MITSUBISHI ELECTRIC

# Personal Computer Embedded Type Servo System Controller

# Motion Control Software SWM-G Operating Manual (SWMOS)

-MR-SWMG16-U
-MR-SWMG32-U
-MR-SWMG64-U
-MR-SWMG128-U
-MR-SWMG16N1-U
-MR-SWMG32N1-U
-MR-SWMG64N1-U
-MR-SWMG128N1-U

# SAFETY PRECAUTIONS

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.

The precautions given in this manual are concerned with this product only.

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

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

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

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

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

## [Design Precautions]

### ⚠WARNING

- Configure safety circuits externally to ensure that the entire system operates safely even when a fault occurs in the personal computer. Failure to do so may result in an accident due to an incorrect output or malfunction.
  (1) Configure external safety circuits, such as an emergency stop circuit, protection circuit, and protective interlock circuit for forward/reverse operation or upper/lower limit positioning.
  (2) If an incorrect home position return direction is set, motion control may continue without deceleration. To prevent machine damage caused by this, configure an external interlock circuit.
  (3) When this product detects an error, the motion slows down and stops or the motion rapidly stops, depending on the stop setting in parameter. Set the parameter to meet the specifications of the positioning control system. In addition, set the home position return parameter and positioning data within the specified setting range.
- For the operating status of each station after a communication failure, refer to manuals for the network used. Incorrect output or malfunction due to a communication failure may result in an accident.
- When modifying control while this product is running, configure an interlock in the program to ensure that the entire system always operates safely. For other forms of control (such as program modification, parameter change, forced output, or operating status change (status control)), read the relevant manuals carefully and ensure that the operation is safe before proceeding. Improper operation may damage machines or cause accidents. Determine corrective actions to be taken by the system in case of a communication failure.
- Especially, when a remote system is controlled, immediate action cannot be taken if a problem occurs due to a communication failure. To prevent this, configure an interlock in the program, and determine corrective actions to be taken by the system in case of a communication failure.
- If a communication cable is disconnected, the network may be unstable, resulting in a communication failure of multiple stations. Configure an interlock in the program to ensure that the entire system will always operate safely even if communications fail. Failure to do so may result in an accident due to an incorrect output or malfunction.

## [Design Precautions]

### ⚠WARNING

- If safety standards (ex. robot safety rules, etc.) apply to the system using the servo amplifier and servomotor, make sure that the safety standards are satisfied.
- Construct a safety circuit external to each remote station if the abnormal operation of the remote stations to be connected to this product differs from the safety directive operation in the system.

## [Design Precautions]

### ⚠CAUTION

- Do not install the control lines or communication cables together with the main circuit lines or power cables. Keep a distance of 100 mm or more between them. Failure to do so may result in malfunction due to noise.
- After the personal computer is powered on or rebooted, the time taken for the system to enter the RUN status varies depending on the system configuration and/or performance of the personal computer. Design circuits so that the entire system will always operate safely, regardless of the time.

## [Security Precautions]

### ⚠WARNING

- To maintain the security (confidentiality, integrity, and availability) of the system against unauthorized access, denial-of-service (DoS) attacks, computer viruses, and other cyberattacks from external devices via the network, take appropriate measures such as firewalls, virtual private networks (VPNs), and antivirus solutions.

## [Wiring Precautions]

### ⚠CAUTION

- Ground the controllers in which this product is installed, servo amplifiers, and servo motors with a ground resistance of 100 ohm or less. Do not use a common grounding with other equipment.
- Do not install the control lines or communication cables together with the main circuit lines or power cables. Keep a distance of 100 mm or more between them. Failure to do so may result in malfunction due to noise.
- Place the cables in a duct or clamp them. If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the cables or malfunction due to poor contact.
- Check the interface type and correctly connect the cable. Incorrect wiring (connecting the cable to an incorrect interface) may cause failure of the external device.
- When disconnecting the cable, do not pull the cable by the cable part. Pulling the cable may result in malfunction or damage to the cable.
- Prevent foreign matter such as dust or wire chips from entering the personal computer. Such foreign matter can cause a fire, failure, or malfunction.
- For Ethernet cables to be used in the system, select the ones that meet the specifications in the user's manual. If not, normal data transmission is not guaranteed.

## [Startup and Maintenance Precautions]

### ⚠WARNING

- Shut off the external power supply (all phases) used in the system before cleaning. Failure to do so may result in electric shock or malfunction.
- Do not connect or disconnect any communication cable while power is on. Failure to do so may cause malfunction.

## [Startup and Maintenance Precautions]

### ⚠CAUTION

- When modifying control while this product is running, configure an interlock in the program to ensure that the entire system will always operate safely. For other forms of control (such as program modification, parameter change, forced output, or operating status change (status control)), read the relevant manuals carefully and ensure that the operation is safe before proceeding. Improper operation may damage machines or cause accidents. Determine corrective actions to be taken by the system in case of a communication failure.
- Especially, when a remote system is controlled, immediate action cannot be taken if a problem occurs due to a communication failure. To prevent this, configure an interlock in the program, and determine corrective actions to be taken by the system in case of a communication failure.
- Use any radio communication device such as a cellular phone or PHS (Personal Handy-phone System) more than 25 cm away in all directions from the personal computer. Failure to do so may cause malfunction.
- Maintenance must be performed by qualified maintenance personnel with knowledge.
- Before testing the operation, set a low speed value for the speed limit parameter so that the operation can be stopped immediately upon occurrence of a hazardous condition.
- Confirm and adjust the program and each parameter before operation. Unpredictable movements may occur depending on the machine.
- When using the absolute position system function, on starting up, and when the absolute position motor has been replaced, always perform a home position return.
- Before starting the operation, confirm the brake function.
- Do not perform a megger test (insulation resistance measurement) during inspection.
- After maintenance and inspections are completed, confirm that the position detection of the absolute position detection function is correct.
- Extreme adjustments and changes may lead to unstable operation, so never make them.

## [Operating Precautions]

### ⚠CAUTION

- When modifying control (such as data modification, program change, or operating status change (status control)), read relevant manuals carefully and ensure the safety before operation. Incorrect change or modification may cause system malfunction, damage to the machines, or accidents.
- Do not go near the machine during test operations. Doing so may lead to injuries.

# CONDITIONS OF USE FOR THE PRODUCT

(1) Mitsubishi Motion Control Software ("the PRODUCT") shall be used in conditions;
i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.
MITSUBISHI ELECTRIC SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI ELECTRIC USER, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.
("Prohibited Application")
Prohibited Applications include, but not limited to, the use of the PRODUCT in;
- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

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

(3) Mitsubishi Electric shall have no responsibility or liability for any problems involving Motion control software trouble and system trouble caused by DoS attacks, unauthorized access, computer viruses, and other cyberattacks.

# INTRODUCTION

Thank you for purchasing Motion Control Software SWM-G.
This manual describes the required operating procedure of the engineering tool for using Motion Control Software SWM-G.
Before using this product, please read this manual and the relevant manuals carefully and develop familiarity with the functions and performance of the Motion control software SWM-G to handle the product correctly.
Please make sure that the end users read this manual.

## Relevant products

MR-SWMG16-U, MR-SWMG32-U, MR-SWMG64-U, MR-SWMG128-U, MR-SWMG16N1-U, MR-SWMG32N1-U, MR-SWMG64N1-U, MR-SWMG128N1-U

# CONTENTS

# RELEVANT MANUALS

| Manual name [manual number] | Description | Available form |
|---|---|---|
| Motion Control Software SWM-G Operating Manual (SWMOS) [IB-0300563ENG] (this manual) | This manual explains the system configuration, parameter settings, and online function operations of Motion Control Software SWM-G. | e-Manual PDF |
| Motion Control Software SWM-G User's Manual (Installation) [IB-0300561ENG] | This manual explains the required procedures and settings for installing Motion Control Software SWM-G in a personal computer. | e-Manual PDF |
| Motion Control Software SWM-G User's Manual (Startup) [IB-0300562ENG] | This manual explains the specifications, procedures before operation, and settings of Motion Control Software SWM-G. | e-Manual PDF |
| Motion Control Software SWM-G Operating Manual (EcConfigurator) [IB-0300617ENG] | This manual explains the methods for diagnosing and managing EtherCAT networks of Motion Control Software SWM-G. | e-Manual PDF |

**Point**

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

e-Manual has the following features:

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

# TERMS

Unless otherwise specified, this manual uses the following terms.

| Term | Description |
|---|---|
| I/O size | The number of I/O points. It is expressed in bytes. |
| MR Configurator2 | The product name of the servo setup software. |
| MR-J5(W)-G | A generic term for MR-J5-☐G(-RJ), MR-J5W☐-☐G, MR-J5-☐G(-RJ)N1, MR-J5W☐-☐G-N1, MR-JET-☐G, and MR-JET-☐G-N1 servo amplifiers. |
| MR-J5-G | An MR-J5-☐G☐(-RJ) servo amplifier. |
| MR-J5W-G | An MR-J5W☐-☐G servo amplifier. |
| MR-J5-G-N1 | An MR-J5-☐G(-RJ)N1 servo amplifier. |
| MR-J5W-G-N1 | An MR-J5W☐-☐G-N1 servo amplifier. |
| MR-JET-G | An MR-JET-☐G servo amplifier. |
| MR-JET-G-N1 | An MR-JET-☐G-N1 servo amplifier. |
| NIC | A network interface card for Ethernet connection. |
| RTX<br>RTX64 | An extension function that operates Windows in real time, which is developed by IntervalZero.<br>RTX64 is compatible with 64-bit natively. |
| SWM-G | A generic product name for Motion Control Software SWM-G and Motion Control Software SWM-G (CC-Link IE TSN edition). |
| SWM-G-N1 | A generic product name for Motion Control Software SWM-G-N1 (CC-Link IE TSN + EtherCAT edition). |
| SWM-G engine | A task on RTX64 that performs management of SWM-G modules, axis management, and API processing. |
| SWMOS | A generic product name for the engineering tool SWM-G Operating Station. |
| Device | An object for the communication between a user application and the SWM-G engine or each module. |
| Personal computer | A generic term for personal computers where Windows® operates. |
| Platform | A generic term for network connection functions to be loaded to RTX64.<br>CC-Link IE TSN and a simulator are available as modules. |
| Module | A generic term for modules to be loaded to RTX64. A file with the extension "rtdll". |
| User unit | A unit of the position defined by the user (such as 1 mm and 1 μs).<br>It is abbreviated as "U".<br>The speed is expressed as "U/s", the acceleration is expressed as "U/s$^2$", and the jerk is expressed as "U/s$^3$" in user unit. |

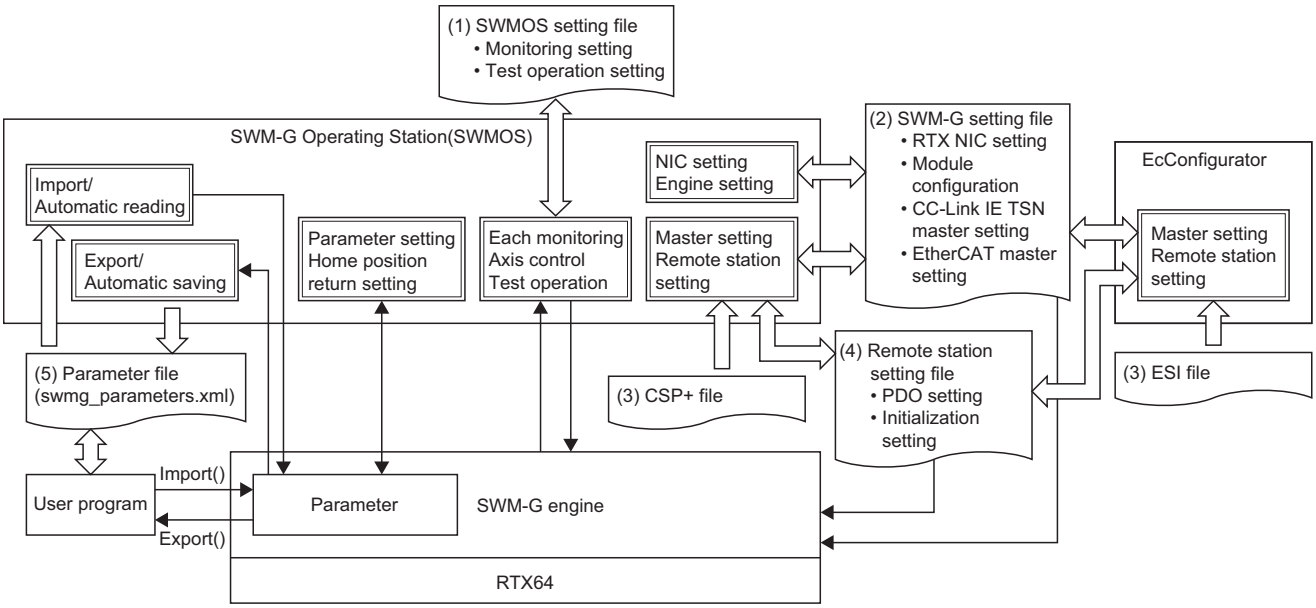
# PART 1 BASICS OF SWMOS

This part describes the screen configuration and basic operation of SWMOS.

# 1 FUNCTION OF SWMOS

SWM-G Operating Station (SWMOS) is an engineering tool for SWM-G to configure various settings of SWM-G and to perform test operation on the personal computer in which the SWM-G engine is operating.

## Overall configuration diagram and files used




| File | | Program used | Description |
|---|---|---|---|
| (1) SWMOS setting file | *.db | SWMOS | Used to set various types of monitoring, axis control, and test operation.<br>Generated for each SWMOS project. |
| (2) SWM-G setting file | RTX NIC setting<br>(RtxTcplp.ini) | SWMOS | Created in the NIC setting. |
| | | SWM-G engine | Read at the startup of the engine. |
| | Module configuration<br>(Module.ini) | SWMOS | Created in the engine setting. |
| | | SWM-G engine | Read at the startup of the engine. |
| | CC-Link IE TSN master setting<br>(*.def) | SWMOS | Created when "Save to Project" or "Save to Engine" is executed in the network setting. |
| | | SWM-G engine | Read when the communication is started. |
| | EtherCAT master setting<br>(*.def) | EcConfigurator | *1 |
| | | SWM-G engine | Read when the communication is started. |
| (3) Profile | CSP+ file<br>(*.cspp) | SWMOS | Read at network setting. |
| | ESI file<br>(*.xml) | EcConfigurator | *1 |
| (4) Remote station setting file | CUI file<br>(*.txt) | SWMOS | Created when "Save to Project" or "Save to Engine" is executed in the network setting. |
| | | SWM-G engine | Read when the communication is started. |
| | ENI file<br>(*.txt) | EcConfigurator | *1 |
| | | SWM-G engine | Read when the communication is started. |
| (5) Parameter file | swmg_parameters.xml or an optional file name | SWMOS | The file is read and applied to the engine with the import function and automatic read.<br>Parameters are read from the engine and the file is created with the export function and automatic save. |
| | | User program | Used for the parameter file API such as Export() and Import(). |

*1 For details of EcConfigurator, refer to the following.
Motion Control Software SWM-G Operating Manual (EcConfigurator)

# 1.1 Main Functions of SWMOS



The following table lists the main functions of SWMOS.

| Function | Description | Reference |
|---|---|---|
| Project management | Manages settings used in the test operation or others as project data. | ☞ Page 19 Home Tab |
| SWMOS system configuration | Sets the system configuration of SWMOS. | ☞ Page 34 Configuration Tab |
| Network communication operation | Starts or stops the network communication. | ☞ Page 42 Operation Tab |
| Axis control, axis status monitor | Performs control such as the servo ON/OFF of all the axes, alarm clear, and emergency stop.<br>In addition, current values and status of axes are monitored and displayed. | ☞ Page 42 Operation Tab |
| Waveform data collection/analysis | Collects waveform data and analyzes start timing and waveform patterns. | ☞ Page 52 Analyzer Tab |
| SWMG engine setting/check | Checks the module setting and engine execution status of the SWMG engine. | ☞ Page 56 SWM-G engine |
| License management | Manages the license of SWMG. | ☞ Page 64 License |
| System diagnosis | Diagnoses the system of SWMG. | ☞ Page 69 Diagnostics |
| Network setting | Configures the network setting of CC-Link IE TSN. | ☞ Page 70 Network Setting |
| Axis setting | Sets parameters of axes and performs home position return. | ☞ Page 102 Axis Setting |
| Single axis test operation | Performs test operation such as JOG operation, positioning operation, inching operation, speed control, and torque control. | ☞ Page 111 Single-axis control |
| Multi-axis test operation | Performs test operation of multiple axes. | ☞ Page 125 Multi-axis control |
| Interpolation control test operation | Performs test operation of linear interpolation, circular interpolation, and helical interpolation. | ☞ Page 129 Interpolation control |
| Gantry control test operation | Performs home position return and test operation of the gantry control. | ☞ Page 137 Gantry control |
| I/O control test | Performs control and monitoring of the digital I/O and analog I/O. | ☞ Page 145 I/O Control |

# 2 SCREEN CONFIGURATON AND BASIC OPERATION

This chapter describes the screen configuration and basic operation of SWMOS.

## 2.1 Start and End

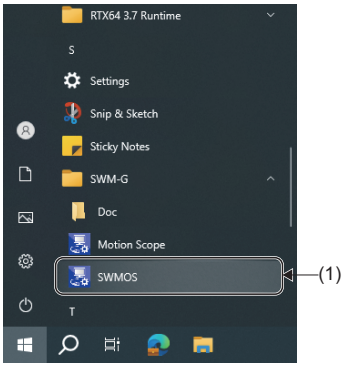
The following describes how to start/end SWMOS.

### Start

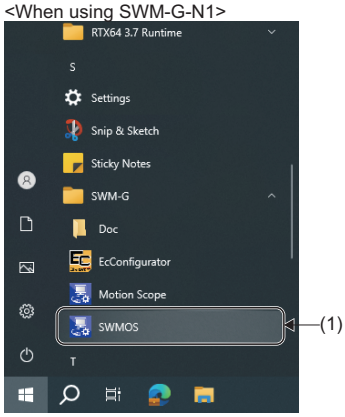
#### Operating procedure

Select [SWM-G] ⇨ [SWMOS] (1) from the Windows start menu.

<When using SWM-G>




<When using SWM-G-N1>



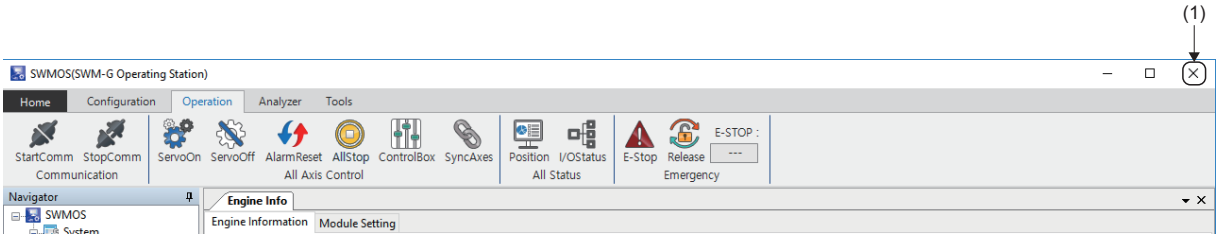

**Point**

- When SWMOS is started, the SWM-G engine is automatically started. The setting to start the network communication can be optionally configured.
- When the SWM-G engine is not started since the license is not authenticated, the functions of SWMOS that can be used are limited to the SWM-G engine management, license management, and system diagnosis.
- The following manual is stored in the Doc folder displayed by selecting [SWM-G] ⇨ [Doc] from the Windows start menu.
  SWM-G User Manual

### End

#### Operating procedure

Click the [×] button (1) in the upper right of the SWMOS screen.




**Point**

When SWMOS is ended, the SWM-G engine is automatically ended if no other device is operating. Since the network communication is disconnected as well, check the operation status before ending SWMOS.

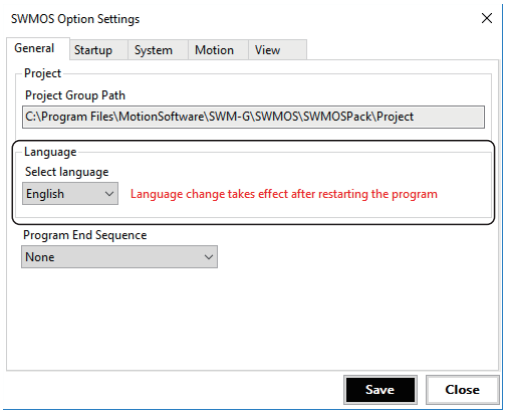
# 2.2 Switching Display Language

SWMOS supports multiple display languages. The display language of the menu and others can be switched in one personal computer.



## Window

[Home] ⇨ [Option] (🔧) ⇨ [General] tab




## Operating procedure

In the [General] tab, select the language from the "Select language" pull-down list.

- Supported languages

| Item | Language |
|---|---|
| English | English |
| Japanese | Japanese |
| Korean | Korean |
| Chinese | Chinese (Simplified) |

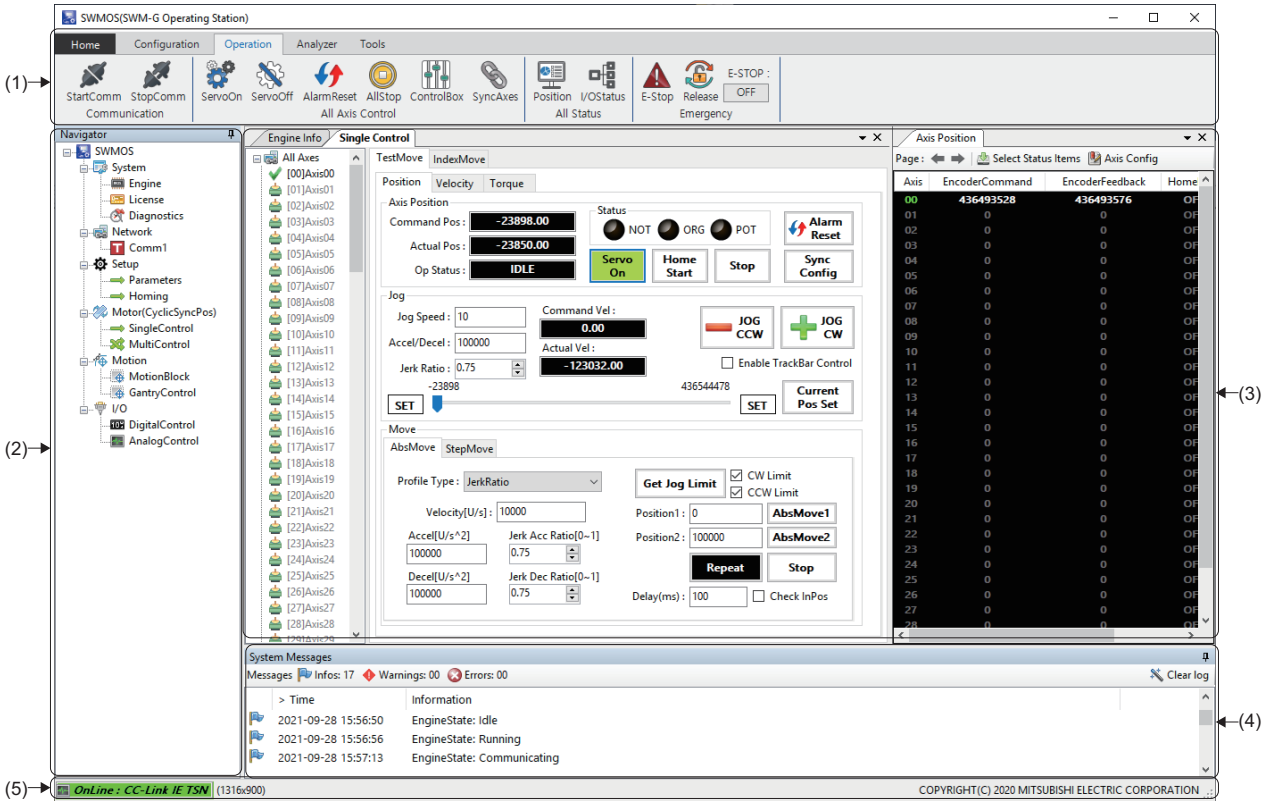
# 2.3 Screen Configuration

This section describes the screen configuration when SWMOS is started.

## Overall screen

The following shows the overall screen configuration.

### Window




### Displayed items

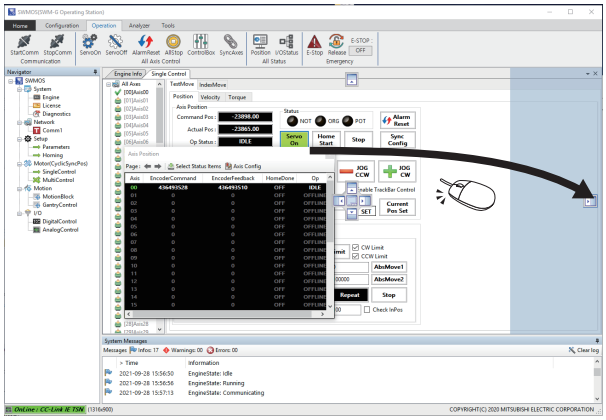
| Name | Description |
|---|---|
| (1) Ribbon | The tab is switched to perform operation such as project setting, monitoring/control of servo axes and I/O, and data collection/analysis.<br>The operation of the ribbon bar can be used separately from the operation of the navigation window.<br>(☞ Page 18 Ribbon) |
| (2) Navigation window | The system setting, network setting, and axis setting are configured and the single axis control, multi-axis control, motion control, and I/O control are performed.<br>The operation of the navigation window can be used separately from the operation of the ribbon bar.<br>(☞ Page 18 Navigation window) |
| (3) Main window | Displays the function selected in the ribbon bar or navigation window.<br>When multiple tabs are opened, the displayed functions can be switched with the tabs.<br>Click the [×] button in the upper right of the main window to close a displayed function. |
| (4) Message window | Displays messages output from the SWM-G engine and SWMOS. |
| (5) Status bar | Displays the status of the network communication and display size of the "SWMOS" screen.<br>■Communication status display<br>• OffLine : Network communication stopped<br>• OnLine : CC-Link IE TSN : Communicating by CC-Link IE TSN<br>• OnLine : Simulation : Communicating by simulator<br>• OnLine : Hybrid(CC-Link IE TSN+Simulation) : Communicating by CC-Link IE TSN and simulator |

## ■ Switching between docking and float of the docking window

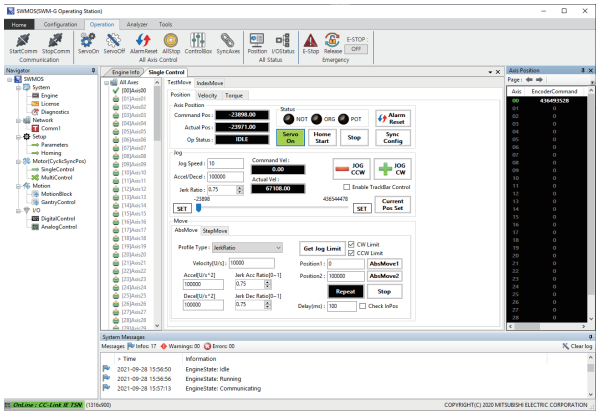
- Docking display

  Drag and drop the title bar of a floating window to the guidance in the main frame to dock it in the main window. Depending on the position of the guidance where the window is dropped, the window is docked and displayed as a title bar or tab.

■Docking display as a title bar (guidance at the upper right side)

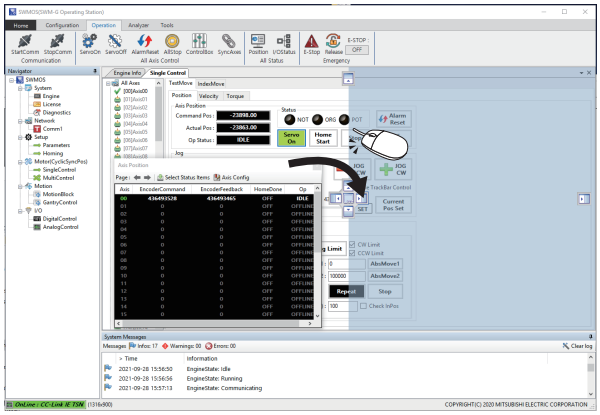


Drop the window to the guidance at the right edge.

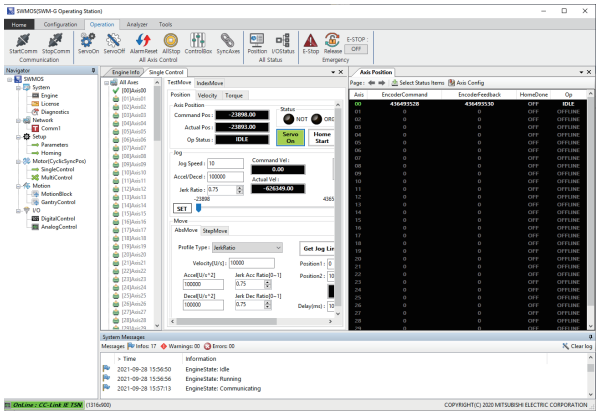


It is docked as a title bar.

■Docking display as a tab (guidance in the center)



Drop the window to the guidance at the center right.



It is docked as a tab.

- Floating display

  Drag the title bar of a docking window to an arbitrary position to display it independently of the main frame.

**Point**

Once a window is docked, its display format can be switched between the docking and floating by double-clicking the title bar or tab.

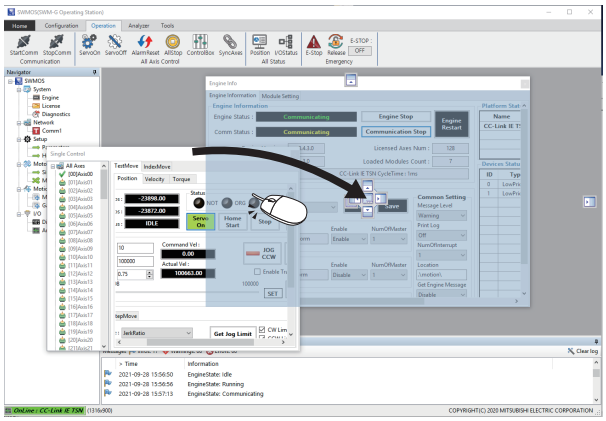
## ■ Combining work windows

The guidance is displayed when a floating window is moved close to another floating window.

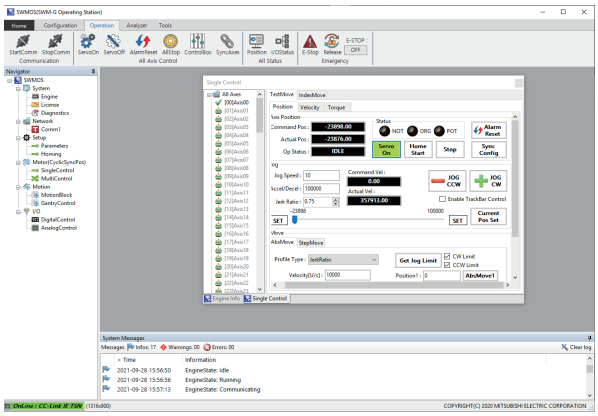
Drag and drop the window to the guidance to combine the windows.

Depending on the position of the guidance where the window is dropped, the windows are arranged next to each other or displayed as tabs.

■Displayed as tabs (guidance in the center)

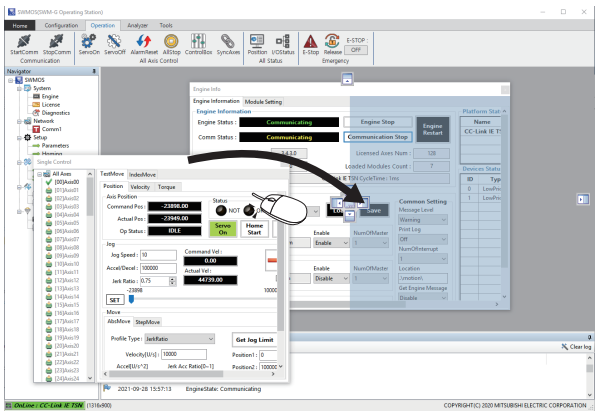


Drop the window to the guidance at the center.

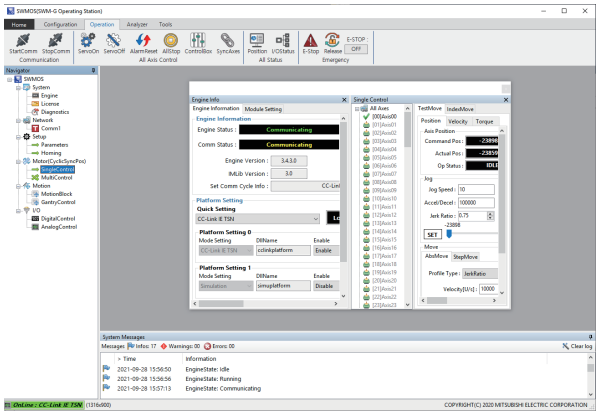


It is displayed as a tab.

■Arranged next to each other (guidance in the center)



Drop the window to the guidance at the center right.



It is displayed next to the other window.

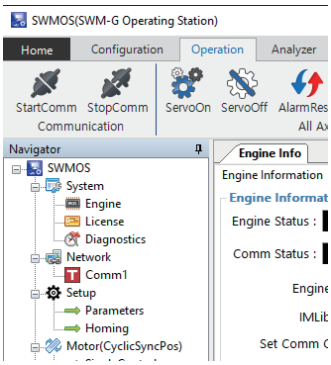
## ■ Unpinning the window

A window which has the pin button [📌] in the upper right can be hidden.

Click the pin button to pin/unpin the window.

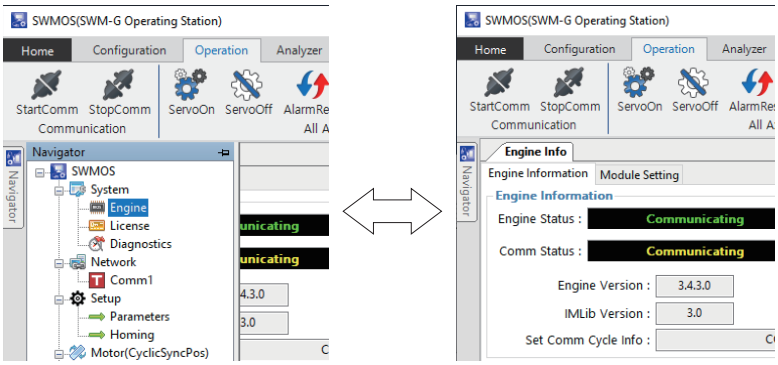
- Vertical pin button [📌]

  The window is pinned and always displayed. (Default)




- Horizontal pin button [⊣]

  The window is automatically switched to the tab display when not being operated.

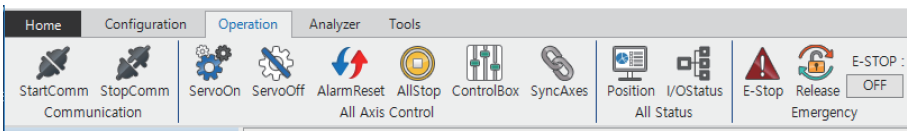


# Ribbon

The ribbon is an interface in which the function can be switched with the tabs.
The operation of the ribbon can be used independently from the operation of the navigation window. The ribbon cannot be hidden or customized. For details of the ribbon, refer to the following.
☞ Page 19 FUNCTION OF RIBBON

## Window

Click a tab at the top part of the ribbon to display the function assigned to the tab.

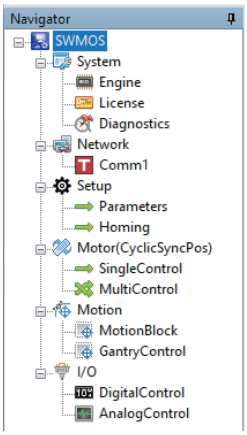



# Navigation window

The navigation window is a window that displays various functions in a tree format.
By using the tree, the setting/status of the SWM-G engine can be displayed, parameters can be set, and test operation can be performed.
The operation of the navigation window can be used separately from the operation of the ribbon.
For details of the navigation window, refer to the following.
☞ Page 55 FUNCTION OF NAVIGATION WINDOW

## Window

Click each item in the tree display to display each function.



# 3 FUNCTION OF RIBBON

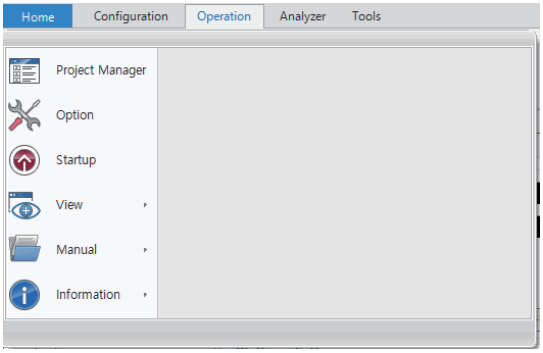
From the ribbon, configure project settings, monitor/control the servo axes and I/O, and collect/analyze data.

## 3.1 Home Tab

Project settings and option settings are configured, and information of SWMOS is checked.



### Window




### Displayed items

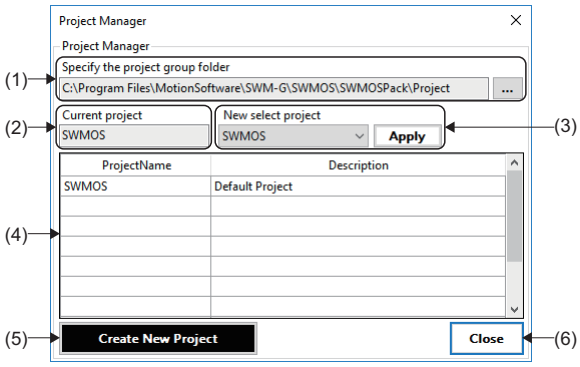
| Item | Description | Reference |
|---|---|---|
| Project Manager ( ) | Overall settings of SWMOS are managed for each project. | ☞ Page 20 Project Manager |
| Option ( ) | Option settings of SWMOS are configured. | ☞ Page 22 Option |
| Startup ( ) | Displays the "Getting started" screen of SWMOS. | ☞ Page 28 Getting started |
| View ( ) | The display size of the SWMOS screen is set. | ☞ Page 30 View |
| Manual( ) | Displays the manual (SWM-G User Manual) that describes the functions of SWM-G. | ☞ Page 31 Manual |
| Information ( ) | Windows Update information and the version of SWMOS are checked. | ☞ Page 32 Information |

# Project Manager

Overall settings of SWMOS are managed for each project.

## Window

[Home] ⇨ [Project Manager] ( )



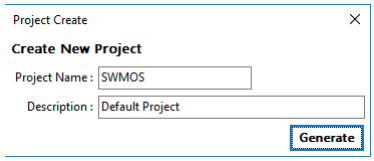

## Displayed items

| Item | Description |
|---|---|
| (1) Specify the project group folder | Set the group folder where the project is stored.<br>In the "Browse For Folder" screen which is displayed by clicking the [...] button, set a folder to store the project. |
| (2) Current project | Displays the project currently selected. |
| (3) New select project | Select a project to which the current project is switched from the pull-down list.<br>When a project is selected from the pull-down list and the [Apply] button is clicked, to the current project is switched to the selected one.<br>(☞ Page 21 Switching the project) |
| (4) Project list | Displays projects in the project group.<br>• ProjectName: Displays the names of the projects.<br>• Description: Displays the descriptions (comments) of the projects. |
| (5) [Create New Project] button | Creates a new project. (☞ Page 20 Creating a new project) |
| (6) [Close] button | Closes the "Project Manager" screen. |

# Creating a new project

## Operating procedure

1. Click the [Create New Project] button to open the "Project Create" screen.
2. In the "Project Create" screen, enter "Project Name" and "Description", and click the [Generate] button.




3. When the project is successfully created, the project is added to the project group and displayed in the project list. The project data newly created is initialized.

**Point**

The created project cannot be deleted from SWMOS.

## Switching the project

### Operating procedure

1. Select a project to which the current project is switched from the [New select project] pull-down list.
2. A confirmation message appears when the [Apply] button is clicked. Check the displayed message, and click the [Yes] button.
3. A restart confirmation message appears. Check the displayed message, and click the [Yes] button. Restart SWMOS.

To apply the switched project data to SWMOS, restarting SWMOS is required.



## Project data

The setting data of the following functions in SWMOS is saved as the project data.

### ■ Settings that are saved as the SWMOS project data

| Item | Description |
|---|---|
| Project data management target | • Axis status display item<br>• Axis name<br>• Number of displayed digits<br>• Home position return (JOG speed)<br>• Single axis operation<br>• Multi-axis operation<br>• Interpolation control<br>• Gantry control<br>• I/O control |

**Point**

The project data does not include any of the SWM-G engine settings (module.ini, cclink_network.def, or RtxTcpIp.ini) or parameters.

# Option

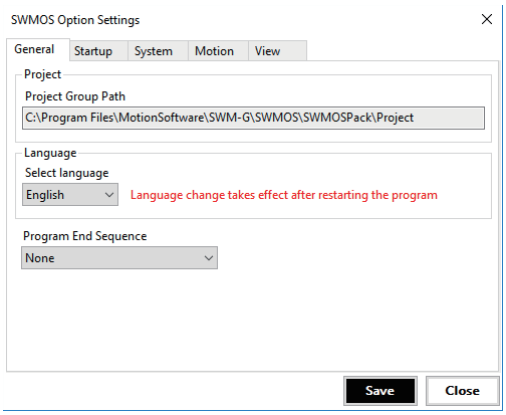
Option settings of SWMOS are configured.

**Point**

The configured option settings are applied to entire SWMOS. The option settings cannot be changed for each project.

## Window

[Home] ⇨ [Option] ( )




## Displayed items

Select each tab and configure the option settings.

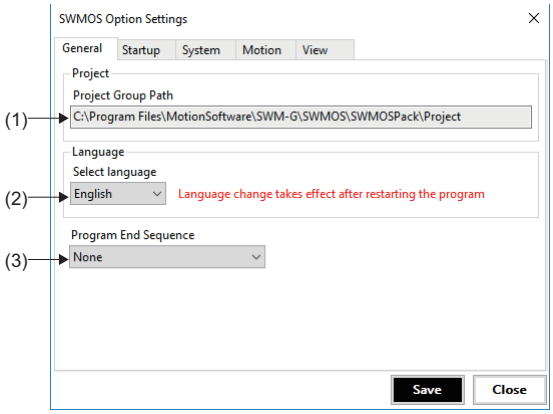
| Item | Description | Reference |
|---|---|---|
| [General] tab | Set the project folder, language, and processing that is executed at the end. | ☞ Page 23 General |
| [Startup] tab | Set the processing that is executed at the startup. | ☞ Page 24 Startup |
| [System] tab | Set the display update cycle and automatic read/save of the parameter file. | ☞ Page 25 System |
| [Motion] tab | Set the axis display mode and emergency stop level. | ☞ Page 26 Motion |
| [View] tab | Set the window size and configure the docking window setting. | ☞ Page 27 View |
| [Save] button | Saves the configured option settings. | — |
| [Close] button | Closes the "SWMOS Option Settings" screen. | — |

# General

Configure the general settings in the [General] tab of the option setting screen.

## Window

[Home] ⇨ [Option] ( ) ⇨ [General] tab




## Displayed items

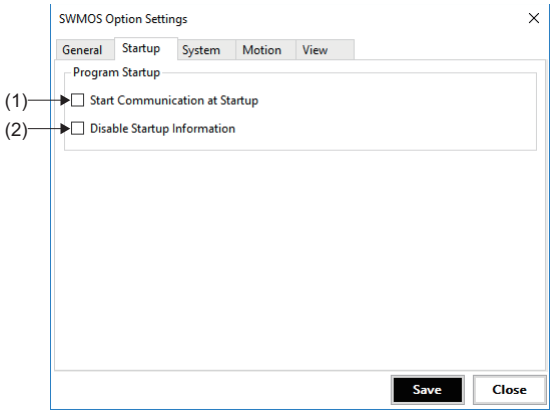
| Name | Description | Default |
|---|---|---|
| (1) Project Group Path | Displays the project folder set in [Home] ⇨ [Project ( )] ⇨ [Specify the project group folder]. | C:\Program Files\MotionSoftware\SWM-G\SWMOS\SWMOSPack\Project |
| (2) Select language | Set the display language of SWMOS.<br>• English: English<br>• Japanese: Japanese<br>• Korean: Korean<br>• Chinese: Chinese (Simplified) | Language set in Windows |
| (3) Program End Sequence | Set the processing that is executed when SWMOS is ended.<br>• None: No processing is executed.<br>• CommStop: The network communication is stopped.<br>• ServoOffAndCommStop: The network communication is stopped after the servo OFF. | None |

## Startup

Configure the settings for SWMOS startup in the [Startup] tab of the option setting screen.

### Window

[Home] ⇨ [Option] ( ) ⇨ [Startup] tab




### Displayed items

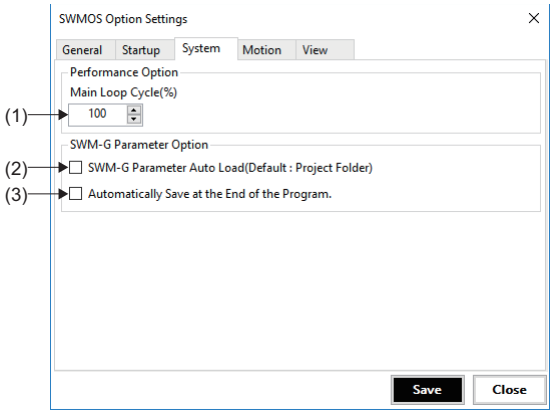
| Name | Description | Default |
|---|---|---|
| (1) Start Communication at Startup | Set whether to start the network communication at the startup of SWMOS.<br>• Selected: The network communication is started at the startup.<br>• Not selected: The network communication is not started at the startup. | Not selected |
| (2) Disable Startup Information | Set whether to display the "Getting started" screen that displays the startup information at the startup of SWMOS.<br>• Selected: The "Getting started" screen is not displayed at the startup.<br>• Not selected: The "Getting started" screen is displayed at the startup. | Not selected |

# System

Configure the system settings of SWMOS in the [System] tab of the option setting screen.

## Window

[Home] ⇨ [Option] ( ) ⇨ [System] tab




## Displayed items

| Name | Description | Default |
|---|---|---|
| (1) Main Loop Cycle | Set the load rate of the monitor value update cycle of the axis status.<br>• Setting range: 10 to 100 [%] | 100 [%] |
| (2) SWM-G Parameter Auto Load(Default: Project Folder) | Set whether to automatically read the parameter file at the startup of SWMOS.<br>The "swmg_parameters.xml" file stored in "Project folder name*1\PARAMETERS" is read.<br>• Selected: The parameter file is read.<br>• Not selected: The parameter file is not read. | Not selected |
| (3) Automatically Save at the End of the Program | Set whether to save the parameter file when SWMOS is ended.<br>The "swmg_parameters.xml" file stored in "Project folder name*1\PARAMETERS" is saved.<br>• Selected: The parameter file is saved.<br>• Not selected: The parameter file is not saved. | Not selected |

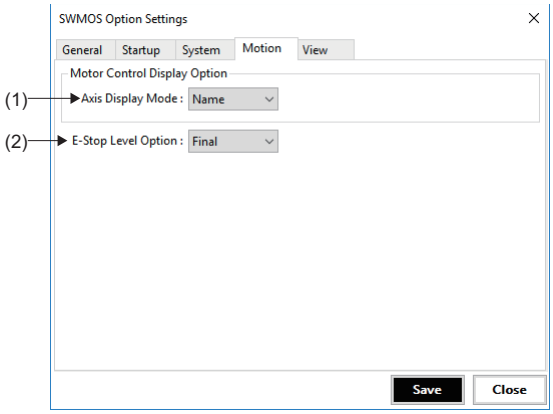
*1 The project folder name is the one created by the user.

# Motion

Configure the motion control settings of SWMOS in the [Motion] tab of the option setting screen.

## Window

[Home] ⇨ [Option] ( ) ⇨ [Motion] tab




## Displayed items

| Name | Description | Default |
|---|---|---|
| (1) Axis Display Mode*1 | Set the axis display mode of the axis tree.<br>• Number: The axis number (Axis00 to Axis127) is displayed.<br>• Name: The axis name ([00] axis name to [127] axis name) is displayed.<br>*: The axis name is set in [Axis Config] of the "Axis Position" screen. (☞ Page 49 Axis display setting) | Number |
| (2) E-Stop Level Option | Set the emergency stop level.<br>• Final: Servo OFF<br>• Level1: Emergency stop level 1 (Deceleration stop or servo OFF after deceleration stop) | Final |

*1 When the [Apply] button is clicked in [Axis Config Information], the display is switched to the set axis display mode. The axis display mode is applied to the axis tree in the following screens. (☞ Page 49 Axis display setting)

· Navigation window ⇨ [SWMOS] ⇨ [Setup] ⇨ [➡Parameters] ⇨ [Detailed] tab

· Navigation window ⇨ [SWMOS] ⇨ [Setup] ⇨ [➡Homing]

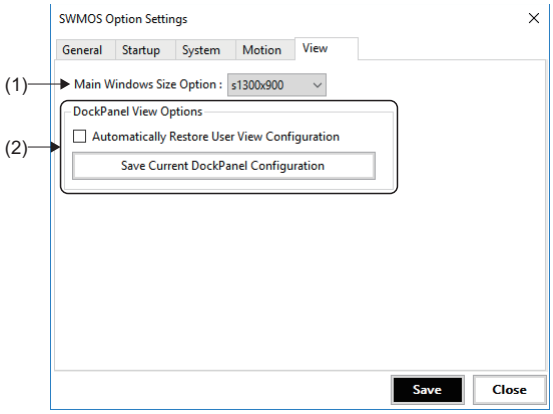
· Navigation window ⇨ [SWMOS] ⇨ [Motor(CyclicSyncPos)] ⇨ [➡SingleControl]

# View

Configure the display settings of SWMOS in the [View] tab of the option setting screen.

## Window

[Home] ⇨ [Option] ( ) ⇨ [View] tab




## Displayed items

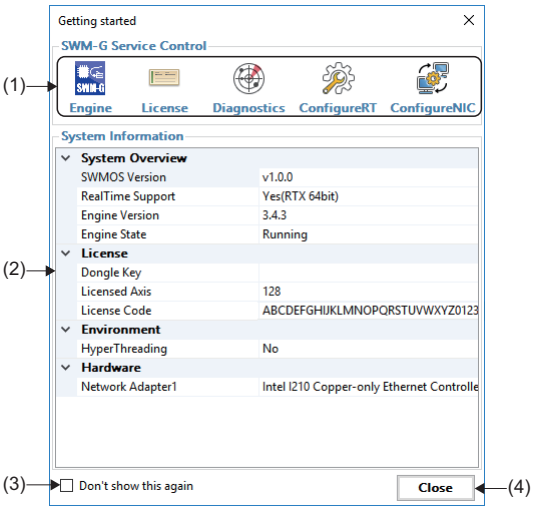
| Name | Description | Default |
|---|---|---|
| (1) Main Windows Size Option | Set the size of the screen displayed at the startup of SWMOS.<br>• s1024x768: 1024 × 768 dots<br>• s1200x800: 1200 × 800 dots<br>• s1300x900: 1300 × 900 dots | s1300x900 |
| (2) DockPanel View Options | Click the [Save Current DockPanel Configuration] button to save the status of the docking window of SWMOS.<br>Set whether to perform automatic restoration with the saved status of the docking window.<br>• Selected: The status is saved and automatically restored.<br>• Not selected: The status is not saved or automatically restored. | Not selected |

# Getting started

Display the "Getting started" screen.

## Window

[Home] ⇨ [Startup] ( )




## Displayed items

Configure the following option settings in each tab.

| Item | Description |
|---|---|
| (1) SWM-G Service Control | Click each icon to display the window for the management function.<br>• Engine ( ): Displays the window for the engine. (☞ Page 56 SWM-G engine)<br>• License ( ): Displays the window for the license. (☞ Page 64 License)<br>• Diagnostics ( ): Displays the window for the diagnosis. (☞ Page 69 Diagnostics)<br>• ConfigureRT ( ): Displays the "RTX64 ### Control Panel" screen*1. (RTX64 Help)<br>• ConfigureNIC ( ): Displays the "SWM-G Configure NIC" screen. (☞ Page 35 Configure NIC) |
| (2) System Information | Displays the information such as version and license of the system and the information of the personal computer.<br>For details of each item, refer to the following.<br>☞ Page 29 System information |
| (3) Disable getting started display (Don't show this again) | When "Don't show this again" is selected, the "Getting started" screen is not displayed at the startup of SWMOS.<br>To display the "Getting started" screen at the startup of SWMOS again, configure the setting by selecting [Home] ⇨ [Option ( )] ⇨ [Startup] tab from the ribbon. (☞ Page 24 Startup) |
| (4) [Close] button | Closes the "Getting started" screen. |

*1 ### = Displays the version of RTX.

## System information

The version information and license information of the system, environmental setting of the personal computer, and the information of the installed NIC can be checked.

| Item | | Description |
|---|---|---|
| System Overview*1 | SWMOS Version | Displays the version of SWMOS. |
| | RealTime Support | Displays whether the real-time OS is supported. |
| | Engine Version | Displays the version of the SWM-G engine. |
| | Engine State | Displays the status of the SWM-G engine.<br>• Shutdown: Stopped<br>• Idle: Waiting<br>• Running: Execution in progress<br>• Communicating: Communication in progress |
| License | Dongle Key | Displays the unique ID number of the USB license key. |
| | Licensed Axis | Displays the number of axes of the licensed product. |
| | License Code | Displays the SWM-G license code. |
| Environment | Hyper-Threading | Displays the status of the Hyper-Threading setting of the personal computer.<br>• No: Disabled<br>• Yes: Enabled*2 |
| Hardware | | Displays the information of the NIC installed to the personal computer. |

*1 For the version notation of each item, refer to the following.
SWM-G User Manual

*2 When Hyper-Threading is enabled, the SWM-G engine may not operate correctly. Disable it in the BIOS setting.

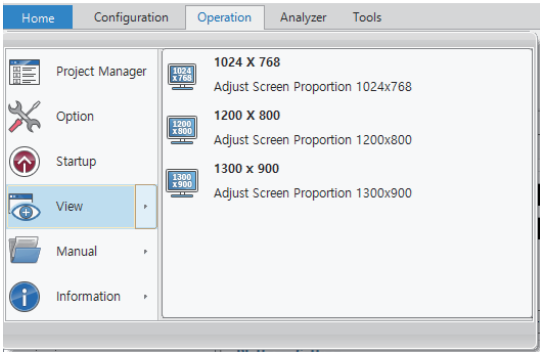
# View

The display size of the SWMOS screen is set.

Select the size from the screen proportion displayed by selecting [Home] ⇨ [View] ( ) from the ribbon.

## Window

[Home] ⇨ [View] ( )




## Displayed items

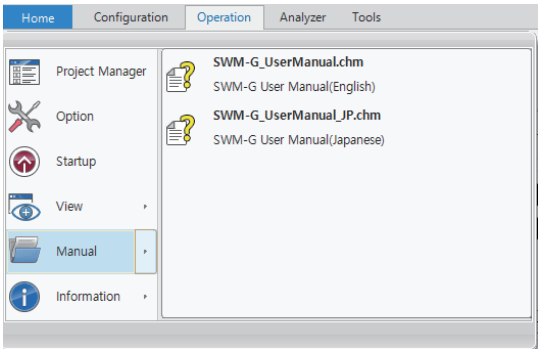
| Item | Description |
|---|---|
| Display proportion selection | Set the display size of the SWMOS screen.<br>This setting is also applied to [Main Windows Size Option] displayed by selecting [Home] ⇨ [Option] ( ) ⇨ [View] tab.<br>• 1024 × 768 ( ): Adjust screen proportion 1024 × 768 dots<br>• 1200 × 800 ( ): Adjust screen proportion 1200 × 800 dots<br>• 1300 × 900 ( ): Adjust screen proportion 1300 × 900 dots |

# Manual

The manuals (SWM-G User Manual) that describe the functions of SWM-G are displayed.
Select the manual from the manuals displayed by selecting [Home] ⇨ [Manual] ( ) from the ribbon.

## Window

[Home] ⇨ [Manual] ( )




## Displayed items

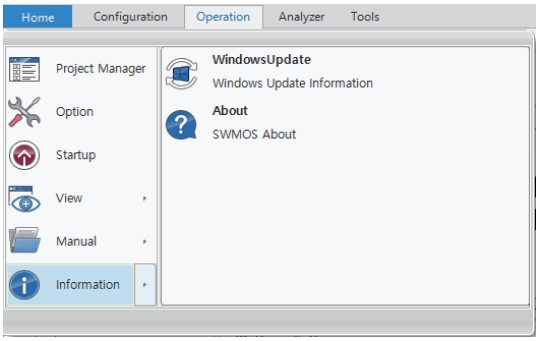
| Item | Description |
|---|---|
| Manual selection | Select a manual (SWM-G User Manual) for the language to be displayed.<br>• SWM-G_UserManual.chm ( ): English manual<br>• SWM-G_UserManual_JP.chm ( ): Japanese manual |

# Information

Windows Update information and the version of SWMOS can be checked.
Select the information to check from the items displayed by selecting [Home] ⇨ [Information] ( ) from the ribbon.

## Window

[Home] ⇨ [Information] ( )



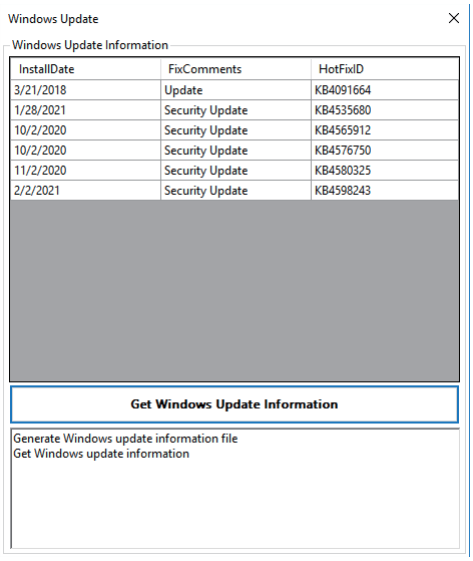

☞ Page 32 Windows update information
☞ Page 33 SWMOS about

## Windows update information

The update information of Windows installed in the personal computer can be checked.

### Window

[Home] ⇨ [Information] ( ) ⇨ [Windows Update Information] ( )




### Operating procedure

1. Click the [Get Windows Update Information] button in the "Windows Update" screen to collect the update information applied to Windows.
2. After the collection is completed, a list is displayed in the Windows Update Information area. The collected Windows Update information is saved as a text file and stored in the following location.

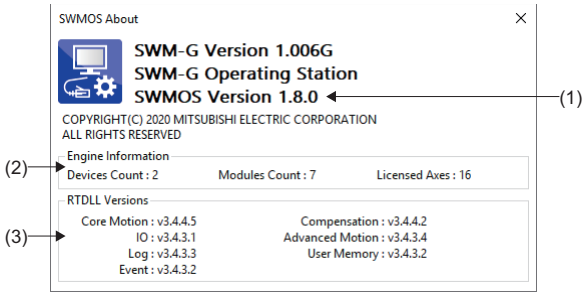
| Storage destination of Windows Update information file |
|---|
| C:\WindowsUpdateInfo.txt |

## SWMOS about

The version of SWMOS, SWM-G engine information, and version of RTDLL can be checked.

### Window

[Home] ⇨ [Information] ( ) ⇨ [SWMOS About] ( )



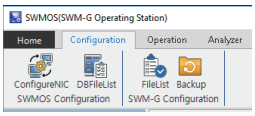

### Displayed items

| Item | Description |
|---|---|
| (1) SWMOS version | Displays the version of SWMOS. |
| (2) Engine Information | Displays the device information and license information.<br>• Devices Count: Displays the number of operating devices.<br>• Module Count: Displays the number of loaded modules.<br>• Licensed Axes: Displays the number of axes of the licensed product. |
| (3) RTDLL Versions | Displays the version of the RTDLL module.<br>For the version notation, refer to the following.<br>SWM-G User Manual |

# 3.2 Configuration Tab

The NIC setting, SWMOS setting, and SWM-G setting are configured, and backup is performed.

## Window




## Displayed items

| Item | | Description | Reference |
|---|---|---|---|
| SWMOS Configuration | ConfigureNIC ( ) | Configure the RTX driver setting of the network interface card (NIC). | ☞ Page 35 Configure NIC |
| | DBFileList ( ) | Check the contents of the setting file for each operation set in SWMOS. | ☞ Page 38 DB file list |
| SWM-G Configuration | FileList ( ) | Check the contents of the SWM-G setting file. | ☞ Page 39 File list |
| | Backup ( ) | Back up files related to SWM-G. | ☞ Page 40 Backup |

# Configure NIC

Configure the RTX driver setting of the network interface card (NIC).

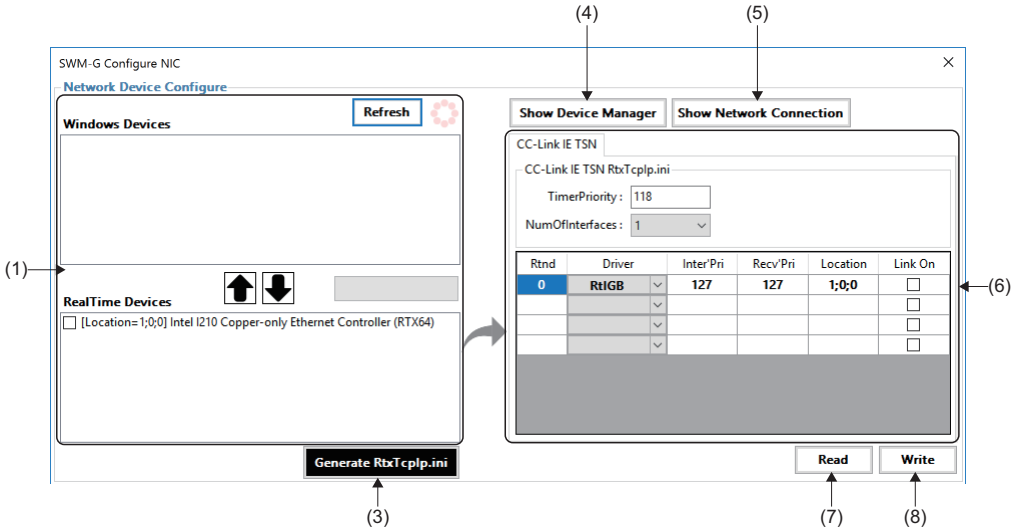
**Point**

Normally, operation can be performed with the default settings configured at the installation. Use this function when an NIC is added or changed.

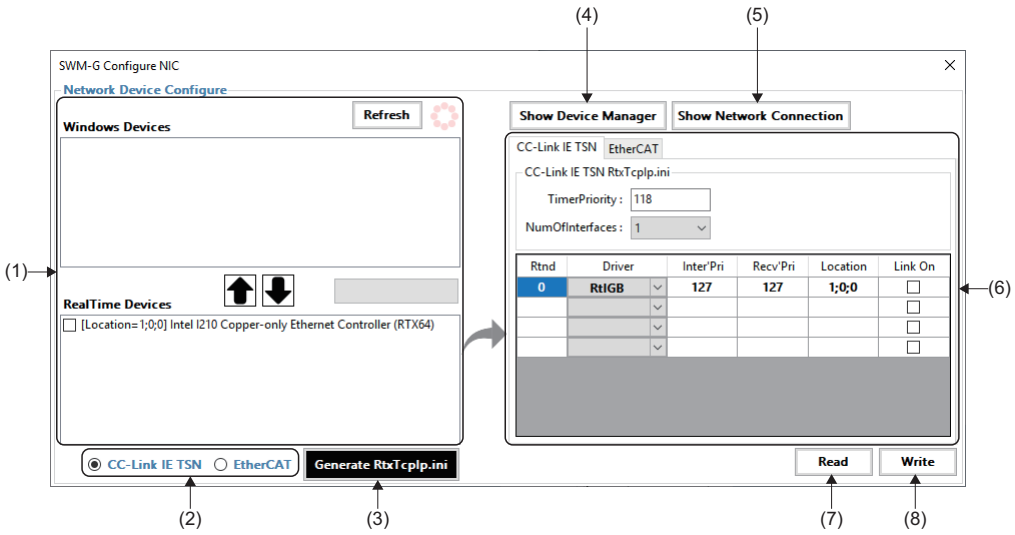
## Window

[Configuration] ⇨ [ConfigureNIC] ()

- When using SWM-G




- When using SWM-G-N1



## Displayed items

| Item | Description |
|---|---|
| (1) NIC device assignment | Perform the NIC device assignment for Windows and RTX.<br>• [Refresh]: Updates the list of NIC devices.<br>• [↑]: Moves the selected NIC from RealTime Devices (RTX) to Windows Devices.<br>• [↓]: Moves the selected NIC from Windows Devices to RealTime Device (RTX). |
| (2) Platform selection*1 | Select the platform to be set.<br>Once a platform has been selected, the RTX NIC settings tab will switch to the tab for the selected platform. |
| (3) [GenerateRtxTcpIp.ini] button | Generates the NIC setting file (RtxTcpIp.ini) from the NIC device selected for RTX. |
| (4) [Show Device Manager] button | Displays the "Device Manager" screen of Windows. The NIC status can be checked. |
| (5) [Show Network Connection] button | Displays the "Network Connections" screen of Windows. The network connection status can be checked in the "Network Connections" screen. |
| (6) RTX NIC setting | Configure the NIC setting for RTX.<br>Normally, use the default settings.<br>• [CC-Link IE TSN] tab: Configure the NIC setting for CC-Link IE TSN connection.<br>• [EtherCAT] tab*1: Configure the NIC setting for EtherCAT connection. |
| (7) [Read] button | Reads the NIC setting file (RtxTcpIp.ini) and applies it to the "SWM-G Configure NIC" screen. |
| (8) [Write] button | Writes the contents of the "SWM-G Configure NIC" screen to the NIC setting file (RtxTcpIp.ini). |

*1 When using SWM-G-N1 only

## Operating procedure

The NIC driver setting can be configured with the normal installation procedure. To change the setting individually, configure it with the following procedure.

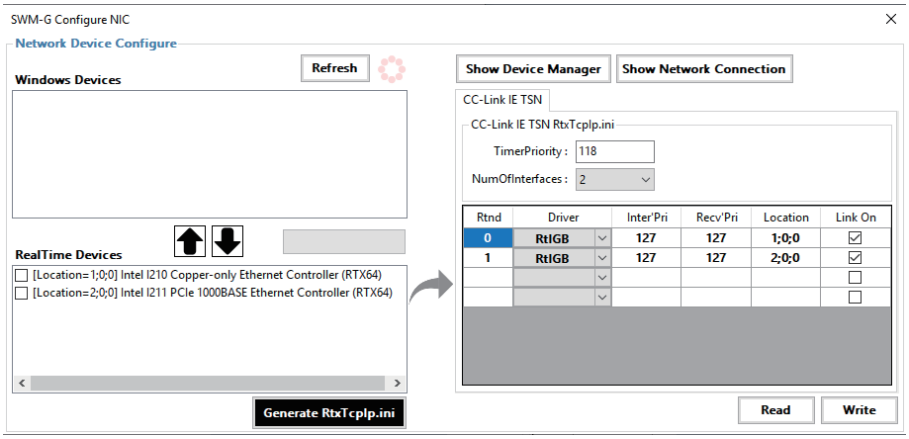
1. When the NIC device assignment is required to be changed between RTX and Windows, change it in the screen for the NIC device assignment.
2. Select the platform to be used by switching to the [CC-Link IE TSN] tab or the [EtherCAT] tab in RTX NIC setting.
3. Select the NIC device (RTX side), and click the [Generate RtxTcpIp.ini] button. Generate the NIC setting file (RtxTcpIp.ini) and update the RTX NIC setting. The NIC setting is set to the initial value.
4. Set the following items when changing the NIC setting of RTX. Normally, operation can be performed with the default settings. When changing the settings, refer to the following.
   RTX64 Help

| Item | Description | Default |
|---|---|---|
| TimerPriority (Timer priority) | Set the timer priority. | 118 |
| NumOfInterfaces (Number of communication masters) | Set the number of masters for CC-Link IE TSN. The supported number of masters is 2. | 1 |
| Rtnd (Communication master number) | The master number set in the NIC assignment order. This item cannot be changed. | — |
| Driver (Communication driver) | Select the communication driver according to the NIC type.<br>The communication driver that supports CC-Link IE TSN is "RTIGB" only.<br>For details of the supported NIC, refer to the following.<br>SWM-G User Manual | Automatically set according to the NIC type |
| Inter'Pri (Interrupt thread priority) | Set the interrupt thread priority. | 127 |
| Recv'Pri (Receive thread priority) | Set the receive thread priority. | 127 |
| Location (NIC installation location) | Set the location (PCI bus;Device;Function) where the NIC is installed.<br>The installation location can be checked from "Device Manager" of Windows. | Automatically set according to the location where the NIC is installed. |
| Link On(Link status display of NIC) | Set whether to enable the link status display of the NIC.<br>• Selected: Enabled<br>• Not selected: Disabled | Not selected |

5. Click the [Write] button to apply the settings to the NIC setting file (RtxTcpIp.ini).

**Point**

When there are multiple NIC devices to be used (RTX side), up to two ports are assigned to CC-Link IE TSN.



# DB file list

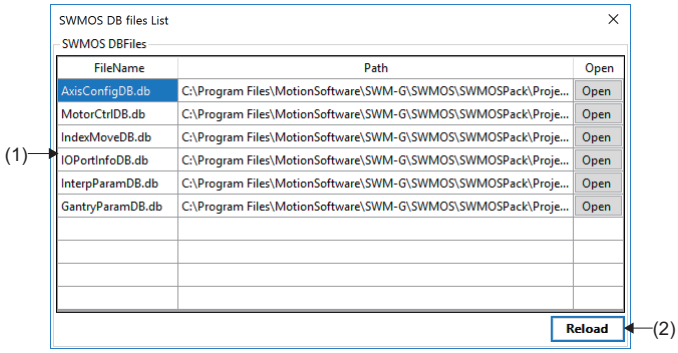
The contents of the setting file of each operation set in SWMOS can be checked.

**Point**

Normally, the SWMOS setting file is not edited. Use it only for checking the contents.

## Window

[Configuration] ⇨ [DBFileList] ( )




## Displayed items

| Item | Description |
|---|---|
| (1) SWMOS DBFiles | Check the following SWMOS setting files. Click the [Open] button to display each file.<br>• AxisConfigDB.db: All-axes monitoring setting<br>• MotorCtrlDB.db: Settings for home position return, single axis control, and multi-axis control<br>• IndexMoveDB.db: Index operation setting<br>• IOPortInfoDB.db: I/O control setting<br>• InterpParamDB.db: Interpolation control setting<br>• GantryParamDB.db: Gantry control setting |
| (2) [Reload] button | Reads the setting files again. |

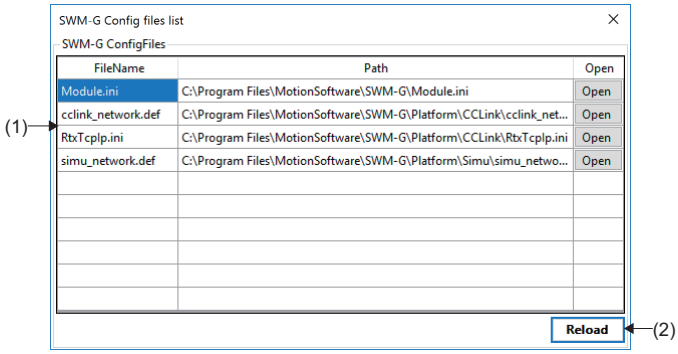
# File list

The contents of the SWM-G setting file can be checked.

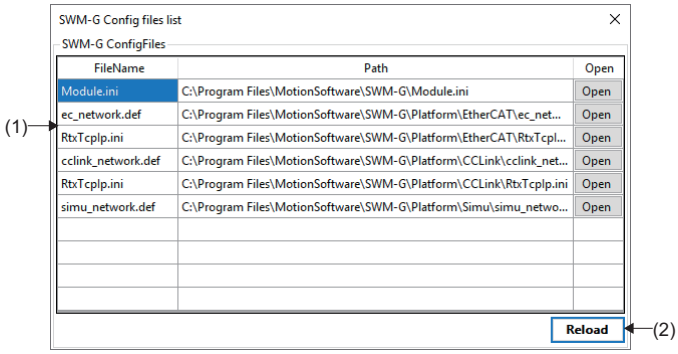
## Window

[Configuration] ⇨ [FileList] ( )

- When using SWM-G




- When using SWM-G-N1




## Displayed items

| Item | Description |
|---|---|
| (1) SWM-G ConfigFiles | Check the following SWM-G setting files. Click the [Open] button to display each file.<br>• Module.ini: Module configuration setting<br>• ec_network.def: EtherCAT setting*1<br>• RtxTcpIp.ini: EtherCAT RTX NIC setting*1<br>• cclink_network.def: CC-Link IE TSN setting<br>• RtxTcpIp.ini: CC-Link IE TSN RTX NIC setting<br>• simu_network.def: Simulation setting |
| (2) [Reload] button | Reads the setting files again. |

*1 When using SWM-G-N1 only

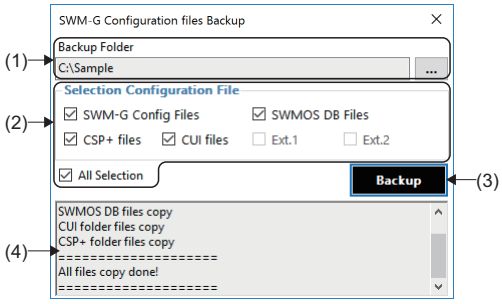
# Backup

Back up files related to SWM-G.

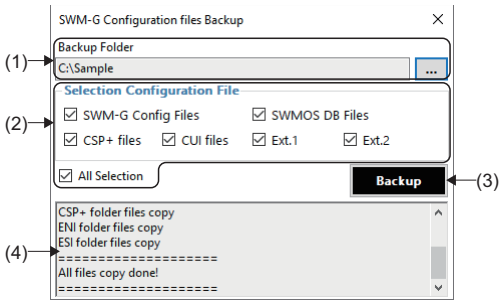
## Window

[Configuration] ⇨ [Backup] ( )

- When using SWM-G




- When using SWM-G-N1




## Displayed items

| Item | Description |
|---|---|
| (1) Backup Folder | Specify the backup destination folder where backup files are stored.<br>In the "Browse For Folder" screen which is displayed by clicking the [...] button, specify a folder to store the backup file. |
| (2) Selection Configuration File | Select files to be backed up.<br>Selecting "All Selection" selects all the target files.<br>*: "Ext.1 (ESI file)" and "Ext.2 (ENI file)" can be selected when using SWM-G-N1. |
| (3) [Backup] button | Backs up the target files selected in "Selection Configuration File" in the backup destination folder. |
| (4) Backup status display field | Displays the execution result of the backup. |

## Operating procedure

1. In the "Browse For Folder" screen which is displayed by clicking [...] button of [Backup Folder], specify the backup destination folder.
2. Select files to be backed up.
3. Click the [Backup] button.

## Backup data

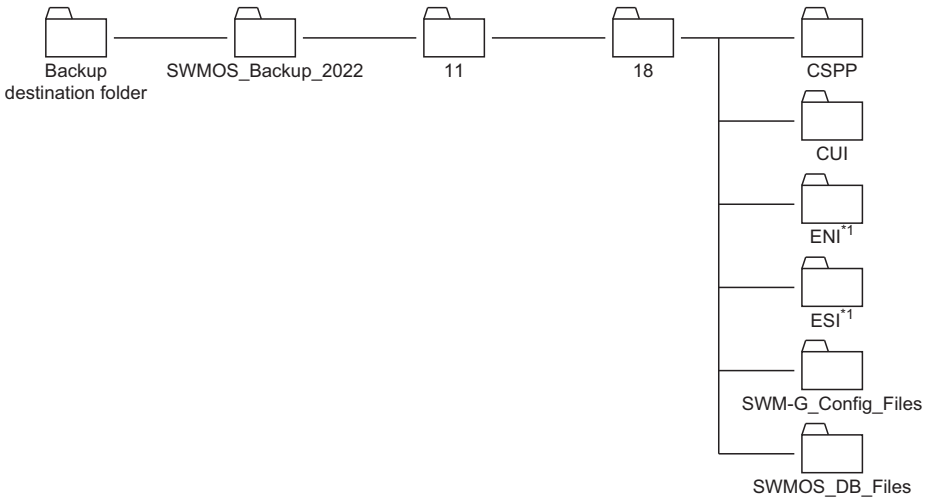
The backup data is stored in the "SWMOS_Backup_yyyy\mm\dd" folder which is created in the specified backup destination folder.

**Ex.**

Data backed up on November 18, 2022

The "SWMOS_Backup_2022\11\18" folder is created, and the backup data is stored in the folder.

To restore a file, manually copy it from the folder.

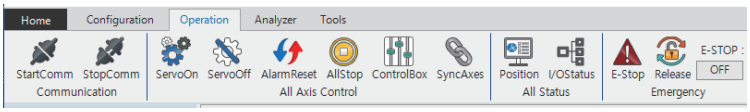



*1 When using SWM-G-N1 only

# 3.3 Operation Tab

The network communication operation is performed, and servo axes and I/O are monitored/controlled.

## Window




## Displayed items

| Item | | Description | Reference |
|---|---|---|---|
| Communication | StartComm ( ) | Starts the network communication. | ☞ Page 42 Network communication start/ communication stop |
| | StopComm ( ) | Stops the network communication. | |
| All Axis Control | ServoOn ( ) | Performs servo ON for all the set axes. | ☞ Page 43 All axes servo ON/ OFF |
| | ServoOff ( ) | Performs servo OFF for all the set axes. | |
| | AlarmReset ( ) | Clears the alarms that have occurred in axes. | ☞ Page 43 Alarm clear |
| | AllStop ( ) | Stops all the operating axes. | ☞ Page 43 All axes stop |
| | ControlBox ( ) | Performs servo ON/OFF, home position return, and alarm clear for the axes. | ☞ Page 44 All axes control |
| | SyncAxes ( ) | Starts/cancels the synchronous control of the slave axes that follow the master axis. | ☞ Page 45 Synchronous control |
| All Status | Position ( ) | The status item of each axis is set and the status of the axis is monitored. | ☞ Page 46 Axis status monitor |
| | I/OStatus ( ) | The status of the input address and output address is monitored. | ☞ Page 50 I/O status |
| Emergency | E-Stop ( ) | Performs the emergency stop. | ☞ Page 51 Emergency stop/ emergency stop release |
| | Release ( ) | Releases the emergency stop. | |
| | E-STOP | Displays the status of the emergency stop. | |

# Network communication start/communication stop

The network communication is started/stopped.

## Operating procedure

### ■ Network communication start

1. Click [Operation] ⇨ [StartComm] ( ) in the ribbon.
2. When the network communication is started, the display of [Engine Information] displayed by selecting [SWMOS] ⇨ [System] ⇨ [Engine] ⇨ [Engine Info] tab in the navigation window is switched to "Engine Status: Communicating" and "Comm Status: Communicating".

### ■ Network communication stop

1. Click [Operation] ⇨ [StopComm] ( ) in the ribbon.
2. When the network communication is stopped, the display of [Engine Information] displayed by selecting [SWMOS] ⇨ [System] ⇨ [Engine] ⇨ [Engine Info] tab in the navigation window is switched to "Engine Status: Running" and "Comm Status: Stopped".

# All axes servo ON/OFF

Servo ON/OFF is performed for all the set axes of the servo amplifier and others.

## Operating procedure

### ■ All axes servo ON

1. Click [Operation] ⇨ [ServoOn] (  ) in the ribbon.
2. Servo ON is performed for all the set axes.

### ■ All axes servo OFF

1. Click [Operation] ⇨ [ServoOff] (  ) in the ribbon.
2. Servo OFF is performed for all the set axes.

**Point**

The servo ON/OFF status of the axes can be checked in the "Axes Control Box" screen displayed by selecting [Operation] ⇨ [ControlBox] (  ) in the ribbon. (☞ Page 44 All axes control)

# Alarm clear

The alarms that have occurred in axes are cleared.
Alarms in all the axes are cleared.

## Operating procedure

1. Click [Operation] ⇨ [AlarmReset] (  ) in the ribbon.
2. Alarms in all the axes are cleared.

**Point**

When the alarm clear is executed, both the servo amplifier alarms and axis alarms are cleared.

# All axes stop

All the operating axes are stopped.

## Operating procedure

1. Click [Operation] ⇨ [AllStop] (  ) in the ribbon.
2. All the operating axes are stopped.

**Point**

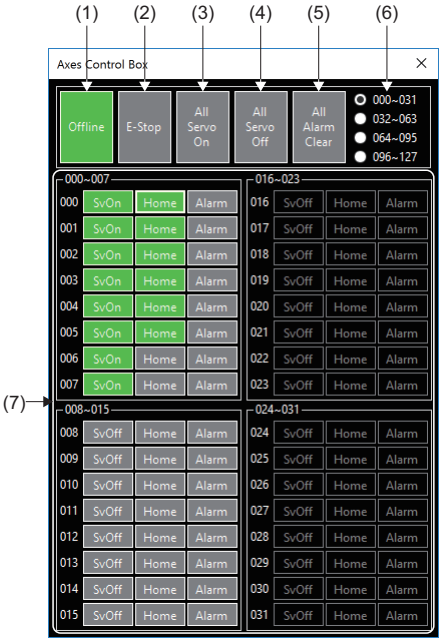
The stop processing is the equivalent of the processing of "ExecQuickStop function" and "StopTrq function" that are API functions. For detailed operation of the deceleration processing and others, refer to the following.
📖SWM-G User Manual

# All axes control

Click each button to perform servo ON/OFF of the axes, home position return, or alarm clear.

## Window

[Operation] ⇨ [ControlBox] ( )




## Displayed items

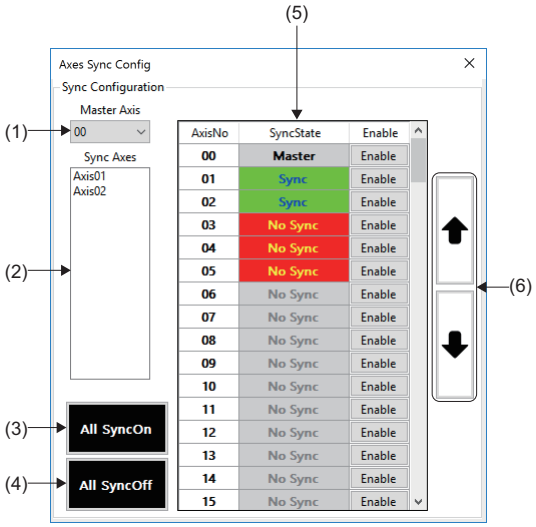
| Item | Description |
|---|---|
| (1) [Online/Offline] button | Starts/stops the network communication.<br>• : Network communication in progress<br>• : Network communication stopped |
| (2) [E-Stop] button | Commands/releases the emergency stop.<br>• : In emergency stop<br>• : Emergency stop released |
| (3) [All Servo On] button | Performs servo ON for all the set axes. |
| (4) [All Servo Off] button | Performs servo OFF for all the set axes. |
| (5) [All Alarm Clear] button | Clears the alarms in all the axes. |
| (6) Axis display selection | Switches the axis display group to be displayed in the "Axes Control Box" screen.<br>• 000 to 031: Axes 0 to 31 are displayed.<br>• 032 to 063: Axes 32 to 63 are displayed.<br>• 064 to 095: Axes 64 to 95 are displayed.<br>• 096 to 127: Axes 96 to 127 are displayed. |
| (7) [Axis display] button | Displays the servo ON status, home position return, and alarm status of each. Click any of the buttons to perform each operation.<br>For axes that are not connected, the buttons are displayed in black ( SvOff ).<br>■[SvOff]/[SvOn] button<br>Performs servo ON/OFF for each axis.<br>• SvOff : Servo OFF state<br>• SvOn : Servo ON state<br>■[Home] button<br>Performs the home position return of each axis.<br>• Home : Home position return incomplete state<br>• Home : Home position return complete state<br>• Home : Home position return in progress<br>■[Alarm] button<br>Clears alarms that have occurred in each axis.<br>• Alarm : No alarm state<br>• Alarm : Alarm state |

# Synchronous control

The synchronous control of the slave axes that follow the master axis is started and cancelled.

## Window

[Operation] ⇨ [SyncAxes] ( )




## Displayed items

| Item | Description |
|---|---|
| (1) Master Axis | Select the master axis.<br>• Setting range: 00 to 127 |
| (2) Sync Axes | Displays slave axes that are synchronized with the selected master axis. |
| (3) [All SycnOn] button | Sets all the axes to the synchronous slave axes.<br>However, axes in states other than the IDLE state and the other master axes are not set. |
| (4) [All SyncOff] button | Cancels the synchronization of the selected master axis and its synchronous slave axes. |
| (5) Synchronous axes display | The status of the synchronous axes is displayed and set.<br>■AxisNo<br>Displays the axis number. (00 to 127)<br>■SyncState<br>Displays the status of the synchronous control.<br>• Master : Master axis<br>• Sync : The slave axis is in the synchronous state.<br>• No Sync : The synchronization of the slave axis is cancelled.<br>• No Sync : The slave axis is in the servo OFF state.<br>■Enable<br>Click the [Enable] button to set/cancel the synchronous slave axis. |
| (6) Synchronous axis display switch button | Switches the synchronous axis display by 16 axes.<br>• [↑] button: Displays the previous 16 axes.<br>• [↓] button: Displays the next 16 axes. |

## Operating procedure

1. Select the master axis number, and start/cancel the synchronous control of the slave axes that follow the master axis. The synchronous control is started only for the axes in the IDLE state. The status of the axes can be checked in the axis status monitor. (☞ Page 46 Axis status monitor)
2. After starting the synchronous control of the slave axes, perform the test operation of the synchronous control by operating the master axis.

# Axis status monitor

The status item of each axis is set and the status of the axis is monitored.

## Window

[Operation] ⇨ [Position] ( )


## Displayed items

| Item | Description |
|---|---|
| (1) Axis display selection button | Switches the synchronous axis display by 32 axes.<br>• [←] button: Displays the previous 32 axes.<br>• [→] button: Displays the next 32 axes. |
| (2) [Select Status Items] button | Clicking the [Select Status Items] button displays the "All Position Setting" screen.<br>Set status to be displayed as the status display items.<br>(☞ Page 47 Axis item selection) |
| (3) [Axis Config] button | Clicking the [Axis Config] button displays the "Axis Config Information" screen.<br>Set axis names to be displayed in the status display item (AxisName).<br>(☞ Page 49 Axis display setting) |
| (4) Axis display item (Axis) | Displays the axis number.<br>• Green: The axis is set and the network communication is in progress.<br>• Gray: Network is stopped or the axis is not set. |
| (5) Status display item | Displays the status items set in the "All Position Setting" screen. |
| (6) Axis status item (Op) | Displays the axis status.<br>• OFFLINE: Not connected<br>• OFF: Servo OFF<br>• IDLE: Waiting<br>• JOG: JOG operation in progress<br>• HOME: Home position return in progress<br>• POS: Positioning control in progress<br>• VELOCITY: Speed control in progress<br>• TRQ: Torque control in progress<br>• SYNC(□*1): Synchronous control in progress<br>• INTPL: Interpolation control in progress<br>• STOP: Stopped<br>• ALARM: Alarm occurring |

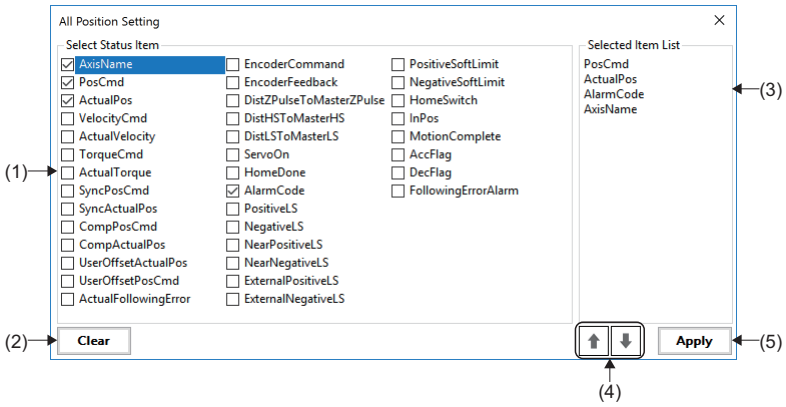
*1 □= Axis number of the master axis (00 to 127)

## Axis item selection

Click the [Select Status Item] button in the "Axis Position" screen to display the "All Position Setting" screen. Set status items to be displayed in the axis status monitor.

### Window

[Operation] ⇨ [Position] ( ) ⇨ [Select Status Item]




### Displayed items

| Item | Description |
|---|---|
| (1) Select Status Item | Select status items to be displayed in the "Axis Position" screen.<br>The selected items are displayed in the selected item list.<br>Up to 20 items can be selected as the status items.<br>For the status items, refer to the following.<br>☞ Page 48 List of status items |
| (2) [Clear] button | Deselects all the selected status items. |
| (3) Selected Item List | Displays the status items selected in the select status item field.<br>In the "Axis Position" screen, the status items are arranged in the display order here. The item at the top is displayed at the left end in the "Axis Position" screen.<br>When no status item is selected, only Axis (axis number) and Op (axis status) are displayed in the "Axis Position" screen. |
| (4) Display item reorder button | Reorders the display order of the selected items in the selected item list. Select an item and click the [↑]/[↓] button to move it to the position to display.<br>• [↑] button: Moves the selected item up a row.<br>• [↓] button: Moves the selected item down a row. |
| (5) [Apply] button | Applies the status items selected in the select status item field to the "Axis Position" screen and closes the "All Position Setting" screen.<br>To close the "All Position Setting" screen without applying the setting, click the [×] button in the upper right. |

## ■ List of status items

| Item | Description | Unit |
|---|---|---|
| AxisName | Axis name | Character string |
| PosCmd | Command position | User unit |
| ActualPos | Feedback position | User unit |
| VelocityCmd | Command speed | U/s |
| ActualVelocity | Feedback speed | U/s |
| TorqueCmd | Command torque | % |
| ActualTorque | Feedback torque | % |
| SyncPosCmd | Synchronous control command position | User unit |
| SyncActualPos | Synchronous control feedback position | User unit |
| CompPosCmd | Command position after applying compensation offset | User unit |
| CompActualPos | Feedback position after applying compensation offset | User unit |
| UserOffsetActualPos | Feedback position after applying user offset | User unit |
| UserOffsetPosCmd | Command position after applying user offset | User unit |
| ActualFollowingError | Feedback following error | Pulse |
| EncoderCommand | Servo command position | Pulse |
| EncoderFeedback | Pulse feedback position | Pulse |
| DistZPulseToMasterZPulse | Difference in Z-phase position between slave axis and master axis | User unit |
| DistHSToMasterHS | Difference in home switch position between slave axis and master axis | User unit |
| DistLSToMasterLS | Difference in limit switch position between slave axis and master axis | User unit |
| ServoOn | Servo ON status | Bit |
| HomeDone | Home position return completion status | Bit |
| AlarmCode | Alarm code (Object ID: 603Fh)*1 | 32-bit integer |
| PositiveLS | Positive direction limit switch status | Bit |
| NegativeLS | Negative direction limit switch status | Bit |
| NearPositiveLS | Positive direction proximity limit switch status | Bit |
| NearNegativeLS | Negative direction proximity limit switch status | Bit |
| ExternalPositiveLS | Positive direction external limit switch status | Bit |
| ExternalNegativeLS | Negative direction external limit switch status | Bit |
| PositiveSoftLimit | Positive direction software limit switch status | Bit |
| NegativeSoftLimit | Negative direction software limit switch status | Bit |
| HomeSwitch | Home switch status | Bit |
| InPos | In-position status | Bit |
| MotionComplete | Motion command completion status | Bit |
| AccFlag | Acceleration status | Bit |
| DecFlag | Deceleration status | Bit |
| FollowingErrorAlarm | Following error status | Bit |

*1 The object ID (603Fh: 00h(Error Code)) is displayed only in the supported servo amplifiers.
For MR-J5-G, check the object ID (2A41h: 00h(Current alarm)) by SDO communication or check the alarm contents in MR Configurator2. For the SDO communication method, refer to the following.
☞ Page 99 Operation

**Point**

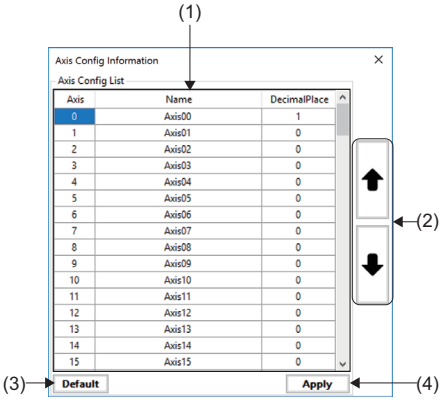
For details of each item, refer to the following.
📖SWM-G User Manual

## Axis display setting

Click the [Axis Config] button in the "Axis Position" screen to display the "Axis Config Information" screen. Set axis names to be displayed in the axis status monitor and the numbers of decimal places in values to be displayed as the position/speed.

### Window

[Operation] ⇨ [Position] ( ) ⇨ [Axis Config]




### Displayed items

| Item | Description |
|---|---|
| (1) Axis Config List | The name and number of decimal places for each axis can be set.<br>■Name<br>Set the axis name.<br>Axis names are displayed in the "Axis Config Information" screen when "AxisName" is selected as the status item for the "Axis Position" screen.<br>• Setting range: Up to 64 one-byte characters (Default value: Axis00 to Axis127 (Axis numbers 00 to 127))<br>■DecimalPlace<br>Set the number of decimal places in values to be displayed as the position/speed.<br>• Setting range: 0 to 6 (Default value: 0) |
| (2) Set axis switch button | Switches the display of axis to be set by 16 axes.<br>• [↑] button: Displays the previous 16 axes.<br>• [↓] button: Displays the next 16 axes. |
| (3) [Default] button | Restores the set axis names and numbers of decimal places to the default values. |
| (4) [Apply] button | Applies the settings configured in the axis config list to the "Axis Position" screen and closes the "Axis Config Information" screen.<br>To close the "Axis Config Information" screen without applying the settings, click the [×] button in the upper right. |

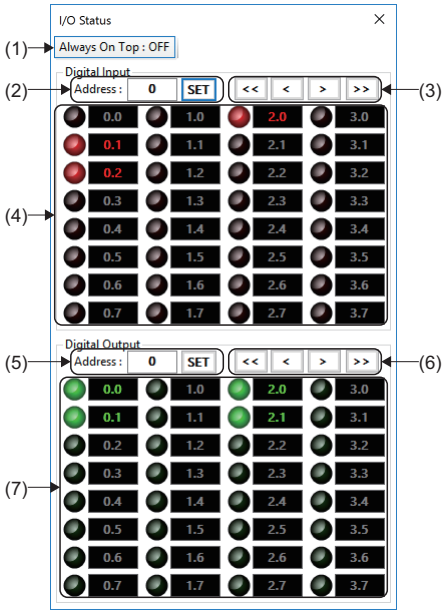
# I/O status

The status of the input address and output address is monitored.

Displays 32 points (4 bytes) of input and 32 points (4 bytes) of output in one screen.

## Window

[Operation] ⇨ [I/OStatus] ( )




## Displayed items

| Item | Description |
|---|---|
| (1) [Always On Top] button | Displays the "I/O Status" screen on the top.<br>When this setting is enabled, the "I/O Status" screen is displayed on the top even if it is overlapped with another screen.<br>• [Always On Top: ON]: The screen is displayed on the top.<br>• [Always On Top: OFF]: The screen is not displayed on the top. |
| (2) Input address setting | Set the input address (byte unit) to be displayed.<br>Enter the input address and click the [SET] button to switch the display to the set input address.<br>• Setting range: 0 to 7999 |
| (3) Display switch button | Switches the display of input address by 16 axes.<br>• [<<] button: Switches the display to the input address of 4 bytes before.<br>• [<] button: Switches the display to the input address of 1 byte before.<br>• [>] button: Switches the display to the input address of 1 byte after.<br>• [>>] button: Switches the display to the input address of 4 bytes after. |
| (4) Input status display | Displays the input status for 32 points (4 bytes).<br>The input address is displayed in a format of "(input address).(bit position)".<br>• : OFF<br>• : ON |
| (5) Output address setting | Set the output address (byte unit) to be displayed.<br>Enter the output address and click the [SET] button to switch the display to the set input address.<br>• Setting range: 0 to 7999 |
| (6) Display switch button | Switches the display of output address by 16 axes.<br>• [<<] button: Switches the display to the output address of 4 bytes before.<br>• [<] button: Switches the display to the output address of 1 byte before.<br>• [>] button: Switches the display to the output address of 1 byte after.<br>• [>>] button: Switches the display to the output address of 4 bytes after. |
| (7) Output status display/control | Displays the output status for 32 points (4 bytes).<br>The output address is displayed in a format of "(output address).(bit position)".<br>Click the button ( ) to turn on/off the output.<br>• : OFF<br>• : ON |

# Emergency stop/emergency stop release

Perform or release the emergency stop on the axis during the operation.

## Operating procedure

### ■ Emergency stop

1. Click [Operation] ⇨ [E-Stop] (  ) in the ribbon.
2. The emergency stop is performed. When the emergency stop is performed, the display of [E-STOP] in the ribbon is switched to [ON].

**⚠ CAUTION**

- Since the emergency stop is performed by the software, this function is not appropriate for the stop in case of an emergency. Use this function along with the emergency stop with the hardware.

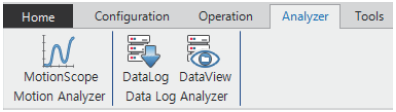
### ■ Emergency stop release

1. Click [Operation] ⇨ [Release] (  ) in the ribbon.
2. The emergency stop is released. When the emergency stop is released, the display of [E-STOP] in the ribbon is switched to [OFF].

# 3.4 Analyzer Tab

Data of servo axes and I/O is collected/analyzed.

## Window




## Displayed items

| Item | | Description | Reference |
|---|---|---|---|
| Motion Analyzer | MotionScope ( ) | Displays axis commands and feedback waveform patterns, performs analysis using digital I/O waveform patterns, and performs analysis using 2D displays. | ☞ Page 52 Motion scope |
| Data Log Analyzer | DataLog ( ) | Generates the log file using the data log function. | ☞ Page 52 Data logging |
| | DataView ( ) | Displays the log file generated by DataLog in a table format. | ☞ Page 53 Data log display |

# Motion scope

Displays axis commands and feedback waveform patterns, performs analysis using digital I/O waveform patterns, and performs analysis using 2D displays.

## Operating procedure

1. Click [Analyzer] ⇨ [MotionScope]( ) in the ribbon.
2. "Motion Scope" will start. Configure each setting and click the [ ] button to start logging.

**Point**

For details of Motion Scope, refer to the following.
☞ BASICS OF MOTION SCOPE

# Data logging

The log file is generated by using the data log function.

## Operating procedure

1. Click [Analyzer] ⇨ [DataLog] ( ) in the ribbon.
2. The "Data Log" screen appears. Configure the settings to generate the log file.

**Point**

For details of the data logging, refer to the following.
☞ Page 156 Data Log Collection

# Data log display

The log file generated by data logging is displayed in a table format.

## Operating procedure

1. Click [Analyzer] ⇨ [DataView] (  ) in the ribbon.
2. The "Data View" screen appears. Set and read the log file to be displayed.

**Point**

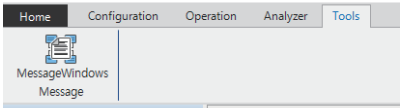
For details of the data log display, refer to the following.

☞ Page 161 Data Log Display

# 3.5 Tools Tab

The status of the SWM-G engine and related information can be checked.

## Window




## Displayed items

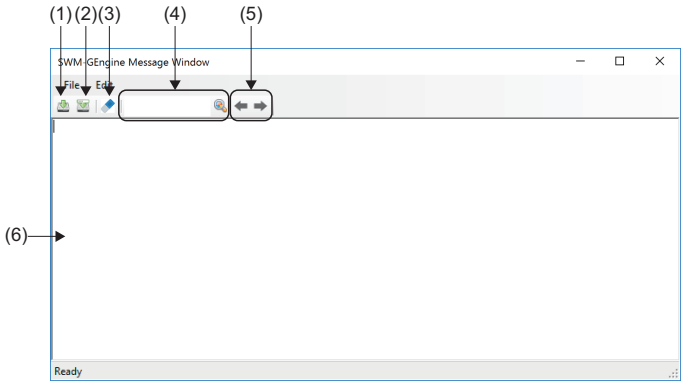
| Item | | Description | Reference |
|---|---|---|---|
| Message | MessageWindows | Messages of the SWM-G engine can be checked. | ☞ Page 54 Message window |

# Message window

Messages of the SWM-G engine are checked.

## Window

[Tools] ⇨ [MessageWindows]




## Displayed items

| Item | Description |
|---|---|
| (1) Overwrite save | Saves the message displayed in the message display field in a file. |
| (2) Save as | Saves the message file once overwritten and displayed in the message display field with a different name. |
| (3) Delete | Deletes the message displayed in the message display field. |
| (4) Search | Searches for a character string in the message displayed in the message display field.<br>Enter the character string to search in the input field, and click . |
| (5) Find next/previous | Searches for the character string in the message.<br>• [←]: Finds the previous occurrence of the character string from the cursor position.<br>• [→]: Finds the next occurrence of the character string from the cursor position. |
| (6) Message display field | Displays the message of the SWM-G engine. |

**Point**

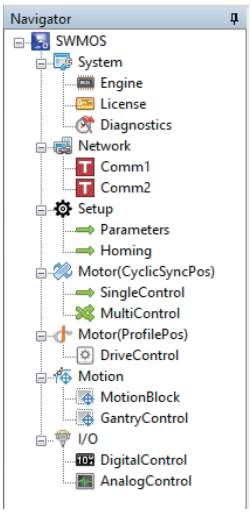
To output the SWM-G engine message to the "SWM-GEngine Message Window", set "Get Engine Message" to "Enable" in the "Common Setting" of the "Platform Setting" area of the tab displayed by selecting [SWMOS] ⇨ [System] ⇨ [Engine] in the navigation window. For details, refer to the following.

☞ Page 58 Platform setting

# 4 FUNCTION OF NAVIGATION WINDOW

From the navigation window, the system setting, network setting, and axis setting are configured and the axis control, motion control, and I/O control are performed.

## Window




## Displayed items

| Item | | Description | Reference |
|---|---|---|---|
| System | Engine | The SWM-G engine is managed. | ☞ Page 56 SWM-G engine |
| | License | The SWM-G license is managed. | ☞ Page 64 License |
| | Diagnostics | The system status of the SWM-G engine is diagnosed. | ☞ Page 69 Diagnostics |
| Network | Comm1 | The communication setting and communication status of the master and remote stations are displayed. | ☞ Page 70 Network Setting |
| | Comm2*1 | | |
| Setup | Parameters | The axis parameters are set. | ☞ Page 102 Parameter |
| | Homing | Home position return settings of axes are configured and home position return is performed. | ☞ Page 106 Home position return |
| Motor(CyclicSyncPos) | SingleControl | The single-axis control is tested. | ☞ Page 111 Single-axis control |
| | MultiControl | Test operations are performed on multiple axes simultaneously. | ☞ Page 125 Multi-axis control |
| Motor(ProfilePos)*2 | DriveControl | The PM motion axis control is tested. | ☞ Page 150 PM motion axis control |
| Motion | Motion Block | Test operations on the linear interpolation, circular interpolation, and helical interpolation are performed. | ☞ Page 129 Interpolation control |
| | GantryControl | Test operations on the gantry control are performed. | ☞ Page 137 Gantry control |
| I/O | DigitalControl | Set the name and start address of the digital I/O to perform I/O control. | ☞ Page 145 Digital I/O control |
| | AnalogControl | Set the name and start address of the analog I/O to perform I/O control. | ☞ Page 147 Analog I/O control |

*1 To display Comm2, select [SWMOS] ⇨ [System] ⇨ [Engine] in the navigation window, select the [Engine Information] tab, set to use two ports (CC-Link IE TSN×2 or CC-Link IE TSN×2+Simulation×2) or "Simulation" in [Quick Setting] under [Platform Setting].

*2 To display Motor(ProfilePos), select [SWMOS] ⇨ [System] ⇨ [Engine] in the navigation window, select [Add PMMotion] in [Module Setting] in the [Module Setting] tab, and add a PM motion module. For details of the setting method, refer to the following.
☞ Page 208 PM Motion Function

**Point**

In the following cases, only [System] is displayed in the tree of the navigation window, and [Setup], [Motor(CyclicSyncPos)], [Motion], or [I/O] is not displayed.

- When the SWM-G engine is stopped
- When the license of SWM-G has not been registered

# 4.1 System

Settings of the SWM-G engine are configured, the license is managed, and diagnosis is performed.

## SWM-G engine

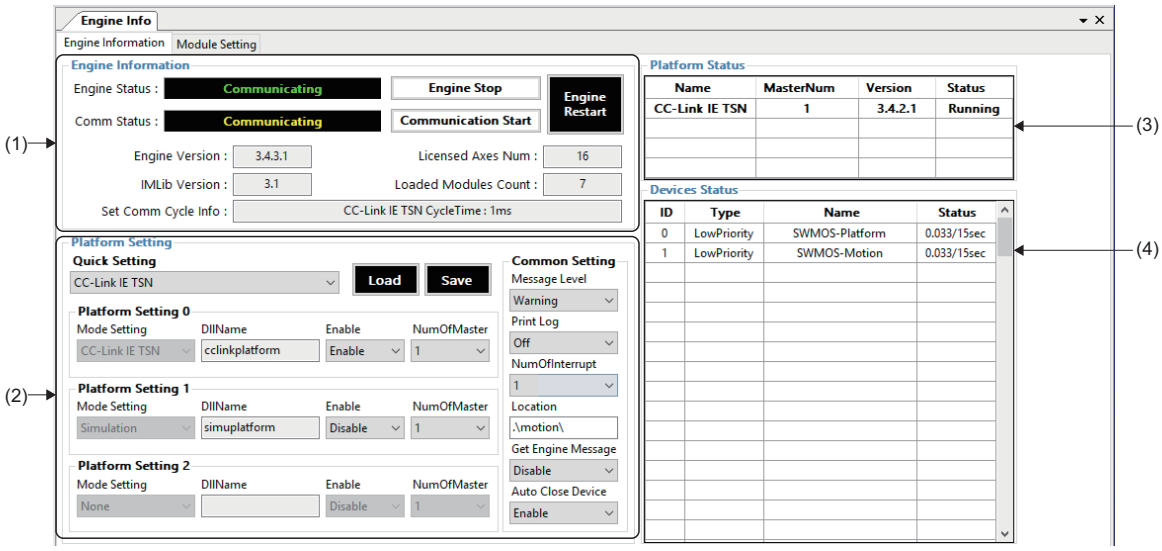
The SWM-G engine is managed.

### Engine information

The status of the SWM-G engine is checked and controlled, and the platform setting is configured.

#### Window

Navigation window ⇨ [SWMOS] ⇨ [System] ⇨ [Engine] ⇨ [Engine Information] tab




#### Displayed items

| Item | Description |
|---|---|
| (1) Engine Information | Check the status of the SWM-G engine and operate the SWM-G engine. (☞ Page 57 Engine information) |
| (2) Platform Setting | Configure settings for the platform modules (CC-Link IE TSN communication, EtherCAT communication*1, and simulator) and common settings for the entire system. (☞ Page 58 Platform setting) |
| (3) Platform Status | Displays the status of the platform module used in the SWM-G engine.<br>■Name<br>Displays the name of the module.<br>■MasterNum<br>Displays the number of masters.<br>■Version<br>Displays the version of the module.<br>■Status<br>Displays the status of the module.<br>• Stopped: Stopped<br>• Running: Execution in progress |
| (4) Device Status | Displays the status of the generated device (communication channel).<br>■ID<br>Displays the ID number of the device.<br>■Type<br>Displays the device type.<br>• Normal<br>• LowPriority<br>• ExitWOCnt<br>• LowpriorityExitWOCnt<br>■Name<br>Displays the name of the device.<br>■Status<br>Displays the watchdog count value/watchdog time to timeout. |

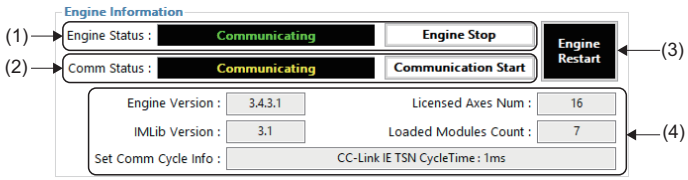
*1 When using SWM-G-N1 only

## ■ Engine information

The SWM-G engine and network communication are started/stopped in the engine information. In addition, the status of the SWM-G engine and network communication can be checked.

### Window

Navigation window ⇨ [SWMOS] ⇨ [System] ⇨ [Engine] ⇨ [Engine Information] tab ⇨ [Engine Information]




### Displayed items

| Item | Description |
|---|---|
| (1) SWM-G engine status | Displays the status and starts/stops the SWM-G engine.<br>Click the [Engine Start/Engine Stop] button to start/stop the SWM-G engine.<br>■Engine status<br>Displays the status of the SWM-G engine.<br>• Stopped: Engine stopped<br>• Preparing: Engine in preparation<br>• Running: Engine running<br>• Communicating: Network communication in progress |
| (2) Network communication status | Displays the status and starts/stops the network communication.<br>Click the [Communication Start/Communication Stop] button to start/stop the network communication.<br>■Communication status<br>Displays the status of the network communication.<br>• Stopped: Network communication stopped<br>• Communicating: Network communication in progress |
| (3) [Engine Restart] button | Restarts the SWM-G engine. |
| (4) SWM-G engine information | Displays the information of the SWM-G engine.<br>• Engine Version: Displays the version of the SWM-G engine.<br>• Licensed Axes Num: Displays the number of axes of the licensed product.<br>• IMLib Version: Displays the version of IMLib.<br>• Loaded Modules Count: Displays the number of loaded modules.<br>• Set Comm Cycle Info: Displays the communication cycle [ms].<br>*: The information of the communication cycle is updated when the network communication is started. |

## ■ Platform setting

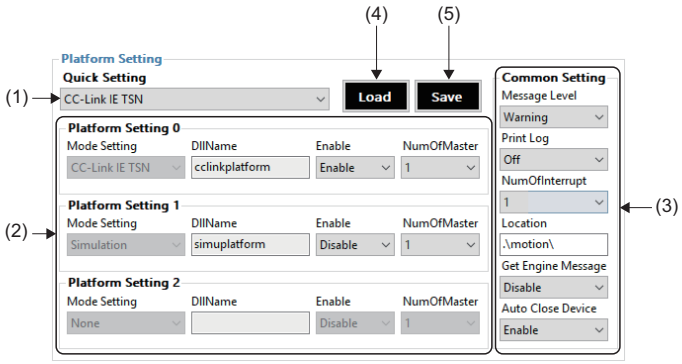
Settings for the platform module to be used in SWM-G are configured in the platform setting. SWM-G has the following platform modules:

- CC-Link IE TSN module
- EtherCAT module*1
- Simulation module

*1 When using SWM-G-N1 only

### Window

Navigation window ⇨ [SWMOS] ⇨ [System] ⇨ [Engine] ⇨ [Engine Information] tab ⇨ [Platform Setting]




### Displayed items

| Item | Description |
|---|---|
| (1) Quick Setting | Set the platform module.<br>• Custom: Custom setting<br>• Simulation×2: Simulation<br>• CC-Link IE TSN: CC-Link IE TSN<br>• CC-Link IE TSN×2: Two ports of CC-Link IE TSN used<br>• CC-Link IE TSN+Simulation: CC-Link IE TSN and simulation<br>• CC-Link IE TSN×2+Simulation×2: Two ports each of CC-Link IE TSN and simulation used<br>• EtherCAT: EtherCAT*1<br>• EtherCAT+Simulation: EtherCAT and simulation*1<br>• CC-Link IE TSN+EtherCAT: CC-Link IE TSN and EtherCAT*1<br>• CC-Link IE TSN+EtherCAT+Simulation: CC-Link IE TSN, EtherCAT, and simulation*1 |
| (2) Platform Setting | Configure settings for up to three platform modules (0 to 2) when "Custom" is set in "Quick Setting".<br>■Mode Setting<br>Select the platform module.<br>• None: No setting<br>• Simulation: Simulation module<br>• CC-Link IE TSN: CC-Link IE TSN module<br>• EtherCAT: EtherCAT module*1<br>■DllName<br>Displays the platform module name.<br>• cclinkplatform: CC-Link IE TSN platform<br>• simuplatform: Simulation platform<br>• ecplatform: EtherCAT platform*1<br>■Enable<br>Enable/disable the platform set in "Mode Setting".<br>• Disable: The platform is disabled.<br>• Enable: The platform is enabled.<br>■NumOfMaster<br>Set the number of masters in the platform.<br>• 1 or 2 |

| Item | Description |
|---|---|
| (3) Common Setting | Configure common settings for the module configuration.<br>■Message level (Message Level)<br>Set the message level of the SWM-G engine.<br>• Error: Displays errors only.<br>• Warning: Displays errors and warnings.<br>• Setting: Displays errors, warnings, and set parameters.<br>• Debug: Displays errors, warnings, set parameters, and debug messages.<br>■Message output flag (Print Log)<br>Set the message output flag of the SWM-G engine.<br>• Off: The message output is OFF.<br>• On: The message output is ON.<br>■NumOfInterrupt<br>Set the number of interruptions to "1" or "2".<br>When the number of interruptions is set to "2", the communication master processes with different cycles can be simultaneously controlled by distributing them to multiple threads.<br>For example, CC-link IE TSN and simulator can be controlled with different communication cycles.<br>■Module path (Location)<br>Set the path where the module file to be loaded is stored.<br>Either of the relative path and absolute path from the module configuration file (Module.ini) can be set.<br>• Default: .\motion\<br>■Message output method (Get Engine Message)<br>Set the output method of the SWM-G engine.<br>• Disable: The message is output to the console.<br>• Enable: The message is output to the message output buffer of the SWM-G engine.<br>■Device automatic deletion (Auto Close Device)<br>Set whether to perform the alive check for devices.<br>• Disable: The alive check is not performed for devices.<br>• Enable: The alive check is performed for devices. |
| (4) [Load] button | Reads the contents of the module configuration file (Module.ini) and applies them to the screen. |
| (5) [Save] button | Saves the settings configured in the platform setting in the module configuration file (Module.ini). |

*1 When using SWM-G-N1 only

## Operating procedure

1. Select the platform module from the [Quick Setting] pull-down list. Configure the settings as listed below according to the selected platform module.

| Quick Setting | Module setting configured in Platform Setting | | | Description |
|---|---|---|---|---|
| | Platform Setting | DllName | Enable | |
| Custom | Platform Setting 0 | Set Platform Setting 0 to 2 individually. | | Custom setting |
| | Platform Setting 1 | | | |
| | Platform Setting 2 | | | |
| Simulation×2 | Platform Setting 0 | CC-Link IE TSN | Disable | Only for simulation |
| | Platform Setting 1 | Simulation | Enable | |
| | Platform Setting 2 | None | — | |
| CC-Link IE TSN | Platform Setting 0 | CC-Link IE TSN | Enable | Only for CC-Link IE TSN |
| | Platform Setting 1 | Simulation | Disable | |
| | Platform Setting 2 | None | — | |
| CC-Link IE TSN×2 | Platform Setting 0 | CC-Link IE TSN | Enable | Two ports of CC-Link IE TSN used |
| | Platform Setting 1 | Simulation | Disable | |
| | Platform Setting 2 | None | — | |
| CC-Link IE TSN+Simulation | Platform Setting 0 | CC-Link IE TSN | Enable | CC-Link IE TSN and simulation |
| | Platform Setting 1 | Simulation | Enable | |
| | Platform Setting 2 | None | — | |
| CC-Link IE TSN×2+Simulation×2 | Platform Setting 0 | CC-Link IE TSN | Enable | Two ports each of CC-Link IE TSN and simulation used |
| | Platform Setting 1 | Simulation | Enable | |
| | Platform Setting 2 | None | — | |
| EtherCAT | Platform Setting 0 | EtherCAT | Enable | Only for EtherCAT |
| | Platform Setting 1 | Simulation | Disable | |
| | Platform Setting 2 | None | — | |
| EtherCAT+Simulation | Platform Setting 0 | EtherCAT | Enable | EtherCAT and simulation |
| | Platform Setting 1 | Simulation | Enable | |
| | Platform Setting 2 | None | — | |
| CC-Link IE TSN+EtherCAT | Platform Setting 0 | CC-Link IE TSN | Enable | CC-Link IE TSN and EtherCAT |
| | Platform Setting 1 | EtherCAT | Enable | |
| | Platform Setting 2 | None | — | |
| CC-Link IE TSN+EtherCAT+Simulation | Platform Setting 0 | CC-Link IE TSN | Enable | CC-Link IE TSN, EtherCAT, and simulation |
| | Platform Setting 1 | EtherCAT | Enable | |
| | Platform Setting 2 | Simulation | Enable | |

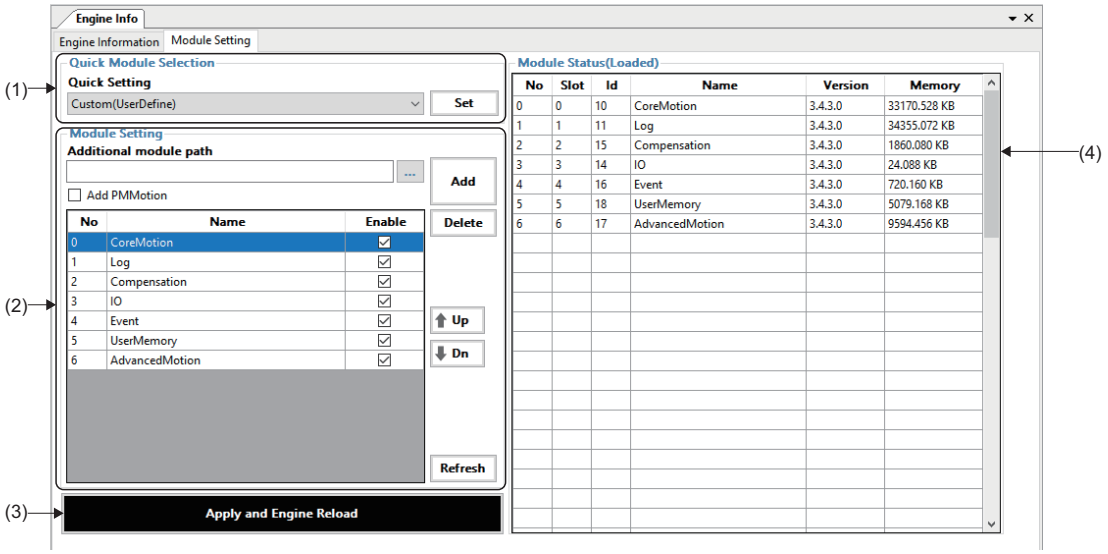
2. To change the platform setting, change the settings in [Platform Setting 0] to [Platform Setting2]. When any of the settings is changed, [Quick Setting] is set to "Custom".
3. To change the common setting, change the settings in [Common Setting].
4. After configuring the settings, click the [Save] button. The confirmation message "Do you want to save in Module.ini?" appears. Click the [Yes] button to save the module configuration file (Module.ini).
5. Then, the confirmation message "Do you want to restart the SWM-GEngine?" appears. Click the [Yes] button to restart the SWM-G engine. The settings are applied to the SWM-G engine after the restart.

# Module setting

Settings for the motion module to be used in the SWM-G engine are configured and checked.

## Window

Navigation window ⇨ [SWMOS] ⇨ [System] ⇨ [Engine] ⇨ [Module Setting] tab




## Displayed items

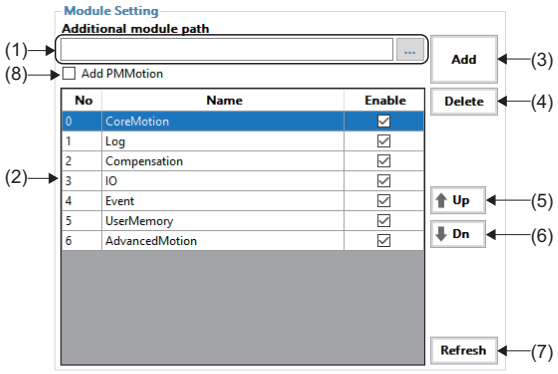
| Item | Description |
|---|---|
| (1) Quick Module Selection | Configure the motion module setting.<br>Click the [Set] button to apply it to the module setting.<br>• Custom(UserDefine): Custom setting<br>• Default: Default setting (CoreMotion, Log, Compensation, IO, Event, UserMemory, AdvancedMotion) |
| (2) Module Setting | Motion modules are added, deleted, enabled, and disabled and the definition order is changed. (☞ Page 62 Module setting) |
| (3) [Apply and Engine Reload] button | Saves the configured settings in the module configuration file (Module.ini), and restarts the SWM-G engine. The settings are applied to the SWM-G engine after the restart. |
| (4) Module Status(Loaded) | Displays the status of the motion modules used in the SWM-G engine.<br>■No<br>Displays the order of module definition.<br>■Slot<br>Displays the slot number of the module. This number is assigned to each module in the order of loading.<br>■Id<br>Displays the ID number of the module. This number is specific to each module.<br>■Name<br>Displays the name of the module.<br>■Version<br>Displays the version of the module.<br>■Memory<br>Displays the memory usage amount of the module. |

## ■ Module setting

Motion modules are added, deleted, enabled, and disabled and the definition order is changed.

### Window

Navigation window ⇨ [SWMOS] ⇨ [System] ⇨ [Engine] ⇨ [Module Setting] tab ⇨ [Module Setting]




### Displayed items

| Item | Description |
|---|---|
| (1) Additional module path | Set the module file (*.rtdll) to be added.<br>From the "Open" screen that is displayed by clicking the [...] button, the module file can be set. |
| (2) Module list | Displays the list of the set modules.<br>■No<br>Displays the order of module definition.<br>■Name<br>Displays the name of the module.<br>■Enable*2<br>Enables/disables the module loading.<br>• Selected: The module loading is enabled.<br>• Not selected: The module load is disabled. |
| (3) [Add] button*1 | Adds a module to the module list.<br>After setting a configured module file (*.rtdll) in "Additional Module Path", click the [Add] button to add it. |
| (4) [Delete] button*1 | Deletes a module from the module list.<br>Select a module from the module list and click the [Delete] button to delete it. |
| (5) [↑Up] button*1 | Moves the definition order of a module up a row.<br>Select a module to move its definition order up from the module list, and click the [↑Up] button. |
| (6) [↓Dn] button*1 | Moves the definition order of a module down a row.<br>Select a module to move its definition order down from the module list, and click the [↓Dn] button. |
| (7) [Refresh] button | Reads the module configuration file (Module.ini) and applies it to the screen. |
| (8) Add PMMotion | Adds a PM motion module.<br>Adding a PM motion module adds "PMMotion" to the module list and adds [SWMOS] ⇨ [Motor(Profilepos)] ⇨ [DriveControl] to the navigation window. (☞ Page 150 PM motion axis control, ☞ Page 208 PM Motion Function)<br>• Not selected: No PM motion module is added.<br>• Selected: A PM motion module is added. |

*1 The module configuration file (Module.ini) is updated at the timing of clicking the button.

*2 The module configuration file (Module.ini) is not updated when the status of the checkbox is changed. Click the [Apply and Engine Reload] button to update the file.

**Point**

The PM motion module can be added by selecting "Add PMMotion". The PM motion module controls the axes using the PP, HM, PV, and TQ command modes. The PM motion axis is required to be connected to a network different from the one for normal axes. For details of the setting method, refer to the following.

☞ Page 208 PM Motion Function

## Operating procedure

1. Select a module from the [Quick Setting] pull-down list in [Quick Module Selection], and click the [Set] button.

| Quick Setting | Description | Module to be set |
|---|---|---|
| Custom(UserDefine) | Custom setting | Set modules individually. |
| Default (CoreMotion, Log, Comp', IO, Event, UserMem', AdvMotion) | Default setting | Set CoreMotion, Log, Compensation, IO, Event, UserMemory, and AdvancedMotion. |

2. When the confirmation message "Do you want to apply the quick setting?" appears, click the [Yes] button. The settings of the selected module is applied to [Module Setting] and the module configuration file (Module.ini) is updated.

3. To change the module setting, change the settings in [Module Setting].

- When adding a module
  Specify the module file (*.rtdl) to be added in [Additional module path] and click the [Add] button.
- When deleting a module
  Select the module to be deleted from the module list and click the [Delete] button.
- When changing the module definition order
  Select a module to change its definition order from the module list and click the [↑Up] or [↓Dn] button.

4. When the module setting is completed, click the [Apply and Engine Reload] button to update the module configuration file (Module.ini).

5. The confirmation message "Do you want to restart the SWM-GEngine?" appears. Click the [Yes] button to restart the SWM-G engine. The settings are applied to the SWM-G engine after the restart.

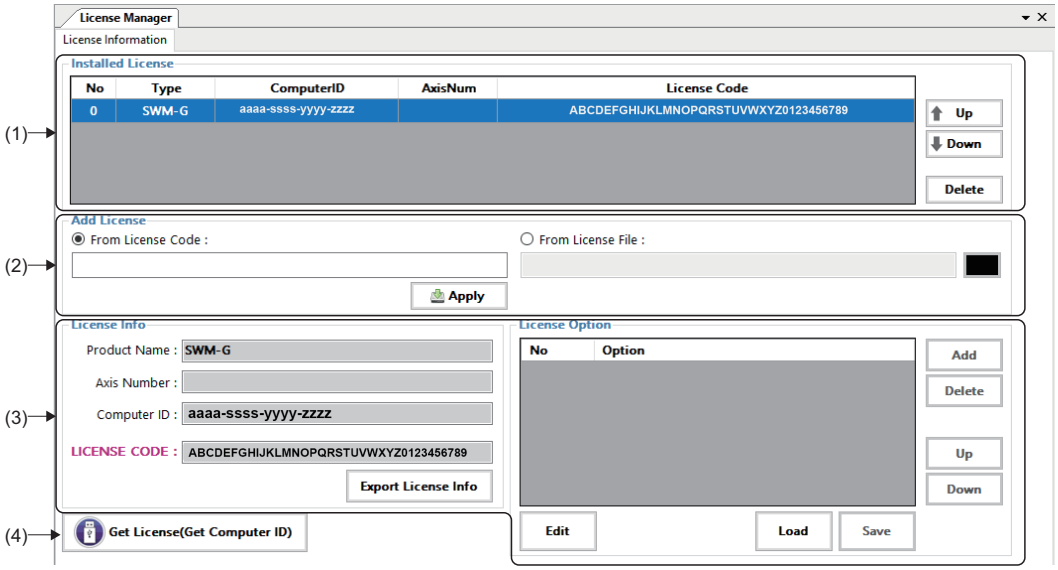
# License

The SWM-G license is managed.

Typically, inputting the license is completed at the time of the SWM-G installation. This function is used to check, back up, and restore the license.

## Window

Navigation window ⇨ [SWMOS] ⇨ [System] ⇨ [License] ⇨ [License Information] tab




## Displayed items

| Item | Description |
|---|---|
| (1) Installed License | Registered licenses are displayed and can be deleted.<br>Select a license from the license list and click the [Delete] button to delete it.<br>■No<br>Displays the order of license registration.<br>The order of the license selected in the license list can be changed by clicking the [↑Up] button/[↓Down] button.<br>■Type<br>Displays the name of the licensed product.<br>■ComputerID<br>Displays the computer ID.<br>■AxisNum<br>Displays the number of axes of the licensed product.<br>■License Code<br>Displays the registered license code. |
| (2) Add License | Used to add a license.<br>■From License Code<br>Enter a license code and click the [Apply] button to add it.<br>■From License File<br>Set a license file (*.lic) and click the [Apply] button to add it.<br>A license file can be set in the "Open" screen which is displayed by clicking the [...] button. |
| (3) License Info | Detailed information of the license is displayed and edited. (☞ Page 65 License information/option information) |
| (4) [Get License(Get Computer ID)] button | Check the computer ID assigned to the USB key. |

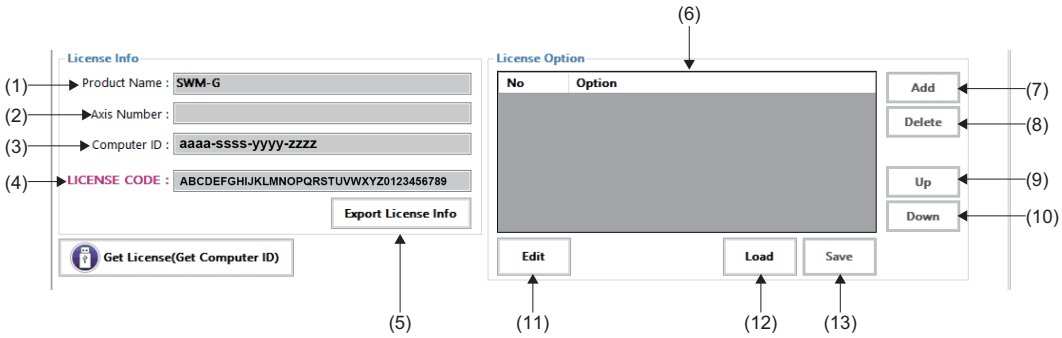
## ■ License information/option information

The license information of the license selected in installed license is displayed and edited.

In addition, option information is added to the license information as necessary.

### Window

Navigation window ⇨ [SWMOS] ⇨ [System] ⇨ [License] ⇨ [License Information] tab ⇨ [License Option]




### Displayed items

| Item | Description |
|---|---|
| (1) Product Name | The product name is displayed and edited. |
| (2) Axis Number | The number of axes is displayed and edited. |
| (3) Computer ID | The computer ID is displayed and edited. |
| (4) LICENSE CODE | Displays the license code.<br>*: The license code cannot be edited. |
| (5) [Export License Info] button | Saves the license information in s license file (*.lic).<br>Set the file saving destination and file name in the "Save As" screen which is displayed by clicking the [Export License Info] button. |
| (6) Option list | Displays the list of the set option names.<br>■No<br>Displays the addition order of the option information.<br>■Option<br>Displays the input option information. |
| (7) [Apply] button | Adds an option information to the option list.<br>Click the [Edit] button, and click the [Apply] button to add it. |
| (8) [Delete] button | Deletes an option information from the option list.<br>Select an option name from the option list, and click the [Delete] button to delete it. |
| (9) [Up] button | Moves an option up a row in the option list.<br>Select an option to be moved up from the option list, and click the [Up] button. |
| (10) [Down] button | Moves an option down a row in the option list.<br>Select an option to be moved down from the option list, and click the [Down] button. |
| (11) [Edit] button | Enables editing the following columns.<br>■License Info<br>• Product Name<br>• Axis Number<br>• Computer ID<br>■License Option<br>• Option |
| (12) [Load] button | Reads the saved license information and applies it to the screen. |
| (13) [Save] button | Saves the edited settings. |

## SWM-G license

To enable the SWM-G engine, registering "License code" is required.

The SWM-G engine can be enabled by registering "License code" and inserting the USB key to the personal computer.

### ■ License code

The license code is the character string described in the license agreement included with the USB key.

Ex.

License code: "AAAAAA-BBBBBB-CCCCCC-DDDDDD-EEEEEE-FFFFFF"

The license code is linked with the ID specific to the USB key (computer ID).

## License operation

### ■ How to add a license with a license code

#### Operating procedure

1. Select [From License Code] in [Add License]. The text box is enabled. Then, enter a 36-character license code, which is described in the license agreement, in the text box.
2. Click the [Add] button to register it to the [Installed License] list.
3. To check that the license is normally registered, restart the SWM-G engine and check that [Engine Status] is in the "Running" state. (☞ Page 57 Engine information)

### ■ How to add a license with a license file

#### Operating procedure

1. Select [From License File] in [Add License]. The text box is enabled. Then, specify a license file (*.lic). A license file can be set in the "Open" screen which is displayed by clicking the [...] button.
2. Click the [Add] button to register it to the [Installed License] list.
3. To check that the license is normally registered, restart the SWM-G engine and check that [Engine Status] is in the "Running" state. (☞ Page 57 Engine information)

### ■ How to delete a license

#### Operating procedure

1. Select a license to be deleted from the [Installed License] list.
2. Click the [Delete] button to delete the selected license.

## ■ How to check and edit license detailed information

### Operating procedure

1. Select a license to check its detailed information from the [Installed License] list. The detailed information of the selected license can be checked in [License Info]. Additional information can be checked in [License Option].
2. Clicking the [Edit] button in [License Option] enables editing the items other than the license code.

| Item | Description | Edit |
|---|---|---|
| Product Name | Name of licensed product | ○ |
| Axis Number | Number of axes of licensed product | ○ |
| Computer ID | Computer ID | ○ |
| LICENSE CODE | License code | × |

3. Edit the option information as necessary. When editing the information is completed, click the [Save] button to save. Clicking the [Load] button cancels the edited information and loads the information before the edit.

- When adding a module
  Click the [Add] button.
- When deleting a module
  Click the [Delete] button.
- When changing the order of modules
  Select an option from the module list, and click the [Up] or [Down] button to change the order.

**Point**

The items other than the license code are information only to display. They do not affect the license authentication.
The items other than the license code are blank immediately after the license registration. Add information as necessary.

## ■ Saving a license file

The registered license can be saved in a license file (*.lic). It can be used as a backup of the license.

### Operating procedure

1. Select the license to be saved from the [Installed License] list.
2. Click [License Information] ⇨ [Export License Info] button to display the "Save As" screen. Set the saving destination and file name of the license file, and click the [Save] button to save it.

**Point**

The saved license file (*.lic) is used when a license file is registered by selecting it from [Add License] ⇨ [From License File].

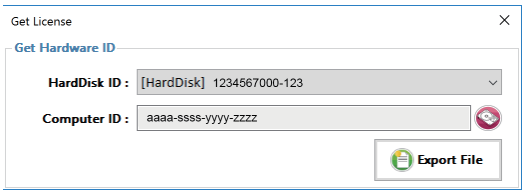
## ■ Acquiring the computer ID

The computer ID uniquely assigned to the USB key can be checked.

Use the computer ID when contacting Mitsubishi Electric.

### Operating procedure

***1.*** Click the [Get License(Get Computer ID)] button to display the "Get License" screen.




***2.*** Select the [Dongle] item from the pull-down list. The computer ID for the USB key is displayed in [Computer ID].

***3.*** Click the [Export File] button to display the "Save As" screen. Set the saving destination and name of the file, and click the [Save] button.

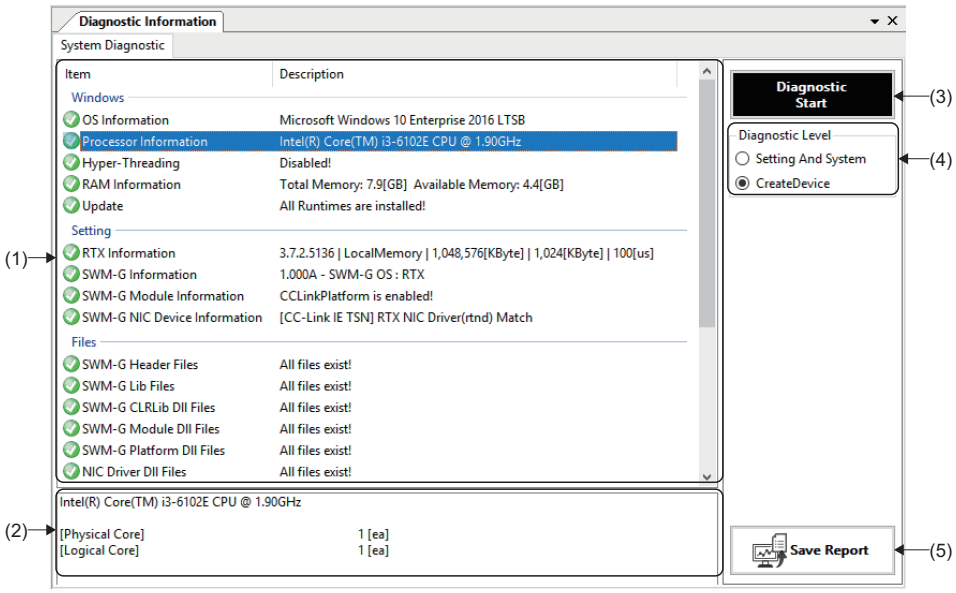
The computer ID information is saved in a text file (*.txt).

# Diagnostics

The system status of the SWM-G engine is diagnosed.

## Window

Navigation window ⇨ [SWMOS] ⇨ [System] ⇨ [Diagnostics] ⇨ [System Diagnostic] tab




## Displayed items

| Item | Description |
|---|---|
| (1) Diagnostic item list | Displays the list of diagnostic items and the diagnostic results.<br>■Diagnostic result<br>• : Normal<br>• : Error or not diagnosed |
| (2) Diagnostic result detail display | Displays the detailed information of the selected diagnostic item. |
| (3) [Diagnostic Start] button | Starts diagnostics. |
| (4) Diagnostic Level | Select the level of diagnostics.<br>• Setting And System: The system status is diagnosed.<br>• CreateDevice: The system status and device creation are diagnosed. |
| (5) [Save Report] button | Saves the diagnostic results in a text file (*.txt) on the desktop. |

## Operating procedure

1. Select the level of diagnostics in [Diagnostic Level].
2. Click the [Diagnostic Start] button to start the diagnostics.
3. When the diagnostics is completed, the completion message "System diagnosis is completed" appears. Click the [OK] button and check the diagnostic results displayed in the diagnostic item list.
4. Select an item to display its detailed information in the diagnostic result detail display. For details of the items, refer to the following.

☞ Page 207 Diagnostic Result

5. Click the [Save Report] button to save the diagnostic results in a text file (*.txt). The diagnostic results file is saved on the desktop of the personal computer with a file name "SWMOS_DiagnosisLog-yyyy-mm-dd_tt-mm-ss".

Ex.

When the file is saved at "1:36:52 PM on December 25, 2020"

SWMOS_DiagnosisLog-20-12-25_13-36-52.txt

yy-mm-dd hh-mm-ss

# 4.2 Network Setting

The network setting of CC-Link IE TSN is configured.
When two ports are assigned in the NIC setting, Comm1 and Comm2 are displayed in the order of the RTX NIC setting in the "NIC setting" screen. Configure the settings for each port.

**Point**

The network settings for EtherCAT are set in EcConfigurator. For details of EcConfigurator, refer to the following.
Motion Control Software SWM-G Operating Manual (EcConfigurator)

## Comm1/Comm2

The communication setting and communication status of the master and remote stations are displayed.
Select an item to be set (CC-Link IE TSN, Simulation, Monitor) from the Comm1/Comm2 tree.

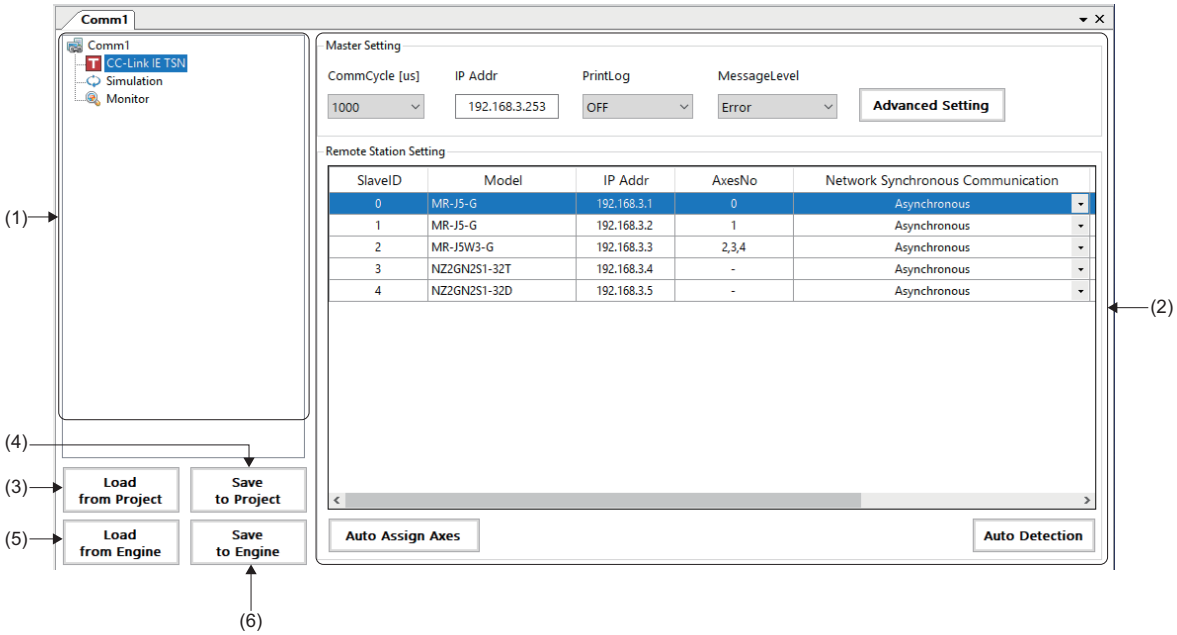
**Point**

To display Comm2, select navigation window ⇨ [SWMOS] ⇨ [System] ⇨ [Engine] ⇨ [Engine Information] tab ⇨ [Platform Setting] ⇨ [Quick Setting], and set the following.

- Set to use two ports (CC-Link IE TSN×2 or CC-Link IE TSN×2+Simulation×2)
- Simulation (Simulation×2)

### Window

Navigation window ⇨ [SWMOS] ⇨ [Network] ⇨ [Comm1/Comm2]




### Displayed items

| Item | | Description |
|---|---|---|
| (1) Comm1/ Comm2 tree | CC-Link IE TSN | Configure the master setting and remote station setting of the CC-Link IE TSN platform. (☞ Page 75 CC-Link IE TSN) |
| | Simulation | Configure the master setting and axis number setting of the simulation platform. (☞ Page 91 Simulation) |
| | Monitor | Displays the master and remote station statuses. (☞ Page 93 Monitor) |
| (2) Setting/status display | | Displays the setting items and statuses of the master/remote station.<br>The displayed items differ depending on the item selected in the Comm1/Comm2 tree. |

| Item | Description |
|---|---|
| (3) [Load from Project] button | Loads the information of the master setting, remote station setting, and simulation setting from the setting file. (☞ Page 72 Loading a setting file) |
| (4) [Save to Project] button | Saves the set master setting, remote station setting, and simulation setting in the setting file. (☞ Page 71 Saving a setting file) |
| (5) [Load from Engine] button | Loads the information of the master setting, remote station setting, and simulation setting from the SWM-G engine. (☞ Page 73 Loading information from the SWM-G engine) |
| (6) [Save to Engine] button | Writes the information of the master setting, remote station setting, and simulation setting to the SWM-G engine. (☞ Page 73 Writing information to the SWM-G engine) |

## Saving/Loading a setting file

### ■ Saving a setting file

Save the master setting, remote station setting, and simulation setting as a setting file in the specified folder.
Manage the setting file in the following folder.

| Storage destination folder |
|---|
| C:\Program Files\MotionSoftware\SWM-G\SWMOS\SWMOSPack\Project\SWMOS\NETWORK |

By default, no storage destination folder is set. Specify it on the "Folder browsing" screen at saving. After saving the setting, the specified folder is created in the above folder, and the following files are saved. (If the setting file already exists, the file is overwritten.)

| Setting file | Storage destination folder | File name |
|---|---|---|
| Master setting (Network definition file) | \Specified folder*1\DEF\ | cclink_network.def |
| Remote station setting (CUI file) | \Specified folder*1\CUI\ | swmos-**********.txt*2 |
| Simulation setting (Simulation definition file) | \Specified folder*1\DEF\ | simu_network.def |

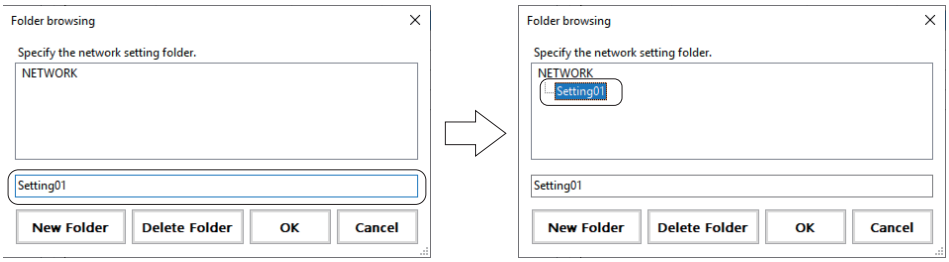
*1 The folder name specified in the "Folder browsing" screen
*2 ********** = IP address of the remote station

#### Operating procedure

1. Click the [Save to Project] button.
2. The confirmation message "Do you want to save the setting to the project data?" appears. Click the [Yes] button.
3. The "Folder browsing" screen appears.

<When saving the setting in a newly created folder>

- Enter the "Folder name" in the folder name entry column, and click the [New Folder] button. A folder is created under "NETWORK". Select the created folder, and click the [OK] button.




<When saving the setting in an existing folder>

- Select the save destination folder, and click the [OK] button.

4. When the saving is completed, the completion message "Succeeded in saving the setting to the project data." appears. Click the [OK] button to close the message.

**Point**

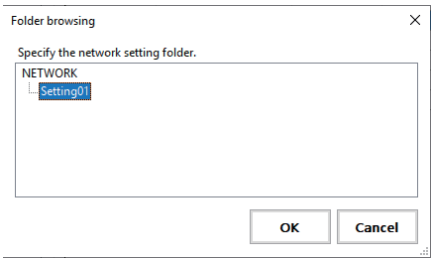
- Click the [Save to Project] button to save the setting file, and if the setting has an error, an error message appears. Click the [OK] button to close the error message. The "Network Setting Error Information" screen appears. Check the displayed error details and eliminate the error. For details of the "Network Setting Error Information" screen, refer to the following.
  ☞ Page 74 Network setting error information
- Any created folders can be deleted with the [Delete Folder] button. To delete a folder, select a folder under "NETWORK", and click the [Delete Folder] button.

## ■ Loading a setting file

Load the setting file (master setting, remote station setting, simulation setting) from the specified folder.

### Operating procedure

1. Click the [Load from Project] button.
2. The confirmation message "Do you want to load the setting from the project data?" appears. Click the [Yes] button.
3. The "Folder browsing" screen appears. Select a folder from which the setting file is loaded, and click the [OK] button.




4. When the loading is completed, the completion message "Succeeded in loading the setting from the project data." appears. Click the [OK] button to close the message.

## Writing/Loading information to/from the SWM-G engine

### ■ Writing information to the SWM-G engine

Write the information of the master setting, remote station setting, and simulation setting to the SWM-G engine.
Store the files in the following folder to apply each setting information to the SWM-G engine.
Load the setting file at the communication start.

| Setting file | Storage destination folder | File name |
|---|---|---|
| Master setting (Network definition file) | C:\Program Files\MotionSoftware\SWM-G\Platform\CCLink\ | cclink_network.def |
| Remote station setting (CUI file) | C:\cui\ | swmos-**********.txt*1 |
| Simulation setting (Simulation definition file) | C:\Program Files\MotionSoftware\SWM-G\Platform\Simu\ | simu_network.def |

*1 ********** = IP address of the remote station

**Point**

- The setting written to the SWM-G engine is applied at the communication start.

#### Operating procedure

1. Click the [Save to Engine] button.
2. The confirmation message "Do you want to load the setting from the engine?" appears. Click the [Yes] button.
3. When the writing is completed, the completion message "Succeeded in loading the setting from the engine." appears. Click the [OK] button to close the message.

**Point**

Click the [Save to Engine] button to write the setting file, and if the setting has an error, an error message appears. Click the [OK] button to close the error message. The "Network Setting Error Information" screen appears. Check the displayed error details and eliminate the error. For details of the "Network Setting Error Information" screen, refer to the following.
☞ Page 74 Network setting error information

### ■ Loading information from the SWM-G engine

Load the information of the master setting, remote station setting, and simulation setting from the SWM-G engine.

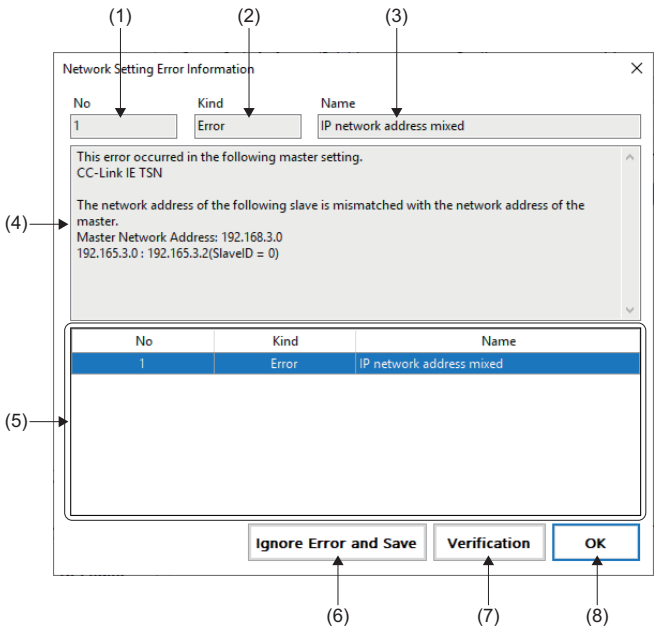
#### Operating procedure

1. Click the [Load from Engine] button.
2. The confirmation message "Do you want to save setting to the engine?" appears. Click the [Yes] button.
3. When the loading is completed, the completion message "Succeeded in saving the setting to the engine." appears. Click the [OK] button to close the message.

## Network setting error information

When the setting file is saved with the [Save to Project] button or written to the SWM-G engine with the [Save to Engine] button, if the setting has an error, the error message "A setting error has occurred. Please resolve the error indicated in the Network Setting Error Information window." appears. Clicking the [OK] button in the error message displays the "Network Setting Error Information" screen. Check the error details displayed on the "Network Setting Error Information" screen and eliminate the error.

### Window




### Displayed items

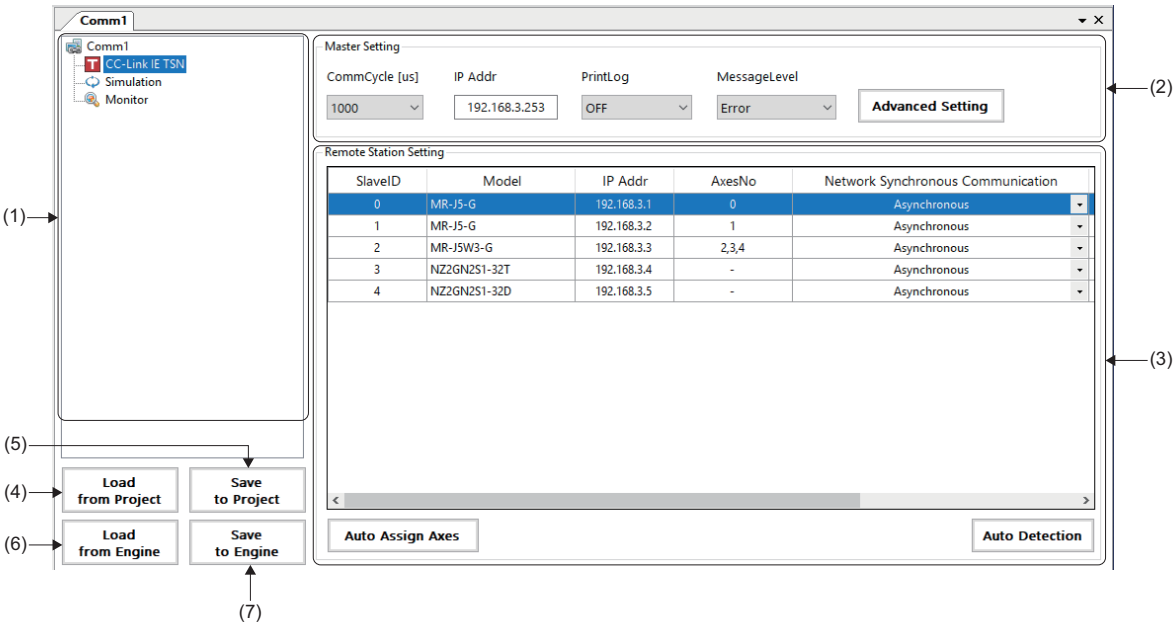
| Item | Description |
|---|---|
| (1) No | Displays the order in the list of the error selected in the error list. |
| (2) Kind | Displays the type of the error selected in the error list. |
| (3) Name | Displays the name of the error selected in the error list. |
| (4) Details | Displays the details of the error selected in the error list. |
| (5) Error list | Displays the list of occurring errors.<br>Selecting an error in the list displays the error details in (1) to (4). |
| (6) [Ignore Error and Save] button | Saves each file of the master setting, remote station setting, and simulation setting ignoring the error details. |
| (7) [Verification] button | Clicking the [Verification] button after eliminating the error cause can verify the measures against the error. |
| (8) [OK] button | Closes the "Network Setting Error Information" screen. Saving the setting file or writing the file to the engine is not performed. |

# CC-Link IE TSN

Configure the master setting and remote station setting of the CC-Link IE TSN platform.

## Displayed items

Navigation window ⇨ [SWMOS] ⇨ [Network] ⇨ [Comm1/Comm2] ⇨ [CC-Link IE TSN] in the Comm1/Comm2 tree

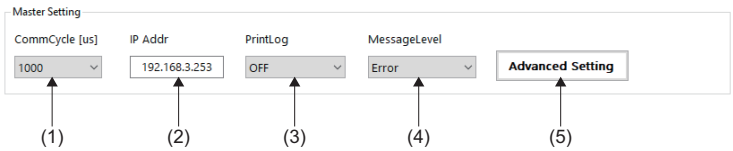



## Displayed items

| Item | Description |
|---|---|
| (1) Comm1/Comm2 tree | Select a function to be set from the tree. |
| (2) Master Setting | Set the communication cycle, IP address, log output, message level, and advanced setting. (☞ Page 76 Master setting) |
| (3) Remote Station Setting | Set the model, axis number, and detail setting of the remote station. (☞ Page 78 Remote station setting) |
| (4) [Load from Project] button | Loads the information of the master setting, remote station setting, and simulation setting from the setting file. (☞ Page 72 Loading a setting file) |
| (5) [Save to Project] button | Saves the set master setting, remote station setting, and simulation setting in the setting file. (☞ Page 71 Saving a setting file) |
| (6) [Load from Engine] button | Loads the information of the master setting, remote station setting, and simulation setting from the SWM-G engine. (☞ Page 73 Loading information from the SWM-G engine) |
| (7) [Save to Engine] button | Writes the information of the master setting, remote station setting, and simulation setting to the SWM-G engine. (☞ Page 73 Writing information to the SWM-G engine) |

## ■ Master setting

### Window




### Displayed items

| Item | Description | Default |
|---|---|---|
| (1) CommCycle [us] (Communication cycle) | Set the communication cycle.<br>• Setting value: 125, 250, 500, 1000, 2000, 4000, 8000 [μs] | 1000 [μs] |
| (2) IP Addr (IP address) | Set the IP address of the master. | 192.168.3.253 |
| (3) PrintLog (Log output) | Select whether to output the log after the communication stop.<br>• OFF: Log is not output.<br>• ON: Log is output. | OFF |
| (4) MessageLevel (Message level) | Set the message level.<br>• Error: Error message only<br>• Warning: Error message, warning message<br>• Setting: Error message, warning message, setting message<br>• Debug: Error message, warning message, setting message, debug message | Error |
| (5) [Advanced Setting] button | Clicking the [Advanced Setting] button displays the "Master Advanced Setting" screen. Configure the settings related to the CC-Link IE TSN network. (☞ Page 77 Master advanced setting) | — |

**Point**

- When multiple ports are used, the master setting for Comm2 is also required. For the Comm2 master setting, configure the settings for the communication cycle, log output, message level, and advanced setting.
- A common IP address is set to Comm1 and Comm2. The last IP address set for either Comm1 or Comm2 is valid.

### Precautions

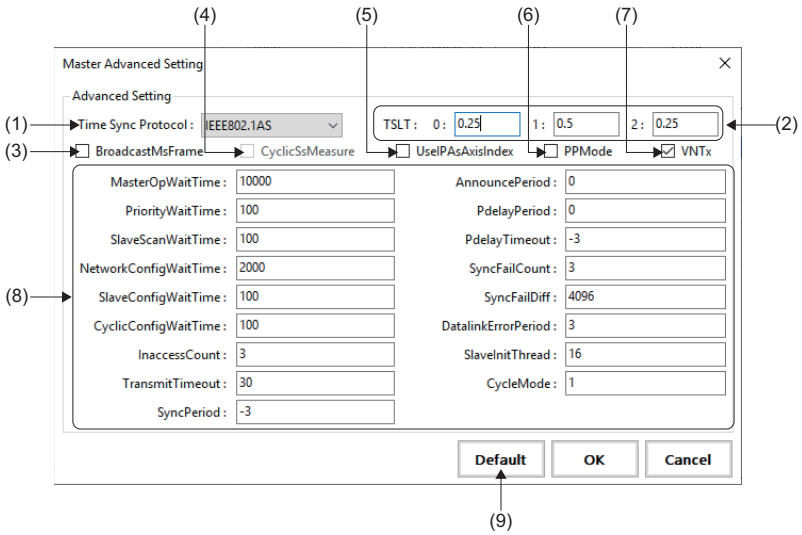
- Set the communication cycle of Comm2 the same as or longer than that of Comm1. (Comm1 communication cycle ≤ Comm2 communication cycle)
- Comm1 and Comm2 cannot perform synchronization and interpolation control. For details of the affected functions, refer to "Motion ⇨ Architecture ⇨ Interrupts and Multi-Cycle" in the following manual.
  SWM-G User Manual

## ■ Master advanced setting

Clicking the [Advanced Setting] button in the master setting displays the "Master Advanced Setting" screen. Detailed settings related to the CC-Link IE TSN network can be configured. For details of the settings, refer to "CC-Link IE TSN Platform ⇨ Network Define (cclink_network.def)" in the following manual.

📖SWM-G User Manual

### Window

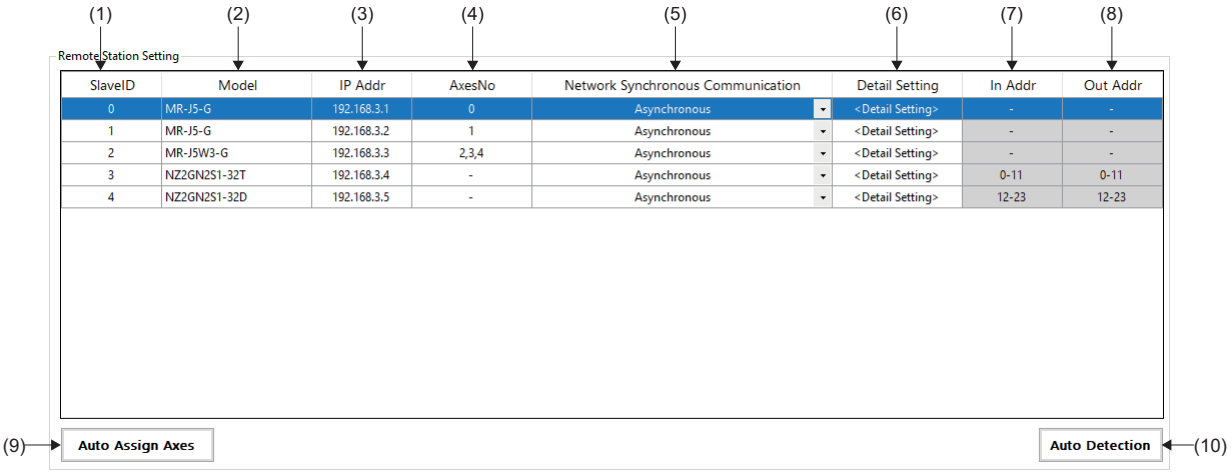



### Displayed items

| Item | Description | Default value |
|---|---|---|
| (1) Time Sync Protocol<br>(Time synchronous protocol) | Select the time synchronous protocol.<br>• IEEE802.1AS<br>• IEEE1588 | IEEE802.1AS |
| (2) TSLT (Time slot) | Set the division ratio of the time slot.<br>• TSLT0: IP communication<br>• TSLT1: CC-Link IE TSN Network<br>• TSLT2: Time synchronization | TSLT 0 = 0.25<br>TSLT 1 = 0.5<br>TSLT 2 = 0.25 |
| (3) BroadcastMsFrame<br>(Ms frame broadcast setting) | Select whether to broadcast the CyclicMs frame.<br>• Selected: The frame is broadcasted.<br>• Not selected: The frame is not broadcasted. | Not selected |
| (4) CyclicSsMeasure<br>(CyclicSs frame log output) | Select whether to output the log of the CyclicSs frame after the communication stop. This item can be selected when [PrintLog] in the master setting is set to "ON: Log is output".<br>• Selected: Log is output.<br>• Not selected: Log is not output. | Not selected |
| (5) UseIPAsAxisIndex (Axis index selection) | Select whether to use the fourth octet in the IP address of the remote station as the start value of the axis number.<br>• Selected: Use<br>• Not selected: Not use | Not selected |
| (6) PPMode (PM motion function selection) | Select whether to use the PM motion function.<br>• Selected: Use<br>• Not selected: Not use | Not selected |
| (7) VNTx (IP communication selection) | Select whether to use the IP communication mixed function.<br>• Selected: Use<br>• Not selected: Not use | Selected |
| (8) Setting item | There is no need to change the setting values for the items in (8).<br>Normally, use the default values. | — |
| (9) [Default] button | Discards the changed setting and returns to the default value. | — |

## ■ Remote station setting

### Window




### Displayed items

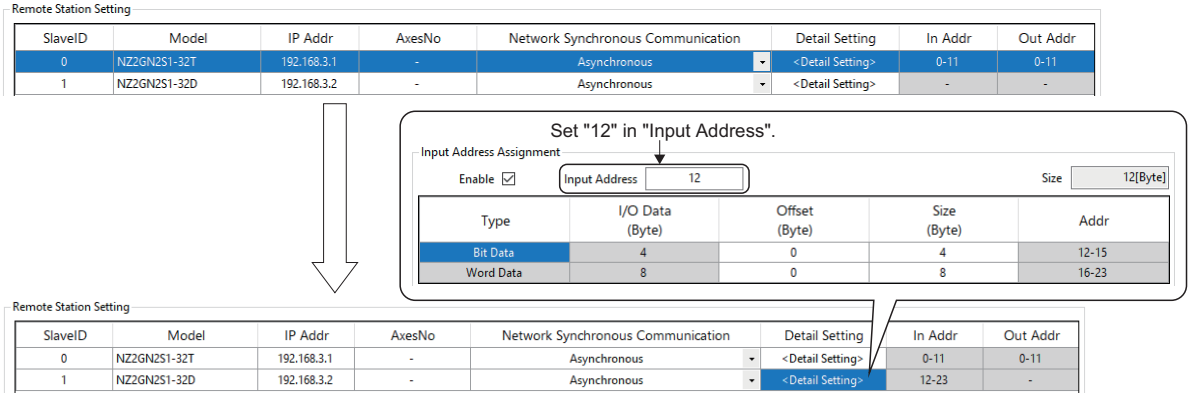
| Item | Description |
|---|---|
| (1) SlaveID | Displays the slave ID of the remote station. The number is assigned from "0" in the order of connection. |
| (2) Model | Clicking a cell in the [Model] column displays the "Model Selection" screen.<br>Set the remote station to be connected. |
| (3) IP Addr | Set the IP address of the remote station. |
| (4) AxesNo | Clicking a cell in the [AxesNo] column displays the "Axis Number Setting" screen.<br>Set the axis number of the remote station. When a multi-axis servo amplifier is selected, axis numbers for the number of axes are displayed. |
| (5) Network Synchronous Communication | Set the network synchronous communication.<br>• Asynchronous: Not synchronized with network synchronous communication.<br>• Synchronous: Synchronized with network synchronous communication. |
| (6) Detail Setting | Clicking a cell in the [<Detail Setting>] column displays the "Detail Setting" screen.<br>Set the detail information (TXPDO, RXPDO, IoInputAssignment, IoOutputAssignment, and SLMPaccess) of the remote station.<br>• TXPDO: The data to be sent from the remote station is set.<br>• RXPDO: The data to be received by the remote station is set.<br>• IoInputAssignment: The input address is set.<br>• IoOutputAssignment: The output address is set.<br>• SLMPaccess: The read/write of the object is set.<br>*: The setting items differ depending on the selected remote station.<br>• When the servo amplifier (MR-J5(W)-G) is selected (☞ Page 80 Detail setting (When the servo amplifier (MR-J5(W)-G) is selected))<br>• When the I/O module is selected (☞ Page 85 Detail setting (When the input/output module is selected)) |
| (7) In Addr*1 | Displays the input address of the remote station.<br>Set the input address in "IoInputAssignment" on the "Detail Setting" screen. |
| (8) Out Addr*1 | Displays the output address of the remote station.<br>Set the output address in "IoOutputAssignment" on the "Detail Setting" screen. |
| (9) [Auto Assign Axes] button | Axis numbers are automatically assigned to servo amplifiers that are detected automatically or added manually.<br>Axis numbers are assigned from the lowest number excluding axes that have already been assigned from [CC-Link IE TSN] ⇨ remote station setting in the Comm1/Comm2 tree and [Simulation] ⇨ [Simulation Axis Setting].<br>The axis number automatically assigned differs depending on the setting of "UseIPAsAxisIndex (Axis index selection)" in the “Master Advanced Setting” window, which is displayed by clicking [Master Setting] ⇨ the [Advanced Setting] button. For details, refer to the following.<br>☞ Page 90 Automatic assignment of axis numbers |
| (10) [Auto Detection] button | Automatically detects the connected remote station. |

*1 Set the input and output addresses so that they do not overlap with the ones set for each remote station.

**Ex.**

When setting the input address of SlaveID "0"

Since the input address of SlaveID "0" occupies "0 to 11", set a value equal to or greater than "12" to the input address of SlaveID "1".



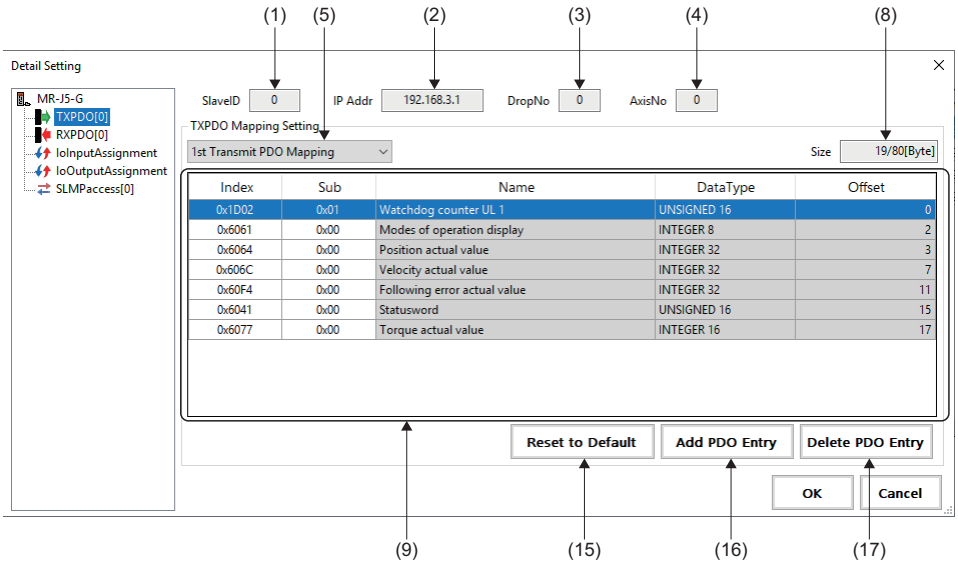
## ■ Detail setting (When the servo amplifier (MR-J5(W)-G) is selected)

Clicking a cell in the [<Detail Setting>] column in the remote station setting displays the "Detail Setting" screen. Set the detail information (TXPDO, RXPDO, IoInputAssignment, IoOutputAssignment, and SLMPaccess) of the remote station.

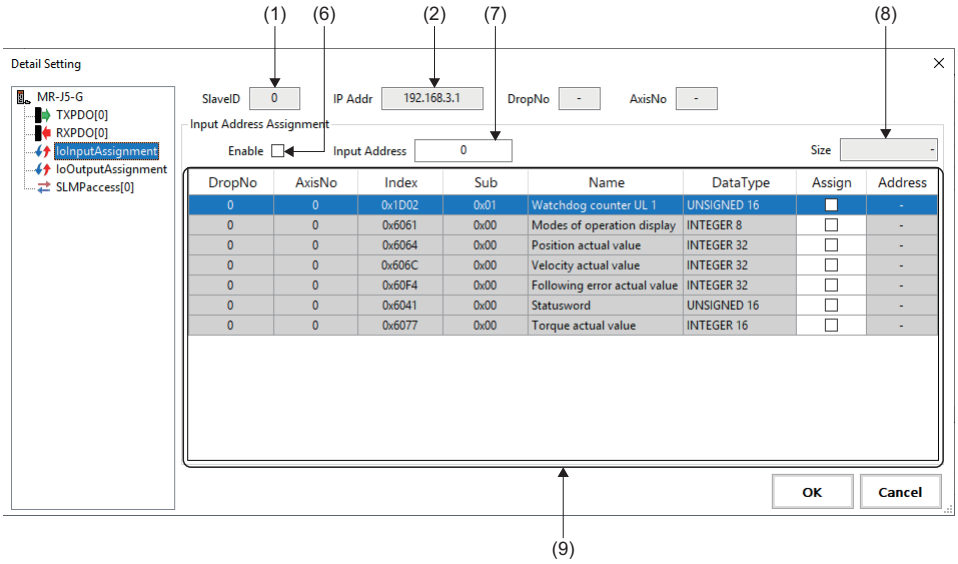
Set IoInputAssignment and IoOutputAssignment only when assigning them to the input/output to use.

### Window

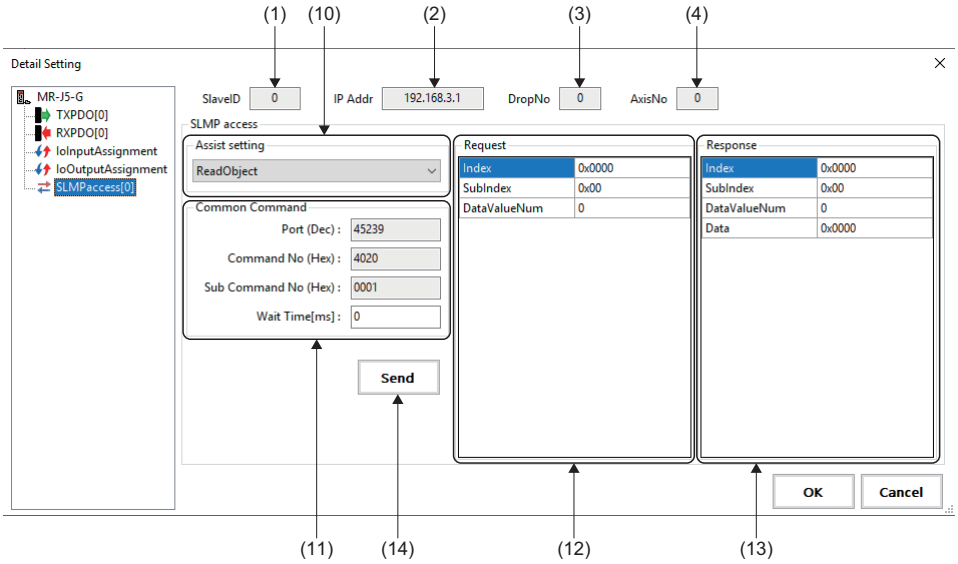
- When TXPDO or RXPDO is selected




- When IoInputAssignment or IoOutputAssignment is selected



• When SLMPaccess is selected




## Displayed items

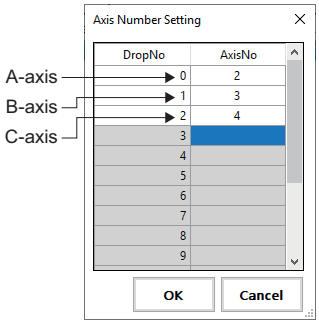
| Item | Description |
|---|---|
| (1) SlaveID | Displays the slave ID of the selected remote station. |
| (2) IP Addr | Displays the IP address of the selected remote station. |
| (3) DropNo | Displays the drop number[*1] of the selected remote station. |
| (4) AxisNo | Displays the axis number of the selected remote station. |
| (5) Mapping setting | Select a mapping object of Transmit PDO Mapping/Receive PDO Mapping (1st, 2nd, 3rd, 4th) from the pull-down list.<br>Selecting an object from the pull-down list switches the object list.<br>• 1st: PDO mapping for cyclic synchronous operation (csp/csv/cst/hm)<br>• 2nd: PDO mapping for motion mode (high-speed)<br>• 3rd: PDO mapping for profile mode operation (pp/pv/tq/hm)<br>• 4th: PDO mapping for positioning mode (pt/jg/hm) |
| (6) Enable | Set whether to assign the input/output address.<br>• Selected: The input/output address is assigned.<br>• Not selected: The input/output address is not assigned. |
| (7) Input/Output Address | Set the start number of the input/output address to be assigned.<br>*: Set the input and output addresses so that they do not overlap with the ones set for each remote station. |
| (8) Size | Displays the total size of the objects displayed in the object list. |
| (9) Object list | Displays the list of object items.<br>Objects are added and deleted.<br>■DropNo<br>Displays the drop number[*1] of the selected remote station.<br>■AxisNo<br>Displays the axis number of the selected remote station.<br>■Index<br>Displays the index number of the PDO object.<br>■Sub<br>Displays the sub index number of the PDO object.<br>■Name<br>Displays the name of the PDO object determined by the index and sub.<br>■DataType<br>Displays the data size of the PDO object.<br>■Offset<br>Displays the offset of the PDO object.<br>■Assign<br>Select whether to assign the object.<br>• Selected: Assign<br>• Not selected: Not assign<br>■Address<br>Displays the range of the address to be used when the checkbox in the "Assign" column is selected. |

| Item | Description |
|---|---|
| (10) Assist setting | Set the command.<br>• ReadObject: Reads the value of the object corresponding to the index and subindex specified by the master station.<br>• WriteObject: Writes the specified value to the object corresponding to the index and subindex specified from the master station.<br>• MemoryRead: Reads the data of the remote buffer memory.<br>• MemoryWrite: Writes the data to the remote buffer memory.<br>• ClearErrorCode: Clears the error code.<br>• RemoteReset: Resets the machine error stop status. |
| (11) Common Command | Displays the port, command No., and subcommand No. of the command selected in assist setting.<br>The Wait Time can be set here. |
| (12) Request | Specifies the value to be read or written by the command set in assist setting.<br>This handles 1-byte, 2-byte, and 4-byte data.<br>■When the read object (ReadObject) is selected<br>• Index: Specify the index in hexadecimal units.<br>• SubIndex: Specify the sub index in hexadecimal units.<br>• DataValueNum: Specify the data size as "0".<br>■When the write object (WriteObject) is selected<br>• Index: Specify the index in hexadecimal units.<br>• SubIndex: Specify the sub index in hexadecimal units.<br>• DataValueNum: Specify the data size as "1", "2", or "4" in byte length.<br>• Data: Specify the data in hexadecimal units.<br>■When the remote buffer memory read (MemoryRead) is selected<br>• StartAddr: Specify the start address in hexadecimal units.<br>• WI: Specify the data size as "1" or "2" in byte length.<br>■When the remote buffer memory write (MemoryWrite) is selected<br>• StartAddr: Specify the start address in hexadecimal units.<br>• WI: Specify the data size as "1" or "2" in byte length.<br>• Data: Specify the data in hexadecimal units. |
| (13) Response | Displays the data read by the command.<br>The command response can be checked here. |
| (14) [Send] button | Sends the data for the command set in assist setting.<br>Objects and remote buffer memory can be read/written even when communication is stopped.<br>The success/failure of the command is displayed in the message window. |
| (15) [Reset to Default] button | Resets the object set to the object list to the default value. |
| (16) [Add PDO Entry] button | Adds an object to the object list.<br>The object can be added from the "Object list" screen displayed by clicking the [Add PDO Entry] button. |
| (17) [Delete PDO Entry] button | Deletes the selected object from the object list. |

*1 The drop number is a number for identifying the logical axis of the remote stations.

**Ex.**

For the multi-axis servo amplifier (MR-J5W-G)



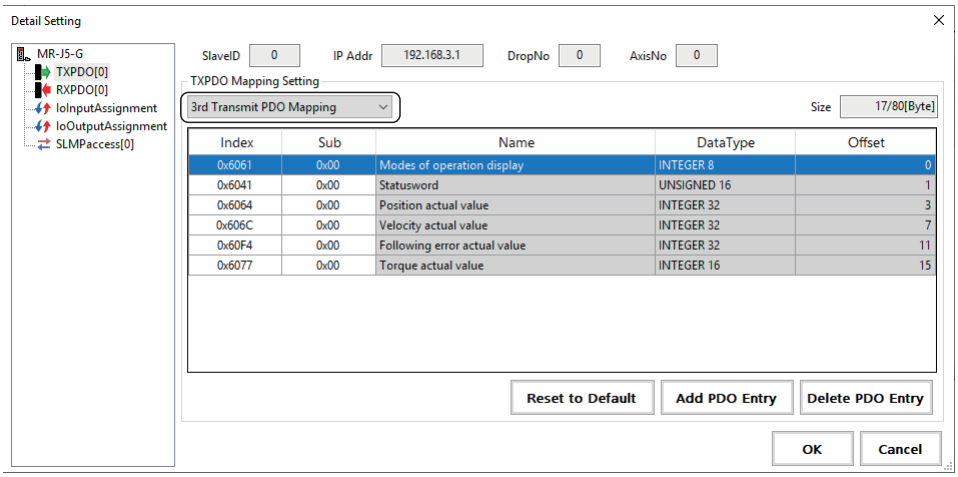

*: For the single axis servo amplifier (MR-J5-G), only "0" is displayed in DropNo.

## Operating procedure

**1.** Select TXPDO/RXPDO to switch the display to the TXPDO or RXPDO mapping setting. Select Transmit PDO Mapping/Receive PDO Mapping (1st, 2nd, 3rd, 4th) to be set from the pull-down list of the TXPDO or RXPDO mapping setting. The default mapping of the selected Transmit PDO Mapping/Receive PDO Mapping is displayed in the object list.

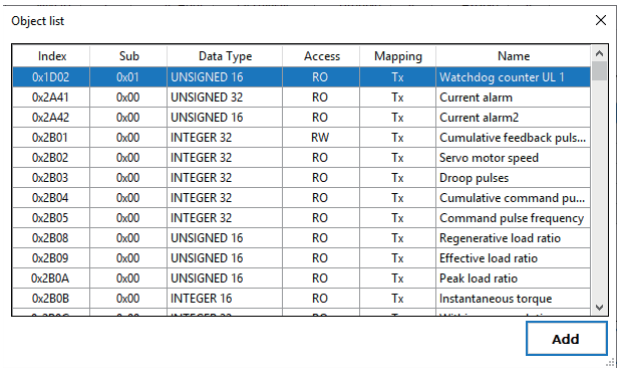
Ex.

When "3rd Transmit PDO Mapping" is selected



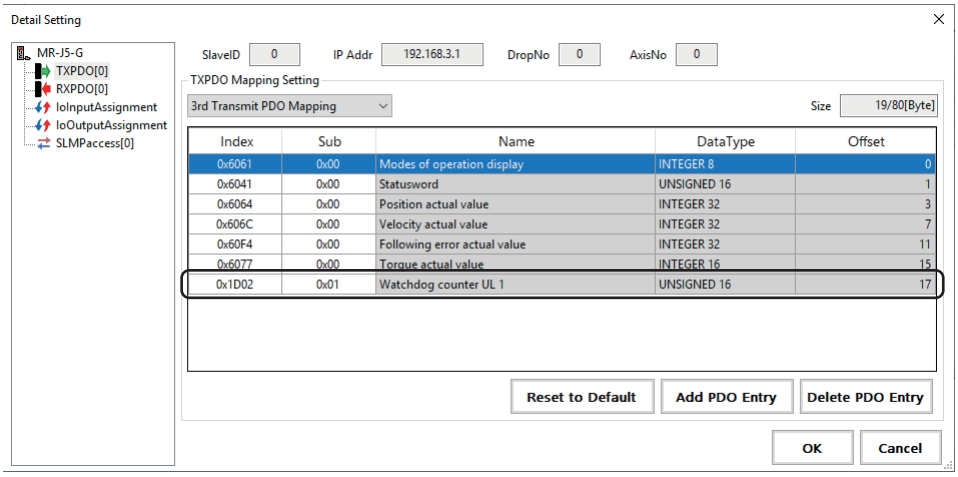

**2.** To add a PDO object, click the [Add PDO Entry] button to display the "Object list" screen.

**3.** Select an object to be added from the "Object list" screen, and click the [Add] button. When adding an object is completed, click the [×] button in the upper right of the "Object list" screen to close the screen.



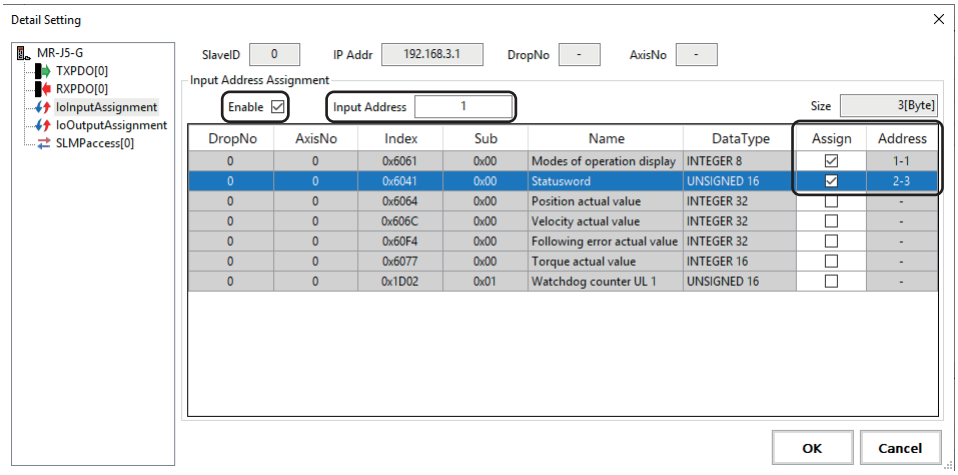

**4.** The object added to the object list is displayed.

*: For unnecessary objects, select the object and click the [Delete PDO Entry] button to delete it.



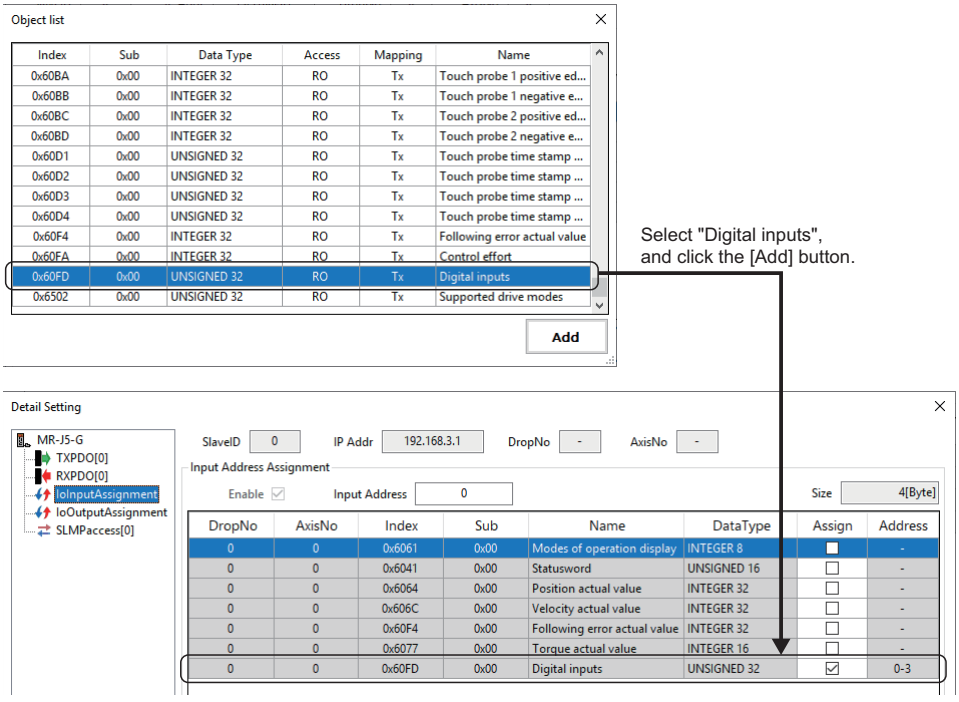
**5.** IoInputAssignment/IoOutputAssignment are used only when the data assigned to TXPDO/RXPDO is input/output to the input device/output device. When configuring the setting, select IoInputAssignment or IoOutputAssignment to switch the display to the input address assignment or output address assignment, and select "Enable". Items can be assigned.

**6.** By setting the input address or output address and selecting the items to be assigned, the address with the start number set in the input/output address is automatically assigned and displayed in the address field.
*: Set the input and output addresses so that they do not overlap with the ones assigned to other remote stations.




**Point**

- When using an external signal of the servo amplifier, select "Digital inputs" in the "Object list" screen to add it. When "Digital inputs" is added, an address is automatically assigned to IoInputAssignment.



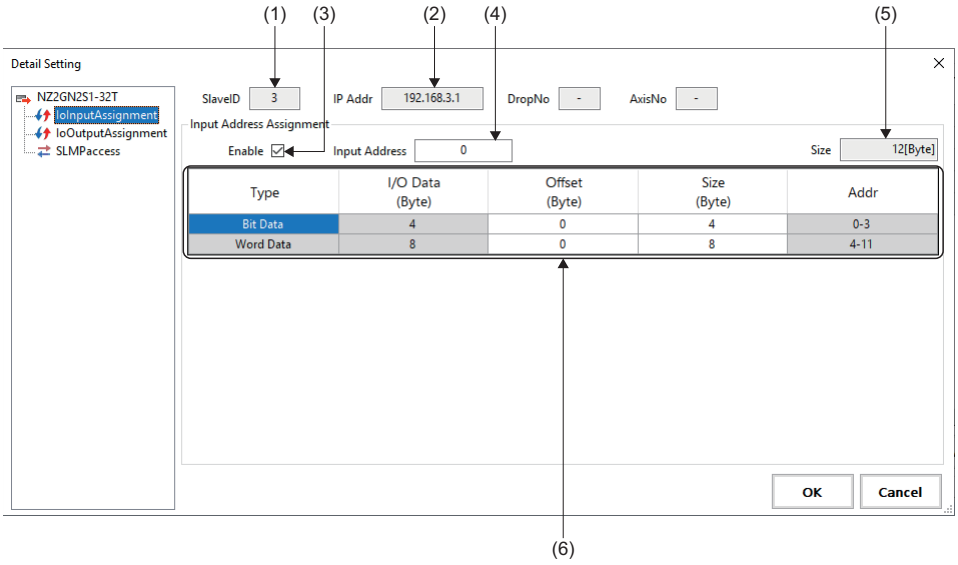

- When IoInputAssignment or IoOutputAssignment is enabled, the status of the input address and output address can be checked and the operation can be performed in the "I/O Status" screen. (☞ Page 50 I/O status)
- Note that if the object assigned to RXPDO is assigned to IoOutputAssignment, the I/O control is prioritized and control operations on SWMOS may become unavailable.

## ■ Detail setting (When the input/output module is selected)

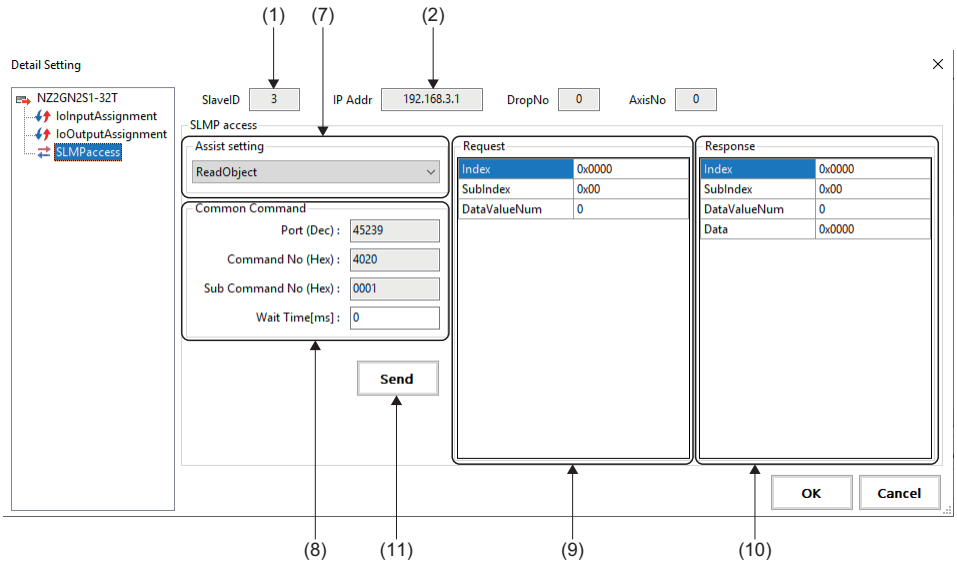
Clicking a cell in the [<Detail Setting>] column in the remote stations setting displays the "Detail Setting" screen. Set the detail information (IoInputAssignment, IoOutputAssignment) of the remote stations.

### Window

• When IoInputAssignment or IoOutputAssignment is selected




• When SLMPaccess is selected




### Displayed items

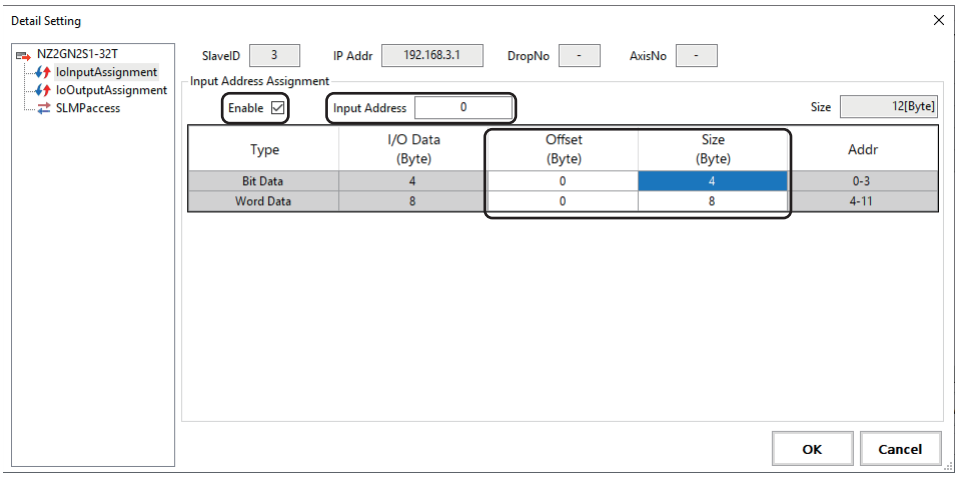
| Item | Description |
|---|---|
| (1) SlaveID | Displays the slave ID of the selected remote stations. |
| (2) IP Addr | Displays the IP address of the selected remote stations. |
| (3) Enable | Set whether to assign the input/output address.<br>• Selected: The input/output address is assigned.<br>• Not selected: The input/output address is not assigned. |
| (4) Input/Output Address | Set the start number of the input/output address to be assigned.<br>*: Set the input and output addresses so that they do not overlap with the ones set for each remote stations. |
| (5) Size | Displays the total size of the input/output addresses displayed in the input/output list. |

| Item | Description |
|---|---|
| (6) Input/Output data list | Displays the list of input/output address items. Set the bit data and word data.<br>■Type<br>Displays the data type (bit data, word data).<br>■I/O Data (Byte)<br>Displays the size of the bit data and word data.<br>■Offset (Byte)<br>Set the offset of the bit data and word data.<br>■Size (Byte)<br>Set the size of the bit data and word data.<br>■Addr<br>Displays the range of the address to be used according to the offset and size setting. |
| (7) Assist setting | Set the command.<br>• ReadObject: Reads the value of the object corresponding to the index and subindex specified by the master station.<br>• WriteObject: Writes the specified value to the object corresponding to the index and subindex specified from the master station.<br>• MemoryRead: Reads the data of the remote buffer memory.<br>• MemoryWrite: Writes the data to the remote buffer memory.<br>• ClearErrorCode: Clears the error code.<br>• RemoteReset: Resets the machine error stop status. |
| (8) Common Command | Displays the port, command No., and subcommand No. of the command selected in assist setting. |
| (9) Request | Specifies the value to be read or written by the command set in assist setting.<br>This handles 1-byte, 2-byte, and 4-byte data.<br>■When the read object (ReadObject) is selected<br>• Index: Specify the index in hexadecimal units.<br>• SubIndex: Specify the sub index in hexadecimal units.<br>• DataValueNum: Specify the data size as "0".<br>■When the write object (WriteObject) is selected<br>• Index: Specify the index in hexadecimal units.<br>• SubIndex: Specify the sub index in hexadecimal units.<br>• DataValueNum: Specify the data size as "1", "2", or "4" in byte length.<br>• Data: Specify the data in hexadecimal units.<br>■When the remote buffer memory read (MemoryRead) is selected<br>• StartAddr: Specify the start address in hexadecimal units.<br>• Wl: Specify the data size as "1" or "2" in byte length.<br>■When the remote buffer memory write (MemoryWrite) is selected<br>• StartAddr: Specify the start address in hexadecimal units.<br>• Wl: Specify the data size as "1" or "2" in byte length.<br>• Data: Specify the data in hexadecimal units. |
| (10) Response | Displays the data read by the command.<br>The command response can be checked here. |
| (11) [Send] button | Sends the data for the command set in assist setting.<br>Objects and remote buffer memory can be read/written even when communication is stopped.<br>The success/failure of the command is displayed in the message window. |

## Operating procedure

**1.** Select IoInputAssignment or IoOutputAssignment to switch the display to the input address assignment or output address assignment, and select "Enable". The offset and size can be set.

**2.** Set the start number of the input/output address, and set the offset and size.




**3.** By setting the input address or output address and selecting the items to be assigned, the address with the start number set in the input/output address is automatically assigned and displayed in the address field.

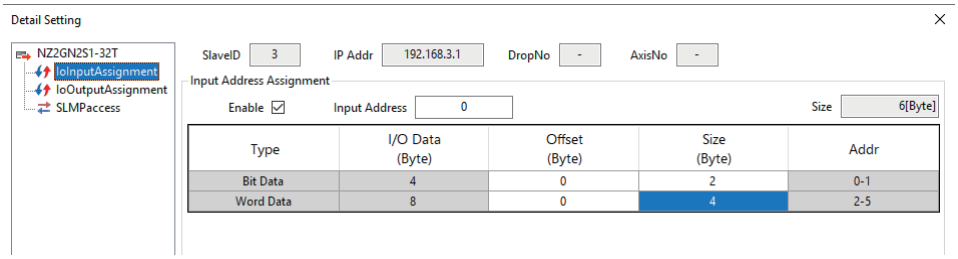
*: Set the input and output addresses so that they do not overlap with the ones assigned to other remote stations.

**Ex.**

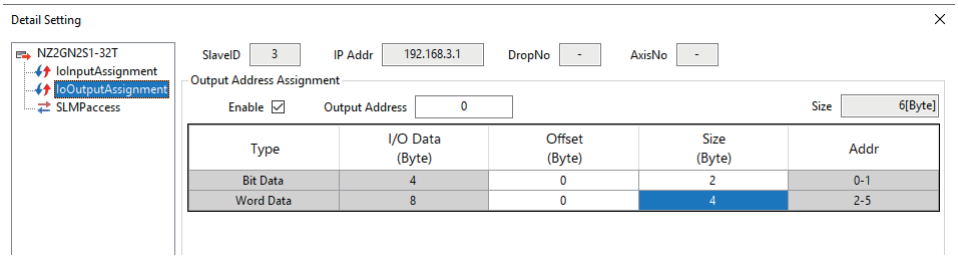
When setting the offset and size of the I/O combined module (32-point module)

| Type | Setting details |
|---|---|
| Bit Data | The data is used with the remote input signal use prohibited areas (RX10 to RX1F) and remote output signal use prohibited areas (RY0 to RY0F) skipped. |
| Word Data | Only the data for 4 bytes is used. |

- IoInputAssignment




- IoOutputAssignment



## Editing a remote station

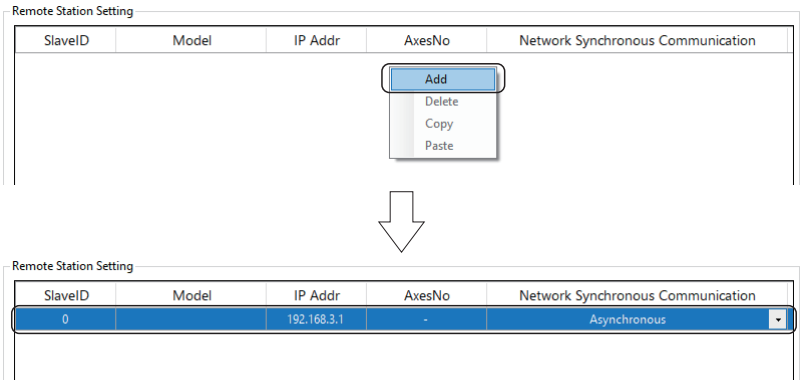
This section describes how to add a remote station to the list and edit it.

### ■ Adding a remote station

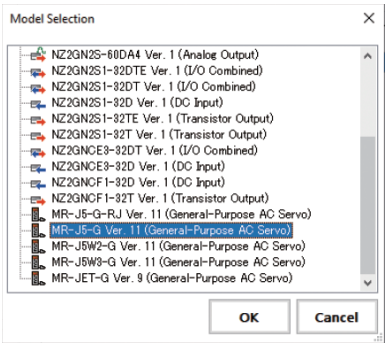
Add a remote station to the remote station setting.

#### Operating procedure

***1.*** Right-click the object list in the remote station setting, and click [Add] to add a line in the object list.




***2.*** Clicking a cell in the [Model] column displays the "Model Selection" screen. Select a remote station to be added (example: MR-J5-G) from the list, and click the [OK] button.

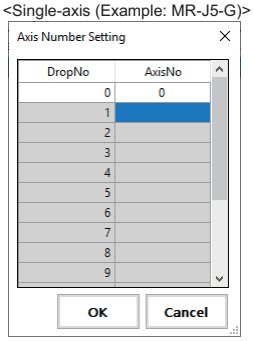



***3.*** The selected remote station is displayed in the cell in the [Model] column.

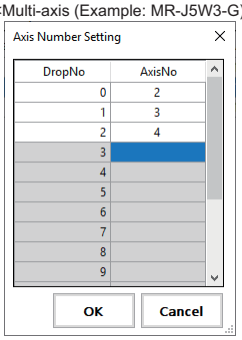
***4.*** Set the IP address of the remote station.

***5.*** Clicking a cell in the [AxesNo] column displays the "Axis Number Setting" screen. Set the axis number for the drop number, and click the [OK] button. For a multi-axis, set axis numbers for the number of axes.

<Single-axis (Example: MR-J5-G)>




<Multi-axis (Example: MR-J5W3-G)>




***6.*** Clicking a cell in the [<Detail Setting>] column displays the "Detail Setting" screen. Configure the detail setting of the remote station. Configure the detail setting as necessary. For the "Detail Setting" screen, refer to the following.

- Servo amplifier (MR-J5(W)-G) (☞ Page 80 Detail setting (When the servo amplifier (MR-J5(W)-G) is selected))
- I/O module (☞ Page 85 Detail setting (When the input/output module is selected))

**Point**

Click the [Auto Detection] button to detect the remote station connected to CC-Link IE TSN and apply it to the remote station setting. However, the axis number is not detected. Set the axis number in the "Axis Number Setting" screen displayed by clicking a cell in the [AxesNo] column.

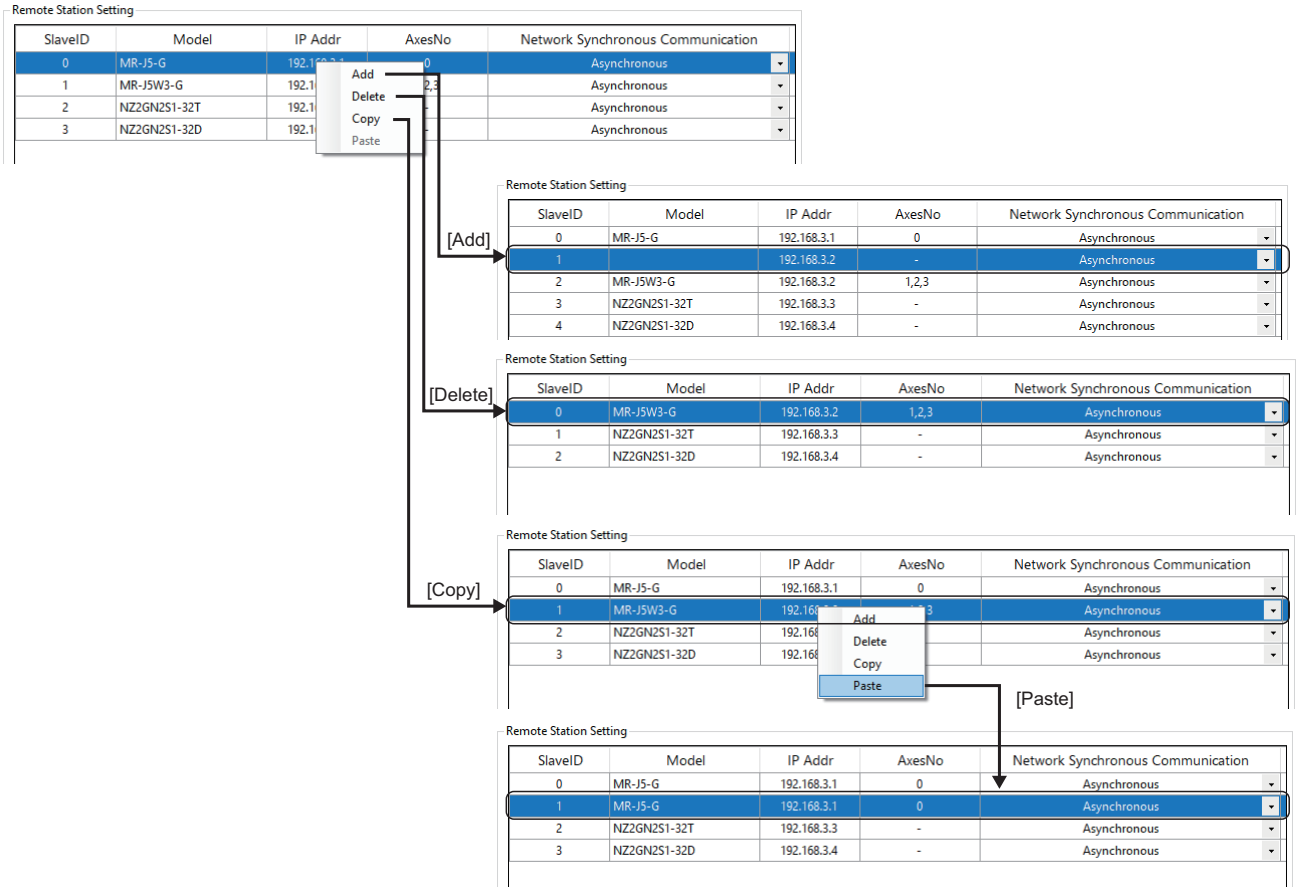
## ■ Editing a remote station

Edit the remote station list added to the remote station setting.

### Operating procedure

***1.*** Select the SlaveID line to be edited from the remote station list, and right-click it. Click the item for editing ([Add], [Copy], [Delete]).

| Editing operation | Description |
|---|---|
| [Add] | A line is added below the selected SlaveID line. |
| [Copy] | After copying the selected SlaveID line, select another SlaveID line as a pasting destination and click [Paste] to paste the SlaveID line selected earlier on the pasting destination. |
| [Delete] | The selected SlaveID line is deleted. |



## Automatic assignment of axis numbers

Click the [Auto Assign Axes] button in the remote station setting to automatically assign axis numbers to a servo amplifier that has been automatically detected or manually added. Axis numbers that have been already set from [CC-Link IE TSN] ⇨ remote station setting in the Comm1/Comm2 tree and [Simulation] ⇨ [Simulation Axis Setting] are ignored.
When there are multiple ports, the [Auto Assign Axes] button must be operated for each port.
The assigned axis number differs depending on the setting of "UseIPAsAxisIndex (Axis index selection)" and "PPMode (PM motion function selection)" in the "Master Advanced Setting" window, which is displayed by clicking [Master Setting] ⇨ the [Advanced Setting] button.
An error occurs if the assignment fails when the [Auto Assign Axes] button is operated.

### ■ When UseIPAsAxisIndex (Axis index selection) is "Disabled (Not selected)"

Click the [Auto Assign Axes] button to automatically assign axis numbers from the lowest number (from 0) excluding the axis numbers that have already been set.
If there is no vacant number, an error is displayed.
When multiple ports are used, the axis numbers are assigned from the port set first (Comm1 or Comm2). For the port set last (including manually set axes and simulation axes), axis numbers are assigned starting from "the last number assigned+1" of the port set first.
When the axis number reaches the license limit (number of axes of licensed product-1), a vacant number is assigned starting from "0" again.

### ■ When UseIPAsAxisIndex (Axis index selection) is "Enabled (Selected)"

Click the [Auto Assign Axes] button to automatically assign the value in the fourth octet of the IP address.
Axes that have already been set will also have their number assignments overwritten.
To set the axis numbers manually, rewrite the axis numbers before executing "Writing information to the SWM-G engine" or "Save to project".
If an IP address that cannot automatically an axis number is set, an error occurs and automatic assignment is canceled.

#### Precautions

- When setting the IP address to the axis number, set the fourth octet of the servo amplifier in the range of "1 to the number of axes of licensed product". Note that because the upper limit of the axis number is "the number of axes of licensed product-1", set the last axis to "Axis number 0" manually.

**Point**

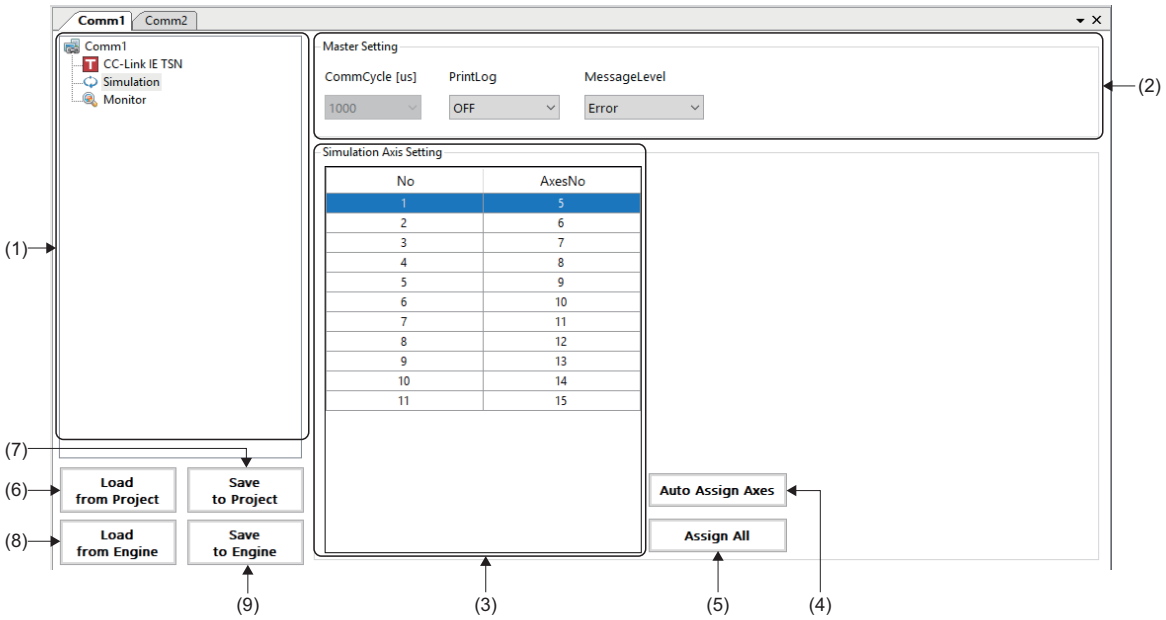
- When PPMode (PM motion function selection) is "Selected (Used)", axis numbers can be automatically assigned to axes used in PM motion in the same way as normal axes. However, when normal axes and PM motion axes are used in multiple ports, the axis numbers are managed separately for each port. Additionally, when setting the IP address to the axis number, the fourth octet of the servo amplifier must be set to "1 to 128".
- The setting contents are checked when executing "Writing information to the SWM-G engine" or "Save to project", and if the setting has an error, the error is displayed on the "Network Setting Error Information" screen. (☞ Page 74 Network setting error information)

# Simulation

The motion control is verified without servo amplifiers.

## Window

Navigation window ⇨ [SWMOS] ⇨ [Network] ⇨ [Comm1/Comm2] ⇨ [Simulation] in the Comm1/Comm2 tree




## Displayed items

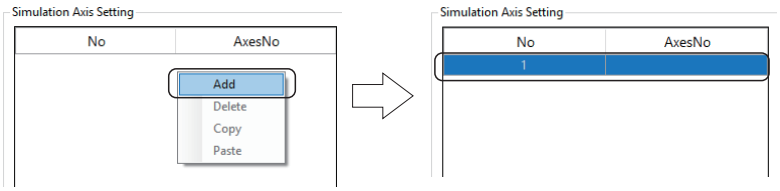
| Item | Description |
|---|---|
| (1) Comm1/Comm2 tree | Select a function to be set from the tree. |
| (2) Master Setting | Set the communication cycle display, log output, and message level.<br>■CommCycle [us] (Communication cycle)<br>Displays the communication cycle. The value set in [CommCycle [us]] under [Master Setting] displayed by selecting [CC-Link IE TSN] in the Comm1/Comm2 tree is displayed.<br>■PrintLog (Log output)<br>Select whether to output the log after the communication stop.<br>• OFF: Log is not output.<br>• ON: Log is output.<br>■MessageLevel (Message level)<br>Set the message level.<br>• Error: Error message only<br>• Warning: Error message, warning message<br>• Setting: Error message, warning message, setting message<br>• Debug: Error message, warning message, setting message, debug message |
| (3) Simulation Axis Setting | Configure the simulation axis setting.<br>■No<br>Displays the order of the simulation axis setting list.<br>■AxesNo<br>Set the axis number of the simulation axis. |
| (4) [Auto Assign Axes] button | Axis numbers are automatically assigned to simulation axes that are manually added.<br>Axis numbers are assigned from the lowest number (from 0) excluding the axis numbers that have already been set from [CC-Link IE TSN] ⇨ remote station setting in the Comm1/Comm2 tree and [Simulation] ⇨ [Simulation Axis Setting]. |
| (5) [Assign All] button | Assigns all the axis numbers that are not used for the real axes as simulation axes. When there are axis numbers used for the real axes, assign consecutive numbers excluding the ones for the real axes. |
| (6) [Load from Project] button | Loads the information of the master setting, remote station setting, and simulation setting from the setting file.<br>(☞ Page 72 Loading a setting file) |
| (7) [Save to Project] button | Saves the set master setting, remote station setting, and simulation setting in the setting file.<br>(☞ Page 71 Saving a setting file) |
| (8) [Load from Engine] button | Loads the information of the master setting, remote station setting, and simulation setting from the SWM-G engine.<br>(☞ Page 73 Loading information from the SWM-G engine) |

| Item | Description |
|---|---|
| (9) [Save to Engine] button | Writes the information of the master setting, remote station setting, and simulation setting to the SWM-G engine. (☞ Page 73 Writing information to the SWM-G engine) |

## Operating procedure

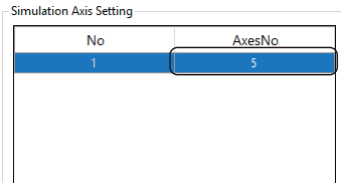
### ■ Adding a simulation axis

***1.*** Right-click the table in the simulation axis setting, and click [Add] to add a line in the list.




***2.*** Set the axis number (example: 5) of the simulation axis.

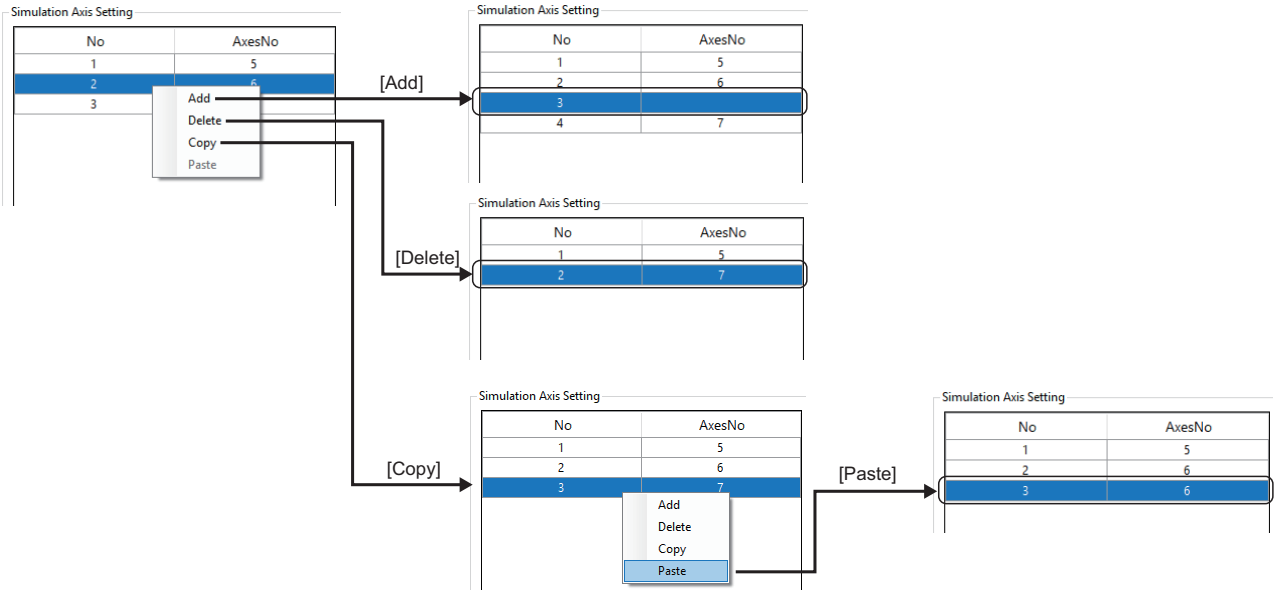
*: Clicking the [Assign All] button can assign all the axes that are not used for the real axes as simulation axes.




### ■ Editing a simulation axis

***1.*** Select and right-click the line of the simulation axis No. to be edited. Click the item for editing ([Add], [Copy], [Delete]).

| Editing operation | Description |
|---|---|
| [Add] | A line is added below the selected No. line. |
| [Copy] | After copying the selected No. line, select another No. line as a pasting destination and click [Paste] to paste the No. line selected earlier on the pasting destination. |
| [Delete] | The selected No. line is deleted. |



# Monitor

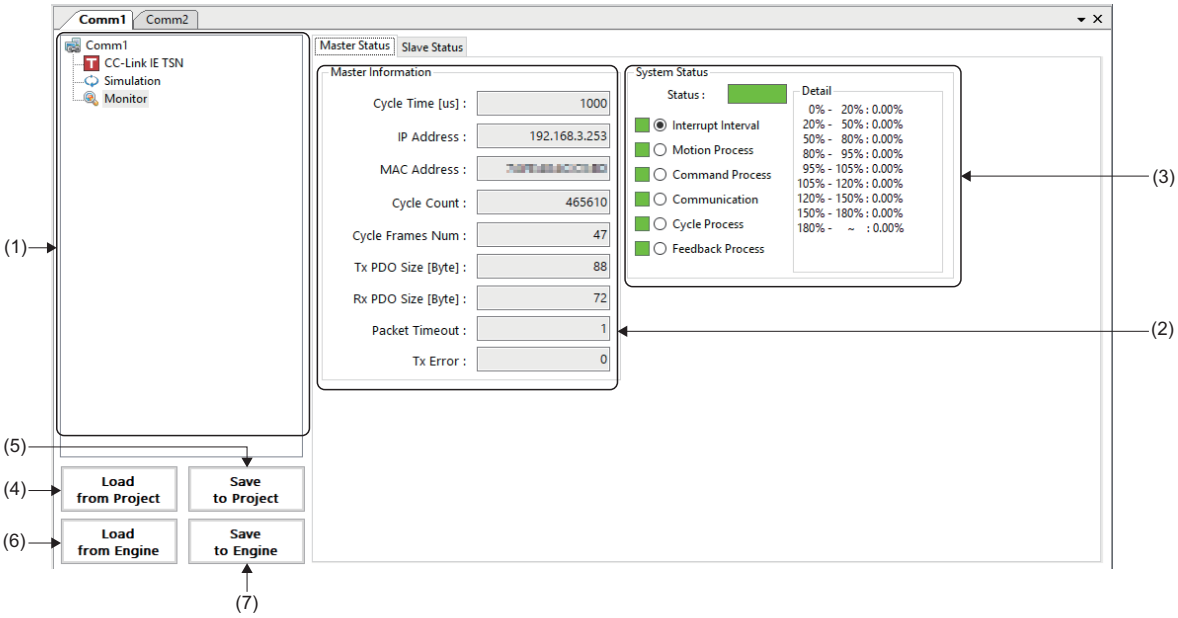
The master and remote station statuses are displayed.

## Master status

The master information and status and the system status can be checked.

### Window

Navigation window ⇨ [SWMOS] ⇨ [Network] ⇨ [Comm1/Comm2] ⇨ [Monitor] in the Comm1/Comm2 tree ⇨ [Master Status] tab




### Displayed items

| Item | Description |
|---|---|
| (1) Comm1/Comm2 tree | Select a function to be set from the tree. |
| (2) Master Information | Displays the communication information of the master. (☞ Page 93 Master information) |
| (3) System Status | Displays the system status. (☞ Page 94 System status) |
| (4) [Load from Project] button | Loads the information of the master setting, remote station setting, and simulation setting from the setting file. (☞ Page 72 Loading a setting file) |
| (5) [Save to Project] button | Saves the set master setting, remote station setting, and simulation setting in the setting file. (☞ Page 71 Saving a setting file) |
| (6) [Load from Engine] button | Loads the information of the master setting, remote station setting, and simulation setting from the SWM-G engine. (☞ Page 73 Loading information from the SWM-G engine) |
| (7) [Save to Engine] button | Writes the information of the master setting, remote station setting, and simulation setting to the SWM-G engine. (☞ Page 73 Writing information to the SWM-G engine) |

#### ■ Master information

The communication information of the master is displayed.

| Item | Description |
|---|---|
| Cycle Time [us] | Displays the communication cycle set in the master. |
| IP Address | Displays the IP address of the master. |
| MAC Address | Displays the MAC address of the master. |
| Cycle Count | Displays the number of communication cycles after the SWM-G engine is started. |
| Cycle Frames Num | Displays the number of frames sent at each communication cycle. |
| Tx PDO Size [Byte] | Displays the overall Tx PDO data amount (master → remote station). |
| Rx PDO Size [Byte] | Displays the overall Rx PDO data amount (remote station → master). |
| Packet Timeout | Displays the number of packet timeouts. |
| Tx Error | Displays the number of sending errors. |

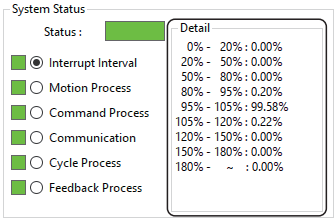
## ■ System status

The system status is displayed. The stability of the system can be checked.

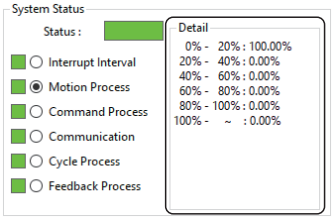
Selecting a radio button of the item indicating the status displays the status bar in a color according to the status.

In addition, the detail data of the item selected in [Detail] is displayed.

• Interrupt Interval




• Motion Process/Command Process/Communication/Cycle Process/Feedback Process




| Item | Description |
|---|---|
| Interrupt Interval | Displays the statistics of the ratio of the interrupt interval to nominal communication cycle.<br>The nominal communication cycle is the communication cycle specified in the master. |
| Motion Process | Displays the statistics of the ratio of the processing time of the motion module to nominal communication cycle. |
| Command Process | Displays the statistics of the ratio of the command processing time to nominal communication cycle. |
| Communication | Displays the statistics of the ratio of the communication processing time to nominal communication cycle. |
| Cycle Process | Displays the statistics of the ratio of the cycle processing time to nominal communication cycle. |
| Feedback Process | Displays the statistics of the ratio of the feedback processing time to nominal communication cycle. |

The following table lists the display colors of the status bar. For details, refer to the following.

SWM-G User Manual

• Interrupt Interval

| Item | Description |
|---|---|
| Green | The status is normal. |
| Yellow | Although there is a little processing load, it is not a problem. |
| Orange | The processing load is high.<br>It may be improved by adjusting the communication cycle or others. |
| Red | The processing load is too high and the communication may be disconnected.<br>Review the settings such as the communication cycle. |

• Motion Process/Command Process/Communication/Cycle Process/Feedback Process

| Item | Description |
|---|---|
| Green | Indicates that the rate of data between 0% and 40% is 90% or more. |
| Yellow | Indicates that the rate of data between 0% and 40% is between 60% and 90%. |
| Orange | Indicates that the rate of data between 0% and 40% is between 30% and 60%. |
| Red | Indicates that the rate of data between 0% and 40% is less than 30%. |

**Point**

• Since the communication amount is relatively high and a jitter tends to occur immediately after the communication start, a packet timeout or sending error may occur. When the settings of "MessageLevel" and "PrintLog" under [Master Setting] in [CC-Link IE TSN] in the Comm1/Comm2 tree are as follows, the log output at the communication stop may temporarily become a processing load and a packet timeout or sending error may occur. These errors are not problems unless they occur at the normal state.

· MessageLevel: Debug (Error message, warning message, setting message, debug message)

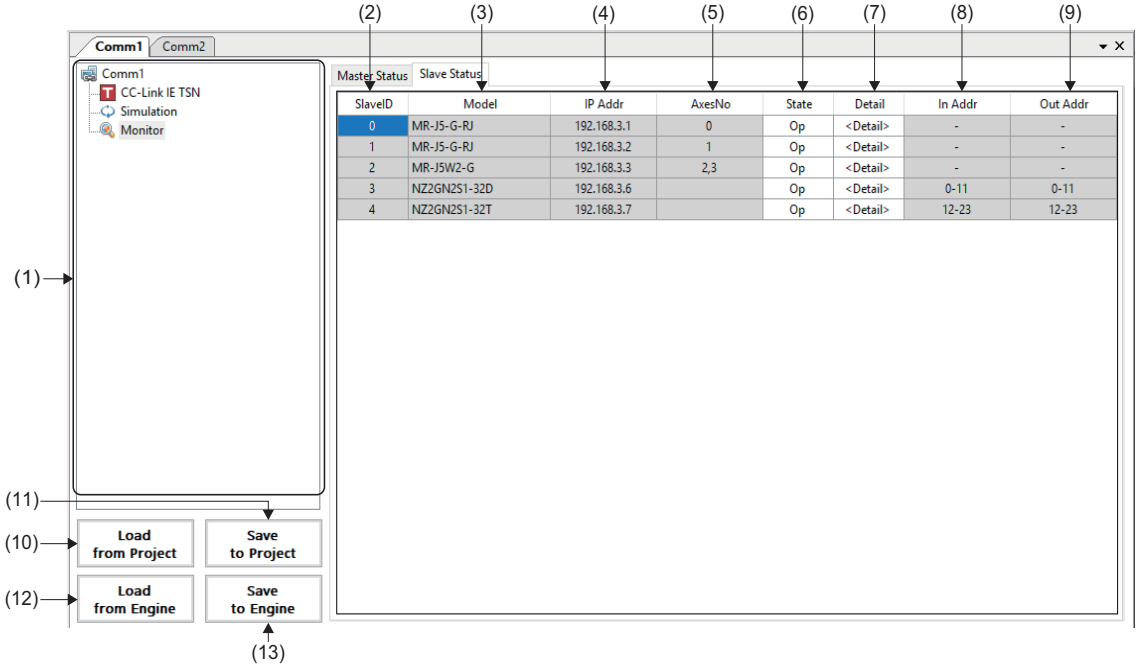
· PrintLog: ON (Log is output.)

# Remote station status

The remote station information can be checked.

## Window

Navigation window ⇨ [SWMOS] ⇨ [Network] ⇨ [Comm1/Comm2] ⇨ [Monitor] in the Comm1/Comm2 tree ⇨ [Slave Status] tab



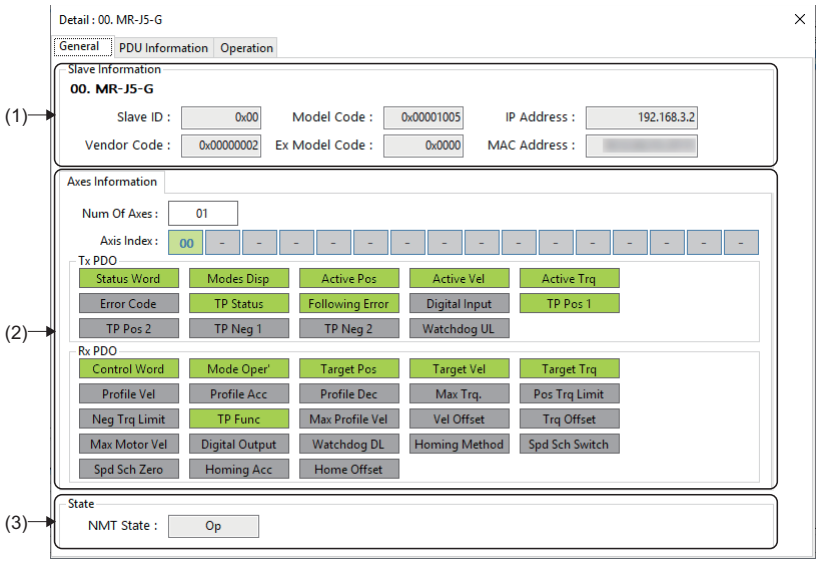

## Displayed items

| Item | Description |
|---|---|
| (1) Comm1/Comm2 tree | Select a function to be set from the tree. |
| (2) SlaveID | Displays the slave ID of the remote station. The number is assigned from "0" in the order of connection. |
| (3) Model | Displays the model name of the remote station. |
| (4) IPAddr | Displays the IP address set in the remote station. |
| (5) AxesNo | Displays the axis number of the remote station. When a multi-axis servo amplifier is selected, axis numbers for the number of axes are displayed. |
| (6) State | Displays the communication status of the remote station.<br>• None: Not connected<br>• Init: Initial communication state<br>• Preop (Pre-Operational): SDO communication state by transient transmission<br>• Safeop (Safe-Operational): PDO communication state by cyclic transmission (Servo motor driving is impossible)<br>• Op (Operational): PDO communication state by cyclic transmission (Servo motor driving is possible) |
| (7) Detail | Clicking a cell in the [<Detail>] column displays the "Detail" screen.<br>The detail information of the remote station can be checked.<br>Select each tab of the information to be checked in the "Detail" screen to switch the screen.<br>• [General] tab: Displays the remote station information and axis information of the remote station. (☞ Page 96 General)<br>• [PDU Information] tab: Displays the basic information and PDU information of the remote station. (☞ Page 97 PDU information)<br>• [Operation] tab: Displays the information of the remote station and reads/writes the object. (☞ Page 99 Operation) |
| (8) In Addr | Displays the input address usage range of the remote station. |
| (9) Out Addr | Displays the output address usage range of the remote station. |
| (10) [Load from Project] button | Loads the information of the master setting, remote station setting, and simulation setting from the setting file.<br>(☞ Page 72 Loading a setting file) |
| (11) [Save to Project] button | Saves the set master setting, remote station setting, and simulation setting in the setting file.<br>(☞ Page 71 Saving a setting file) |
| (12) [Load from Engine] button | Loads the information of the master setting, remote station setting, and simulation setting from the SWM-G engine.<br>(☞ Page 73 Loading information from the SWM-G engine) |
| (13) [Save to Engine] button | Writes the information of the master setting, remote station setting, and simulation setting to the SWM-G engine.<br>(☞ Page 73 Writing information to the SWM-G engine) |

## ■ General

### Window

Comm1/Comm2 tree ⇨ [Monitor] ⇨ [Slave Status] tab ⇨ Click a cell in the [<Detail>] column ⇨ [General] tab




### Displayed items

| Item | Description |
|---|---|
| (1) Slave Information | Displays the information of the remote station. (☞ Page 96 Slave Information) |
| (2) Axes Information | Displays the axis information of the remote station. (☞ Page 96 Axis Information) |
| (3) State | Displays the communication information. (☞ Page 96 State) |

## ■ Slave Information

| Item | Description |
|---|---|
| Slave ID (Slave ID) | Displays the slave ID. The number is assigned from "0" in the order of connection. |
| Model Code | Displays the model code of the remote station. |
| IP Address | Displays the IP address set in the remote station. |
| Vendor Code | Displays the vendor code of the remote station. |
| Ex Model Code | Displays the extension model code of the remote station. |
| MAC Address | Displays the MAC address of the Ethernet port assigned to the remote station. |

## ■ Axis Information

| Item | Description |
|---|---|
| Num Of Axes | Displays the number of axes of the remote station. |
| Axis Index | Displays the axis number for multiple axes. |
| Tx PDO | Displays the status of Tx PDO mapping of the axis specified with the CANopen object required for PDO of the axis.<br>• Gray: PDO mapping disabled<br>• Green: PDO mapping enabled |
| Rx PDO | Displays the status of the Rx PDO mapping of the axis specified with the CANopen object required for PDO of the axis.<br>• Gray: PDO mapping disabled<br>• Green: PDO mapping enabled |

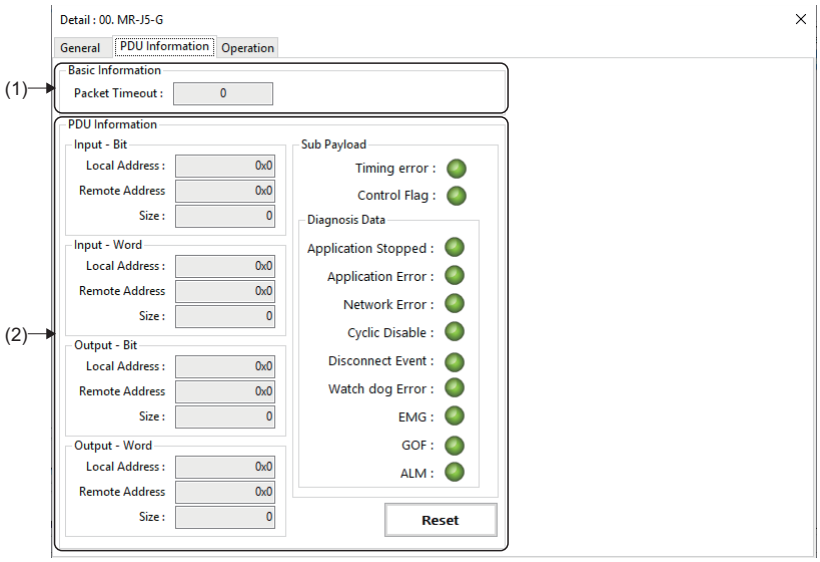
## ■ State

| Item | Description |
|---|---|
| NMT State | Displays the communication status of the NMT state machine.<br>• None: Not connected<br>• Init: Initial communication state<br>• Preop (Pre-Operational): SDO communication state by transient transmission<br>• Safeop (Safe-Operational): PDO communication state by cyclic transmission (Servo motor driving is impossible)<br>• Op (Operational): PDO communication state by cyclic transmission (Servo motor driving is possible) |

## ■ PDU information

### Window

Comm1/Comm2 tree ⇨ [Monitor] ⇨ [Slave Status] tab ⇨ Click a cell in the [<Detail>] column ⇨ [PDU Information] tab




### Displayed items

| Item | Description |
|---|---|
| (1) Basic Information | Displays the basic information of the PDU.<br>■Packet Timeout<br>Displays the number of packet timeouts. |
| (2) PDU Information | Displays the PDU information. (☞ Page 97 PDU information) |

## ■ PDU information

| Item | Description |
|---|---|
| Input - Bit | Displays the input bit information.<br>• Local Address: Displays the I/O address of SWM-G.<br>• Remote Address: Displays the I/O address of the remote station.<br>• Size: Displays the size of the I/O. |
| Input - Word | Displays the input word information.<br>• Local Address: Displays the I/O address of SWM-G.<br>• Remote Address: Displays the I/O address of the remote station.<br>• Size: Displays the size of the I/O. |
| Output - Bit | Displays the output bit information.<br>• Local Address: Displays the I/O address of SWM-G.<br>• Remote Address: Displays the I/O address of the remote station.<br>• Size: Displays the size of the I/O. |
| Output - Word | Displays the output word information.<br>• Local Address: Displays the I/O address of SWM-G.<br>• Remote Address: Displays the I/O address of the remote station.<br>• Size: Displays the size of the I/O. |
| Sub Payload | Indicates the sub payload information with lamps.<br>■Timing error<br>Indicates the timing error information with the lamp.<br>• Green: Timing error not detected<br>• Red: Timing error detected<br>■Control Flag<br>Indicates the control flag information with the lamp.<br>• Green: Cyclic transmission can be performed<br>• Red: Cyclic transmission cannot be performed |

| Item | | Description |
|---|---|---|
| Diagnosis Data | Application Stopped | Indicates the application stop information with the lamp.<br>• Green: Application operating<br>• Red: Application stopped |
| | Application Error | Indicates the application error information with the lamp.<br>• Green: Application error not detected<br>• Red: Application error detected |
| | Network Error | Indicates the network error information with the lamp.<br>• Green: Network error not detected<br>• Red: Network error detected |
| | Cyclic Disable | Indicates the cyclic control data information with the lamp.<br>• Green: Cyclic data enabled<br>• Red: Cyclic data disabled |
| | Disconnect Event | Indicates the existence of the disconnection event of the remote station with the lamp.<br>• Green: Disconnection event not detected<br>• Red: Disconnection event detected |
| | Watch dog Error | Indicates the watchdog error information with the lamp.<br>• Green: Watchdog error not detected<br>• Red: Watchdog error detected |
| | EMG | Indicates the system emergency stop information with the lamp.<br>• Green: EMG signal not detected<br>• Red: EMG signal detected |
| | GOF | Indicates the gate off request information of the power supply module with the lamp.<br>• Green: GOF signal not detected<br>• Red: GOF signal detected |
| | ALM | Indicates the alarm occurrence information with the lamp.<br>• Green: ALM signal not detected<br>• Red: ALM signal detected |
| [Reset] button | | Clears the errors in the sub payload information of the remote station.<br>When any of these errors turns on, the error display is not cleared until reset. Click the [Reset] button to acquire the latest error information. |

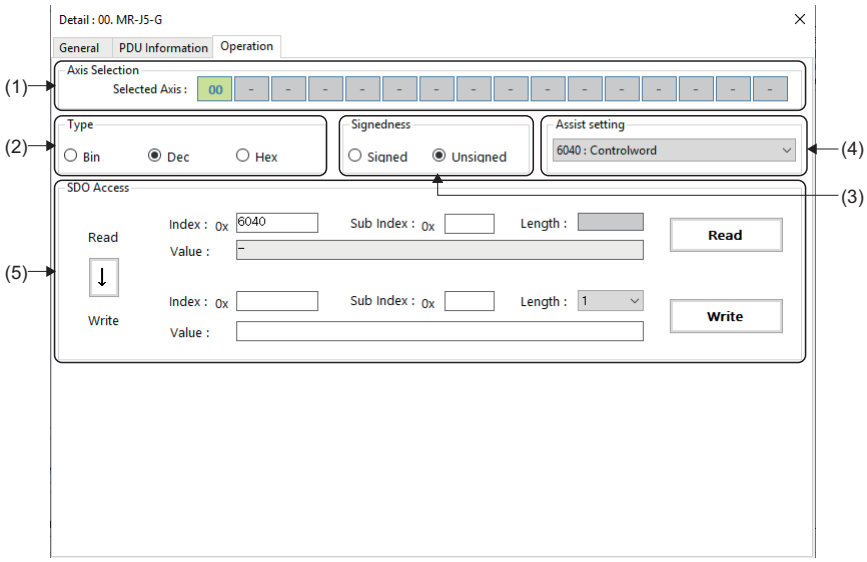
**Point**

Since the communication amount is relatively high and a jitter tends to occur immediately after the communication start, an error may occur. When an error occurs at the communication start, click the [Reset] button to clear the error. These errors are not problems unless they occur at the normal state.

## ■ Operation

### Window

Comm1/Comm2 tree ⇨ [Monitor] ⇨ [Slave Status] tab ⇨ Click a cell in the [<Detail>] column ⇨ [Operation] tab

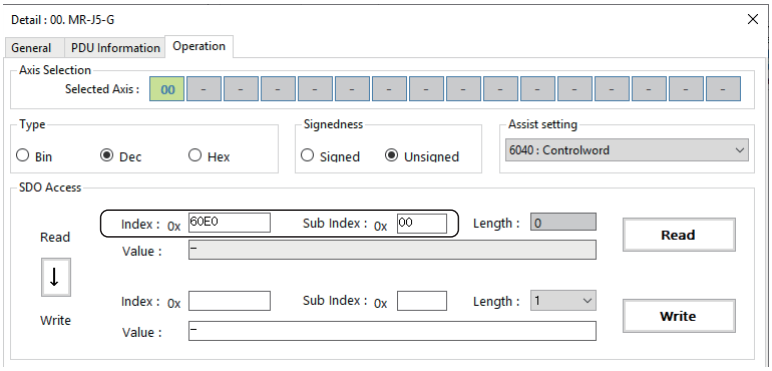



| Item | Description |
|---|---|
| (1) Axis Selection | Displays the axis number when a servo amplifier is selected. When a multi-axis servo amplifier is selected, axis numbers for the number of axes are displayed. |
| (2) Type | Select the data format for values.<br>• Bin(Binary)<br>• Dec(Decimal)<br>• Hex(Hexadecimal) |
| (3) Signedness | Select the signedness of values when "Dec" is selected as the type.<br>• Signed<br>• Unsigned |
| (4) Assist setting | Select the object from/to which the SDO value is read/written from the pull-down list.<br>Selecting an SDO value from the pull-down list displays the object set as the index or sub index on the reading side. |
| (5) SDO Access | The object is read or written.<br>• Index: Specify the index of the object.<br>• Sub Index: Specify the sub index of the object.<br>• [↓] button: Copies the object information (index/sub index/length) on the reading side to the writing side.<br>• [Read] button: Reads the object specified with the index and sub index.<br>• [Write] button: Writes the specified value to the object specified with the index and sub index. |

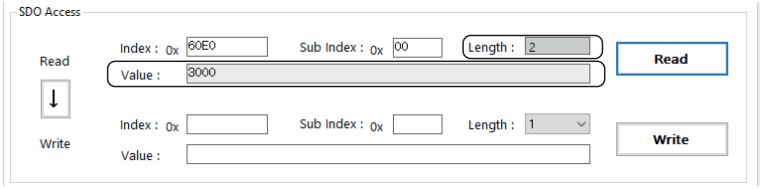
## Operating procedure

### ■ Reading an object

1. Select a number of the axis to be read, and select a data type of the value from "Type". Select the signedness when "Dec" is selected as the type.
2. Enter the index and sub index of the object to be read, and click the [Read] button.



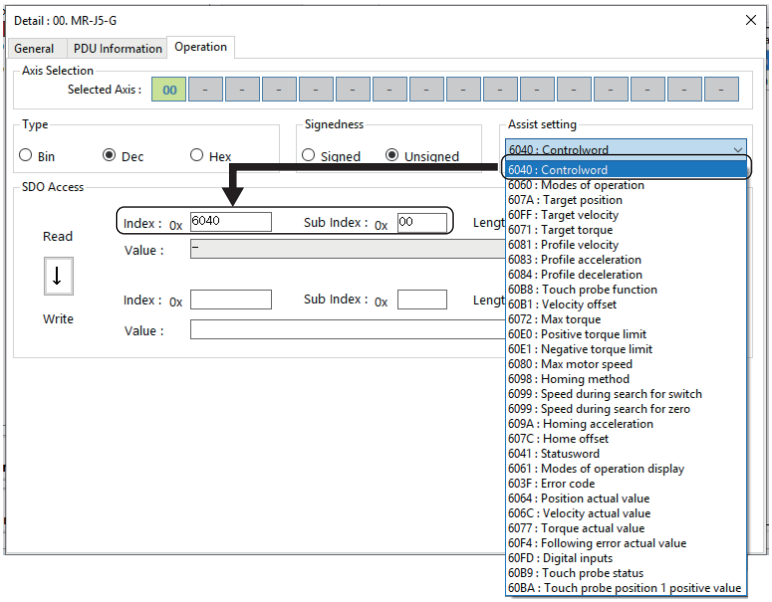

3. When the reading is completed, the length and value of the object are displayed.




**Point**

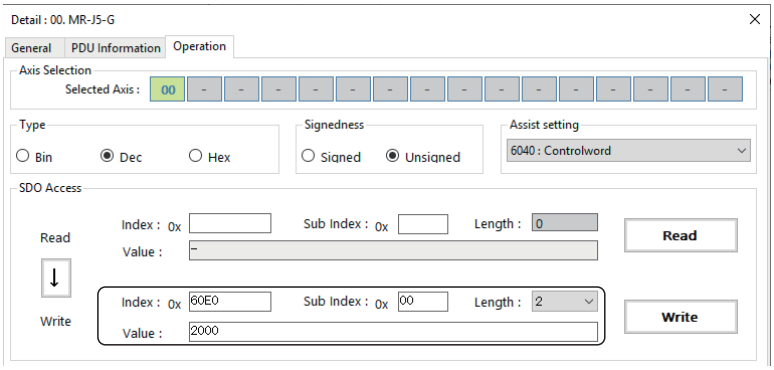
The index and sub index of the object to be read can be selected and input from the pull-down list in the assist setting.

Selecting an object from the pull-down list displays the selected object in the index and sub index on the reading side.



## ■ Writing an object

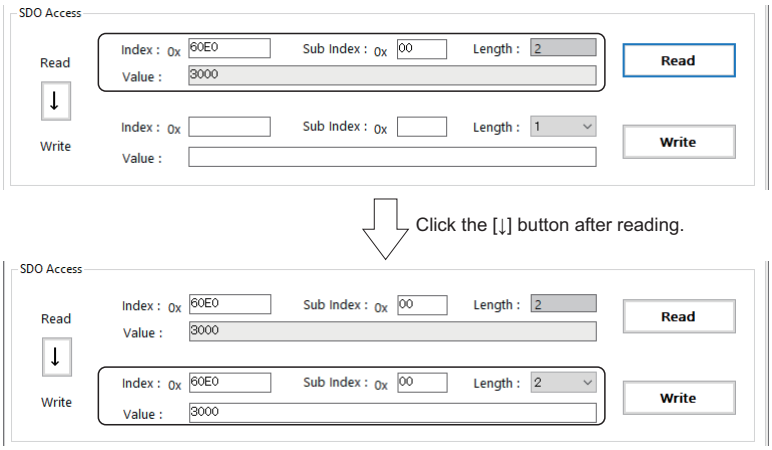
1. Select a number of the axis to be written, and select a data type of the value from "Type". Select the signedness when "Dec" is selected as the type.
2. Enter the index, sub index, value, and length of the object to be written, and click the [Write] button.




3. Write the value to the object.

**Point**

- Writing a value may fail when the object length is different. In that case, click the [Read] button to read a value, after acquiring the object length, click the [↓] button to copy the value to the writing side, and click the [Write] button to write the value.



# 4.3 Axis Setting

Axis parameters are set and home position return is performed.

## Parameter

The axis parameters are set.

**Point**

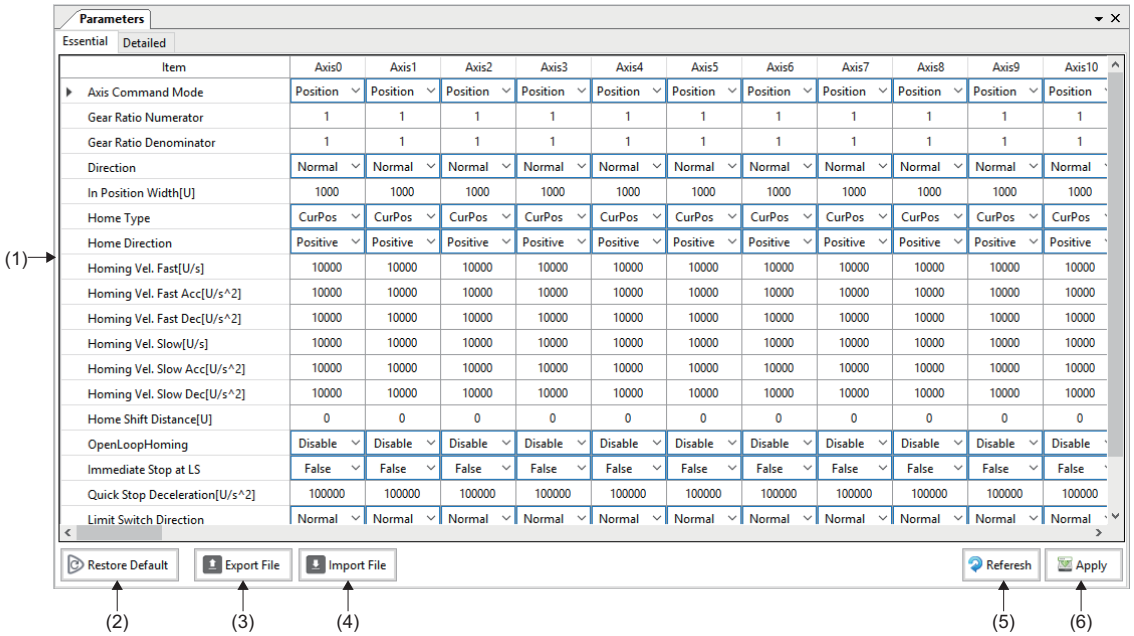
When the SWM-G engine is restarted, the parameters in SWM-G are initialized and set to the default values. It is recommended to save the parameters set in this function with the [Export File] button. The saved parameter file can be applied to the SWM-G engine with the [Import File] button.

### Basic settings

The basic parameters for all the axes are set. In addition, the set parameters are saved in a file and loaded.

#### Window

Navigation window ⇨ [SWMOS] ⇨ [Setup] ⇨ [Parameters] ⇨ [Essential] tab




#### Displayed items

| Item | Description |
|---|---|
| (1) Parameter setting screen | Set the parameters for all the axes.<br>Parameters set here are basic ones such as the gear ratio and home position return setting.<br>The set parameters can be applied to the SWM-G engine with the [Apply] button.<br>For details of each parameter, refer to "Parameters" in the following manual.<br>SWM-G User Manual |
| (2) [Restore Default] button | Restores the set parameters for all the axes to the default values and applies them to the SWM-G engine. |
| (3) [Export File] button | Acquires the parameters applied to the SWM-G engine with the [Apply] button and saves them in a parameter file (.xml). |
| (4) [Import File] button | Loads parameter from a parameter file (.xml) and applies them to the SWM-G engine. |
| (5) [Refresh] button | Reads the parameters for all the axes from the SWM-G engine and applies them to the screen.<br>Use this button when applying parameters, which are changed in the user program (API) or others, to the SWMOS screen. |
| (6) [Apply] button | Applies the parameters for all the axes set in the parameter setting screen to the SWM-G engine. |

## ■ Setting parameters for all axes

### Operating procedure

1. Set the parameters in the parameter setting screen.
2. When the parameter setting is completed, click the [Apply] button to apply the parameters to the SWM-G engine.

### Precautions

- When the parameter setting screen is switched to another operation screen during the parameter setting, the set values are not applied to the SWM-G engine. Click the [Apply] button to apply them to the SWM-G engine before switching the screen.



## ■ Saving a parameter file

### Operating procedure

1. Click the [Export File] button to display the "Get and Export Parameter" screen.
2. Set the parameter file name and click the [Save] button to save the parameter file (.xml).

**Point**

The system parameters and axis parameters for all the axes are saved in an xml file format. This xml file can be used from the user program (Import function).

### Precautions

- The saving operation with the [Export File] button saves the parameters directly read from the SWM-G engine instead of the parameters set and displayed in the screen in a file.
  To save the set parameters in a file, apply the parameters to the SWM-G engine with the [Apply] button, and then perform the saving operation.

## ■ Loading a parameter file

### Operating procedure

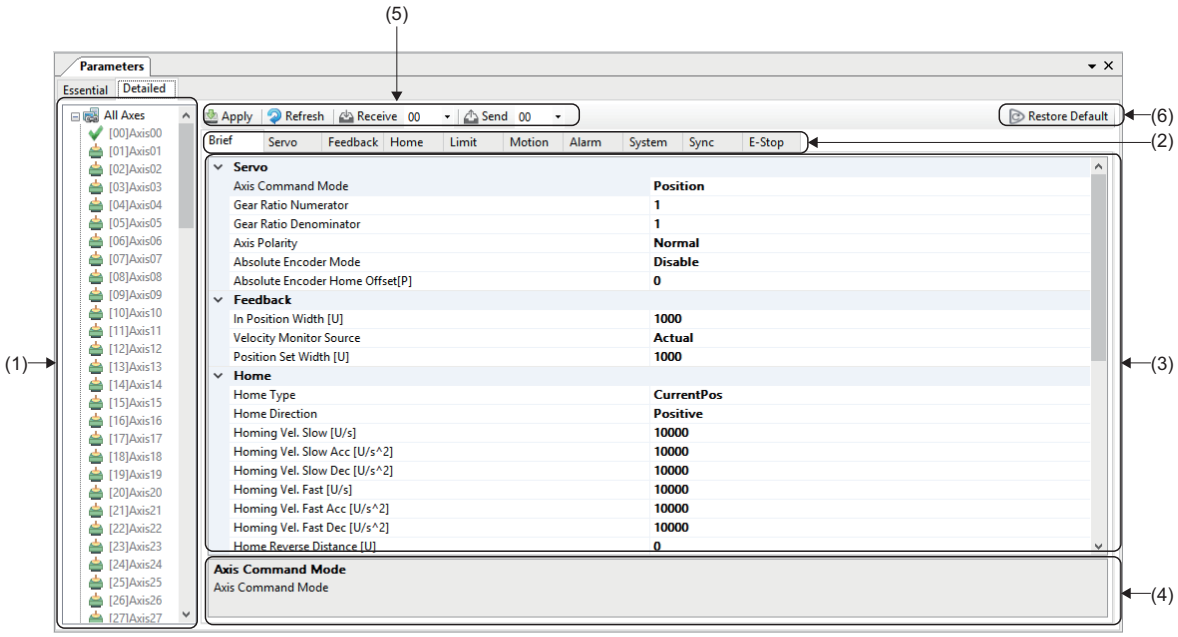
1. Click the [Import File] button to display the "Import and Set Parameter" screen.
2. Select a parameter file to be loaded, and click the [Open] button to load and apply parameters from the parameter file (.xml) to the SWM-G engine.

# Detailed settings

Detailed parameters are set for each axis.

## Window

Navigation window ⇨ [SWMOS] ⇨ [Setup] ⇨ [Parameters] ⇨ [Detailed] tab




## Displayed items

| Item | Description |
|---|---|
| (1) Axis tree | Select an axis to set parameters.<br>The axis display can be set in the axis display mode. (☞ Page 26 Motion) |
| (2) Parameter type tab | Switch the parameters to be set by selecting the type tab.<br>• [Brief] tab: Simple setting<br>• [Servo] tab: Axis parameters<br>• [Feedback] tab: Feedback parameters<br>• [Home] tab: Home position parameters<br>• [Limit] tab: Limit parameters<br>• [Motion] tab: Motion parameters<br>• [Alarm] tab: Alarm parameters<br>• [System] tab: Flight recorder parameters<br>• [Sync] tab: Synchronous parameters<br>• [E-Stop] tab: Emergency stop parameters |
| (3) Parameter list | Displays the list of parameters selected from the parameter type tabs. |
| (4) Simple description display | Displays a simple description for the selected parameter.<br>For details of parameters, refer to "Parameters" in the following manual.<br>📖SWM-G User Manual |
| (5) Parameter operation button | Operate the parameters of the target axis.<br>• [Apply] button: Applies the parameters to the SWM-G engine.<br>• [Refresh] button: Loads the parameters from the SWM-G engine.<br>• [Receive] button: Copies the parameters from the specified axis and applies them to the SWM-G engine.<br>• [Send] button: Copies the parameters to the specified axis and applies them to the SWM-G engine. |
| (6) [Restore Default] button | Restores all the parameters set in the target axis to the default values and applies them to the SWM-G engine. |

## ■ Setting parameters for all axes

### Operating procedure

1. Select an axis to set parameters from the axis tree.
2. Select the tab in which the parameter to be set is included, and set the parameter.
3. When the parameter setting is completed, click the [Apply] button to apply the parameters to the SWM-G engine.

### Precautions

- If the target axis is switched in the axis tree or the parameter setting screen is switched to other operation screen during the parameter setting, the set value is not applied to the SWM-G engine. Click the [Apply] button and apply them to the SWM-G engine before switching the screen.

**Point**

Since the flight recorder parameters are common to all the axes, the same values are set regardless of where they are set. However, "Collect Axis Flight Recorder Data" is an exception.

## ■ Copying parameters from the specified axis

### Operating procedure

1. Select the copy destination axis (example: Axis00) from the axis tree.
2. Select the copy source axis number (example: Axis01) from the pull-down list for [Receive], and click the [Receive] button.
3. All the parameters of the copy source are copied to the axis (example: Axis00), and applied to the SWM-G engine.

## ■ Copying parameters to the specified axis

### Operating procedure

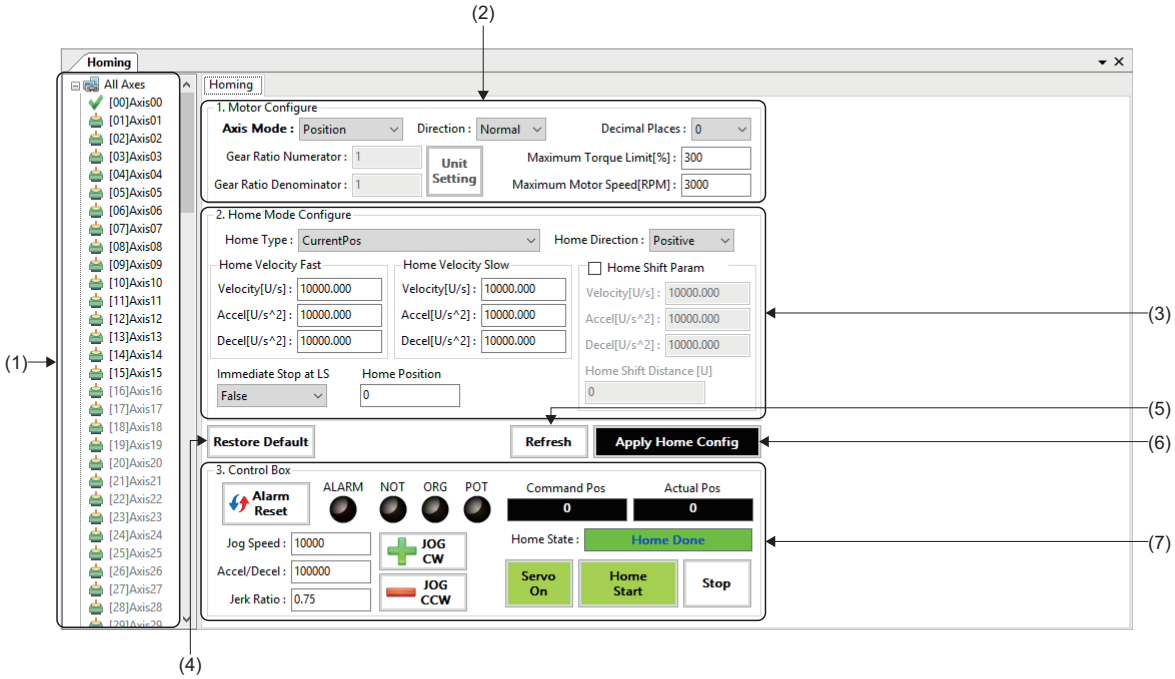
1. Select the copy source axis (example: Axis00) from the axis tree.
2. Select the copy destination axis number (example: Axis02) from the pull-down list for [Send], and click the [Send] button.
3. All the parameters are copied to the specified copy destination axis (example: Axis02), and applied to the SWM-G engine.

# Home position return

Home position return settings of axes are configured and home position return is performed.

## Window

Navigation window ⇨ [SWMOS] ⇨ [Setup] ⇨ [Homing] ⇨ [Homing] tab

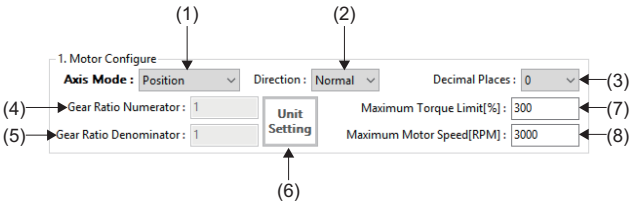



## Displayed items

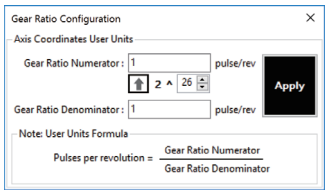
| Item | Description |
|---|---|
| (1) Axis tree | Select the axis for which the home position return is performed.<br>The axis display can be set in the axis display mode. (☞ Page 26 Motion) |
| (2) Motor Configure | Set the axis parameters required for the home position return test. (☞ Page 107 Axis parameter setting) |
| (3) Home Mode Configure | Set the parameters for the home position return. (☞ Page 108 Home position return setting) |
| (4) [Restore Default] button | Restores the axis parameter setting and home position return setting which are set in the target axis to the default values and applies them to the SWM-G engine.<br>*: [Decimal Places] of the axis parameter setting is not restored to the default value. |
| (5) [Refresh] button | Loads the axis parameter setting and home position return setting from the SWM-G engine. |
| (6) [Apply Home Config] button | Applies the set axis parameters and home position return setting to the SWM-G engine. |
| (7) Control Box | Performs test operation of the home position return. (☞ Page 109 Home position return control) |

## ■ Axis parameter setting

### Window

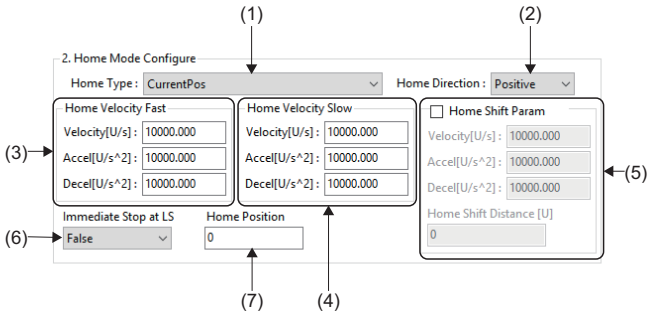



### Displayed items

| Item | Description |
|---|---|
| (1) Axis Mode | Set the command mode of the axis.<br>*: When performing the home position return, set the axis mode to "Position". |
| (2) Direction | Set the direction of the axis.<br>• Normal: The servo position command of positive direction is sent by the normal direction command.<br>• Reverse: The servo position command of negative direction is sent by the normal direction command. |
| (3) Decimal Places | Set the number of decimal places in the monitor display of SWMOS.<br>• 0 to 6 |
| (4) Gear Ratio Numerator | Set the numerator of the gear ratio of SWM-G. This item cannot be changed at servo ON. |
| (5) Gear Ratio Denominator | Set the denominator of the gear ratio of SWM-G. This item cannot be changed at servo ON. |
| (6) [Unit Setting] button | Click the [Unit Setting] button to display the "Gear Ratio Configuration" window.<br>Enter the gear ratio denominator, and click the [↑] button to calculate the gear ratio numerator.<br>Click the [Apply] button to set the calculated numerical values to the gear ratio numerator and gear ratio denominator in the axis parameter setting.<br>  |
| (7) Maximum Torque Limit [%] | Set the maximum torque limit. |
| (8) Maximum Motor Speed [RPM] | Set the maximum motor speed. |

## ■ Home position return setting

### Window

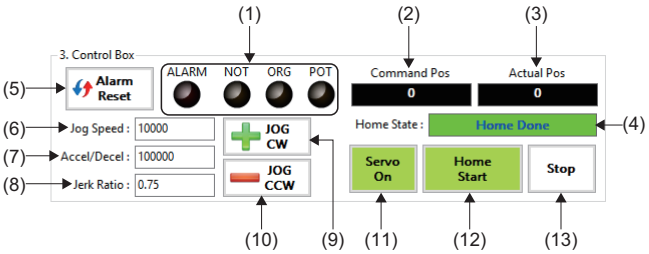



### Displayed items

| Item | | Description |
|---|---|---|
| (1) Home Type | | Set the home position return method.<br>For details of the home type of the home position return method, refer to "Homing ⇨ Home Types" in the following manual.<br>📖SWM-G User Manual |
| (2) Home Direction | | Set the direction searched for the home position at the time of the home position return operation.<br>• Positive: Positive direction<br>• Negative: Negative direction |
| (3) Home Velocity Fast | Velocity [U/s] | Set the speed [U/s] of the high-speed home position return. |
| | Accel [U/s$^2$] | Set the acceleration [U/s$^2$] of the high-speed home position return. |
| | Decel [U/s$^2$] | Set the deceleration [U/s$^2$] of the high-speed home position return. |
| (4) Home Velocity Slow | Velocity [U/s] | Set the speed [U/s] of the low-speed home position return. |
| | Accel [U/s$^2$] | Set the acceleration [U/s$^2$] of the low-speed home position return. |
| | Decel [U/s$^2$] | Set the deceleration [U/s$^2$] of the low-speed home position return. |
| (5) Home shift | Home Shift Param | Select [Home Shift Param] to configure the settings for the home shift.<br>• Selected: The settings for the home shift are enabled.<br>• Not selected: The settings for the home shift are disabled. |
| | Velocity [U/s] | Set the speed [U/s] of the home shift. |
| | Accel [U/s$^2$] | Set the acceleration [U/s$^2$] of the home shift. |
| | Decel [U/s$^2$] | Set the deceleration [U/s$^2$] of the home shift. |
| | Home Shift Distance [U] | Set the home shift distance [U]. |
| (6) Immediate Stop at LS | | Set whether to enable/disable the immediate stop without decelerating the axis when reaching the limit switch is detected.<br>• False: Immediate stop disabled<br>• True: Immediate stop enabled |
| (7) Home Position | | Set the home position [user unit] to be set at the home position return completion. |

## ■ Home position return control

### Window




### Displayed items

| Item | Description |
|---|---|
| (1) Axis status | Displays the axis statuses with lamps.<br>• ALARM: Alarm status<br>• NOT: Negative direction limit switch status<br>• ORG: Home switch status<br>• POT: Positive direction limit switch status |
| (2) Command Pos | Displays the command position. |
| (3) Actual Pos | Displays the feedback position. |
| (4) Home State | Displays the home position return status.<br>• Not Homed: Home position return not performed<br>• Home Done: Home position return complete<br>• □□Search*1: Home position return in progress |
| (5) [Alarm Reset] button | Clears the alarm. |
| (6) Jog Speed | Set the JOG operation speed [U/s]. |
| (7) Accel/Decel | Set the JOG operation acceleration/deceleration [U/s$^2$]. |
| (8) Jerk Ratio | Set the jerk ratio of the JOG operation.<br>• 0 to 1.0 |
| (9) [JOG CW] button | Performs the JOG operation in the forward direction (the command position is added). |
| (10) [JOG CCW] button | Performs the JOG operation in the reverse direction (the command position is subtracted). |
| (11) [Servo On] button | Switches servo ON/OFF.<br>Performing servo ON turns on this button in green. |
| (12) [Home Start] button | Starts the home position return.<br>This button turns green when the home position return is completed. |
| (13) [Stop] button | Stops the home position return. |

*1 □□= Selected home type

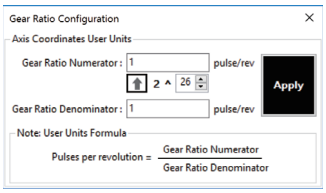
## Home position return operation

### ■ Setting parameters for home position return

#### Operating procedure

1. Select the axis for which the home position return is performed from the axis tree.
2. Set the axis parameters required for the home position return test operation in [1. Motor Configure].

*1 Click the [Unit Setting] button to display the "Gear Ratio Configuration" screen.
Enter the gear ratio denominator, and click the [↑] button to calculate the gear ratio numerator.
Click the [Apply] button to set the calculated numerical values to the gear ratio numerator and gear ratio denominator in the axis parameter setting.




3. Set the parameters for home position return in [2. Home Mode Configure].
4. When the setting is completed, click the [Apply Home Config] button to apply the set parameters to the SWM-G engine.

### ■ Test operation of the home position return

#### Operating procedure

1. Select the axis for which the test operation of the home position return is performed from the axis tree.
2. Click the [Servo On] button to perform servo ON for the axis.
3. Use the [JOG CW]/[JOG CCW] button as necessary to move the axis to the start position of the home position return.
4. Click the [Home Start] button to start the home position return operation.
5. When the home position return is normally completed, "Home Done" is displayed in [Home State].

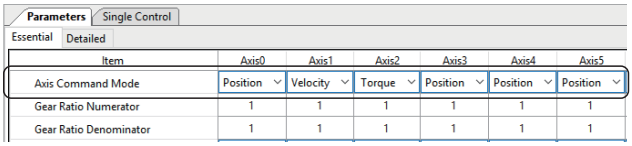
# 4.4 Axis Control

The single-axis control and multi-axis control of the axis (cyclic mode) are performed.

## Single-axis control

The single-axis control is tested. For the single-axis control, the test operations of the position control, speed control, and torque control can be performed. Switch and use the axis control mode according to the operation.

To switch the axis control mode, set the axis control mode to be performed in the single-axis control in [Axis Command Mode] in the [Essential] tab which is displayed by selecting [SWMOS] ⇨ [Setup] ⇨ [Parameters] in the navigation window, and write the parameters to the SWM-G engine.




| Parameter | Setting value |
|---|---|
| Axis Command Mode | • Position: Position control<br>• Velocity: Speed control<br>• Torque: Torque control |

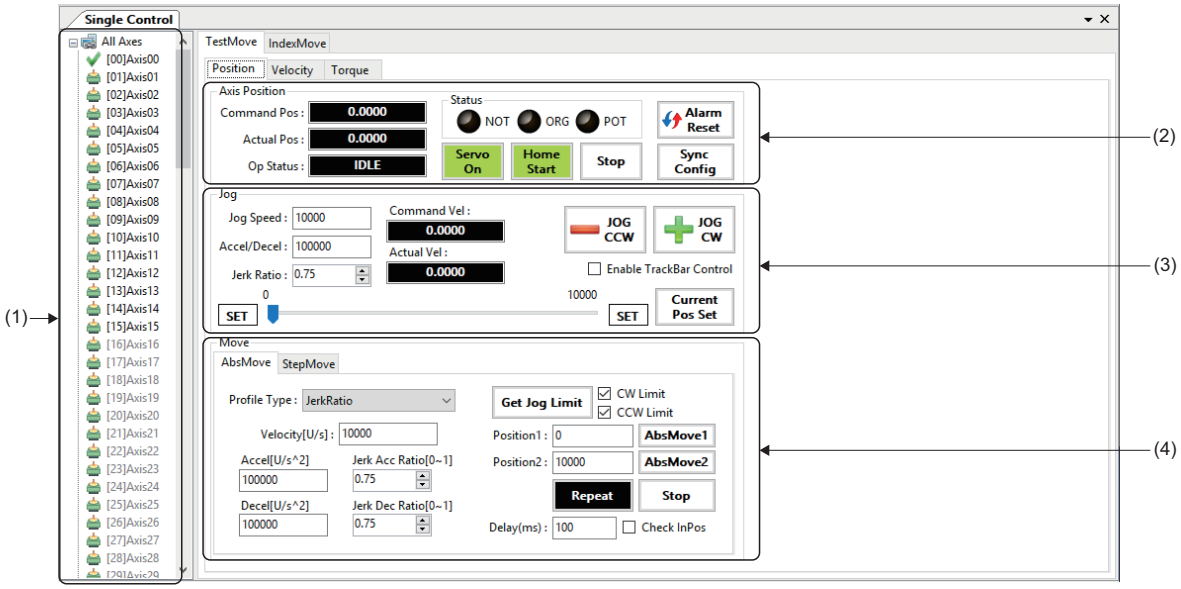
# Test operation (position control)

The operation of the single-axis position control is performed.

To operate the position control, set "Position" in "Axis Command Mode" in the [Essential] tab which is displayed by selecting [SWMOS] ⇨ [Setup] ⇨ [Parameters] in the navigation window.

## Window

Navigation window ⇨ [SWMOS] ⇨ [Motor(CyclicSyncPos)] ⇨ [SingleControl] ⇨ [TestMove] ⇨ [Position] tab




## Displayed items

| Item | Description |
|---|---|
| (1) Axis tree | Select the axis for which the position control of the test operation is executed.<br>The axis display can be set in the axis display mode. (☞ Page 26 Motion) |
| (2) Axis Position | The position and status of the axis are displayed, servo ON/OFF, home position return, stop, and alarm reset are performed, and synchronous setting is configured.<br>(☞ Page 113 Axis status) |
| (3) Jog | JOG operation is performed. (☞ Page 114 JOG operation) |
| (4) Move/StepMove | The positioning operation and step operation are performed.<br>(☞ Page 115 Positioning operation (absolute position operation), ☞ Page 116 Positioning operation (step operation)) |

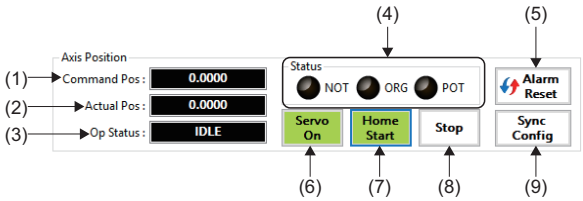
## ■ Axis status

The current position and axis status are checked in the "Axis Position" area.

Servo ON/OFF, home position return, stop, and alarm reset can be performed, and the synchronous setting can be configured.

### Window

Navigation window ⇨ [SWMOS] ⇨ [Motor(CyclicSyncPos)] ⇨ [SingleControl] ⇨ [TestMove] ⇨ [Position] tab ⇨ [Axis Position]




### Displayed items

| Item | Description |
|---|---|
| (1) Command Pos | Displays the command position. |
| (2) Actual Pos | Displays the feedback position. |
| (3) Op Status | Displays the control status of the axis.<br>• OFFLINE: Not connected<br>• OFF: Servo OFF<br>• IDLE: Waiting<br>• JOG: JOG operation in progress<br>• HOME: Home position return in progress<br>• POS: Positioning operation in progress<br>• SYNC (□*1): Synchronous control in progress<br>• INTPL: Interpolation control in progress<br>• STOP: Stopped<br>• ALARM: Alarm occurring |
| (4) Status | Displays each signal status of the axis with lamps.<br>• NOT: Negative direction limit switch status<br>• ORG: Home switch status<br>• POT: Positive direction limit switch status |
| (5) [Alarm Reset] button | Clears the alarm. |
| (6) [Servo On] button | Switches servo ON/OFF.<br>Performing servo ON turns on this button in green. |
| (7) [Home Start] button | Starts the home position return.<br>This button turns green when the home position return is completed. |
| (8) [Stop] button | Stops the operation. |
| (9) [Sync Config] button | Displays the "Axes Sync Config" screen to configure the synchronous control setting. For details of the "Axes Sync Config" screen, refer to the following.<br>☞ Page 45 Synchronous control |

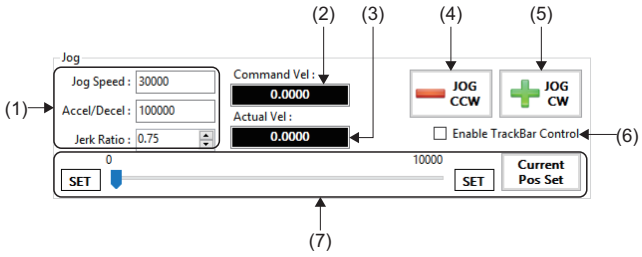
*1 □= Axis number of the master axis (00 to 127)

## ■ JOG operation

JOG operation is performed in the jog area.

### Window

Navigation window ⇨ [SWMOS] ⇨ [Motor(CyclicSyncPos)] ⇨ [SingleControl] ⇨ [TestMove] ⇨ [Position] tab ⇨ [Jog]




### Displayed items

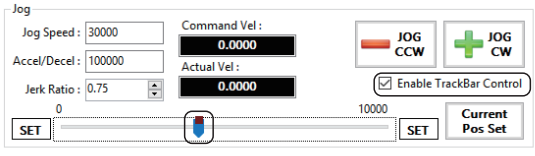
| Item | Description |
|---|---|
| (1) Jog Speed | Set the speed for JOG operation.<br>• Jog Speed: Set the JOG operation speed [U/s].<br>• Accel/Decel: Set the JOG operation acceleration/deceleration [U/s$^2$].<br>• Jerk Ratio: Set the jerk ratio (0 to 1.0) of the JOG operation. |
| (2) Command Vel | Displays the command speed [U/s]. |
| (3) Actual Vel | Displays the feedback speed [U/s]. |
| (4) [JOG CCW] button | Performs the JOG operation in the reverse direction (the command position is subtracted). |
| (5) [JOG CW] button | Performs the JOG operation in the forward direction (the command position is added). |
| (6) Enable TrackBar Control | Selecting this item displays ■ (current position) on the arrow ( ) in the trackbar.<br>The JOG operation is performed by operating the trackbar. |
| (7) Trackbar | The upper limit value and lower limit value during the test operation are displayed, and the JOG operation is performed with the trackbar.<br>■[SET] button (Left side)<br>Sets the current command position to the lower limit position of the trackbar.<br>■[SET] button (Right side)<br>Sets the current command position to the upper limit position of the trackbar.<br>■[Current Pos Set] button<br>Sets the current command position to the center position of the trackbar, and sets the lower limit position and upper limit position of the trackbar to the positions shown below.<br>• Lower limit position of the trackbar: Current position "-10"<br>• Upper limit position of the trackbar: Current position "+10" |

### Operating procedure

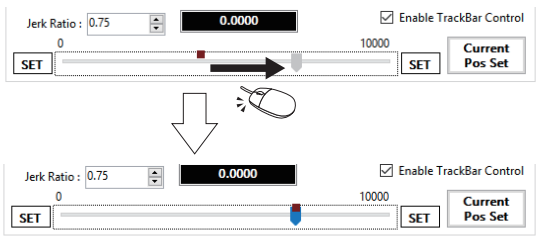
The following describes how to perform the JOG operation using the trackbar.

***1.*** Perform positioning to the upper limit position and lower limit position with the [JOG CW]/[JOG CCW] button, and update the upper limit position and lower limit position for the trackbar operation.

***2.*** Selecting [Enable TrackBar Control] displays ■ (current position) in the trackbar.




***3.*** Drag and drop the arrow ( ) in the trackbar to start the JOG operation towards the moved position.

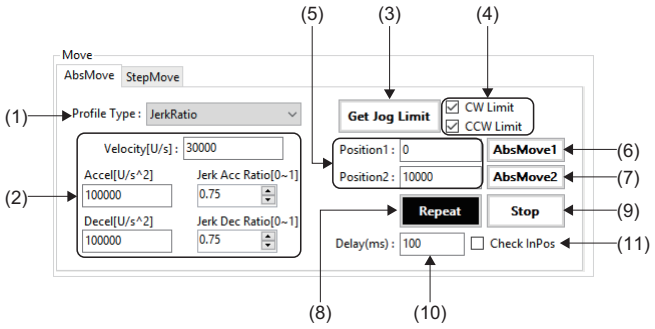


## ■ Positioning operation (absolute position operation)

In the "AbsMove" tab in the "Move" area, positioning operation to the two set points is performed.

### Window

Navigation window ⇨ [SWMOS] ⇨ [Motor(CyclicSyncPos)] ⇨ [SingleControl] ⇨ [TestMove] ⇨ [Position] tab ⇨ [Move] ⇨ [AbsMove] tab




### Displayed items

| Item | Description |
|---|---|
| (1) Profile Type[*1] | Select the acceleration/deceleration method used for the positioning operation.<br>• Trapezoidal: Trapezoid<br>• SCurve: S-curve<br>• Jerk Ratio: Jerk ratio<br>• Parabolic: Parabolic<br>• Sin: Sine<br>• AdvancedS: Advanced-S<br>• TrapezoidalMAT: Trapezoidal moving average time<br>• JerkLimited: Jerk-limited<br>• JerkLimitedSCurve: Jerk limited S-curve<br>• JerkLimitedAdvancedS: Jerk limited advanced-S<br>• TwoVelocityTrapezoidal: Two velocity trapezoidal<br>• TwoVelocitySCurve: Two velocity S curve<br>• TwoVelocityJerkRatio: Two velocity jerk ratio<br>• TimeAccTrapezoidal: Time acceleration trapezoidal<br>• TimeAccSCurve: Time acceleration S-curve<br>• TimeAccJerkRatio: Time acceleration jerk ratio<br>• TimeAccParabolic: Time acceleration parabolic<br>• TimeAccSin: Time acceleration sine<br>• TimeAccAdvancedS: Time acceleration advanced-S<br>• ConstantDec: Constant deceleration<br>• JerkRatioFixedVelocityT: Jerk ratio/fixed velocity-T<br>• JerkRatioFixedVelocityS: Jerk ratio/fixed velocity-S<br>• JerkLimitedFixedVelocityT: Jerk-limited/fixed velocity-T<br>• JerkLimitedFixedVelocityS: Jerk-limited/fixed velocity-S<br>• ParabolicVelocity: Parabolic velocity |
| (2) Speed setting | • Velocity[U/s]: Set the target speed.<br>• Accel[U/s$^2$]: Set the acceleration.<br>• Decel[U/s$^2$]: Set the deceleration.<br>• Jerk Acc Ratio[0~1]: Set the acceleration jerk ratio.<br>• Jerk Dec Ratio[0~1]: Set the deceleration jerk ratio. |
| (3) [Get Jog Limit] button | Sets the upper limit position and lower limit position displayed in the trackbar in [Jog] as the target positions.<br>The lower limit position value of the trackbar is set in [Position1] and the upper limit position value is set in [Position2]. |
| (4) CW Limit/CCW Limit | Selecting these items enable the target position setting for the upper limit position and lower limit position of the trackbar in [Jog].<br>• CW Limit: Enables the operation in which the upper limit position of the trackbar is set to [Position 2].<br>• CCW Limit: Enables the operation in which the lower limit position of the trackbar is set to [Position 1]. |
| (5) Position1/Position2 | Set the target position of the absolute position positioning operation.<br>• Position1: Set the absolute position value for Position1.<br>• Position2: Set the absolute position value for Position2. |
| (6) [AbsMove1] button | Performs the absolute position positioning operation on the position set in Position1.<br>Depending on whether [Enable TrackBar Control] in [Jog] is selected or not, the following moves within the trackbar when the [AbsMove1] button is clicked.<br>• Selected: ■ in the trackbar moves to the position of the value set in [Position1].<br>• Not selected: ▮ in the trackbar moves to the position of the value set in [Position1]. |

| Item | Description |
|---|---|
| (7) [AbsMove2] button | Performs the absolute position positioning operation on the position set in Position2.<br>Depending on whether [Enable TrackBar Control] in [Jog] is selected or not, the following moves within the trackbar when the [AbsMove2] button is clicked.<br>• Selected: ■ in the trackbar moves to the position of the value set in [Position2].<br>• Not selected: ▼ in the trackbar moves to the position of the value set in [Position2]. |
| (8) [Repeat] button | Starts the reciprocating positioning operation with the values set in [Position1] and [Position2].<br>Depending on whether [Enable TrackBar Control] in [Jog] is selected or not, the following moves within the trackbar and the reciprocating operation is performed.<br>• Selected: ■ moves and the reciprocating operation is performed.<br>• Not selected: ▼ moves and the reciprocating operation is performed. |
| (9) [Stop] button | Stops the positioning operation. |
| (10) Delay(ms) | Set the standby time [ms] after the positioning completion. |
| (11) Check InPos | When this item is selected, the next positioning is started after the in-position is turned on. |

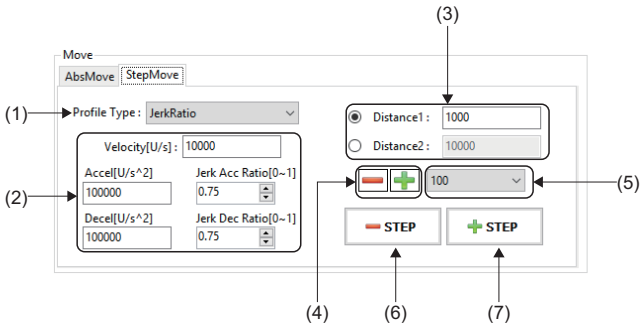
*1 For details of the acceleration/deceleration method, refer to the following.
SWM-G User Manual

## ■ Positioning operation (step operation)

In the "StepMove" tab in the "Move" area, step operation is performed.

### Window

Navigation window ⇨ [SWMOS] ⇨ [Motor(CyclicSyncPos)] ⇨ [SingleControl] ⇨ [TestMove] ⇨ [Position] tab ⇨ [Move] ⇨ [StepMove] tab




### Displayed items

| Item | Description |
|---|---|
| (1) Profile Type*1 | Select the acceleration/deceleration method used for the step operation.<br>• Trapezoidal: Trapezoid<br>• S-Curve: S-curve<br>• Jerk Ratio: Jerk ratio<br>• Parabolic: Parabolic<br>• Sin: Sine<br>• AdvancedS: Advanced-S<br>• TrapezoidalMAT: Trapezoidal moving average time<br>• JerkLimited: Jerk-limited<br>• JerkLimitedSCurve: Jerk limited S-curve<br>• JerkLimitedAdvancedS: Jerk limited advanced-S<br>• TwoVelocityTrapezoidal: Two velocity trapezoidal<br>• TwoVelocitySCurve: Two velocity S curve<br>• TwoVelocityJerkRatio: Two velocity jerk ratio<br>• TimeAccTrapezoidal: Time acceleration trapezoidal<br>• TimeAccSCurve: Time acceleration S-curve<br>• TimeAccJerkRatio: Time acceleration jerk ratio<br>• TimeAccParabolic: Time acceleration parabolic<br>• TimeAccSin: Time acceleration sine<br>• TimeAccAdvancedS: Time acceleration advanced-S<br>• ConstantDec: Constant deceleration<br>• JerkRatioFixedVelocityT: Jerk ratio/fixed velocity-T<br>• JerkRatioFixedVelocityS: Jerk ratio/fixed velocity-S<br>• JerkLimitedFixedVelocityT: Jerk-limited/fixed velocity-T<br>• JerkLimitedFixedVelocityS: Jerk-limited/fixed velocity-S<br>• ParabolicVelocity: Parabolic velocity |

| Item | Description |
|---|---|
| (2) Speed setting | • Velocity[U/s]: Set the target speed.<br>• Accel[U/s$^2$]: Set the acceleration.<br>• Decel[U/s$^2$]: Set the deceleration.<br>• Jerk Acc Ratio[0~1]: Set the acceleration jerk ratio.<br>• Jerk Dec Ratio[0~1]: Set the deceleration jerk ratio. |
| (3) Step movement amount setting | Set the movement amount of the step operation.<br>• Distance1: Set the movement amount 1.<br>• Distance2: Set the movement amount 2. |
| (4) [−] button/[+] button | Subtracts/adds the value in the pull-down list from/to the values set in [Distance1]/[Distance2].<br>• [−] button: Subtracts the value.<br>• [+] button: Adds the value. |
| (5) Pull-down list | Set the value to be subtracted or added from/to [Distance1]/[Distance2].<br>• 10, 100, 1000, 10000, 100000 |
| (6) [−STEP] button | Executes the step operation once in the subtraction direction.<br>Depending on whether [Enable TrackBar Control] in [Jog] is selected or not, the following moves within the trackbar to the position calculated by subtracting the value set in [Distance1] or [Distance2] when the [−STEP] button is clicked.<br>• Selected: ■ in the trackbar moves to the position calculated by subtracting the set value.<br>• Not selected: ▼ in the trackbar moves to the position calculated by subtracting the set value. |
| (7) [+STEP] button | Executes the step operation once in the addition direction.<br>Depending on whether [Enable TrackBar Control] in [Jog] is selected or not, the following moves within the trackbar to the position calculated by adding the value set in [Distance1] or [Distance2] when the [+STEP] button is clicked.<br>• Selected: ■ in the trackbar moves to the position calculated by adding the set value.<br>• Not selected: ▼ in the trackbar moves to the position calculated by adding the set value. |

*1 For details of the acceleration/deceleration method, refer to the following.
SWM-G User Manual

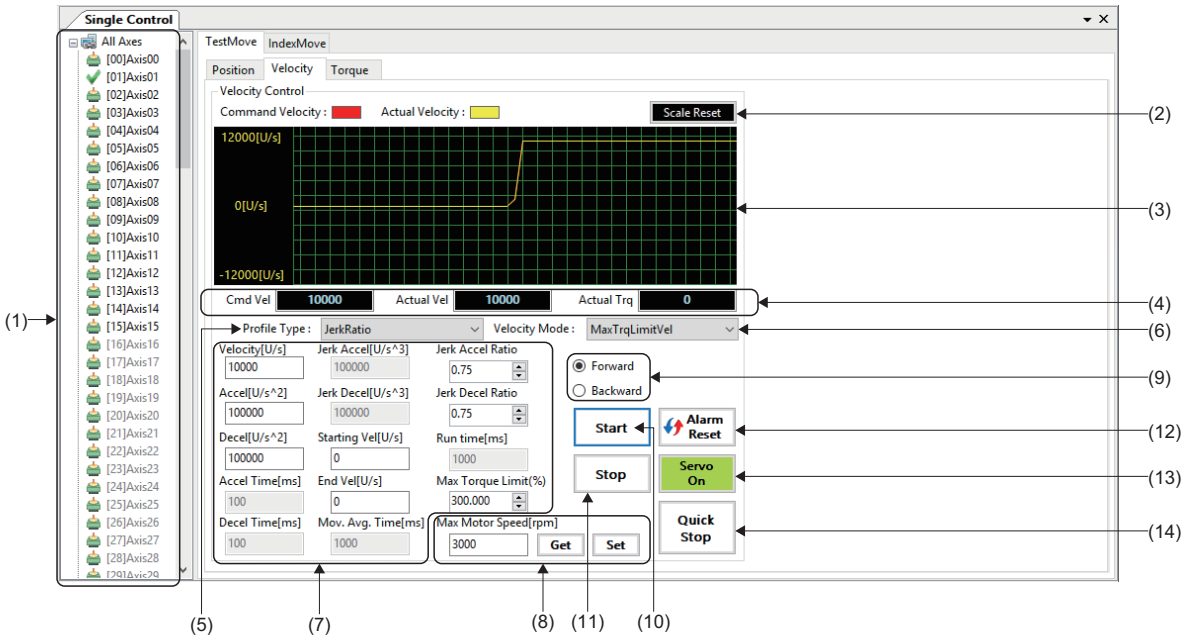
# Test operation (speed control)

The operation of the single-axis speed control is performed.

To operate the speed control, set "Velocity" in "Axis Command Mode" in the [Essential] tab which is displayed by selecting [SWMOS] ⇨ [Setup] ⇨ [Parameters] in the navigation window.

## Window

Navigation window ⇨ [SWMOS] ⇨ [Motor(CyclicSyncPos)] ⇨ [SingleControl] ⇨ [TestMove] ⇨ [Velocity] tab




## Displayed items

| Item | Description |
|---|---|
| (1) Axis tree | Select the axis for which the speed control of the test operation is executed.<br>The axis display can be set in the axis display mode. (☞ Page 26 Motion) |
| (2) [Scale Reset] button | Recalculates the scale of the graph area. |
| (3) Graph area | Displays the status of the speed control. The command speed and feedback speed are plotted in the graph area.<br>• Command speed: Red<br>• Feedback speed: Yellow |
| (4) Speed control status | Displays the command speed, feedback speed, and feedback torque.<br>• Cmd Vel: Displays the command speed [U/s].<br>• Actual Vel: Displays the feedback speed [U/s].<br>• Actual Trq: Displays the feedback torque [%]. |

| Item | Description |
|---|---|
| (5) Profile Type[*1] | Select the acceleration/deceleration method for the speed control.<br>• Trapezoidal: Trapezoid<br>• S-Curve: S-curve<br>• Jerk Ratio: Jerk ratio<br>• Parabolic: Parabolic<br>• Sin: Sine<br>• AdvancedS: Advanced-S<br>• TrapezoidalMAT: Trapezoidal moving average time<br>• JerkLimited: Jerk-limited<br>• JerkLimitedSCurve: Jerk limited S-curve<br>• JerkLimitedAdvancedS: Jerk limited advanced-S<br>• TwoVelocityTrapezoidal: Two velocity trapezoidal<br>• TwoVelocitySCurve: Two velocity S curve<br>• TwoVelocityJerkRatio: Two velocity jerk ratio<br>• TimeAccTrapezoidal: Time acceleration trapezoidal<br>• TimeAccSCurve: Time acceleration S-curve<br>• TimeAccJerkRatio: Time acceleration jerk ratio<br>• TimeAccParabolic: Time acceleration parabolic<br>• TimeAccSin: Time acceleration sine<br>• TimeAccAdvancedS: Time acceleration advanced-S<br>• ConstantDec: Constant deceleration<br>• JerkRatioFixedVelocityT: Jerk ratio/fixed velocity-T<br>• JerkRatioFixedVelocityS: Jerk ratio/fixed velocity-S<br>• JerkLimitedFixedVelocityT: Jerk-limited/fixed velocity-T<br>• JerkLimitedFixedVelocityS: Jerk-limited/fixed velocity-S<br>• ParabolicVelocity: Parabolic velocity |
| (6) Velocity Mode | Select the specification method for the speed control.<br>• Velocity: Speed command<br>• TimedVel: Speed command with the time specified<br>• MaxTrqLimitVel: Speed command with the maximum torque limit specified |
| (7) Speed setting | Set the parameters for the speed control to perform the test operation.<br>• Velocity[U/s]: Set the target speed.<br>• Accel[U/s$^2$]: Set the acceleration.<br>• Decel[U/s$^2$]: Set the deceleration.<br>• Accel Time [ms]: Set the acceleration time.<br>• Decel Time [ms]: Set the deceleration time.<br>• Jerk Accel [U/s$^3$]: Set the acceleration jerk.<br>• Jerk Decel [U/s$^3$]: Set the deceleration jerk.<br>• End Vel [U/s]: Set the end speed.<br>• Mov. Avg. Time [ms]: Set the moving average time.<br>• Jerk Accel Ratio [0 to 1.0]: Set the acceleration jerk ratio.<br>• Jerk Decel Ratio [0 to 1.0]: Set the deceleration jerk ratio.<br>• RunTimeMilliseconds: Set the execution time for the time specification method.<br>• Max Torque Limit(%): Set the maximum torque limit for the maximum torque limit specification method. |
| (8) Max Motor Speed[rpm][*2] | Set the maximum motor speed for the axis.<br>Set the motor speed and click the [Set] button to set the motor speed.<br>Click the [Get] button to acquire the current value. |
| (9) Forward/Backward | Set the direction in which the speed control is executed.<br>• Forward: Speed control in the positive direction<br>• Backward: Speed control in the negative direction |
| (10) [Start] button | Starts the speed control. |
| (11) [Stop] button | Stops the speed control. |
| (12) [Alarm Reset] button | Clears the alarm. |
| (13) [Servo On] button | Switches servo ON/OFF.<br>Performing servo ON turns on this button in green. |
| (14) [Quick Stop] button | Stops the speed control with the quick stop. |

*1 For details of the acceleration/deceleration method, refer to the following.
SWM-G User Manual

*2 This item cannot be changed for the servo amplifier (MR-J5(W)-G).

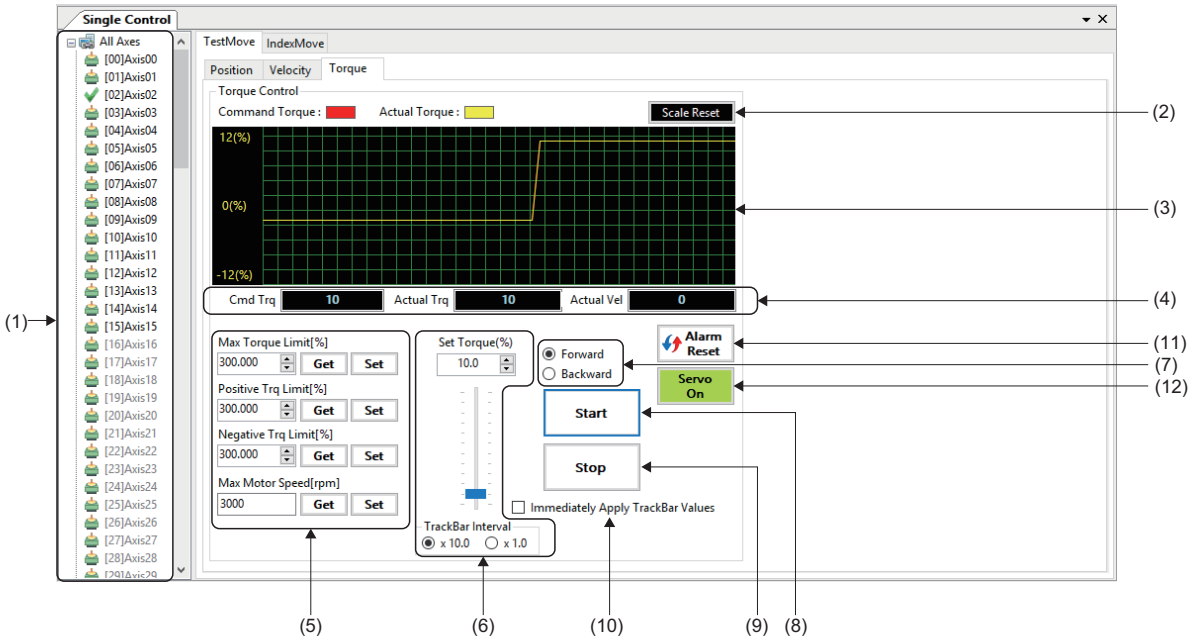
# Test operation (torque control)

The operation of the single-axis torque control is performed.

To operate the torque control, set "Torque" in "Axis Command Mode" in the [Essential] tab which is displayed by selecting [SWMOS] ⇨ [Setup] ⇨ [Parameters] in the navigation window.

## Window

Navigation window ⇨ [SWMOS] ⇨ [Motor(CyclicSyncPos)] ⇨ [SingleControl] ⇨ [TestMove] ⇨ [Torque] tab




## Displayed items

| Item | Description |
|---|---|
| (1) Axis tree | Select the axis for which the torque control of the test operation is executed.<br>The axis display can be set in the axis display mode. (☞ Page 26 Motion) |
| (2) [Scale Reset] button | Recalculates the scale of the graph area. |
| (3) Graph area | Displays the status of the torque control. The command torque and feedback torque are plotted in the graph area.<br>• Command torque: Red<br>• Feedback torque: Yellow |
| (4) Torque control status | Displays the command torque, feedback torque, and feedback speed.<br>• Cmd Trq: Displays the command torque [%].<br>• Actual Trq: Displays the feedback torque [%].<br>• Actual Vel: Displays the feedback speed [U/s]. |
| (5) Torque setting | Set the parameters for the torque control to perform the test operation.<br>Set each item and click the [Set] button to set the values.<br>Click the [Get] button to acquire the current value.<br>• Max Torque Limit[%]: Set the maximum torque limit.<br>• Positive Trq Limit[%]: Set the positive-direction torque limit.<br>• Negative Trq Limit[%]: Set the negative-direction torque limit.<br>• Max Motor Speed[rpm][*1]: Set the maximum motor speed. |
| (6) Trackbar | During the test operation, the torque command value is changed with the trackbar and applied to the graph area.<br>■Set Torque(%)<br>Set the torque command value.<br>■TrackBar Interval<br>Select the unit of scale for the trackbar.<br>• ×10.0%<br>• ×1.0% |
| (7) Forward/Backward | Set the direction in which the torque control is executed.<br>• Forward: Torque control in positive direction<br>• Backward: Torque control in negative direction |
| (8) [Start] button | Starts the torque control. |
| (9) [Stop] button | Stops the torque control. |

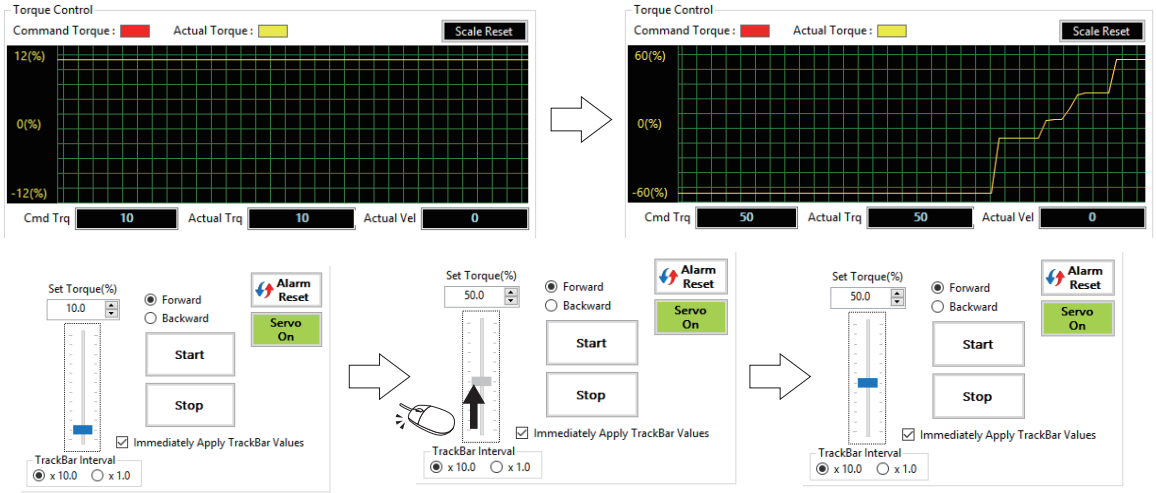
| Item | Description |
|---|---|
| (10) Immediately Apply TrackBar Values | When this item is selected, the torque command value set with the trackbar is immediately applied to the graph area. |
| (11) [Alarm Reset] button | Clears the alarm. |
| (12) [Servo On] button | Switches servo ON/OFF.<br>Performing servo ON turns on this button in green. |

*1 This item cannot be changed for the servo amplifier (MR-J5(W)-G). Set the maximum speed with the servo parameter [PV21 (Speed limit extension setting)] of the servo amplifier.

## Operating procedure

The following describes the torque control operation performed by using the trackbar.

1. Click the [Start] button to start the torque control operation.
2. When the trackbar is dragged while [Immediately Apply TrackBar Values] is selected, the torque command value is changed, and the changed value is applied as the actual torque control command in real time. The unit of scale for the trackbar can be selected from "10.0%" and "1.0%" in [TrackBar Interval].



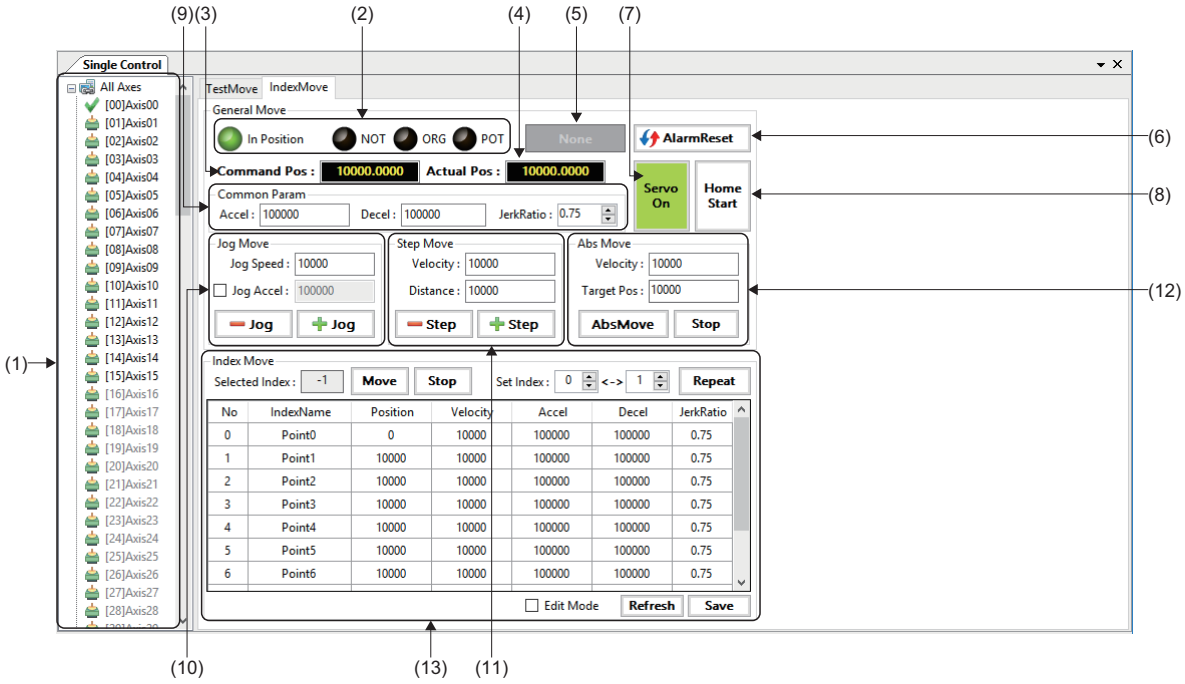

3. When [Immediately Apply TrackBar Values] is not selected, the torque command value changed with the trackbar is applied to the actual torque control when the [Start] button is clicked.

# Index operation

The positioning operation to the registered index position is performed.

## Window

Navigation window ⇨ [SWMOS] ⇨ [Motor(CyclicSyncPos)] ⇨ [SingleControl] ⇨ [IndexMove]




## Displayed items

| Item | Description |
|---|---|
| (1) Axis tree | Select the axis for which the index operation is executed.<br>The axis display can be set in the axis display mode. (☞ Page 26 Motion) |
| (2) Axis status | Displays the axis statuses with lamps.<br>• In Position: In-position status<br>• NOT: Negative direction stroke limit status<br>• ORG: Home position status<br>• POT: Positive direction stroke limit status |
| (3) Command Pos | Displays the command position. |
| (4) Actual Pos | Displays the feedback position. |
| (5) Alarm display | Displays the status of the alarm occurrence in the axis.<br>Gray: No alarm<br>Red: Alarm occurring |
| (6) [AlarmReset] button | Clears the alarm. |
| (7) [Servo On] button | Switches servo ON/OFF.<br>Performing servo ON turns on this button in green. |
| (8) [Home Start] button | Starts the home position return.<br>This button turns green when the home position return is completed. |
| (9) Common Param | Set the acceleration, deceleration, and jerk ratio of the JOG operation, step operation, and ABS operation.<br>• Accel: Set the acceleration [U/s$^2$].<br>• Decel: Set the deceleration [U/s$^2$].<br>• JerkRatio: Set the jerk ratio (0 to 1.0). |
| (10) Jog Move | JOG operation is performed.<br>• Jog Speed: Set the JOG operation speed [U/s].<br>• Jog Accel: Selecting this item enables the JOG operation acceleration/deceleration [U/s$^2$] to be set.<br>• [Jog] button: Performs the JOG operation in the reverse direction (the command position is subtracted).<br>• [Jog] button: Performs the JOG operation in the forward direction (the command position is added). |

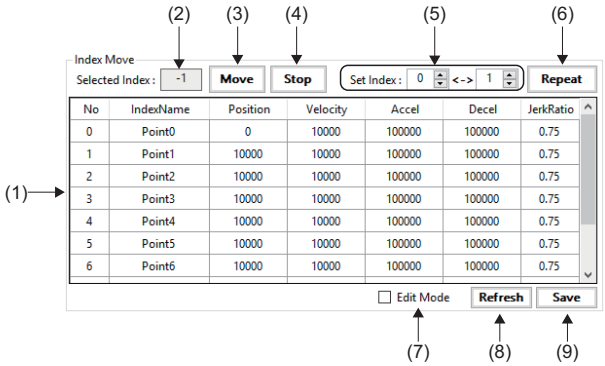
| Item | Description |
|---|---|
| (11) Step Move | Step operation is performed.<br>• Velocity: Set the step speed [U/s].<br>• Distance: Set the step movement amount [user unit].<br>• [−Step] button: Performs the step operation in the subtraction direction.<br>• [+Step] button: Performs the step operation in the addition direction. |
| (12) Abs Move | Positioning operation with the absolute position is performed.<br>• Velocity: Set the positioning speed [U/s].<br>• Target Pos: Set the target position [user unit].<br>• [AbsMove] button: Starts the positioning operation.<br>• [Stop] button: Stops the positioning operation. |
| (13) Index Move | Ten index positions are registered to perform the test operation. (☞ Page 123 Index control) |



## ■ Index control

Index operation data is set to execute the index operation.

### Window




### Displayed items

| Item | Description |
|---|---|
| (1) Index operation data | Set 10 index operation data.<br>• No: Displays the index number (0 to 9).<br>• IndexName: Set the name of the index operation data.<br>• Position: Set the target position [user unit] with the absolute position specification.<br>• Velocity: Set the speed [U/s] of the index operation.<br>• Accel: Set the acceleration [U/s$^2$] of the index operation.<br>• Decel: Set the deceleration [U/s$^2$] of the index operation.<br>• JerkRatio: Set the jerk ratio (0 to 1.0) of the index operation.<br>*: When setting the data for the index operation, select [Edit Mode].<br>*: The column of the set index operation data is highlighted in yellow and the setting is not confirmed. Click the [Save] button to confirm the setting. |
| (2) Selected Index | Displays the index number of the selected index operation data. |
| (3) [Move] button | Starts the absolute position positioning with the selected index operation data. |
| (4) [Stop] button | Stops the index operation in execution. |
| (5) Set Index | Set two index numbers (0 to 9) to perform the reciprocating operation. |
| (6) [Repeat] button | Starts the reciprocating operation with the absolute position positioning between two points.<br>The button display is switched to [Stop] during the reciprocating operation.<br>When the [Stop] button is clicked, the reciprocating operation is ended after the index operation in execution is completed, and then the button display is switched to [Repeat]. |
| (7) Edit Mode | Selecting this item enables the index operation data to be edited.<br>When the [Refresh] button or [Save] button is clicked, this item is deselected. |
| (8) [Refresh] button | Reads the index operation data from the SWMOS project data and applies it to the screen. |
| (9) [Save] button | Saves the set index operation data to the SWMOS project data. |

## Operating procedure

1. Select [Edit Mode] and set the position, speed, acceleration/deceleration, and jerk ratio of the index operation data.
2. Click the [Save] button to save the set data in the SWMOS project.

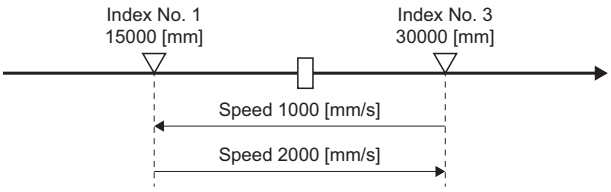
**Point**

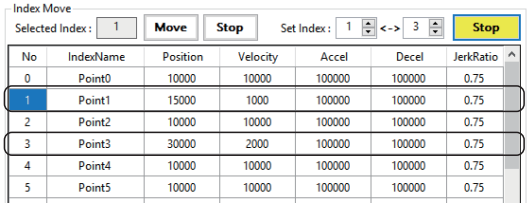
After the index operation data is set, the data highlighted in yellow is not confirmed. Click the [Save] button to confirm it before starting the operation.

3. Select the index operation data to be operated in [Set Index], and click the [Move] button.
4. When performing the reciprocating operation between two index positions, set two index numbers in [Set Index] and click the [Repeat] button.

Ex.

When executing the reciprocating operation between two index numbers "1" and "3"




| No | IndexName | Position | Velocity | Accel | Decel | JerkRatio |
|---|---|---|---|---|---|---|
| 0 | Point0 | 10000 | 10000 | 100000 | 100000 | 0.75 |
| 1 | Point1 | 15000 | 1000 | 100000 | 100000 | 0.75 |
| 2 | Point2 | 10000 | 10000 | 100000 | 100000 | 0.75 |
| 3 | Point3 | 30000 | 2000 | 100000 | 100000 | 0.75 |
| 4 | Point4 | 10000 | 10000 | 100000 | 100000 | 0.75 |
| 5 | Point5 | 10000 | 10000 | 100000 | 100000 | 0.75 |

5. To execute the reciprocating operation between different index positions, stop the operation by clicking the [Stop] button, set different index numbers in [Set Index], and then click the [Repeat] button to start the reciprocating operation.
   *: The button display switches between [Repeat] and [Stop] depending on the status of the reciprocating operation.

**Point**

When the index operation data is changed during the reciprocating operation, the changed value is applied at the next positioning operation.

# Multi-axis control

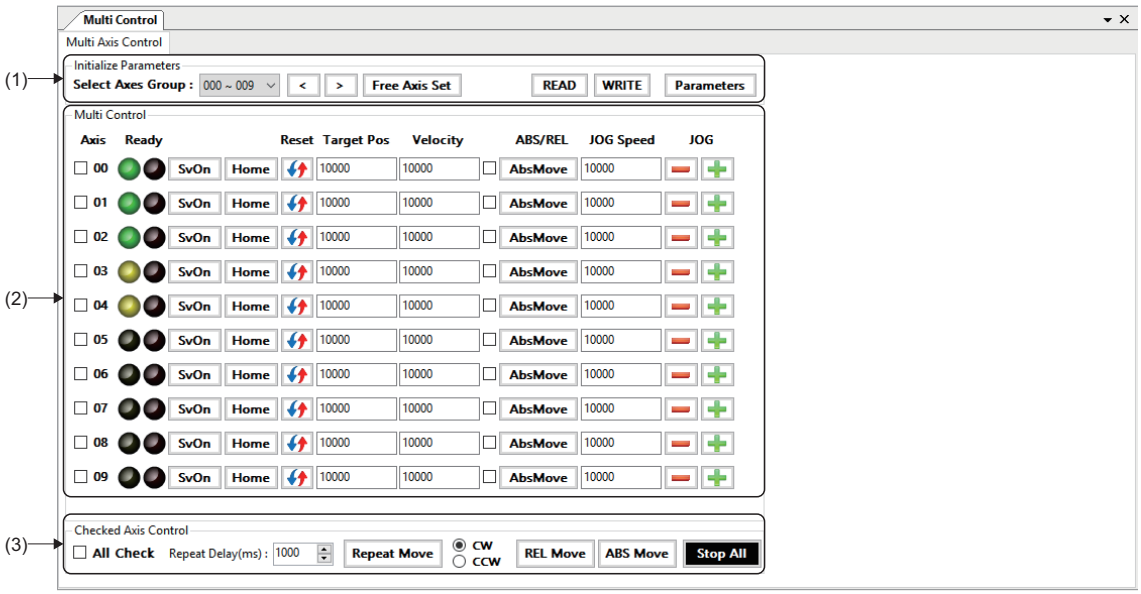
Test operations are performed on multiple axes simultaneously.

## CAUTION

- Positioning operation can be performed with the settings for up to 10 axes displayed on one screen, however, when operating multiple axes that interfere with each other simultaneously, pay full attention to the interference.

### Window

Navigation window ⇨ [SWMOS] ⇨ [Motor(CyclicSyncPos)] ⇨ [MultiControl]




### Displayed items

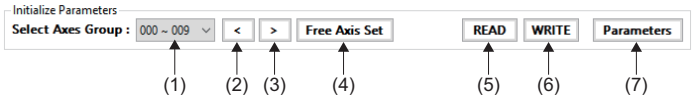
| Item | Description |
|---|---|
| (1) Initialize Parameters | Set the group of the axes (up to 10 axes) to be controlled and the parameters.<br>(☞ Page 126 Multi-axis operation setting) |
| (2) Multi Control | Servo ON/OFF, home position return, positioning operation, and JOG operation are performed on the axis group.<br>(☞ Page 127 Multi-axis operation) |
| (3) Checked Axis Control | Positioning operation is performed on the selected axis.<br>(☞ Page 128 Selected axis operation) |

## ■ Multi-axis operation setting

Set the group of the axes (up to 10 axes) to be controlled and the parameters.

Two methods are provided for the axis group: one is to select 10 axes from axis 0, and the other is to select 10 axes with arbitrary settings.

### Window

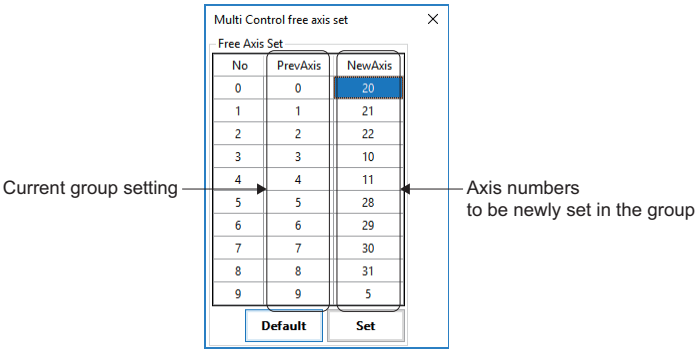



### Displayed items

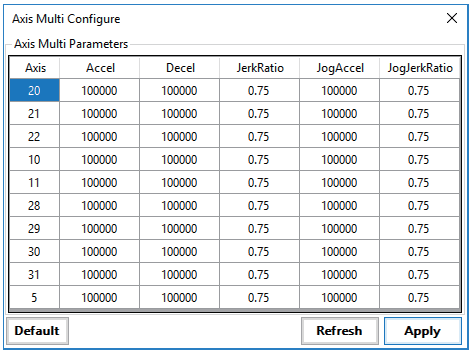
| Item | Description |
|---|---|
| (1) Axis group setting | Select the group of the axes for which multi-axis operation is performed.<br>• "000 to 009" to "120 to 127": "Axis 00 to 09" to "Axis 120 to 127"<br>• Free Axis: Arbitrary axes can be set in the "Multi Control free axis set" screen. |
| (2) [<] button | Switches the display from the displayed axis group to the one 10 axes before. |
| (3) [>] button | Switches the display from the displayed axis group to the one 10 axes after. |
| (4) [Free Axis Set] button | Displays the "Multi Control free axis set" screen.<br>Arbitrary 10 axes can be set for multi-axis operation. |
| (5) [READ] button | Reads the settings of the multi-axis control from the SWMOS project data. |
| (6) [WRITE] button | Saves the settings of the multi-axis control to the SWMOS project data. |
| (7) [Parameters] button | Displays the "Axis Multi Configure" screen.<br>Set the acceleration, deceleration, jerk ratio, JOG acceleration/deceleration, and JOG jerk ratio of the axis group. |

### Operating procedure

***1.*** Click the [Free Axis Set] button to display the "Multi Control free axis set" screen. Set the axis in the [NewAxis] column for each axis number and click the [Set] button. The axis group for 10 axes that are controlled simultaneously are set.



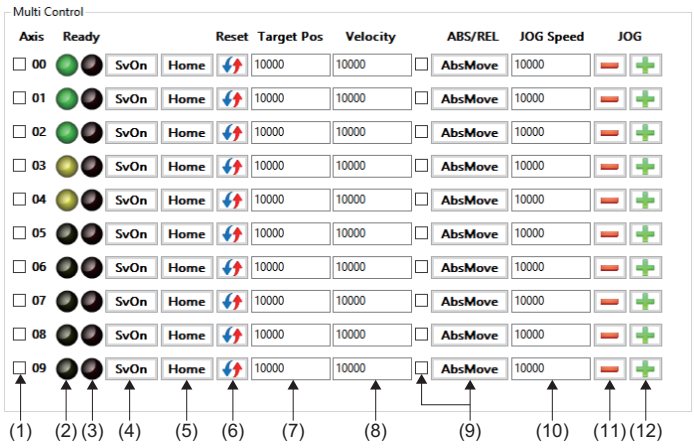

***2.*** Click the [Parameters] button to display the "Axis Multi Configure" screen. Set the acceleration, deceleration, and jerk ratio of the set axis group. When the setting is completed, click the [Apply] button.



## ■ Multi-axis operation

Servo ON/OFF, home position return, positioning operation, and JOG operation are performed on the axis group set in the multi-axis operation setting.

### Window




### Displayed items

| Item | Description |
|---|---|
| (1) Axis | Displays the axis number of the axis group.<br>When this item is selected, the axis can be set in [Checked Axis Control] as the axis used. |
| (2) Axis status (left side) | Displays the axis statuses with lamps.<br>• Black: Servo OFF<br>• Yellow: Servo ON<br>• Green: Home position return complete |
| (3) Axis status (right side) | Displays the axis status.<br>• Black: No alarm<br>• Red: Alarm occurring |
| (4) [SvOn] button | Switches servo ON/OFF. |
| (5) [Home] button | Starts the home position return. |
| (6) [] button | Resets the alarm. |
| (7) Target Pos | Set the absolute position/movement amount [user unit] of the positioning operation. |
| (8) Velocity | Set the positioning operation speed [U/s]. |
| (9) [AbsMove]/[RelMove] button | Starts the positioning operation. Depending on whether this item is selected or not, the positioning operation is switched between the absolute position and relative position and the button display is also switched.<br>• Selected: The positioning operation of the relative position is started. The [RelMove] button is displayed.<br>• Not selected: The positioning operation of the absolute position is started. The [AbsMove] button is displayed.<br>*: The button display changes to [Stop] during the positioning operation, and returns to the original display when the positioning operation is completed. Click the button when [Stop] is displayed to stop the positioning operation. |
| (10) JOG Speed | Set the JOG operation speed [U/s]. |
| (11) [] button | Performs the JOG operation in the reverse direction (the command position is subtracted). |
| (12) [] button | Performs the JOG operation in the forward direction (the command position is added). |

### Operating procedure

1. Click the [SvOn] button to perform servo ON.
2. Click the [Home] button to perform home position return.
3. To perform positioning operation, set [Target Pos] and [Velocity]. Select the absolute position (not selected) or relative position (selected) in [ABS/REL], and then click the [AbsMove]/[RelMove] button to start the positioning operation.
4. To perform JOG operation, set [JOG Speed] and click the [] button or [] button.

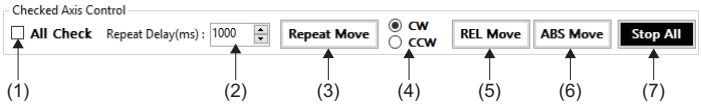
**Point**

If the [] button or [] button of the same axis is clicked during the positioning operation, the operation is switched to the JOG operation.

## ■ Selected axis operation

The positioning operation is performed on the axis whose axis number is selected for the multi-axis operation.

### Window




### Displayed items

| Item | Description |
|---|---|
| (1) All Check | Selecting this item selects all the [Axis] check boxes in [Multi Control] to select all the axes in the axis group. |
| (2) Repeat Delay(ms) | Set the standby time [ms] after the positioning operation is completed. |
| (3) [Repeat Move] button | Starts reciprocating operation by positioning between the operation start position and set positioning operation data position. |
| (4) REL+/REL- | Select the movement direction of the relative position positioning operation.<br>• REL+: Positioning operation is performed with the set movement amount.<br>• REL-: Positioning operation is performed with the set movement amount subtracted. |
| (5) [REL Move] button | Performs positioning operation on the selected axis at the relative position.<br>Whether the axis is selected in [ABS/REL] under [Multi Control] is ignored. |
| (6) [ABS Move] button | Performs positioning operation on the selected axis at the absolute position.<br>Whether the axis is selected in [ABS/REL] under [Multi Control] is ignored. |
| (7) [Stop All] button | Stops all the axes of the axis group. |

### Operating procedure

***1.*** Select [Axis] in [Multi Control] or [All Check] to select the target axes.

***2.*** Set the positioning operation data of the target axes in [Multi Control].

| Positioning operation | Setting item |
|---|---|
| Reciprocating operation | • Target Pos<br>• Velocity<br>• ABS/REL (Select the target axis) |
| REL operation | • Target Pos (movement amount)<br>• Velocity |
| ABS operation | • Target Pos (target position)<br>• Velocity |

***3.*** To perform reciprocating operation, set [Repeat Delay(ms)] and click the [Repeat Move] button to start the reciprocating operation of the target axis.

***4.*** To perform positioning operation, click the [REL Move] button or [ABS Move] button to start the positioning operation of the target axis.

# 4.5 Motion Control

Test operations on the interpolation control and gantry control are performed.

## Interpolation control

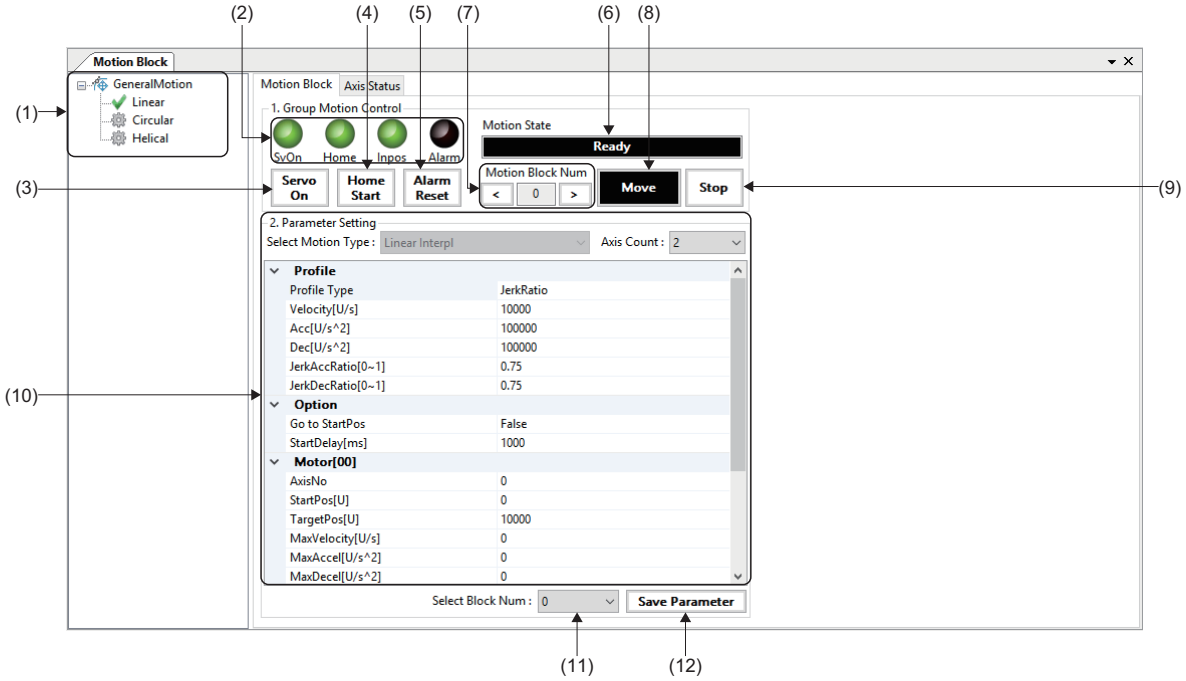
Test operations on the linear interpolation, circular interpolation, and helical interpolation are performed.

### Interpolation operation

Motion blocks (up to 30 blocks) are set in the linear interpolation, circular interpolation, or helical interpolation, and test operations are performed with the selected motion block setting.

#### Window

Navigation window ⇨ [SWMOS] ⇨ [Motion] ⇨ [MotionBlock] ⇨ [Motion Block] tab




#### Displayed items

| Item | Description |
|---|---|
| (1) Interpolation type tree | Select the interpolation control type.<br>• Linear<br>• Circular<br>• Helical |
| (2) Interpolation axis status | Displays the interpolation axis status with lamps.<br>• SvOn: Lights in green ( ) when servo ON is performed for all the interpolation axes.<br>• Home: Lights in green ( ) when the home position return for all the interpolation axes is completed.<br>• Inpos: Lights in green ( ) when all the interpolation axes are in the in-position state.<br>• Alarm: Lights in red ( ) when any of the interpolation axes is in the alarm state. |
| (3) [Servo On] button | Performs servo ON/OFF for all the interpolation axes. |
| (4) [Home Start] button | Performs home position return for all the interpolation axes. |
| (5) [Alarm Reset] button | Resets the alarms for all the interpolation axes. |
| (6) Motion State | Displays the status of the motion control.<br>• Idle: Servo OFF<br>• Ready: Waiting<br>• Homing: Home position return in progress<br>• Running: Interpolation control in progress |

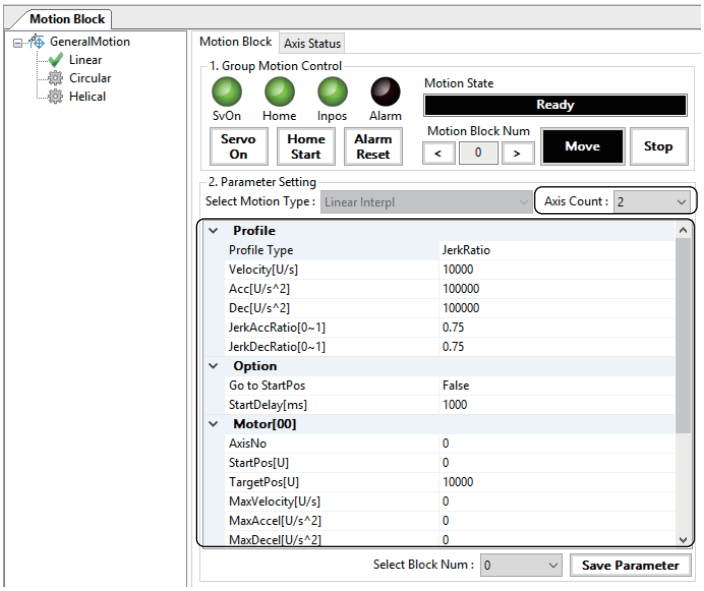
| Item | Description |
|---|---|
| (7) Motion Block Num | Select the motion block number (0 to 29).<br>• Entry column: Enter the motion block number to be displayed.<br>• [<] button: Switches the display from the displayed motion block number to the number one block before.<br>• [>] button: Switches the display from the displayed motion block number to the number one block after.<br>*: When a motion block number is selected, (11) displays the same number. |
| (8) [Move] button | Starts the interpolation control of the selected motion block. |
| (9) [Stop] button | Stops the interpolation control in execution. |
| (10) Interpolation control data setting | Set the interpolation control data of the selected motion block number.<br>For the interpolation control data of each interpolation control, refer to the following.<br>• Linear interpolation (☞ Page 130 Linear interpolation)<br>• Circular interpolation (☞ Page 132 Circular interpolation)<br>• Helical interpolation (☞ Page 134 Helical interpolation) |
| (11) Select Block Num | Select the motion block number (0 to 29) from the pull-down list.<br>*: When a motion block number is selected, (7) displays the same number. |
| (12) [Save Parameter] button | Saves the settings of the selected motion block setting to the SWMOS project data. |

## ■ Linear interpolation

Test operations on the linear interpolation are performed.

### Operating procedure

1. Select [Linear] from the interpolation type tree.
2. Select the number of the motion block for which linear interpolation is performed in [Select Block Num].
3. Select the number of axes from the [Axis Count] pull-down list. Up to 15 linear interpolation axes can be selected.
4. Set the linear interpolation data.




| Item | | Description |
|---|---|---|
| Profile | Profile Type*1 | Select the acceleration/deceleration method.<br>• Trapezoidal: Trapezoid<br>• SCurve: S-curve<br>• JerkRatio: Jerk ratio<br>• Parabolic: Parabolic<br>• Sin: Sine<br>• AdvancedS: Advanced-S<br>• TrapezoidalMAT: Trapezoidal moving average time |
| | Velocity[U/s] | Set the target speed [U/s]. |
| | Acc[U/s$^2$] | Set the acceleration [U/s$^2$]. |
| | Dec[U/s$^2$] | Set the deceleration [U/s$^2$]. |
| | JerkAccRatio[0~1] | Set the acceleration jerk ratio [0 to 1.0]. |
| | JerkDecRatio[0~1] | Set the deceleration jerk ratio [0 to 1.0]. |

| Item | | Description |
|---|---|---|
| Option | Go to StartPos | Set the start position of the axis for which linear interpolation is performed.<br>• True: The interpolation is started after the axis is moved to the start position.<br>• False: The interpolation is started from the current position. |
| | StartDelay[ms] | Set the standby time [ms] after moving the axis to the start position. |
| Motor[00] to [14]*2 | AxisNo | Set the number of the axis for which linear interpolation is performed.<br>• 0 to 127 |
| | StartPos[U] | Set the start position [user unit].<br>*: It is used when "True" is set in [Go to StartPos]. |
| | TargetPos[U] | Set the target position [user unit]. |
| | MaxVelocity[U/s] | Set the maximum speed [U/s]. |
| | MaxAccel[U/s$^2$] | Set the maximum acceleration [U/s$^2$]. |
| | MaxDecel[U/s$^2$] | Set the maximum deceleration [U/s$^2$]. |

*1 For details of the acceleration/deceleration method, refer to the following.
SWM-G User Manual

*2 It differs depending on the number of axes set in [Axis Count].

**Point**

The linear interpolation profile calculation mode (Linear Intpl Profile Calc Mode) uses the axis parameter specified in Axis [00]. Set the parameter in the parameter setting in advance. For details of the linear interpolation profile calculation mode, refer to the following.
SWM-G User Manual

***5.*** When the setting of the linear interpolation data is completed, click the [Save Parameter] button to save the motion block number setting.

***6.*** Make the test operation of the axis for which linear interpolation is performed ready and click the [Start] button to start the linear interpolation.

***7.*** When [Go to StartPos] is set to "True", the linear interpolation is started after each axis has moved to the position set in [Go to StartPos] and the standby time set in [StartDelay[ms]] has elapsed.

## ■ Circular interpolation

Test operations on the circular interpolation are performed.

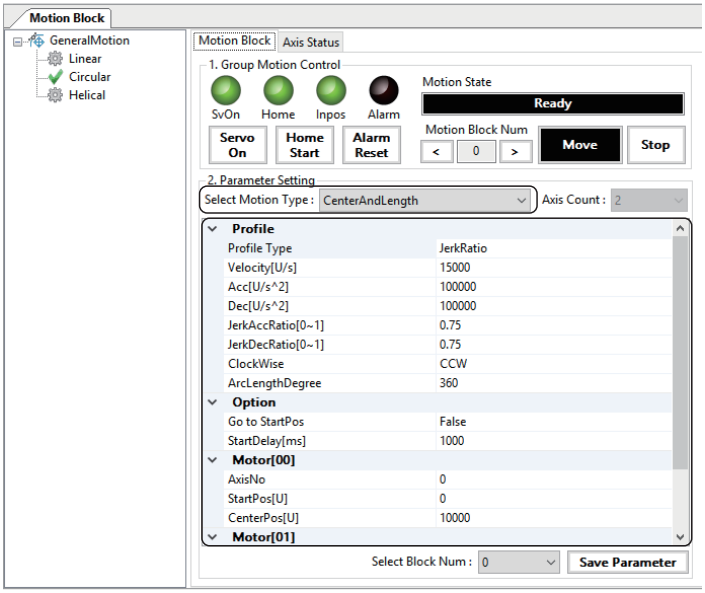
### Operating procedure

1. Select [Circular] from the interpolation type tree.
2. Select the number of the motion block for which circular interpolation is performed in [Select Block Num].
3. Select the circular interpolation method from the [Select Motion Type] pull-down list.

| Circular interpolation method*1 | Description |
|---|---|
| CenterAndLength | Performs the circular interpolation by setting the center position and circular ark length. |
| CenterAndEnd | Performs the circular interpolation by setting the center position and end position (target position). |
| ThroughAndEnd | Performs the circular interpolation by setting the passing position and end position (target position). |
| LengthAndEnd | Performs the circular interpolation by setting the circular ark length and end position (target position). |
| RadiusAndEnd | Performs the circular interpolation by setting the radius and end position (target position). |
| ThroughAndEnd3D | Performs the circular interpolation in a 3D space by setting the passing position and end position (target position). |

*1 For details of the circular interpolation method, refer to the following.
SWM-G User Manual

4. Set the circular interpolation data.




| Item | | Description |
|---|---|---|
| Profile | Profile Type*1 | Select the acceleration/deceleration method.<br>• Trapezoidal: Trapezoid<br>• SCurve: S-curve<br>• JerkRatio: Jerk ratio<br>• Parabolic: Parabolic<br>• Sin: Sine<br>• AdvancedS: Advanced-S<br>• TrapezoidalMAT: Trapezoidal moving average time |
| | Velocity[U/s] | Set the target speed [U/s]. |
| | Acc[U/s$^2$] | Set the acceleration [U/s$^2$]. |
| | Dec[U/s$^2$] | Set the deceleration [U/s$^2$]. |
| | JerkAccRatio[0~1] | Set the acceleration jerk ratio [0 to 1.0]. |
| | JerkDecRatio[0~1] | Set the deceleration jerk ratio [0 to 1.0]. |
| | ClockWise*2*3*5 | Select the rotation direction.<br>• CCW: Counter-clockwise<br>• CW: Clockwise |
| | ArcLengthDegree*2*5 | Set the circular ark length. |
| | Radius*6 | Set the radius. |

| Item | | Description |
|---|---|---|
| Option | Go to StartPos | Set the start position of the axis for which circular interpolation is performed.<br>• True: The interpolation is started after the axis is moved to the start position.<br>• False: The interpolation is started from the current position. |
| | StartDelay[ms] | Set the standby time [ms] after moving the axis to the start position. |
| Motor[00]<br>Motor[01]<br>Motor[02]*7 | AxisNo | Set the number of the axis for which circular interpolation is performed.<br>• 0 to 127 |
| | StartPos[U] | Set the start position [user unit].<br>*: It is used when "True" is set in [Go to StartPos]. |
| | CenterPos[U]*2*3 | Set the center position [user unit] of the circular ark. |
| | ThroughPos[U]*4*7 | Set the passing position [user unit] of the circular ark. |
| | EndPos[U]*3*4*5*6*7 | Set the target position [user unit] of the circular ark. |

*1 For details of the acceleration/deceleration method, refer to the following.
SWM-G User Manual
*2 Settable only when CenterAndLength is selected
*3 Settable only when CenterAndEnd is selected
*4 Settable only when ThroughAndEnd is selected
*5 Settable only when LengthAndEnd is selected
*6 Settable only when RadiusAndEnd is selected
*7 Settable only when ThroughAndEnd3D is selected

**5.** When the setting of the circular interpolation data is completed, click the [Save Parameter] button to save the motion block number setting.

**6.** Make the test operation of the axis for which circular interpolation is performed ready and click the [Start] button to start the circular interpolation.

**7.** When [Go to StartPos] is set to "True", the circular interpolation is started after each axis has moved to the position set in [Go to StartPos] and the standby time set in [StartDelay[ms]] has elapsed.

## ■ Helical interpolation

Test operations on the helical interpolation are performed.

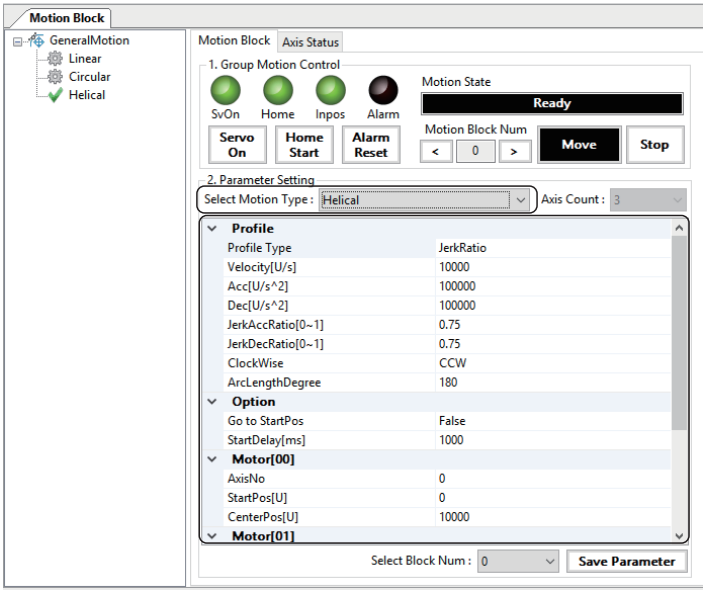
### Operating procedure

1. Select [Helical] from the interpolation type tree.
2. Select the number of the motion block for which helical interpolation is performed in [Select Block Num].
3. Select the helical interpolation method from the [Select Motion Type] pull-down list.

| Helical interpolation method*1 | Description |
|---|---|
| Helical | Path on the spiral |
| Circular | Circular path |
| Linear | Linear path |

*1 For details of the helical interpolation method, refer to the following.
SWM-G User Manual

4. Set the helical interpolation data.




| Item | | Description |
|---|---|---|
| Profile | Profile Type*1 | Select the acceleration/deceleration method.<br>• Trapezoidal: Trapezoid<br>• SCurve: S-curve<br>• JerkRatio: Jerk ratio<br>• Parabolic: Parabolic<br>• Sin: Sine<br>• AdvancedS: Advanced-S<br>• TrapezoidalMAT: Trapezoidal moving average time |
| | Velocity[U/s] | Set the target speed [U/s]. |
| | Acc[U/s$^2$] | Set the acceleration [U/s$^2$]. |
| | Dec[U/s$^2$] | Set the deceleration [U/s$^2$]. |
| | JerkAccRatio[0~1] | Set the acceleration jerk ratio [0 to 1.0]. |
| | JerkDecRatio[0~1] | Set the deceleration jerk ratio [0 to 1.0]. |
| | ClockWise | Select the rotation direction.<br>• CCW: Counter-clockwise<br>• CW: Clockwise |
| | ArcLengthDegree | Set the circular ark length. |
| Option | Go to StartPos | Set the start position of the axis for which helical interpolation is performed.<br>• True: The interpolation is started after the axis is moved to the start position.<br>• False: The interpolation is started from the current position. |
| | StartDelay[ms] | Set the standby time [ms] after moving the axis to the start position. |

| Item | | Description |
|---|---|---|
| Motor[00]<br>Motor[01] | AxisNo | Set the number of the circular axis for which helical interpolation is performed.<br>• 0 to 127 |
| | StartPos[U] | Set the start position [user unit].<br>*: It is used when "True" is set in [Go to StartPos]. |
| | CenterPos[U] | Set the center position [user unit] of the circular ark. |
| Motor[02] | Z-AxisNo | Set the number of the linear axis for which helical interpolation is performed.<br>• 0 to 127 |
| | StartPos[U] | Set the start position [user unit].<br>*: It is used when "True" is set in [Go to StartPos]. |
| | Z-AxisEndPos[U] | Set the target position [user unit] of the linear axis. |

*1 For details of the acceleration/deceleration method, refer to the following.
SWM-G User Manual



***5.*** When the setting of the helical interpolation data is completed, click the [Save Parameter] button to save the motion block number setting.

***6.*** Make the test operation of the axis for which helical interpolation is performed ready and click the [Start] button to start the linear interpolation.

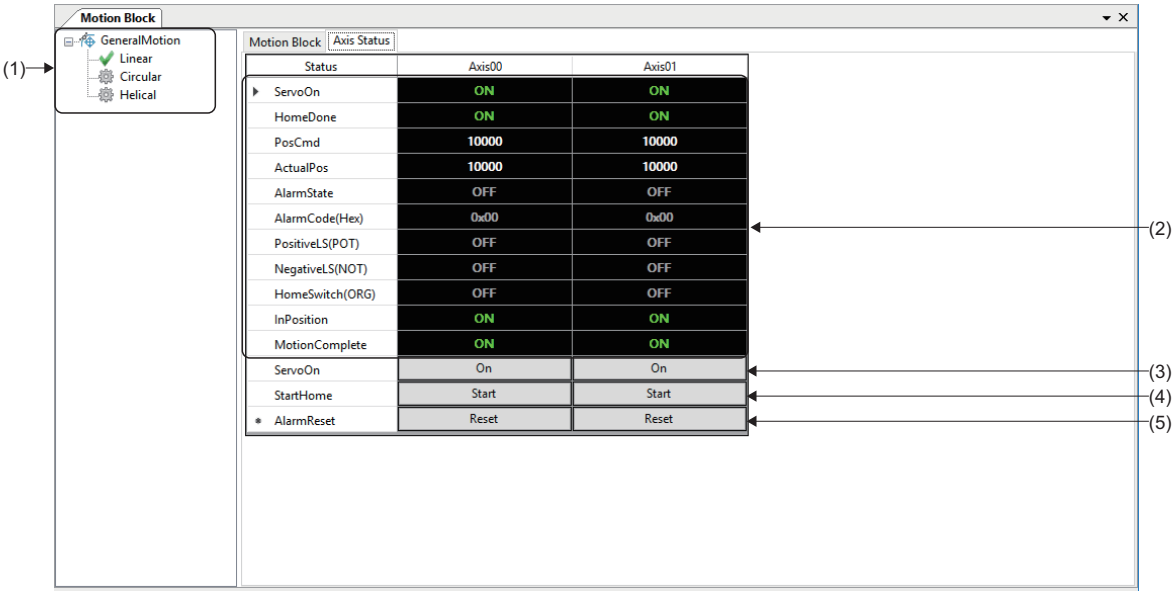
***7.*** When [Go to StartPos] is set to "True", the helical interpolation is started after each axis has moved to the position set in [Go to StartPos] and the standby time set in [StartDelay[ms]] has elapsed.

# Interpolation axis status

The axis statuses during the interpolation control are monitored.

## Window

Navigation window ⇨ [SWMOS] ⇨ [Motion] ⇨ [MotionBlock] ⇨ [Axis Status] tab




## Displayed items

| Item | Description |
|---|---|
| (1) Interpolation type tree | Select the interpolation control type.<br>• Linear<br>• Circular<br>• Helical |
| (2) Axis status | Displays the each axis status.<br>• ServoOn: Displays the servo ON/OFF status.<br>• HomeDone: Displays the home position return status.<br>• PosCmd: Displays the command position.<br>• ActualPos: Displays the feedback position.<br>• AlarmState: Displays the alarm occurrence status.<br>• AlarmCode(Hex): Displays the alarm code that has occurred in hexadecimal.<br>• PositiveLS(POT): Displays the status of the limit switch in the positive direction.<br>• NegativeLS(NOT): Displays the status of the limit switch in the negative direction.<br>• HomeSwitch(ORG): Displays the home switch status.<br>• InPosition: Displays the in-position status.<br>• MotionComplete: Displays the motion command completion status. |
| (3) [On] button | Performs servo ON/OFF for each axis. |
| (4) [Start] button | Performs home position return of each axis. |
| (5) [Reset] button | Resets alarms of each axis. |

# Gantry control

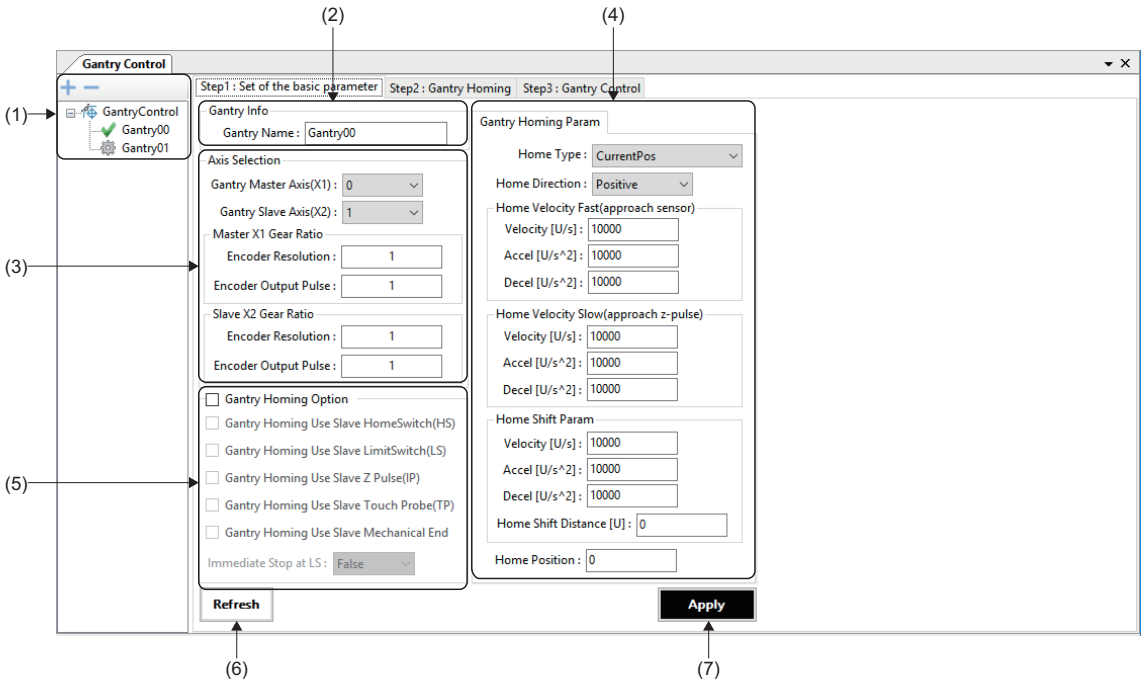
Test operations on the gantry control are performed.

## Gantry control setting

Set the parameters for gantry control.

### Window

Navigation window ⇨ [SWMOS] ⇨ [Motion] ⇨ [GantryControl] ⇨ [Step1: Set of the basic parameter] tab




### Displayed items

| Item | Description |
|---|---|
| (1) GantryControl tree | Select the gantry setting to be operated. Click the [+]/[-] button to add/delete the gantry setting.<br>• [+] button: Adds a new gantry setting. (Up to 30 settings)<br>• [-] button: Deletes the gantry setting displayed at the bottom of the tree. |
| (2) Gantry Info | Set the gantry setting name.<br>Click the [Apply] button to apply the name to the display of the GantryControl tree. |
| (3) Axis Selection | Set the axis number and gear ratio of the gantry axis.<br>• Gantry Master Axis(X1): Set the axis number (0 to 127) of the master axis.<br>• Gantry Slave Axis(X2): Set the axis number (0 to 127) of the slave axis.<br>• Master X1 Gear Ratio: Set the gear ratio of the master axis.<br>• Slave X2 Gear Ratio: Set the gear ratio of the slave axis. |
| (4) Gantry Homing Param | Set the home position return parameters of the master axis (X1).<br>■Home Type<br>Select the home type of the gantry home position return.<br>■Home Direction<br>Select the home position return direction.<br>• Positive: Positive direction<br>• Negative: Negative direction<br>■Home Velocity Fast(approach sensor)/Home Velocity Slow(approach z-pulse)<br>Set the speed [U/s], acceleration [U/s$^2$], and deceleration [U/s$^2$] of the high-speed home position return and low-speed home position return.<br>■Home Shift Param<br>Set the speed [U/s], acceleration [U/s$^2$], deceleration [U/s$^2$], and home shift distance [U] of the home shift.<br>■Home Position<br>Set the home position [user unit] to be set at the completion of the home position return.<br>*: For details of the home type, refer to "Gantry Homing Home Types" in the following manual.<br>SWM-G User Manual |

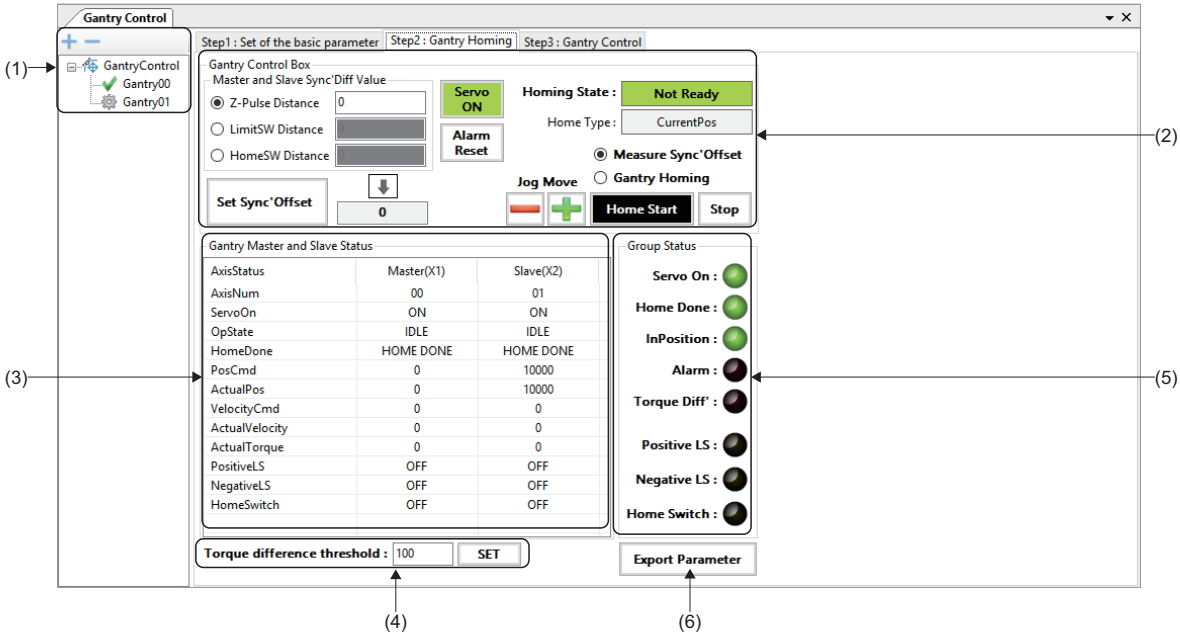
| Item | Description |
|---|---|
| (5) Gantry Homing Option | Selecting [Gantry Homing Option] enables setting the home position return option of the master axis (X1).<br>■Slave axis setting<br>Select a function to be used in the slave axis.<br>• Selected: Used in the slave axis<br>• Not selected: Not used in the slave axis<br>■Immediate Stop at LS<br>Set whether to enable/disable the immediate stop without decelerating the axis when reaching the limit switch is detected.<br>• False: Immediate stop disabled<br>• True: Immediate stop enabled |
| (6) [Refresh] button | Reads the parameters from the SWM-G engine and applies them to the screen. |
| (7) [Apply] button | Applies the parameters to the SWM-G engine. |

# Gantry home position return

The gantry home position return is performed.

## Window

Navigation window ⇨ [SWMOS] ⇨ [Motion] ⇨ [GantryControl] ⇨ [Step2: Gantry Homing] tab

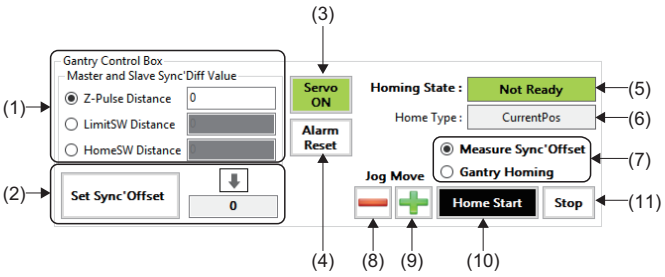



## Displayed items

| Item | Description |
|---|---|
| (1) GantryControl tree | Select the gantry setting to be operated. Click the [+]/[-] button to add/delete the gantry setting.<br>• [+] button: Adds a new gantry setting. (Up to 30 settings)<br>• [-] button: Deletes the gantry setting displayed at the bottom of the tree. |
| (2) Gantry Control Box | Displays each difference distance between the master axis and slave axis, and performs each control of the gantry home position return.<br>(☞ Page 139 Gantry home position return control) |
| (3) Gantry Master and Slave Status | Displays the statuses of the master axis and slave axis. |
| (4) Torque difference threshold | Set the torque difference check threshold between the master axis and slave axis in percentage.<br>Enter a value and click the [SET] button. |
| (5) Group Status | Displays the group status of the gantry control with lamps.<br>• Servo On: Servo ON status<br>• Home Done: Home position return completion status<br>• InPosition: In-position status<br>• Alarm: Servo alarm status<br>• Torque Diff': Torque difference status<br>• Positive LS: Positive direction limit switch status<br>• Negative LS: Negative direction limit switch status<br>• Home Switch: Home switch status |
| (6) [Export Parameter] button | Acquires the parameters from the SWM-G engine and saves them in a file. |

## ■ Gantry home position return control

### Window




### Displayed items

| Item | Description |
|---|---|
| (1) Master and Slave Sync'Diff Value | Displays the difference distance between the master axis and slave axis.<br>■Z-Pulse Distance<br>Displays the distance between the Z-phases of the master axis and slave axis. (Equivalent to the variable "distZPulseToMasterZPulse" [user unit])<br>■LimitSW Distance<br>Displays the distance between the limit switches of the master axis and slave axis. (Equivalent to the variable "distLSToMasterLS" [user unit])<br>■HomeSW Distance<br>Displays the distance between the home switches of the master axis and slave axis. (Equivalent to the variable "distHSToMasterHS" [user unit]) |
| (2) Home shift distance setting | Sets the home shift distance of the slave axis.<br>• [↓] button: Sets the selected difference distance as the setting value.<br>• [Set Sync'Offset] button: Sets the home shift distance of the slave axis. |
| (3) [Servo On] button | Switches servo ON/OFF.<br>Performing servo ON turns on this button in green.<br>*: When servo ON is performed, servo ON is performed for both the master axis and slave axis, and they automatically enter the synchronous control state. |
| (4) [Alarm Reset] button | Clears the alarm. |
| (5) Homing State | Displays the home position return status.<br>• Not Ready: Home position return not performed, slave axis synchronization cleared<br>• Ready: Home position return not performed<br>• Homing: Home position return in progress<br>• Home Done: Home position return complete |
| (6) Home Type | Displays the home type of the gantry home position return. |
| (7) Mode selection | Select the mode in which gantry home position return is performed.<br>• Measure Sync'Offset: For measuring the distance between signals<br>• Gantry Homing: Parallel compensation home position return by home shift |
| (8) [▬] button | Performs the JOG operation in the reverse direction (the command position is subtracted). |
| (9) [✚] button | Performs the JOG operation in the forward direction (the command position is added). |
| (10) [Home Start] button | Starts the gantry home position return. |
| (11) [Stop] button | Stops the gantry home position return. |

## Operating procedure

### ■ Measurement mode

Follow the procedure below to measure each difference distance between the master axis and slave axis (between Z-phases/ home switches/limit switches).

1. Adjust the parallelism of the gantry mechanism and click the [Servo On] button to perform servo ON.
2. Select [Measure Sync'Offset] and click the [Home Start] button to start the gantry home position return.
3. When the gantry home position return is completed, [Z-Pulse Distance]/[LimitSW Distance]/[HomeSW Distance] for each difference distance is updated according to the home position return method.
4. Select the difference distance to be set from [Z-Pulse Distance]/[LimitSW Distance]/[HomeSW Distance], and click the [↓] button to set it as the setting value.
5. Clicking the [Set Sync'Offset] button and setting the distance as the home shift distance of the slave axis eliminate the need for the parallelism adjustment for subsequent home position return and enable gantry home position return in "Gantry Homing".

### ■ Normal mode

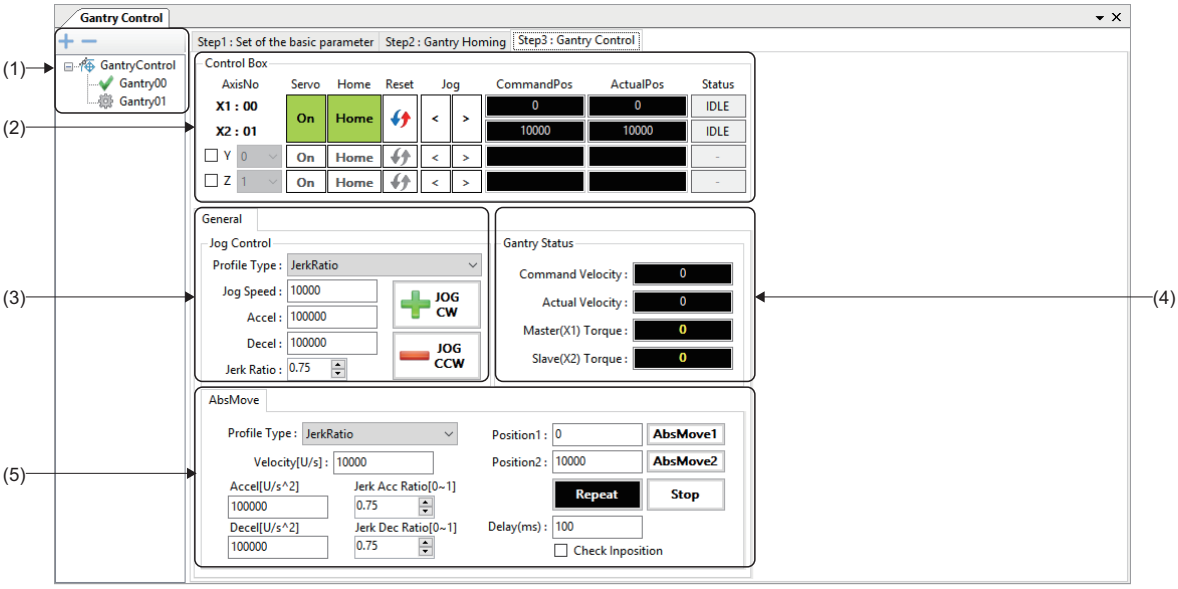
1. Click the [Servo On] button to perform servo ON. The parallelism adjustment is not necessary, however, check that the home shift distance of the slave axis (the value set in [Set Sync'Offset]) is set correctly.
2. Select [Gantry Homing] and click the [Home Start] button to start the gantry home position return.
3. When the gantry home position return is completed, the parallelism of the slave axis is automatically adjusted with the set home shift amount.

# Gantry operation

Test operations by the gantry control are performed.

## Window

Navigation window ⇨ [SWMOS] ⇨ [Motion] ⇨ [GantryControl] ⇨ [Step3: Gantry Control] tab

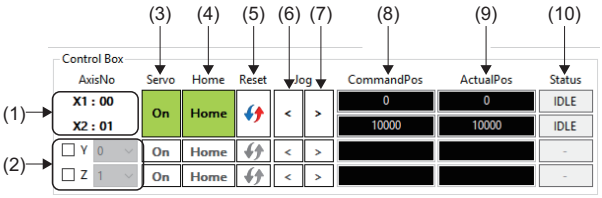



## Displayed items

| Item | Description |
|---|---|
| (1) GantryControl tree | Select the gantry setting to be operated. Click the [+]/[-] button to add/delete the gantry setting.<br>• [+] button: Adds a new gantry setting. (Up to 30 settings)<br>• [-] button: Deletes the gantry setting displayed at the bottom of the tree. |
| (2) Control Box | Displays the statuses of X1 (master axis) and X2 (slave axis) and performs the control.<br>In addition, the Y-axis and Z-axis that configure the gantry mechanism can be controlled. (☞ Page 142 Gantry axis control) |
| (3) Jog Control | The JOG operation of the gantry mechanism is performed. (☞ Page 143 JOG operation) |
| (4) Gantry Status | Monitors the speed and torque of the gantry axis.<br>• Command Velocity: Displays the command speed [U/s].<br>• Actual Velocity: Displays the feedback speed [U/s].<br>• Master(X1) Torque: Displays the feedback torque [%] of the master axis.<br>• Slave(X2) Torque: Displays the feedback torque [%] of the slave axis. |
| (5) AbsMove | The positioning operation of the gantry mechanism is performed. (☞ Page 144 Absolute position operation) |

## ■ Gantry axis control

### Window

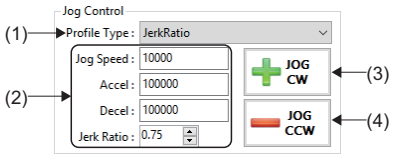



### Displayed items

| Item | Description |
|---|---|
| (1) AxisNo | Displays the axis numbers assigned to X1 (master axis) and X2 (slave axis) that are used in the gantry axis control. |
| (2) Y-axis/Z-axis | Selecting each item specifies the Y-axis or Z-axis.<br>Select the axes to be assigned to the Y-axis and Z-axis from the pull-down list. |
| (3) [On] button | Switches servo ON/OFF.<br>Performing servo ON turns on this button in green. |
| (4) [Home] button | Starts the gantry home position return.<br>This button turns green when the home position return is completed. |
| (5) [] button | Clears the alarm. |
| (6) [<] button | Performs the JOG operation in the reverse direction (the command position is subtracted). |
| (7) [>] button | Performs the JOG operation in the forward direction (the command position is added). |
| (8) CommandPos | Displays the command position [user unit]. |
| (9) ActualPos | Displays the feedback position [user unit]. |
| (10) Status | Displays the axis status.<br>• OFF: Servo OFF<br>• IDLE: Waiting<br>• JOG: JOG operation in progress<br>• HOME: Home position return in progress<br>• POS: Positioning operation in progress<br>• VELOCITY: Speed control in progress<br>• TRQ: Torque control in progress<br>• SYNC: Synchronous control in progress<br>• INTPL: Interpolation control in progress<br>• STOP: Stopped<br>• ALARM: Alarm occurring |

## ■ JOG operation

### Window



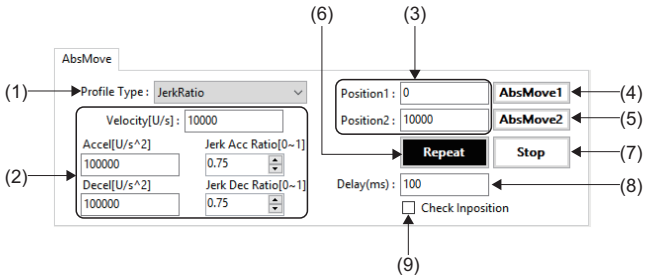

### Displayed items

| Item | Description |
|---|---|
| (1) ProfileType*1 | Select the acceleration/deceleration method used for the JOG operation of the gantry mechanism.<br>• Trapezoidal: Trapezoid<br>• SCurve: S-curve<br>• Jerk Ratio: Jerk ratio<br>• Parabolic: Parabolic<br>• Sin: Sine<br>• AdvancedS: Advanced-S<br>• TrapezoidalMAT: Trapezoidal moving average time |
| (2) JOG speed | Set the speed for JOG operation.<br>• Jog Speed: Set the JOG operation speed [U/s].<br>• Accel: Set the acceleration of the JOG operation [U/s$^2$].<br>• Decel: Set the deceleration of the JOG operation [U/s$^2$].<br>• Jerk Ratio: Set the jerk ratio (0 to 1.0) of the JOG operation. |
| (3) [JOG CW] button | Performs the JOG operation in the forward direction (the command position is added). |
| (4) [JOG CCW] button | Performs the JOG operation in the reverse direction (the command position is subtracted). |

*1 For details of the acceleration/deceleration method, refer to the following.
SWM-G User Manual

## ■ Absolute position operation

### Window




### Displayed items

| Item | Description |
|---|---|
| (1) ProfileType*1 | Select the acceleration/deceleration method used for the positioning operation of the gantry mechanism.<br>• Trapezoidal: Trapezoid<br>• SCurve: S-curve<br>• Jerk Ratio: Jerk ratio<br>• Parabolic: Parabolic<br>• Sin: Sine<br>• AdvancedS: Advanced-S<br>• TrapezoidalMAT: Trapezoidal moving average time |
| (2) Speed setting | • Velocity[U/s]: Set the target speed.<br>• Accel[U/s$^2$]: Set the acceleration.<br>• Decel[U/s$^2$]: Set the deceleration.<br>• Jerk Acc Ratio[0~1]: Set the acceleration jerk ratio.<br>• Jerk Dec Ratio[0~1]: Set the deceleration jerk ratio. |
| (3) Position1/Position2 | Set the target position of the absolute position positioning operation.<br>• Position1: Set the absolute position value for Position1.<br>• Position2: Set the absolute position value for Position2. |
| (4) [AbsMove1] button | Performs the absolute position positioning operation on the position set in Position1. |
| (5) [AbsMove2] button | Performs the absolute position positioning operation on the position set in Position2. |
| (6) [Repeat] button | Starts the reciprocating positioning operation with the values set in [Position1] and [Position2]. |
| (7) [Stop] button | Stops the positioning operation. |
| (8) Delay(ms) | Set the standby time [ms] after the positioning completion. |
| (9) Check Inposition | When this item is selected, the next positioning is started after the in-position is turned on. |

*1 For details of the acceleration/deceleration method, refer to the following.
SWM-G User Manual

# 4.6 I/O Control

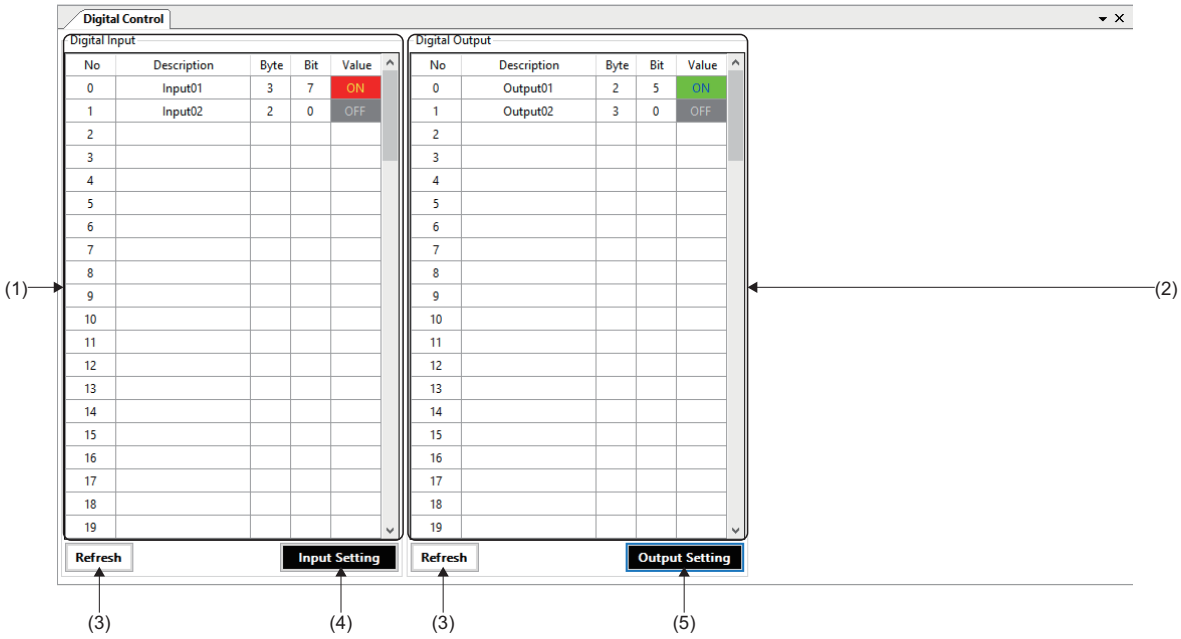
The I/O module is set and controlled.

## Digital I/O control

Set the name and start address of the digital I/O to perform I/O control.
It is used to check the signal status or perform an output test by registering the frequently-used digital I/O during the test operation.

### Window

Navigation window ⇨ [SWMOS] ⇨ [I/O] ⇨ [Digital Control]




### Displayed items

| Item | Description |
|---|---|
| (1) Digital Input | Displays the registered digital input signals. Digital input signals for up to 100 points can be registered.<br>■No<br>Displays the registration order of the digital input signals.<br>■Description<br>Displays the digital input signal names.<br>■Byte<br>Displays the input addresses.<br>• 0 to 7999<br>■Bit<br>Displays the input bits.<br>• 0 to 7<br>■Value<br>Displays the input statuses.<br>• ON : ON<br>• OFF : OFF |

| Item | Description |
|---|---|
| (2) Digital Output | Displays the registered digital output signals. Digital output signals for up to 100 points can be registered.<br>■No<br>Displays the registration order of the digital output signals.<br>■Description<br>Displays the digital output signal names.<br>■Byte<br>Displays the output addresses.<br>• 0 to 7999<br>■Bit<br>Displays the output bits.<br>• 0 to 7<br>■Value<br>Displays the input statuses. Click the button to switch the ON/OFF state.<br>• ON : ON<br>• OFF : OFF |
| (3) [Refresh] button | Reads the setting and apply it to the screen. |
| (4) [Input Setting] button<br>(5) [Output Setting] button | Click the [Input Setting] button or [Output Setting] button to display the "I/O Setting" screen.<br>Digital input signals and digital output signals are registered.<br>(☞ Page 146 Registration method of the digital I/O signal) |

## Registration method of the digital I/O signal

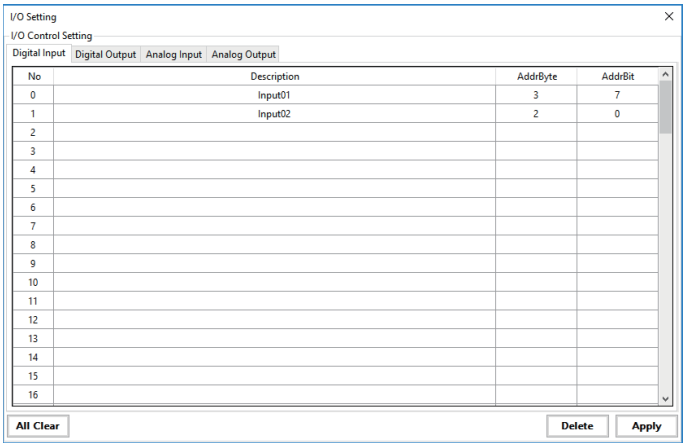
The following shows the procedure for registering digital input signals and digital output signals.

### Operating procedure

1. Click the [Input Setting] button or [Output Setting] button to display the "I/O Setting" screen.
2. Set "Description", "AddrByte", and "AddrBit" of the digital input signals and digital output signals to be registered.
   - Select the corresponding line and click the [Delete] button to delete the selected line.
   - Click the [All Clear] button to delete all the registered contents in the displayed tab.
3. When the setting is completed, click the [Apply] button to register.

Ex.

When registering bit 7 of the 3rd byte in the input address space as "Input01" and bit 0 of the 2nd byte as "Input02"




**Point**

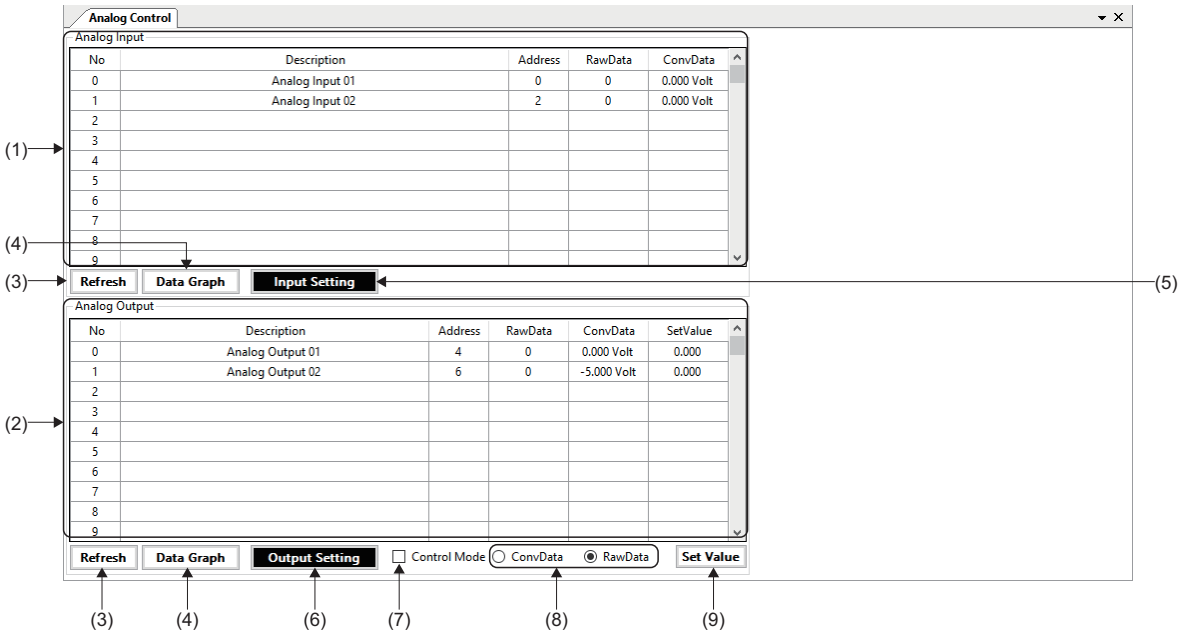
To delete the registered contents, click the [Delete] button or [All Clear] button.
Even if the signal name or address data is deleted with Delete and the [Apply] button is clicked, "0" is displayed in the address and bit fields of the digital input/digital output display area and the data is not deleted.

# Analog I/O control

Set the name and start address of the analog I/O to perform I/O control.
It is used to check the analog value or perform an output test by registering the frequently-used analog I/O during the test operation.

## Window

Navigation window ⇨ [SWMOS] ⇨ [I/O] ⇨ [AnalogControl]




## Displayed items

| Item | Description |
|---|---|
| (1) Analog Input | Displays the registered analog input signals. Analog input signals for up to 100 points can be registered.<br>■No<br>Displays the registration order of the analog input signals.<br>■Description<br>Displays the analog input signal names.<br>■Byte<br>Displays the input addresses.<br>• 0 to 7999<br>■RawData<br>Displays the analog input values (raw values).<br>■ConvData<br>Displays the converted input values. |
| (2) Analog Output | Displays the registered analog output signals. Analog output signals for up to 100 points can be registered.<br>■No<br>Displays the registration order of the analog output signals.<br>■Description<br>Displays the analog output signal names.<br>■Byte<br>Displays the output addresses.<br>• 0 to 7999<br>■RawData<br>Displays the analog output values (raw values).<br>• 0 to 7<br>■ConvData<br>Displays the converted output values.<br>■SetValue<br>Displays the analog output setting values. |
| (3) [Refresh] button | Reads the setting and apply it to the screen. |
| (4) [Data Graph] button | Displays the "Analog User Interface" screen.<br>An analog input signal or analog output signal is displayed in a graph.<br>(☞ Page 149 Analog graph display) |

| Item | Description |
|---|---|
| (5) [Input Setting] button | Click the [Input Setting] button or [Output Setting] button to display the "I/O Setting" screen.<br>Digital input signals and digital output signals are registered.<br>(☞ Page 148 Registration method of the analog I/O signal) |
| (6) [Output Setting] button | |
| (7) Control Mode | When this item is selected, the analog output value setting mode is enabled and [SetValue] becomes settable.<br>If it becomes settable, the cell is displayed in yellow. |
| (8) ConvData/RawData | Select whether to set the value in [SetValue] as "ConvData" or "RawData". |
| (9) [Set Value] button | Sets the value in [SetValue] as the analog output value. |

## Registration method of the analog I/O signal

The following shows the procedure for registering analog input signals and analog output signals.

### Operating procedure

1. Click the [Input Setting] button or [Output Setting] button to display the "I/O Setting" screen.
2. Set "Description", "StartAddrByte", "RawDataMin", "RawDataMax", and "ConvDataRange" for the analog input signals and analog output signals to be registered.

- Select the corresponding line and click the [Delete] button to delete the selected line.
- Click the [All Clear] button to delete all the registered contents in the displayed tab.
- The access size (1 byte/2 bytes/4 bytes) is automatically determined according to the setting of "RawDataMin" and "RawDataMax".

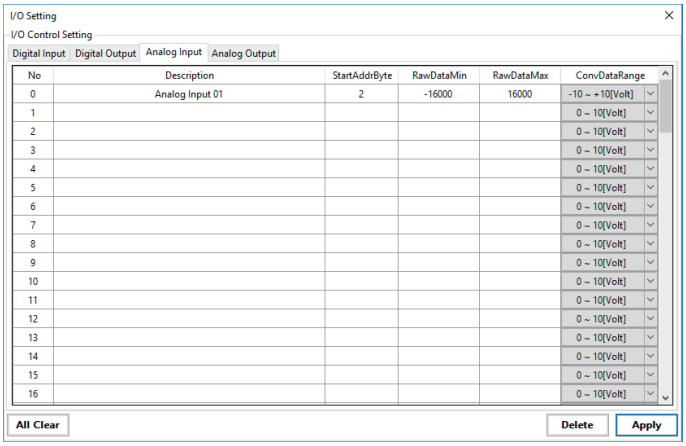
| Setting value | | I/O value | |
|---|---|---|---|
| Max. value - Min. value | Min. value | Access size | I/O value range |
| 255 or less | Less than 0 | Signed 1-byte | -128 to 127 |
| | 0 or more | Unsigned 1-byte | 0 to 255 |
| 256 to 65535 | Less than 0 | Signed 2-byte | -32768 to 32767 |
| | 0 or more | Unsigned 2-byte | 0 to 65535 |
| 65536 or more | Less than 0 | Signed 4-byte | -2147483648 to 2147483647 |

3. When the setting is completed, click the [Apply] button to register.

**Ex.**

When registering signals with the following settings

- Register a few bytes of the input address space as a 16-bit analog input "Analog Input 01".
- Convert the analog input range "-10 to +10[Volt]" as "-16000 to +16000".




**Point**

To delete the registered contents, click the [Delete] button or [All Clear] button.
Even if the signal name or address data is deleted with [Delete] and the [Apply] button is clicked, "0" is displayed in the address and bit fields of the analog input/analog output display area and the data is not deleted.

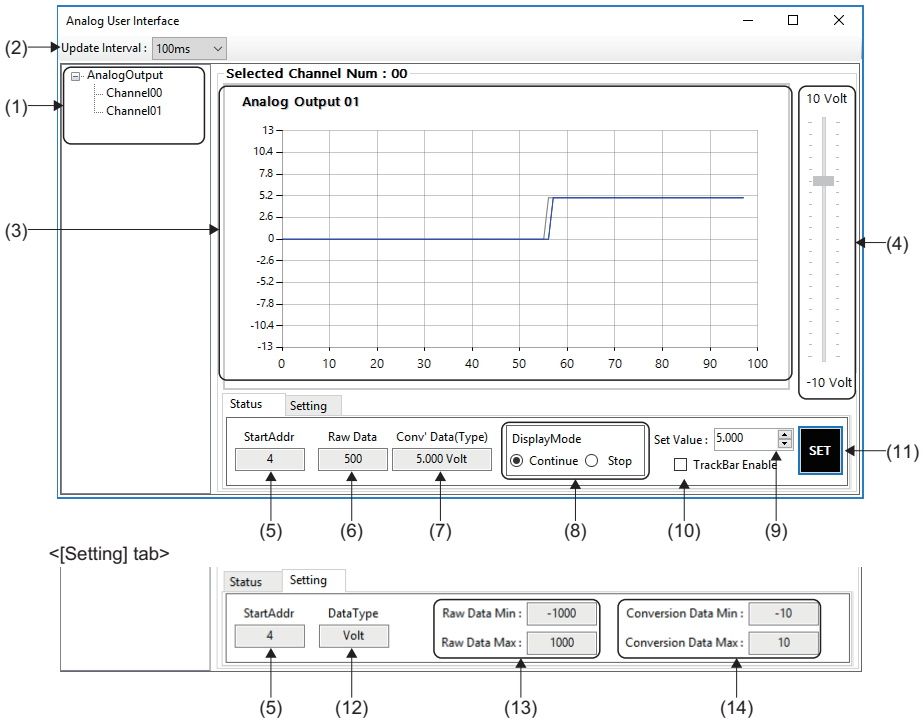
## Analog graph display

An analog input signal or analog output signal is displayed in a graph.

Select a signal (Channel00 to Channel99) to be displayed in the graph to start graph display.

In the analog output graph display, the converted output value can be output in [Setting] as test output.

### Window




<[Setting] tab>




### Displayed items

| Item | Description |
|---|---|
| (1) Signal selection tree | Select the signal to be displayed in the graph. |
| (2) Update Interval | Select the graph update interval from the pull-down list.<br>10ms, 20ms, 50ms, 100ms, 200ms, 500ms, 1000ms |
| (3) Graph display | Displays the graph of the selected signal.<br>• Horizontal axis: Updated count<br>• Vertical axis: Converted analog value |
| (4) Trackbar*1 | The output value can be changed by using the trackbar.<br>To enable the trackbar, select [TrackBar Enable]. |
| (5) StartAddr | Displays the input address or output address. |
| (6) Raw Data | Displays the analog value (raw value). |
| (7) Conv' Data(Type) | Displays the converted analog value. |
| (8) DisplayMode | Select the graph display mode.<br>• Continue: Plotting execution<br>• Stop: Plotting stopped |
| (9) Set Value*1 | Set the analog output value (converted value). |
| (10) TrackBar Enable*1 | When this item is selected, the trackbar is enabled. |
| (11) [SET] button*1 | Changes the output value (converted value) to the value set in [Set Value]. |
| (12) DataType | Displays the unit after conversion. |
| (13) Raw Data Min/Raw Data Max | Displays the minimum value and maximum value of the analog value (raw value). |
| (14) Conversion Data Min/Conversion Data Max | Displays the minimum value and maximum value of the converted analog value. |

*1 For analog output signal only

# 4.7 Axis Control (PM Motion)

The single-axis control of the axis (profile mode) is performed.

To perform control in the axis control (PM motion), select [SWMOS] ⇨ [System] ⇨ [Engine] in the navigation window, select [Add PMMotion] in [Module Setting] in the [Module Setting] tab, and add a PM motion module. For details of the setting method, refer to the following.

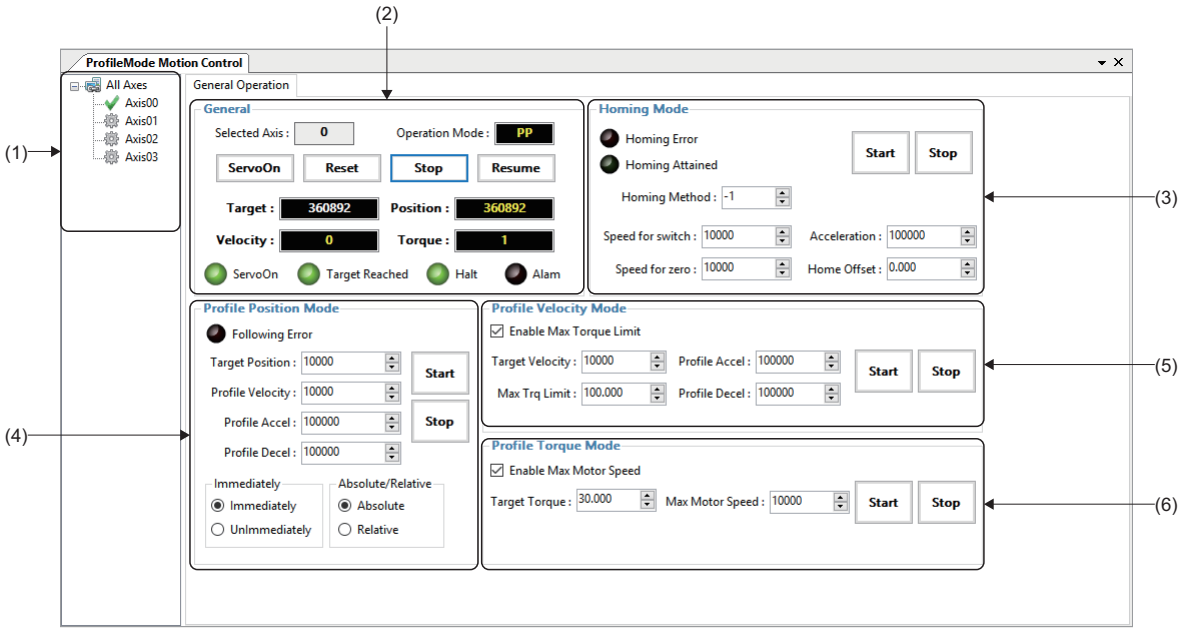
☞ Page 208 PM Motion Function

## PM motion axis control

The PM motion axis control is tested.

### Window

Navigation window ⇨ [SWMOS] ⇨ [Motor(ProfilePos)] ⇨ [DriveControl]



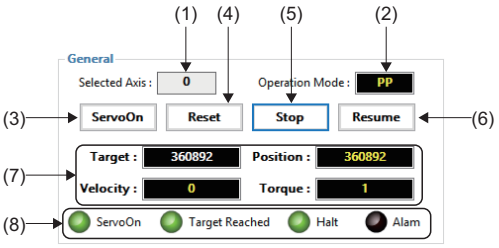

### Displayed items

| Item | Description |
|---|---|
| (1) Axis tree | Select the axis for which the test operation is performed. |
| (2) General | Displays the axis position and status.<br>Servo ON/OFF, alarm reset, and operation stop/resume are performed.<br>(☞ Page 151 Axis status) |
| (3) Homing Mode | The home position return is performed. (☞ Page 152 Home position return mode) |
| (4) Profile Position Mode | The positioning operation is performed. (☞ Page 153 Profile position mode) |
| (5) Profile Velocity Mode | The speed control is performed. (☞ Page 153 Profile speed mode) |
| (6) Profile Torque Mode | The torque control is performed. (☞ Page 154 Profile torque mode) |

## ■ Axis status

The current position and axis status are checked, servo ON/OFF, home position return, stop, and alarm reset are performed, and synchronous setting is configured.

### Window



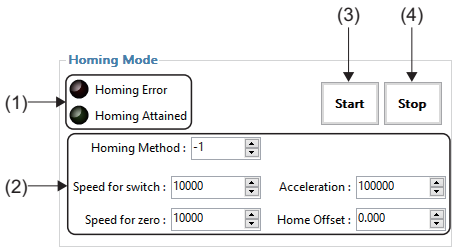

### Displayed items

| Item | Description |
|---|---|
| (1) Selected Axis | Displays the axis number of the PM motion axis. |
| (2) Operation Mode | Displays the control mode. |
| (3) [ServoOn] button | Switches servo ON/OFF. |
| (4) [Reset] button | Resets the alarm. |
| (5) [Stop] button | Stops the operation. |
| (6) [Resume] button | Resumes the operation. |
| (7) Axis status | Displays the axis status.<br>• Target: Displays the target position.<br>• Position: Displays the current position.<br>• Velocity: Displays the speed.<br>• Torque: Displays the toque. |
| (8) Axis control status | Displays the axis control status with lamps.<br>• ServoOn: In servo ON<br>• Target Reached: The target position reached<br>• Halt: Stopped<br>• Alarm: Alarm occurring |

## ■ Home position return mode

The home position return operation is performed.

### Window



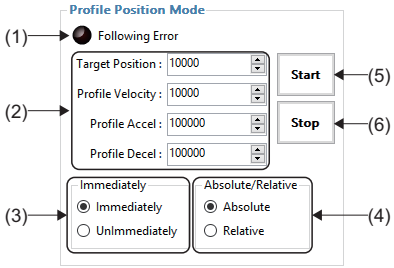

### Displayed items

| Item | Description |
|---|---|
| (1) Home position return status | Displays the home position return status with lamps.<br>• Homing Error: Home position return failure<br>• Homing Attained: Home position return complete |
| (2) Home position return parameter | Set the home position return parameters.<br>• Homing Method: Home position return method<br>• Speed for switch: Speed for switch detection<br>• Speed for zero: Speed for zero position detection<br>• Acceleration: Acceleration/deceleration time constant for home position return<br>• Home Offset: Home position return offset value |
| (3) [Start] button | Starts the home position return. |
| (4) [Stop] button | Stops the home position return. |

## ■ Profile position mode

The operation to the set position is performed in the position mode.

### Window



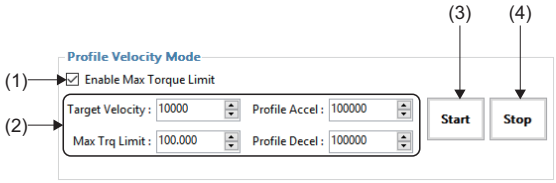

### Displayed items

| Item | Description |
|---|---|
| (1) Axis status | Displays the following error status with a lamp.<br>• : Error not occurred<br>• : Error occurred |
| (2) Target position control | Set the command position, speed, and acceleration/deceleration.<br>• Target Position: Set the command position.<br>• Profile Velocity: Set the speed.<br>• Profile Accel: Set the acceleration.<br>• Profile Decel: Set the deceleration. |
| (3) Command change | Set the change method of the position command.<br>• Immediately: The position command is immediately executed. When the axis is executing another position command, the position command is overwritten.<br>• UnImmediately: The position command is executed after the position command which is currently being executed is completed. |
| (4) Absolute position/relative position | Select the absolute position command or relative position command.<br>• Absolute: The axis operates with the absolute position command.<br>• Relative: The axis operates with the relative position command. |
| (5) [Start] button | Starts the positioning operation. |
| (6) [Stop] button | Stops the positioning operation. |

## ■ Profile speed mode

The operation to the set position is performed in the speed mode.

### Window



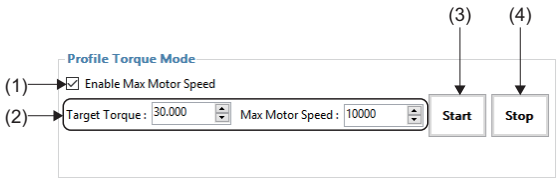

### Displayed items

| Item | Description |
|---|---|
| (1) Torque limit value specification | Set whether to use the maximum torque limit value.<br>• Selected: The maximum torque limit value is used.<br>• Not selected: The maximum torque limit value is not used. |
| (2) Speed control parameter | Set the command speed.<br>• Target Velocity: Set the command speed.<br>• Max Trq Limit: Set the maximum torque limit value.<br>• Profile Accel: Set the acceleration.<br>• Profile Decel: Set the deceleration. |
| (3) [Start] button | Starts the speed control. |
| (4) [Stop] button | Stops the speed control. |

## ■ Profile torque mode

The operation to the set position is performed in the torque mode.

### Window




### Displayed items

| Item | Description |
|---|---|
| (1) Motor speed specification | Set whether to use the maximum motor speed.<br>• Selected: The maximum motor speed is used.<br>• Not selected: The maximum motor speed is not used. |
| (2) Torque control parameter | Set the command torque.<br>• Target Torque: Set the command torque.<br>• Max Motor Velocity: Set the maximum motor speed. |
| (3) [Start] button | Starts the torque control. |
| (4) [Stop] button | Stops the torque control. |

# PART 2 BASICS OF WAVEFORM DATA COLLETION/ ANALYSIS TOOL

This part describes the basic operation of the waveform data collection/analysis tool.

# 5 DATA LOGGING FUNCTION

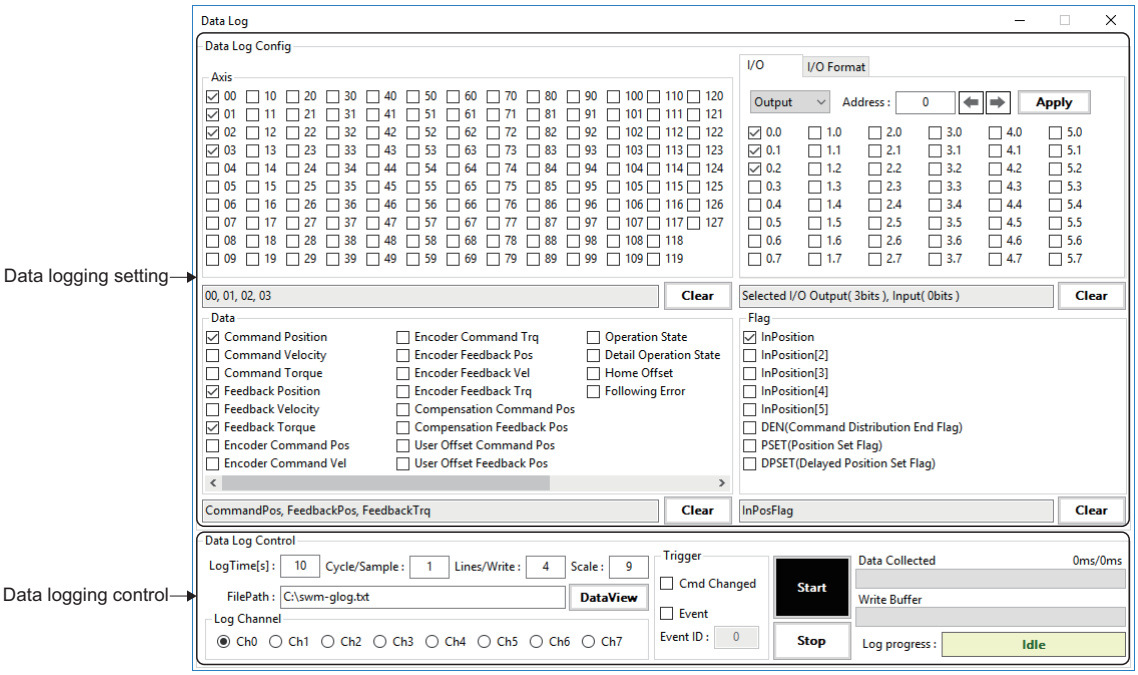
By using the data logging function of SWM-G, the collected data can be set and controlled easily.
The collected log data is saved in a log file. The log file can be displayed in a table format to check the data.

## 5.1 Data Log Collection

By using the data logging function of SWM-G, log files are generated.

### Window

[Analyzer] ⇨ [DataLog] ( )



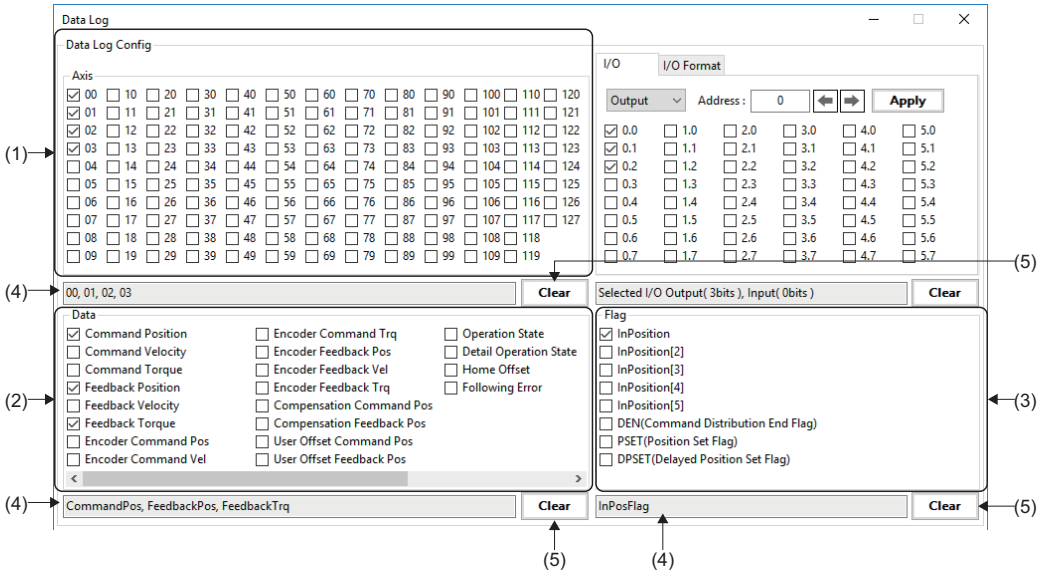
# Data log collection setting

Set the data items to be collected.

## ■ Axis data setting

### Window

[Analyzer] ⇨ [DataLog] ( )




### Displayed items

| Item | Description |
|---|---|
| (1) Axis | Set the target axes from which the data logs are to be collected. The selected items are displayed in the selected item display column.<br>• 00 to 127: Axis 0 to 127 |
| (2) Data*1 | Set the axis data items from which the data logs are to be collected. The selected items are displayed in the selected item display column.<br>• Command Position: Command position<br>• Command Velocity: Command speed<br>• Command Torque: Command torque<br>• Feedback Position: Feedback position<br>• Feedback Velocity: Feedback speed<br>• Feedback Torque: Feedback torque<br>• Encoder Command Pos: Encoder command position<br>• Encoder Command Vel: Encoder command speed<br>• Encoder Command Trq: Encoder command torque<br>• Encoder Feedback Pos: Encoder feedback position<br>• Encoder Feedback Vel: Encoder feedback speed<br>• Encoder Feedback Trq: Encoder feedback torque<br>• Compensation Command Pos: Command position after applying compensation offset<br>• Compensation Feedback Pos: Feedback position after applying compensation offset<br>• User Offset Command Pos: Command position after applying user offset<br>• User Offset Feedback Pos: Axis feedback position after applying user offset<br>• Operation State: Axis status<br>• Detail Operation State: Detailed axis status<br>• Home Offset: Home offset<br>• Following Error: Following error |
| (3) Flag*1 | Set the axis status items (bit data) from which the data logs are to be collected. The selected items are displayed in the selected item display column.<br>• InPosition: In-position<br>• InPosition[2]: In-position 2<br>• InPosition[3]: In-position 3<br>• InPosition[4]: In-position 4<br>• InPosition[5]: In-position 5<br>• DEN(Command Distribution End Flag): The position command reaches the target position.<br>• PSET(Position Set Flag): The feedback position reaches the target range.<br>• DPSET(Delayed Position Set Flag): The feedback position is held within the target range for the specified time. |

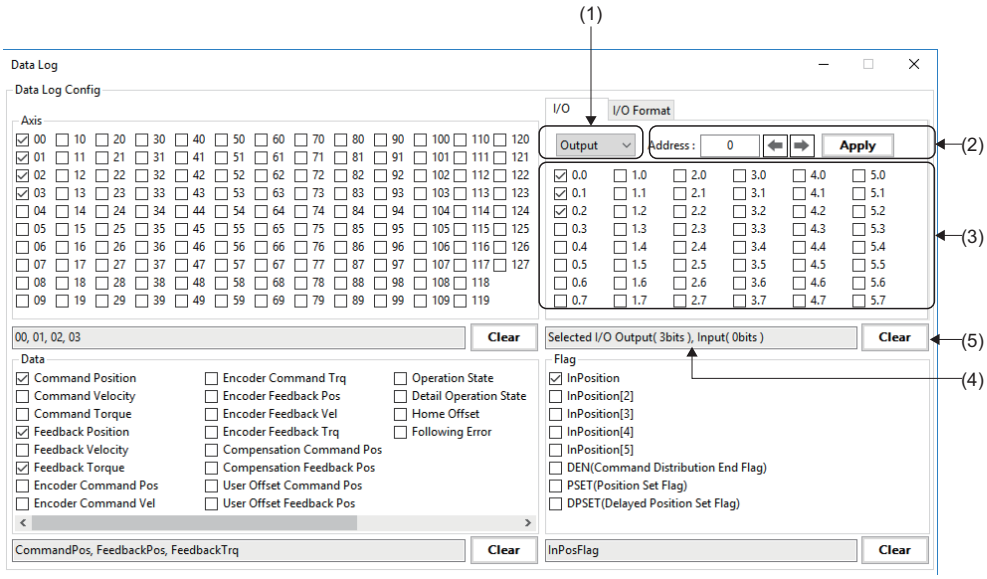
| Item | Description |
|---|---|
| (4) Selected item display column | The items selected in "Axis", "Data", and "Flag" are displayed. |
| (5) [Clear] button | Used to deselect all the items selected in each section.<br>Click the [Clear] buttons in "Axis", "Data", and "Flag" to deselect the items. |

*1 For details of each item, refer to the following.
SWM-G User Manual

## ■ I/O bit setting

### Window

[Analyzer] ⇨ [DataLog] ( ) ⇨ [I/O] tab



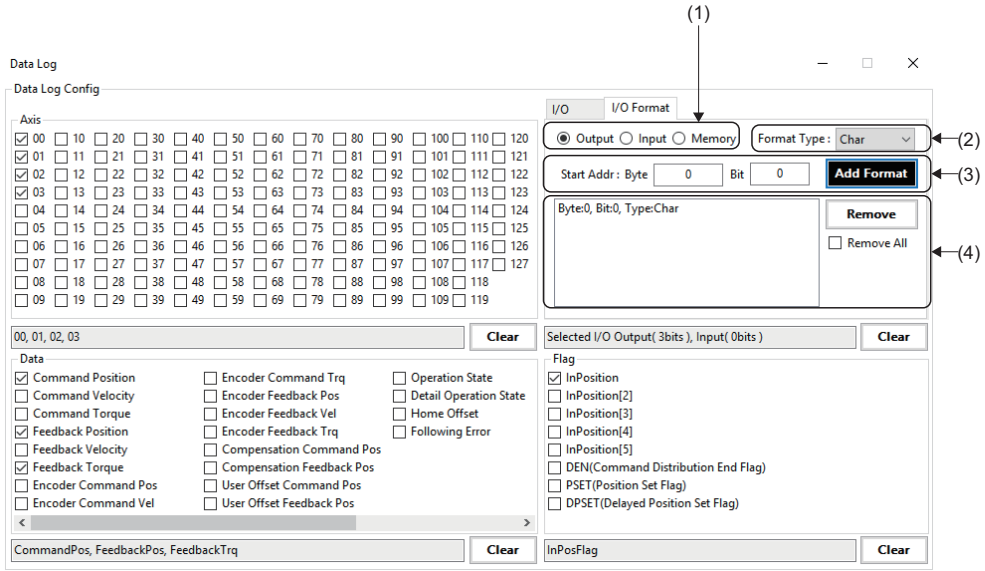

### Displayed items

| Item | Description |
|---|---|
| (1) I/O setting | Set the address I/O.<br>• Output: Output<br>• Input: Input |
| (2) Address setting | Set the address to be displayed in the I/O selection area.<br>Enter the address in the address entry column, and click the [Apply] button or click the [←]/[→] button to switch the display.<br>• Address setting range: 0 to 7999<br>• [←] button: Used to switch the display to the address 6 bytes before.<br>• [→] button: Used to switch the display to the address 6 bytes after.<br>• [Apply] button: Used to display the address entered in the address entry column in the I/O selection area. |
| (3) I/O selection area | Set the I/O bits from which the data logs are to be collected.<br>The selected items are displayed in the selected item display column. |
| (4) Selected item display column | Displays the number of I/O bits selected in the I/O selection area. |
| (5) [Clear] button | Used to deselect all the items selected in the I/O selection area.<br>Click the [Clear] button to deselect the items. |

## ■ I/O bit arbitrary data setting

### Window

[Analyzer] ⇨ [DataLog] ( ) ⇨ [I/O Format] tab




### Displayed items

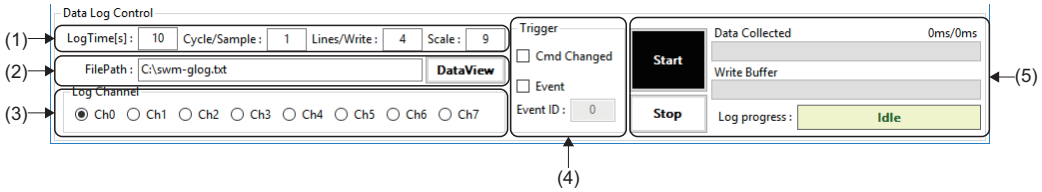
| Item | Description |
|---|---|
| (1) I/O setting | Select "Output"/"Input"/"Memory" of the address.<br>• Output: Output<br>• Input: Input<br>• Memory: User memory |
| (2) Data format setting*1 | Set the address data format.<br>• Char: Signed 1-byte<br>• Uchar: Unsigned 1-byte<br>• Short: Signed 2-byte<br>• Ushort: Unsigned 2-byte<br>• Int: Signed 4-byte<br>• Uint: Unsigned 4-byte<br>• Long: Signed 4-byte<br>• Ulong: Unsigned 4-byte<br>• Float: 4-byte floating point number<br>• Double: 8-byte floating point number |
| (3) Address setting | Set the address to be displayed in the collected data list.<br>Enter values in Byte (start address) and Bit (start bit), and click the [Add Format] button.<br>• Byte setting range: 0 to 7999<br>• Bit setting range: 0 to 7 |
| (4) Collected data list | Displays the data from which the data logs are to be collected for each of "Output", "Input", and "Memory".<br>Select "Output", "Input", or "Memory" in the I/O setting to switch the display.<br>Select data displayed in the collected data list, and click the [Remove] button to delete it from the list.<br>Select [Remove All], and click the [Remove] button to delete all the data displayed in the collected data list. |

*1 For details of the data format, refer to the following.
SWM-G User Manual

## Data log collection control

Set the data log collection conditions to start/stop the data log collection.

### Window




### Displayed items

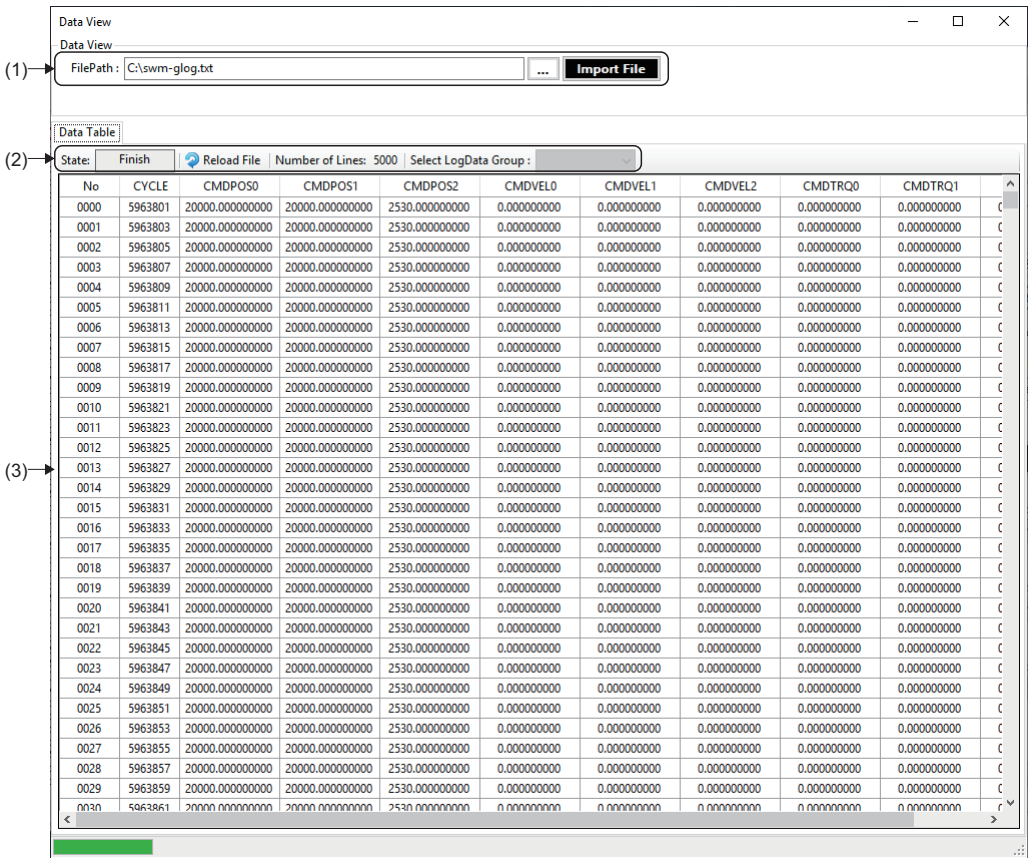
| Item | Description |
|---|---|
| (1) Data log collection condition | Set the data collection conditions of the data log.<br>• LogTime: Set the time (second) at which the log data is to be collected.<br>• Cycle/Sample: Set the interval (communication cycle) at which the log data is to be collected.<br>• Lines/Write: Set the writing frequency (number of lines per writing) of the log file.<br>• Scale: Set the number of decimal places (0 to 9) of the floating point data at the time of log output. |
| (2) FilePath | Specify the log file name with the absolute path.<br>Click the [DataView] button to display the "Data View" screen. (☞ Page 161 Data Log Display) |
| (3) Log Channel | Select the log channel to be used. |
| (4) Trigger | Select the trigger condition for starting data logging. When selecting "Event", enter "Event ID".<br>• Cmd Changed: Starts data logging along with the command value change of the axis from which the data log is to be collected.<br>• Event: Starts data logging at the completion of the event condition for the set [Event ID]. |
| (5) Data logging start/stop | Starts/stops the data log collection.<br>• [Start] button: Used to start the data log collection.<br>• [Stop] button: Used to stop the data log collection.<br>• Data Collected: Displays the data logging progress.<br>• Write Buffer: Displays the written buffer usage.<br>• Log progress: Displays the log operation status (Idle (standby)/Running (data collection in progress)/Finished (collection completed)). |

# 5.2 Data Log Display

The log file generated with the data log collection function of SWM-G is displayed in a table format.

## Window

[Analyzer] ⇨ [DataView] ( )




## Displayed items

| Item | Description |
|---|---|
| (1) FilePath | Reads the specified log file.<br>Enter the log file name with the absolute path and click the [Import File] button to read the log file.<br>Click the [...] button to display the "Open" screen and set the log file to be read. |
| (2) Log data information | Displays the log data status.<br>• State: Displays the log data reading status (Idle (standby)/Reading (reading)/Finish (reading completed)).<br>• [Reload File] button: Reads the log file again.<br>• Number of Lines: Displays the number of all the lines in the log data.<br>• Select LogData Group: Switches the display range of the log data that is divided and displayed every 20 lines.<br>Select the range of the lines to be displayed from the pull-down list. |
| (3) Data list | Reads the data selected in the "Data Log" screen and displays the log data.<br>For the log data to be displayed, refer to the following.<br>☞ Page 162 Log file format |

**Point**

If the log file size is large, the "Reading" state (file reading state) may continue for a while.

## ■ Log file format

The columns in the log file are arranged in the order shown in the table below. For details of each data, refer to the following.

📖SWM-G User Manual

| Order | Character string*1 | Description | Axis data/axis status item |
|---|---|---|---|
| 1 | CYCLE | Number of cycles | — |
| 2 | CMDPOS[0 to 127] | Command position | Command Position |
| 3 | FBPOS[0 to 127] | Feedback position | Feedback Position |
| 4 | CMPCMDPOS[0 to 127] | Command position after applying compensation offset | Compensation Command Pos |
| 5 | CMPFBPOS[0 to 127] | Feedback position after applying compensation offset | Compensation Feedback Pos |
| 6 | ENCCMDPOS[0 to 127] | Encoder command position | Encoder Command Pos |
| 7 | ENCFBPOS[0 to 127] | Encoder current feedback position | Encoder Feedback Pos |
| 8 | CMDVEL[0 to 127] | Command speed | Command Velocity |
| 9 | FBVEL[0 to 127] | Feedback speed | Feedback Velocity |
| 10 | ENCCMDVEL[0 to 127] | Encoder command speed | Encoder Command Vel |
| 11 | ENCFVVEL[0 to 127] | Encoder feedback speed | Encoder Feedback Vel |
| 12 | CMDTRQ[0 to 127] | Command torque | Command Torque |
| 13 | FBTRQ[0 to 127] | Feedback torque | Feedback Torque |
| 14 | ENCCMDTRQ[0 to 127] | Encoder command torque | Encoder Command Trq |
| 15 | ENCFBTRQ[0 to 127] | Encoder feedback torque | Encoder Feedback Trq |
| 16 | FOLERR[0 to 127] | Following error | Following Error |
| 17 | HOMEOFFSET[0 to 127] | Home offset | Home Offset |
| 18 | INPOSITION[0 to 127] | In-position | InPosition |
| 19 | DEN[0 to 127] | The position command reaches the target position. | DEN(Command Distribution End Flag) |
| 20 | PSET[0 to 127] | The feedback position reaches the target range. | PSET(Position Set Flag) |
| 21 | DPSET[0 to 127] | The feedback position is held within the target range for the specified time. | DPSET(Delayed Position Set Flag) |
| 22 | INPOS(2)[0 to 127] | In-position 2 | InPosition[2] |
| 23 | INPOS(3)[0 to 127] | In-position 3 | InPosition[3] |
| 24 | INPOS(4)[0 to 127] | In-position 4 | InPosition[4] |
| 25 | INPOS(5)[0 to 127] | In-position 5 | InPosition[5] |
| 26 | OPSTATE[0 to 127] | Axis status | Operation State |
| 27 | D.OPSTATE[0 to 127] | Detailed axis status | Detail Operation State |
| 28 | UOCMDPOS[0 to 127] | Command position after applying user offset | User Offset Command Pos |
| 29 | UOFBPOS[0 to 127] | Axis feedback position after applying user offset | User Offset Feedback Pos |
| 30 | out_[0 to 7999].[0 to 7] | Output bit | — |
| 31 | in_[0 to 7999].[0 to 7] | Input bit | — |
| 32 | out_[type][0 to 7999].[0 to 7] | Output bit | — |
| 33 | in_[type][0 to 7999].[0 to 7] | Input bit | — |
| 34 | m_[type][0 to 7999].[0 to 7] | User memory data | — |

*1 The value in brackets in the character string indicates the following.
- [0 to 127]: Axis number
- [0 to 7999]: Address
- [0 to 7]: Bit
- [Type]: Data format

# PART 3 BASICS OF MOTION SCOPE

This part describes the screen configuration and basic operation of Motion Scope.

# 6 SCREEN CONFIGURATON AND BASIC OPERATION

This chapter describes the screen configuration and basic operation of Motion Scope.

## 6.1 Motion Scope Function

Motion Scope is a tool that displays axis commands and feedback waveform patterns, performs analysis using digital I/O waveform patterns, and performs analysis using 2D displays.

## 6.2 Start and End

The following describes how to start/end Motion Scope.

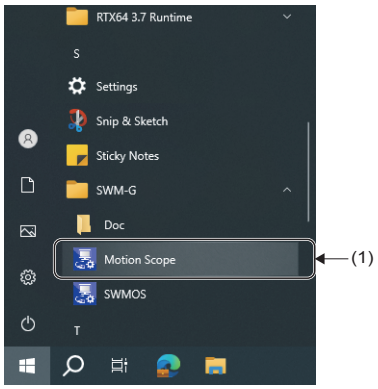
### Start

#### Operating procedure

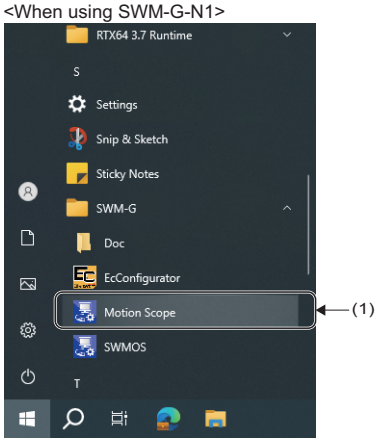
**■ Starting from the start menu**

Select [SWM-G] ⇨ [Motion Scope] (1) from the Windows start menu.

<When using SWM-G>

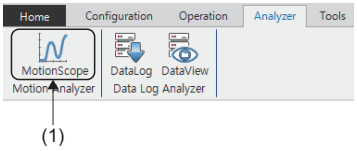



<When using SWM-G-N1>




**■ Starting from the SWMOS ribbon**

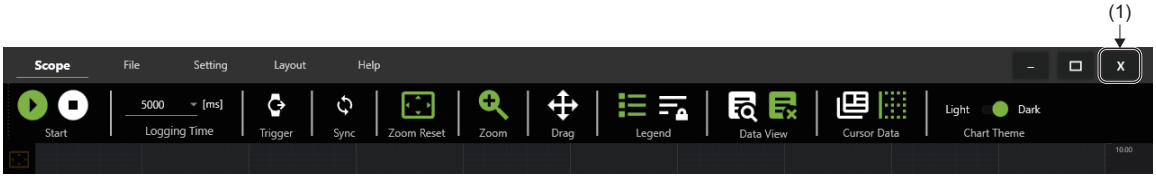
Click ⇨ [Analyzer] ⇨ [MotionScope]( ) (1) from the SWMOS ribbon.




### End

#### Operating procedure

Click the [×] button (1) at the top right of the Motion Scope screen.



# 6.3 Screen Configuration

This section describes the screen configuration when Motion Scope is started.

## Overall screen

The following shows the overall screen configuration.

### Window


### Displayed items

| Name | Description |
|---|---|
| (1) Ribbon | The tab is switched to perform operations such as the scope, files, settings, and layout. (☞ Page 169 FUNCTION OF RIBBON) |
| (2) Side toolbar | Displays the tool for chart analysis.<br>This toolbar is used to operate the zoom, drag, legend, data view, and cursor. (☞ Page 166 Side toolbar) |
| (3) Chart display area | The area that displays the chart.<br>A maximum of four charts can be displayed in this area.<br>The scale values of the horizontal axis (X-axis) and vertical axis (Y-axis) are shown below.<br>• Horizontal axis: Time passed since logging started [ms]<br>• Vertical axis : position [user units], speed [U/s], torque [%] |
| (4) Status bar | Displays the current status of logging.<br>• Idle: Logging has stopped<br>• Running: Collecting logging data<br>• Waiting Trigger: Collecting trigger condition logging data |

# Side toolbar

The side toolbar operates the zoom, drag, legend, data view, and cursor for each chart.
The side toolbar is displayed for each chart displayed under [Layout] on the ribbon ⇨ [0 1 2 3].
The operations on the side toolbar work in the same way as those on [Scope] on the ribbon.

## Window

## Displayed items

| Item | | Description | Reference |
|---|---|---|---|
| Zoom reset | | Restores the initial state to display the entire chart when the chart display is zoomed in or moved.<br>*: This function is the same as [Layout] on the ribbon ⇨ [ ] | ☞ Page 176 Zoom mode |
| Zoom | | Zooms in on the range of the chart selected by dragging the mouse.<br>*: This function is the same as [Layout] on the ribbon ⇨ [ ] | |
| Drag | | Moves the chart display in the direction where the mouse has been dragged while maintaining the ratio of the X-axis and Y-axis.<br>*: This function is the same as [Layout] on the ribbon ⇨ [ ] | ☞ Page 177 Drag mode |
| Legend | | Displays the legend of the data item in the chart display area.<br>*: This function is the same as [Layout] on the ribbon ⇨ [ ] | ☞ Page 178 Legend |
| Data View | | Displays the information of the cursor position and the data item in a list.<br>*: This function is the same as [Layout] on the ribbon ⇨ [ ] | ☞ Page 180 Data view |
| Cursor Data | | Displays the information of the X-axis and Y-axis data of the mouse position on the chart.<br>*: This function is the same as [Layout] on the ribbon ⇨ [ ] | ☞ Page 182 Cursor tag |
| Drag (Y-axis) | | Moves the chart display up/down by dragging the mouse on the position of the Y-axis. | ☞ Page 167 Drag (Y-axis) |
| Y-Axis Zero Position | | Displays the zero point of the Y-axis at the center of the chart display area. | ☞ Page 167 Y-axis zero point position |
| Chart Theme | | Sets the display methods for items such as the numerical values for the displayed X-axis and Y-axis in the chart display area (font size, decimal points) and the size of the chart points. | ☞ Page 168 Y-axis zero point position |

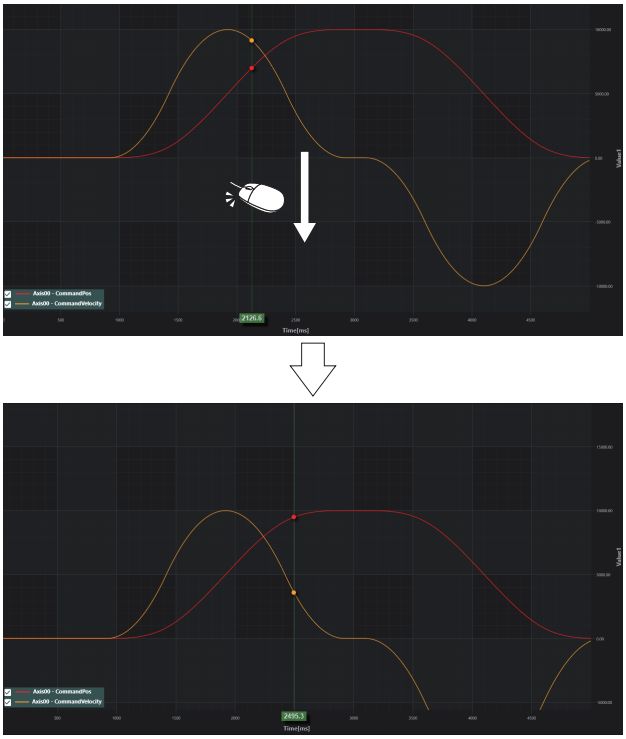
## Changing the Y-axis position

### ■ Drag (Y-axis)

Drag the mouse up or down to move the chart display position of the Y-axis.

The Y-axis position change can be operated when the Y-axis position change is set to [ ] (enabled) and [ ] (enabled).

The Y-axis position change cannot be operated when set to [ ] (disabled).

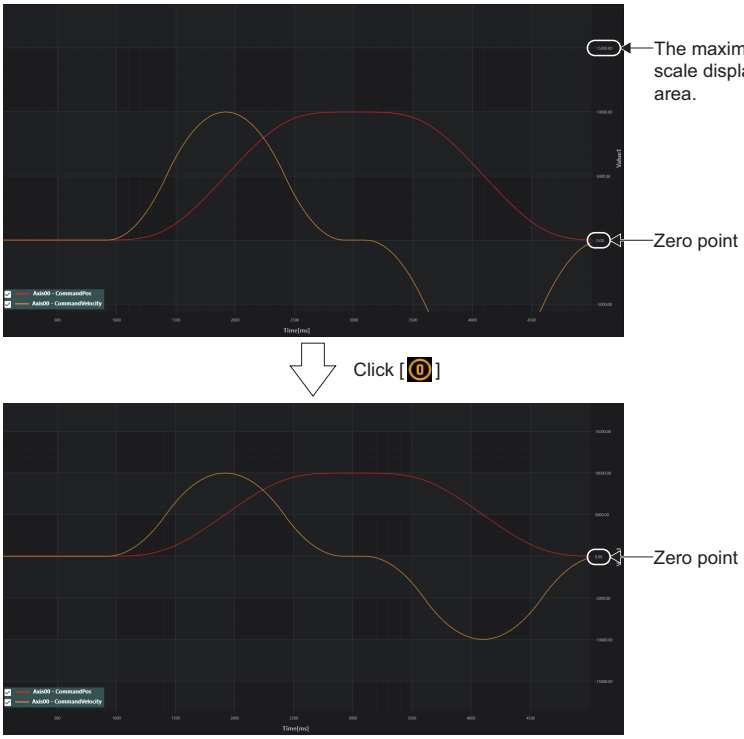


### ■ Y-axis zero point position

Click [ ] to display the zero point position of the Y-axis at the center of the chart display area.

The chart display area displays the zero point at the center of the chart with the top and bottom ranges of the chart display area based on the maximum value of the currently displayed Y-axis scale. Thus, if the maximum value of the Y-axis scale being displayed is less than the maximum value of the chart, not all of the chart may be displayed.

In this case, click [ ] to reset the display and show the whole chart.

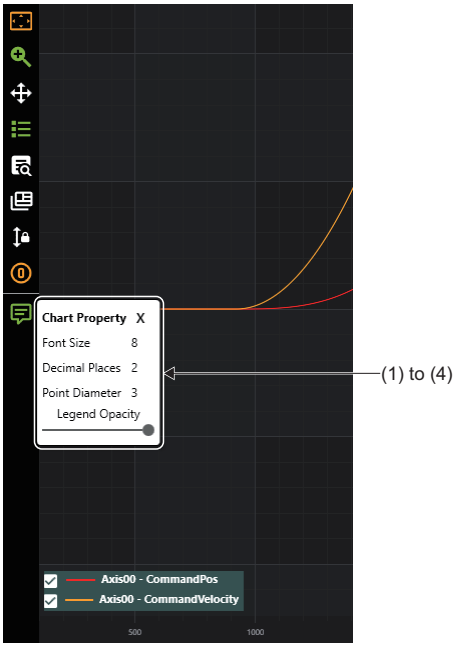


## Changing the chart properties

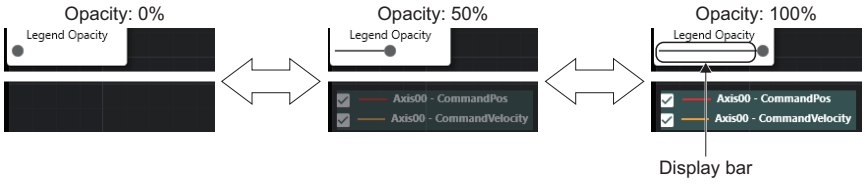
Set the font size, number of decimal places, and size of lines used for the values displayed in the chart display area.

### Window

[ ]




### Displayed items

| Name | Description |
|---|---|
| (1) Font Size | Sets the font size for the scale displays on the horizontal and vertical axes.<br>Select the font size from the pull-down list.<br>• Setting value: 6 to 14 [points] |
| (2) Decimal Places | Sets the number of digits displayed after the decimal point on the horizontal and vertical axes.<br>Select the number of digits displayed after the decimal point from the pull-down list.<br>• Setting value: 0 to 9 [digits] |
| (3) Point Diameter | Changes the size of lines when the chart type set in [Settings] ⇨ [Series type] on the ribbon is set to [LinePoint] or [Point].<br>• Setting value: 1 to 9 |
| (4) Legend Opacity | Sets the opacity of the legend displayed under [Scope] on the ribbon ⇨ [ ].<br>Set the opacity by dragging the display bar with the mouse.<br>The right side is "Opacity: 100%" and moving it to the left will set it to "Opacity: 0%".<br>  |

# 7 FUNCTION OF RIBBON

The scope, file, setting, layout, and help tabs are operated from the ribbon.

## 7.1 Scope

Configure the settings for displaying the chart and operating the data.

**Point**

Each operation in the Scope tab is enabled for all charts displayed in the chart display area. To operate each chart, use the side toolbar displayed for each chart.
(☞ Page 166 Side toolbar)

### Window


### Displayed items

| Item | | Description | Reference |
|---|---|---|---|
| Start (Log control) | | Starts logging. | ☞ Page 170 Starting/stopping logging |
| | | Stops logging. | |
| Logging Time | | Sets the collection time [ms] for the log data. | ☞ Page 170 Logging time setting |
| Trigger (Trigger settings) | | Displays the trigger mode setting and configures the trigger. | ☞ Page 171 Trigger setting |
| Sync (Chart synchronization) | | Displays all charts synchronously by cycle (time). | ☞ Page 175 Chart synchronization |
| Zoom Reset | | Restores the initial state to display the entire chart when the chart display is zoomed in or moved. | ☞ Page 176 Zoom mode |
| Zoom | | Zooms in on the range of the chart selected by dragging the mouse. | |
| Drag | | Moves the chart display in the direction where the mouse has been dragged while maintaining the ratio of the X-axis and Y-axis. | ☞ Page 177 Drag mode |
| Legend | | Displays the legend of the data item in the chart display area. | ☞ Page 178 Legend |
| Data View | | Displays the information of the cursor position and the data item in a list. | ☞ Page 180 Data view |
| Cursor Data (Cursor position data display) | | Displays the information of the X-axis and Y-axis data of the mouse position on the chart. | ☞ Page 182 Cursor tag |
| Chart Theme (Background color) | | Switches the chart theme for the chart display area. | ☞ Page 183 Switching chart theme |

# Starting/stopping logging

Start and stop logging.

## Operating procedure

### ■ Starting logging

1. Click [Scope] ⇨ [  ]
2. When logging is started, the display on the status bar switches to "Running (  )" or "Waiting Trigger (  )".

**Point**

Before starting the log, it is necessary to configure parameters such as log data and trigger settings in advance.

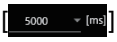
### ■ Stopping logging

1. Click [Scope] ⇨ [  ]
2. When logging is stopped, the display on the status bar switches to "Idle(  )"

# Logging time setting

Set the collection time [ms] for the log data.

## Operating procedure

1. Click [Scope] ⇨ [Logging Time] ⇨ [  ] to display the pull-down list.
2. Select the collection time [ms] for the log data from the pull-down list.

| Collection time [ms] |
|---|
| • 5000<br>• 10000<br>• 15000<br>• 20000<br>• Continuous*1 |

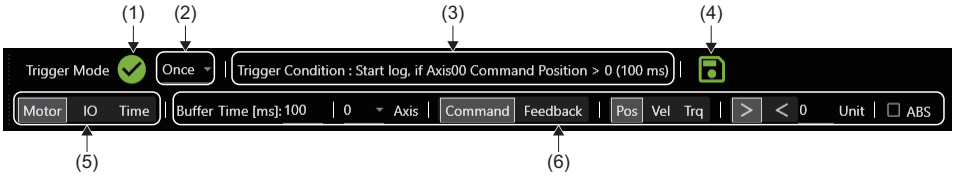
*1 If "Continuous" is set for the collection time, the log data is collected continuously until logging is stopped by clicking [Scope] ⇨ [  ].

# Trigger setting

Configure the trigger mode and the trigger conditions.

## Window

[Scope] ⇨ [ ]



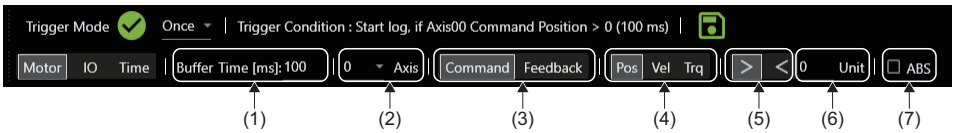

## Displayed items

| | |
|---|---|
| (1) Enable/disable trigger ( / ) | Enables/disables the trigger mode.<br>• : Trigger Mode is disabled.<br>• : Trigger Mode is enabled. |
| (2) Trigger mode | Sets the trigger mode<br>• Once: The trigger is applied only once.<br>• Continuous: The trigger remains active even after logging is finished. |
| (3) Trigger condition | Displays the trigger conditions currently set. |
| (4) Save to project ( ) | Saves the set trigger condition in a file.<br>■Storage destination folder<br>C:\Program Files\MotionSoftware\SWM-G\SWMOS\<br>■File name<br>MotionScope.ini |
| (5) Trigger target | Sets the trigger target.<br>• Motor: Sets the trigger condition with the motor information.<br>• IO: Sets the trigger condition with the I/O information.<br>• Time: Sets the trigger condition with the elapsed time. Logging starts after the set time has elapsed. |
| (6) Condition setting | Sets the trigger condition.<br>Settings differ for each trigger target.<br>• Motor (☞ Page 172 Motor)<br>• IO (☞ Page 173 IO)<br>• Time (☞ Page 173 Time) |

## ■ Motor

Set the trigger condition with the motor information.

### Window



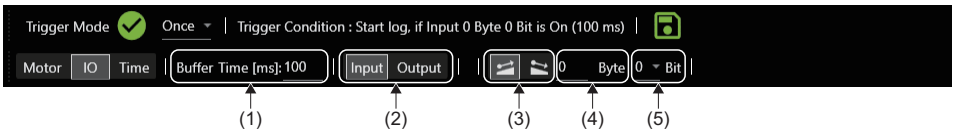

### Displayed items

| Item | Description |
|---|---|
| (1) Buffer time [ms] | Sets the buffer time [ms] for logging.<br>• Setting value: 0 to 65535 |
| (2) Axis No. | Sets the axis number.<br>• Setting value: 0 to 127 |
| (3) Data type | Sets the data type used for the trigger condition.<br>• Command: Command value<br>• Feedback: Feedback value<br>*: If not selected, "Feedback" is selected for operation. |
| (4) Select data | Sets the data used for the trigger condition.<br>• Pos: Position data<br>• Vel: Speed data<br>• Trq: Torque data<br>*: If not selected, "Trq" is selected for operation. |
| (5) Sign | Selects the sign for judgment.<br>• >: When the value is greater than the condition value in (6)<br>• <: When the value is less than the condition value in (6)<br>*: If not selected, ">" is selected for operation. |
| (6) Condition value | Sets the condition value.<br>• Setting value: -2147483648 to 2147483647 |
| (7) Absolute value | If selected, the data is applied as the absolute value.<br>• Selected: The data is applied as the absolute value.<br>• Not selected: The data is not applied as the absolute value. |

## ■ IO

Set the trigger condition with the I/O information.

### Window



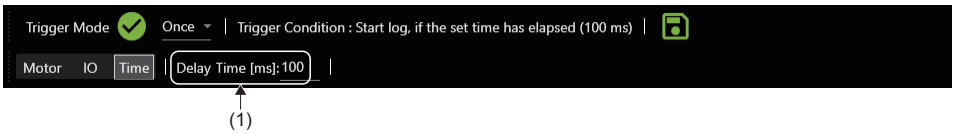

### Displayed items

| Item | Description |
|---|---|
| (1) Buffer time [ms] | Sets the time before the trigger.<br>• Setting value: 0 to 65535 |
| (2) Input/output value setting | Sets the data used for the trigger condition<br>• Input: The input value is used.<br>• Output: The output value is used.<br>*: If not selected, "Output" is selected for operation. |
| (3) Rising edge/falling edge detection | Selects the trigger condition. The trigger condition is detected by the level.<br>• : The trigger condition is detected by rising edge.<br>• : The trigger condition is detected by falling edge.<br>*: If not selected, " " is selected for operation. |
| (4) I/O address | Sets the I/O address.<br>• Setting value: 0 to 7999 |
| (5) I/O bit | Sets the I/O bit.<br>• Setting value: 0 to 7 |

## ■ Time

Set the trigger condition with the elapsed time.

### Window




### Displayed items

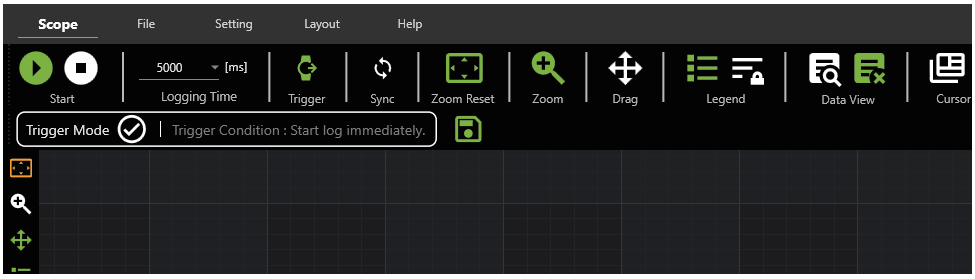
| Item | Description |
|---|---|
| (1) Delay time [ms] | Sets the delay time [ms].<br>Logging starts after the set time has elapsed.<br>• Setting value: 0 to 65535 |

## Trigger condition setting

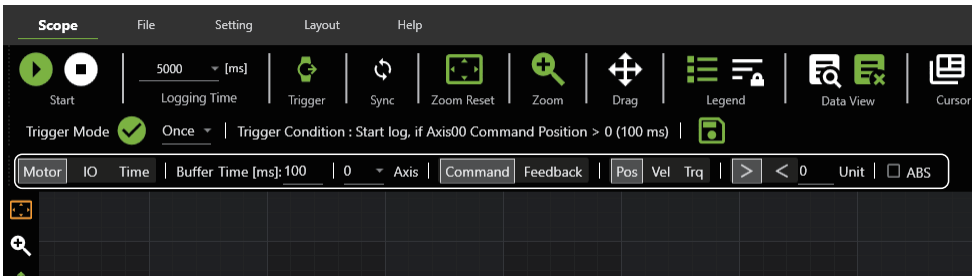
Set the trigger condition.

### Operating procedure

1. Click [ ].
2. The menu of the trigger mode is displayed. Click [ ].

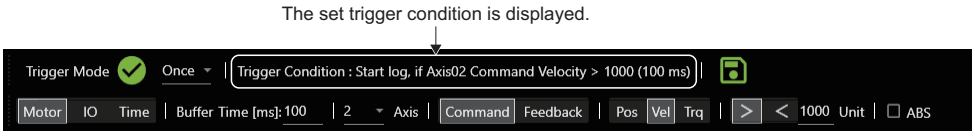



3. The trigger condition setting menu is displayed. Set the trigger condition.




Ex.

When setting to start logging when the command speed of axis 2 exceeds 1000 [user unit]




4. When the setting is completed, click [ ].
5. Save the trigger setting file.

- The trigger setting file is saved in the following storage destination folder with the following file name.

| Item | Description |
|---|---|
| File name | MotionScope.ini |
| Storage destination folder | C:\Program Files\MotionSoftware\SWM-G\SWMOS\ |

# Chart synchronization

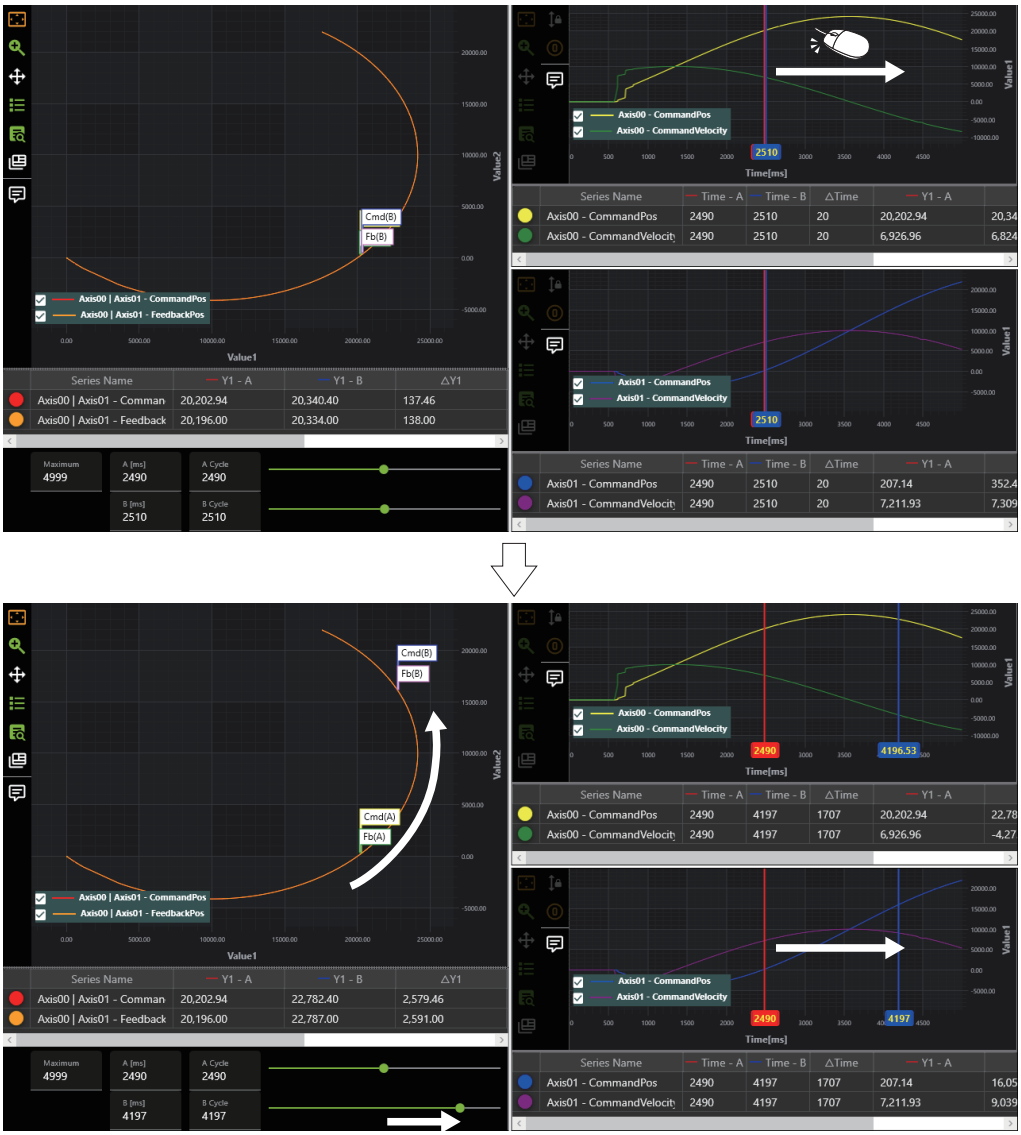
All charts are synchronized by cycle (time) and displayed in synchronous mode.
Each chart can be analyzed from the same cycle.
In synchronous mode, the cursors are synchronized so that all charts are moved by the same cycle.

## Window

[Scope] ⇨ [ ]

## Operating procedure

1. Click [Scope] ⇨ [ ]. (Turns to [ ] during chart synchronization.)
2. The position of the X-axis and the Y-axis in all displayed charts are displayed at the same position.
3. When the cursor position is moved by dragging the mouse, the cursors in all charts are moved by the same cycle.
   For 2D charts, this can be operated with the slider at the bottom of the chart.



# Zoom mode

Zoom in on the range of the chart selected by dragging the mouse.

## Operating procedure

1. Click [Scope] ⇨ [  ]. (Turns to [  ] while in zoom mode.)
2. Drag the mouse over the chart display area. The area where the mouse has been dragged is zoomed in on.

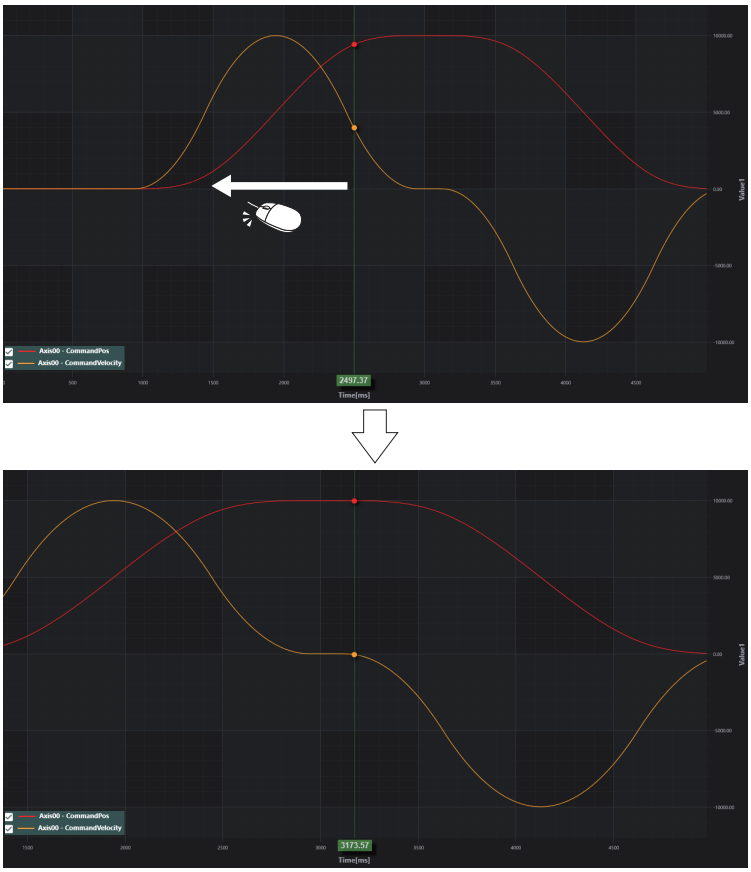

3. To cancel the zoom display and display the entire chart, click [  ].

# Drag mode

The chart display is moved in the direction where the mouse has been dragged.

## Operating procedure

1. Click [Scope] ⇨ [ ]. (Turns to [ ] while in drag mode.)
2. Drag the mouse left or right on the chart display area. The chart is moved in the direction where the mouse has been dragged.



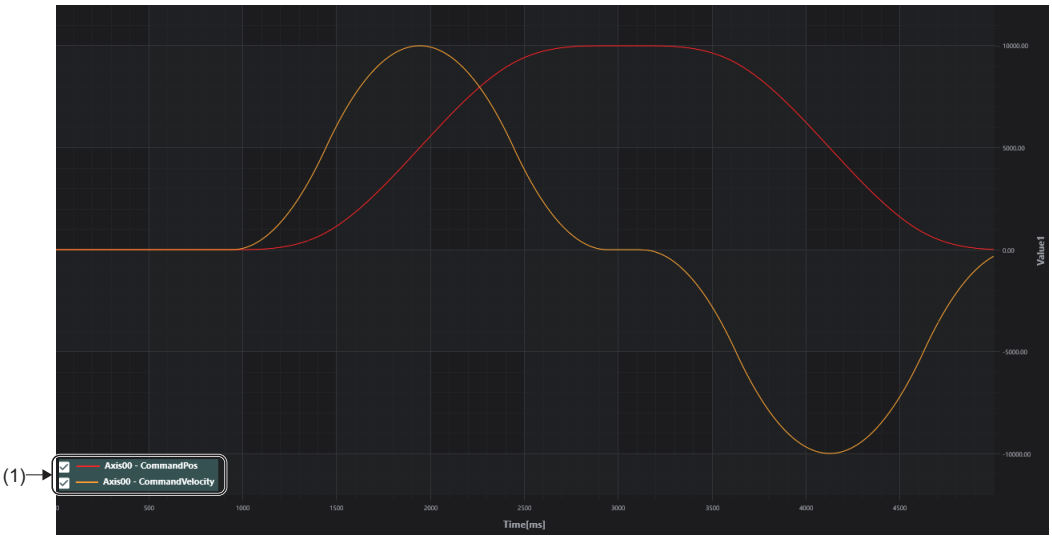

3. To display the entire chart from the position where it has been moved, click [ ].

# Legend

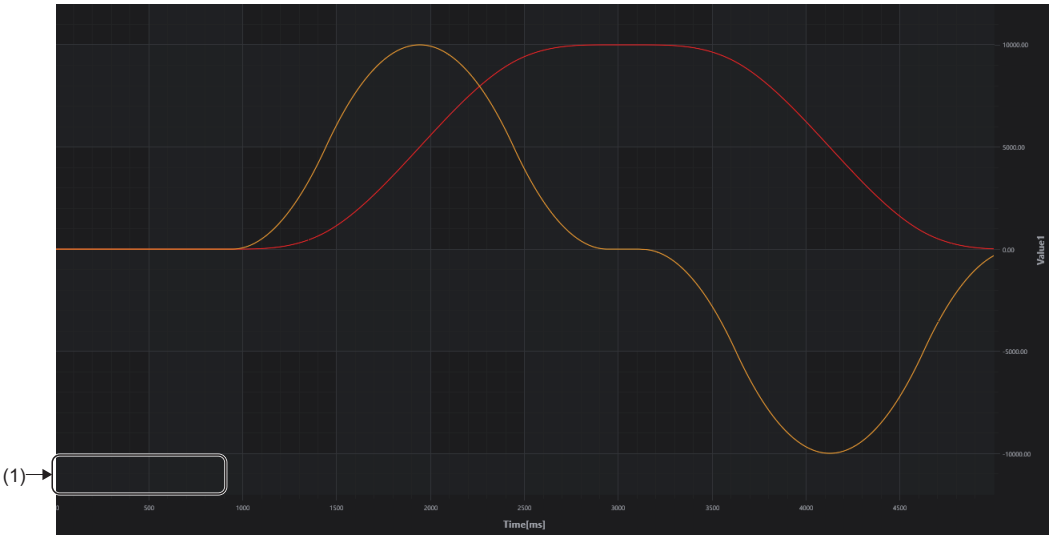
Display the legend for the axis name and data item set in [Setting] from the ribbon (☞ Page 190 Data setting) the chart display area.
The data items in the chart can be checked.

## Window

- When the legend is displayed
  [Scope] ⇨ [  ] (Turns to [  ] when the display changes.)




- When the legend is hidden
  [Scope] ⇨ [  ] (Turns to [  ] when the display changes.)

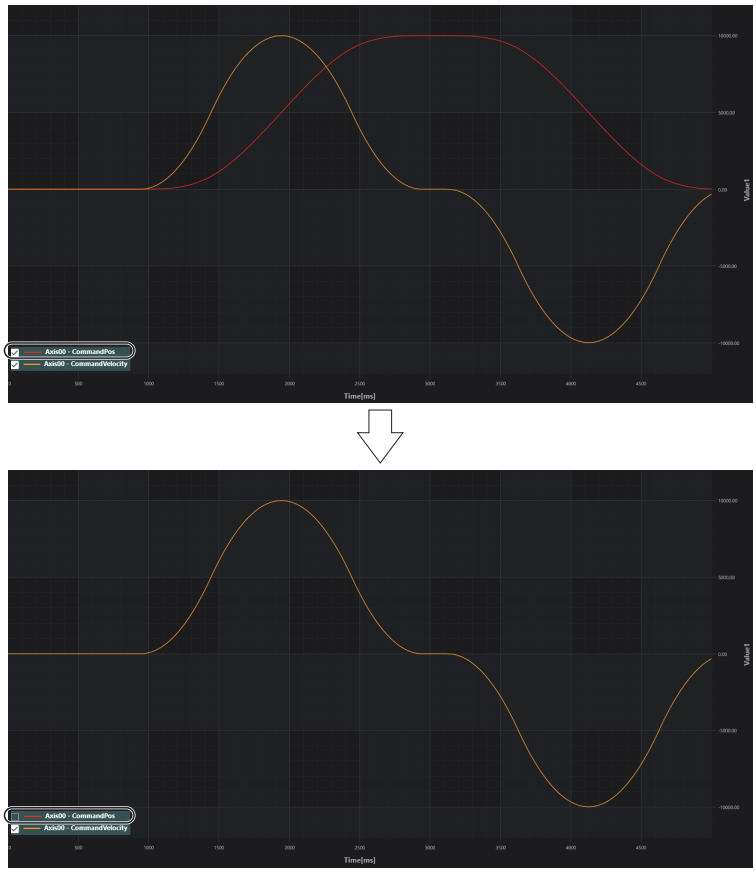



## Displayed items

| Item | Description |
|---|---|
| (1) Legend | Displays the data items of the chart.<br>Data items can be displayed/hidden by selecting/not selecting an item.<br>• Selected: The chart is displayed.<br>• Not selected: The chart is hidden. |

## Operating procedure

1. Click [Scope] ⇨ [  ]. (Turns to [  ] when the display changes.)
2. The legend is displayed in the lower left corner of the chart. Deselect the data item (example: —— Axis00 - CommandPos) in the legend. The chart for the data item deselected is hidden.




3. Hide the legend by clicking [Scope] ⇨ [  ]. (Turns to [  ] when the display changes.)

**Point**

The opacity for the legend display can be set by clicking [] ⇨ [Chart Property] ⇨ [Legend Opacity] from the side toolbar. For details, refer to the following.

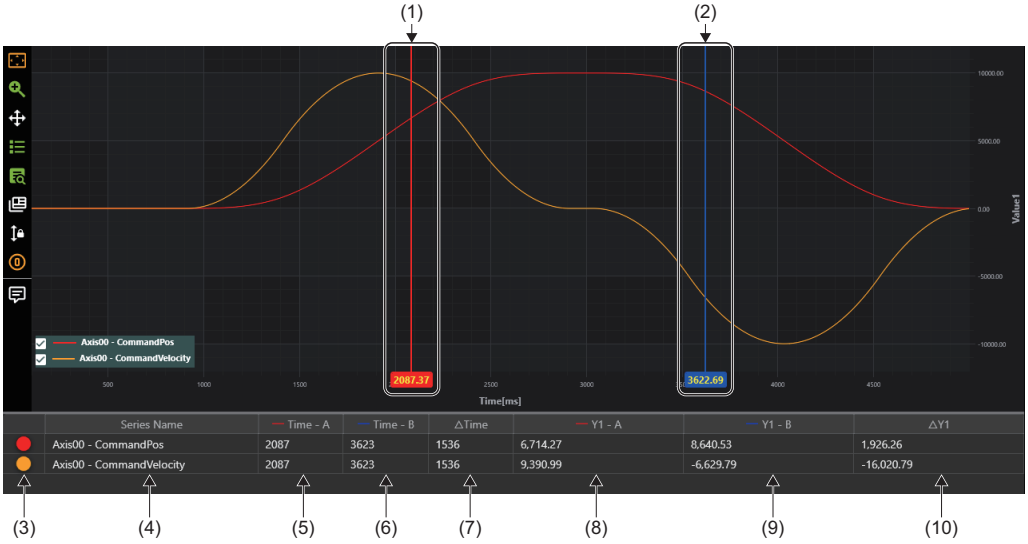
☞ Page 168 Changing the chart properties

# Data view

The data of the cursor position and the data item are displayed in a list.
The X-axis and Y-axis data of the cursor position can be checked here.

## Window

[Scope] ⇨ [] (Turns to [] when the display changes.)




## Displayed items

| Name | Description |
|---|---|
| (1) Cursor A | Set by moving cursor A (red) to a position where the data of "— Time - A" and "— Y1 - A" are displayed. |
| (2) Cursor B | Set by moving cursor B (blue) to a position where the data of "— Time - B" and "— Y1 - B" are displayed. |
| (3) Display color | Set the display color for the Series Name chart to be displayed in the chart display area.<br>Click on the display color to display the display color list. Select a desired color to change the color.<br>■Display color list<br>  |
| (4) Series Name | Displays the data item selected by clicking [Setting] from the ribbon ⇨ [Data Type] from the data setting area.<br>(☞ Page 190 Data setting) |
| (5) — Time - A | Displays the time [ms] of the horizontal axis of cursor A. |
| (6) — Time - B | Displays the time [ms] of the horizontal axis of cursor B. |
| (7) △ Time | Displays the time difference [ms] between cursor A and cursor B ((— Time-B) - (— Time-A)). |
| (8) — Y1 - A | Displays the value of the vertical axis of cursor A. |
| (9) — Y1 - B | Displays the value of the vertical axis of cursor B. |
| (10) △ Y1 | Displays the difference value between cursor A and cursor B ((— Y1-B) - (— Y1-A)). |

## Operating procedure

1. Click [Scope] ⇨ [  ]. (Turns to [  ] when the display changes.)
2. The data of the position information and elapsed time for cursor A (red) and cursor B (blue) are displayed in a list.
3. When cursor A or B is dragged with the mouse, the data of the cursor position at the destination are displayed in a list.

Ex.

When cursor A is moved

The display of data of "— Time - A" and "— Y1 - A" for cursor A is changed to the data of the cursor position at the destination.

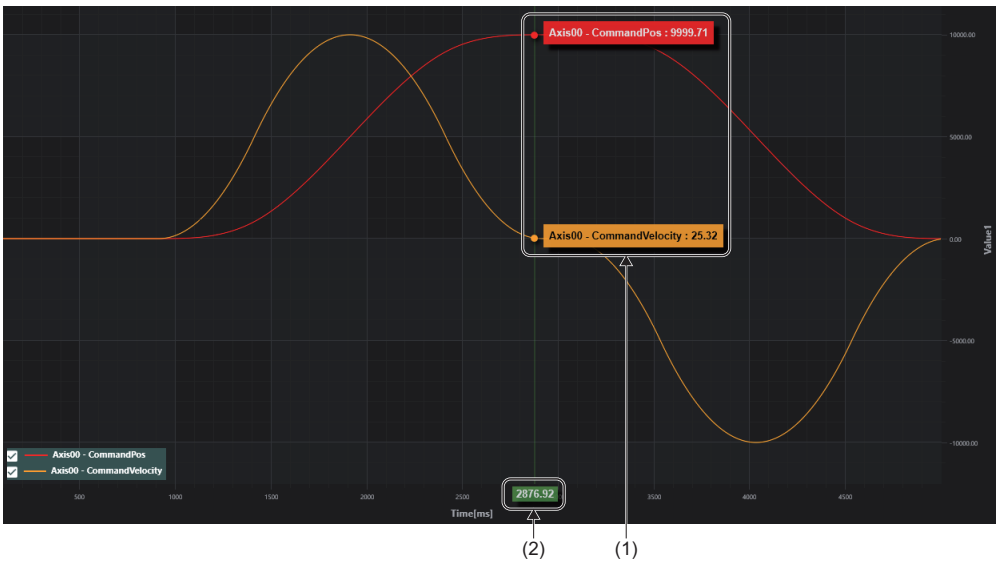

4. Hide the cursor and the list by clicking [Scope] ⇨ [  ]. (Turns to [  ] when the display changes.)

# Cursor tag

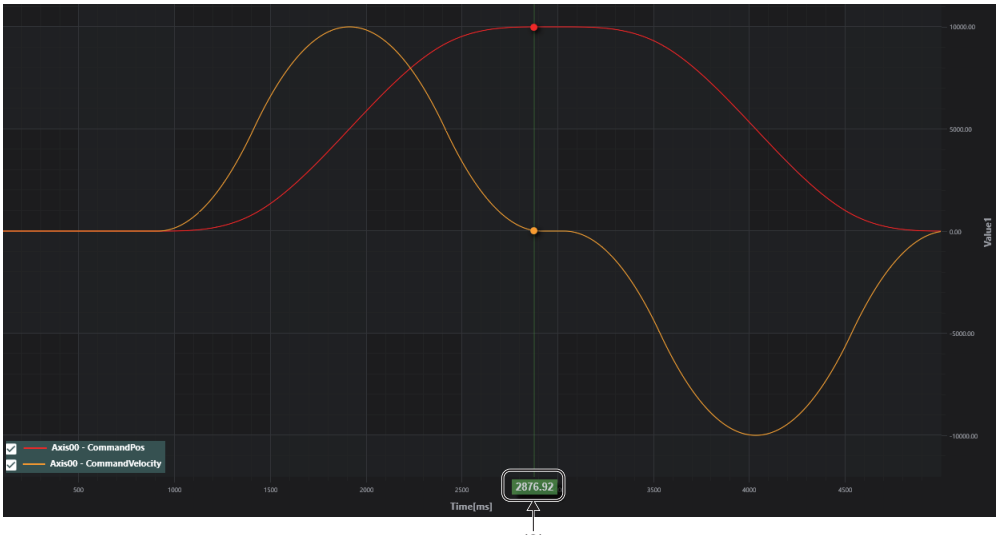
The Y-axis data information of the mouse position (X-axis) is displayed on the chart.
The X-axis and Y-axis data of the mouse position can be checked on the chart display area.

## Window

- When the data view is displayed
  [Scope] ⇨ [ ] (Turns to [ ] when the display changes.)




- When the data view is not displayed
  [Scope] ⇨ [ ] (Turns to [ ] when the display changes.)




## Displayed items

| Item | Description |
|---|---|
| (1) Y-axis data | Displays the Y-axis data of the mouse position. |
| (2) X-axis data | Displays the X-axis data of the mouse position. |

## Operating procedure

1. Click [Scope] ⇨ [ ]. (Turns to [ ] when the display changes.)
2. When the mouse is moved to the chart display area, the X-axis and Y-axis data of the mouse position are displayed on the chart display area.
3. The Y-axis data can be hidden by clicking [Scope] ⇨ [ ]. (Turns to [ ] when the display changes.)

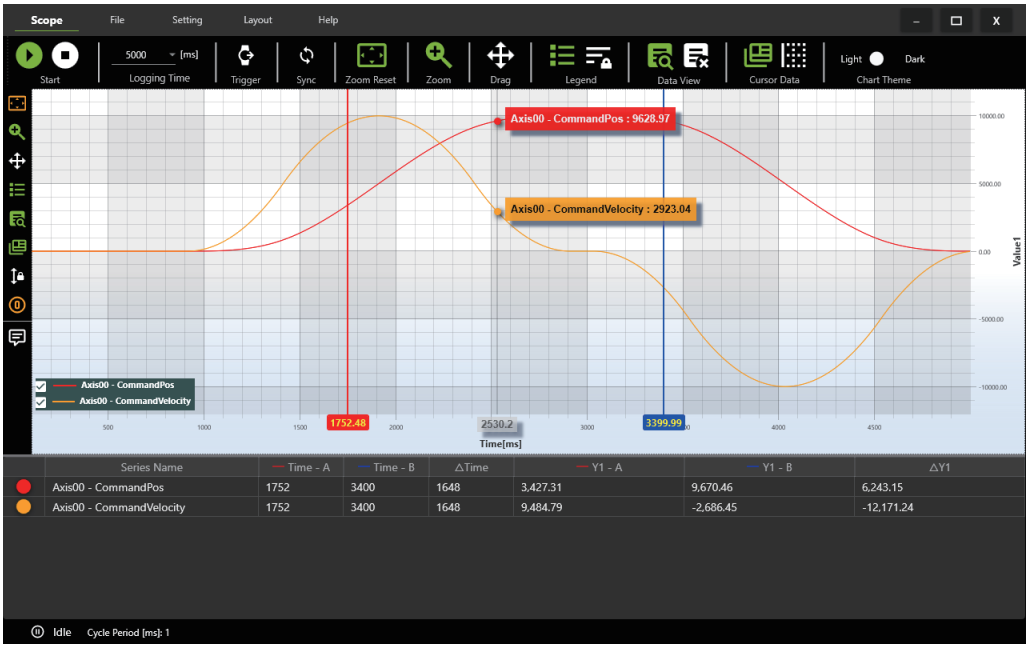
# Switching chart theme

Switch the chart theme for the chart display area.

## Window

- When "Dark (Light Dark)" is selected


- When "Light (Light Dark)" is selected



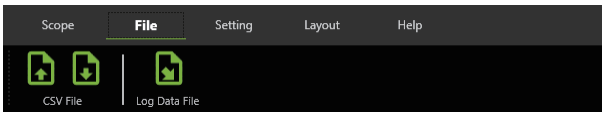

## Operating procedure

***1.*** Click [Scope] ⇨ [Chart Theme] ⇨ [ / ] to switch between "Dark (black)" and "Light (white)".

# 7.2 File

Save the logged data in a file, or load it from a file.

## Window




## Displayed items

| Item | | Description | Reference |
|---|---|---|---|
| CSV File | | Saves the logged data in a file (.csv/.json). | ☞ Page 184 Saving a log file |
| | | Loads the logged data from a file (.csv/.json). | ☞ Page 184 Loading a log file |
| Log Data File | | Loads the data from a log file (.txt) saved by SWMOS and displays it in chart format. | ☞ Page 184 Loading an SWM-G log file |

# Saving a log file

Save the logged data in a file.

After saving the file, the following two types of files are saved.

| File | Description |
|---|---|
| JSON file (.json) | Saves the information related to chart type, axis information, and layout. |
| CSV file (.csv) | Saves the data type and axis, or I/O data information according to the cycle. |

## Operating procedure

1. Click [File] ⇨ [ ].
2. The "Save As" screen appears. Set the storage destination and file name of the log file, and click the [Save] button.
3. The data files (CSV file and JSON file) are saved.

# Loading a log file

Load the logged data from the saved file (JSON file (.json) and CSV file (.csv)).

## Operating procedure

1. Click [File] ⇨ [ ].
2. The "Open" screen appears. Select the log file to be loaded, and click the [Open] button.

# Loading an SWM-G log file

Load the data from a log file saved by SWMOS or SWM-G console program to display it in a chart format.

## Operating procedure

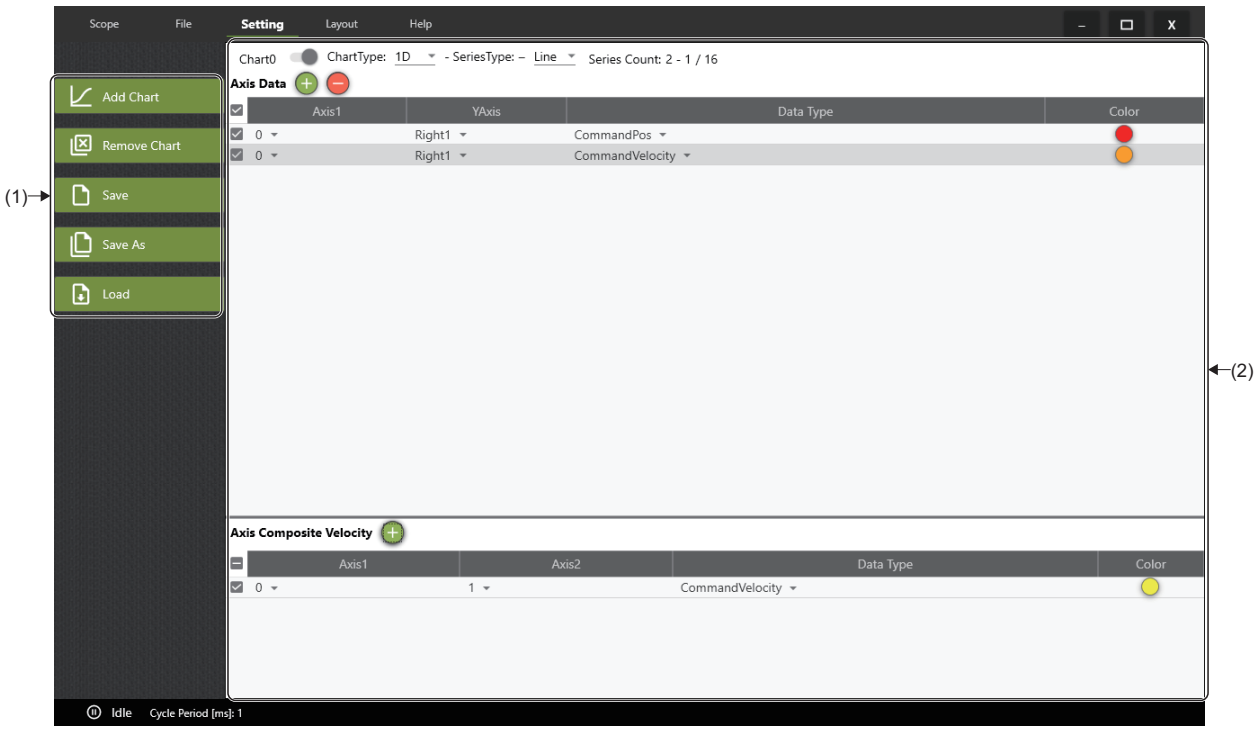
1. Click [File] ⇨ [ ].
2. The "Open" screen appears. Select the log file to be loaded, and click the [Open] button.

# 7.3 Setting

Set the data to be displayed in a chart.

## Window

[Setting]




## Displayed items

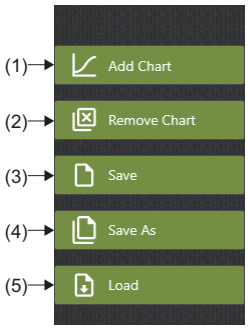
| Item | Description | Reference |
|---|---|---|
| (1) Side menu | Adds/deletes a chart and saves/loads chart settings. | ☞ Page 186 Side menu |
| (2) Data setting area | Sets the chart type, line type, axis number, I/O data, data type, chart display color, etc. | ☞ Page 190 Data setting |

# Side menu

Add/delete a chart and save/load chart settings.

## Window

[Setting] ⇨ Side menu




## Displayed items

| Item | Description | Reference |
|---|---|---|
| (1) Add Chart | Adds the chart to be displayed in the chart display area.<br>Up to 4 charts can be added.<br>• Setting range: Chart0 to Chart3 | ☞ Page 187 Adding a chart |
| (2) Remove Chart | Deletes a displayed chart. | ☞ Page 188 Deleting a chart |
| (3) Save | Overwrites and saves the settings to a selected folder or file (.json). | ☞ Page 189 Overwrite and save to a selected folder |
| (4) Save As | Specifies the file saving destination and file name to save the setting in a file (.json). | ☞ Page 189 Saving in a specified folder |
| (5) Load | Loads the setting from the saved file (.json). | ☞ Page 189 Loading the settings |

## Adding/deleting a chart

### ■ Adding a chart

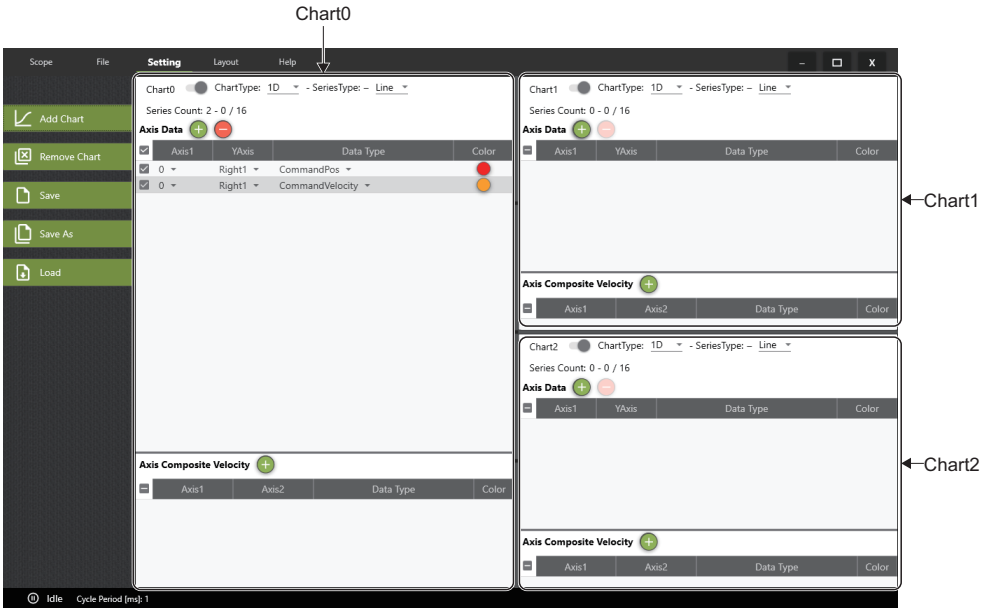
Add the chart to be displayed in the chart display area. Up to 4 charts can be added.

#### Operating procedure

1. Click [Setting] ⇨ [ Add Chart ] in the side menu.
2. Add a chart. A chart is added each time [ Add Chart ] is clicked.

Ex.

When the data setting of the chart "Chart0 to Chart2" is added




3. The added charts are applied to the chart display area of [Scope].

## ■ Deleting a chart

Delete a displayed chart.

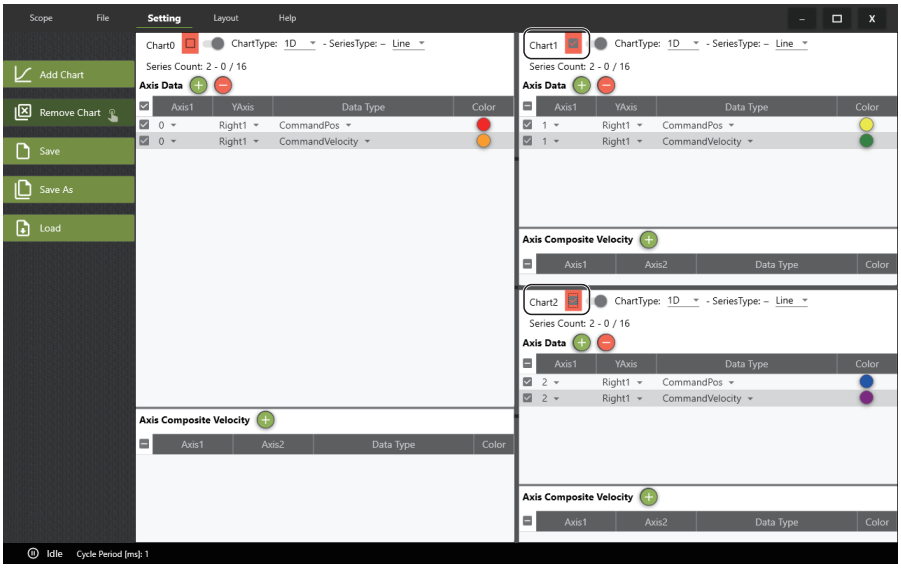
### Operating procedure

**1.** Click [Setting] ⇨ [Remove Chart] in the side menu.

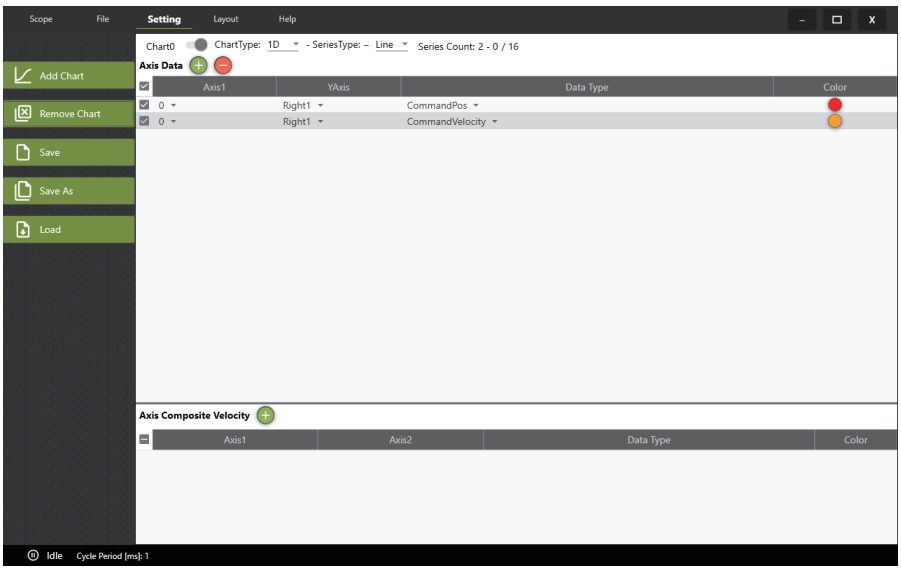
**2.** The [Remove Chart] tab switches to [Remove Chart], and a checkbox [☐] appears in the upper left corner of the chart data setting. Place a check [☑] in the checkbox [☐] of the charts to be deleted.

Ex.

To delete the data setting of the chart "Chart1" and "Chart2"




**3.** Click [Remove Chart]. All selected items [☑] of the charts are deleted.



## Saving the settings

### ■ Overwrite and save to a selected folder

Overwrite and save the settings to a selected folder or file (.json).

#### Operating procedure

1. Click [Setting] ⇨ [Save] in side menu.
2. Overwrite and save to the selected file.

- The settings file is overwritten and saved with the file name and folder specified in [Settings] ⇨ [Save As] on the side menu. If the file name and storage destination have not yet been specified when saving, the file is saved with the following file name and storage destination folder.

| Item | Description |
|---|---|
| File name | Default.json |
| Storage destination folder | C:\Program Files\MotionSoftware\SWM-G\SWMOS\MotionScopePack\Data\ |

### ■ Saving in a specified folder

Specify the file name and file storage destination to save the settings in a file (.json).

#### Operating procedure

1. Click [Setting] ⇨ [Save As] in side menu.
2. The "Save As" screen appears. Set the file name and the file storage destination of the settings, and click the [Save] button.
3. The file is saved to the storage destination folder with the specified name.

## Loading the settings

Load the settings from the saved file (.json).

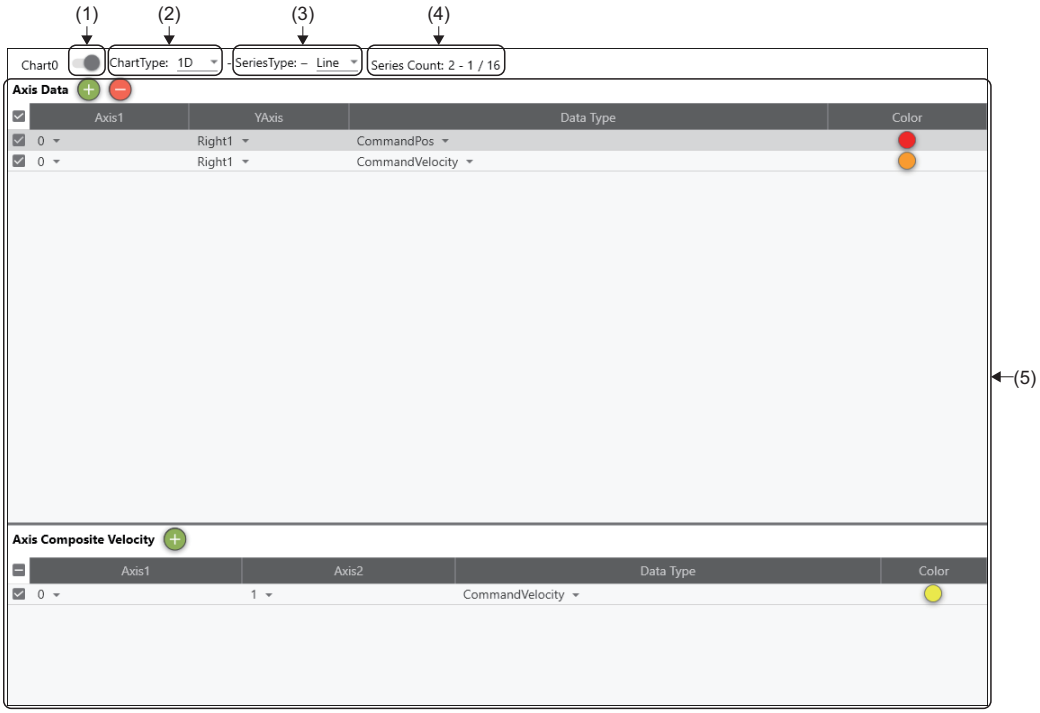
#### Operating procedure

1. Click [Setting] ⇨ [Load] in the side menu.
2. The "Open" screen appears. Select the settings file to be loaded, and click the [Open] button.

# Data setting

Set the chart type, line type, axis number, I/O data, data type, and chart display color of the displayed chart.

## Window




## Displayed items

| Item | Description |
|---|---|
| (1) Change the chart type | Switch between enabled/disabled in the chart type selection.<br>• : The chart type selection is enabled.<br>• : The chart type selection is disabled.<br>*: When "disabled" is set, the chart type selected cannot be changed. |
| (2) Chart Type | Select the chart type.<br>• 1D: One-dimensional chart<br>• 2D: Two-dimensional chart<br>• DIO: Digital I/O chart<br>• AIO: Analog I/O chart |
| (3) Series Type | Set the type of chart line.<br>• Line: Display with line<br>• LinePoint: Display with line and points<br>• Point: Display with points |
| (4) Series Count | Displays the number of data settings.<br>The number of data settings differ depending on the set chart type.<br>■1D<br>• Number of settings: 16<br>• Displayed items: Number of Axis Data settings - number of Axis Composite Velocity settings / number of possible settings<br>*: Number of possible settings = number of Axis Data settings + number of Axis Composite Velocity settings<br>■2D<br>• Number of settings: 2<br>• Displayed items: 2 / 2<br>*: 2 axes are always set.<br>■DIO<br>• Number of settings: 16<br>• Displayed items: Number of IO Bit settings - number of Axis Flag settings / number of possible settings<br>*: Number of possible settings = number of IO Bit settings + number of Axis Flag settings<br>■AIO<br>• Number of settings: 16<br>• Displayed items: number of analog data settings / number of possible settings<br>*: Number of possible settings = number of analog data settings |

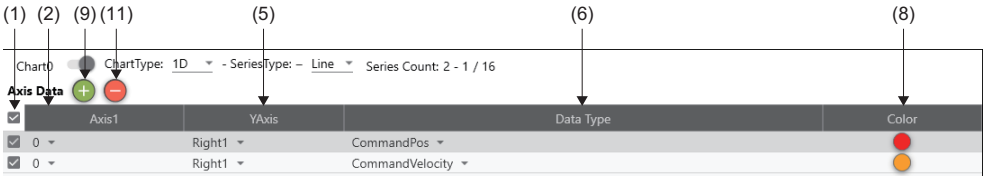
| Item | Description |
|---|---|
| (5) Data setting area | Add or delete the data to be used in the chart, and configure the settings for displaying the chart.<br>The setting differs depending on the chart type.<br>• 1D (☞ Page 191 ChartType: 1D)<br>• 2D (☞ Page 193 ChartType: 2D)<br>• DIO (☞ Page 194 ChartType: DIO)<br>• AIO (☞ Page 196 ChartType: AIO) |

## ■ ChartType: 1D

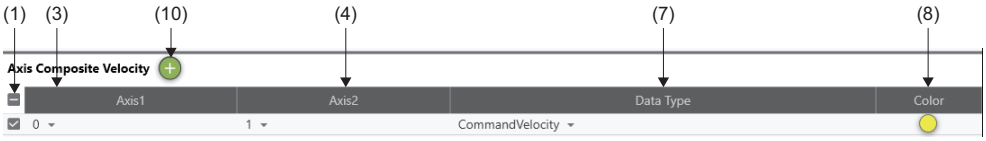
The motion profile corresponding to the time (X-axis) can be checked.

### Window

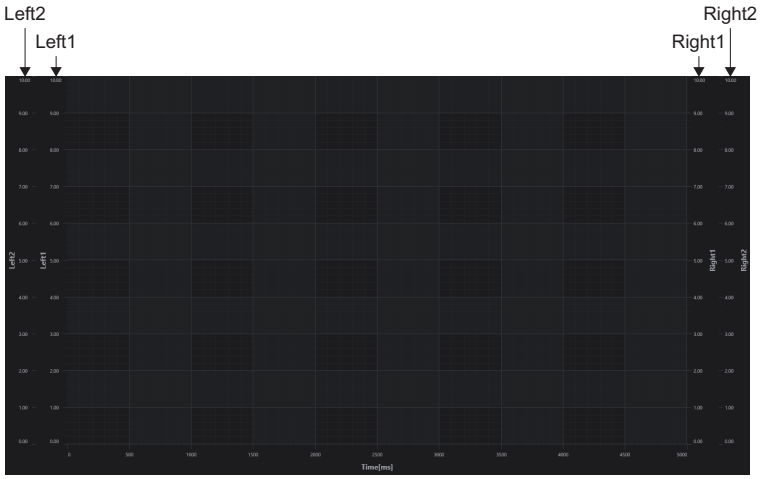
• Axis Data




• Axis Composite Velocity




### Displayed items

| Item | Description |
|---|---|
| (1) ☑/☐ | Select whether to use the data in a chart.<br>The selected items (☑) are displayed as a graph in a chart.<br>• Selected: Data to be used<br>• Not selected: Data not to be used |
| (2) Axis1[*1] | Sets the axis No.<br>• Setting value: 0 to 127 |
| (3) Axis1[*1] | |
| (4) Axis2[*1] | |
| (5) YAxis | Sets the display position of the Y-axis scale. Two scales of Y-axis can be displayed on each side of the chart screen area.<br>• Right1: Right side 1<br>• Right2: Right side 2<br>• Left1: Left side 1<br>• Left2: Left side 2<br>  |

| Item | Description |
|---|---|
| (6) Data Type | Sets the data recorded in the log.<br>• CommnadPos: Command position<br>• CommandVelocity: Command speed<br>• CommandTrq: Command torque<br>• FeedbackPos: Feedback position<br>• FeedbackVelocity: Feedback speed<br>• FeedbackTrq: Feedback torque<br>• EncoderCommnadPos: The 32-bit integer command position sent to the servo motor<br>• EncoderCommnadVelocity: The command speed sent to the servo motor<br>• EncoderCommnadTrq: The command torque sent to the servo motor<br>• EncoderFeedbackPos: The 32-bit integer feedback position returned from the servo motor<br>• EncoderFeedbackVelocity: The feedback speed returned from the servo motor<br>• EncoderFeedbackTrq: The feedback torque returned from the servo motor<br>• Cal_CommandVelocity: The command speed calculated from the command position<br>• Cal_CommandAcc: The command acceleration calculated from the command speed<br>• Cal_FeedbackVelocity: The feedback speed calculated from the feedback position<br>• Cal_FeedbackAcc: The feedback acceleration calculated from the feedback speed<br>• Cal_FollowingError: The position deviation calculated from the command position and the feedback position<br>• CompCommandPos: The command position after applying compensation offset<br>• CompFeedbackPos: The feedback position after applying compensation offset<br>• UserOffsetCommandPos: The command position after applying user offset<br>• UserOffsetFeedbackPos: The feedback position after applying user offset<br>• FollowingError: Following error<br>• HomeOffset: Home offset |
| (7) Data Type | Sets the data recorded in the log when using axis compound speed.<br>• CommandVelocity: Command speed<br>• FeedbackVelocity: Feedback speed |
| (8) Color | Set the display color for the chart to be displayed in the chart display area.<br>Click on the display color to display the display color list. Select a desired color to change the color.<br>■Display color list<br>  |
| (9) [ ] button | Adds an axis row in the Axis Data data setting. |
| (10) [ ] button | Adds an axis row in the Axis Composite data setting. |
| (11) [ ] button | Deletes an axis row from the Axis Data and Axis Composite data setting. |

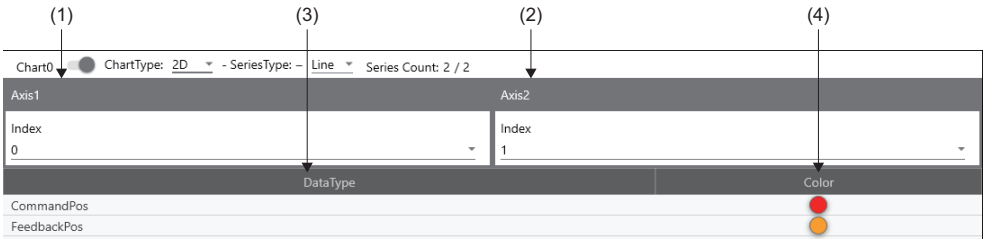
*1 For axis numbers, set only the axis numbers set in the same port. When two ports on a platform are used and a combination of axis numbers assigned to each port are set, an error occurs and logging cannot start.
The following table shows examples of settings that result in an error.

| Platform setting | Description | Error setting example |
|---|---|---|
| Two ports of CC-Link IE TSN used | The following settings were made in [ SWMOS] in the navigation window ⇨ [ Network] ⇨ [ Comm1/Comm2] ⇨ [ CC-Link IE TSN] under the Comm1/Comm2 tree.<br>• When "Axis 0" is set to "Comm1" and "Axis 1" is set to "Comm2" | ■When set on the same chart<br>• Setting "Axis 0" and "Axis 1" to Chart0<br>■When set on different charts<br>• Setting "Axis 0" to Chart0<br>• Setting "Axis 1" to Chart1 |
| Two ports of EtherCAT used | An ENI file and DEF file for 2 ports were made and the following settings were made in EcConfigurator.<br>• When "Axis 0" is set to "Master0" and "Axis 1" is set to "Master1" | |
| Two ports of simulation used | The following settings were made in [ SWMOS] in the navigation window ⇨ [ Network] ⇨ [ Comm1/Comm2] ⇨ [ Simulation] under the Comm1/Comm2 tree.<br>• When "Axis 0" is set to "Comm1" and "Axis 1" is set to "Comm2" | |
| When two ports are used with a combination of platforms | With CC-Link IE TSN (1st port) and EtherCAT (2nd port) used together, the following settings were made.<br>• When "Axis 0" is set to the 1st port and "Axis 1" is set to the 2nd port | |

## ■ ChartType: 2D

Specify two axes as X-axis and Y-axis to check the path of the axes.

### Window




### Displayed items

| Item | Description |
|---|---|
| (1) Axis1*1 | Sets the axis No.<br>Setting value: 0 to 127 |
| (2) Axis2*1 | |
| (3) Data Type | Displays the data recorded in the log.<br>For 2D, this item is fixed with CommnadPos and FeedbackPos.<br>• CommnadPos: Command position<br>• FeedbackPos: Feedback position |
| (4) Color | Set the display color for the chart to be displayed in the chart display area.<br>Click on the display color to display the display color list. Select a desired color to change the color.<br>■Display color list<br>  |

*1 For axis numbers, set only the axis numbers set in the same port. When two ports on a platform are used and a combination of axis numbers assigned to each port are set, an error occurs and logging cannot start.
The following table shows examples of settings that result in an error.

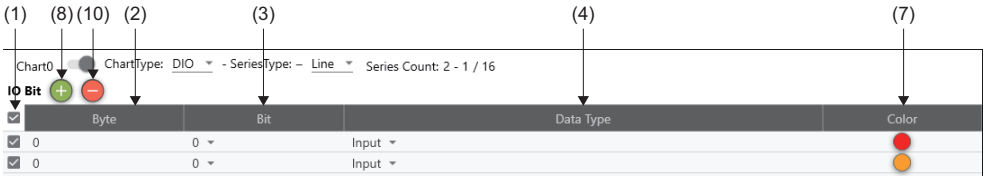
| Platform setting | Description | Error setting example |
|---|---|---|
| Two ports of CC-Link IE TSN used | The following settings were made in [ SWMOS] in the navigation window ⇨ [ Network] ⇨ [ Comm1/Comm2] ⇨ [ CC-Link IE TSN] under the Comm1/Comm2 tree.<br>• When "Axis 0" is set to "Comm1" and "Axis 1" is set to "Comm2" | ■When set on the same chart<br>• Setting "Axis 0" and "Axis 1" to Chart0<br>■When set on different charts<br>• Setting "Axis 0" to Chart0<br>• Setting "Axis 1" to Chart1 |
| Two ports of EtherCAT used | An ENI file and DEF file for 2 ports was made and the following settings were made in EcConfigurator.<br>• When "Axis 0" is set to "Master0" and "Axis 1" is set to "Master1" | |
| Two ports of simulation used | The following settings were made in [ SWMOS] in the navigation window ⇨ [ Network] ⇨ [ Comm1/Comm2] ⇨ [ Simulation] under the Comm1/Comm2 tree.<br>• When "Axis 0" is set to "Comm1" and "Axis 1" is set to "Comm2" | |
| When two ports are used with a combination of platforms | With CC-Link IE TSN (1st port) and EtherCAT (2nd port) used together, the following settings were made.<br>• When "Axis 0" is set to the 1st port and "Axis 1" is set to the 2nd port | |

## ■ ChartType: DIO

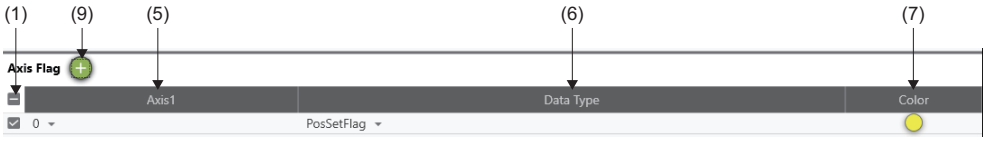
Check the digital I/O data.

### Window

• Axis Data




• Axis Flag




### Displayed items

| Item | Description |
|---|---|
| (1) ☑/☐ | Select whether to use the data in a chart.<br>The selected items (☑) are displayed as a graph in a chart.<br>• Selected: Data to be used<br>• Not selected: Data not to be used |
| (2) Byte | Sets the I/O address.<br>• Setting value: 0 to 7999 |
| (3) Bit | Sets the bit position.<br>• Setting value: 0 to 7 |
| (4) Data Type | Sets the data to be recorded in the log.<br>• Input: Input value<br>• Output: Output valute |
| (5) Axis1*1 | Sets the axis No.<br>Setting value: 0 to 127 |
| (6) Data Type | Sets the data type.<br>• PosSetFlag: Pos Set status<br>• DelayedPosSetFlag: Delayed Pos Set status<br>• CommandDistributionEndFlag: Cmd Distribution End status<br>• InPosFlag: In Pos status |
| (7) Color | Set the display color for the chart to be displayed in the chart display area.<br>Click on the display color to display the display color list. Select a desired color to change the color.<br>■Display color list<br>  |
| (9) [⊕] button | Adds an axis row in the Axis Data data setting. |
| (10) [⊕] button | Adds an axis row in the Axis Flag data setting. |
| (11) [⊖] button | Deletes an axis row from the Axis Data and Flag data setting. |

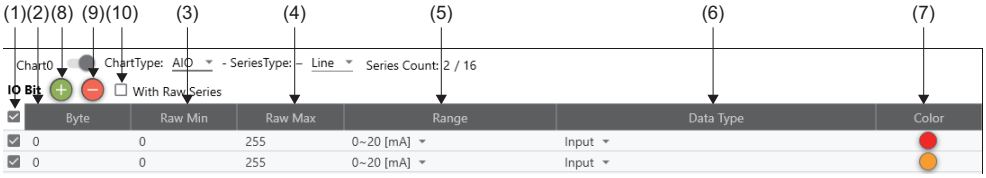
*1 For axis numbers, set only the axis numbers set in the same port. When two ports on a platform are used and a combination of axis numbers assigned to each port are set, an error occurs and logging cannot start.
The following table shows examples of settings that result in an error.

| Platform setting | Description | Error setting example |
|---|---|---|
| Two ports of CC-Link IE TSN used | The following settings were made in [ SWMOS] in the navigation window ⇨ [ Network] ⇨ [ Comm1/Comm2] ⇨ [ CC-Link IE TSN] under the Comm1/Comm2 tree.<br>• When "Axis 0" is set to "Comm1" and "Axis 1" is set to "Comm2" | ■When set on the same chart<br>• Setting "Axis 0" and "Axis 1" to Chart0<br>■When set on different charts<br>• Setting "Axis 0" to Chart0<br>• Setting "Axis 1" to Chart1 |
| Two ports of EtherCAT used | An ENI file and DEF file for 2 ports was made and the following settings were made in EcConfigurator.<br>• When "Axis 0" is set to "Master0" and "Axis 1" is set to "Master1" | |
| Two ports of simulation used | The following settings were made in [ SWMOS] in the navigation window ⇨ [ Network] ⇨ [ Comm1/Comm2] ⇨ [ Simulation] under the Comm1/Comm2 tree.<br>• When "Axis 0" is set to "Comm1" and "Axis 1" is set to "Comm2" | |
| When two ports are used with a combination of platforms | With CC-Link IE TSN (1st port) and EtherCAT (2nd port) used together, the following settings were made.<br>• When "Axis 0" is set to the 1st port and "Axis 1" is set to the 2nd port | |

## ■ ChartType: AIO

Check the analog I/O data.

### Window




### Displayed items

| Item | Description |
|---|---|
| (1) ☑/☐ | Select whether to use the data in a chart.<br>The selected items (☑) are displayed as a graph in a chart.<br>• Selected: Data to be used<br>• Not selected: Data not to be used |
| (2) Byte | Sets the I/O address.<br>• Setting value: 0 to 7999 |
| (3) Raw Min | Sets the minimum value of analog input signals and analog output signals.*1 |
| (4) Raw Max | Sets the maximum value of analog input signals and analog output signals.*1 |
| (5) Range | Sets the range.<br>• 0 to 20 [mA], 4 to 20 [mA], 0 to 5 [V], 1 to 5 [V], -5 to 5 [V], 0 to 10 [V], 2 to 10 [V], -10 to 10 [V] |
| (6) Data Type | Sets the data to be recorded in the log.<br>• Input: Input value<br>• Output: Output value |
| (7) Color | Set the display color for the chart to be displayed in the chart display area.<br>Click on the display color to display the display color list. Select a desired color to change the color.<br>■Display color list<br>  |
| (8) [⊕] button | Adds an axis row in the data setting. |
| (9) [⊖] button | Deletes an axis row from the data setting. |
| (10) With Raw Series | Select whether to display the analog raw value in the analog value displayed in the chart.<br>• Selected: The analog converted value and the analog raw value are displayed.<br>• Not selected: The analog converted value is displayed.<br>*: The analog raw value displayed when "With Raw Series" is selected can be confirmed in the legend (💬) or the data view (🔍). |

*1 The value range for combinations of maximum and minimum values are as follows.

| Setting value | | I/O value | |
|---|---|---|---|
| **Maximum value - Minimum value** | **Minimum value** | **Size** | **Value range** |
| 255 or less | Less than 0 | 1 byte | -128 to 127 |
| | 0 or more | | 0 to 255 |
| 256 to 65535 | Less than 0 | 2 bytes | -32768 to 32767 |
| | 0 or more | | 0 to 65535 |
| 65536 or more | Less than 0 | 4 bytes | -2147483648 to 2147483647 |
| | 0 or more | | 0 to 4294967295 |

## Adding/deleting data

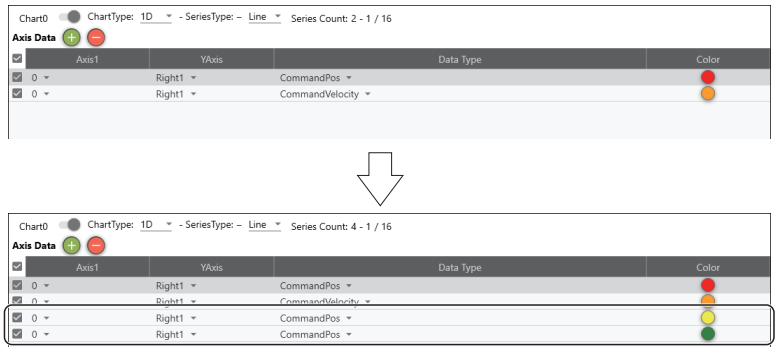
### ■ Adding data

Add data to the chart.

When setting "1D", "DIO", or "AIO" in ChartType, data can be added to the chart.

#### Operating procedure

1. Click the [⊕] button.
2. An axis row is added. A row is added each time the [⊕] button is clicked.




3. Set the added data. When the setting is completed, click [Setting] ⇨ [Save] or [Save As] in the side menu. The data will be applied to a chart after being saved in the file. For saving, refer to the following.

- [Save] (☞ Page 189 Overwrite and save to a selected folder)
- [Save As] (☞ Page 189 Saving in a specified folder)

**Point**

The selected items (☑) are displayed as a graph in the chart.

Keep the selected status (☑) for the items to be displayed in the chart.

7

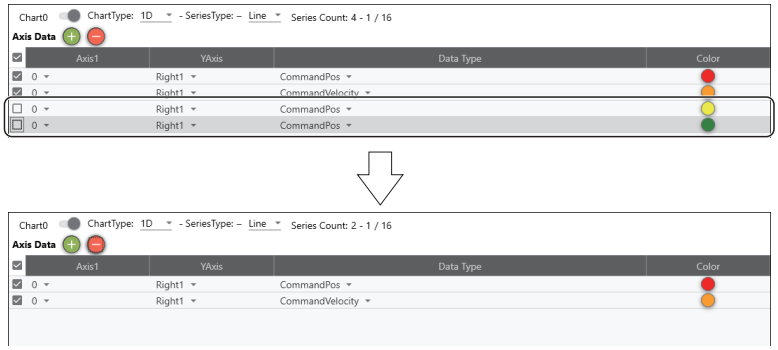
## ■ Deleting data

Delete data from the chart.

When setting "1D", "DIO", or "AIO" in ChartType, data can be deleted from the chart.

### Operating procedure

1. Deselect the selected item (☑) of the row to be deleted. To delete multiple rows, deselect the items of all the target rows.
2. Click the [⊖] button.
3. The deselected rows (☐) will be deleted.




4. When deleting the data is completed, click [Setting] ⇨ [Save] or [Save As] in the side menu. The data will be applied to a chart after being saved in the file. For saving the data, refer to the following.

- [Save] (☞ Page 189 Overwrite and save to a selected folder)
- [Save As] (☞ Page 189 Saving in a specified folder)

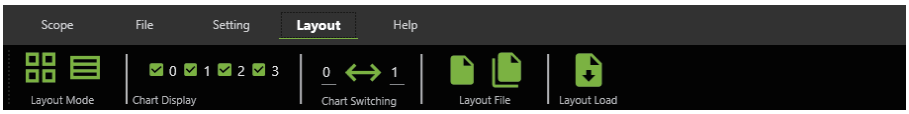
**Point**

When data is added or deleted, make sure to save the data from [Setting] ⇨ [Save] or [Save As] in the side menu. If the data is not saved, it will not be applied to the chart.

# 7.4 Layout

Set the chart layout, chart order switching, and chart show/hide settings.

## Window



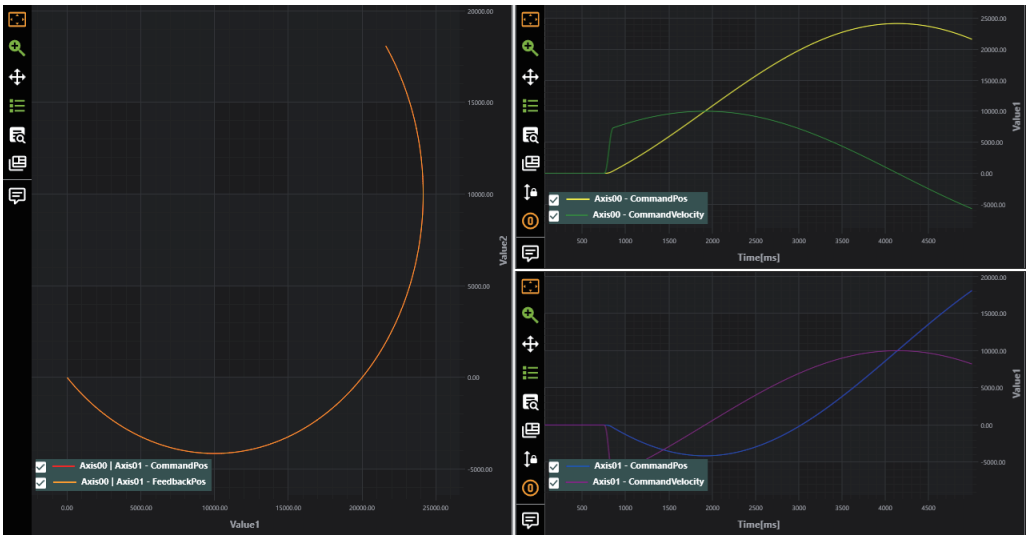

| Item | | Description | Reference |
|---|---|---|---|
| Layout Mode |  | Displays two to four charts divided in the chart display area. | ☞ Page 200 Layout mode |
| |  | Displays the charts vertically in the chart display area. | |
| Chart Display |  | Select the chart to be displayed in the chart display area.<br>The chart with the chart No. selected will be displayed in the chart display area. | ☞ Page 201 Chart display |
| Chart Switching |  | Switches the position of the charts when two or more charts are displayed. | ☞ Page 202 Chart display switching |
| Layout File |  | Overwrites and saves the layout information to a selected folder and file (Default.json). | ☞ Page 203 Overwrite and save to a selected folder |
| |  | Saves the layout information by specifying a file name (.json) and the storage destination. | ☞ Page 203 Saving in a specified folder |
| Layout Load |  | Loads a file (.json) in which the layout information is saved to set the layout. | ☞ Page 203 Loading the layout information |

# Layout mode

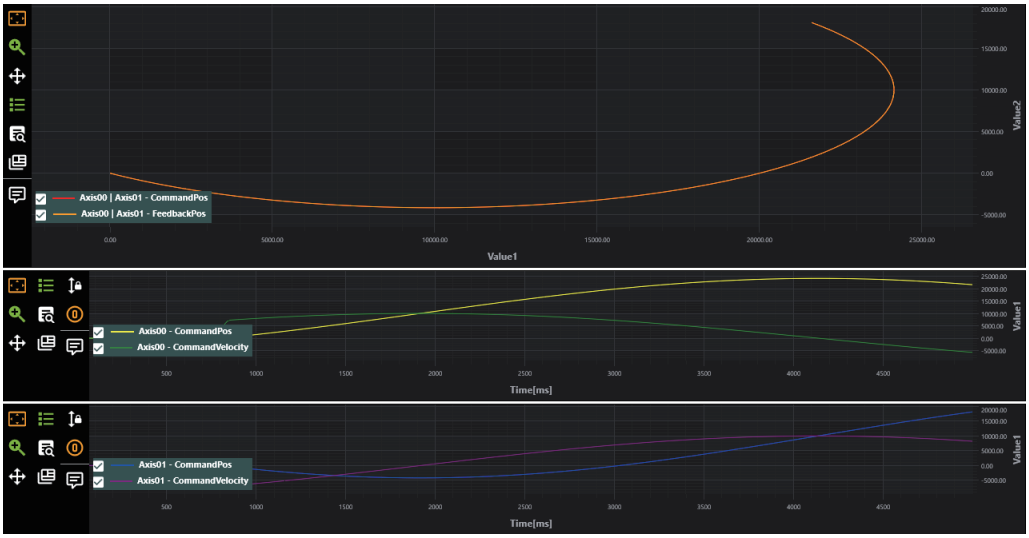
Charts are divided and displayed in the chart display area.

## Window

- [] (Displays two to four charts divided) when selected




- [] (Displays charts vertically) when selected




## Operating procedure

***1.*** Click [Layout] ⇨ [] or [] to select the layout mode of the charts to be displayed in the chart display area.

# Chart display

Select the charts to be displayed in the chart display area.

Select the respective chart numbers to be displayed.

Deselect the respective chart numbers to be hidden.

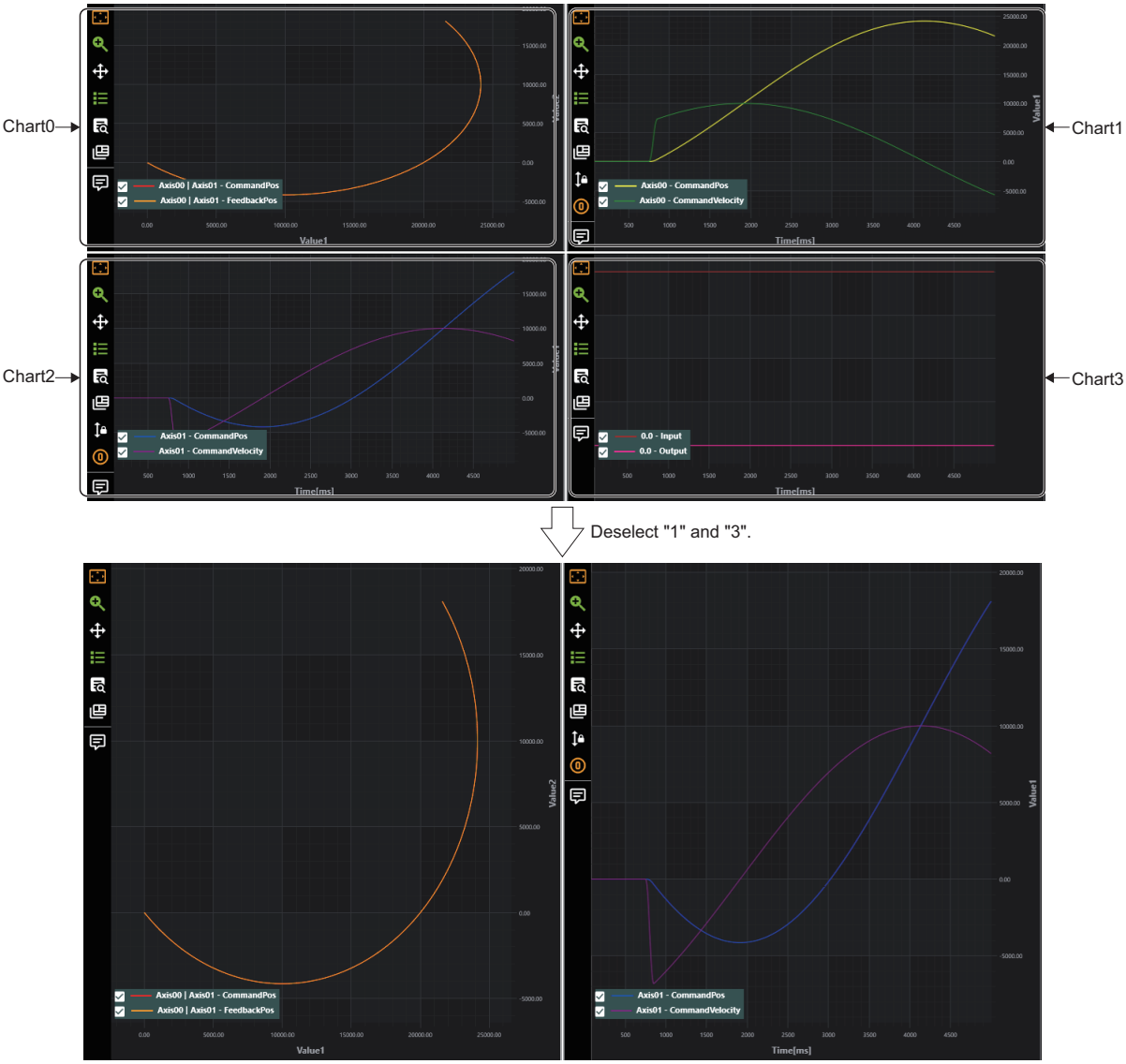
The chart numbers to be displayed are set from [Setting] in the ribbon.

## Operating procedure

***1.*** Select the number of the charts to be displayed in the chart area, and deselect the number of the charts to be hidden.

**Ex.**

When "Chart0" and "Chart2" are displayed, and "Chart1" and "Chart3" are hidden (0 1 2 3)



# Chart display switching

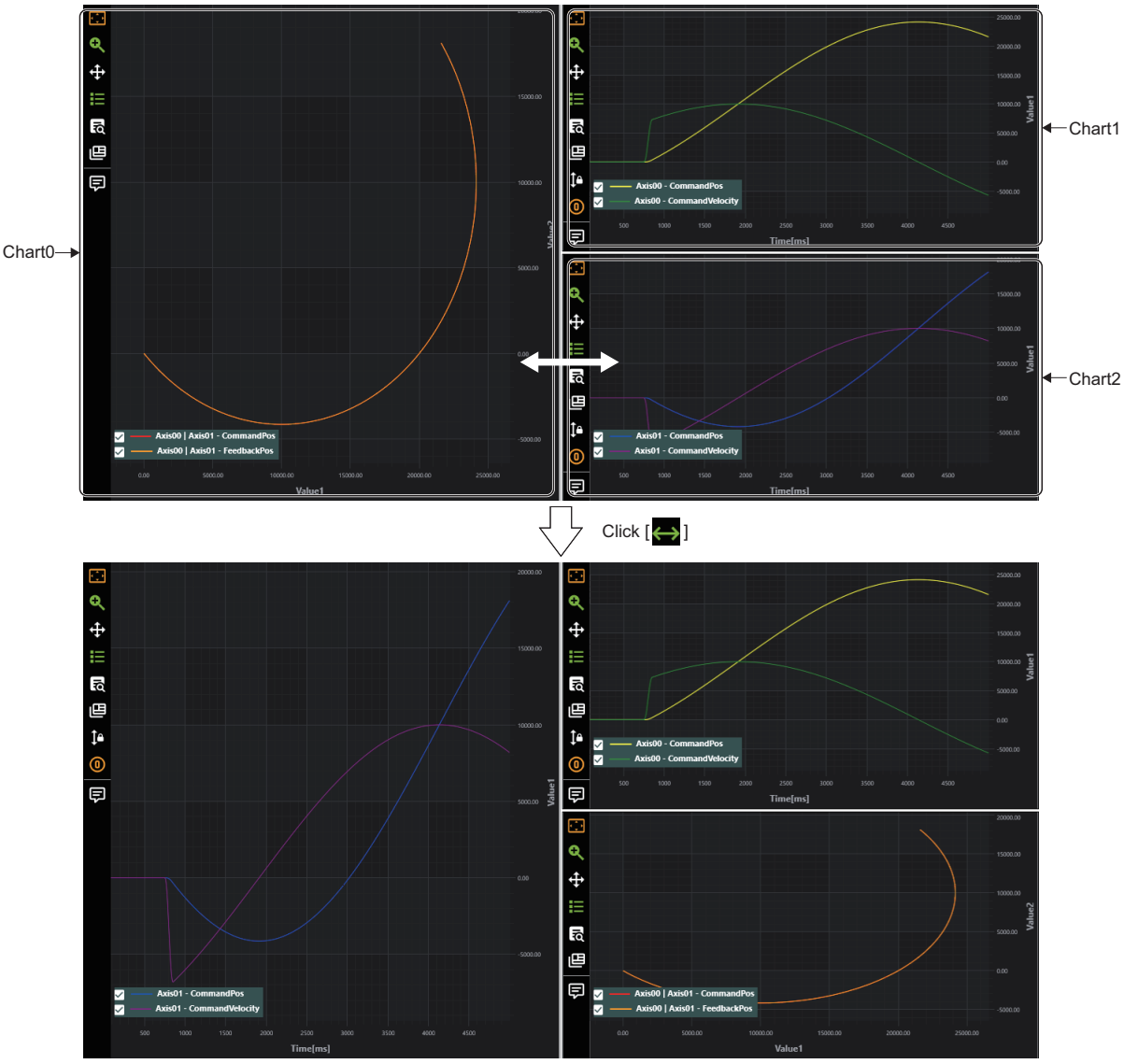
Switch the chart display position when two or more charts are displayed in the chart display area.

## Operating procedure

1. Enter the chart numbers to switch the display position, and click [Layout] ⇨ [↔]
2. The position of the selected charts is switched.

Ex.

When switching the display position of "Chart0" and "Chart2" (0 ↔ 2)



# Layout information

Layout information can be saved in a file and the saved file can be loaded for setting the layout.

## Saving the layout information

### ■ Overwrite and save to a selected folder

Overwrite and save the layout information to a selected folder and file (.json).

#### Operating procedure

1. Click [Layout] ⇨ [  ].
2. Overwrite and save to the selected file.

- The layout information file is overwritten and saved with the file name and folder specified in [Layout] ⇨ [  ]. If the file name and storage destination have not yet been specified when saving, the layout information file is saved with the following file name and storage destination folder.

| Item | Description |
|---|---|
| File name | Default.json |
| Storage destination folder | C:\Program File\/MotionSoftware\SWM-G\SWMOS\MotionScopePack\Data\ |

### ■ Saving in a specified folder

Specify the file name and file storage destination to save the layout information in a file (.json).

#### Operating procedure

1. Click [Layout] ⇨ [  ].
2. The "Save As" screen appears. Specify the file name and file storage destination for the layout information, and click the [Save] button.
3. Save the file to the storage destination folder with the specified file name.

## Loading the layout information

Load the layout information from a file (JSON file (.json) or CSV file (.csv)).

#### Operating procedure

1. Click [Layout] ⇨ [  ].
2. The "Open" screen appears. Select the layout information file to be loaded, and click the [Open] button.

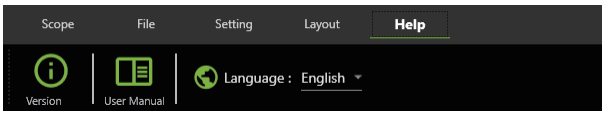
**Point**

When loading layout information, the layout information being displayed is cleared because the layout information from the saved layout information file is loaded.

# 7.5 Help

Set the display language of Motion Scope, access the manual (SWM-G User Manual), and check the version information.

## Window

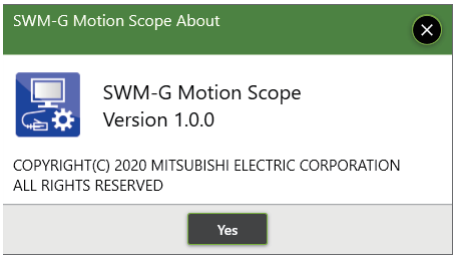



## Version

Check the Motion Scope version.

### Window

[Help] ⇨ [ ]




## User manual

Displays the manual (SWM-G User Manual) that explains the SWM-G functions.

The Doc folder that stores the manual can be displayed by clicking [Help] ⇨ [User Manual].

### Displayed items

[Help] ⇨ [ ]

| Item | Description |
|---|---|
| Manual selection | Select the manual (SWM-G User Manual) in the language to be displayed.<br>• SWM-G_UserManual.chm ( ): English version manual<br>• SWM-G_UserManual_JP.chm ( ): Japanese version manual |

## Language

Set the display language of Motion Scope.

Select the display language from a pull-down list.

### Displayed items

[Help] ⇨ [ ] ⇨ [pull-down list]

• Supported languages

| Item | Language |
|---|---|
| Japanese | Japanese |
| Korean | Korean |
| English | English |
| Chinese | Chinese |

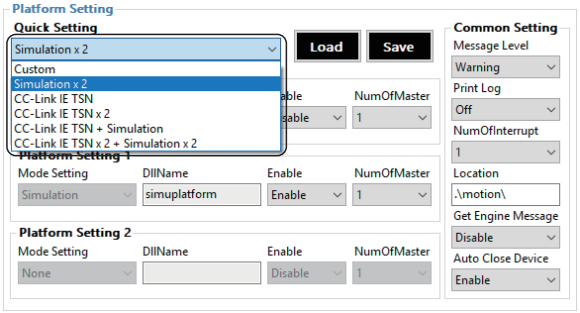
# APPENDIX

## Appendix 1 Simulation Function

By using the simulator platform (SimuPlatform), the motion control can be verified without servo amplifiers.

### Operating procedure

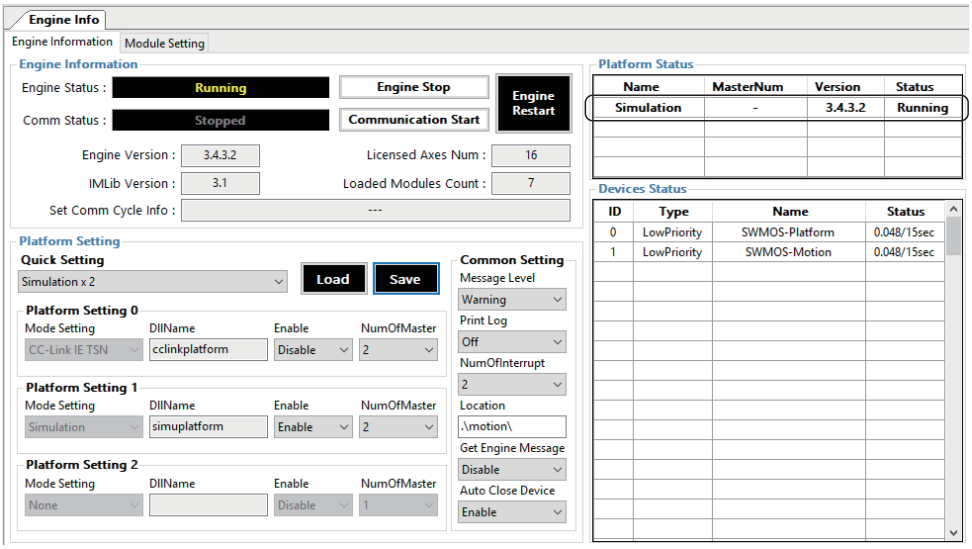
1. Select [SWMOS] ⇨ [System] ⇨ [Engine] in the navigation window, select the [Engine Information] tab, select "Simulation×2" from the pull-down list in [Quick Setting] under [Platform Setting], and click the [Save] button.




2. The confirmation message "Do you want to save Module.ini?" appears. Click the [Yes] button to save the module configuration file (Module.ini).

3. Then, the confirmation message "Do you want to restart the SWM-GEngine?" appears. Click the [Yes] button to restart the SWM-G engine.

4. When the SWM-G engine is restarted, "Simulation" is displayed in [Platform Status] and the simulator platform is enabled.




5. When the [Communication Start] button is clicked, all the axes enter the "IDLE" state and the test operation of the motion control can be performed with virtual axes.

| Axis command mode | Operation |
|---|---|
| Position control (Position) | • Feedback position = Command position<br>• Feedback speed = Command speed<br>• Command torque/feedback torque = Always 0 |
| Speed control (Velocity) | • Feedback position = Updated based on the command speed<br>• Feedback speed = Command speed<br>• Command torque/feedback torque = Always 0 |
| Torque control (Torque) | • Feedback position/command position = Not updated<br>• Feedback speed/command speed = Not updated<br>• Feedback torque = Command torque |

**Point**

- The motion control is performed with the communication cycle "1000μs" by default. To change the communication cycle, set a value for "CommCycle" in the simulation definition file (simu_network.def).
- To limit the axes to be simulated to the specified axes, set "UserDef" to "1 (Enable)" in the simulation definition file (simu_network.def) and set the axis number in the "Index" setting in the "[Axis □[*1]]" section.
  *1: □ = Axis number
- For details of the simulation definition file (simu_network.def), refer to the following.
  SWM-G User Manual
- The simulation definition file (simu_network.def) is stored in the following.
  · File storage destination: C:\Program Files\MotionSoftware\SWM-G\Platform\Simu\simu_network.def

**Ex.**

When performing simulation only on "Axis 3, axis 5, axis 9, axis 15" with the communication cycle "500μs"

```
CommCycle=500
PrintLog=0

[Master 0]
UserDef = 1

[axis 0]
index = 3
[axis 1]
index = 5
[axis 2]
index = 9
[axis 3]
index = 15
```

# Appendix 2 Diagnostic Result

The diagnostic function of SWMOS collects the following information and diagnoses the system status.

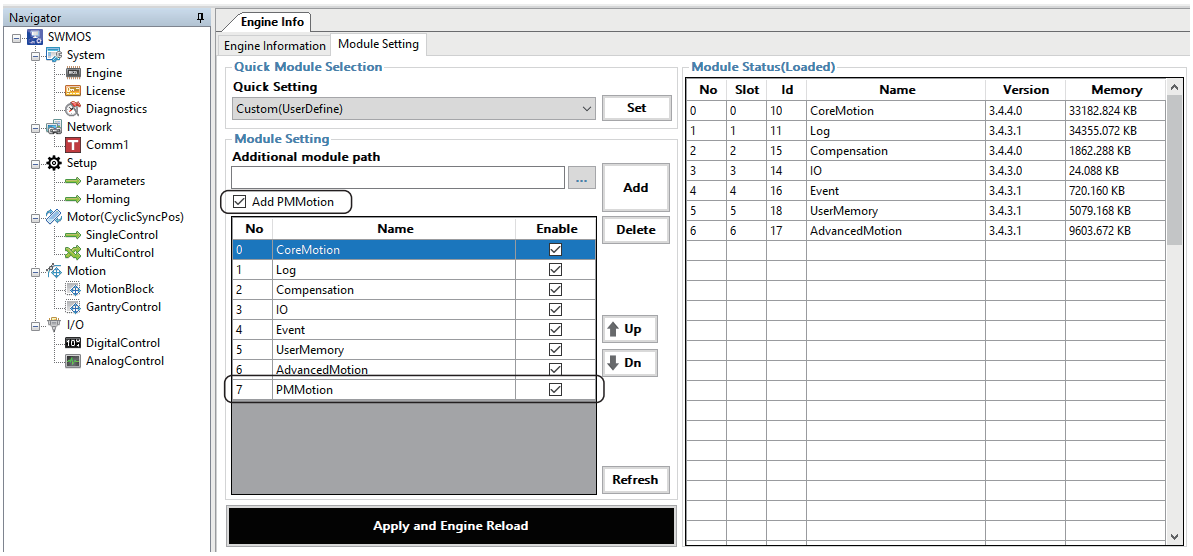
| Type | Item | Detailed information | Error cause |
|---|---|---|---|
| Windows | OS Information | Windows version information | — (Information display only) |
| | Processor Information | CPU information, number of cores | — (Information display only) |
| | Hyper-Threading | Enabling/disabling Hyper-Threading | When Hyper-Threading is enabled |
| | RAM Information | Memory information | — (Information display only) |
| | Update | Runtime information | Runtime not installed |
| Setting | RTX Information | Runtime OS RTX information | RTX installation error |
| | SWM-G Information | SWM-G engine information | SWM-G installation error |
| | SWM-G Module Information | SWM-G module information | Module.ini setting error |
| | SWM-G NIC Device Information | NIC setting information | NIC for CC-Link IE TSN not set |
| Files | SWM-G Header Files | File existence | No header file |
| | SWM-G Lib Files | File existence | No library file |
| | SWM-G CLRLib Dll Files | File existence | No CLRLib DLL file |
| | SWM-G Module Dll Files | File existence | No module DLL |
| | SWM-G Platform Dll Files | File existence | No platform DLL |
| | NIC Driver Dll Files | File existence | No NIC driver DLL |
| License | Dongle Key | USB license key information | USB license key error/not inserted |
| | SWM-G LicenseCode | License code information | License code not registered |
| State | Check RTX Services | RTX service status | RTX service not started |
| | IMDll.dll Infromation | IMDll information | IMDll.dll does not exist |
| | Start collecting engine message | Message collection result | — (Message output test to the message window) |
| | Try to create Device | CreateDevice execution result | Device generation failure |
| | Engine Message | Message collection result | License error<br>Platform start error<br>Module cannot be started due to license inconsistency |

# Appendix 3 PM Motion Function

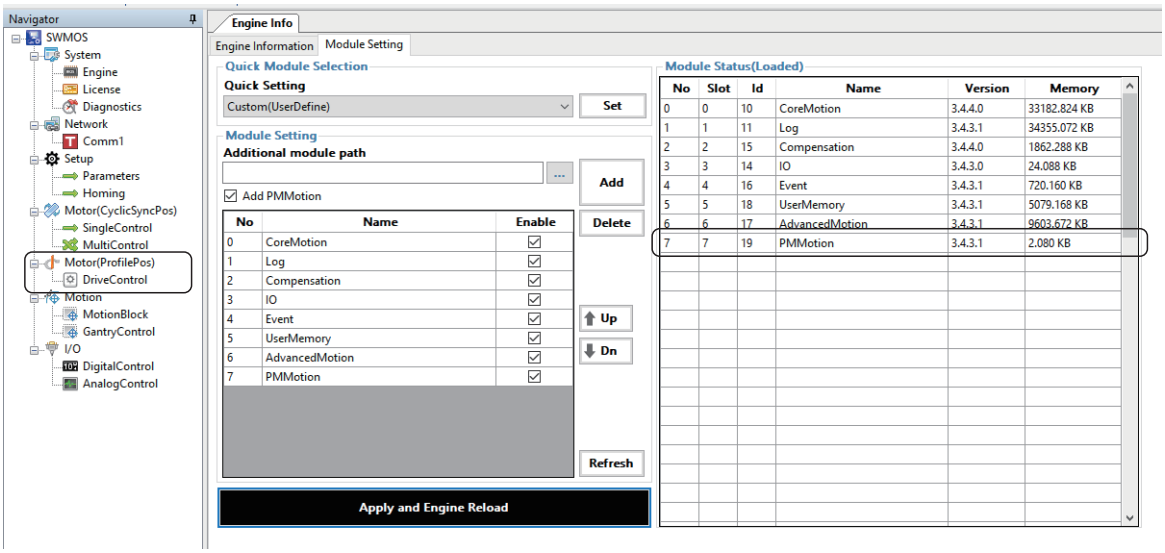
The PM motion module can control axes using the PP, HM, PV, and TQ command modes. It is compatible with only platforms that support these command modes.
The PM motion axes cannot be controlled by other platforms including the simulator platform.
When using the PM motion function, enable "PPMode".
The following shows the procedure for using the PM motion.

## Operating procedure

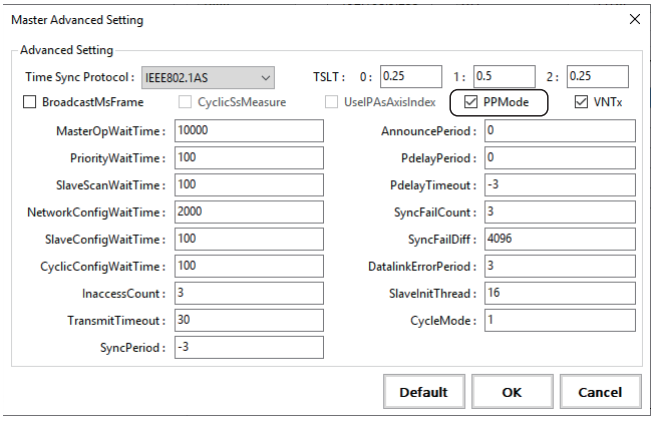
1. Select [SWMOS] ⇨ [System] ⇨ [Engine] in the navigation window, select the [Module Setting] tab, and select [Add PMMotion] in [Module Setting].
2. Add "PMMotion" to the module list.




3. Click the [Apply and Engine Reload] button. The SWM-G engine is restarted and PMMotion is enabled.
4. When PMMotion is enabled, [Motor(ProfilePos)] is displayed in the navigation window.



**5.** Select [SWMOS] ⇨ [Network] ⇨ [Comm1/Comm2] in the navigation window, select [CC-Link IE TSN], and click the [Advanced Setting] button in [Master Setting] to display the "Master Advanced Setting" window. Select "PPMode", and click the [OK] button to close the "Master Advanced Setting" window.




**6.** Change the CUI file setting so that the PDO mapping of the servo drive is for the PM motion.
Select [SWMOS] ⇨ [Network] ⇨ [Comm1/Comm2] in the navigation window, select [CC-Link IE TSN], and click a [Detail Setting] cell in [Remote Station Setting] to display the "Detail Setting" window. Set the PDO objects for TXPDO and RXPDO.

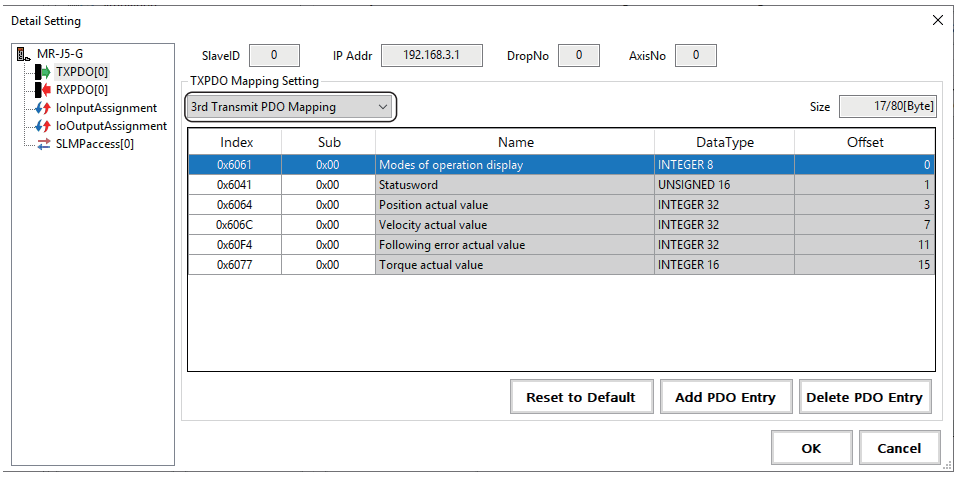
Ex.

For MR-J5-G

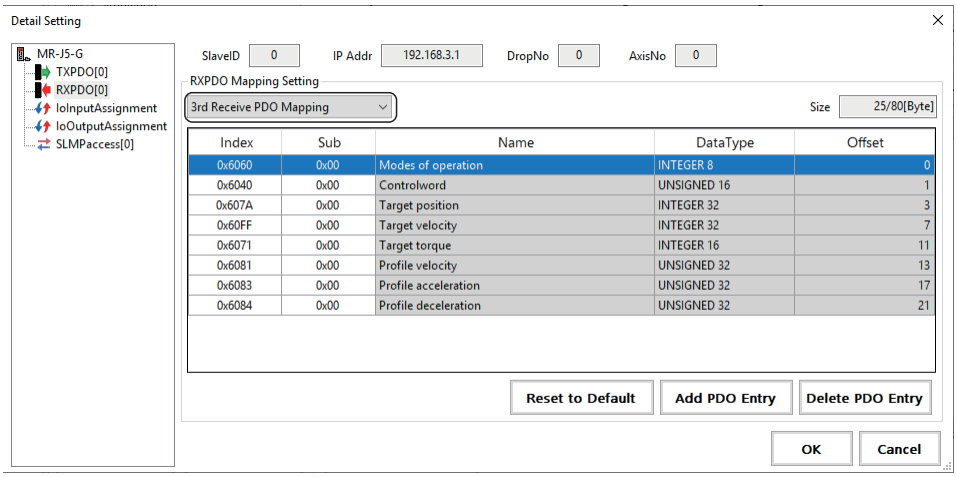
Set "3rd Transmit PDO Mapping" for TXPDO and "3rd Receive PDO Mapping" for RXPDO.

*: Configure the same setting for all the axes set in the remote station setting.

• TXPDO




• RXPDO



7. Click the [OK] button to close the "Detail Setting" window.
8. Start the communication in SWMOS and check the connection.
9. Select [SWMOS] ⇨ [Motor(ProfilePos)] ⇨ [DriveControl] in the navigation window to display the PM motion axis control window. The PM motion axis control can be tested. For the operations of the PM motion axis control, refer to the following.
☞ Page 150 Axis Control (PM Motion)

# Appendix 4 Troubleshooting

This section describes errors that may occur in SWM-G and actions to be taken.

| Description | Cause | Action |
|---|---|---|
| The tool does not start. | • The setup has not been completed.<br>• The license has not been registered. | Run the installer and set up the incomplete items.<br>For details, refer to the following.<br>📖Motion Control Software SWM-G User's Manual (Installation) |
| Only the "System" tree is displayed in the navigation window of SWMOS. | • The SWM-G engine is stopped.<br>• The license of SWM-G has not been registered. | Register the license of SWM-G and start the SWM-G engine. |
| The parameters of the SWM-G engine are initialized immediately after SWMOS is started. | When SWMOS is used alone, the SWM-G engine is restarted. Therefore, the parameters are initialized. | Read the parameter file after SWMOS is started or select [Home] ⇨ [Option (🛠)] ⇨ [System] tab ⇨ [SWM-G Parameter Auto Load(Default: Project Folder)]. For details, refer to the following.<br>☞ Page 25 System |
| The error occurs repeatedly even after it is reset with the sub payload of the PDU information in SWMOS. | The action load becomes high due to a large amount of calculation and communication, resulting in a jitter. | This error may be improved with the following actions.<br>• Change the time slot allocation.<br>• Increase the communication cycle. |

A

# Appendix 5 Adding/Updating a Profile (CSP+) of the Remote Station

A profile is data in which the information (such as model) of the connected device is stored.
The following describes how to add and update a profile.

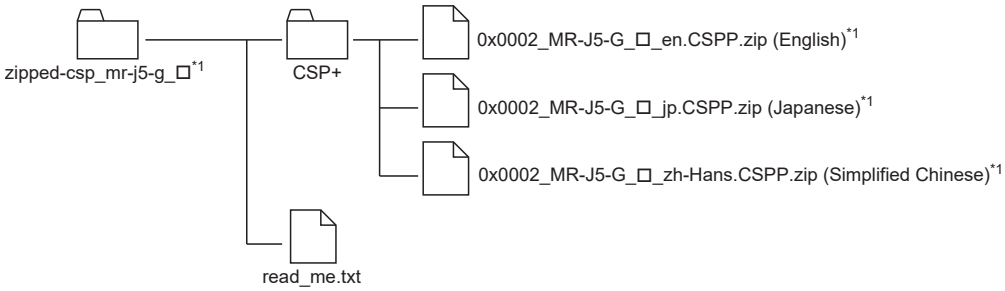
## How to add/update a profile

Add/Update a profile with the following procedure.

### Operating procedure

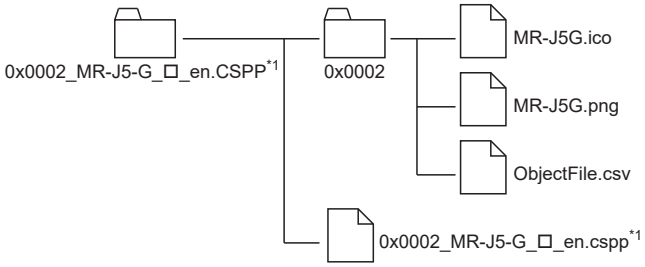
The profile of the servo amplifier (MR-J5-G) is used as an example.

1. Download the profile of the remote station from the Mitsubishi Electric Factory Automation Global Website.
2. Unzip the downloaded zip file to an arbitrary location. A profile (.zip) for each supported language is stored in the "CSP+" folder.



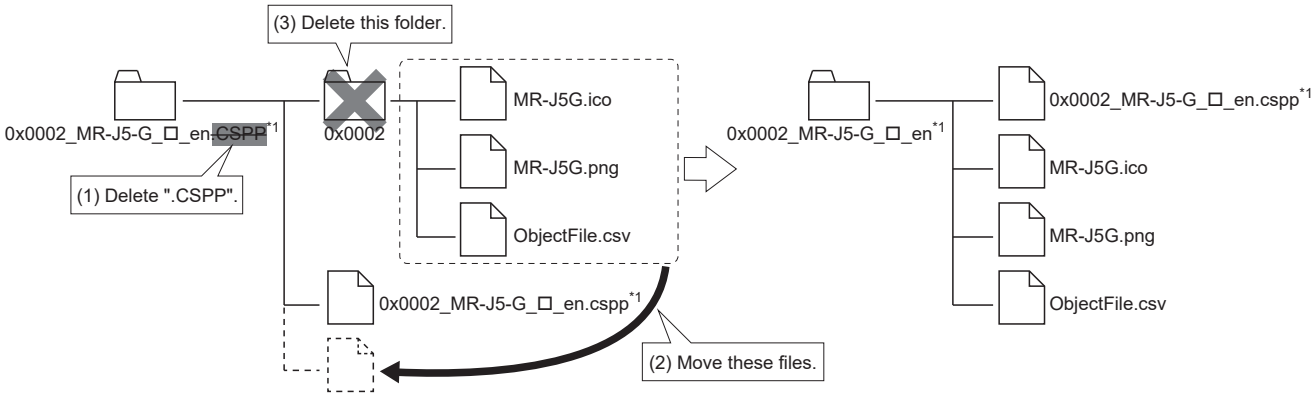

*1 ☐=Profile version

3. Unzip the profile of the supported language (example: English profile (0x0002_MR-J5-G_☐_en.CSPP.zip*1)) in the "CSP+" folder to an arbitrary location. In the "CSP+" folder, store "CSP+ file(.cspp)" and a sub folder in which "icon file (.ico)", "image file (.png)", and "object file (.csv)" are stored.




*1 ☐=Profile version

**4.** Create a folder for registration. Delete ".CSPP" from the name of the folder unzipped and created in step 3. Move all the files in the sub folder to the same hierarchy as the CSP+ file (.cspp), and delete the sub folder "0x0002".




*1 ☐=Profile version

**5.** Store the CSP+ file. Store the folder created in step 4 in "C:\Program Files\MotionSoftware\SWM-G\CSPP". The added CSP+ file is read at the startup of SWMOS.

## Precautions

- Profiles that can be used with SWM-G are automatically added at installation. Profiles can be added manually, but if a profile of a version not supported by SWM-G is added, it will not operate normally. For the supported profiles, contact our sales representative.

A

# REVISIONS

*The manual number is given on the bottom left of the back cover.

| Revision date | *Manual number | Description |
|---|---|---|
| February 2021 | IB(NA)-0300563ENG-A | First edition |
| November 2021 | IB(NA)-0300563ENG-B | ■Added or modified parts<br>Chapter 1, Section 1.1, Section 2.3, 3.1, Chapter 4, Section 4.2, 4.3, Chapter 5, Section 7.1, 7.2, 8.1, 8.2, 9.2, Appendix 2, 3 |
| February 2023 | IB(NA)-0300563ENG-C | ■Added or modified parts<br>Chapter 1, Section 2.1, 3.2, 3.3, Chapter 4, Section 4.1, 4.2, 4.3, 4.4, Appendix 1, 3, 5, 6<br>■Delete parts<br>Part 2, Chapter 5, 6, 7 |
| May 2023 | IB(NA)-0300563ENG-D | ■Added or modified parts<br>Appendix 6 |
| August 2024 | IB(NA)-0300563ENG-E | ■Added functions<br>Motion Scope<br>■Added or modified parts<br>INTRODUCTION, RELEVANT MANUALS, TERMS, Chapter 1, Section 2.1, Section 3.1, 3.2, 3.4, 4.1, 4.2, 4.6, 5.1, Part 3, Chapter 6, 7, Appendix 1, 3, 4, 5<br>■Deleted<br>Appendix 6 |

Japanese manual number: IB-0300560-F

# WARRANTY

Please confirm the following product warranty details before using this product.

## 1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.

However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

[Gratis Warranty Term]

For terms of warranty, please contact your original place of purchase.

[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.

(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.

1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
2. Failure caused by unapproved modifications, etc., to the product by the user.
3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
7. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

## 2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.

(2) Product supply (including repair parts) is not available after production is discontinued.

## 3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

## 4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to:

(1) Damages caused by any cause found not to be the responsibility of Mitsubishi.

(2) Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.

(3) Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.

(4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

## 5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

# INFORMATION AND SERVICES

For further information and services, please contact your local Mitsubishi Electric sales office or representative.
Visit our website to find our locations worldwide.

MITSUBISHI ELECTRIC Factory Automation Global Website
Locations Worldwide
www.MitsubishiElectric.com/fa/about-us/overseas/

# TRADEMARKS

IB(NA)-0300563ENG-E(2408)
MODEL: SWMG-O-E

**MITSUBISHI ELECTRIC CORPORATION**

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