Panasonic

Motion Controller

# GM1 Controller EtherCAT

# User's Manual

## Setup Edition

WUME-GM1ETCSU-04

2023.11

(MEMO)

## Introduction

Thank you for purchasing a Panasonic product. Before you use the product, please carefully read through the installation instructions and the manuals, and understand them in detail to use the product properly.

## Types of Manual

- There are different types of manuals for the GM1 series, as listed below. Refer to the appropriate manual according to your need.
  These manuals can be downloaded from our website: https://industrial.panasonic.com/ac/e/motor/motion-controller/mc/gm1/index.jsp

### Manuals for GM1 series

| Manual name | Manual code | Description |
|---|---|---|
| GM1 Controller EtherCAT User's Manual (Setup Edition) | WUME-GM1ETCSU | Explains wiring between the GM1 and its peripheral devices, installation method, and operation check method. |
| GM1 Controller EtherCAT User's Manual (Operation Edition) | WUME-GM1ETCOP | Explains how to use GM Programmer and PANATERM Lite for GM, set up each function, create projects, and perform other operations. |
| GM1 Series Reference Manual (Hardware Edition) | WUME-GM1H | Explains the functions and performance of each GM1 unit. |
| GM1 Series Reference Manual (Instruction Edition) | WUME-GM1PGR | Explains the specifications of each instruction that can be used with the GM1 Series. |
| GM1 Series Reference Manual (Analog I/O Unit) | WUME-GM1AIO | Explains the functions and performance of each GM1 Analog Expansion Unit. |
| GM1 Series Reference Manual (Pulse Output Unit) | WUME-GM1PG | Explains the functions and performance of each GM1 Pulse Output unit. |

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# Table of Contents

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# 1 Before Using This Product

## 1.1 Safety Precautions

This section explains important rules that must be observed to prevent personal injury and property damage.

- Injuries and damages that may occur as a result of incorrect use are classified into the following levels and safety precautions are explained according to the level.

| | |
|---|---|
| ⚠ **WARNING** | Indicates that there is a risk of death or serious injury |
| ⚠ **CAUTION** | Indicates that there is a risk of minor injury or property damage |

| | |
|---|---|
|  | Indicates an action that is prohibited |
|  | Indicates an action that must be taken |

| ⚠ **WARNING** | |
|---|---|
|  | • Take safety measures outside this product to ensure the safety of the entire system even if this product fails or an error occurs due to external factors. |
|  | • Do not use this product in atmospheres that contain flammable gases.<br>Doing so may result in explosion. |
|  | • Do not throw this product into the fire.<br>Doing so may cause the batteries or other electronic parts to explode. |

| ⚠ **CAUTION** | |
|---|---|
|  | • To prevent abnormal heat generation or smoke generation, use this product with some leeway from the guaranteed characteristics and performance values of the product. |
|  | • Do not disassemble or modify this product.<br>Doing so may result in abnormal heat generation or smoke generation. |
|  | • Do not touch any terminals while the power is on.<br>Doing so may result in electrical shock. |
|  | • Configure emergency stop and interlock circuits outside this product. |
|  | • Connect wires and connectors properly.<br>Failure to do so may result in abnormal heat generation or smoke generation. |
|  | • Do not perform work (such as connection or removal) with the power turned on.<br>Doing so may result in electrical shock. |
|  | • If this product is used in any way that is not specified by Panasonic, its protection function may be impaired. |
|  | • This product has been developed and manufactured for industrial use only. |

## 1.2 Description of Icons Used in this Document

■ **In this manual, the following symbols are used to indicate safety information that must be observed.**

| | |
|---|---|
| Stop | Indicates an action that is prohibited or a matter that requires caution. |
| ! | Indicates an action that must be taken. |
| Info. | Indicates supplemental information. |
| Note | Indicates details about the subject in question or information useful to remember. |
| 1 2 Procedure | Indicates operation procedures. |

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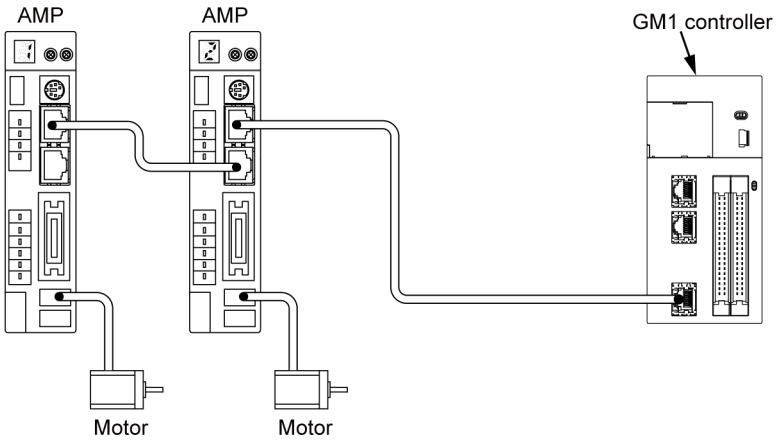
# 2 Basic System Configuration

## 2.1 Outline of the GM1 System

### ■ Network control

A MINAS series servomotor network system can be easily configured by adopting EtherCAT communication.




### ■ System configuration including virtual axes

A motion system that combines real and virtual axes can be configured.

### ■ Two LAN ports

There are two Ethernet connection ports.

Each port can have a unique IP address. They can be used for different purposes, such as for an in-device network or for a host system network.

### ■ Equipped with the high-speed counter input and PWM output

The GM1 Controller is equipped with a 2-ch high-speed counter input for 16 MHz (multiplied by 4) and a 4-ch PWM output that can output a maximum of 100 kHz. These functions can be used without adding expansion units.

## 2.2 Unit Types

### ■ Controller

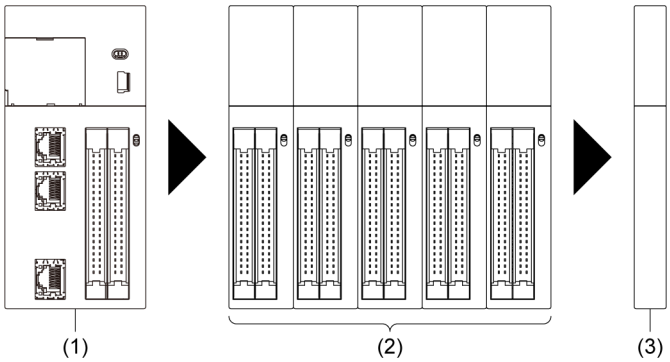
| Type | Function | Product number |
|---|---|---|
| GM1 EtherCAT compatible controller (sink type) | EtherCAT motion controller<br>Transistor NPN type | AGM1CSEC16T |
| GM1 EtherCAT compatible controller (source type) | EtherCAT motion controller<br>Transistor PNP type | AGM1CSEC16P |

### ■ Expansion unit

| Type | Function | Product number |
|---|---|---|
| 64 digital input points | 24 V DC, 64 input points | AGM1X64D2 |
| 64 digital output points (sink type) | 64 output points<br>Transistor NPN type | AGM1Y64T |
| 64 digital output points (source type) | 64 output points<br>Transistor PNP type | AGM1Y64P |
| 64 digital I/O points (sink type) | 24 V DC, 32 input points<br>32 output points<br>Transistor NPN type | AGM1XY64D2T |
| 64 digital I/O points (source type) | 24 V DC, 32 input points<br>32 output points<br>Transistor PNP type | AGM1XY64D2P |
| 8 analog input points | 8 input points | AGM1AD8 |
| 4 analog output points | 4 output points | AGM1DA4 |
| Pulse output (transistor output type) | 4 axes, pulse train, 500 kpps<br>Open collector output | AGM1PG04T |
| Pulse output (line driver output type) | 4 axes, pulse train, 4 Mpps<br>Line driver output | AGM1PG04L |

## 2.3 Restrictions on the Number of Expansion Units

Up to 15 expansion units can be mounted on the right side of the GM1 Controller.




| | | | | | |
|---|---|---|---|---|---|
| (1) | Controller | (2) | Expansion unit | (3) | End unit |

- Be sure to connect an end unit to the end of the system.

# 3 Restrictions on the GM1 Controller and Servo Amplifiers

## 3.1 Restrictions on the Combination of the GM1 Controller and Servo Amplifiers

As for the combination of the GM1 Controller and each MINAS series, confirm the following restrictions.

### Combination of the GM1 Controller and servo amplifiers

| Connectable servo amplifier | | Description |
|---|---|---|
| A5B | A6B | |
| ● | ● | A5B and A6B can be connected to the same network. |

**Note**

- When using servo amplifiers in combination with the GM1 Controller, use the ones with the latest software version.

### ■ Setting ranges of movement amount and speed

The input range of the movement amount or speed specified in the GM1 Controller may differ from the upper and lower setting limits of the servo amplifier.

**Info.**

- The respective control cycles supported by the GM1 Controller and servo amplifiers A5B and A6B are shown below.
  - GM1 Controller: 500 µs to 4 ms (control cycle)
  - Servo amplifier A5B: 500 µs to 4 ms (control cycle)
  - Servo amplifier A6B: 500 µs to 4 ms (control cycle)

## 3.2 Restrictions on Servo Amplifier Parameters

Some parameters of servo amplifiers affect the operation of the GM1 Controller. Use the following parameter.

| No. | Name | Settings | Factory default setting |
|---|---|---|---|
| Pr5.04 | Over-travel inhibit input setup | Use set value 1.<br>(Recommended) | 1 (Note 1) |

(Note 1) We recommend that the set value not be changed due to the characteristics of the GM1 and MINAS.

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# 4 Basic Operations of the GM1 Controller

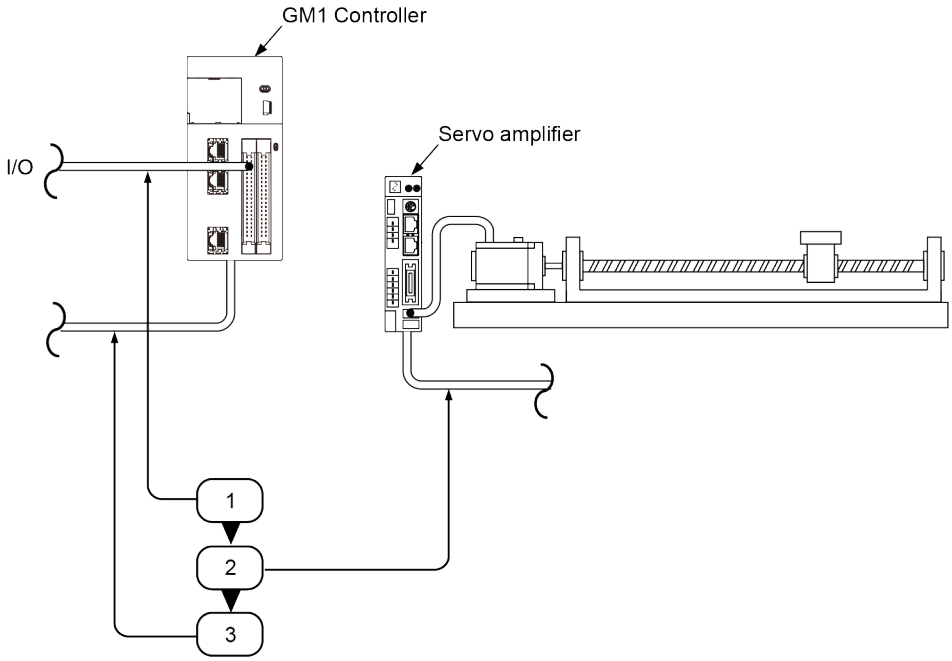
## 4.1 Power ON

When turning ON the power to the system incorporating the GM1 Controller, follow the power ON sequence described in the procedure below.

- Consider the performance and statuses of any external devices connected to the system, and take sufficient care so that turning ON the power will not initiate unexpected movements.

### Procedure

1. Turn ON the power to the I/O devices connected to the GM1 Controller.
2. Turn ON the power to the servo amplifier.
3. Turn ON the power to the GM1 Controller.



## 4.2 Operation Mode Switching

### ■ Switching to the RUN mode

There are the following two methods.

- Press the operation button (►) on the GM Programmer while the STOP LED is lit.
- Set the RUN/STOP switch on the GM1 Controller to RUN.

**Info.**

- The switch cannot be set to the RUN mode if an error that does not allow to continue operation has occurred or if an exceptional situation has occurred.

### ■ Switching to the STOP mode

There are the following two methods.

- Press the stop button (■) on the GM Programmer while the RUN LED is lit.
- Set the RUN/STOP switch on the GM1 Controller to STOP.

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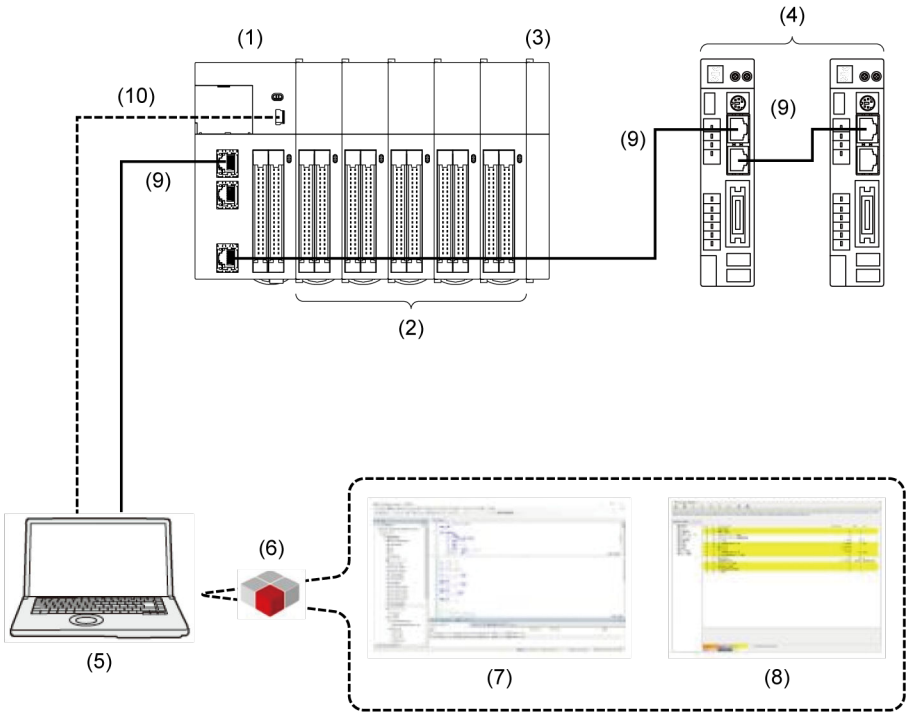
# 5 Installation and System Setup

## 5.1 System Configuration Diagram

The figure below shows the configuration of the GM1 series motion controller (controller and expansion units), servo amplifiers, and PC. GM Programmer and PANATERM Lite for GM communicate with the GM1 Controller via Gateway.




| No. | Name |
|---|---|
| (1) | GM1 Controller |
| (2) | Expansion unit |
| (3) | End unit |
| (4) | Servo amplifier |
| (5) | PC (on which GM Programmer and PANATERM Lite for GM are installed) |
| (6) | Gateway, CodeMeter |
| (7) | GM Programmer |
| (8) | PANATERM Lite for GM |
| (9) | Ethernet cable(Note 1) |
| (10) | USB cable(Note 1) |

(Note 1) Use either Ethernet cables or USB cables.

**Info.**

- To operate the system, you must install GM Programmer and PANATERM Lite for GM on the PC.
- When GM Programmer is installed, MINAS setup support software "PANATERM Lite for GM", Gateway (the application that connects GM Programmer and the GM1 Controller), and CodeMeter are installed at the same time.

## 5.2 Work Flowchart

The following table explains the workflow from installation of the GM1 Controller through to its operation.

| Step | Description | | Reference |
|---|---|---|---|
| 1 | Install GM Programmer and PANATERM Lite for GM. | | "P.6-3" |
| 2 | Make preparations for the servo amplifiers. | | "P.8-1" |
| | 2-1 | Connect the servo amplifiers and the PC. | "P.8-2" |
| | 2-2 | Install the USB driver on the PC. | "P.8-2" |
| | 2-3 | Configure initial settings for the servo amplifiers. | "P.8-2" |
| | 2-4 | Disconnect the servo amplifiers from the PC. | "P.8-4" |
| 3 | Connect the GM1 Controller and each servo amplifier with cables. | | "P.9-1" |
| 4 | Connect the GM1 Controller and GM Programmer. | | "P.10-1" |
| | 4-1 | Connect the GM1 Controller and the PC with a cable. | "P.10-2" |
| | 4-2 | Create a new project. | "P.10-3" |
| | 4-3 | Configure communication settings. | "P.10-6" |
| | 4-4 | Add and set up device objects for servo amplifiers. | "P.10-10" |
| | 4-5 | Configure basic settings for EtherCAT axes. | "P.10-15" |
| | 4-6 | Connect the GM1 Controller to the PC and each servo amplifier and perform an operation check. | "P.10-22" |
| | 4-7 | Log in to the GM1 Controller. | "P.10-25" |
| | 4-8 | Log out from the GM1 Controller. | "P.10-26" |
| 5 | Connect the GM1 Controller and PANATERM Lite for GM. | | "P.11-1" |
| | 5-1 | Set up the servo amplifier connected to the GM1 Controller. | "P.11-2" |
| | 5-2 | Write parameters to the servo amplifier. | "P.11-8" |
| | 5-3 | Write objects to the servo amplifier. | "P.11-9" |
| 6 | Prepare for operation. | | "P.12-1" |
| | 6-1 | Check if a safety circuit is designed properly. | "P.12-3" |
| | 6-2 | Check wiring for each device. | "P.12-2" |
| | 6-3 | Perform an operation check. | "P.12-7" |
| 7 | Using GM Programmer, configure settings for GM1 parameters, motion control, unit control, and communication function. | | GM1 Controller EtherCAT User's Manual (Operation Edition) |
| | 7-1 | Configure settings for the GM1 Controller. | |
| | 7-2 | Configure settings for motion control. | |
| | 7-3 | Configure settings for unit control. | |
| | 7-4 | Configure settings for the communication function. | |
| 8 | Create programs with GM Programmer. | | |
| | 8-1 | Create objects (POU objects) for a program. | |
| | 8-2 | Select a programming language (LD, ST, SFC, FBD, IL, or CFC) and enter a program. | |

| Step | Description | | Reference |
|---|---|---|---|
| | 8-3 | Set variables. | |
| 9 | Set up the GM1 Controller in GM Programmer. | | |
| | 9-1 | Configure time settings. | |
| | 9-2 | Log in to the GM1 Controller. | |
| | 9-3 | Log out from the GM1 Controller. | |
| | 9-4 | Upload the source. | |
| 10 | Configure security settings with GM Programmer. | | |
| | 10-1 | Configure user management settings. | |
| | 10-2 | Configure encryption and signature settings. | |
| | 10-3 | Configure write-protection settings. | |

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# 6 Overview of the GM Programmer

# 6.1 System Requirements

## 6.1.1 Usage Environment of the GM Programmer

### Programming software

| Product name | Applicable language |
|---|---|
| GM Programmer | Japanese / English / Chinese |

(Note 1) When GM Programmer is installed, MINAS setup support software"PANATERM Lite for GM"is installed at the same time.

### Software operating environment

| Item | Description |
|---|---|
| OS | Microsoft(R) Windows(R) 10：32bit/64bit<br>Microsoft(R) Windows(R) 11：64bit |
| PC | PC with the following installed:<br>● Microsoft.NET Framework 4.6.1 or higher<br>● Microsoft Visual C++ 2010 SP1 Redistributable Package (x86)<br>● Microsoft Visual C++ 2010 SP1 Redistributable Package (x64)<br>● Microsoft Visual C++ 2013 Redistributable Package (x86)<br>● Microsoft Visual C++ 2013 Redistributable Package (x64)<br>● Microsoft Visual C++ 2015 Update 3 Redistributable Package (x86)<br>● Microsoft Visual C++ 2015 Update 3 Redistributable Package (x64) |
| HDD | At least 4 GB of free space |
| Memory | At least 8 GB |
| Communication port | LAN port (for Ethernet connection)<br>USB 2.0 port (for USB connection) |

## 6.2 Installation and Uninstallation

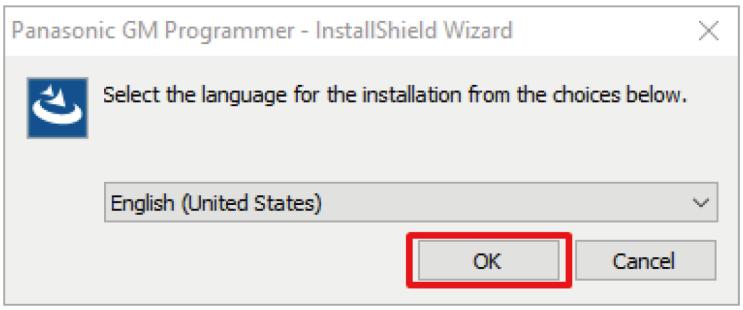
### 6.2.1 Installing GM Programmer

Before installing the GM Programmer on a PC, log on to the PC as an account with Administrator privileges.

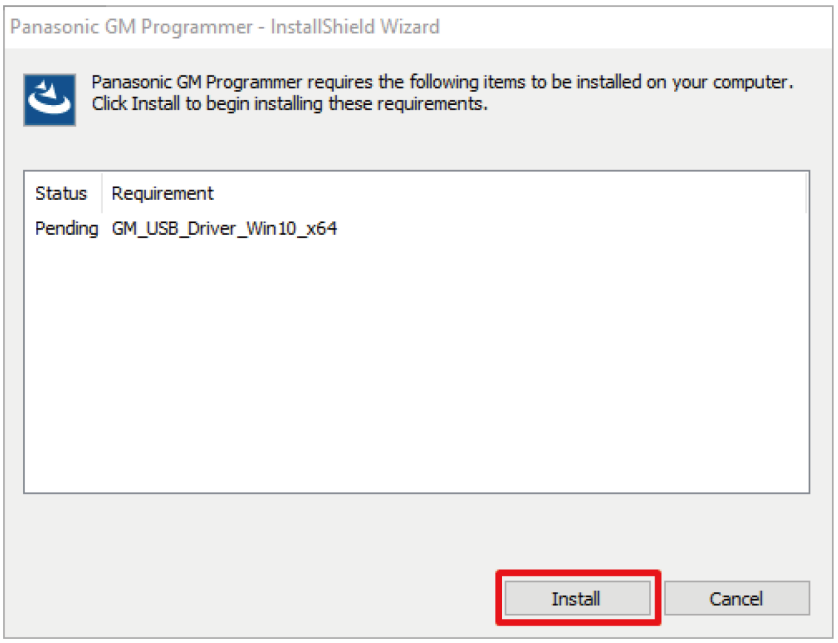
If other applications are running, be sure to close all the applications before installing GM Programmer.

**Procedure**

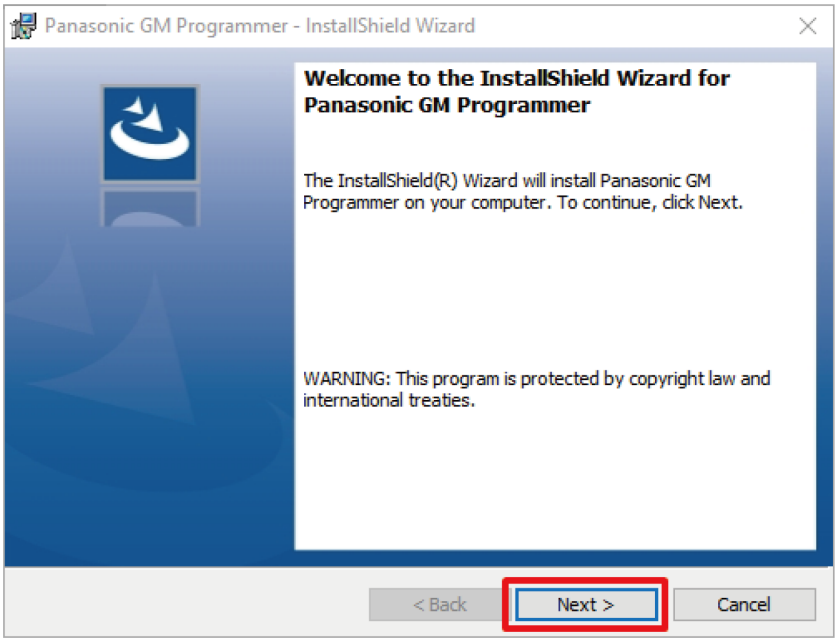
1. Double-click "setup.exe".
   The following window will be displayed. Click [OK].



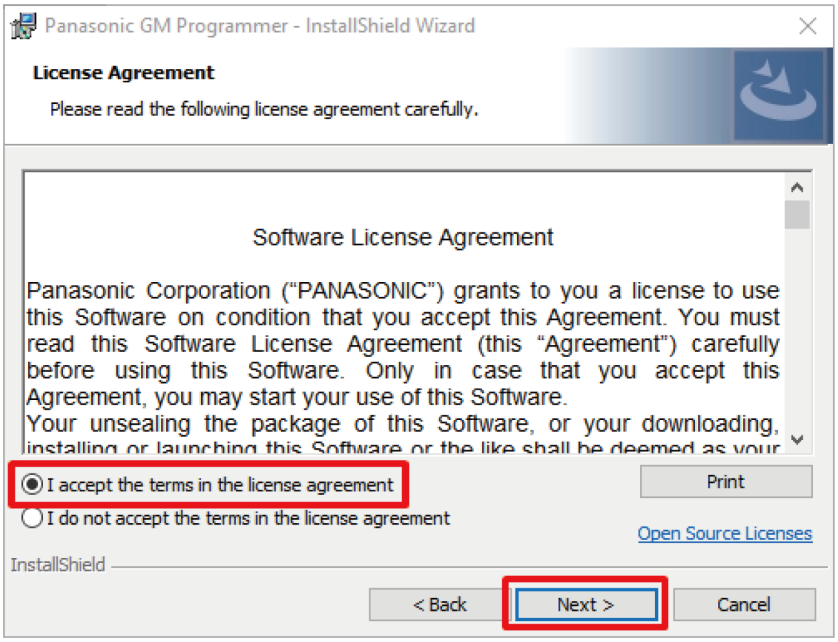

2. The following window will be displayed. Click [Install].
   The display content differs according to the PC environment that you use. (This window may not be displayed at all, depending on the situation.)



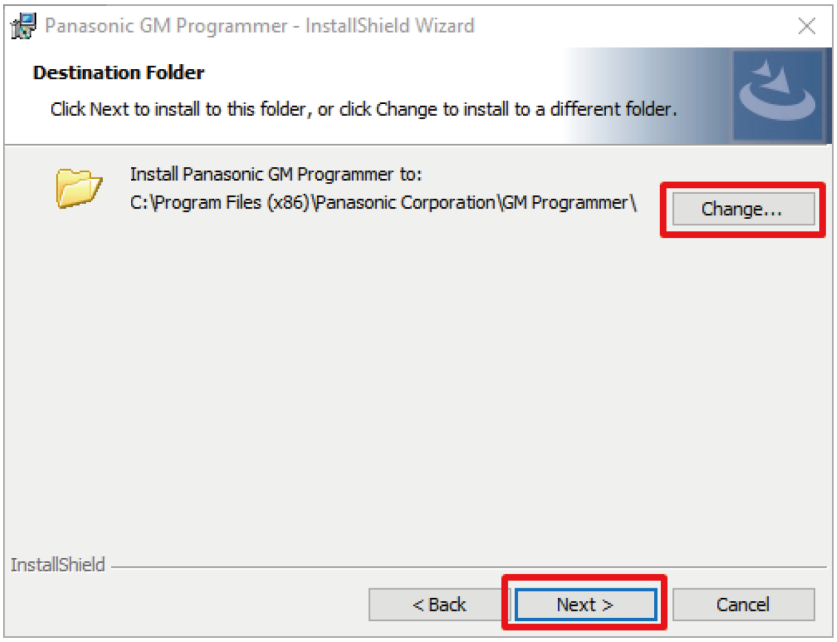
**3.** The following window will be displayed. Click [Next].



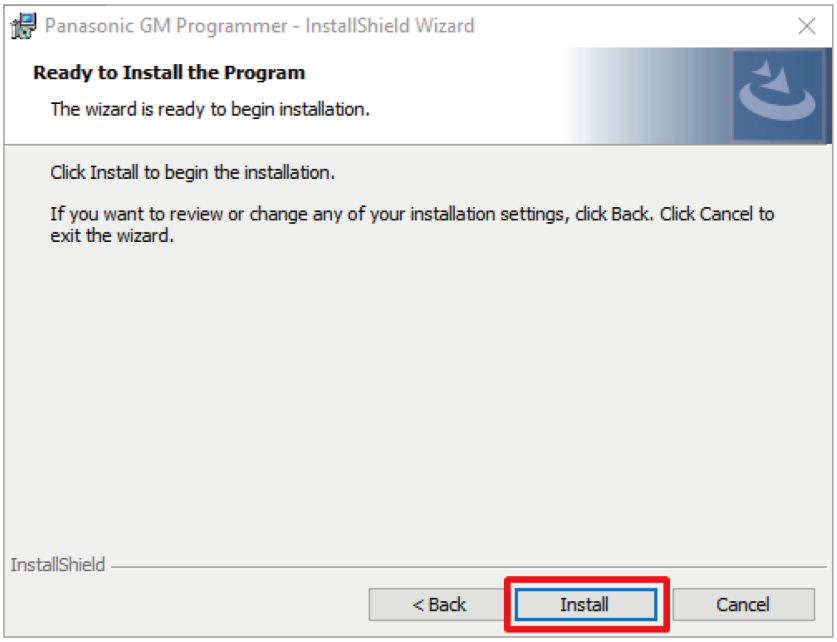

**4.** The following window will be displayed. Select [I accept the terms in the license agreement] and click [Next].



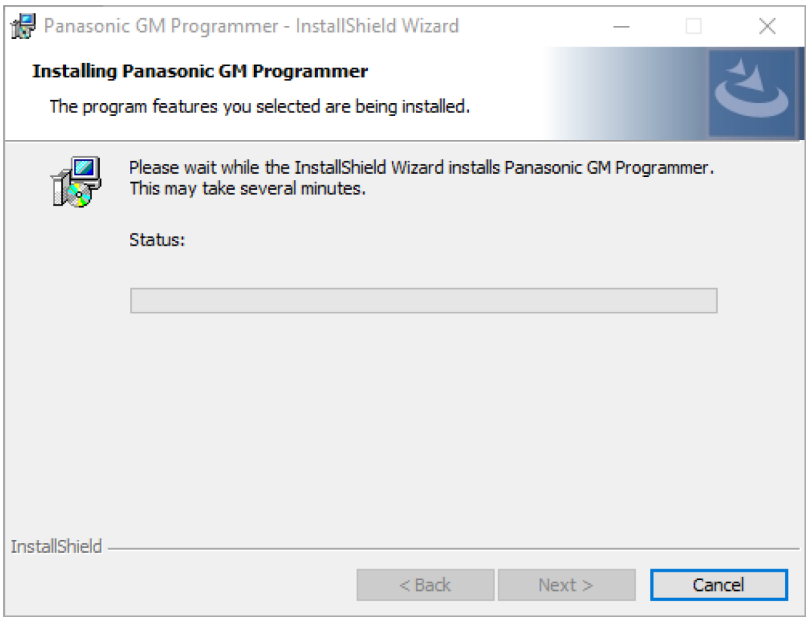

**5.** The following window will be displayed. If you change the installation destination folder, click [Change] and specify a desired installation destination. If you do not change the installation destination folder, click [Next].




***6.*** The window below will be displayed. Click [Install] to start the installation.




***7.*** The following window will be displayed while the installation is in progress.

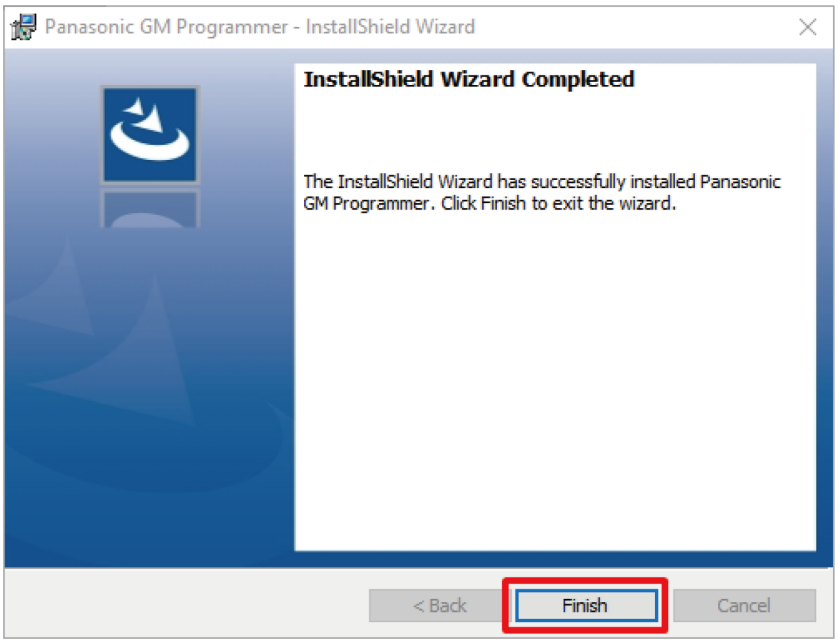



Following this installation, the three packages below will be installed. (The segments indicated by * differ according to the version of the software.)

- CODESYS SoftMotion*.*.*.*_P
- GMPLibrary (*.*.*.*)
- PANATERM-Lite for GM V*.*

These packages take a long time to install. Take care not to click [Cancel] while the installation is in progress.

***8.*** When the installation of all the packages is completed, the following window will be displayed. Click [Finish].



This completes the installation procedure.

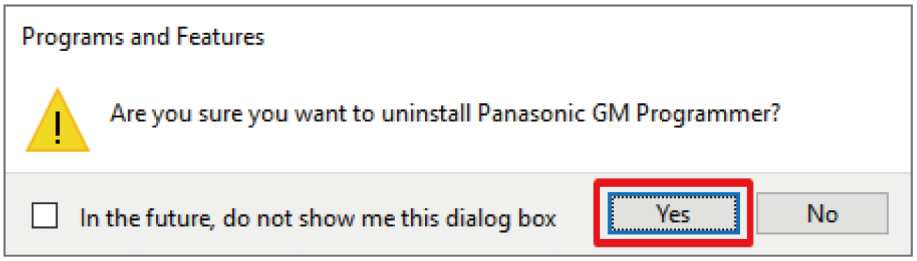
**Info.**

- When the GM Programmer is installed, PANATERM Lite for GM, Gateway (CODESYS Gateway), and CodeMeter applications are installed at the same time.

## 6.2.2 Uninstalling GM Programmer

**Procedure**

1. From the Start menu, select **Windows System**>**Control Panel**, and then click "Uninstall a program".
   A list of installed programs will be displayed.
2. Double-click "Panasonic GM Programmer".
   The following window will be displayed. [Yes]




3. Click the [Yes] button.
   The GM Programmer will be uninstalled.

**Info.**

- When the GM Programmer is uninstalled, PANATERM Lite for GM and Gateway are also uninstalled at the same time.
- CodeMeter will not be uninstalled at this time. Uninstall it separately.

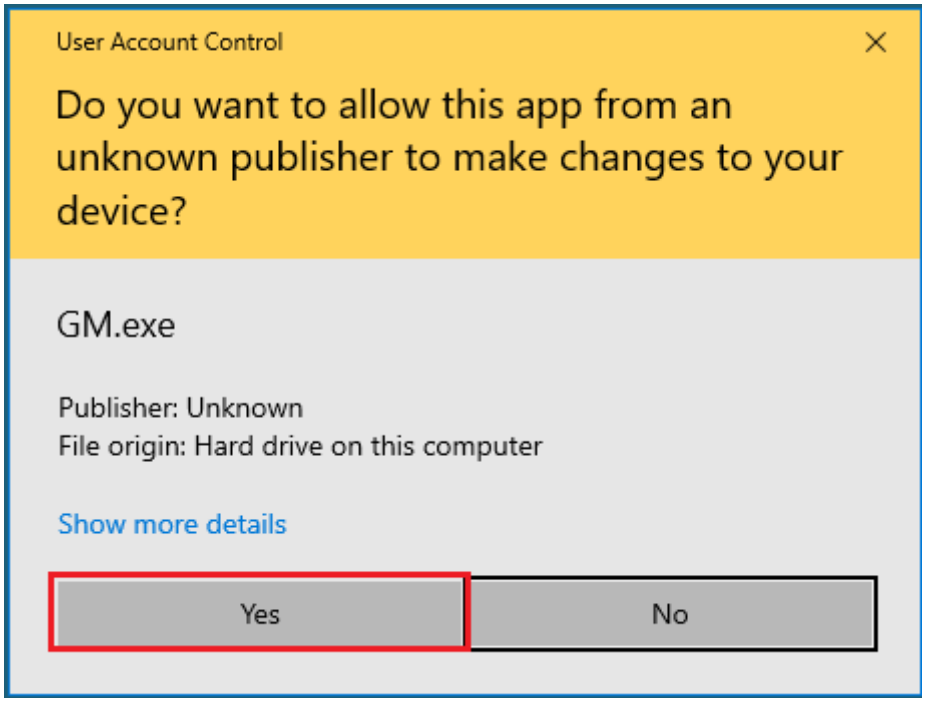
## 6.3 Basic Operations

This section explains how to start and quit GM Programmer.

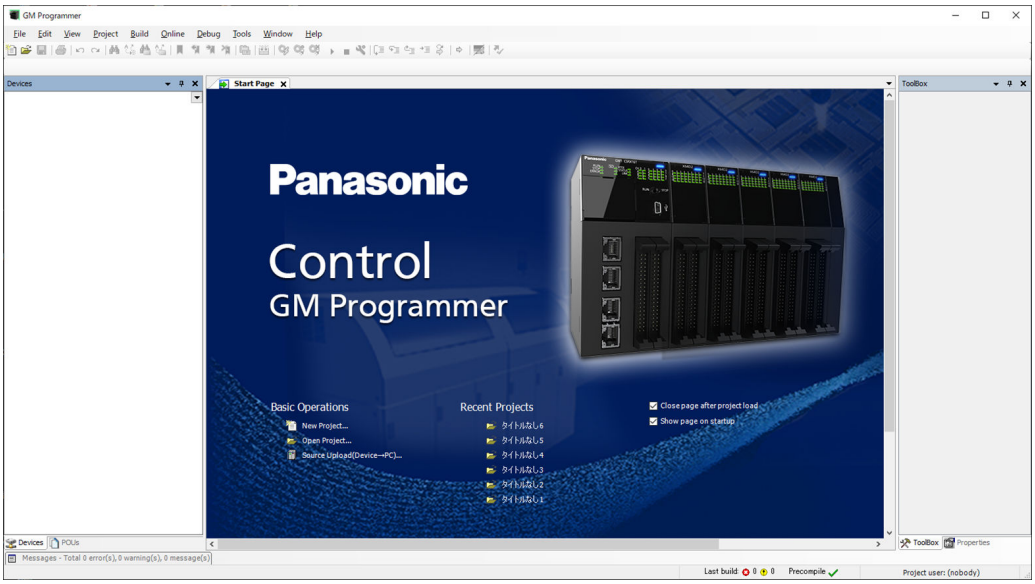
### 6.3.1 How to start

**Procedure**

1. Click the [Start] button and select **Panasonic Corpration>GM Programmer**.
   The "User Account Control" dialog box will be displayed. Click [Yes].




GM Programmer will be started.

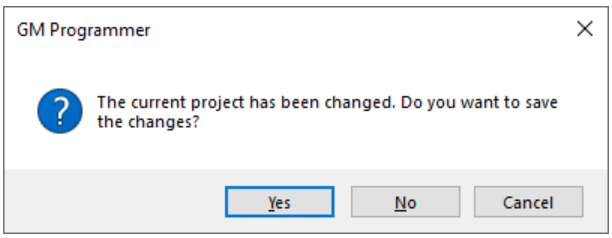



## 6.3.2 How to quit

> ● Before closing GM Programmer, be sure to save any project files that you are editing and must save.

### Procedure

1. From the menu bar, select **File**>**Exit**.
   If changes have not been saved, the following window will be displayed.
   If exiting without saving, select [No].
   If changes need to be saved, select [Yes] to perform the save process.



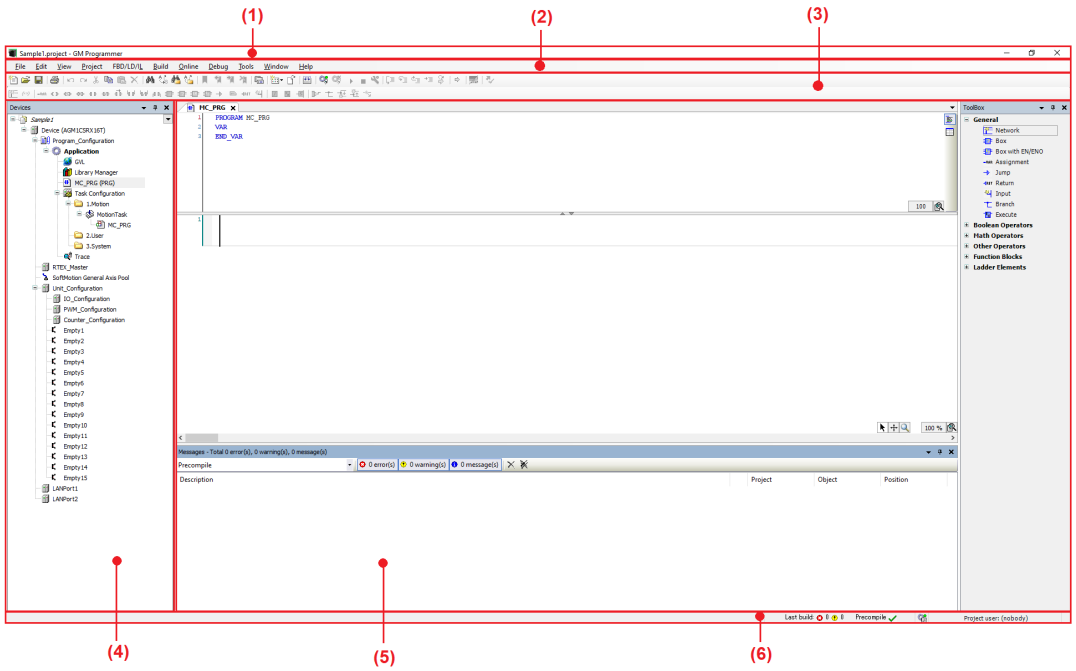

2. Click the [Yes] button.
   GM Programmer will be closed.

### Info.

● You can also close GM Programmer by clicking the [×] button on the title bar.

## 6.4 Component Names

This section presents the name and display content of each component of GM Programmer.




| No. | Name | Description |
|---|---|---|
| (1) | Title bar | The title bar displays the project file name, [minimize] button, [maximize] button, and [close] button. |
| (2) | Menu bar | The menu bar displays the menu commands for each purpose in list format. |
| (3) | Toolbar | The toolbar displays each command as an icon. |
| (4) | Navigator pane | The navigator pane displays the objects (such as devices, applications, and programs) added to the project in a tree structure. |
| (5) | Main pane | The main pane displays a program, function settings, messages, and other data.<br>The window can be switched by selecting a desired tab. |
| (6) | Status field | The status bar displays the build status, logged-in users, and other information. |

## 6.5 Other Functions

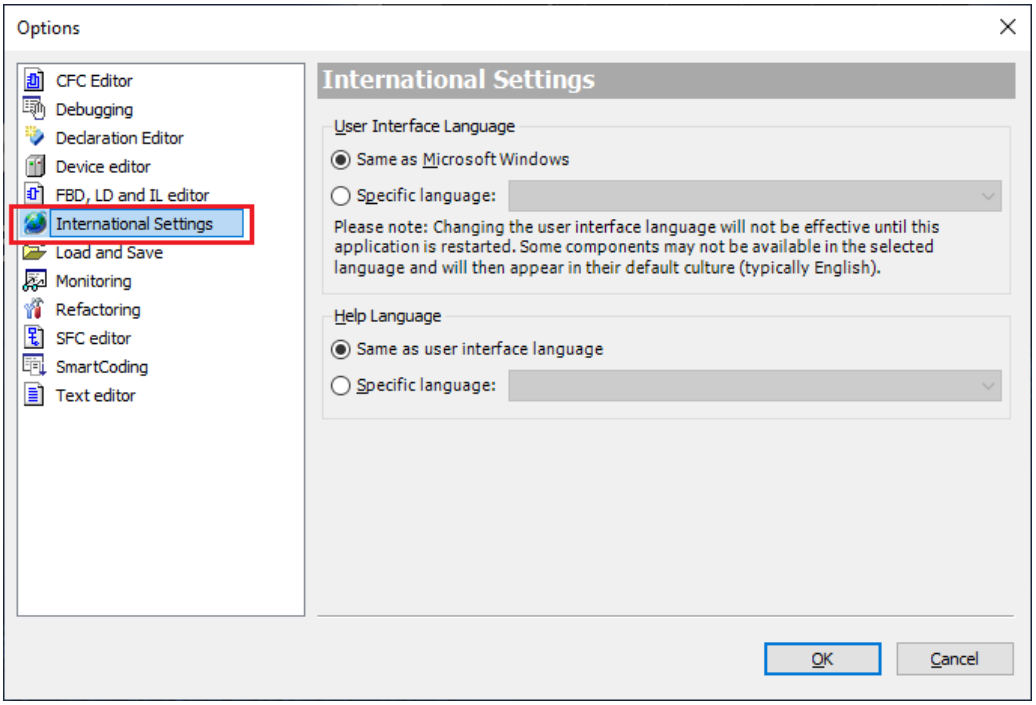
### 6.5.1 Display Language Setting Function

This function allows the user to change the display language setting for GM Programmer.

The default setting is the same language as the one used in the operating system. If you want to use a different language from the one used in the operating system, change the display language setting. After you change the language setting, you must restart GM Programmer.

#### Procedure

1. From the menu bar, select **Tools**>**Options**.
   The "Options" dialog box will be displayed.
2. Select "International Settings" from the Categories pane.
   The "International Settings" pane will be displayed.




3. Select **User Interface Language**>**Specific language** option and specify a desired language in the field.
4. Click [OK].
   The "Options" dialog box will be closed.
   At this stage, the language has not been changed yet.
5. Close GM Programmer and then start GM Programmer again.
   After GM Programmer is started, the selected language takes effect.

**Info.**

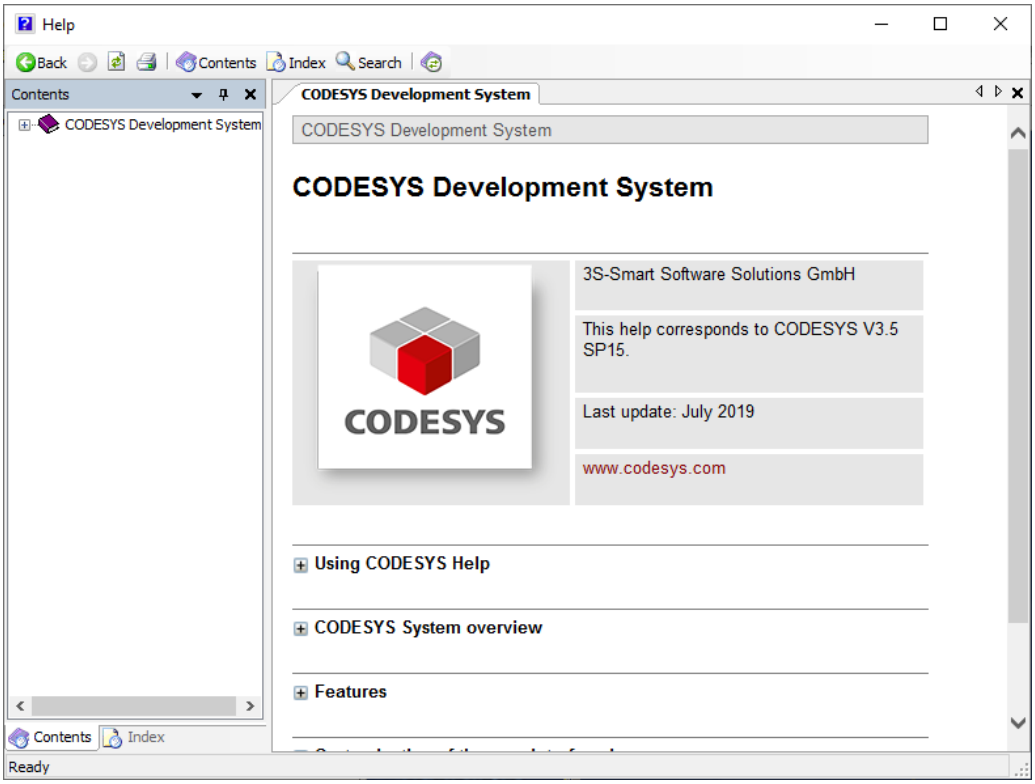
- The display language setting of GM Programmer is linked with that of PANATERM Lite for GM. Therefore, if the display language setting of PANATERM Lite for GM is changed, the display language setting of GM Programmer will also be changed automatically.

## 6.5.2 Online Help Function

This function allows the user to open the manual and check information such as operating methods.

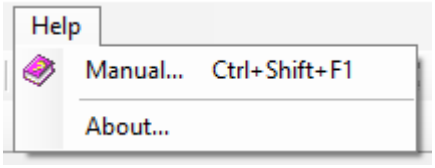
### Procedure

1. Press the [F1] key.
   Online help will be started and the page corresponding to the displayed window will be displayed.



**Info.**

- You can also start online help by selecting **Help**>**Manual** from the menu bar.




## 6.5.3 Version Display Function

This function allows the user to check the version, license, and other information for GM Programmer.

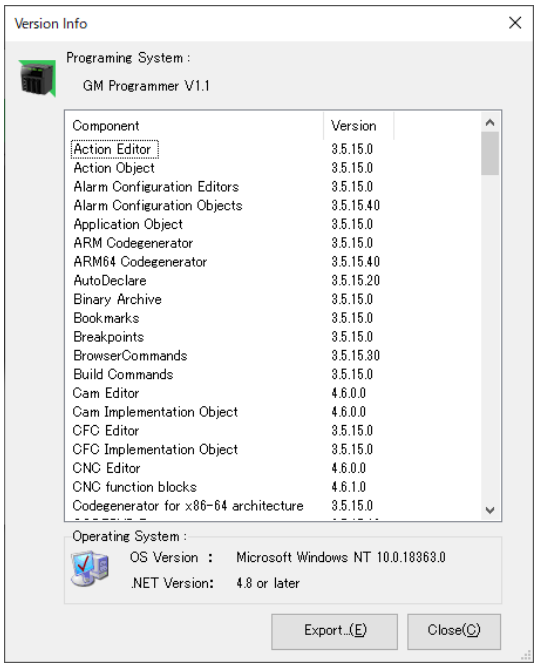
### Procedure

1. From the menu bar, select **Help**>**Version Info**.
   The GM Programmer version is displayed in parentheses on the title bar.

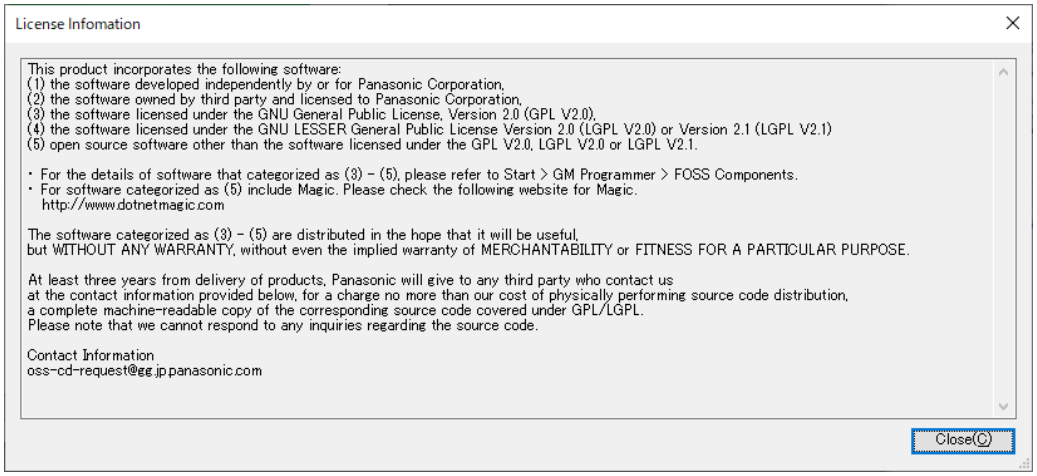

2. Click a desired button at the bottom of the window.

| Button | Description |
|---|---|
| Version Info | Displays information about the plug-ins that have been applied and the operating system of the PC that is used. |
| License Info | Displays license information for the software used by GM Programmer. |

Clicking the[Version Info]button displays the"Version Info"dialog box.




Clicking the[License Info]button displays the"License Information"dialog box.



# 7 Overview of PANATERM Lite for GM

# 7.1 System Requirements

## 7.1.1 Operating Environment of PANATERM Lite for GM

### Programming software

| Product name | Applicable language |
|---|---|
| PANATERM Lite for GM | Japanese / English / Chinese |

(Note 1) When GM Programmer is installed, MINAS setup support software"PANATERM Lite for GM"is installed at the same time.

### Software operating environment

| Item | Description |
|---|---|
| OS | Microsoft(R) Windows(R) 10: 32bit / 64bit |
| PC | PC with the following software installed:<br>● Microsoft.NET Framework 4.6.1 or later<br>● Microsoft Visual C++ 2010 SP1 Redistributable Package (x86)<br>● Microsoft Visual C++ 2010 SP1 Redistributable Package (x64)<br>● Microsoft Visual C++ 2013 Redistributable Package (x86)<br>● Microsoft Visual C++ 2013 Redistributable Package (x64)<br>● Microsoft Visual C++ 2015 Update 3 Redistributable Package (x86)<br>● Microsoft Visual C++ 2015 Update 3 Redistributable Package (x64) |
| HDD | At least 4 GB of free space |
| Memory | At least 8 GB |
| Communication port | LAN port (for Ethernet connection)<br>USB 2.0 port (for USB connection) |

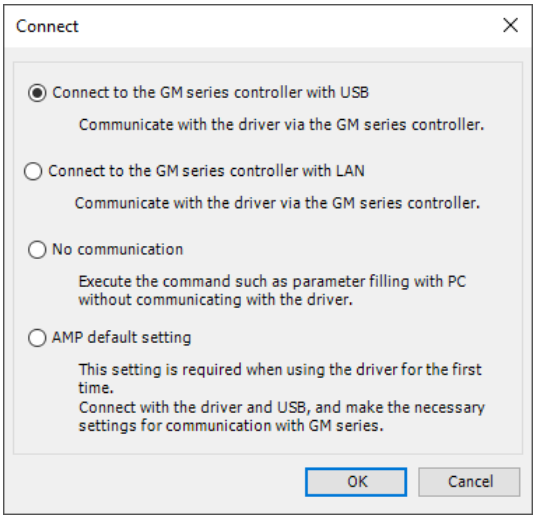
## 7.2 Basic Operations

This section explains how to start and exit PANATERM Lite for GM.

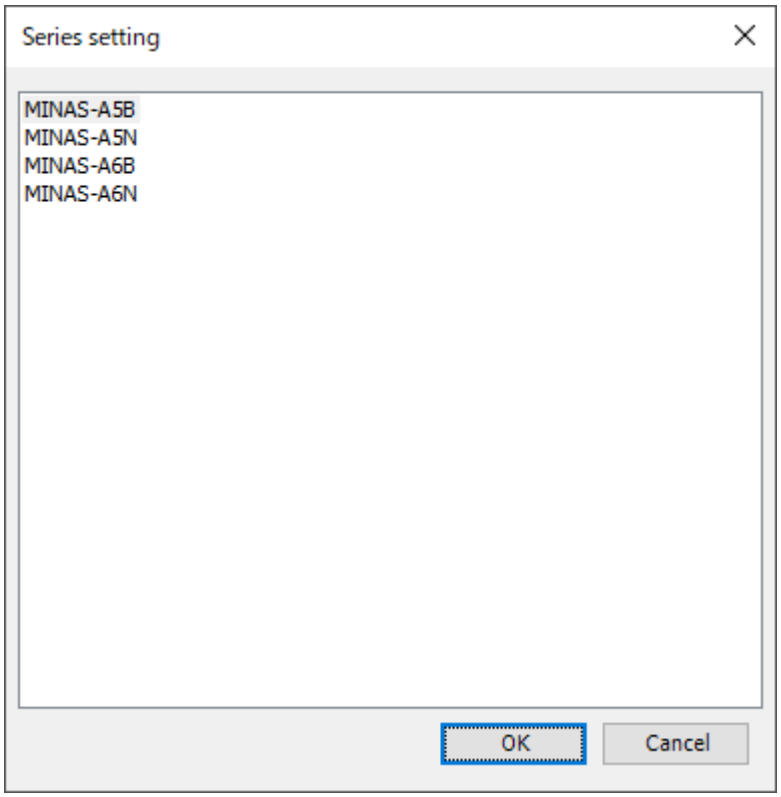
### 7.2.1 How to Start

#### Procedure

1. Click the [Start] button in the Windows task bar and select **Panasonic Corporation**>**PANATERM Lite for GM**.
2. The "Connect" dialog box will be displayed.
   Select a communication setting option and click [OK].

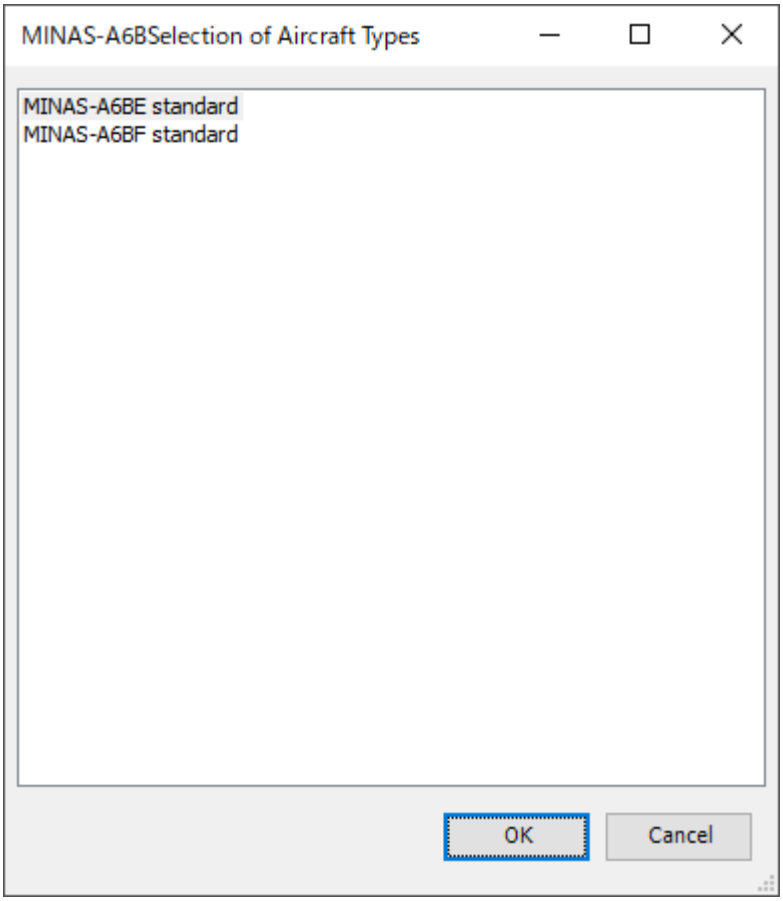



3. The "Series Setting" dialog box will be displayed.

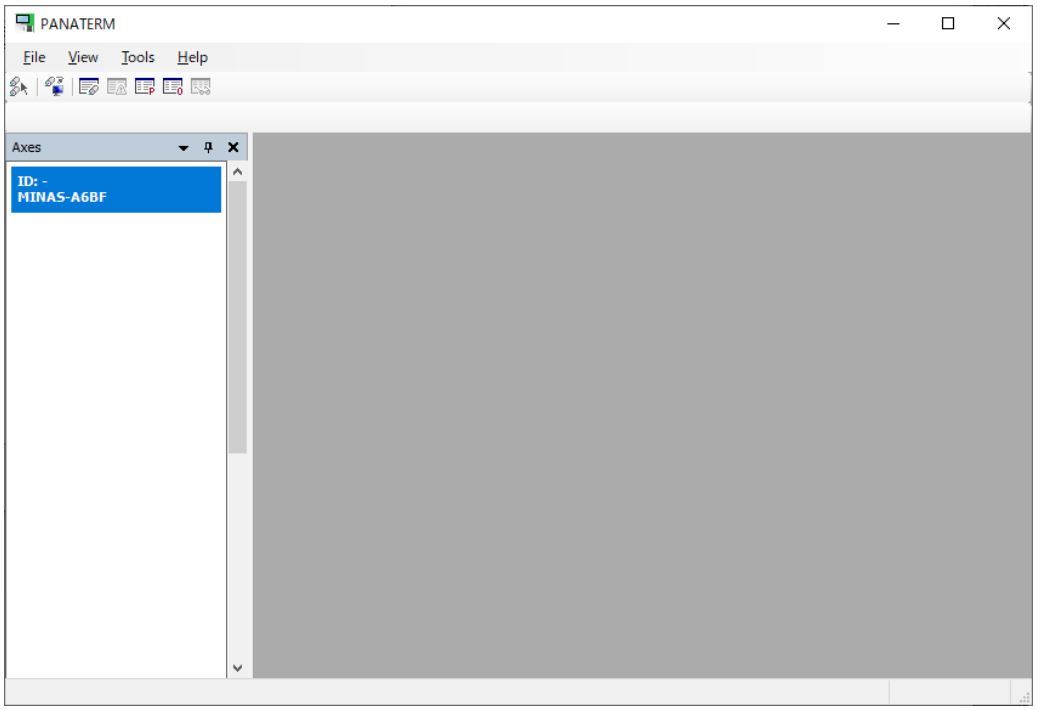

Series setting
MINAS-A5B
MINAS-A5N
MINAS-A6B
MINAS-A6N
OK
Cancel

**Note**

When the "Selection of Aircraft Types" dialog box is displayed, select a model and click the "OK" button.




*4.* PANATERM Lite for GM will be started.




## 7.2.2 How to Exit

- Note that all information will be lost if you close the program without saving settings, collected data, or other information.

### Procedure

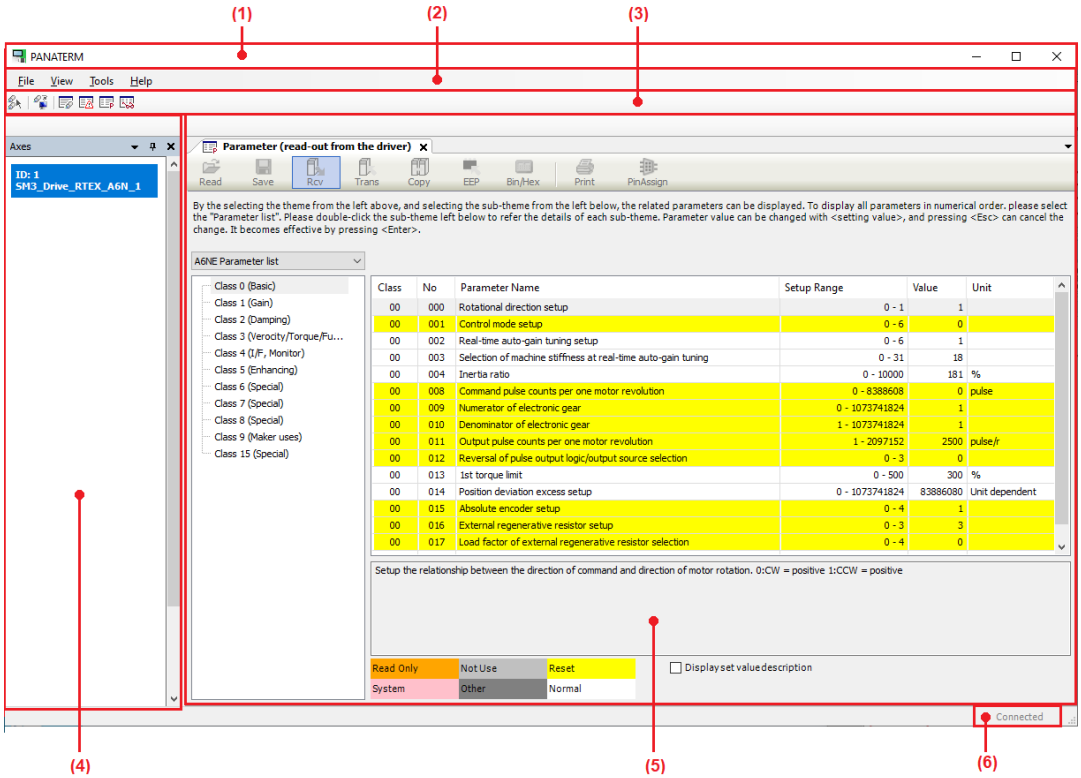
1. From the menu bar, select **File**>**Exit**.
   PANATERM Lite for GM will be closed.

### Info.

- You can also close PANATERM Lite for GM by clicking the [×] button on the title bar.

## 7.3 Component Names

This section explains the components and displays of PANATERM Lite for GM.

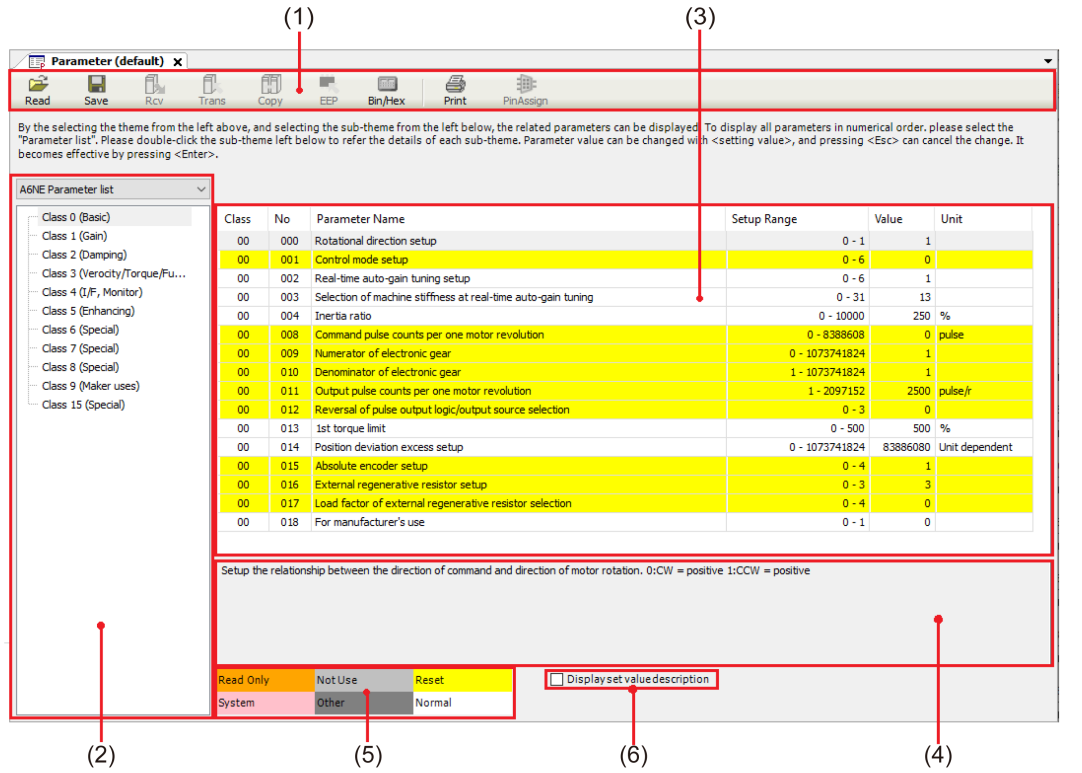



| No. | Name | Description |
|---|---|---|
| (1) | Title bar | The title bar displays the project file name, [minimize] button, [maximize] button, and [close] button. |
| (2) | Menu bar | The menu bar displays the menu commands for each purpose in list format. |
| (3) | Toolbar | The toolbar displays each command as an icon. |
| (4) | Navigator pane | This pane displays a list of axes. |
| (5) | Main pane | This pane displays the Parameter window, Monitor window, Alarm window, and other windows.<br>The window can be switched by selecting a desired tab. |
| (6) | Status field | This field displays the status of connection to the GM1 controller. |

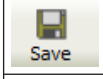
## 7.4 Parameter Window

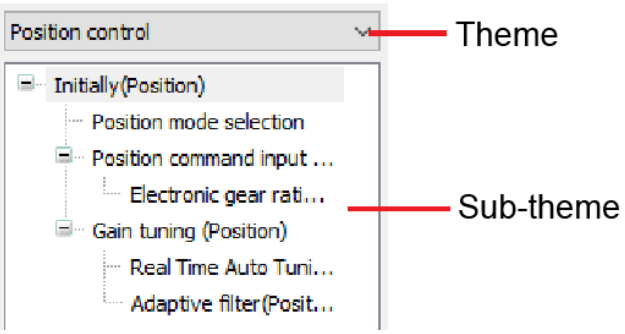
The Parameter window allows the user to check and rewrite the values of servo amplifier parameters, save them to parameter files, and perform other parameter-related operations.

### 7.4.1 Configuration of Parameters Window




| No. | Name | Function |
|---|---|---|
| (1) | Toolbar | The toolbar consists of basic operation commands related to parameters, such as save and read. |

| Icon | Name | Function |
|---|---|---|
|  | Read | Reads parameters from file ".prm5".<br>When this button is enabled, you can specify a parameter file also by drag-and-drop operation. |
|  | Save | Writes parameters to file ".prm5". |
|  | Rcv | Receives parameters from the servo amplifier. |

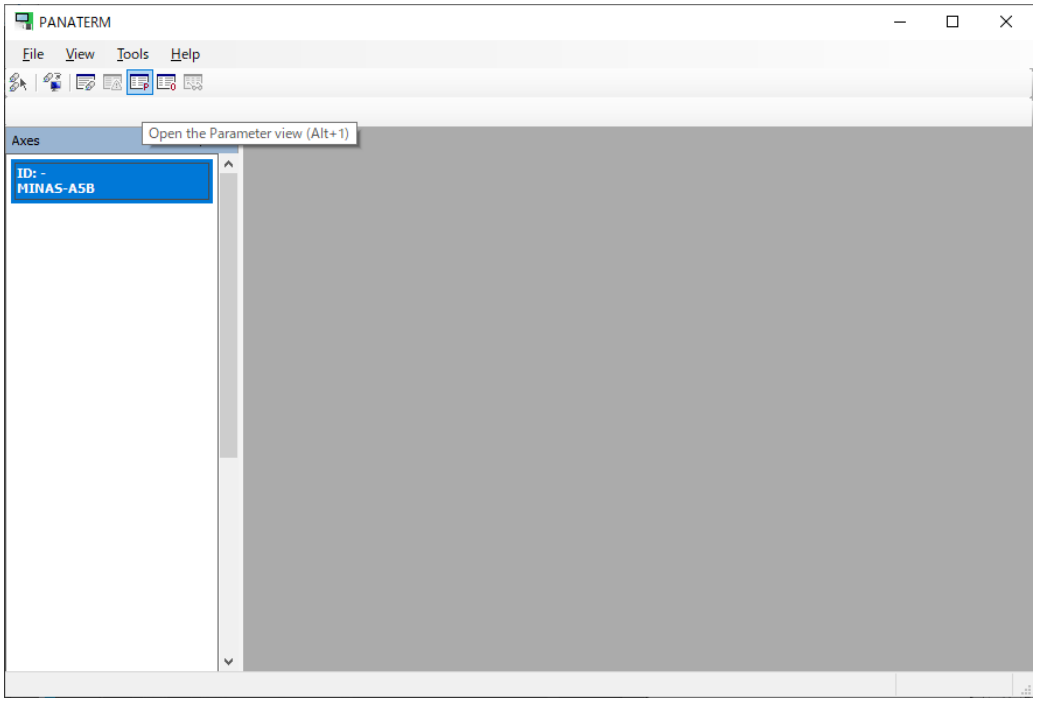
<table>
<tr><th>No.</th><th>Name</th><th>Function</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Icon</th><th>Name</th><th>Function</th></tr>
<tr><td>  </td><td>Trans</td><td>Transmits parameters to the servo amplifier.</td></tr>
<tr><td>  </td><td>Copy</td><td>Copies the parameters of a servo amplifier to servo amplifiers for other axes.</td></tr>
<tr><td>  </td><td>EEP</td><td>Writes parameters to EEPROM of the servo amplifier.</td></tr>
<tr><td>  </td><td>Bin / Hex</td><td>Inputs the selected settings in binary or hexadecimal format.</td></tr>
<tr><td>  </td><td>Print</td><td>Prints parameters.</td></tr>
<tr><td>  </td><td>Pin assignment setting</td><td>Sets I/O pin assignment.</td></tr>
</table>
</td></tr>
<tr><td>(2)</td><td>Theme selection pane</td><td>After a theme is selected, if a parameter category is selected from a sub-theme, related parameters will be displayed in the parameter setting area.<br>  <br>For details on each parameter, refer to the instruction manual and other technical references for the servo amplifier.</td></tr>
<tr><td>(3)</td><td>Parameter setting area</td><td>Allows the user to set or edit parameters.
<table>
<tr><th>Name</th><th>Function</th></tr>
<tr><td>Class</td><td>Displays parameter categories</td></tr>
<tr><td>No.</td><td>Displays parameter numbers</td></tr>
<tr><td>Parameter Name</td><td>Displays parameter names</td></tr>
<tr><td>Setup Range</td><td>Displays the maximum and minimum allowable values of parameter settings</td></tr>
<tr><td>Value</td><td>Displays parameter values. Values can be changed. For parameters provided with a ▼ button beside the set value, a desired value can be selected from the combo box. After selecting a value from the combo box, press the <Enter> key. For parameters without a ▼ button beside the set value, either directly enter a value using <numerical> keys or click "▲""▼" to edit the value by increasing or decreasing it. To set a</td></tr>
</table>
</td></tr>
</table>

| No. | Name | Function |
|---|---|---|
| | | <table><tr><th>Name</th><th>Function</th></tr><tr><td></td><td>value, press the <Enter> key. To return a value to its original value, press the <Esc> key.</td></tr><tr><td>Unit</td><td>Displays the unit of parameter settings.</td></tr></table> |
| (4) | Text display area | Displays a description related to the selected parameter. |
| (5) | Parameter attribute description area | Displays a description of parameter attributes. The background color of each parameter in the parameter setting area represents an attribute. |
| (6) | "Display-set value description" check box | Selecting the check box displays combo boxes and decimal points in the "Value" column of the parameter setting area. To display parameter set values in an easy-to-understand manner, select the check box. |

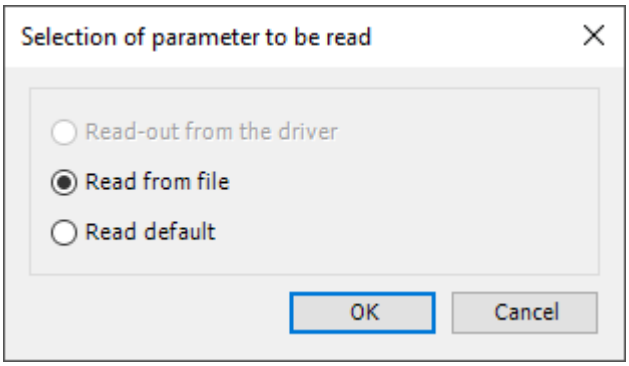
## 7.4.2 Setting Parameters

### 1 2 Procedure

1. From the menu bar on the main pane, select **View**>**Parameter**. Alternatively, on the toolbar, click the "Open the Parameter view" icon.




The "Selection of parameter to be read" dialog box will be displayed.




**☐Read-out from the driver**

Communicates with the connected servo amplifier and reads the parameter settings from the servo amplifier. If this mode is selected, parameter values will be reflected in the servo amplifier as soon as they are changed.

**☐Read from file**

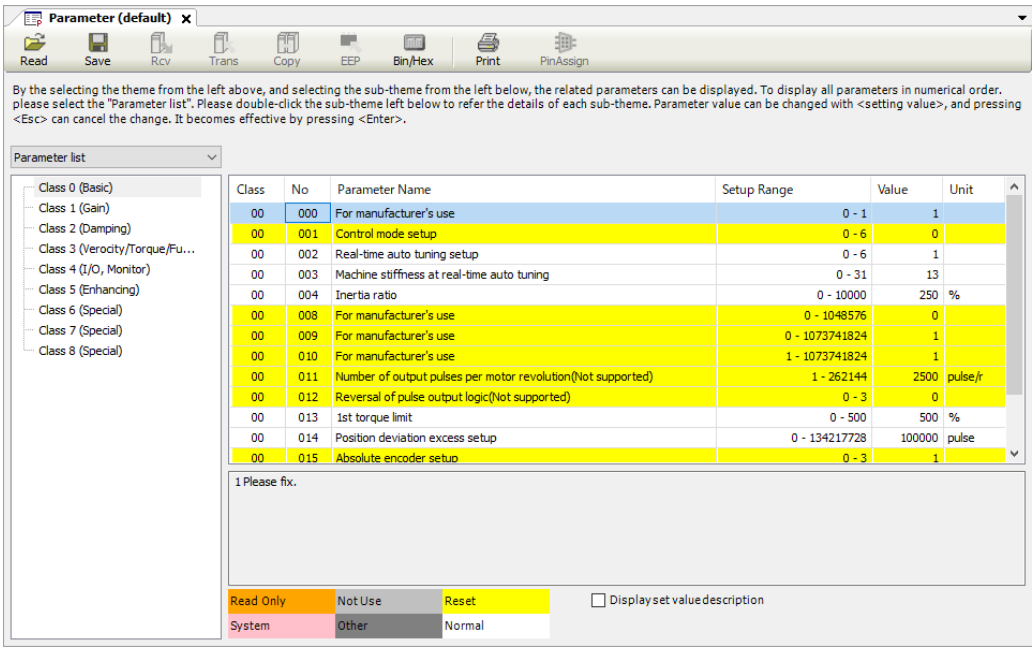
Reads the parameter file (".prm5") that was edited previously. If communication is performed with the servo amplifier, parameter values will be reflected in the servo amplifier as soon as they are changed.

**☐Read default**

Reads the factory default settings of the servo amplifier that were saved during installation. If communication is performed with the servo amplifier, parameter values will be reflected in the servo amplifier as soon as they are changed.

**2.** Select one of the three options above and click the [OK] button.

The Parameter window will be displayed.



3. After changing the parameter settings, click the [EEP] button to write the parameter settings to the EEPROM of the servo amplifier.

4. Click the [×] button on the Parameter window to close the Parameter window.

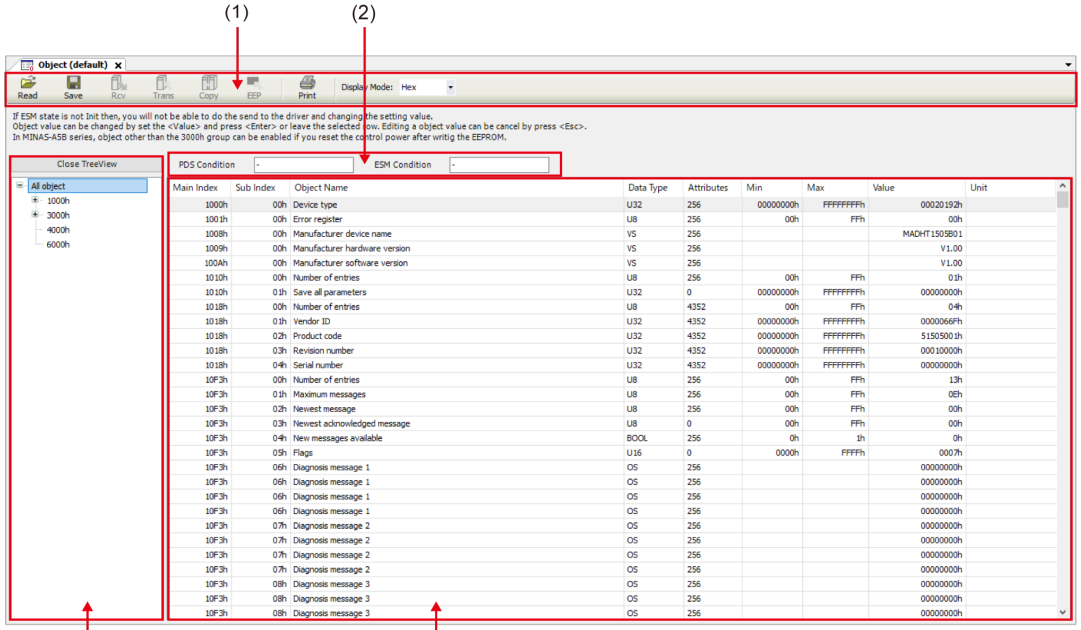
## 7.5 Object Window

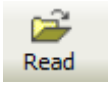
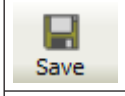
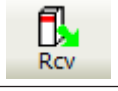
Troubleshooting can be performed more easily by displaying and editing the list of objects on the amplifier side without using a host device.

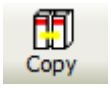
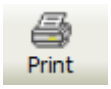
**Info.**

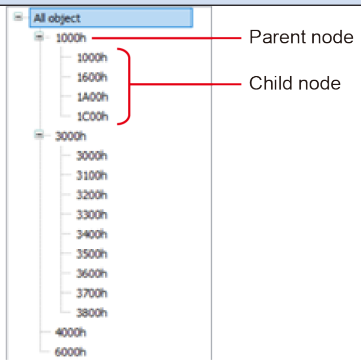
- Some objects affect the behaviors of servo amplifiers or motors. Therefore, before changing the objects, carefully read the instruction manual and other technical references for the servo amplifier and pay careful attention when changing them.

### 7.5.1 Configuration of Object Window




| No. | Name | Function | | |
|---|---|---|---|---|
| (1) | Toolbar | The toolbar consists of basic operation commands related to objects, such as save and read. | | |
| | | Icon | Name | Function |
| | |  | Read | Reads objects from the file (.obj5).<br>When this button is enabled, you can specify a file by drag-and-drop operation. |
| | |  | Save | Writes objects to the file (.obj5). |
| | |  | Rcv | Receives objects from the servo amplifier. |

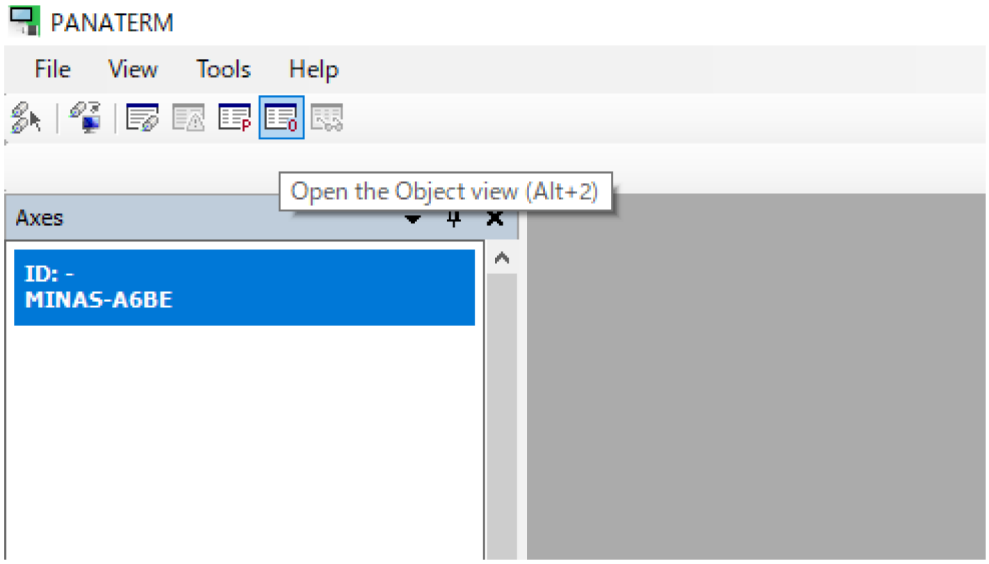
| No. | Name | Function | | |
|---|---|---|---|---|
| | |  | Trans | Transmits objects to the servo amplifier.<br>If you turn OFF the power supply to the servo amplifier without writing to EEPROM, the object will be reverted back to the value before the change was made. |
| | |  | Copy | Copies the objects of a servo amplifier to servo amplifiers for other axes. |
| | |  | EEP | Writes objects to EEPROM of the servo amplifier.<br>Do not turn OFF the power supply to the servo amplifier and the PC while data is being written to EEPROM.<br>If the power supply is cut off while data is being written, the data content is not warranted. |
| | |  | Print | Prints objects. |
| | |  | Display mode | Changes the numerical display of the object being displayed.<br>Hex: Displayed in hexadecimal number and “h” is placed at the end of the number.<br>Dec: Displayed in decimal number and a sign is set.<br>Bin: Displayed in binary number and “b” is placed at the end of the number.<br>The values in the Min-Max column are displayed in hexadecimal number. |
| (2) | Condition monitor | **PDS Condition**<br>Displays the PDS condition on the servo amplifier side.<br>It varies depending on the object value of 6041h-00h. | | |
| | | **ESM Condition**<br>Displays the condition that indicates whether the object can be rewritten on the servo amplifier side.<br>Rewriting is possible when “Operational” is displayed. | | Full display |
| (3) | Object tree | When a node is selected from the object tree, related objects are displayed in the object setting field.<br>Operate **Close TreeView** or **Open TreeView** to hide or display the object tree.<br>Select “All object” to display all objects.<br>When a parent node is selected, all child node objects under the selected node are displayed.<br>When a child node is selected, objects of the selected node are displayed.<br>For details of each object, refer to the instruction manual and other technical references for the servo amplifier. | | |

<table>
<tr><th>No.</th><th>Name</th><th colspan="2">Function</th></tr>
<tr><td></td><td></td><td colspan="2"> 
</td></tr>
<tr><td rowspan="12">(4)</td><td rowspan="12">Object setting field</td><td colspan="2">Allows the user to edit and set an object.</td></tr>
<tr><td>Name</td><td>Function</td></tr>
<tr><td>"Main Index"</td><td>Displays the Main Index of an object.</td></tr>
<tr><td>Sub Index</td><td>Displays the Sub Index of an object.</td></tr>
<tr><td>Object Name</td><td>Displays the name of an object.</td></tr>
<tr><td>Data Type</td><td>Displays the data type of an object.<br>I8: Integer 8 type<br>I16: Integer 16 type<br>I32: Integer 32 type<br>U8: Unsigned 8 type<br>U16: Unsigned 16 type<br>U32: Unsigned 32 type<br>Bool: Boolean type<br>OS: Octet String type<br>VS: Visible String type</td></tr>
<tr><td>Attributes</td><td>Displays the attributes of an object.<br>RO: Read-only attribute, exclusively for reading.<br>RW: Read/write attribute, possible to read or write.</td></tr>
<tr><td>Min</td><td rowspan="2">Displays the setting range of an object.<br>The setting range is not displayed for an object whose Data Type is “OS” or “VS”.</td></tr>
<tr><td>Max</td></tr>
<tr><td>Value</td><td>Displays the value of an object. The value can be changed if the object attribute is “RW” and the set value is a numerical value.<br>Note that there are input restrictions for each Display mode setting. The following values can be input.<br>Hex: 0 to 9, A to F (After editing, ““h”” is automatically placed at the end of the number.)<br>Dec: 0 to 9 and minus sign “-”<br>Bin: 0 and 1 (““b”” is automatically placed at the end of the number.)<br>After changing the value, press the <ENTER> key or click the [Trans] button.<br>To return a value to its original value press the <ESC> key.</td></tr>
<tr><td>Unit</td><td>Displays the unit of an object set value.</td></tr>
</table>

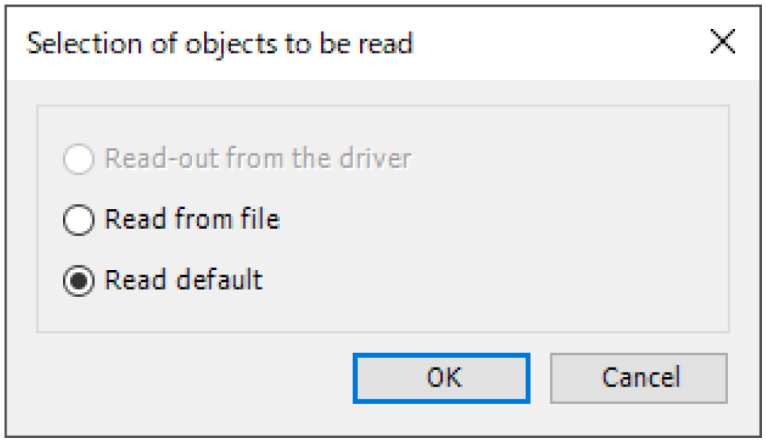
## 7.5.2 Setting Objects

### Procedure

1. From the menu bar on the main pane, select **View>Object**. Alternatively, on the toolbar, click the "Open the Object view" icon.




The "Selection of objects to be read" dialog box will be displayed.




☐**Read-out from the amplifier.**

Communicates with the connected servo amplifier and reads objects set in the servo amplifier.

If this mode is selected, object values will be reflected in the servo amplifier as soon as they are changed.

### ☐Read from file

Reads the parameter file ("obj5") that was edited previously. If communication is performed with the servo amplifier, object values will be reflected in the servo amplifier as soon as they are changed.

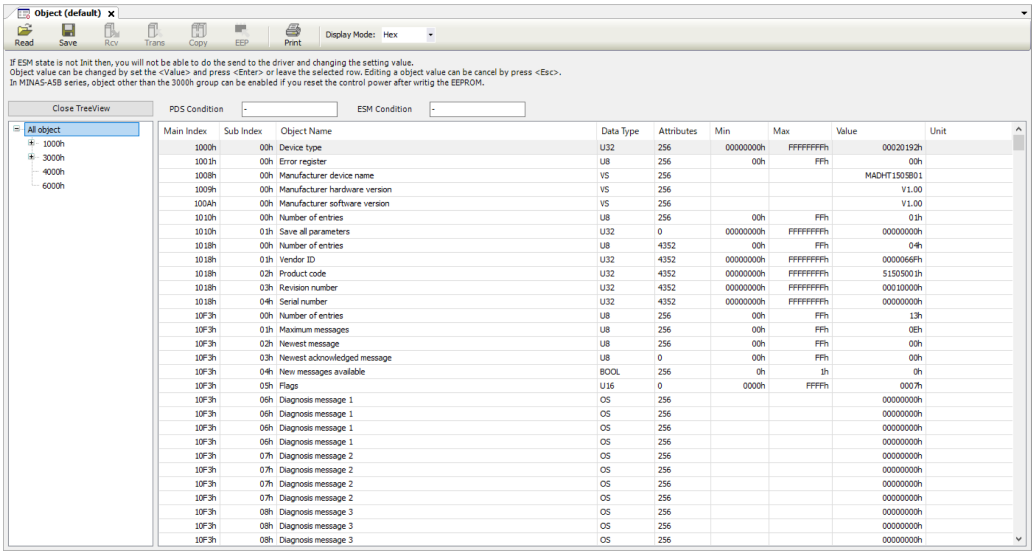
### ☐Read default

Reads the standard default settings of the servo amplifier that were saved during installation.

If communication is performed with the servo amplifier, object values will be reflected in the servo amplifier as soon as they are changed.

**2.** Select one of the three options above for reading the object settings and click the [OK] button.

The Object window will be displayed.



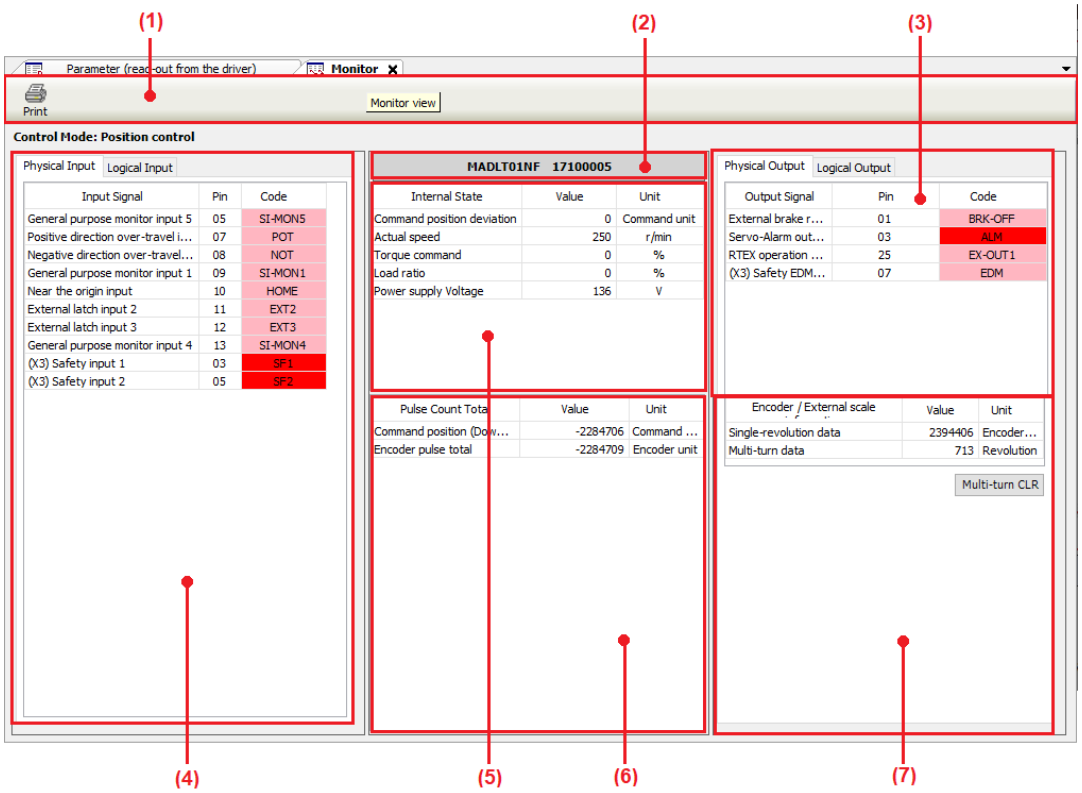

**3.** After changing the object settings, click the [EEP] button to write the object settings to the EEPROM of the servo amplifier.

**4.** Click the [×] button on the Object window to close the Object window.

## 7.6 Monitor Window

The Monitor window displays the operating states of servo amplifiers and motors, I/O signals, internal statuses, and other information and also allows the user to check them.

### 7.6.1 Configuration of Monitor Window




| NO. | Name | Description |
|---|---|---|
| (1) | Toolbar | The toolbar consists of basic operation commands related to parameters.<br><br>**Icon** / **Name** / **Function**<br>Print / Print / Prints the contents of the Monitor window. |
| (2) | Amplifier model name and serial number | Displays the model name and serial number of the servo amplifier. |
| (3) | Output signal status monitor | Displays the status of each output signal. The tab can be switched between "Physical Output" and "Logical Output".<br>Physical Output – Displays the status of output signals from the servo amplifier.<br>Red: Indicates that output transistor is ON<br>Pink: Indicates that output transistor is OFF |

<table>
<tr><th>NO.</th><th>Name</th><th>Description</th></tr>
<tr><td></td><td></td><td>Logical Output – Displays the status of signals within the servo amplifier.<br>Red: Indicates that signal status is active<br>Pink: Indicates that signal status is inactive</td></tr>
<tr><td>(4)</td><td>Input signal status monitor</td><td>Displays the status of input signals. The tab can be switched between "Physical Input" and "Logical Input".<br>Physical Input – Displays the status of input signals to the servo amplifier.<br>Red: Indicates that COM- is connected<br>Pink: Indicates that signal status is open<br>Logical Input – Displays the status of signals within the servo amplifier.<br>Red: Indicates that signal status is active<br>Pink: Indicates that signal status is inactive</td></tr>
<tr><td>(5)</td><td>Internal status monitor</td><td>Displays the internal status of the servo amplifier.<br><table><tr><th>Name</th><th>Function</th></tr><tr><td>Commanded position deviation</td><td>Displays the position deviation of a command unit.</td></tr><tr><td>Actual speed</td><td>Displays the monitor speed</td></tr><tr><td>Torque command</td><td>Displays the torque command.</td></tr><tr><td>Load factor</td><td>Displays the ratio relative to the rated load. Adjust the operation pattern so that 100% is not exceeded.</td></tr><tr><td>Power supply voltage value</td><td>Displays the voltage (voltage between the P and N terminals) of power supply to the servo amplifier.</td></tr></table></td></tr>
<tr><td>(6)</td><td>Pulse sum monitor</td><td>Displays the sum of command and encoder pulses received by the servo amplifier.</td></tr>
<tr><td>(7)</td><td>Encoder information monitor</td><td>Displays encoder information.<br><table><tr><td>Single-turn data</td><td>Displays an absolute position when the motor makes no more than a single turn.</td></tr><tr><td>Multi-turn data</td><td>Displays how many turns the motor made after "Clear" operation.</td></tr></table>Clicking "Clear Multi-turn" resets the multi-turn data stored in the encoder to "0" and clears all encoder errors.<br>Note 1: Before using "Clear Multi-turn", check the precautions on use. To clear encoder errors, you may need to restart the servo amplifier.<br>Note 2: If the connected device is A5B, single-turn data and multi-turn data will be displayed as "-".</td></tr>
</table>

(Note 1) Because Ethernet communication is used to transfer data between the servo amplifier and PC, there is a difference or delay between the value displayed on the screen and the actual value of the servo amplifier.

(Note 2) When the polarity is "+", symbol "+" is not displayed.

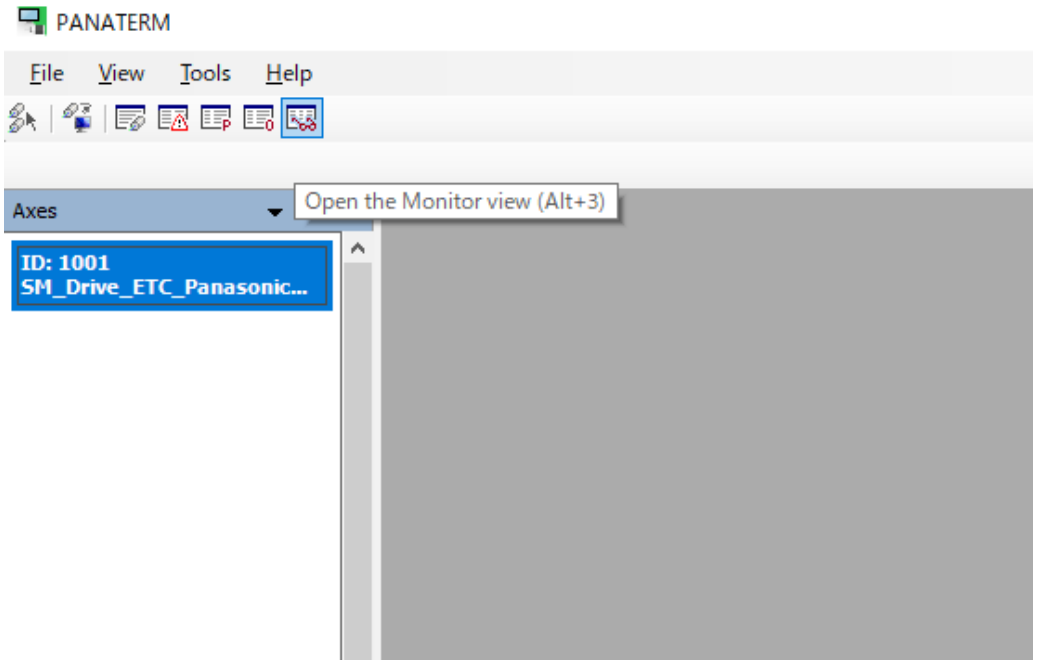
(Note 3) The monitor function is not a measuring instrument. Use the values displayed in the Monitor window as a guide.

(Note 4) If the servo amplifier outputs "Error 40.0 Error protection from absolute system failure" or "Error 42.0 Error protection from absolute overspeed", execute "Clear Multi-turn". Unless the absolute encoder is reset, the alarm cannot be cleared.

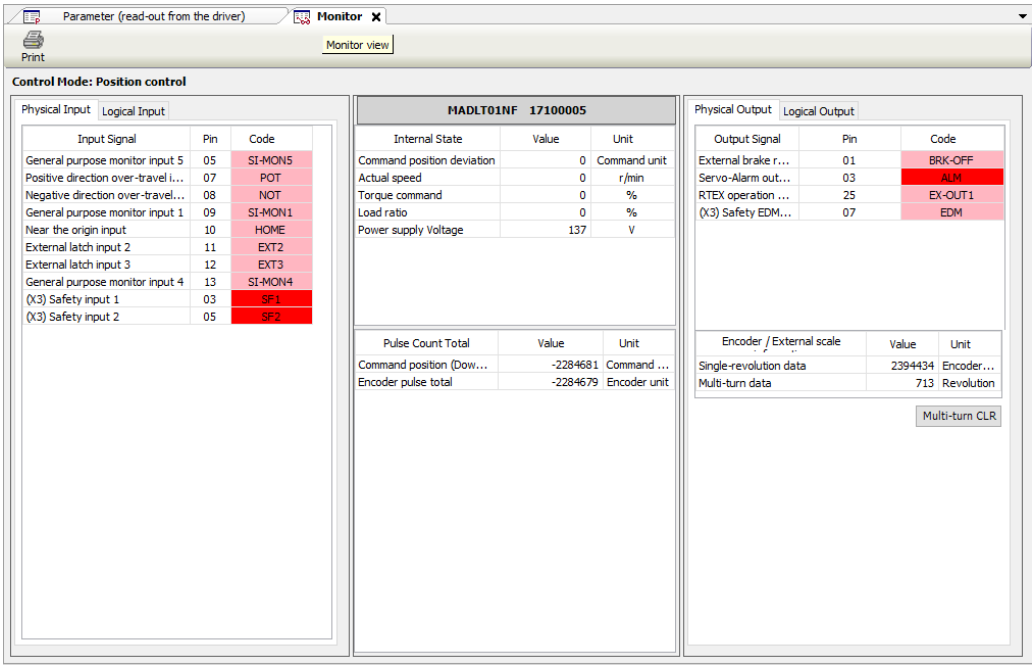
## 7.6.2 Checking the Monitor Window

### Procedure

1. From the menu bar on the main pane, select **View>Monitor**. Alternatively, on the toolbar, click the "Open the Monitor view" icon.




The Monitor window will be displayed.




**2.** Check each item.

Check the input signal state, output signal state, and the internal status of the servo amplifier.

**3.** Click the [×] button on the Monitor window.

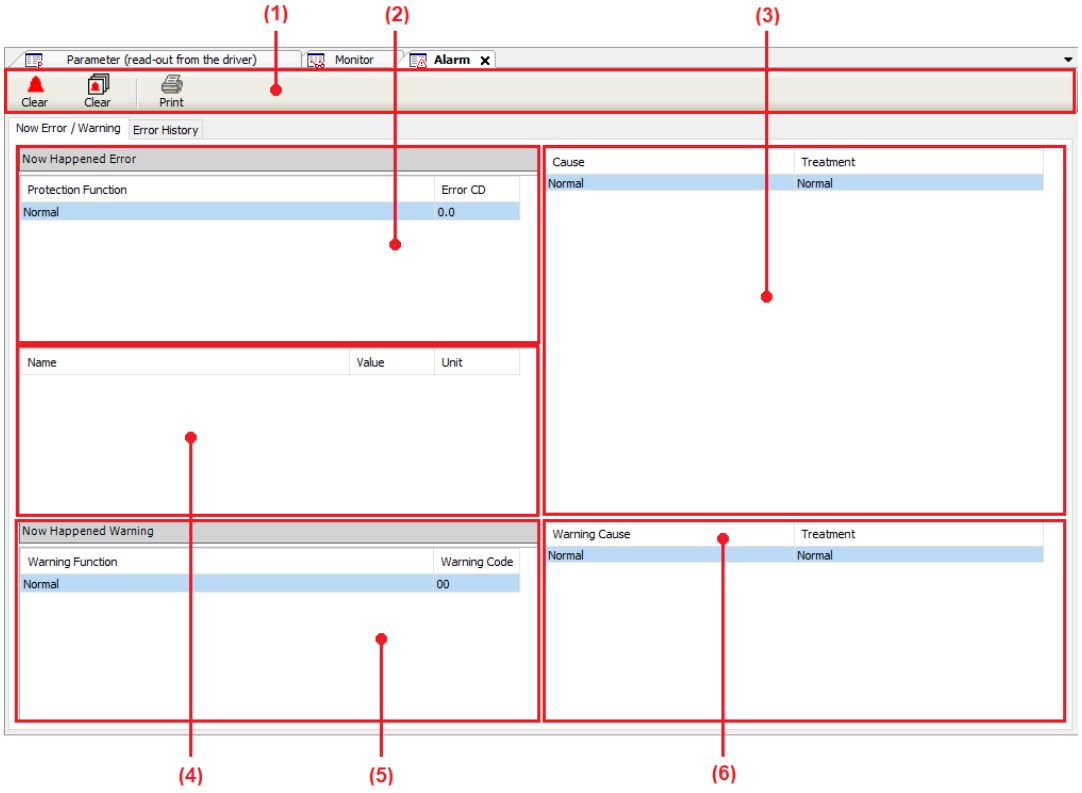
The Monitor window will be closed.

## 7.7 Alarm Window

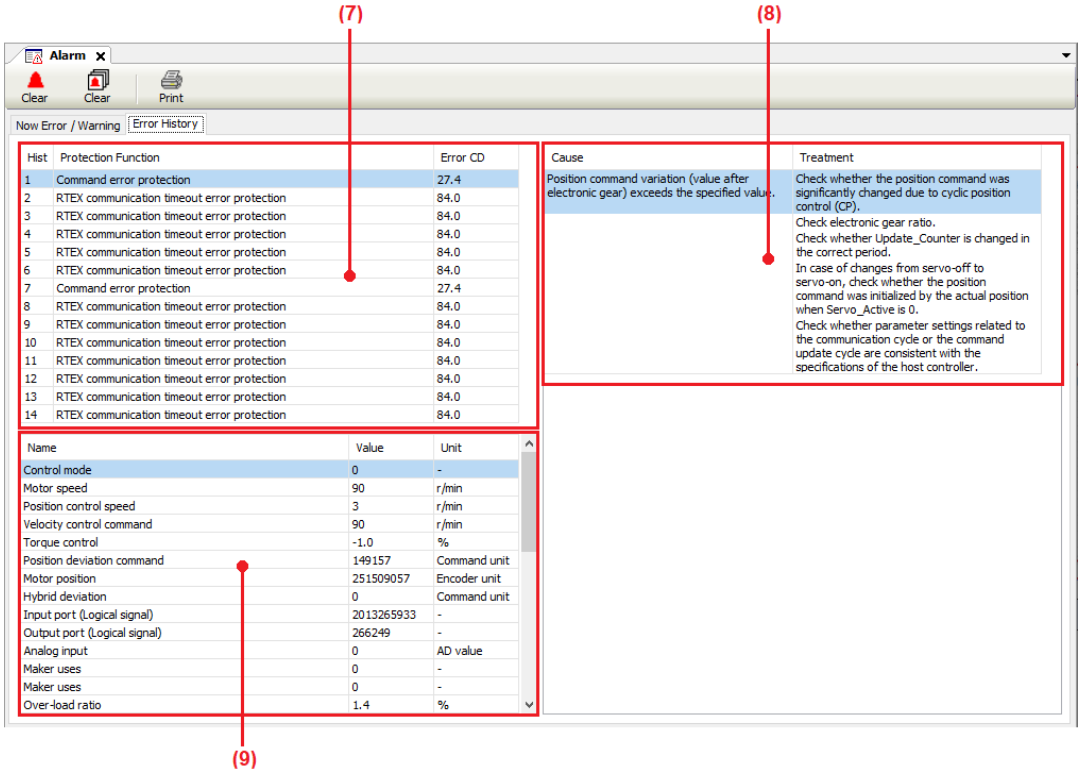
If the front panel of the servo amplifier is blinking, such as when the motor is not working, you can check the alarm status.Please note that the alarm cannot be cleared.

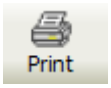
### 7.7.1 Configuration of Alarm Window

**Display of the current errors and warnings (only during communication with servo amplifier)**



## Display of error histories




| No. | Name | Description |
|---|---|---|
| (1) | Toolbar | <table><tr><th>Icon</th><th>Name</th><th>Function</th></tr><tr><td>  </td><td>Clear</td><td>Allows the user to clear the current alarm history. If you click this button after eliminating the cause of the alarm, the current alarm will be cleared and normal operation will be performed. However, you cannot clear any alarms that cannot be cleared by alarm clear input signals of servo amplifiers. In such a case, turn off the servo amplifier, eliminate the cause of the alarm, and then turn the power on again.</td></tr><tr><td>  </td><td>Clear</td><td>Allows the user to clear error histories.</td></tr><tr><td>  </td><td>Print</td><td>Prints error-related information.</td></tr></table> |
| (2) | Current error display area | Displays the alarm numbers and names of all errors that are currently occurring.<br>The alarm displayed on the top of the list is the alarm displayed on the front panel of the servo amplifier. |

| No. | Name | Description |
|---|---|---|
| (3) | Error cause / treatment display area | Displays the cause and treatment of the selected error. |
| (4) | Motor internal status display area | Displays the motor internal status in the event of an alarm. |
| (5) | Current warning display area | Displays the warning numbers and names of all warnings that are currently occurring. |
| (6) | Warning cause / treatment display area | Displays the cause and treatment of the selected warning. |
| (7) | Error history display area | Displays the order of error histories, alarm numbers, and error names. |
| (8) | Error cause / treatment display area | Displays the cause and treatment of the selected error. |
| (9) | Motor internal status display area | Displays the motor internal status in the event of an alarm. |

(Note 1) Some alarms cause tripping as errors but are not recorded in error histories. For alarms that are not recorded in error histories, refer to the instruction manual of the servo amplifier.

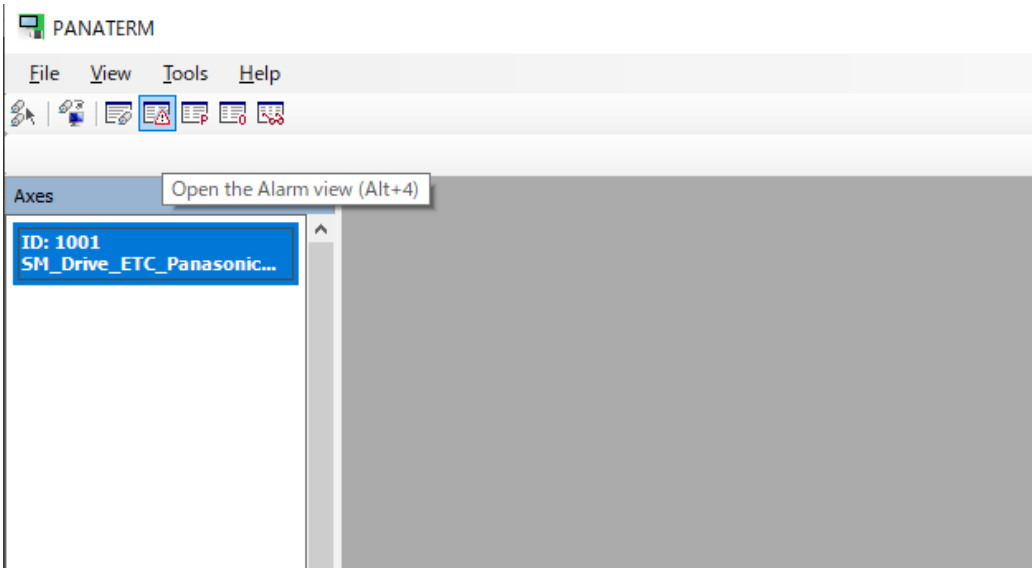
(Note 2) Up to 14 error histories are stored. When more than 14 errors occur, error histories are erased in chronological order (the oldest error history is erased first).

(Note 3) Up to three histories of motor internal status in the event of an alarm are stored. If an alarm occurs immediately after the power is turned on, motor internal status may not be captured normally.

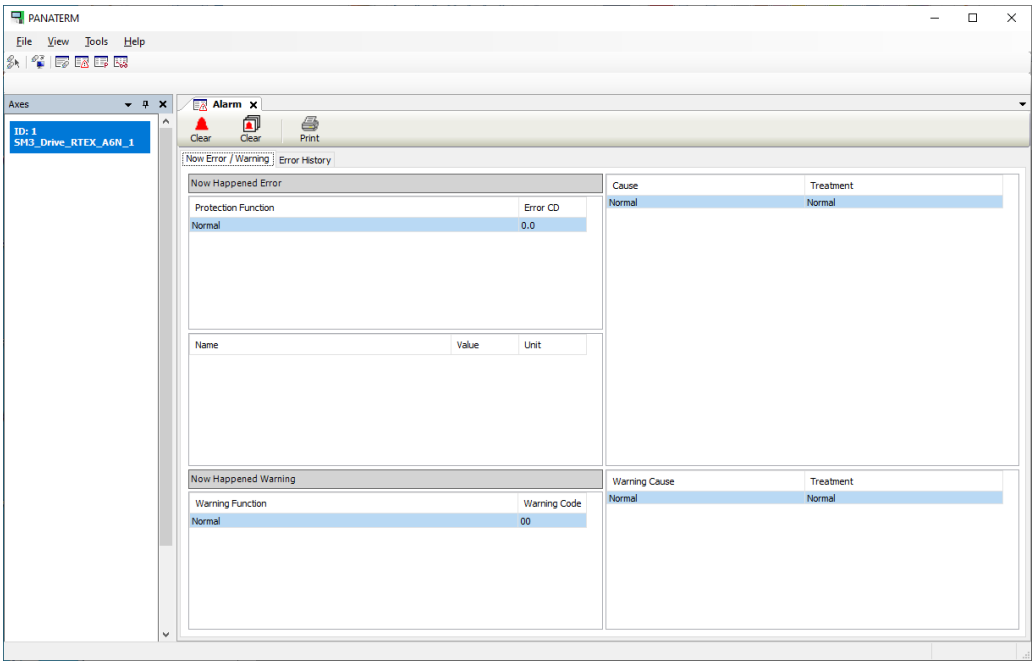
## 7.7.2 Checking Alarms

### Procedure

1. From the menu bar on the main pane, select **View>Alarm**. Alternatively, on the toolbar, click the "Open the Alarm view" icon.



The Alarm window will be displayed.




**2.** Check for any errors that are currently occurring.
Click the "Now Error / Warning" tab and check for any errors that are currently occurring.

**3.** Check for any errors that occurred in the past.
Click the "Error History" tab and check for any errors that occurred in the past.

**4.** Click the [×] button on the Alarm window.
The Alarm window will be closed.

# 7.8 Other Functions

## 7.8.1 Language Setting Function

This function allows the user to set the display language of PANATERM Lite for GM.
The default setting is the same language as the one set in GM Programmer.

### Procedure

1. Select a language from the menu bar tool.
   The language set in PANATERM Lite for GM will be switched.

### Info.

- The display language setting of PANATERM Lite for GM is linked with that of the GM Programmer.

## 7.8.2 Help Function

While performing operation in PANATERM Lite for GM, you can start the Help function to check information such as operating methods.

### Procedure

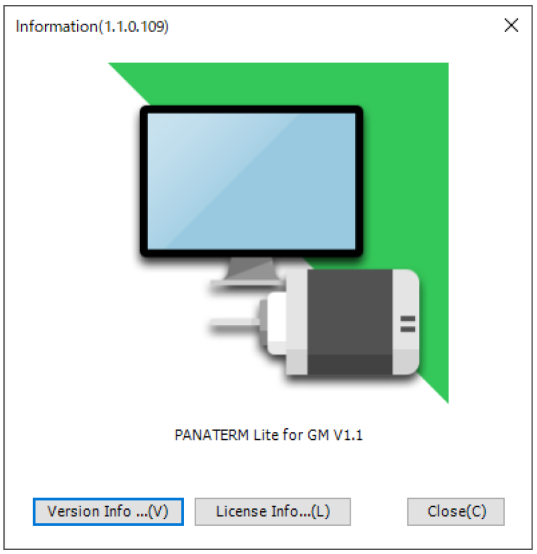
1. From the menu bar, select **Help**>**PANATERM Lite for GM Help**.
   "PANATERM Lite for GM Operation Guide" will be started.

## 7.8.3 Version Display Function

This function allows the user to check the version, license, and other information for PANATERM Lite for GM.

### Procedure

1. From the menu bar, select **Help**>**About**.




**2.** Click a desired button at the bottom of the window.

| Button | Description |
|---|---|
| Version Info | Displays information about the plug-ins that have been applied and the operating system of the PC that is used. |
| License Info | Displays license information for the software used by PANATERM Lite for GM. |

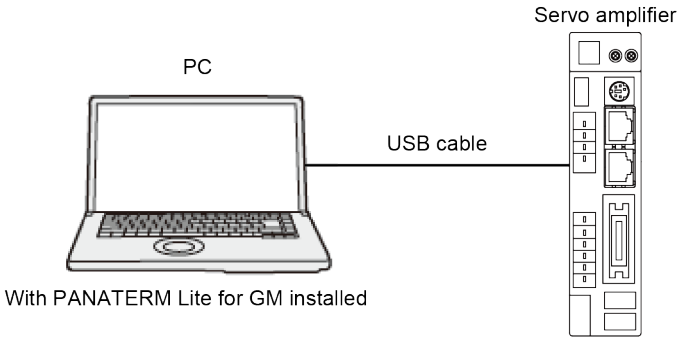
(MEMO)

# 8 Preparing for Servo Amplifiers

# 8.1 Initial Setup for Servo Amplifiers

## 8.1.1 Connecting the Servo Amplifier and PC

Use a USB cable to connect the servo amplifier and a PC on which PANTERM Lite for GM has been installed.



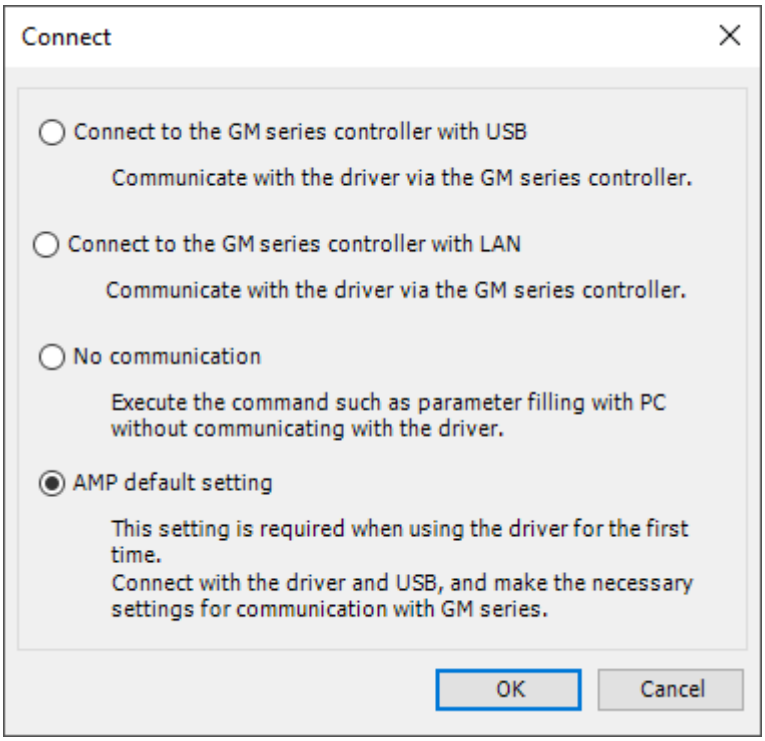

## 8.1.2 Installing the USB Driver

When the GM Programmer is installed, the USB driver is also installed at the same time.

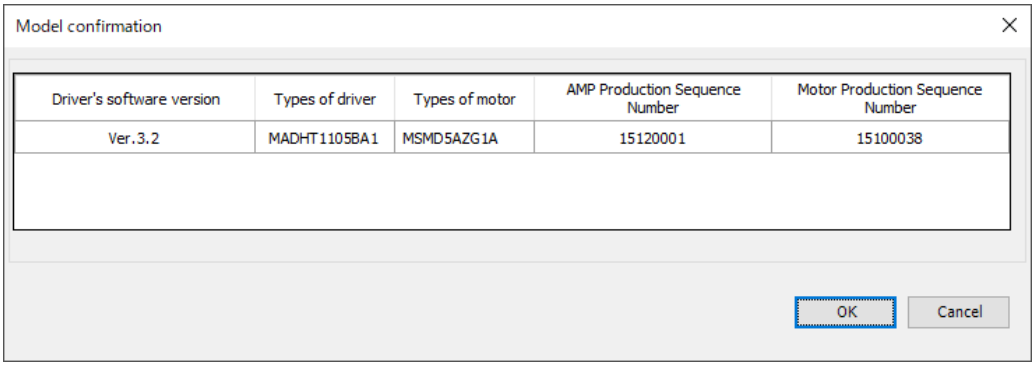
## 8.1.3 Initial Setup for Servo Amplifiers

**1 2 Procedure**

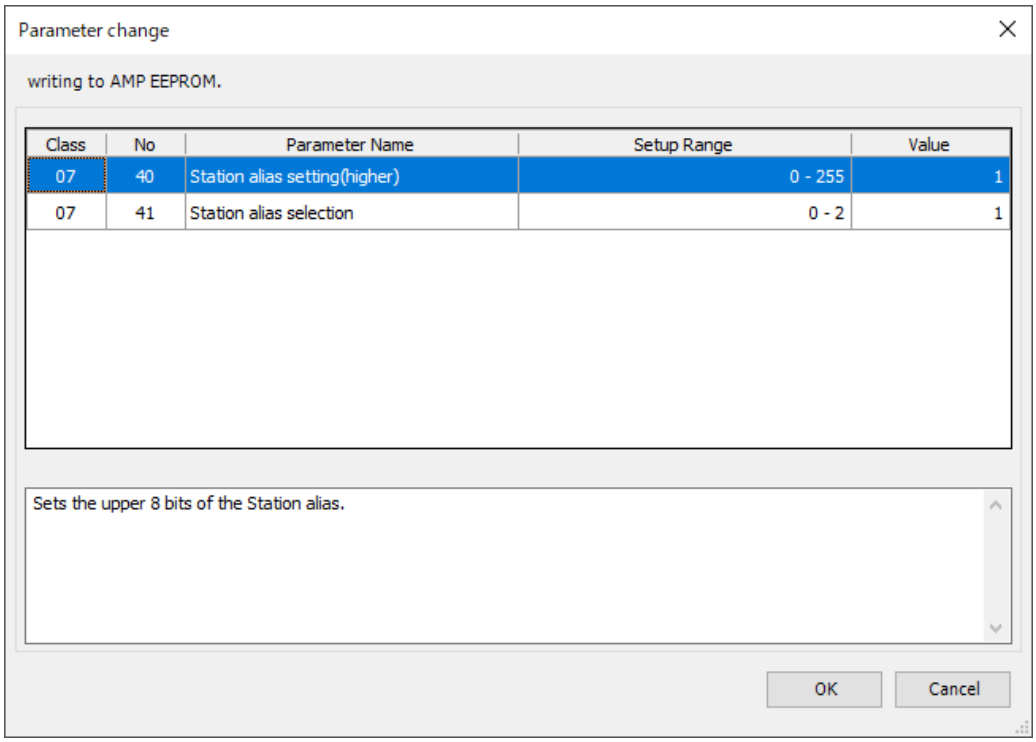
1. Start PANATERM Lite for GM.
   The "Connect" dialog box will be displayed.




**2.** Select "AMP default setting" and click [OK].
The "Model confirmation" dialog box will be displayed.




**3.** Check the software version of the servo amplifier for which settings are to be changed and then click [OK].
The "Parameter change" dialog box will be displayed.




If Pr7.41 is set to 0, the setting of the rotary switch on the front panel of the servo amplifier and the setting of Pr7.40 will be set as Station alias.

| Station alias | |
|---|---|
| **High-order 8 bits** | **Low-order 8 bits** |
| 3740H setting | Rotary switch setting |

If Pr7.41 is set to 1, the value of the SII area (0004h) will be set as Station alias.

The value of the SII area (0004h) can be set using the EtherCAT slave device object of GM Programmer.

***4.*** Click the [OK] button.

The "Setting Complete" dialog box will be displayed.

***5.*** Click the [OK] button.

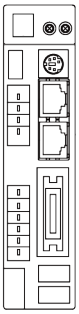
The main pane will be displayed. Start the servo amplifier.

## 8.1.4 Disconnecting the Servo Amplifier from the PC

Disconnect the USB cable connecting the PC and the servo amplifier.

PC

Servo amplifier



(MEMO)

# 9 Connecting the GM1 Controller and Servo Amplifiers

# 9.1 Setting an Address for Each Servo Amplifier

The following are the address setting methods prescribed by EtherCAT.

- Reading the Value of Rotary Switch
- Reading the Value of SII Area

## 9.1.1 Reading the Value of Rotary Switch

Addresses are set using the value of the rotary switch on each servo amplifier.

This setting method is explained using MINAS-A5B as an example.

By setting the Pr7.41 parameter to 0, the value of the rotary switch on the front panel can be used as an address.

In this case, the value of the rotary switch and the value of Pr7.40 are combined and used as an address.

| Station alias | |
|---|---|
| **High-order 8 bits** | **Low-order 8 bits** |
| 3740H setting | Rotary switch setting |

## 9.1.2 Reading the Value of SII Area

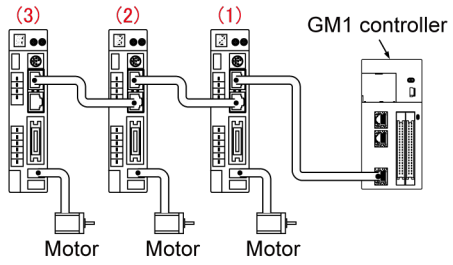
Addresses are set using the value of the SII area (0004h) in each servo amplifier.

This setting method is explained using MINAS-A5B as an example.

By setting the Pr7.41 parameter to 1, the value of the SII area (0004h) can be used as an address.

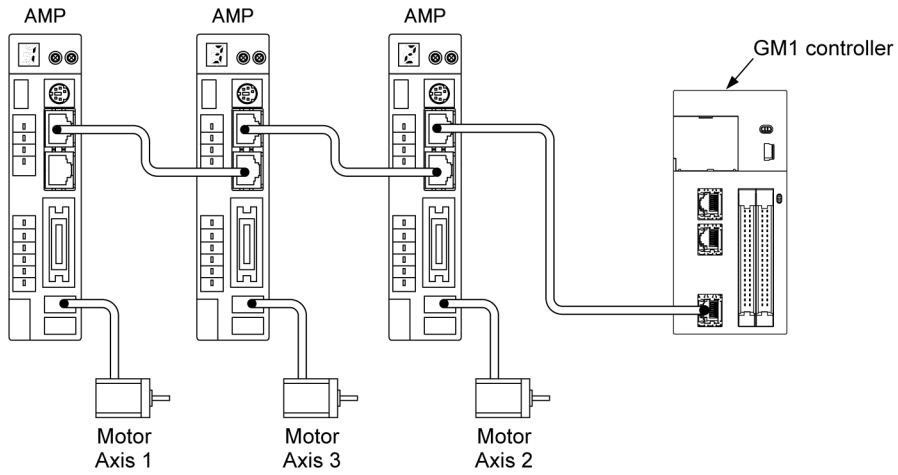
The value of the SII area (0004h) can be set using the EtherCAT slave device object of GM Programmer.

The following figure illustrates the correlation between the settings in GM Programmer and the wiring of each servo amplifier when addresses are set using the value of the SII area.

## 9.2 Connecting the GM1 Controller and Each Servo Amplifier with Cables

Connect the EtherCAT port on the GM1Controller and each servo amplifier with cables.



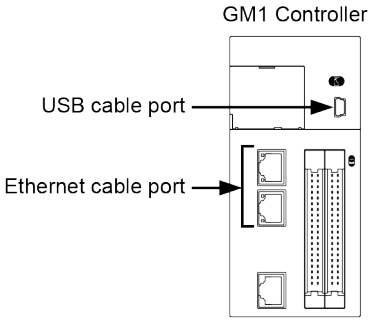
(MEMO)

# 10 Connecting the GM1 Controller and the GM Programmer

# 10.1 Connecting the GM1 Controller and PC

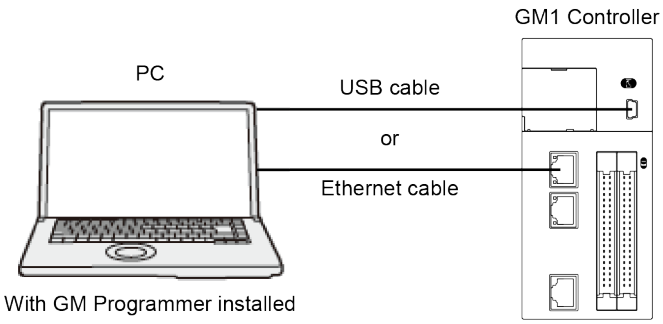
## 10.1.1 Selecting a Connection Port for GM Programmer

Select either LAN port connection or USB port connection.




## 10.1.2 Connecting the GM1 Controller and PC with a Cable

Use an Ethernet cable or USB cable to connect the GM1 Controller and a PC on which GM Programmer is installed.



## 10.2 Creating a New Project

When creating a program using GM Programmer for the first time, create a new project. For the new project, set a device and a programming language to be used.

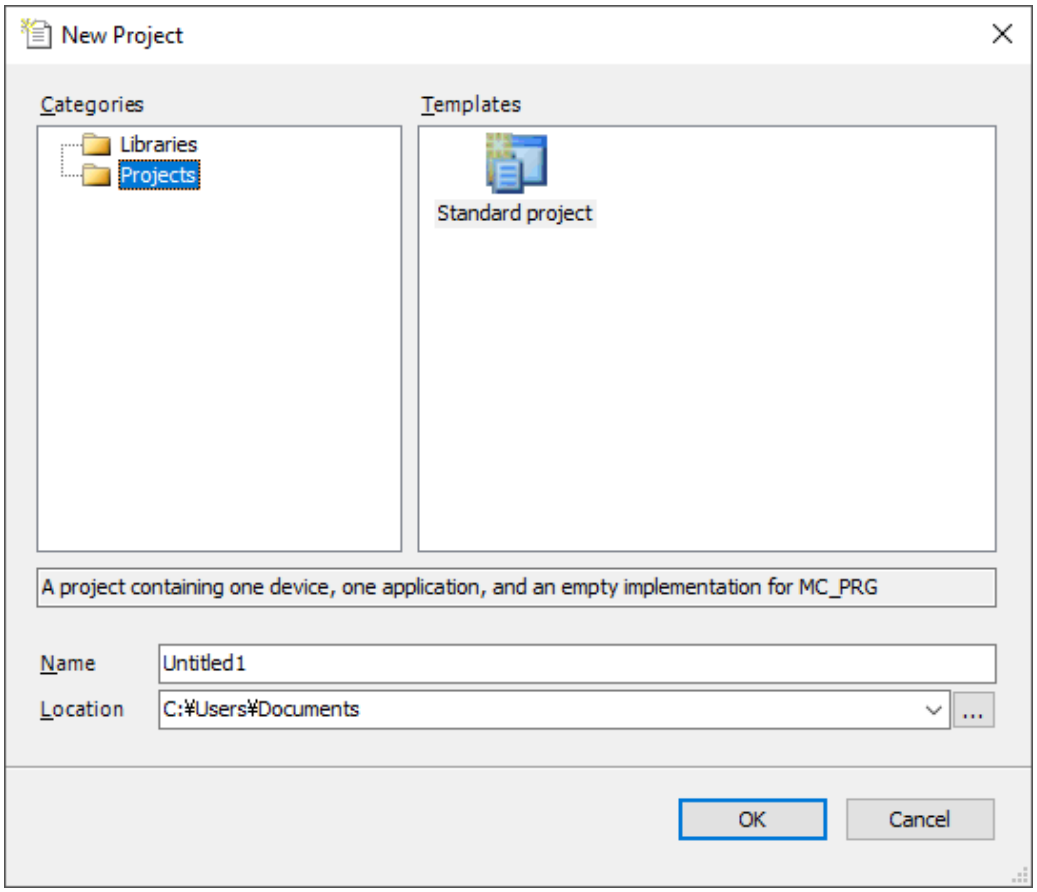
This section describes how to create a new project.

Given below is an example that explains the procedure to create a project for the GM1 Controller (product number: AGM1CSEC16T/P) in Structured Text (ST) format.

### Procedure

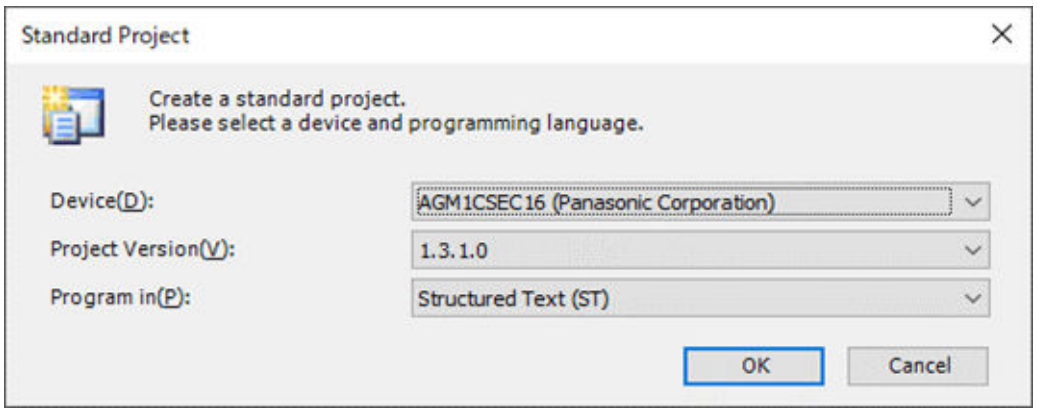
1. Start GM Programmer.
   For details on how to start GM Programmer, refer to "6.3.1 How to start".
   When GM Programmer is started, the Start Page will be displayed.


2. Select "New Project" under "Basic Operations".
   The "New Project" dialog box will be displayed.




3. Select **Projects**>**Standard project**, and specify a project file name in the "Name" field and a project storage location in the "Location" field.

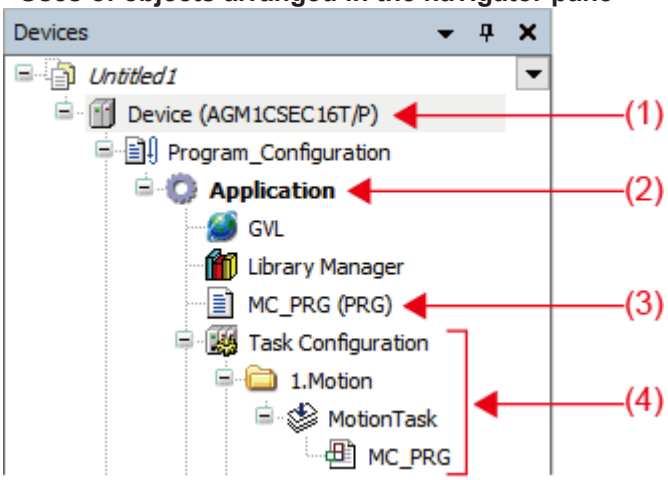
4. Click the [OK] button.
   The "Standard project" dialog box will be displayed.




5. Select "AGM1CSEC16T/P(Panasonic Corporation)" in the "Device" field and "Structured" in the "Program in" field, and click the [OK] button.

A new project will be created. Device and other objects including objects for ST programs are arranged in the navigator pane.

**<Uses of objects arranged in the navigator pane>**




| No. | Name | Function |
|---|---|---|
| (1) | Device object | Sets up device objects. |
| (2) | Application object | Sets up application objects. |
| (3) | Program object (POU object) | Sets up program objects (POU objects). |
| (4) | Task object | Sets up task objects. |

**Info.**

- A new project can also be created from the menu bar by selecting **File**>**New Project**.

## 10.3 Communication Setting

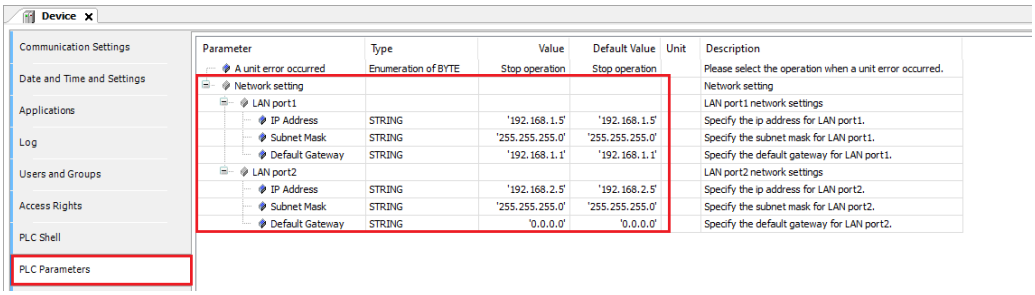
### 10.3.1 Setting the LAN Port

Configure communication settings for the LAN port using "Network setting" in the "PLC Parameters" tab.

When connecting GM Programmer and the GM1 Controller via the LAN port, match the network settings of the PC with those of the GM1 Controller.

#### Procedure

1. Double-click the "Device(AGM1CSEC16T/P)" object in the navigator pane.
   The device editor will open.
2. Open the "PLC Parameters" tab.




3. Check the network settings of the GM1 Controller and match the network settings of the PC with those of the GM1 Controller.
4. Open the "Communication Settings" tab and click "Network scan".
5. Select a GM1 Controller to which you want to connect and click the [OK] button.

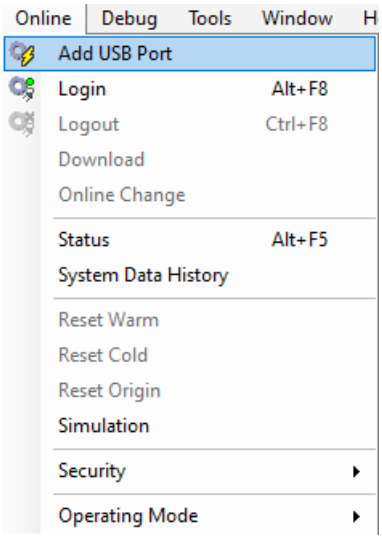
- If the network settings of the GM1 Controller have been changed, the changes will take effect after the project is downloaded.

### 10.3.2 Adding USB Ports

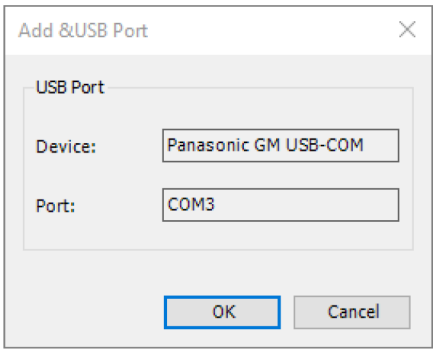
This function allows the user to set a USB port as the communication interface between a tool such as GM Programmer or PANATERM Lite for GM and the GM1 Controller.

#### Procedure

1. Connect the GM1 Controller and PC with a USB cable.
2. From the menu bar, select **Online**>**Add USB Port**.

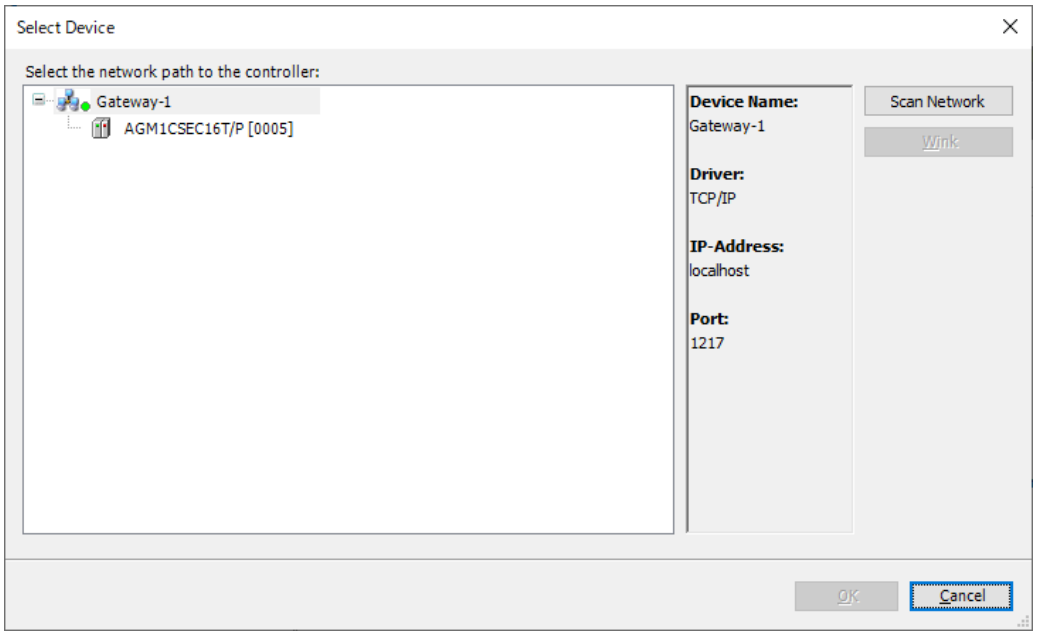



The "Add USB Port" dialog box will be displayed.



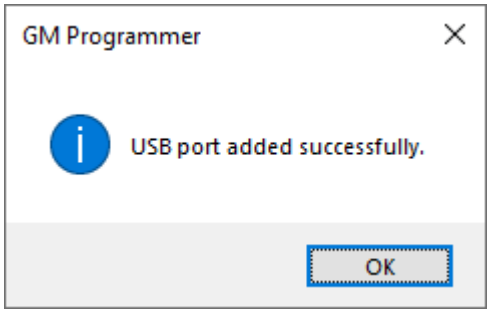

***3.*** Click the [OK] button.
A dialog box to restart the Gateway will be displayed.


***4.*** Click the [OK] button.
The "Select Device" dialog box will be displayed.




**5.** Select a GM1 Controller to which you want to connect and click the [OK] button.

When the connection is completed, a dialog box will be displayed to notify successful connection.




**6.** Click the [OK] button.

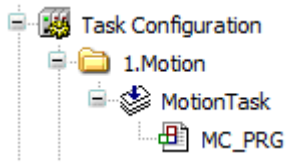
A USB port will be added as the communication interface between the PC and GM1 Controller.

## 10.4 Basic Setting for GM1 Controller

Set a control cycle for the GM1 Controller.

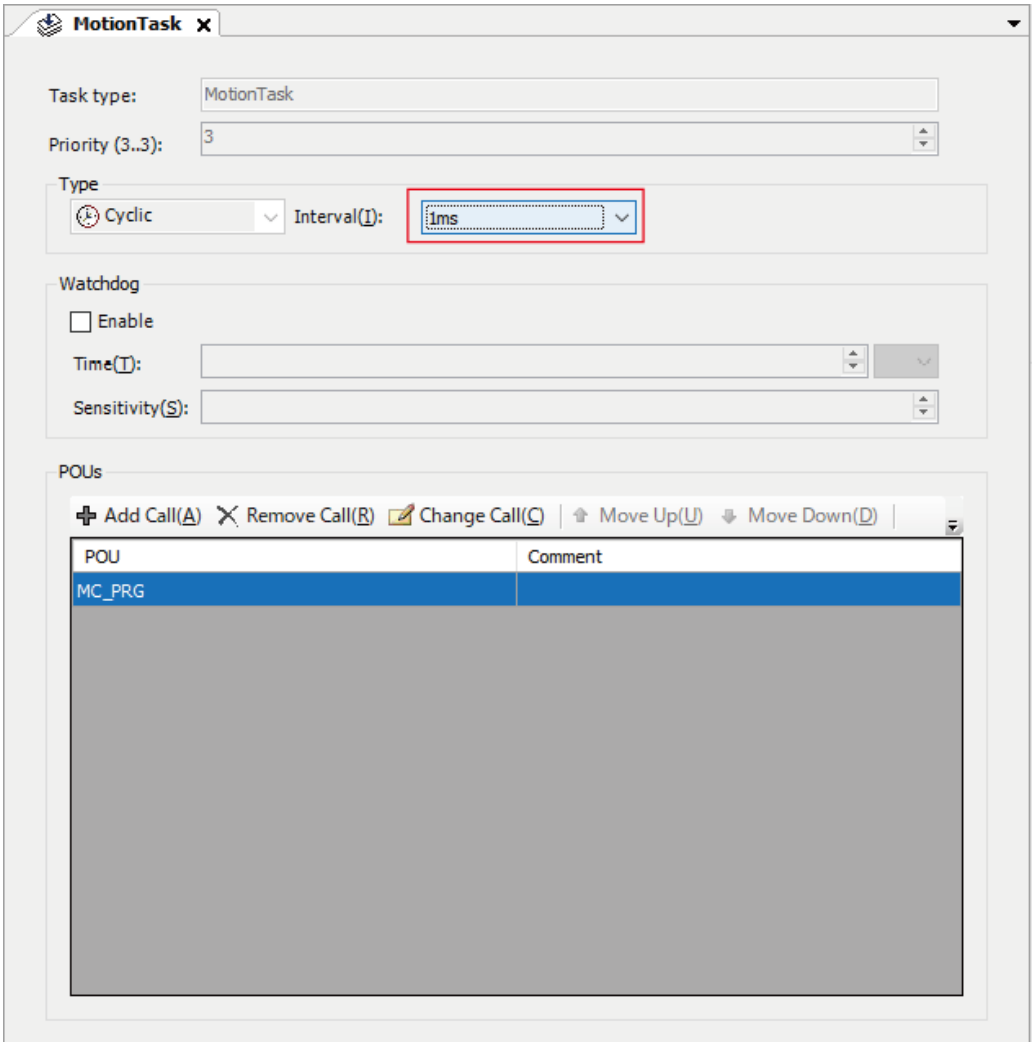
### Procedure

1. Double-click the **MotionTask** object in the navigator pane.




The "MotionTask" editor will open in the main pane.

2. Set a control cycle.



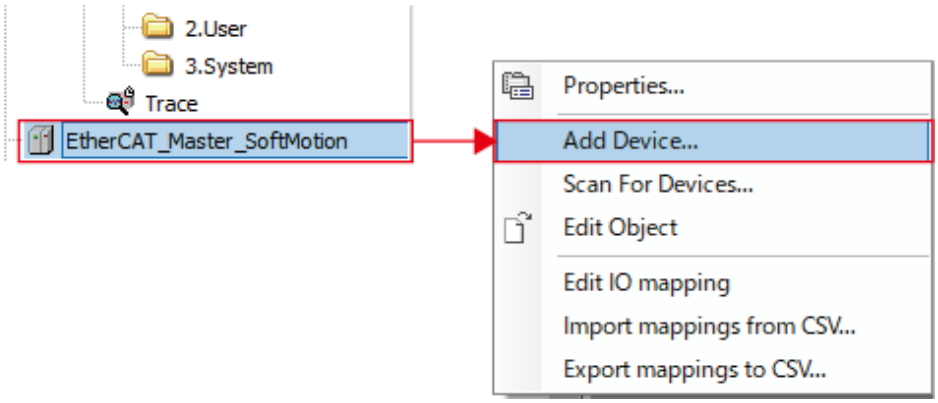
## 10.5 Adding and Setting up Servo Amplifiers

This section explains how to add device objects for servo amplifiers to a project and set them up.

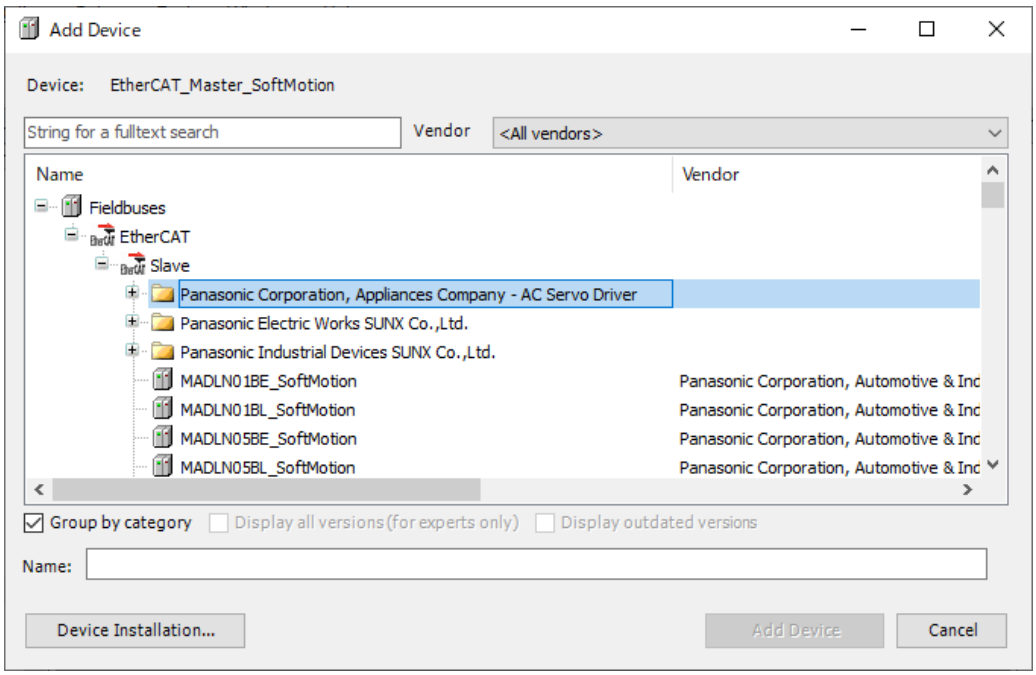
The description below explains how to add device objects for A5B servo amplifiers to a project and how to set them up.

### Procedure

1. Right-click the **EtherCAT_Master_SoftMotion** object in the navigator pane and then select **Add Device** from the context-sensitive menu that is displayed.

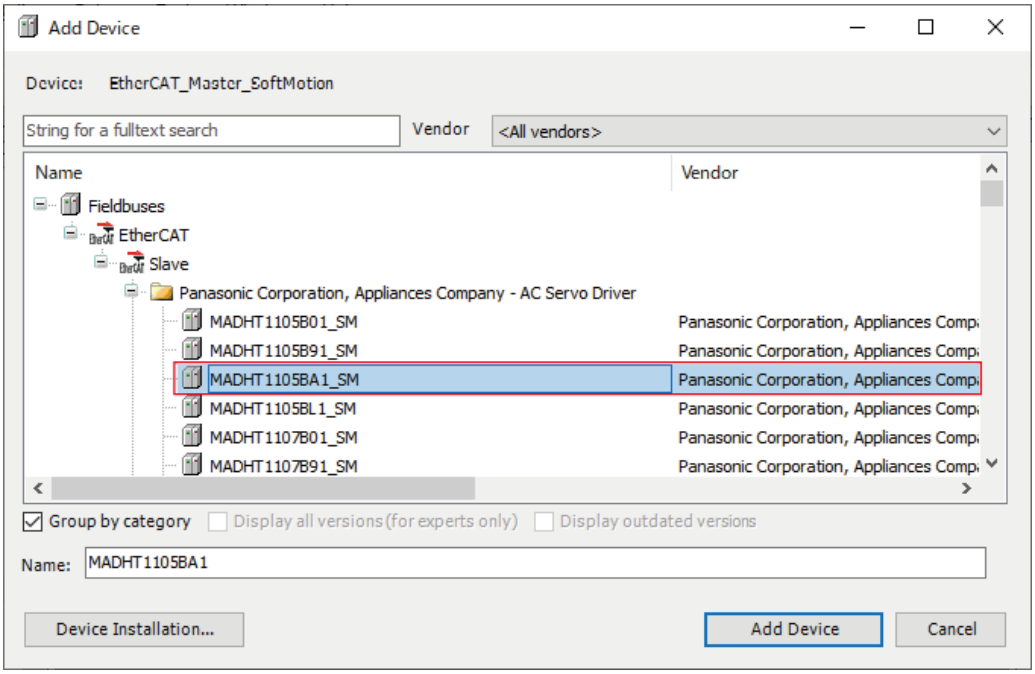



The "Add Device" dialog box will be displayed.

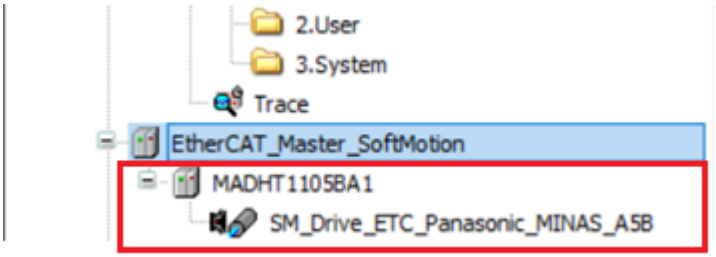



2. Select a device object for the servo amplifier.

The selected device object of the servo amplifier will be added.

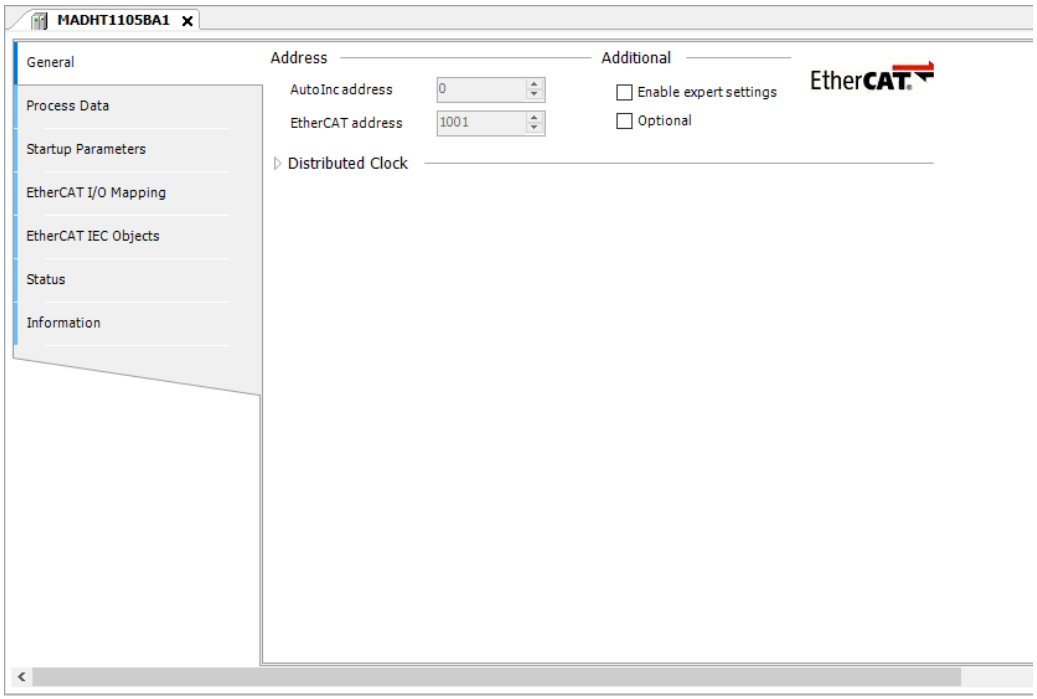



**3.** Click the [Add Device] button.
The selected device object of the servo amplifier will be added to the navigator pane.




Click the [Cancel] button to close the "Select Device" dialog box.

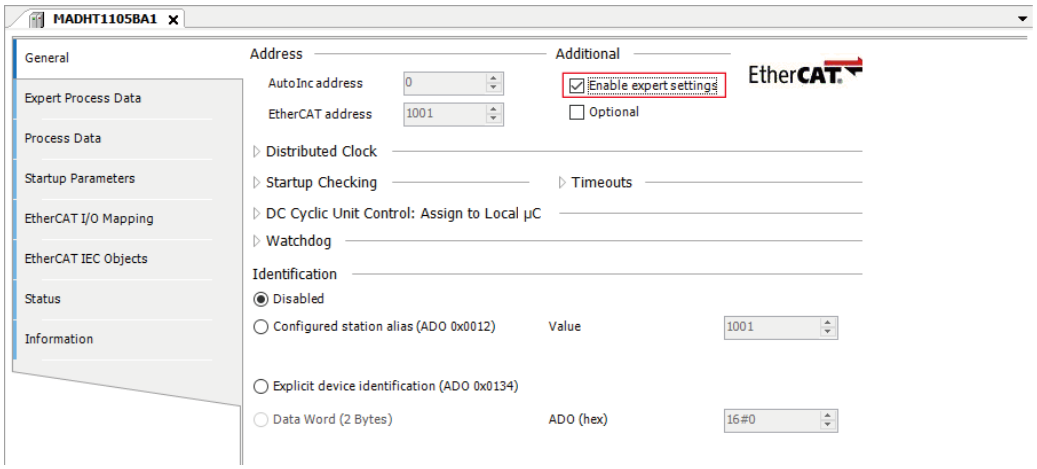
**4.** Double-click the added object.
The setting pane will be displayed in the main pane.




**Info.**

- To remove a device object that has been added, select the device object in the navigator pane and press the <Delete> key.

***5.*** Select the "Enable expert settings" check box.




***6.*** Set a station alias.

How to set a station alias differs according to the setting of Pr7.41 in "8.1.3 Initial Setup for Servo Amplifiers".

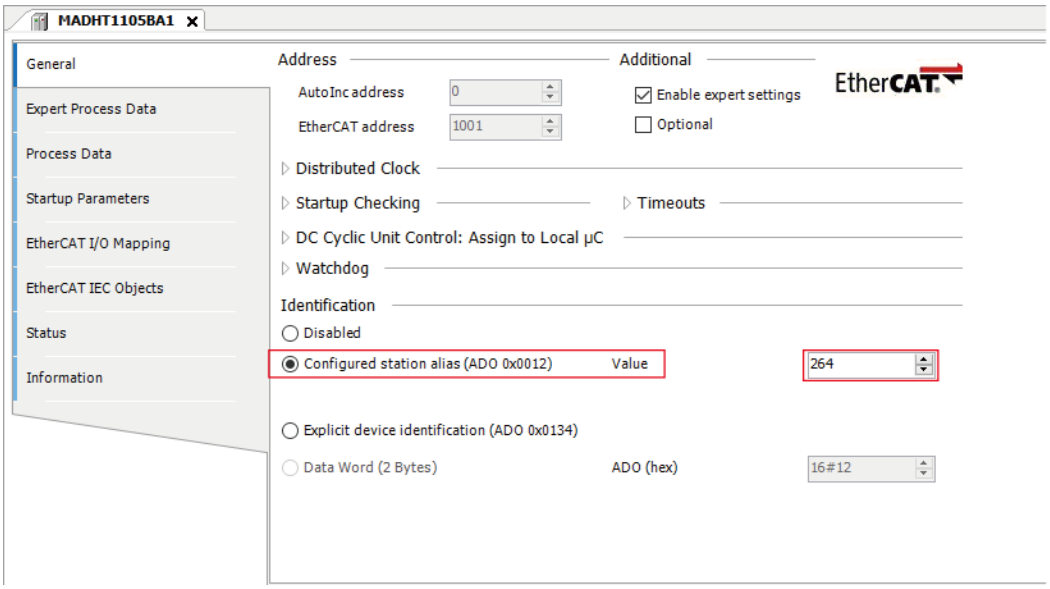
- When Pr.7.41 is set to 0

Select the "Configured station alias” option and enter the setting of the rotary switch on the front panel of the servo amplifier and the setting of Pr7.40 into the input field.

Example: When the value of the rotary switch on the front panel of the servo amplifier is set to 8 and the value of Pr7.40 is set to 1

The high-order 8 bits and low-order 8 bits represent 1 and 8, respectively. Therefore, enter 264 in the input field.

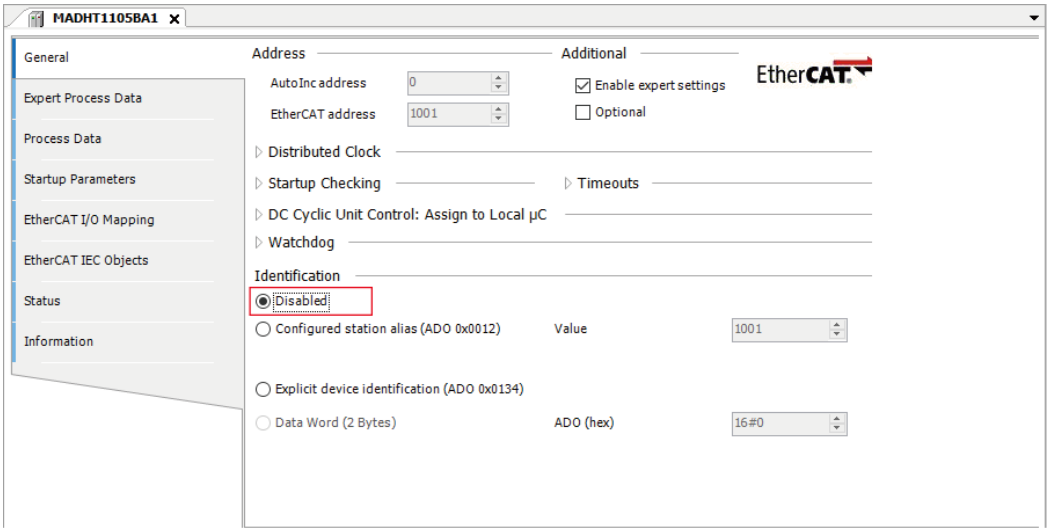
| Station alias | |
|---|---|
| **High-order 8 bits** | **Low-order 8 bits** |
| 3740H setting | Rotary switch setting |




- When Pr.7.41 is set to 1

  Select the "Disable” option.

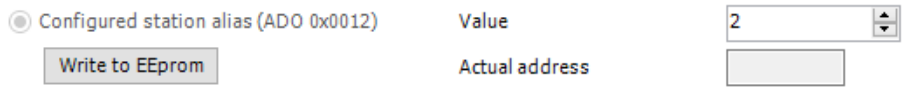
  The numerical value displayed in "EtherCAT address” is set as the station alias value.



**Info.**

- You can also set any desired value after logging in by selecting the configured station alias value.

  Enter any desired value in the input field and click the [Write to Eeprom] button.




  When you log in again after restarting the servo amplifier, the value entered in the input field is set as the station alias value.

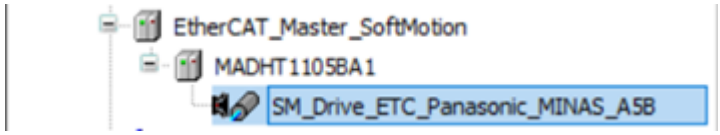
  If you log in for the first time after selecting the "Configured station alias" option, station alias value inconsistency will occur, causing the device name of the servo amplifier in the navigator pane to be grayed out.

## 10.6 Basic Settings for EtherCAT Axes

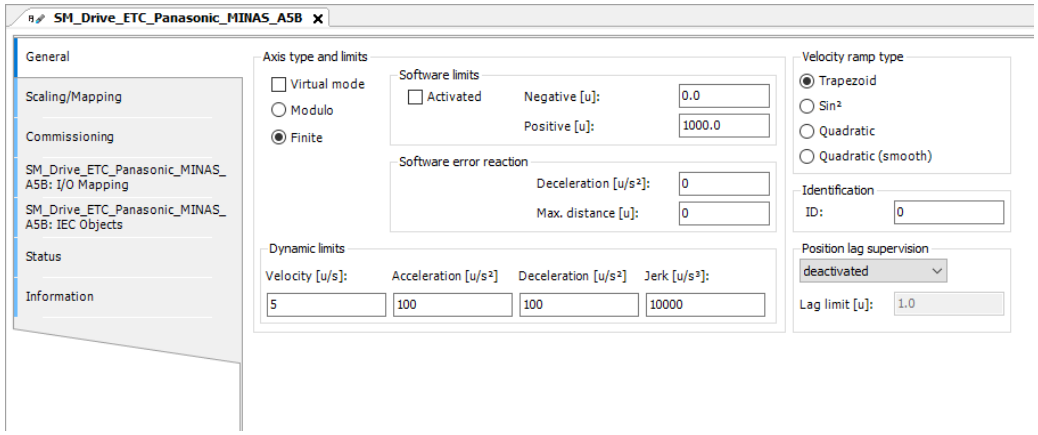
- Be sure to configure settings for EtherCAT axes.

### 1 2 Procedure

1. Double-click the servo amplifier object in the navigator pane.

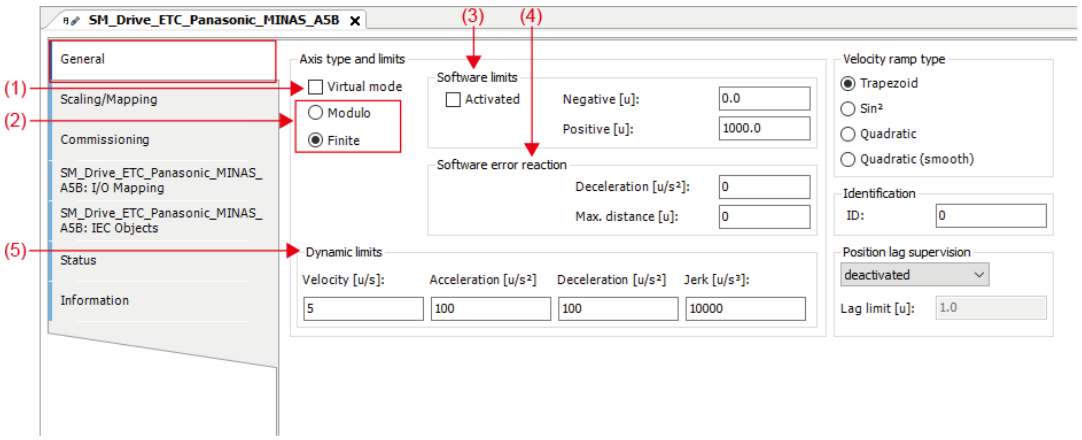



The setting pane will be displayed in the main pane.




### 10.6.1 General Settings

Select the "General" tab and set the following items.



**(1) Virtual mode**

You can set real axes or virtual axes.

Use of real axes: Real axes are used to actually control the servo amplifier.

Use of virtual axes: Virtual axes create and execute a virtual servo amplifier within the GM1 Controller.

**(2) Modulo / Finite**

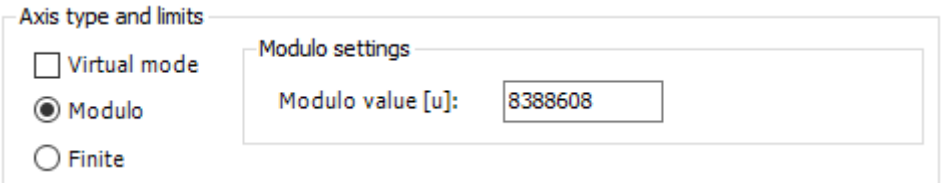
The axis type can be specified.

- Modulo

  Modulo: The motor rotates infinitely (belt drive, etc.) without limiting the travel range.

  - The value of the commanded position keeps looping between 0 and modulo value.
  - The maximum settable modulo value is "255×units in application" (*1).

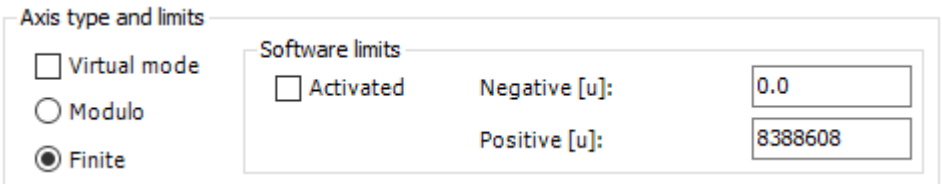
    *1: For "units in application", specify settings in the "Scaling / Mapping" tab.
  - A negative value cannot be set. (A warning is issued. If a download is performed without correcting the value, an error will occur when the GM1 Controller is started.




- Finite

  The set value of the commanded position is a finite value.

  Soft limits can be set. Note that an error will occur if a 32-bit real number is exceeded.




**(3) Soft limits**

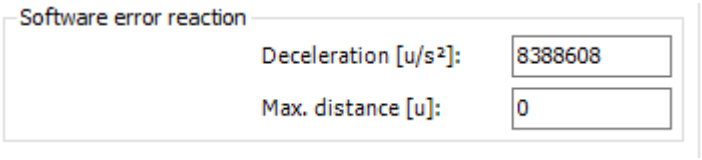
If the axis type is set to "Finite", soft limits can be set.

If the commanded position falls outside the soft limit setting range, an error stop will occur, causing the operation to stop.

If the operation is stopped because the soft limit setting range is exceeded, the value specified in "Deceleration" or "Max. distance" in "Soft error reaction" or the value specified in "Deceleration" in "Dynamic limits" will be applied, whichever is the shortest time from when deceleration starts until a stoppage occurs.


**(4) Software error reaction**

Settings can be configured to stop operation when an error occurs.

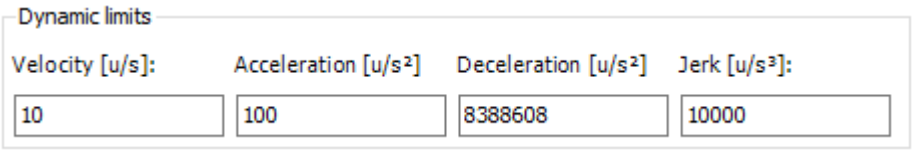



**Info.**

- If the mode is switched from run to stop during operation, an emergency stop will be executed, regardless of the settings in "Software error reaction".
- For stop operation that takes place when an error stop occurs or when the soft limit range is exceeded, one of the values specified in the following items is applied, whichever is the shortest time from when deceleration starts until a stoppage occurs.
  - "Deceleration" in "Software error reaction"
  - "Max. distance" in "Software error reaction"
  - "Deceleration" in "Dynamic limits"
- If "Deceleration" and "Max. distance" in "Software error reaction" are set to 0, these settings will be disabled. In this case, operation is stopped according to the value specified in "Deceleration" in "Dynamic limits".

**(5) Dynamic limits**

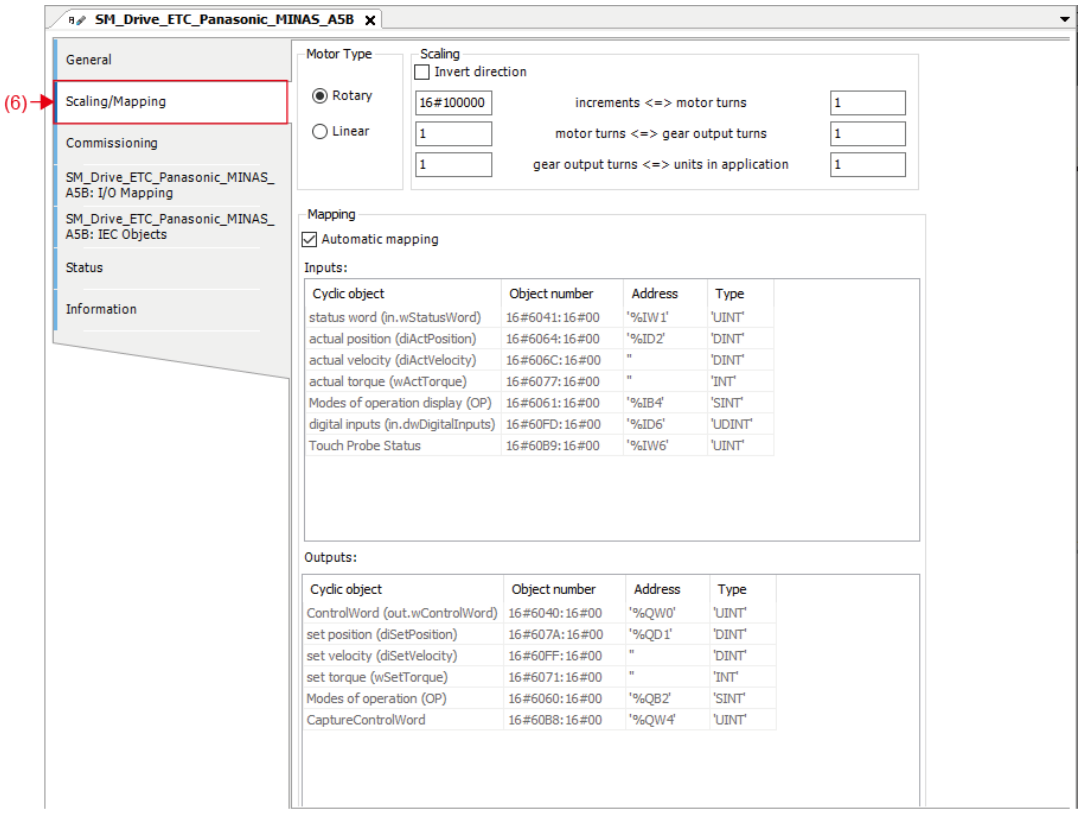
"Velocity", "Acceleration", and "Deceleration" cannot be set to 0. If they are set to 0, a warning will be issued.




The "SMC_CheckLimits" function block can be used to check whether the values set in "Dynamic limits" were exceeded during axis operations. Note that the "SMC_CheckLimits" function block cannot detect whether the value set in "Jerk" was exceeded. Therefore, do not use the "Jerk" field.

## 10.6.2 Scaling / Mapping Settings

Select the "Scaling / Mapping" tab and set the following items.




**(6) Scaling / Mapping**

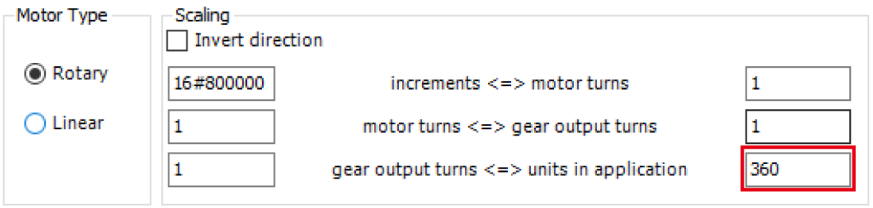
- Rotary type

  When the axis type is set to "Modulo", the ratio in conversion from drive increments to the application unit is set.

  The unit on the servo amplifier and the unit on the application (POU) are converted.

  Example:

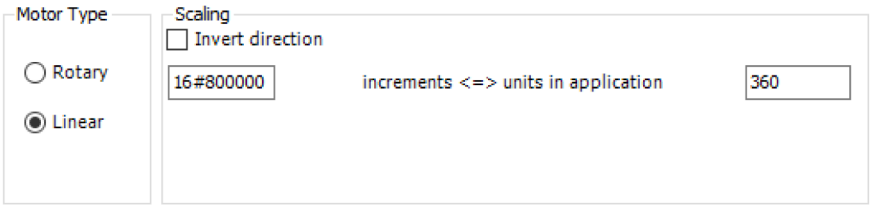
  One revolution of the MINAS A6B MADHT1105BA1 is 0x800000. To treat one revolution as 360 in the application, set this ratio to 360.




  Invert direction: The direction is reversed.

- Linear type

  When the axis type is set to "Finite", the ratio in conversion from drive increments to the application unit is set.




Invert direction: The direction is reversed.

## 10.7 Connecting to the GM1 Controller

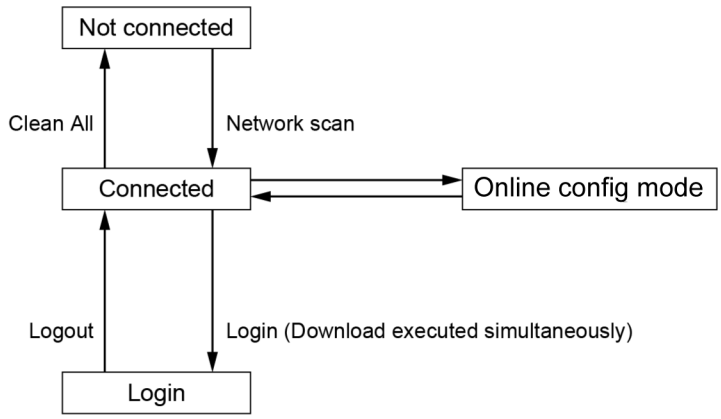
Connect the PC where the GM Programmer is installed to the GM1 Controller.

The connection status of the PC includes "Connected", "Connection as a device user", "Login", and "Online config mode".

Depending on the connection status, operations that can be executed are different.

If the Controller is provided with a device user registration, connection must be made as the device user.

### ■ Without device user registration




### List of available GM1 Controller operations

| Function | Not connected | Connected | Login | Online config mode |
|---|---|---|---|---|
| Setting / acquiring Controller information | × | ○ | ○(Note 1) | × |
| Application management | × | ×(Note 2) | ○ | × |
| Reset | × | ×(Note 3) | ○ | ×(Note 4) |
| Security | × | × | ○ | ○ |
| Debug | × | × | ○ | × |
| Commissioning | × | × | × | ○ |

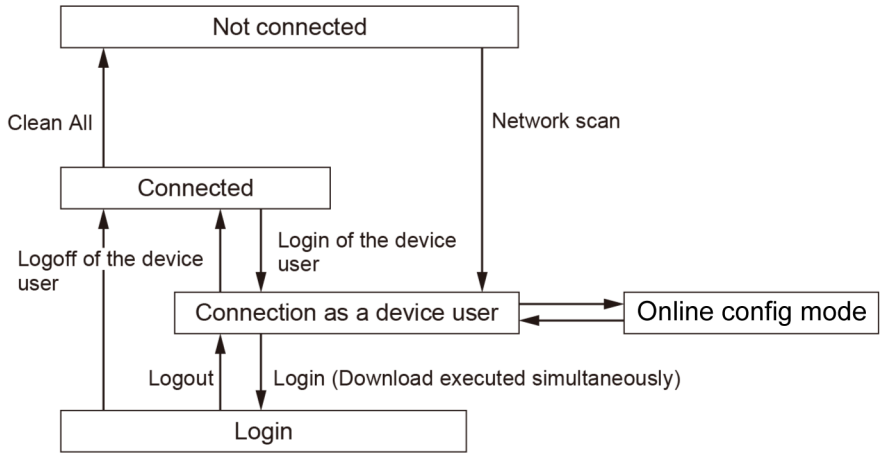
(Note 1) Not possible to operate the PLC Shell.

(Note 2) Possible to upload the source.

(Note 3) Possible to reset the device (PLC initialization) or to delete device application from the device.

(Note 4) Possible to reset the device (PLC initialization).

## ■ With device user registration




### List of available GM1 Controller operations

| Function | Not connected | Connected | \as a device user | Login | Online config mode |
|---|---|---|---|---|---|
| Setting / acquiring Controller information | × | × | ○ | ○(Note 1) | × |
| Application management | × | × | ×(Note 2) | ○ | × |
| Reset | × | × | ×(Note 3) | ○ | ×(Note 4) |
| Security | × | × | ○(Note 5) | ○ | ○ |
| Debug | × | × | × | ○ | × |
| Commissioning | × | × | × | × | ○ |

(Note 1) Not possible to operate the PLC Shell.

(Note 2) Possible to upload the source.

(Note 3) Possible to reset the device (PLC initialization) or to delete device application from the device.

(Note 4) Possible to reset the device (PLC initialization).

(Note 5) Addition of the device user, changing the password for the device user, or deletion of the device user cannot be made if the user of the Device Editor is not synchronized with "Synchronization" of the group tab.

# 10.8 Commissioning

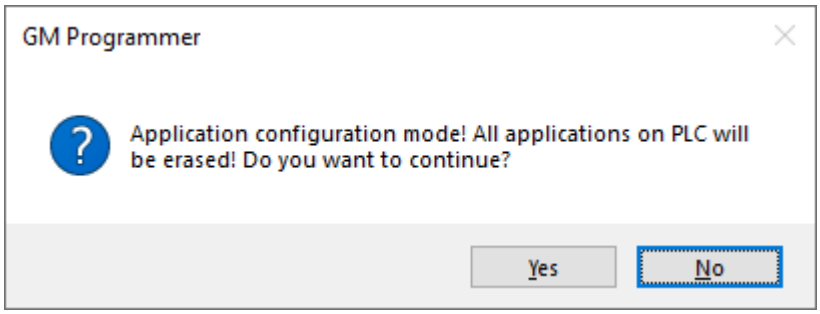
## 10.8.1 Online Config Mode

When the online config mode is selected, the servo amplifiers are set to be connected to the GM1 Controller.

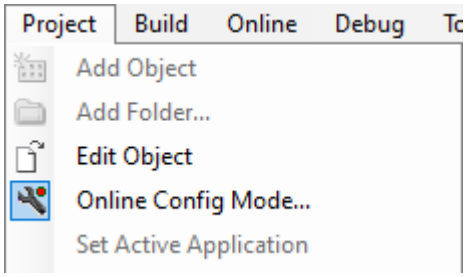
When using the online config mode, perform the setting as described in "10.3 Communication Setting" in advance.

### Procedure

1. From the menu bar, select **Project>Online Config Mode**.
   A confirmation message will be displayed, asking whether to remove all applications.




2. Click [Yes].
   All applications will be removed from the GM1 controller, and the GM1 controller and servo amplifiers will be connected in online config mode.
   While online config mode is in progress, "Online Config Mode" in the menu bar remains selected.




### Info.

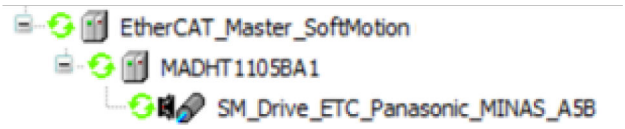
- To cancel the online config mode, select **Project>Online Config Mode** from the menu bar again.

## 10.8.2 Conducting Commissioning for Servo Amplifiers

While in online config mode, you can conduct commissioning for servo amplifiers.
There is no need to create a program for commissioning.
The following is an example of commissioning using the A5B-series servo amplifiers.

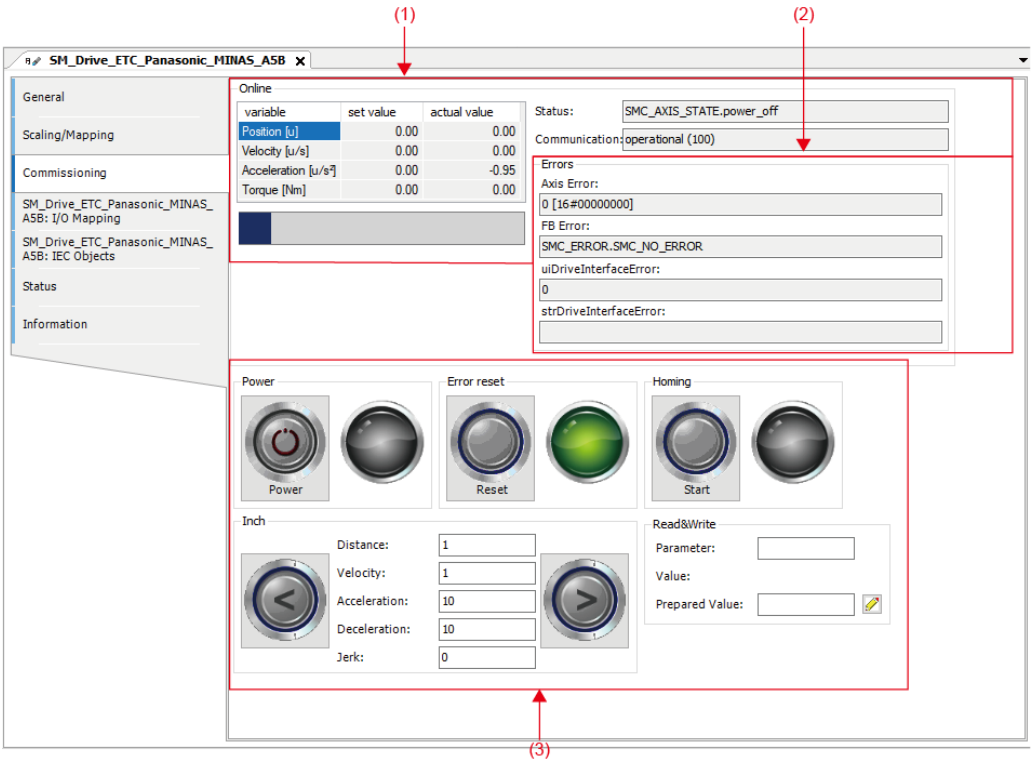
### Procedure

1. Double-click the servo amplifier object in the navigator pane.




The "EtherCAT Axis Setting" dialog box will be displayed.

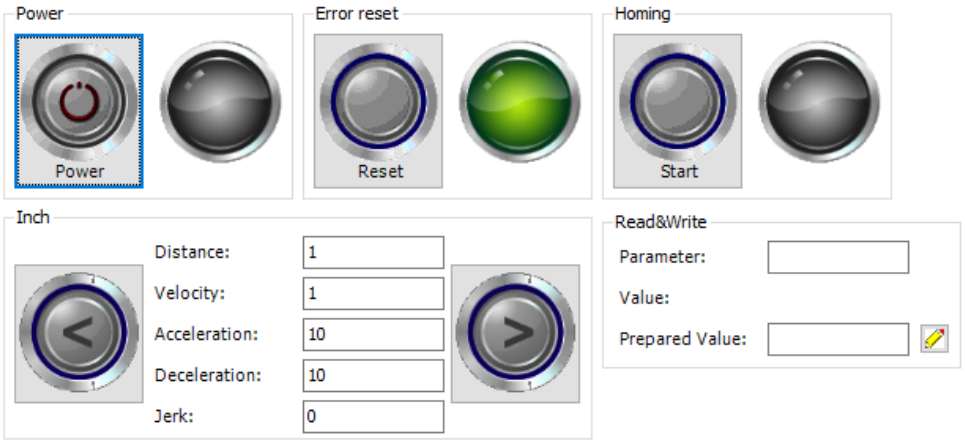
2. Click the "Commissioning" tab.
The Commissioning pane will be displayed.




| No. | Group | Description |
|---|---|---|
| (1) | Status | Displays the running status of the servo amplifiers during commissioning. |
| (2) | Error | Displays errors that occurred during commissioning.<br>Allows the user to clear errors. |

| No. | Group | Description |
|---|---|---|
| (3) | Operation | Allows the user to set commissioning parameters.<br>Allows the user to execute commissioning. |

**3.** Click an appropriate button in the Operation group to start commissioning.
Clicking an icon starts the corresponding commissioning.
To change home return parameters, use the "Program" tab.




**4.** For the servo amplifier status during commissioning, check the "Status" and "Error" groups.

**4-1** To clear errors that are displayed, click the [Reset] button in the "Operation" group.
Clicking the [Reset] button clears all errors.

**5.** From the menu bar, select **Project>Online Config Mode**.
Online config mode will be canceled and commissioning will be terminated.

This completes commissioning for servo amplifiers.

**Info.**

- Even if communication with the servo amplifier is disrupted during "Inching" or "Home Return" operation, the servo amplifier will continue commissioning operation.
- If online config mode is canceled, commissioning will be terminated. To cancel the online config mode, select **Project>Online Config Mode** from the menu bar again.

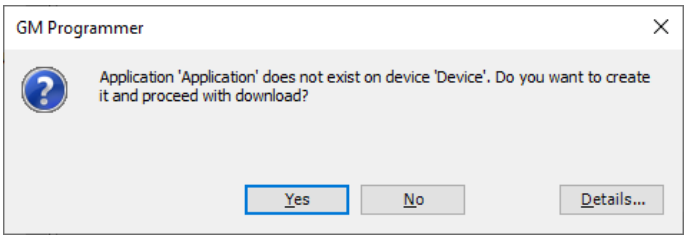
## 10.9 Login

GM Programmer allows the user to log in to the GM1 Controller. When "Login" is executed, applications are downloaded to the GM1 Controller.

### Procedure

1. From the menu bar, select **Online**>**Login**, or press the <Alt> key and the <F8> key simultaneously.

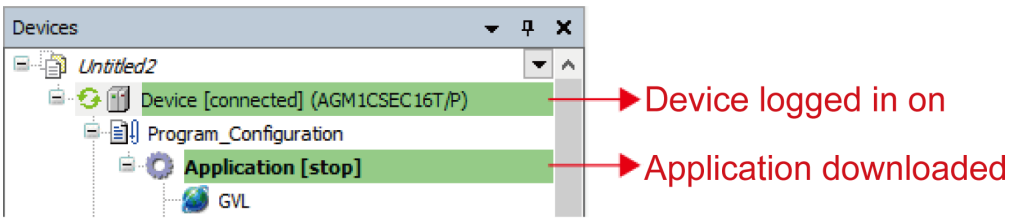
   A confirmation message will be displayed, asking whether to download the applications to the GM1 controller (device).




2. Click [Yes].

   The applications will be downloaded to the GM1 Controller at the same time as you log in to the GM1 Controller (device).

   "connected" will be displayed at the [Device] object in the navigator pane and the status of the downloaded applications will be displayed.




### Info.

- You can also log in by clicking on the toolbar.
- If you log in again after the applications have been downloaded, the confirmation message will not be displayed.

## 10.10 Logout

This function allows the user to log out from the device to which the user logged in.

### Procedure

1. From the menu bar, select **Online**>**Logout**, or press the <Ctrl > + <F8> key simultaneously. You will be logged out.

### Info.

- You can also log out by clicking  on the toolbar.

# 11 Setting up the Servo Amplifier Connected to the GM1 Controller

## 11.1 Setting up the Servo Amplifier Connected to the GM1 Controller

This section explains how to set up MINAS series servo amplifiers connected to the GM1 Controller.

For other devices, refer to their instruction manuals when setting up them.

The PC communicates with the servo amplifier connected to the GM1 Controller.

Connect the PC and GM1 Controller with an Ethernet cable or USB cable. With the GM1 Controller and servo amplifier connected with a Cat5e shielded cable, set up the servo amplifier.

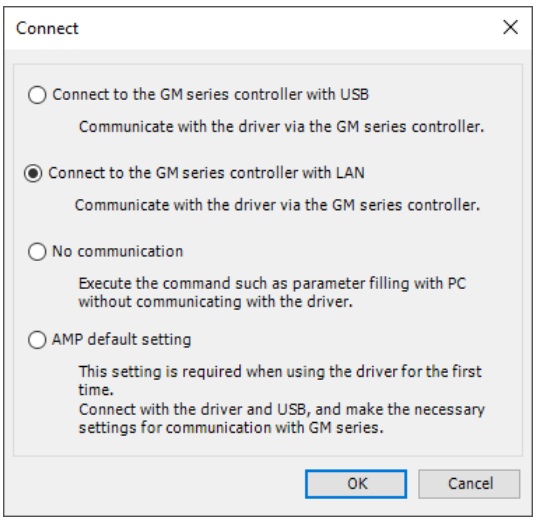
- Perform this setup work only after the connection between the GM1 Controller and the servo amplifier has been established.

### 11.1.1 If Connected with Ethernet Cables

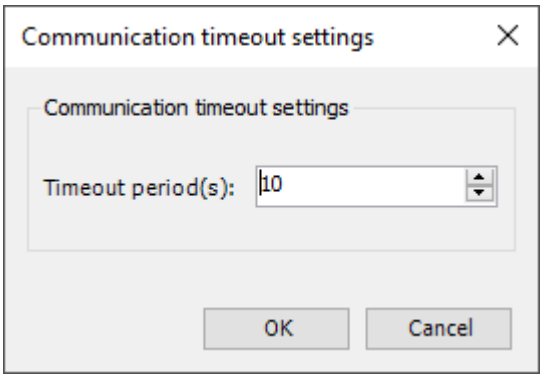
If connected with Ethernet cables, use the following procedure.

**Procedure**

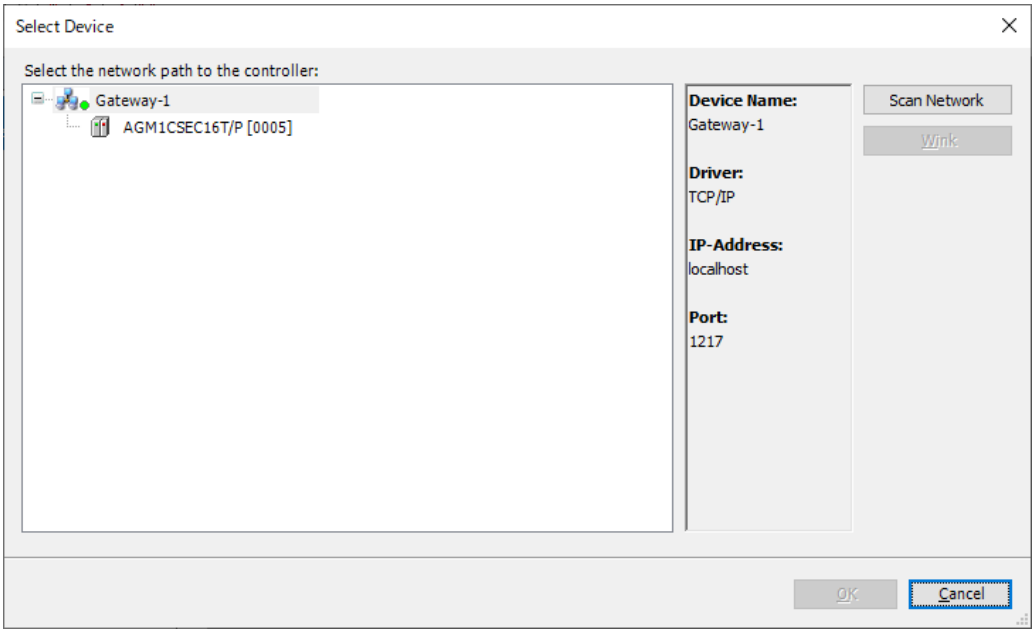
1. Start PANATERM Lite for GM.
   The "Connect" dialog box will be displayed.



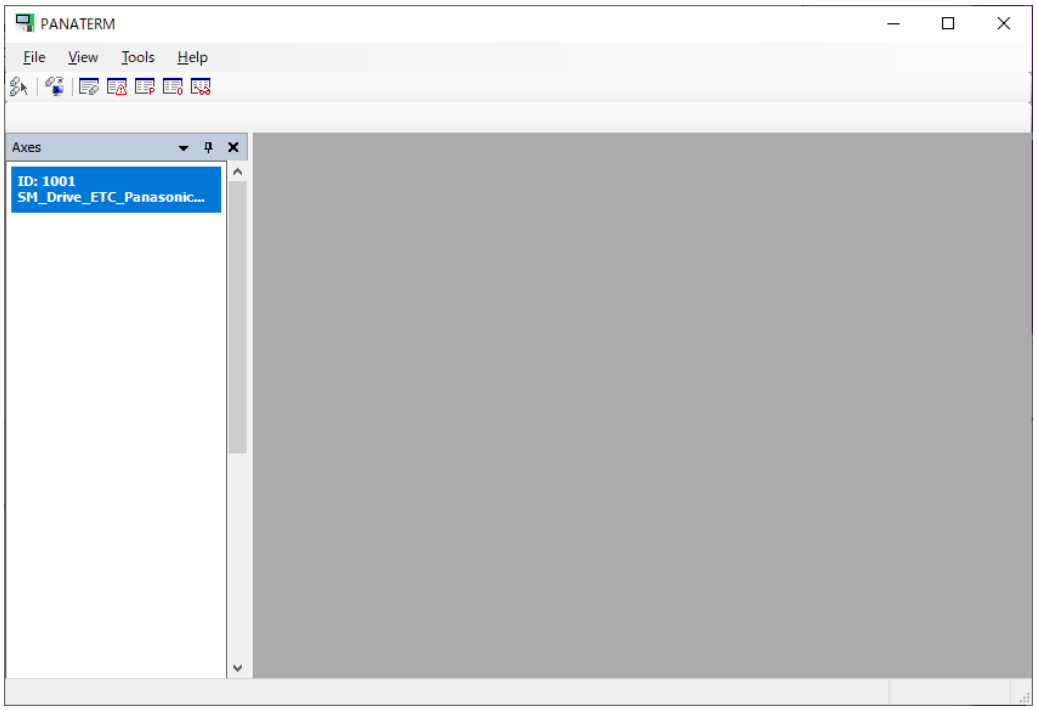

2. Select "Connect to the GM series controller with LAN" and click the [OK] button.
   The "Communication timeout settings" dialog box will be displayed.




*3.* Change the timeout period and click the [OK] button.
The "Select Device" dialog box will be displayed.




*4.* Click the [Search Network] button, select the GM1 Controller, and click the [OK] button.
The main pane will be displayed.

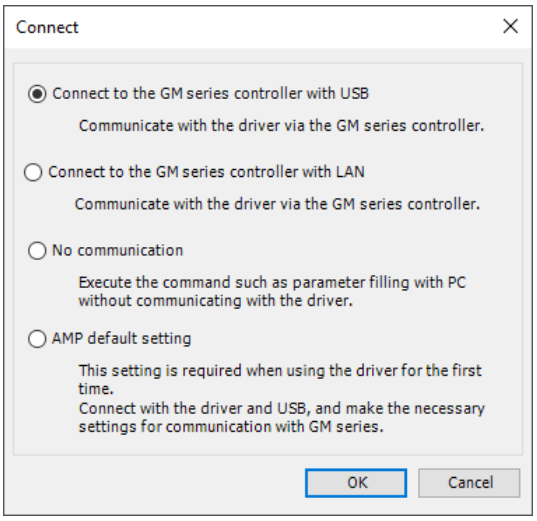



## 11.1.2 If Connected with USB Cables

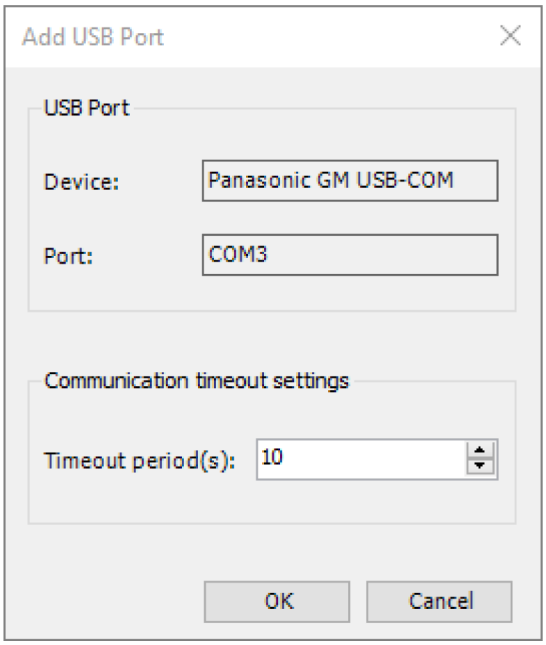
If connected with USB cables, use the following procedure.

### Procedure

1. Start PANATERM Lite for GM.
   The "Connect" dialog box will be displayed.

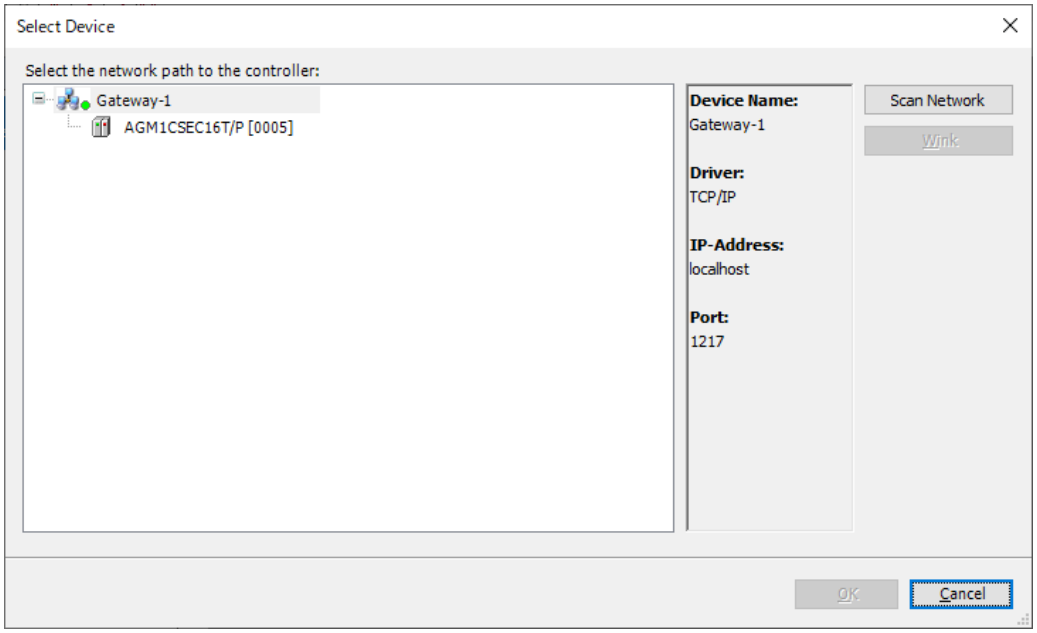



**2.** Select "Connect to the GM series controller with USB" and click the [OK] button.
The "Add USB Port" dialog box will be displayed.

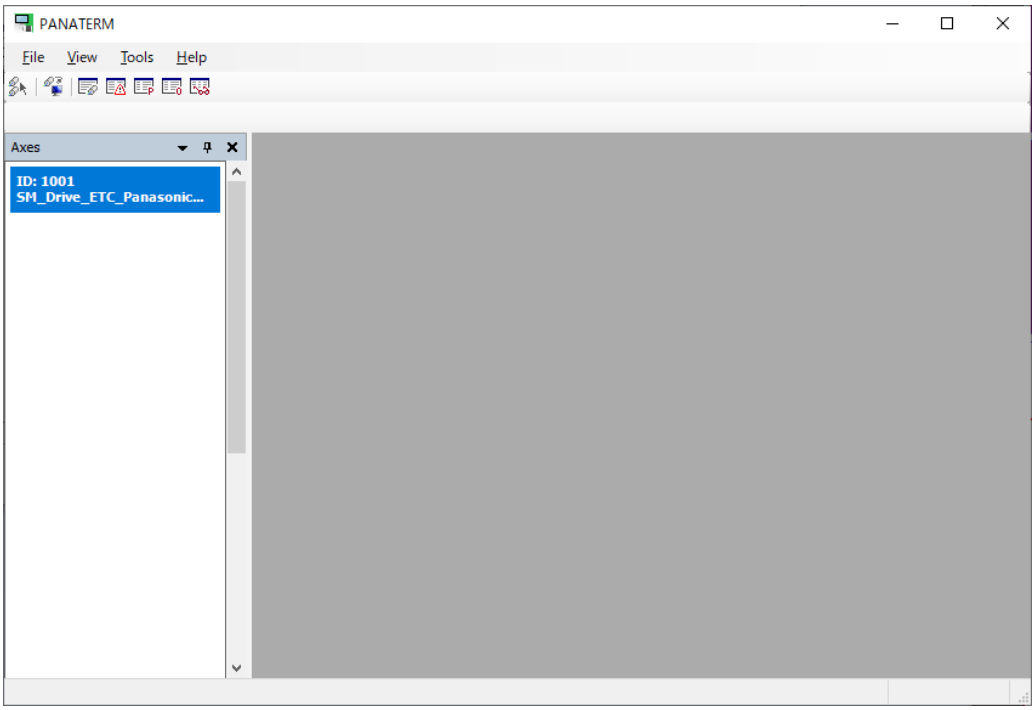



**3.** Change the timeout period and click the [OK] button.
A message window will be displayed, asking whether to add a USB port and restart the Gateway.


**4.** Click the [OK] button.
The "Select Device" dialog box will be displayed.




**5.** Click the [Search Network] button, select the GM1 Controller, and click the [OK] button.
The main pane will be displayed.

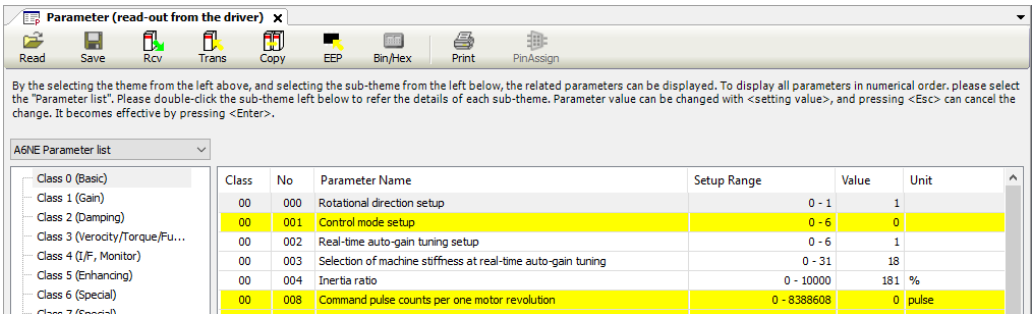

PANATERM
File
View
Tools
Help
Axes
ID: 1001
SM_Drive_ETC_Panasonic...

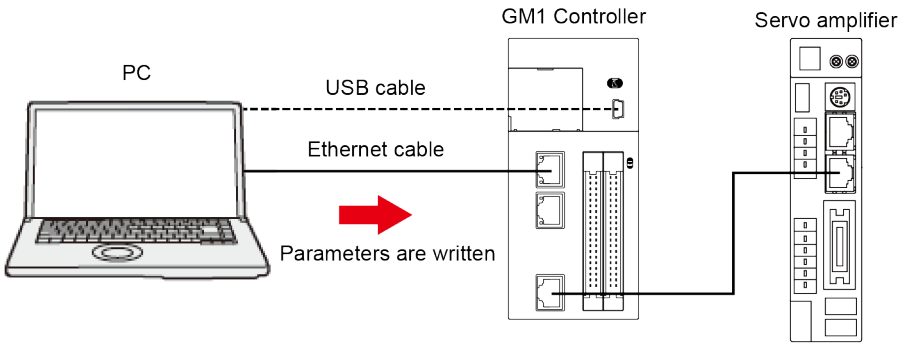
## 11.2 Writing Parameters to Servo Amplifier

By connecting the PC and a servo amplifier, the parameters set with PANATERM Lite for GM can be written directly to the servo amplifier.

### Procedure

1. Start PANATERM Lite for GM.
2. Click "Trans" on the toolbar.
   The parameters will be sent from PANATERM Lite for GM to the servo amplifier.




### Info.

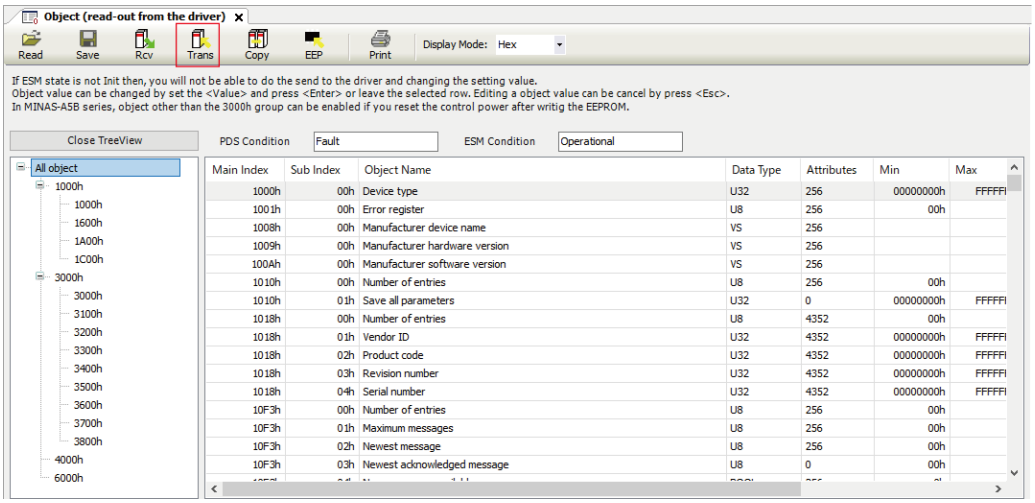
- If you have changed parameters on a yellow background, click "EEP" on the toolbar to restart the servo amplifier.

## 11.3 Writing Objects to Servo Amplifier

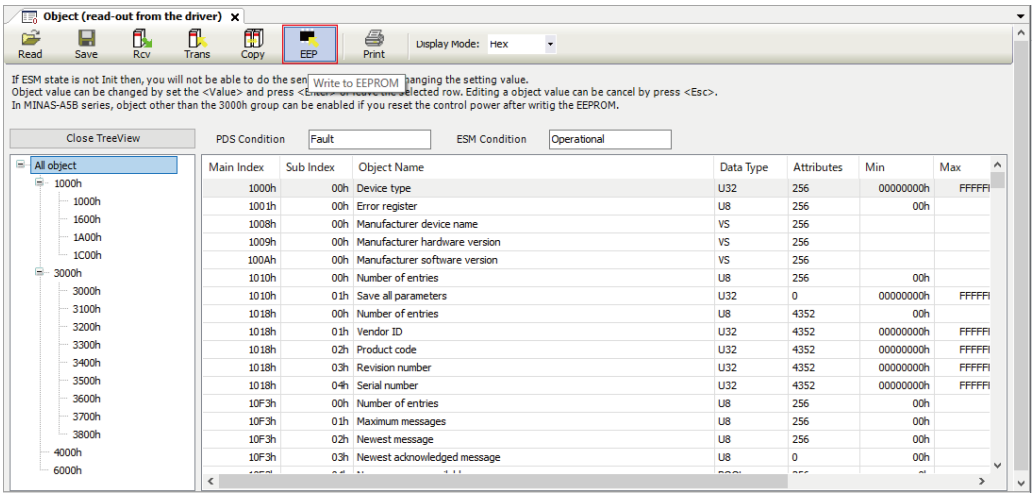
By connecting the PC and a servo amplifier, the objects set with PANATERM Lite for GM can be written directly to the servo amplifier.

### 1 2 Procedure

1. Start PANATERM Lite for GM.
2. Click [Trans] on the toolbar.
   The objects will be sent from PANATERM Lite for GM to the servo amplifier.




3. Click the [EEP] button to write the objects to the EEPROM of the servo amplifier.

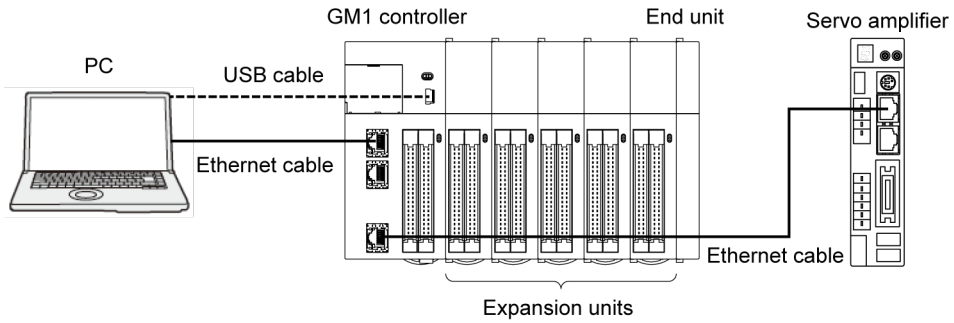


(MEMO)

# 12 Preparation for Operation

## 12.1 Checking Wiring

Firstly, check whether the GM1 Controller, expansion units, servo amplifier, and PC are connected correctly.



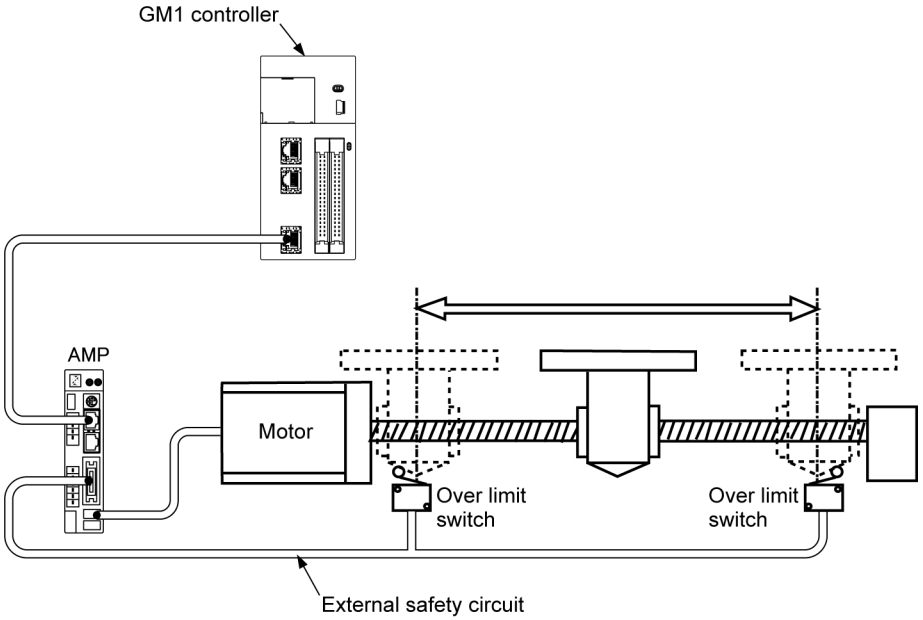
## 12.2 Checking Safety Circuit Design

### 12.2.1 Safety Circuit Design

■ **Example of a safety circuit**

Be sure to create a safety circuit when using this product.

**Installation of over limit switches**

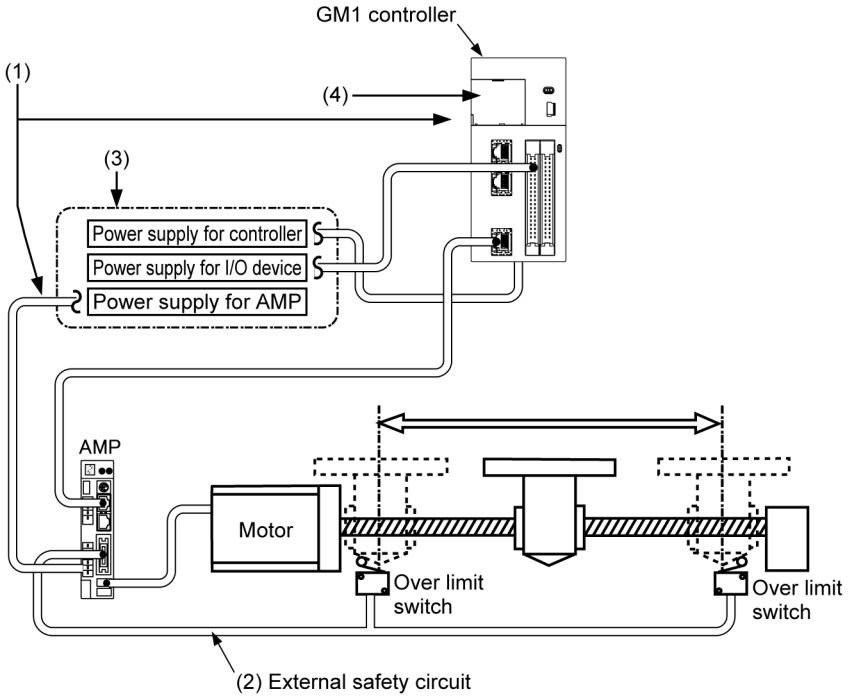



- Install over limit switches as shown above.
- Connect them to the CW and CCW over-travel inhibit inputs of the parallel I/O connector of the servo amplifier. The GM1 Controller receives these inputs as limit (+) and limit (-) inputs through the network.

- Install the safety circuit recommended by the manufacturer of the motor being used.

## 12.2.2 Items to Check during Wiring

■ **System configuration example**




**(1) Checking connections of each device**

Check whether each device has been connected as indicated by the design.

**(2) Checking the installation of an external safety circuit**

Check that the safety circuit is installed as an external circuit by installing and wiring over limit switches properly.

**(3) Checking the settings for power ON sequence**

Check whether settings have been configured so that the power is turned on in sequence.

**(4) Checking the GM1 Controller mode selector switch**

Set the GM1 Controller to STOP mode. Setting to RUN mode can cause unexpected operation.

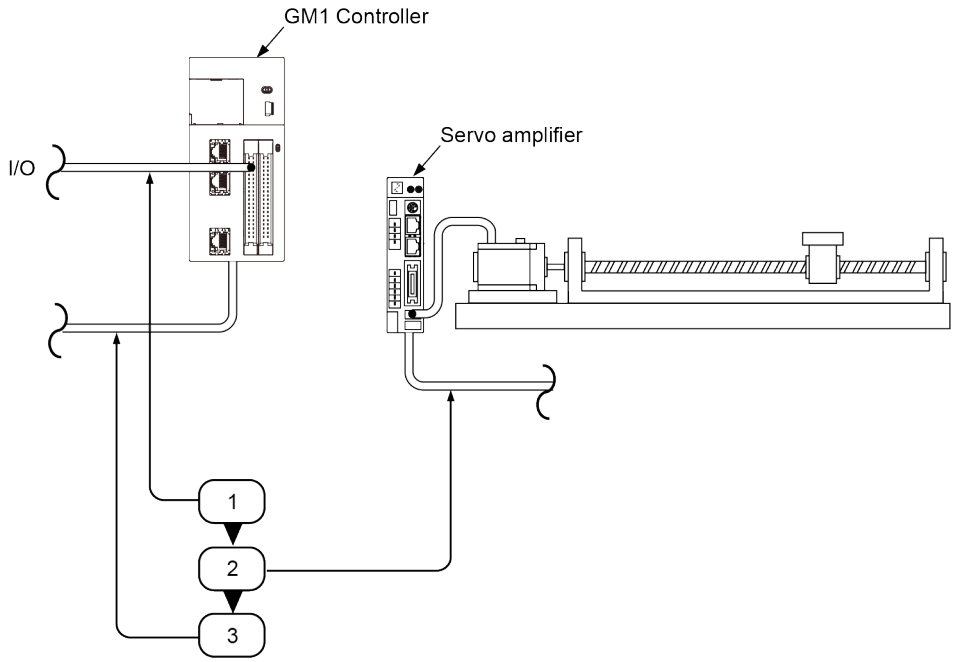
## 12.2.3 Power ON Operation

When turning ON the power to the system incorporating the GM1 Controller, follow the power ON sequence described in the procedure below.

- Consider the performance and statuses of any external devices connected to the system, and take sufficient care so that turning ON the power will not initiate unexpected movements.

## Procedure

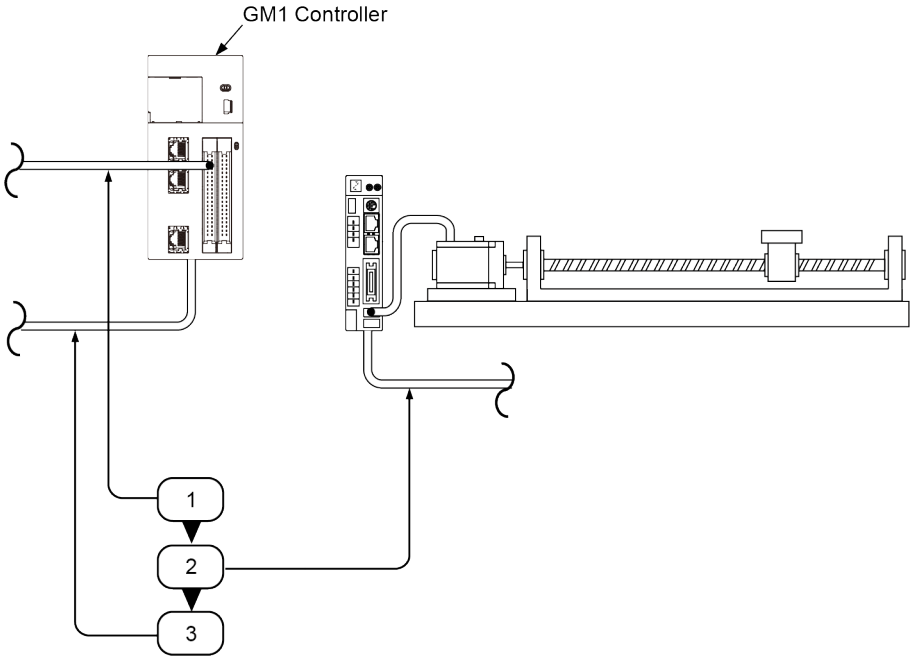
1. Turn ON the power to the I/O devices connected to the GM1 Controller.
2. Turn ON the power to the servo amplifier.
3. Turn ON the power to the GM1 Controller.




### 12.2.4 Power OFF Operation

## Procedure

1. Check that the rotation of the motor has stopped and then turn OFF the power to the GM1 Controller.
2. Turn OFF the power to the servo amplifier.
3. Turn OFF the power to the I/O devices connected to the GM1 Controller.


GM1 Controller
1
2
3

## 12.3 Operation Check

### 12.3.1 Checking the Network

After turning ON the power supplies, check if the operation monitor LEDs of the GM1 Controller are in the following states.

- STATUS: Lit
- LINK: Lit

**Info.**

- If the "STATUS" LED is flashing, the network is not established.
- If the "LINK" LED is not lit, the “RX” (reception side) of the GM1 Controller and “TX” (transmission side) of the servo amplifier are not electrically connected normally.

### 12.3.2 Checking Input Signals

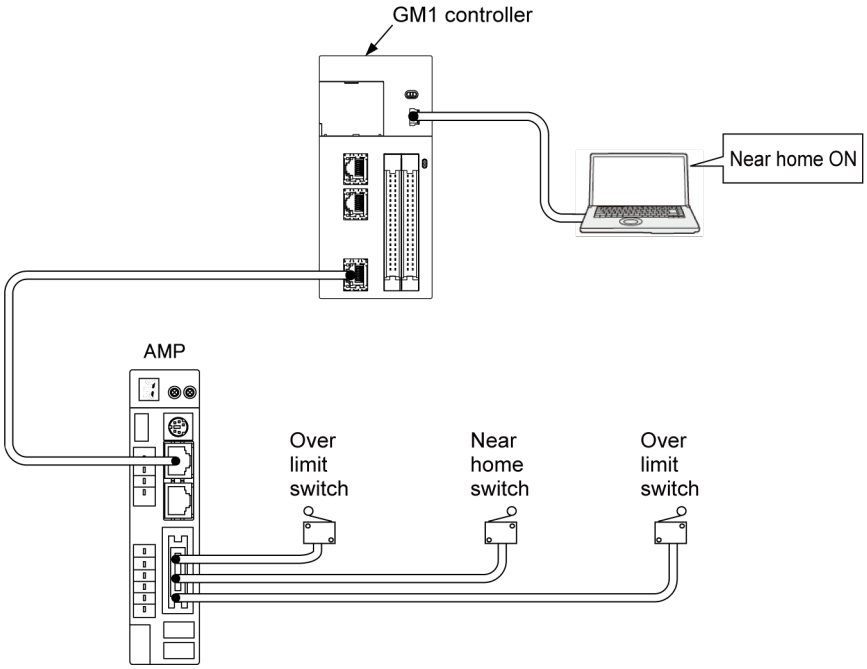
Check the inputs of the over limit switches for the safety circuit that are connected to the servo amplifier and the input of the near home (DOG) switch.

By operating each switch forcibly, check whether signals are normally input into the GM1 Controller.

The input state of each switch can be checked on the monitor screen of the MINAS setup support software "PANATERM Lite for GM".

**Info.**

- After the over limit switches are installed, if the moving direction of the motor is reverse to the limit (+) and limit (-) positions, review the physical connections of each limit switch.



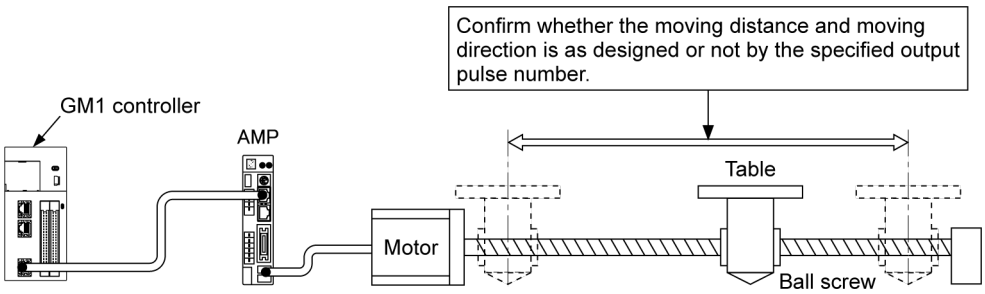

## 12.3.3 Checking the Rotation and Movement Directions and Movement Distance

Check whether the rotation and movement directions of the motor and the movement distance are correct. Movements can be easily checked using the commissioning function of GM Programmer without having to create a user program.

### ■ Using the commissioning function

In GM Programmer, select **Project**>**Online Config Mode**.

Opening the commissioning window for each axis allows you to use the commissioning function.




### ■ Checking the rotation direction

Set the rotation direction on the servo amplifier.

Check the rotation direction by executing inching operation in the commissioning window.

### ■ Checking the movement distance

Set the movement distance on the servo amplifier.
Then, set the scale in the "Scaling / Mapping" window for each axis in GM Programmer.
Check the movement distance by executing inching operation in the commissioning window.

**Info.**

For details on inching operation in the commissioning window, refer to "10.8.2 Conducting Commissioning for Servo Amplifiers".

(MEMO)

# Appendix Warranty / Cautions for Proper Use

# Warranty

## Warranty Period

The warranty period of the Product shall be 12 months from the ex-factory date or 18 months from the date of manufacturing unless otherwise specified between both parties.

## Warranty Scope

Panasonic warrants the replacement of the defected parts of the Product or repair of them when the defects of the Product occur during the Warranty Period, and when the defects are under Panasonic responsibility. This Warranty only covers the Product itself and does not cover any damage to your company and the third party incurred by the Product, such as damage that is induced by an object machined or produced using the Product or by the defects of the Product. This Warranty shall be exempted in the following cases,

1. Defects resulting from misuse and/or repair or modification by the customer.
2. Defects resulting from drop of the Product or damage during transportation.
3. Defects resulting from improper usage of the Product beyond the Specifications.
4. Defects resulting from fire, earthquake, lightening, flood, damage from salt, abnormal voltage or other Act of God, or other disaster.
5. Defects resulting from the intrusion of foreign material to the Product, such as water, oil or metallic particles.
6. Parts exceeding their standard lifetime specified in this document.
7. The machines are not assembled in accordance with the instructions or precautions noted in this specification.
8. When the machine does not match the Product assembled in the machine.
9. When the machine condition is not caused by Panasonic reasons.
10. Defects that Panasonic could not foresee at the time of delivery of the Prodcuct.

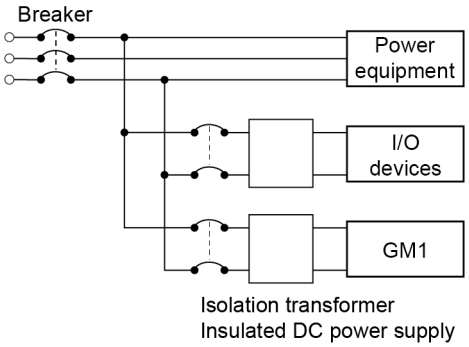
## Cautions for Proper Use

### ■ Selection of a power supply

- Use a low noise power supply.
- The inherent noise resistance is sufficient for the noise superimposed on the power wires, however, the noise can be attenuated further by using the isolation transformer / insulated power supply.

### ■ Isolation of power supply systems

- Wiring to the units, I/O devices, and other power devices should have separate wiring systems.

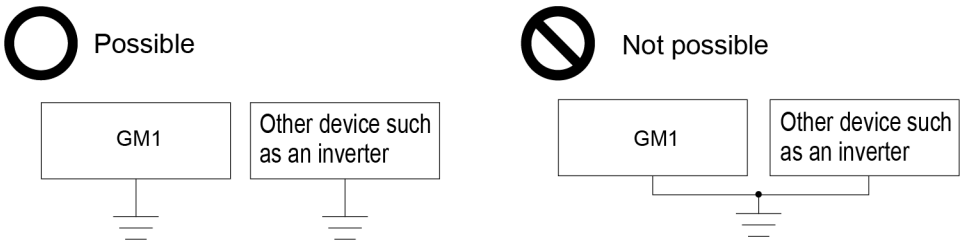



### ■ Power supply sequence

- Start the GM1 controller only after I/O devices and power devices are energized.
  In case of stopping the operation of the GM1 controller, have the I/O devices or power devices turned OFF after the GM1 controller has stopped operating.

### ■ Grounding

- The grounding connection should have a resistance of 100 Ω or less.
- The point of grounding should be as close to the GM1 controller as possible. The ground wire should be as short as possible.
- Sharing the ground with another device may have an adverse effect. Therefore, be sure that grounding is dedicated.




Conversely, depending on your environment, grounding may cause a problem. Do not ground the function earth when grounding a plus (+) terminal of the power.

### ■ Wiring

- Turn OFF the power supply when carry out wiring or connecting the GM1 controller to expansion units.
- Noise resistance measures such as attaching a noise filter, a surge absorber or a ferrite core may be necessary in some cases, depending on the usage environment.

### ■ Installation of an interlock circuit

- When controlling conflicting operations such as the motor rotation in clockwise or counter-clockwise direction, provide an interlock circuit external to the GM1 controller.

### ■ Installation of an emergency stop circuit

- Provide an emergency stop circuit external to the GM1 controller to turn OFF the power supply of the output device.

### ■ Installation environment

Do not use it in the following environments.

- Direct sunlight
- Sudden temperature changes causing condensation.
- Inflammable or corrosive gas.
- Excessive airborne dust, metal particles or saline matter.
- Benzine, paint thinner, alcohol or other organic solvents or strong alkaline solutions such as ammonia or caustic soda.
- Direct vibration, shock or direct drop of water.
- Influence from power transmission lines, high voltage equipment, power cables, power equipment, radio transmitters, or any other equipment that would generate high switching surges. (100 mm or more)

### ■ Handling instructions

- Before touching the unit, always touch a grounded piece of metal in order to discharge static electricity.
- Always rid yourself of any static electricity before handling this product.
- Do not connect a unit other than our GM1 series to the side connector on the unit.
- Use copper wires with a temperature rating of 90°C or higher.

## Revision History

The manual code is shown at the bottom of the cover page.

| Date of issue | Manual code | Revision details |
|---|---|---|
| August 2021 | WUME-GM1ETCSU-01 | First edition |
| March 2022 | WUME-GM1ETCSU-02 | 2nd edition<br>● Clerical corrections |
| April 2022 | WUME-GM1ETCSU-03 | 3rd edition<br>● Changed the Company name |
| November 2023 | WUME-GM1ETCSU-04 | 4th edition<br>● Clerical corrections<br>● Windows® 11: 64-bit support |

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Please contact .....

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WUME-GM1ETCSU-04