' to start the group policy editor. In the tree view, browse to 'Local computer policy =&gt; Computer configuration =&gt; Windows settings =&gt; Security settings =&gt; Local policies =&gt; User rights assignment', and in the 'Policy' list in the right-hand pane, double click on 'Deny logon locally'. Use the dialog that appears to add the new user account name to the list.</p>

Option	Notes
2.	<p>Give OPC server access rights to the ASPNET user</p> <p>By default, the web service will run under an account created by Internet Information server called 'ASPNET'. This account can be given COM access rights to the MX OPC server, which removes the need to use a separate account and plain text password.</p> <p>If you have already configured DCOM (described in "DCOM configuration" ) and have assigned OPC access rights to a new group, you may be able to add the ASPNET account to this group. Alternatively, you can assign MX OPC server access rights to the ASPNET user independently (described later).</p> <p>The main risk with this option is that a badly-secured ASP.NET application running as the ASPNET user in the same instance of Internet Information Server may be easier for an attacker to exploit if it has the additional access rights needed by COM or DCOM.</p>

## Before you begin

Before you start to modify the PC configuration, please ensure that:

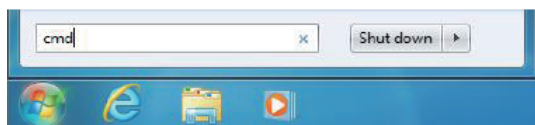
- The server (and optionally, client) PCs are up to date with service packs and security fixes. Applying the latest security fixes will reduce the risks introduced when the security configuration is changed.
- You are logged on to the PC(s) using a local administrator account
- If you have not already installed Internet Information Server (IIS), you have your original operating system installation media available as you may be prompted for additional files.
- If you will be testing the XML-DA connection from another PC or using DCOM, that there is a working TCP/IP network connection between the client and server PCs. One way to test this is by using the 'ping' command:

### Operating procedure

1. Open a command prompt as follows:

Windows 7, Windows 8, Windows 10, or Windows Server 2008 R2

Click the Windows icon or start button, then enter 'cmd' in the search box and press enter.



2. In the command window that appears, enter 'ping <otherpc>', where <otherpc> is the name of the other computer e.g. 'ping SCADAserver'. A computer's network name can normally be found by right-clicking on 'My computer', selecting 'properties' then clicking on the 'Computer name' tab. If in doubt, ask your network administrator for assistance.
  3. After pressing return, you should normally see a message such as 'Pinging <address> with 32 bytes of data' (where <address> is the IP address such of the other PC, for example 192.168.200.100) followed by four response messages from the other computer. If no address is shown, there may be a problem in finding the other computer by name – ask your network administrator to check the PCs settings. If the address is found but there are no responses, this may mean that the connection is not working, or it can sometimes indicate that a third-party firewall on one of the computers is preventing the ping request from being sent or the ping response from being received.
- If you need to modify the DCOM or COM settings, make a note of the previous settings in case the changes have to be reversed. Some of the changes will affect all applications using DCOM on the computer, not just the MX OPC server, and this could stop other applications (such as other OPC servers) from working.

# Configuring XML-DA

The configuration of XML-DA depends on the operating system used. Where there are significant differences between operating systems, this will be made clear in the directions.

NOTE: If you install Internet Information Server (IIS) after the .NET framework, ASP.NET pages will not work correctly. Follow the instructions in "Adding ASP.NET support to a new installation of Internet Information Server" to fix this. If you have not yet installed either package, install IIS first to prevent the issue from occurring.

## Turning off user account control

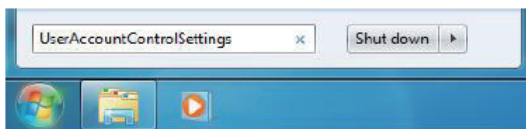
If you are installing on a later operating system which has user account control (UAC) such as Windows 7 or Windows Server 2008 R2, you may experience problems installing the XML-DA wrapper, even if you are logged in as a user with Administrator rights.

If any of the installers do not run correctly, it may be necessary to temporarily turn off user account control during the installation, and restore it afterwards. The instructions below explain how to turn UAC on or off, for each operating system.

Note that it is usually necessary to reboot after changing the UAC settings.

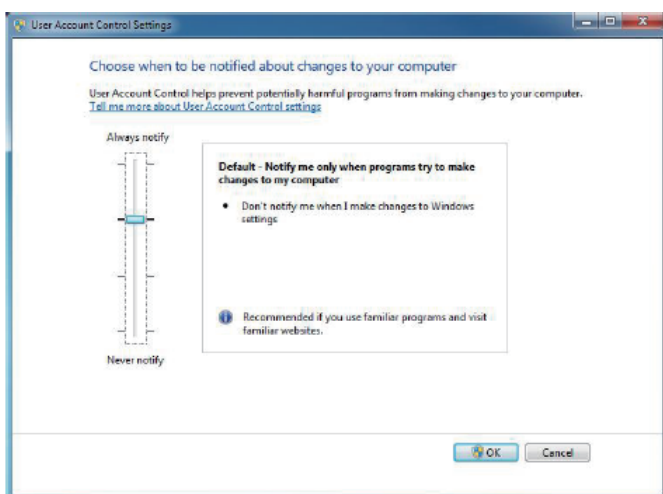
### ■ Windows 7 and Windows Server 2008 R2

Click on the windows logo (or start button) and enter `UserAccountControlSettings` in the search box that appears, before pressing enter.



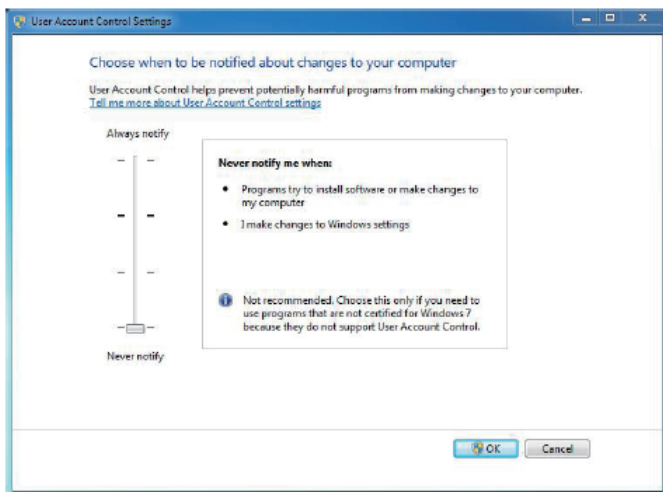
#### Open user account control

The slider will normally start on the 'Default' setting (as in the picture below). With this setting, UAC prompts will be shown as normal.



#### Default UAC setting

To disable UAC, drag the slider to 'Never' as shown below. This will prevent UAC prompts from appearing. After clicking 'OK' to confirm the setting, you will be prompted to restart the computer.



**UAC switched off**

## Installing Internet Information Server (IIS)

XML-DA requires Microsoft Internet Information Server (IIS) to operate. Although this is supplied with Windows 7 and most editions of later operating systems, it is not always installed by default.

### ■ Installing Internet Information Server (Windows 7 or later)

To install Internet Information Service on Windows 7 and later operating systems (other than server operating systems), start by clicking on the Windows icon (or 'Start' button) then type 'appwiz.cpl' in the search box before pressing enter.

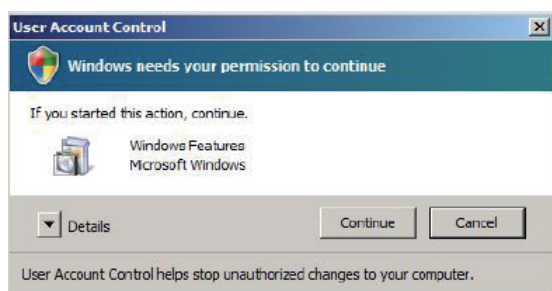


In the window that appears, click 'Turn Windows features on or off' (as shown below).



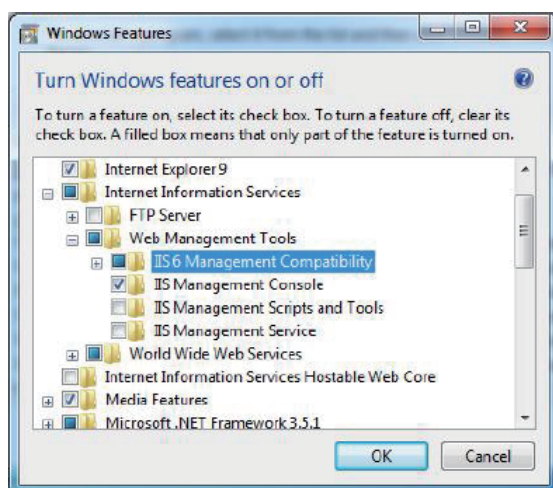
**Turn Windows features on or off**

Depending on your operating system, you may see a user account control prompt like the one below. Click 'Continue' or 'Yes'.



**Windows features UAC prompt**

The windows features page is shown below. Find 'Internet Information Services' in the list. Ensure that the box to the left is ticked, then expand the item to find 'Web Management Tools' / 'IIS 6 Management Compatibility' and check the box next to it as well. When you are ready, click 'OK' and Internet Information Server will be installed.



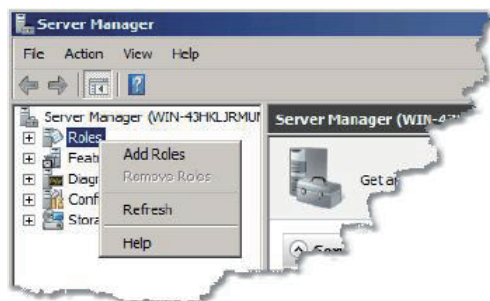
**Enable internet information server**

## ■Installing Internet Information Server (Windows Server 2008 R2)

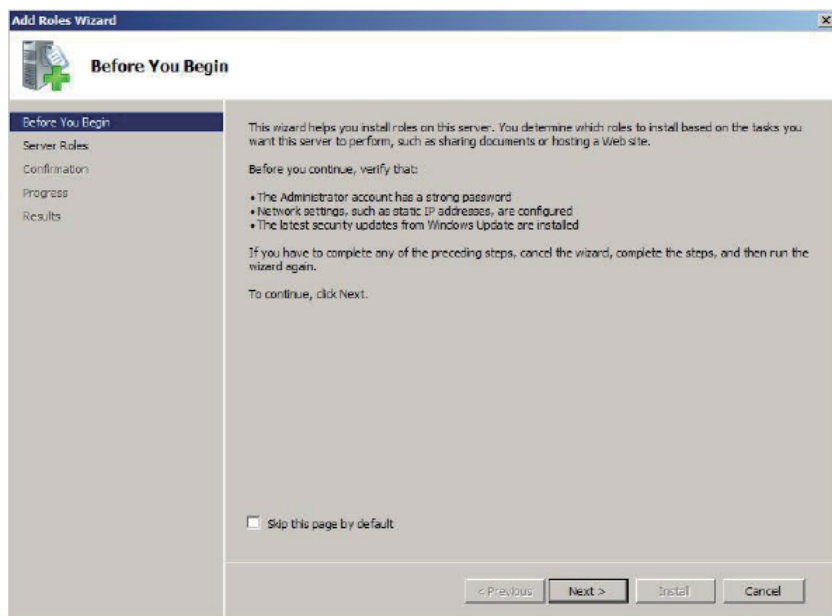
To install Internet Information Server on Windows Server 2008 R2, start by clicking on the Windows icon (or 'Start' button) then type 'ServerManager.msc' in the search box before pressing enter.



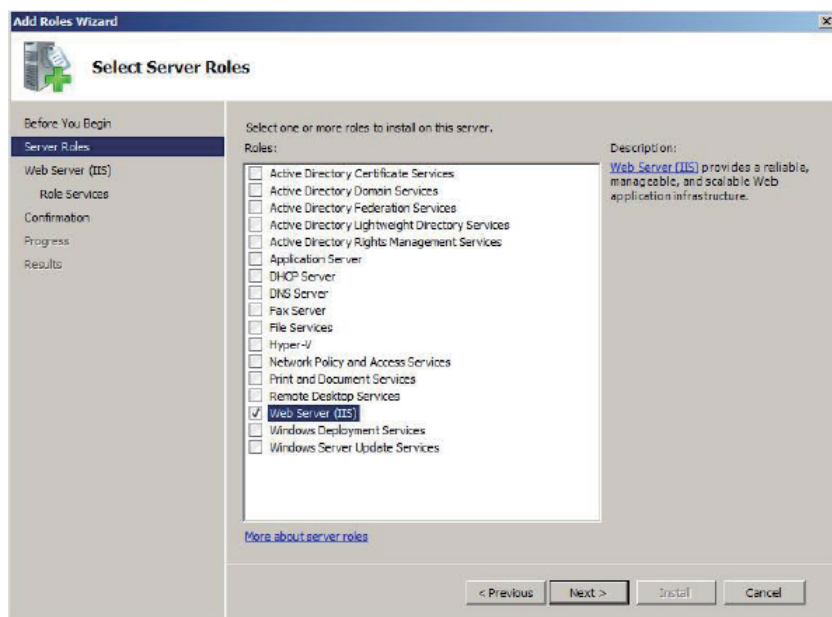
When the 'Server Manager' window appears, right click on 'Roles' then select 'Add Roles' (as shown below).



Click 'Next' to skip the introduction screen (pictured below).

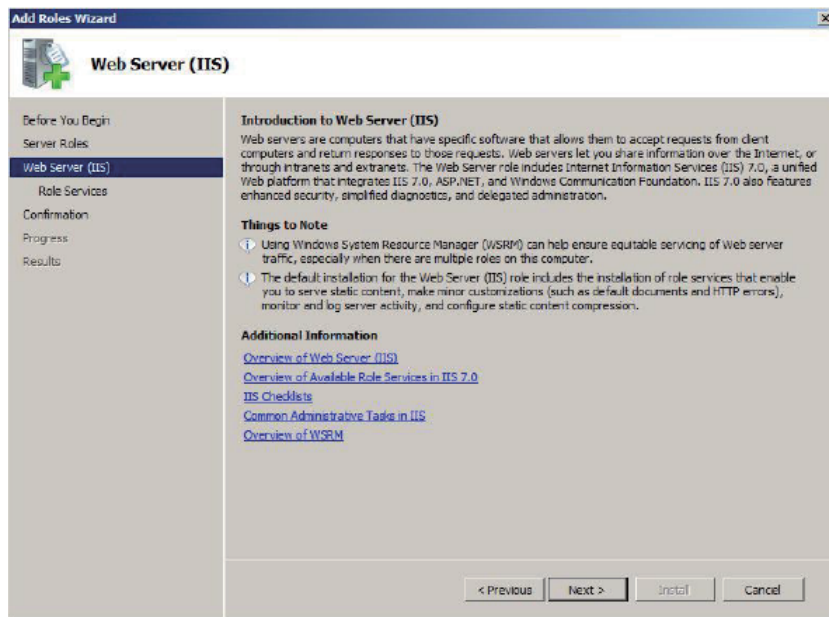


In the 'Server Roles' list, check 'Web Server (IIS)' then click 'Next'.

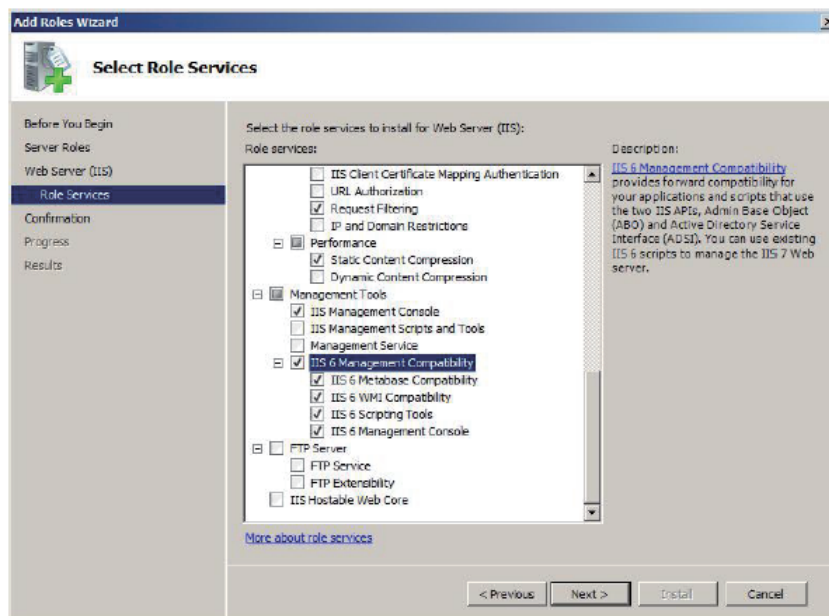




Read through the instructions on the following page (shown below) then click 'Next'.



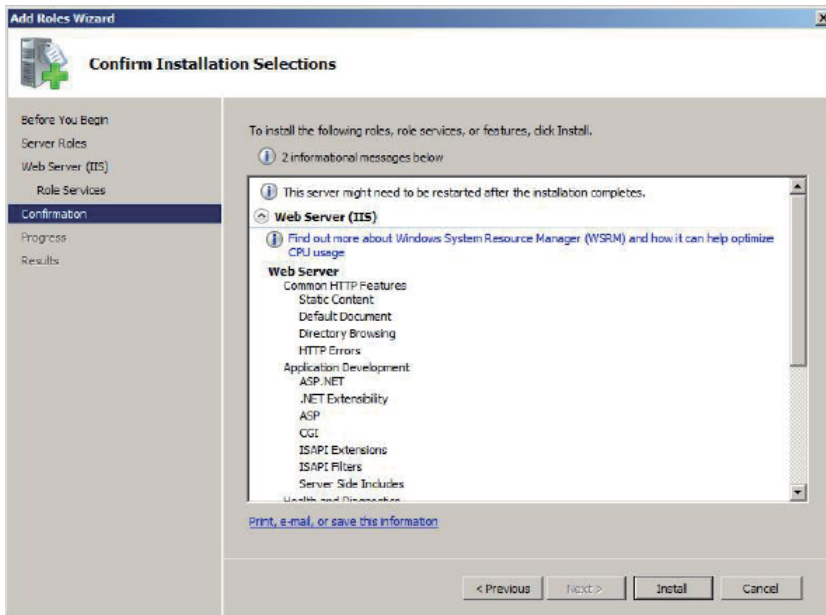
On the 'Role Services' page, scroll the list down to find 'IIS 6 Management Compatibility' under 'Management tools', and check the box next to it:



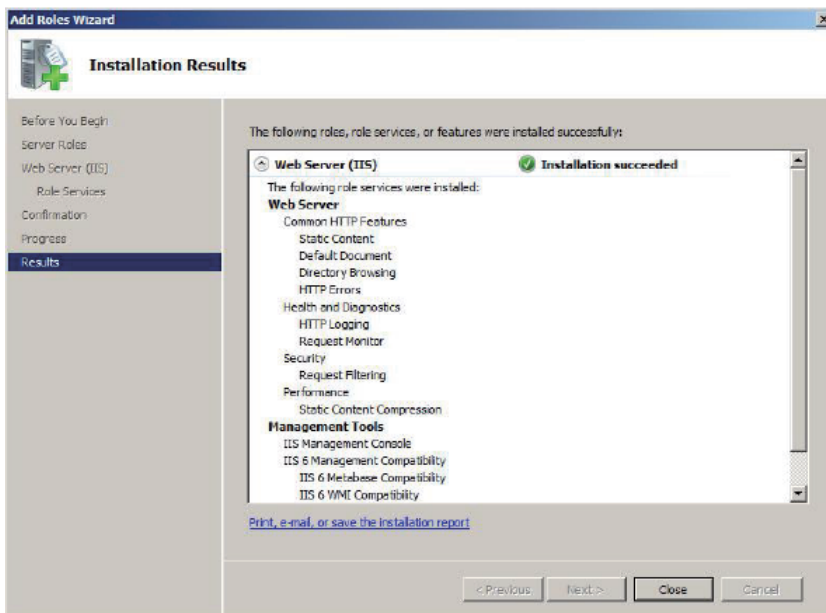
The 'Application development' items should also be enabled (as shown below), before clicking 'Next'.



The confirmation page below will be shown. Click 'Install'.



When the installation results page appears, click 'Close'.



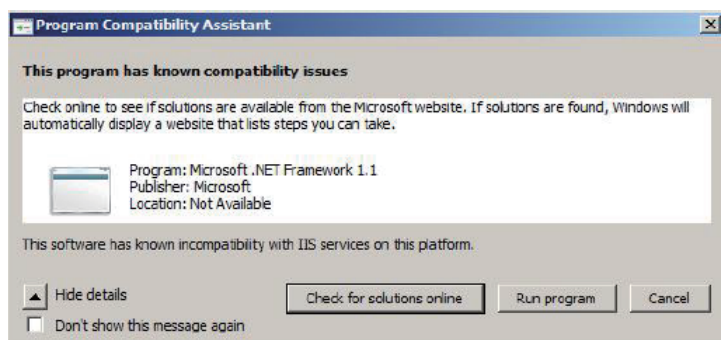


## Installing Microsoft .NET framework v1.1

The XML-DA wrapper web service requires Microsoft .NET framework v1.1 to run. To determine whether or not this is installed on your computer, select 'Start ⇒ Control panel ⇒ Add/remove programs' (or 'Start ⇒ Control panel ⇒ Programs / Uninstall a program') and see if 'Microsoft .NET framework v1.1' appears in the list. If the .NET framework was already installed before you installed IIS, you may need to follow the instructions in the next section before ASP.NET pages will work correctly. If the .NET framework v1.1 was not installed, download the installer from the Microsoft web site at [www.microsoft.com/downloads](http://www.microsoft.com/downloads). By searching for ".NET framework 1.1" you should be able to find the two items:

- .NET framework v1.1 redistributable package (filename 'dotnetfx.exe')
- .NET framework v1.1 service pack 1 (filename 'NDP1.1sp1-KB867460-X86.exe')

Download both of these, and install the redistributable package first, followed by the service pack. After installing both these items, there will be some remaining security fixes, which can be installed through Windows update (see the next section). When the .NET framework v1.1 is installed on Windows Server 2008 R2, you will see a warning like the one below. Select 'Run program'.



Compatibility warning on Windows Server 2008

### ■ Adding ASP.NET support to a new installation of Internet Information Server

If Internet Information Server was installed after the .NET framework, you will need to register ASP.NET with Internet information server using the 'aspnet\_regiis.exe' file located in the .NET framework directory.

For 7 or later operating systems, click on the Windows icon or 'Start' button, then enter the same text in the search box before pressing **Ctrl** + **Shift** + **Enter**. You may need to answer 'Yes' or 'Allow' if a user access control prompt appears.

If you will also be using ASP.NET from other versions of the .NET framework later, you may wish to register those versions as well. For example, to register the current .NET 2.0 framework, the command to use is:

```
%WINDIR%\Microsoft.NET\Framework\v2.0.50727\aspnet_regiis.exe -i
```

A

## Updating system components

If you installed Internet Information Server (IIS) or the Microsoft .NET framework in the previous steps, it is advisable to update your computer to ensure that it has the latest security patches, as there may have been security fixes developed since the installation media were created. If the computer has an internet connection, the easiest way to do this is to use Windows Update.

### ■A) If your Computer is configured for automatic Windows updates

If you already have automatic updates enabled, you can trigger an update by selecting 'Start->Run' and entering 'wuauclt / DETECTNOW' (or on later operating systems, clicking the Windows icon or 'Start' button and typing the same text into the search box). Depending on how the automatic updates are configured, you will either be prompted to install the new updates and to restart the computer afterwards, or the installation may be performed the next time you restart the computer.

### ■B) If your computer is not configured for automatic Windows updates

To update the computer manually, either (depending on your operating system):

- select Start ⇒ [All Programs] ⇒ Windows update (or Microsoft update)
- start Internet explorer and select 'Tools ⇒ Windows Update'

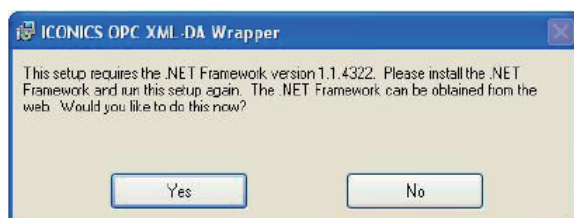
then follow the prompts and select any patches related to Internet Information Server for installation. You may need to restart your computer after the patches are installed.

For the .NET 1.1 framework in particular, you may find that you have to repeat this step until no more updates are found – the updates are not included in a single package.

## Installing the XML-DA wrapper

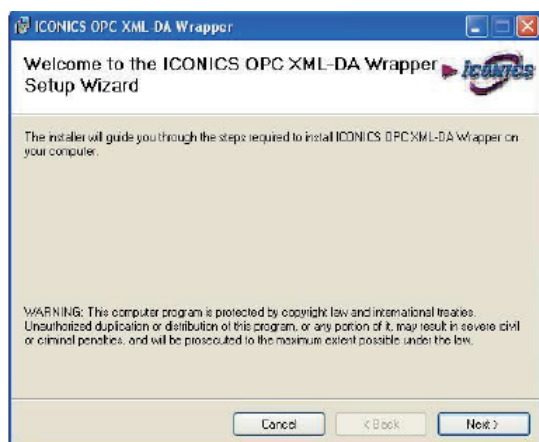
To install the wrapper web service, run the supplied installer 'XMLDAwrapperSetup.msi'. Note that on later operating systems such as Windows 7 and Windows Server 2008 R2, you may need to turn off user account control temporarily for the installation to complete successfully.

If you see the message below, the .NET framework v1.1 has not been correctly installed - see "Installing Microsoft.NET framework v1.1" for instructions on how to do this.

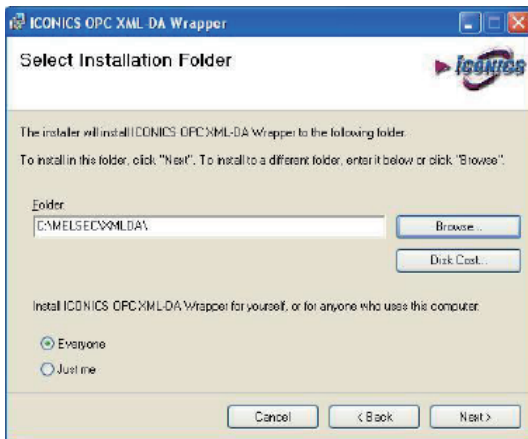


**.NET framework required prompt**

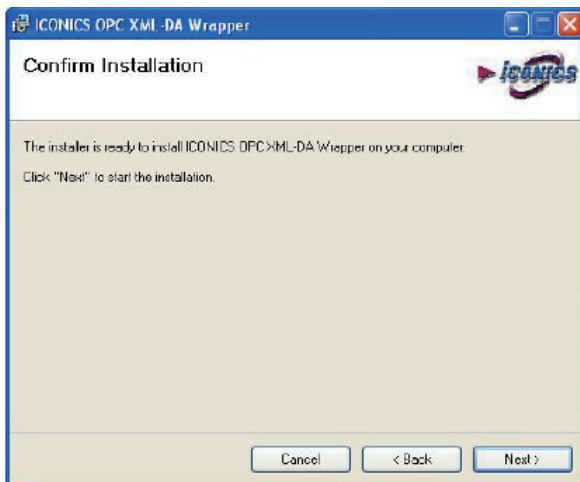
Once the .NET framework v1.1 is installed, the installer will go on to the 'Welcome' page (below). Click 'Next' to continue.



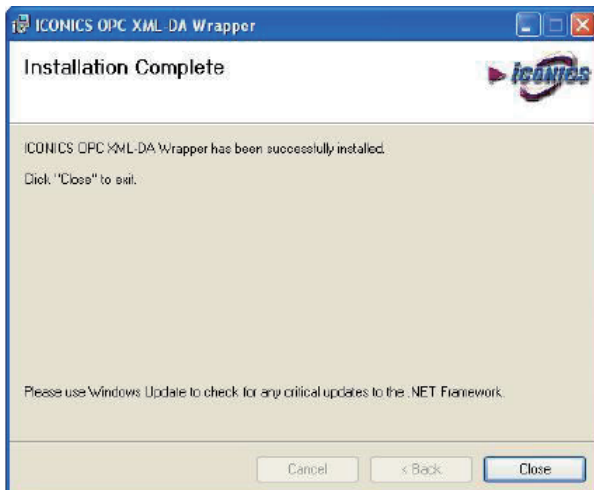
You will now be prompted for the location where the wrapper should be installed. For this example, the wrapper will be installed to 'C:\MELSEC\XMLDA' (see picture below). You may optionally select 'Everyone' to allow other users to access the files. Select 'Next' to continue.



At the 'Confirm installation' prompt, select 'Next'.



When installation is complete, you will see the dialog below and the readme file will be displayed. Click 'Close'.

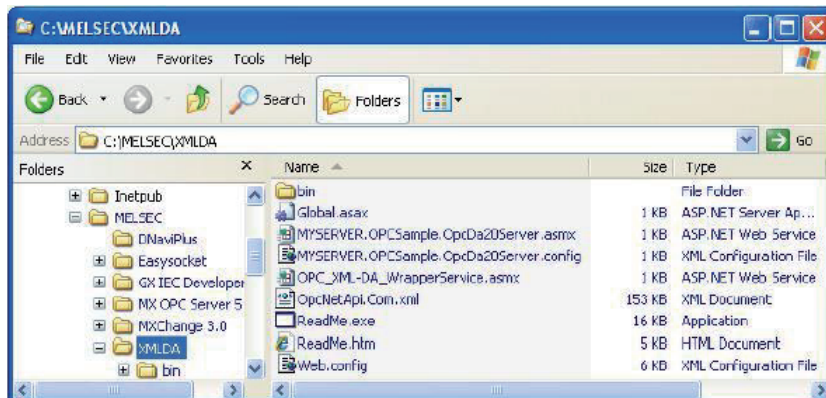


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## Configuring the XML-DA wrapper

The next step is to set up a web service for MX OPC server.

Browse to the directory where the wrapper was installed (in the above example, this was 'C:\Melsec\XMLDA'). The directory contents should be similar to the following example:



Take a copy of the file 'OPC\_XML-DA\_WrapperService.asmx', and rename this copy as 'Mitsubishi.MXOPC.6.asmx' – this is the 'ProgID' (human-readable name) of the current MX OPC server version. Other OPC servers can be added in the same way by using the 'ProgID' of the server with the '.asmx' extension. If no config file is supplied, the name of the file is used to find the OPC server to read from, which is assumed to be on the local PC.

An alternative method of configuration is demonstrated by the 'MYSERVER.OpcDa20Server.asmx' and 'MYSERVER.OpcDa20Server.config' files. In this case, a '.config' file is supplied containing the PC and OPC server names in the 'Node' and 'ProgID' entries respectively. This requires that DCOM is configured correctly to allow connections to the PC where the OPC server is running – see the "DCOM configuration" for instructions on how to do this.

The 'Web.config' file is a text file can be edited with e.g. 'Notepad' (Select Start -> Run and enter 'notepad.exe' then click OK and browse to the file) to configure the account that is used to access the OPC server. Find the lines shown below in the file:

```
<!-- IDENTITY
This section allows the web service to impersonate a specific Windows user account that
determines what privileges the web service has. This is important for the XML-DA sample
web service since it must be able to launch as access local COM servers. The two sample
COM servers included with the distribution are configured to allow 'Everyone' access which
means that no special web service configuration is required. Changes to this section are
required before the XML-DA sample server can connect to other COM servers.

There are two possibilities for determining identity: the web service can use an account
that is explicitly specified in this file or it can use the account identified by IIS
integrated windows authentication, If the later approach is used then there must be no entry
in this file for 'userName/password' and the virtual directory for the webservice must
have anonymous access must be disabled (which forces the client to explicitly login).
-->

<!-- <identity impersonate="true" userName="[username]" password="[password]"/> -->
```

Whether this needs to be changed or not depends on your chosen security option from the table in "Security considerations". By default, the last line of the section above is commented out (with '<!--' and '-->' markers at the start and end of the line. With this line disabled, Internet information server will run the web service using its built-in 'ASPNET' account. This is the correct method if you are using security option 2 ('assign rights to the ASPNET user'), in which case you can go on to the next section.

The alternative is to select a fixed user name and password for the account to use – this is the correct method for security option 1 ('fixed user name and password in web.config'). To do this, copy the line and paste a copy of it on the line below. Remove the '<!--' and '-->' comment markers at the start and end of the new line, and set a username and password. The resulting lines for username 'xmluser' and password 'opensesame' would look like this:

```
<!-- <identity impersonate="true" userName="[username]" password="[password]"/> -->
<identity impersonate="true" userName="xmluser" password="opensesame"/>
```

WARNING: Do not re-use a password that you use on other systems and wish to keep secret, as it is stored in readable text form and can be seen by any other user with access to the computer.

After modifying the file, save the changes and close notepad.

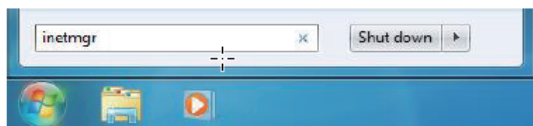
## Configuring Internet Information Server (IIS)

The configuration of Internet Information Server depends on the operating system and IIS versions. Depending on your operating system, either following the instructions for Windows 7 or later operating systems.

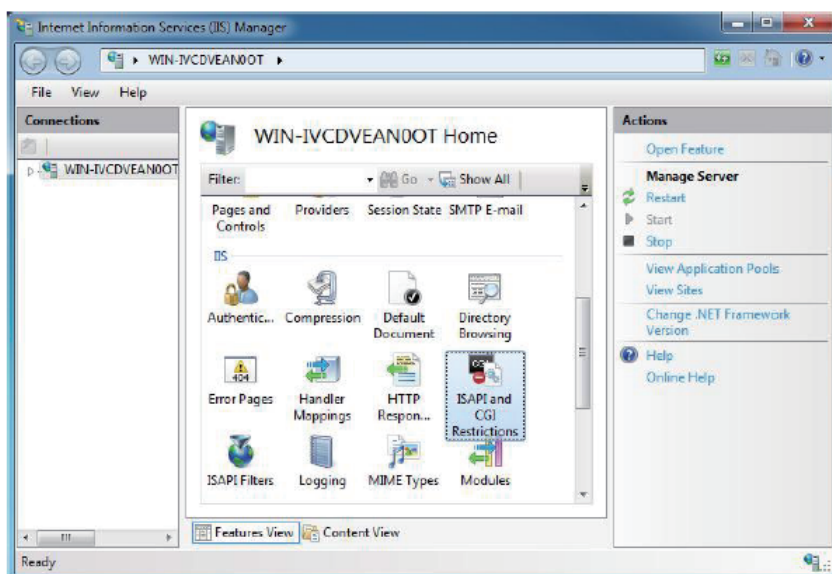
### ■ Configuring Internet Information Server (IIS) on later operating systems

On Windows 7 and later operating systems, there are some additional steps necessary to configure the security in IIS, before the application can be added.

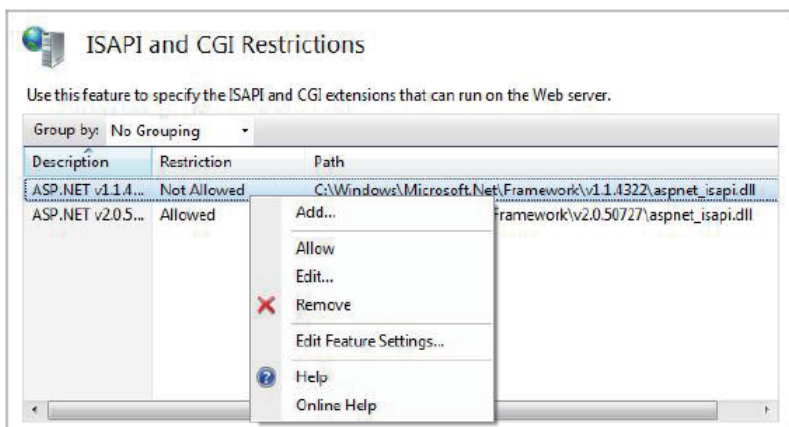
Click the Windows icon (or 'Start' button) and enter 'inetmgr' before pressing enter:



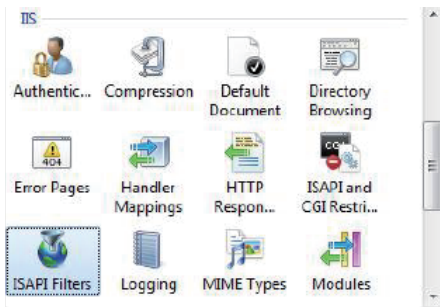
In the 'Internet Information Services (IIS) Manager' window, click on the local computer name in the 'Connections' tree at the top left, then find 'ISAPI and CGI restrictions' in the 'IIS' section and double-click it.



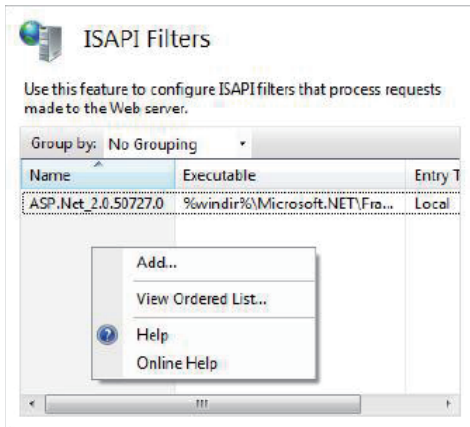
Find the entry for ASP.NET v1.1 in the list, right click it and select 'Allow':



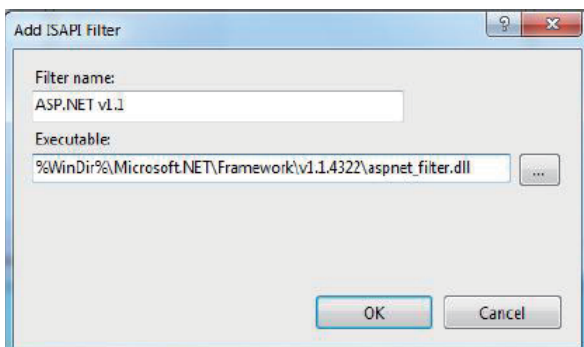
Return to the previous screen by clicking on the local PC name at the top level again, and this time double-click on 'ISAPI filters'.



Right click on the background of the ISAPI Filters page, and select 'Add' from the context menu.

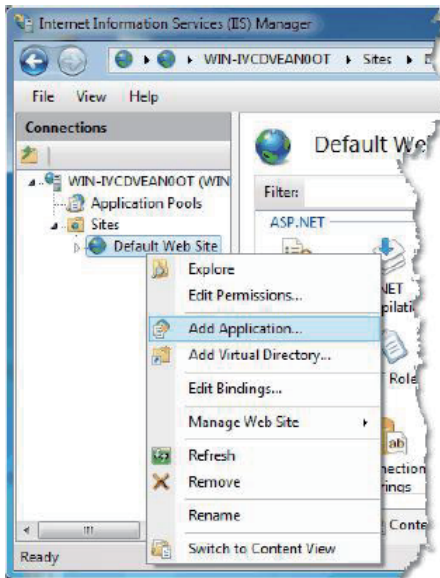


In the 'Add ISAPI Filters' dialog, enter a name e.g. 'ASP.NET v1.1' and path '%windir%\Microsoft.NET\Framework\v1.1.4322\aspnet\_filter.dll'.



After the security has been configured, a new application can be added. Return to the 'Internet Information Services (IIS) Manager' window, then expand the tree on the left side until 'Default Web Site' is visible, before right clicking on it and selecting 'Add Application...'.



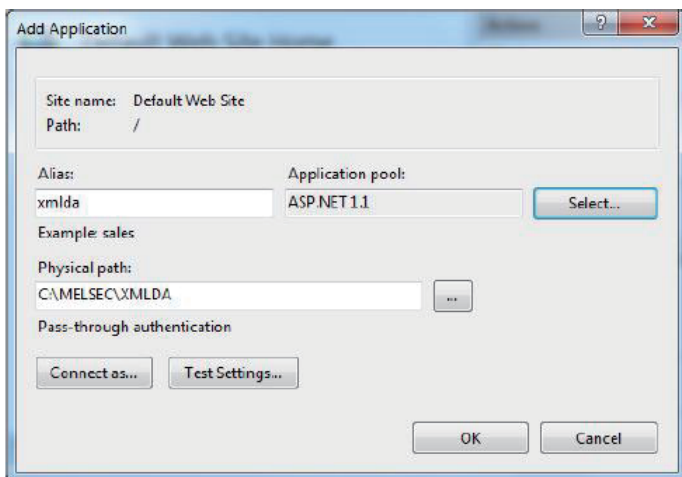


#### Adding an application

The 'Add Application' dialog will be shown (see below).

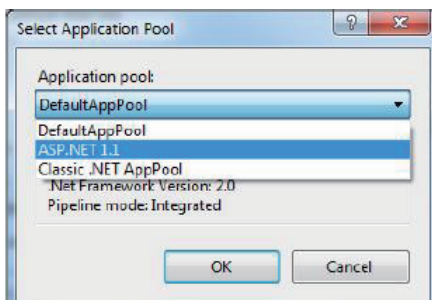
The 'Alias' name is the name that will be used to refer to the directory as part of the URL entered in the address bar in the web browser, e.g. 'http://computername/alias/'. In this example, we will use the name 'xmlda'.

The 'Physical path' is the directory where content is stored. Browse to the directory where you installed the OPC wrapper (see "Installing the XML-DA wrapper"), then click 'Connect as'.

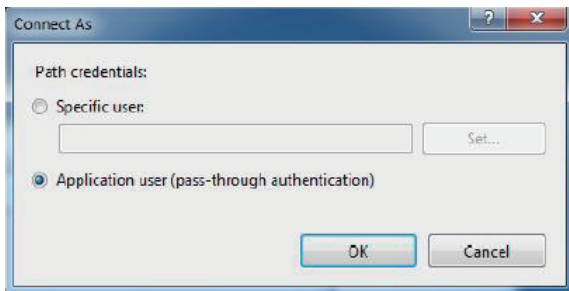


#### Add application dialog

The application pool must be changed to 'ASP.NET 1.1'. To do this, click on the 'Select' button to the right of the application pool, and select 'ASP.NET 1.1' from the list (see below) before clicking 'OK'.

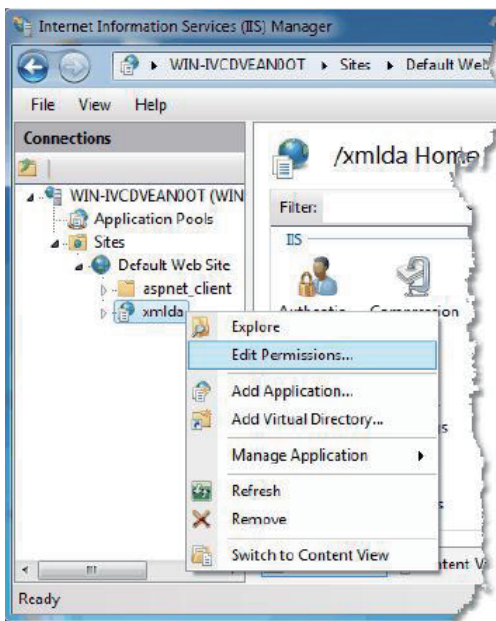


In the 'Connect as' settings on the 'Add application' dialog, you can select the user identity that will be used. Depending on your security configuration, this can either be a specific user account, or the application user. After selecting 'OK', the 'Test settings' button from the previous dialog can be used to check if the directory will be readable.



Click 'OK' to close the 'Add application' dialog and return to the main configuration page, where the new alias should appear as an item under the default web site.

You can optionally right click on the new alias, and select 'Edit permissions' from the context menu (as shown below) to view the standard folder properties dialog. This has a 'Security' tab where the folder permissions can be edited (e.g. to make sure that the IIS account used will be able to read the files).





## COM configuration

If the user account you selected to run the OPC server has already been configured to have the correct COM access rights for MX OPC server (for example, through previously configuring a working DCOM connection with the same account), you can move on to the next section. Otherwise, you will need to configure COM security access for the user account (either the fixed user name and password you chose, or the ASPNET account).

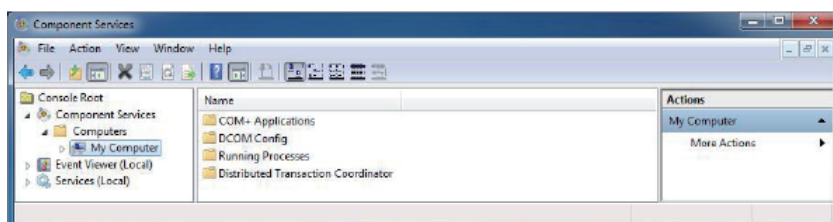
This section will describe how to do this. The instructions are different for Windows 7 or later, so follow the instructions in the section for your operating system.

### ■COM configuration on Windows 7 or later

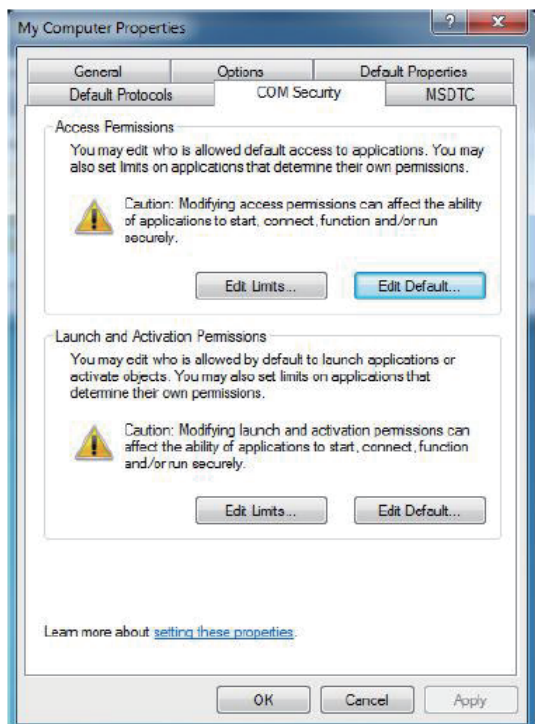
Click on the Windows icon or 'Start' button, then in the search box type 'dcomcnfg' and press enter.



In the first window that appears (see example below), click on the 'Component services' and 'Computers' items in the left hand pane to expand them, so that 'My Computer' is shown.

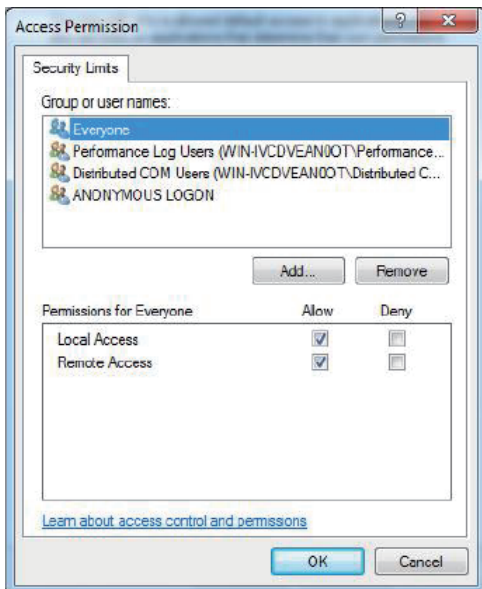


Right click on 'My computer' and select 'Properties' from the pop-up menu. In the next window, click on the 'COM security' tab to show the dialog below:



The 'Limits' on this page will override the COM security settings for individual components, and if the settings are too restrictive there can be problems accessing the OPC server.

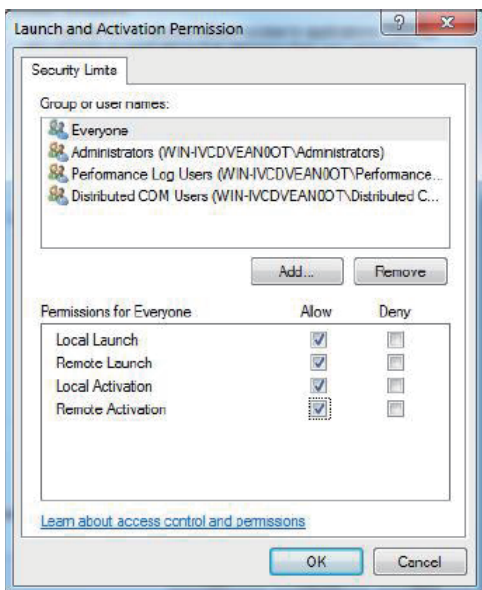
In the 'Access permissions' section, click 'Edit limits' to display the window below.



In the example above, DCOM can be used by all users (the 'Everyone' group) – if 'Everyone' has at least 'Local access' rights, you do not need to change these settings further. Otherwise, add the account(s) to be enabled (e.g. ASPNET) to this list with the 'add' button, and make sure that at least 'Local access' is enabled.

Note: Although using XML-DA with an OPC server on the same PC as IIS does not require 'Remote access' to be enabled, DCOM does require remote access. If you have already configured DCOM you may find that 'Remote access' is already enabled for some or all users – there is no need to remove it.

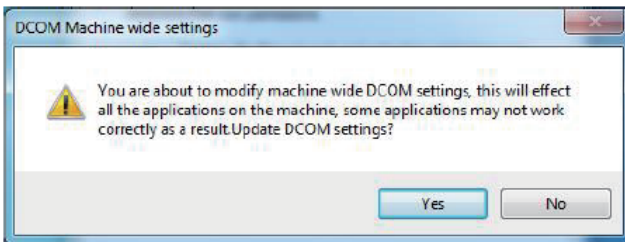
Click 'OK' to save the changes, then on the 'COM security' screen click the 'Edit limits' button in the 'Launch and Activation Permissions' section to show the window below:



Ensure that all the 'Allow' checkboxes are set for the 'Local launch' and 'Local activation' permissions of the user account that will be accessing the server (e.g. ASPNET). If the 'Everyone' group already has permissions (which is the case in the above picture), it should not be necessary to add the new user account separately. As before, there is no need to remove the 'Remote' permissions if they have already been set (for example as part of DCOM configuration).

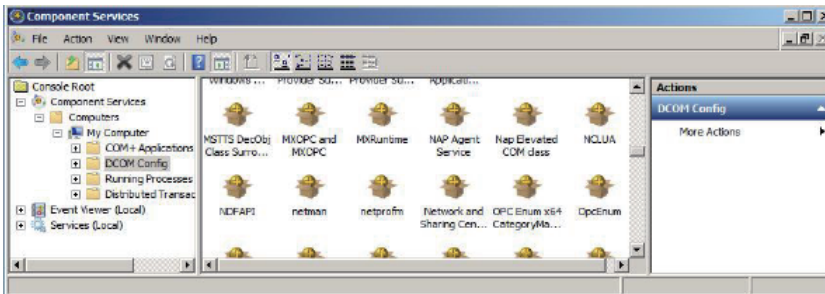
Click 'OK' to return to the 'COM security' window. The 'Edit defaults' settings for 'Access permissions' and 'Launch permissions' on this page are used to set the default permissions for COM applications. If you are not too concerned with security (for example, if your computer(s) are running on an isolated network with no internet connection), one alternative at this point is to give the new user (e.g. ASPNET) default access and launch/ activate permissions to all COM objects using these dialogs. However, it is preferable to set permissions for just the objects that the user needs, which we will do in the rest of this section.

When you have finished, click 'OK' to return to the 'Component Services' dialog. You may see a warning message like the one below, in which case answer 'Yes'.

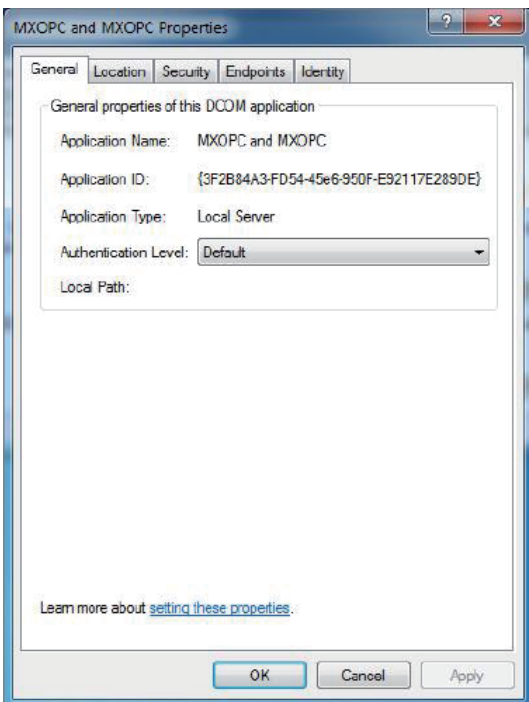


You will need to configure the security on the MX OPC server and MX Runtime services. To do this, double-click on the 'DCOM config' entry, and find 'MXOPC' and 'MXRuntime' in the list, as shown in the picture below. Depending on your operating system and installation, these items may not be visible in the window at the same time, and there may also be an 'OPC Enum x64 CategoryManager' item.

Note: As XML-DA does not support enumerating OPC servers, you do not need to set permissions for 'OPCenum'.

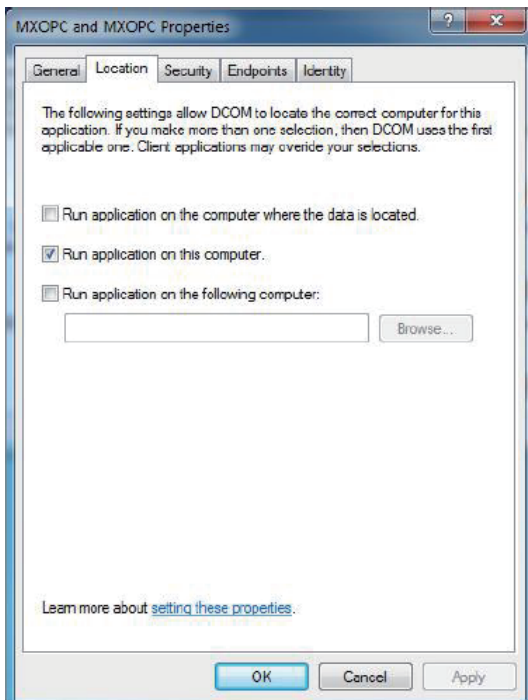


This step will need to be repeated for each item in turn – 'MXOPC' will be used for this example. Right click on the 'MXOPC' icon and select 'properties'. The window below should appear; confirm that the authentication level setting is 'Default'.

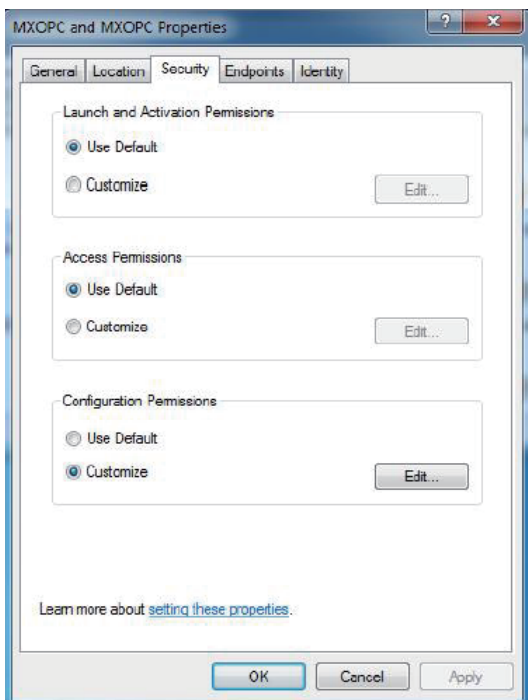


Switch to the 'Location' tab as shown below. Confirm that the 'Run application on this computer' check box is selected.

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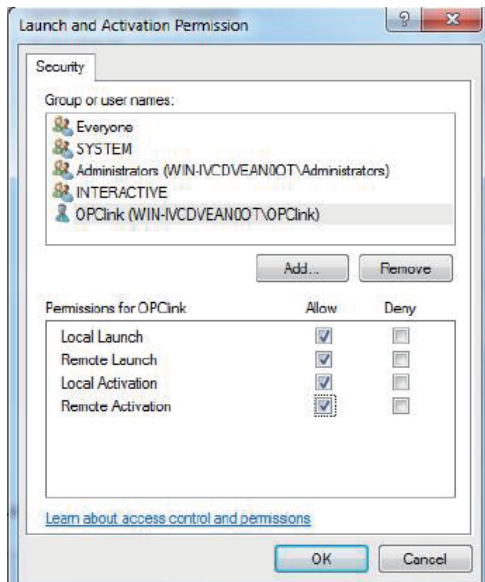


Now switch to the 'Security tab'.

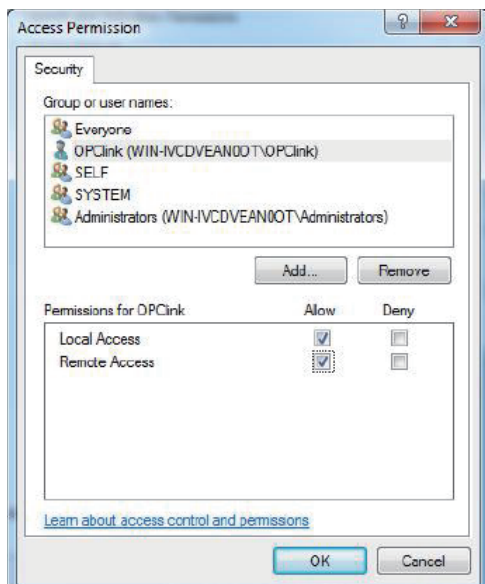


The 'Launch and activation permissions' and 'Access permissions' can both be left as 'Default' to use the default security settings configured earlier. Alternatively, they can be customized to allow more control over the users that can start and use each server. To do this, select 'customise' for each option and select 'Edit'.

A sample 'Launch and activation permissions' edit window is shown below, in which a named user 'OPClink' has been added. As with the 'edit defaults' settings, all four 'allow' check boxes must be set for users requiring access through DCOM.

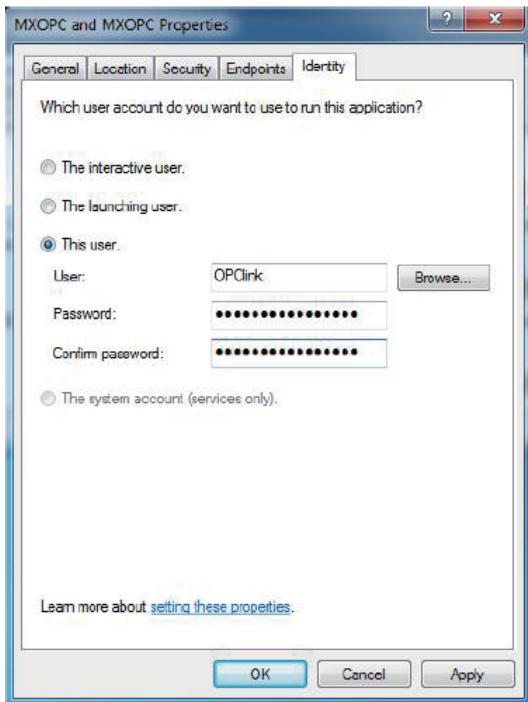


The 'Access permissions' configuration screen is shown below, with a named user 'OPClink' added.



After changing the settings on the security tab (if required), select the 'Identity' tab. In the sample screen below, the server has been configured to run as a named user.

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The options on this screen are:

- The interactive user – the user who is currently logged on to the machine. This can cause problems with DCOM, as there is no guarantee of which user (if any) will be logged on when the server is accessed from another computer.
- The launching user – the user who accessed the server, causing it to be started.
- A named user – the server runs as a specified user, whose name and password are provided. This option allows the server to be configured independently of the user that started the server and the user that is logged on, and works well for unattended computers.
- The system account, when the server is configured to run as a service.

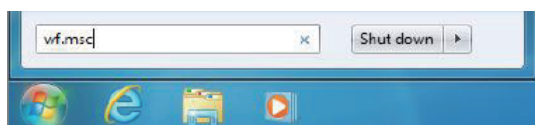
Press 'OK' to return to the 'Component settings' page, which can then be closed.

## Configuring the Windows firewall

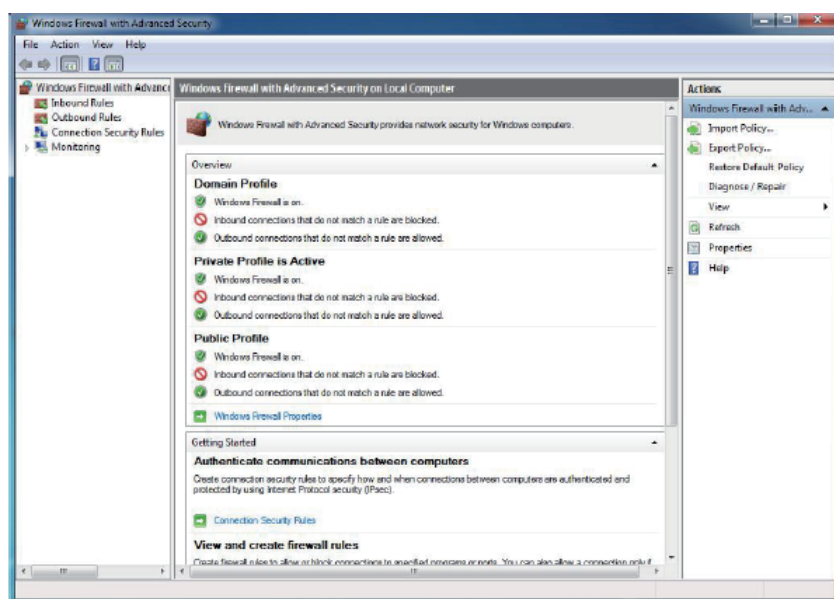
If you are using the Windows firewall provided with Windows 7 or later, you may need to configure it to allow TCP/IP network traffic to reach the XML-DA server in Internet Information Server (IIS). If you are using a third party software firewall, please refer to the manual to find out how to make the equivalent configuration changes. If XML-DA does not work when your third-party firewall is enabled, but works when it is switched off, the problem is likely to be with the firewall configuration. To configure the firewall for XML-DA, following the instructions for Windows 7 or later operating systems.

### ■Configuring the Windows firewall (Windows 7 or later)

To edit the windows firewall settings, click on the Windows icon (or start button), and enter 'wf.msc' in the search box before pressing enter.

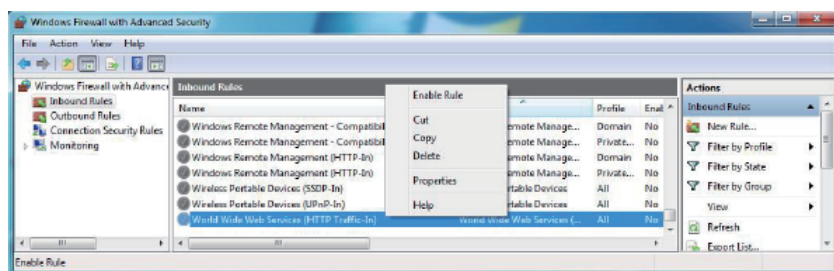


This will show the firewall advanced settings page, as in the sample below.



Advanced firewall settings

Click on 'Inbound Rules', and find 'World Wide Web Services (HTTP Traffic-In)' in the list. Right click on it and select 'Enable Rule'. If 'Disable Rule' is shown in the context menu instead, the rule is already enabled and does not need to be changed.



Enable HTTP traffic



## Testing XML-DA

After all the software has been installed and configured, you can test the server by going to any browser and entering the URL of the XML-DA web service. This will be in the form:

`http://<computername>/<virtualdirectory>/<servicename>.asmx`

where

- <computername> is the PC name or address. 'localhost' can be used as a shorthand for the local PC
- <virtualdirectory> is the IIS directory linked to the web service – 'xmlda' in the examples
- <servicename> is the web service file – 'Mitsubishi.MXOPC.6.asmx' in the examples

So for the example configuration in these instructions, the URL would be:

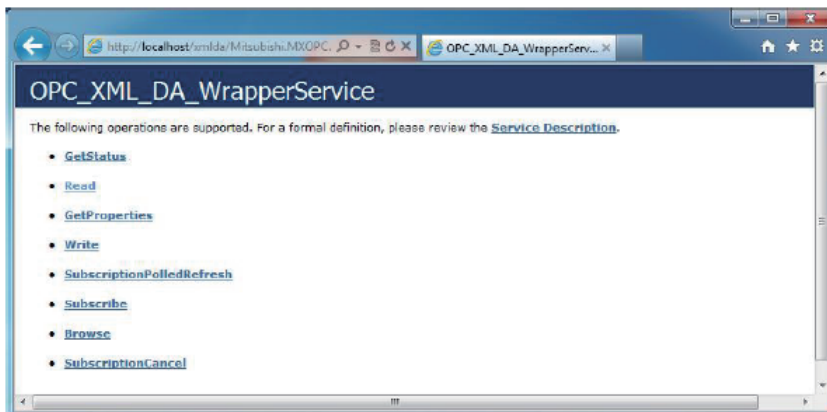
`http://localhost/xmlda/Mitsubishi.MXOPC.6.asmx`

Depending on your firewall settings, the service can be accessed from other PCs by substituting the server computer name or address in place of 'localhost'.

Note: If your IIS installation does not use the default web port (80), you will need to alter the URL to include the port number, separated from the computer name by a colon (:) character. For example, if IIS is configured for port 8080:

`http://localhost:8080/xmlda/Mitsubishi.MXOPC.6.asmx`

If the web server configuration is correct, you should see a page similar to this:



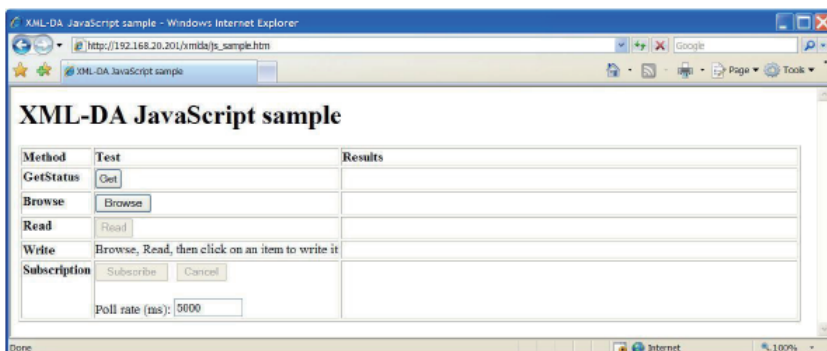
This demonstrates that the server is configured and listening, but does not necessarily prove that it can be used to read data, as the connection from IIS to the OPC server is not checked at this stage.

To prove that the OPC connection also works, you will need to connect to the server using an XML-DA client. The Javascript sample code can be used for this purpose. Find the file 'js\_sample.htm' from the 'Javascript' directory under 'XML-DA' on the CD, and copy this into the directory where you installed the XML-DA wrapper ('C:\MELSOFT\XMLDA' in the examples). If your wrapper service file was not called 'Mitsubishi.MXOPC.6.asmx' (as in the example), use notepad to find this text in the 'js\_sample.htm' file, and modify it to match the name that you used.

Now replace the 'Mitsubishi.MXOPC.6.asmx' part of the test URL in Internet Explorer with 'js\_sample.htm', e.g.:

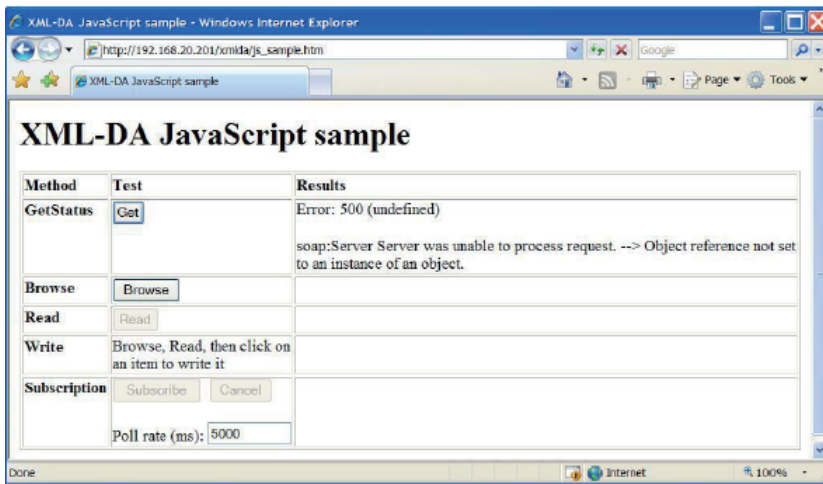
`http://localhost/xmlda/js_sample.htm`

The javascript example page should appear, similar to the picture below.

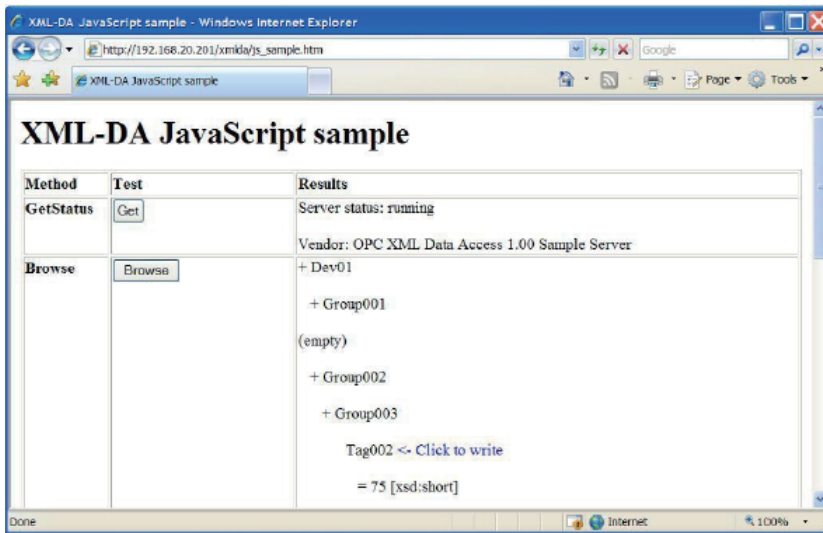


If you are able to use the 'Get' [status], 'Browse' and 'Read' buttons on the example page, the XML-DA web service is working correctly. If there are errors reported, the service may need further configuration. The example picture below shows an error caused by incorrect DCOM permissions.





After fixing the permissions, the example can be used as normal (see picture below where Tag002 is about to be written).



# Troubleshooting

If the XML-DA configuration is not working, this section can be used to identify common problems and how to fix them.

## Problems and solutions

This section will describe possible solutions to some of the problems that may occur when configuring XML-DA.

Problem	Solution
When connecting to the XML-DA server from a web browser, IIS reports error 500.	<ul style="list-style-type: none"><li>• Check that the virtual directory is set up correctly and points to the location where the web service wrapper was installed.</li></ul>
When attempting to open a .asmx page, the page is not shown and instead there is a prompt to open or save the .asmx file.	ASP.NET may not be correctly registered with Internet Information Server. Follow the instructions in "Adding ASP.NET support to a new installation of Internet Information Server" to fix this.
Although the test web page shows correctly from Internet Explorer, the XML-DA service still does not work from client applications.	<ul style="list-style-type: none"><li>• Make sure that the user account used for the web service has sufficient access rights to start and use the OPC server. Check the event log for error messages (see next section).</li><li>• Check that the web service .asmx file matches the 'progID' of the server (i.e. Mitsubishi.MXOPC.6 or Mitsubishi.MXOPC) if no config file is used. If there is a .config file to match the .asmx file, check that its settings refer to the correct computer name and 'progID'.</li></ul>
XML-DA connection works on the local PC, but not from another PC.	<ul style="list-style-type: none"><li>• Check that there is a working network connection between the PCs.</li><li>• Check the firewall settings to make sure that the port number you are using for the server (the default is 80 'HTTP') is not being blocked, either on the server PC or the client PC.</li></ul>
Reading items returns error 'E_UNKNOWNITEMPATH'.	Ensure that the 'ItemPath' parameter is set to "" (empty string) if not used. It can no longer be left to take the default value.
Reading items throws a SOAP exception described as 'bad character in XML'.	If you are reading strings, make sure that the strings do not contain any characters that are not supported in the XML stream used by SOAP to return the response.
Other general issues	Try restarting Internet Information Server. If restarting IIS does not solve the problem, try restarting your computer.

## Using event viewer for troubleshooting

When XML-DA is not working as expected, it is often possible to get additional diagnostic information from the Windows event logs. To start the event viewer, select 'Start->Run' and enter 'eventvwr' before clicking 'OK', or on later operating systems click the Windows icon (or start button) and enter 'eventvwr' in the search box. Check each of the available logs (Application, Security, etc.) for error or warning messages that occurred around the time that XML-DA or DCOM access was being attempted.

Some example errors are shown in the table below.

Source	Description	Notes
DCOM	The machine-default permission settings do not grant Local Activation permission for the COM Server application with CLSID (CLSID) to the user (USER). This security permission can be modified using the Component Services administrative tool.	Messages similar to this suggest that the web service may be running as a user without sufficient COM access rights to start or access the OPC server. Either use a different user account, or assign OPC rights to the account as described in "COM configuration".
DCOM	DCOM was unable to communicate with the computer (COMPUTER) using any of the configured protocols.	If you are using a remote DCOM connection, the target computer could not be accessed. There may be a problem with the DCOM or security configuration, or a problem with the network connection or routing between the two computers. It may just be that the computer name has been mistyped. Also remember that DCOM cannot cross network address translation (NAT) boundaries and can be stopped by certain network switches and routers.
W3SVC	The server was unable to logon the Windows NT account '(ACCOUNT)' due to the following error: Logon failure: user account restriction. Possible reasons are blank passwords not allowed, logon hour restrictions, or a policy restriction has been enforced. The data is the error code.	IIS could not use the specified account due to policy restrictions (e.g. 'Accounts: Limit local account use of blank passwords to console logon only'). Find the affected policy and either comply with it (in the above example, set a non-blank password) or if it is permitted by your security standards and reasonable to do so, relax the policy using the Group policy editor (gpedit.msc).

# Appendix 4 USB Driver Installation Procedure

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To communicate with a CPU module via USB, installing a USB driver is required.

If multiple MELSOFT products are already installed, refer to the installation location of the first product.

## Windows® 7 or later

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### Operating procedure

1. Connect a personal computer and a CPU module with a USB cable, and power ON a programmable controller.
2. Select [Control Panel] ⇒ [System and Security] ⇒ [Administrative Tools] ⇒ [Computer Management] ⇒ [Device Manager] from Windows® Start\*1. Right-click "Unknown device" and click "Update Driver Software".
3. Select "Browse my computer for driver software" on the "Update Driver Software" screen, and specify 'Easysocket\USBDrivers' in the folder where MELSOFT MX OPC Server DA Configuration Tool is installed on the next screen.

\*1 On the Start screen or from the Start menu.

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