

Personal Computer Embedded Type Servo System Controller

Motion Control Software SWM-G User's Manual (Startup)

-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".

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

- Configure external safety circuits 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 safety circuits externally, 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.

- 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]

- 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]

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]

- 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.

- 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]

- 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]

- 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 performance specifications, procedures before operation, and settings 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.

When applying program examples provided in this manual to an actual system, ensure the applicability and confirm that it will not cause system control problems.

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

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RELEVANT MANUALS

Manual name [manual number]	Description	Available form
Motion Control Software SWM-G User's Manual (Startup) [IB-0300562ENG] (this manual)	This manual explains the specifications, procedures before operation, and settings 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 Operating Manual (SWMOS) [IB-0300563ENG]	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 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

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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	An extension function that operates Windows in real time, which is developed by IntervalZero.
RTX64	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.
Madula	
User unit	A unit of the position defined by the user (such as 1 mm and 1 μ s). It is abbreviated as "U".
	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.

1 OVERVIEW

Motion Control Software SWM-G is software that is installed in a personal computer to perform motion control and network control. Connect the personal computer to servo amplifiers or remote stations such as a remote I/O using CC-Link IE TSN. Connect the personal computer in star topology or line topology using Ethernet cables. Star topology and line topology can be combined in a network.

In Motion Control Software SWM-G, up to 128 axes of servo motors can be controlled.

1.1 System Configuration

The following shows the SWM-G system configuration.



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- · Connecting to the NIC port set at the time of installation is required.
- When using multi-axis servo amplifiers, the invalid axis setting cannot be used.

1.2 Architecture

All the functions of SWM-G have been implemented in "rtdll" and can be used by loading them.

The following shows the overall flow chart of data in the SWM-G architecture.



Item	Description
SWM-G engineering tool	 SWMOS An integrated utility. EcConfigurator*1 A network setting tool for EtherCAT communication.
User application	A program created by the user.
SSC API	An interface library with SWM-G.
SWM-G engine	Performs the motion control and network management.
Motion Interface	A motion interface.
Platform Interface	A platform interface.
MP Interface	A motion-platform interface.
CoreMotion.rtdll	Performs the basic motion control.
Compensation.rtdll	Performs the compensation processing.
AdvancedMotion.rtdll	Performs the advanced motion control.
Event.rtdll	Performs the event processing.
IO.rtdll	Performs the I/O control.
CCLinkPlatform.rtdll	Communicates with the CC-Link IE TSN remote stations.
SimuPlatform.rtdll	Simulates the virtual axis.
EcPlatform.rtdll ^{*1}	Communicates with the EtherCAT remote station.

*1 When using SWM-G-N1 only

2.1 Performance Specifications

The following shows the performance specifications of SWM-G.

Item		MR-SWMG16-U/	MR-SWMG32-U/	MR-SWMG64-U/	MR-SWMG128-U/			
		MR-SWMG16N1-U	MR-SWMG32N1-U	MR-SWMG64N1-U	MR-SWMG128N1-U			
Number of control	axes	16 axes	32 axes	64 axes	128 axes			
Number of connect	cted stations	Up to 128 stations						
CC-Link IE TSN	Communication speed	1 Gbps/100 Mbps ^{*1*2}						
	Communication cycle	Standard 1 ms, Can be set to	0.125 ms to 8 ms by the use	r				
	Other communication specifications	Mixture of class B, Hot Conne	ect, SDO communication, IP c	communication				
	Transmission line type	Line topology, star topology, I	ine + star topology					
EtherCAT ^{*4}	Communication speed	100 Mbps						
	Communication cycle	Standard 1 ms, Can be set to	0.125 ms to 4 ms by the use	r				
	Other communication specifications	Class A compliant, CoE, EoE, FoE, SoE, AoE, VoE, FSoE, DC-synchronous/SM-synchronous, Hot Connect						
	Transmission line type	Line topology, star topology, r	ing topology					
I/O size		Input 8000 bytes, output 8000) bytes					
Positioning		Up to 128 axes simultaneously (absolute value command, relative value command) Override is possible						
Acceleration/dece processing	leration	Trapezoidal, S-curve, jerk ratio, parabolic, sine, advanced-S, trapezoidal moving average time, jerk-limited, jerk limited S-curve, jerk-limited advanced-S, two velocity trapezoidal, two velocity S-curve, two velocity jerk ratio, time acceleration trapezoidal, time acceleration S-curve, time acceleration jerk ratio, time acceleration parabolic, time acceleration sine, time acceleration advanced-S, constant deceleration, jerk ratio/fixed velocity-T, jerk ratio/fixed velocity-S, jerk-limited/fixed velocity-S						
Interpolation funct	lion	2- to 4-axis linear interpolation (up to 128 axes), 2-axis circular interpolation, 3-axis circular interpolation, 3-axis helical interpolation, PVT						
Continuous path		Combination of linear and circular interpolation, spline interpolation, pre-read speed automatic control, linear/circular continuous path with rotation stage						
Real-time control		Event, triggered motion, position synchronous output						
Synchronous cont	trol	Simple synchronization, synchronous gear ratio, synchronous phase offset, synchronous compensation, dynamic establishment/cancellation of synchronization, multiple pairs (up to 64 pairs) of synchronization between 1 axis and multiple axes (synchronous group)						
Electronic cam		Cam curves of eight systems	can be defined, cam curve pe	er communication cycle, phase	operation, clutch			
Home position ret	urn function ^{*3}	Home position return using the external input signal, mechan	Home position return using the Z-phase (index pulse), home position sensor, limit sensor, limit proximity sensor, external input signal, mechanical end, and gantry axis can be performed.					
Compensation fur	nction	Backlash/pitch error compens	sation, plane strain (straightne	ess) compensation				

*1 When there are two ports, 1 Gbps devices and 100 Mbps devices can be assigned to each port.

*2 When multiple CC-Link IE TSN classes are mixed, the functionality and performance of a part of the network or the entire network are equivalent to the lower CC-Link IE TSN class.

*3 It does not support the home position return mode of the servo amplifier.

*4 When using SWM-G-N1 (MR-SWMG16N1-U, MR-SWMG32N1-U, MR-SWMG64N1-U, and MR-SWMG128N1-U) only

2.2 Supported Platforms

The platforms supporting SWM-G are shown below.

Any supported platforms can be used.

 \bigcirc : Supported, \times : Not supported

Product name	Platform		
	Simulation	CC-Link IE TSN	EtherCAT
SWM-G	0	0	×
SWM-G-N1	0	0	0

The following shows the SWM-G functions.

Function		Description			
Home position re	eturn	Aligns the axis coordinates with the physical machine coordinates.			
Basic function	Position control	Moves the specified axis to the specified position.			
	Speed control	Accelerates or decelerates the command axis to the target speed using the specified parameter and keeps it moving after it reaches the target speed. The control not including the position loop is performed on the command to the servo amplifier.			
	Torque control	Maintains a constant torque in the specified direction. The control not including the position loop is performed on the command to the servo amplifier.			
	JOG operation	Performs the JOG operation on the command axis using the specified parameter.			
	Linear interpolation	Interpolates the axis so that is moves in a straight line in synchronization.			
	Circular interpolation	Interpolates two axes onto a circular arc.			
	3D circular interpolation	Interpolates three axes onto a circular arc in a 3D space.			
	Helical interpolation	Moves three axes in spirals.			
	Override	Overwrites the target value of the axis executing the command. Including the target position, every parameter of the motion command can be changed.			
	Trigger motion	Delays the execution of the motion command until the specified trigger condition is satisfied.			
	Synchronous control	If the command position of the master axis changes, the command position of the slave axis also changes by the same amount.			
Advanced	Spline interpolation	Moves two to six axes along the path defined by a point sequence or other parameters.			
function	PVT control	Commands the axis using a point cloud consisting of position, speed, and time. The axis passes the position of each point at the specified speed and at the specified time.			
	Path interpolation	Two interpolation axes follow the defined path with either a single motion profile or different motion profiles for each segment.			
	Rotation path interpolation	Rotates the entire path by adding the rotating axis to the path interpolation.			
	Pre-read path interpolation	Specifies the speed limit and acceleration limit for each interpolation axis in addition to the path interpolation function. The interpolation speed and acceleration of each path segment are adjusted so that the path is completed in the shortest time within the axis limit.			
	E-CAM	Controls the command position of the slave axis according to the position of the master axis. The command position of the slave axis is calculated from the position of the master axis using the point data defined in the E-CAM table.			
Compensation function	Pitch error compensation	Compensates the physical irregularities of the axes by defining the offsets measured at the command positions at regular intervals of the axes.			
	2D pitch error compensation	Calculates the pitch offset from the positions of two reference axes instead of one axis.			
	Backlash compensation	Applies the offsets when the axis changes the movement direction.			
Others	Touch probe	Latches the axis position. Two types of touch probes are available; A hardware touch probe and software touch probe.			
	Position synchronous output	Used to set the output signal when a specific condition is satisfied.			
	Planned speed override	Overwrites the speed of the axis executing the position command when a specific condition is satisfied.			
	10	Performs the I/O module control.			
	User memory	Performs the user memory control.			
	Logging	Saves the data specified by the setting.			
PM motion		Instead of sending the position, speed, or torque command to the servo drive for each cycle, the motion command is sent to the servo drive only when the PM motion module function is called.			

4 PROCEDURES BEFORE OPERATION AND SETTING

This chapter describes the procedures before the operation of SWM-G.

1. Setup

Install Motion Control Software SWM-G in a personal computer.

For details, refer to the following.

Motion Control Software SWM-G User's Manual (Installation)

2. Wiring and connection of system configuration devices

Connect the personal computer and remote stations such as servo amplifiers with Ethernet cables.

 $\ensuremath{\boxtimes}^{\ensuremath{\square}}$ Page 15 Wiring and Connection of System Configuration Devices

3. Startup and initial setting of the engineering tool (SWMOS)

Start the engineering tool (SWMOS) and set the CC-Link IE TSN platform.

Page 16 Startup and Initial Setting of the Engineering Tool (SWMOS)

4. Network configuration setting

Set the network configuration.

- Page 19 Network Configuration Setting
- 5. Parameter setting of the servo amplifier
- Set the parameters of the drive unit to be used.
- Page 25 Parameter Setting of the Servo Amplifier

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Details of procedures before operation will be described using an example of when "CC-Link IE TSN" is used for the platform.

For details on using "EtherCAT" for the platform, refer to the following manual. Motion Control Software SWM-G Operating Manual (EcConfigurator)

4.1 Wiring and Connection of System Configuration Devices

Connect the personal computer and remote stations such as servo amplifiers with Ethernet cables.

Set the rotary switches of the servo amplifiers.

In the initial state of the servo amplifiers, the rotary switches (SW1/SW2) correspond to the fourth octet of the IP address.

System configuration example

In the following system configuration example, the initial values of the IP addresses are used.

Applicable device	IP address
Personal computer (master)	192.168.3.253
MR-J5-G	192.168.3.1
MR-J5W3-G	192.168.3.2



· Connecting to the set NIC port is required.

· When using multi-axis servo amplifiers, the invalid axis setting cannot be used.

4.2 Startup and Initial Setting of the Engineering Tool (SWMOS)

Start the engineering tool SWM-G Operating Station (SWMOS) and set the CC-Link IE TSN platform. This setting allows the communication with CC-Link IE TSN remote stations.

Starting SWMOS

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



For details of the SWM-G functions, select [SWM-G] ⇔ [Doc] from the Windows start menu and refer to the following manual stored in the Doc folder.

2. When SWMOS is started, the "Getting started" screen and "SWMOS" screen appear. In the "Getting started" screen, the system version, license information, and others can be checked. Click the [Close] button to close the "Getting started" screen.

■"SWMOS" scre	en	■"Getting started" screen
SWMOS(SWM-G Operating Statio	sn) — 🗆 X	Getting started X
StartComm StopComm Communication	Analyzer Joos Analyzer Joos A Servoor Al Alamikeet AllSiop Controllox SyncAvec All Main Keet AllSiop Controllox SyncAvec All Status Battus	Engine License Diagnostics ConfigureRT ConfigureNIC
Neighter 0 ■ System System Constant Diagnostics 0 0 0 0 0 0 0 0 0 0 0 0 0	Engine Info Engine Information Module Setting Engine Status: Stopped Engine Status: Stopped Communication Status: Stopped Communication Status: Name MasterNum Yersion i Engine Version : 0.00.0 Licensed Axers Num : 0 Doctore Status: Doctore	system Information ✓ System Information Vital
0//Line (1024x768)	Imme Information Information Z023-01-11 1430-33 Version: VI.3.0 Z023-01-11 1430-33 Version: VI.3.0 Z023-01-11 1430-34 Engine State: Shutdown COPYRIGHTICI 2020 MTSUBSH ELECTRC CORPORATION .:	
(1024000)	Con missing y 2020 Min 300 Jan Etter Min 2010	

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If you select "Don't show this again" in the "Getting started" screen and click the [Close] button to close the screen, the "Getting started" screen will not be displayed at the next startup.

Checking and setting the platform

1. Select [System] ⇒ [Engine] (1) in the navigation window on the "SWMOS" screen to display the Engine Info window. Select the [Engine Information] tab (2) and check the settings in [Platform Setting] (3).



2. Select [Platform Setting] ⇒ [Quick Setting] (4), select "CC-Link IE TSN", and click the [Save] button (5).



3. When the message "Do you want to save in Module.ini?" appears, click the [Yes] button.



4. When the message "Do you want to restart the SWM-GEngine?" appears, click the [Yes] button to restart the engine.



5. When the engine is restarted, the status can be checked in [Engine Status] (6) in [Engine Information]. Update the status in order of "Stopped" → "Preparing" → "Running".
The network information is displayed in [Diatform Status] (7).

The network information is displayed in [Platform Status] (7).

Engine Info										
igine information N	lodule Setting					DI-M	Charles and		•	
Engine Informatio	n 🔶					Platte	orm Status –			C
Engine Status :	Running		Engine Stop	`	Engine	66.1		MasterNum	Version	Status
Comm Status :	Stopped		Communication	Start	Restart			•	3.4.2.1	Kunning
Engine V	/ersion : 3.4.3.1		Licensed Axes	Num :	16					
IMLib V	/ersion : 3.1		Loaded Modules	Count :	7	Devic	es Status			
Set Comm Cyc	le Info :	CC-Link	IE TSN CycleTime : 1r	ms		ID	Туре	Nam	e	Status /
Platform Setting						0	LowPriority	SWMOS-PI	atform	0.033/15sec
Ouick Setting				Comm	on Setting –	1	LowPriority	SWMOS-N	lotion	0.033/15sec
CC-Link IE TSN		~ Lo	ad Save	Message	e Level					
D 1 C 1 C	•			Warning	g v					
Mode Setting	DIIName	Enable	NumOfMaster	Print Lo	g					
CC-Link IE TSN	cclinkplatform	Enable	× 1 ×	Off	\sim					
CC LINKIE TOTT		Lindore		NumOfl	nterrupt					
Platform Setting	1			1	\sim					
Mode Setting	DIIName	Enable	NumOfMaster	Location	1					
Simulation	 simuplatform 	Disable	✓ 1	.\motio	n\					
				Get Engi	ine Message					
Platform Setting	2			Disable	\sim					
Mode Setting	DiiName	Enable	NumOfMaster	Auto Clo	ose Device					
None		Disable	× 1 ×	Enable	\sim					

6. With the above settings, the preparation for communicating with the CC-Link IE TSN remote stations has been completed. Since the engine will be stopped by closing the "SWMOS" screen, leave it in the execution state.

4.3 Network Configuration Setting

After setting the CC-Link IE TSN platform, set the network configuration.

This section describes the settings using the system configuration example in Section 4.1. (SP Page 15 System configuration example)

Displaying the CC-Link IE TSN setting screen

- **1.** Select [SWMOS] ⇔ [Network] ⇔ [Comm1] (1) in the navigation window on the "SWMOS" screen to display the Comm1 window.
- 2. Select [CC-Link IE TSN] (2) in the [Comm1] tree. [Master Setting] (3) and [Remote Station Setting] (4) are displayed.



Master setting

- **1.** Set [Communication cycle (CommCycle)] (1) and [IP address (IP Addr)] (2) in [Master Setting]. (In the explanation of this section, the initial values are set.)
- Communication cycle: 1000[μs]
- IP address: 192.168.3.253



Remote station setting

- **1.** Right-click the object list in the remote station setting, and click [Add] (3) to add a line in the object list. Add lines for the number of remote stations to be connected.
- **2.** Double-click a cell in the [Model] (4) column.



3. The "Model Selection" screen is displayed. Select a remote station to be added (example: MR-J5-G) from the list, and click the [OK] button.



- 4. The selected remote station is displayed in the cell in the [Model] (4) column.
- 5. Set the IP address (5) of the remote station. (In the explanation of this section, the initial values are set.)
- 6. Double-click a cell in the [AxesNo] (6) column.

	A LL	10.4.1.1	A NI		
SlaverD	IVIODEI	IP Addr	Axesino	Network Synchronous Communicatio	n
0	MR-J5-G	192.168.3.1		Asynchronous	
	≜	≜			
	(4)	(5)	(6)		

7. The "Axis Number Setting" screen is displayed. 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.



8. The axis numbers set in [AxesNo] (6) are displayed.

SlaveID	Model	IP Addr	AxesNo	Network Synchronous Communication	
0	MR-J5-G	192.168.3.1	0	Asynchronous	
1	MR-J5W3-G	192.168.3.2	1,2,3	Asynchronous	

Point P

When setting axis numbers, click the [Auto Assign Axes] button to automatically assign axis numbers. For details of the Auto Assign Axes, refer to "Automatic assignment of axis numbers" in the following manual. Motion Control Software SWM-G Operating Manual (SWMOS)

Saving the settings

1. Click the [Save to Project] (1) button.

Engine Info Co	mm1						•
Comm1 CC-Link IE TSN Simulation		Master Setting CommCycle [us 1000] IP Addr / 192.168.3.253	PrintLog OFF	MessageLev Error	Advanced Setting	
		Remote Station S	etting				
		SlaveID	Model	IP Addr	AxesNo	Network Synchronous Communication	
		0	MR-J5-G	192.168.3.1	0	Asynchronous	
		1	MR-J5W3-G	192.168.3.2	1,2,3	Asynchronous	
Load from Project	to Project	<					
Load	Save	Auto Assig	n Axes			Auto Detect	io

2. The confirmation message "Do you want to save the setting to the project data?" appears. Click the [Yes] button.
*1 If the setting has an error, an error message appears. (SP Page 24 Network setting error information)



- **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 (2), and click the [New Folder] button (3). A folder (4) 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.

Information	×
Succeeded in saving the settin	g to the project data.
	UK
Point P	

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

<Storage destination folder>

C:\Program Files\MotionSoftware\SWM-G\SWMOS\SWMOSPack\Project\SWMOS\NETWORK

Precautions

• The settings are not applied to the SWM-G engine only by saving the setting file with the [Save to Project] button. Write the settings to the SWM-G engine with the [Save to Engine] button to apply the settings to the SWM-G engine.

Writing to the SWM-G engine

1. Click the [Save to Engine] button (1).

Comm1 CC-Link IE TSN	- Master Setting -	1 ID Adda	Duintle e		
Simulation	Commeycle [us	j iP Addr	PrintLog	MessageLev	/ei
- 🧠 Monitor	1000	/ 192.168.3.253	OFF	 ✓ 	 Advanced Setting
	-Remote Station S	etting			
	SlaveID	Model	IP Addr	AxesNo	Network Synchronous Communication
	0	MR-J5-G	192.168.3.1	0	Asynchronous
	1	MR-J5W3-G	192.168.3.2	1,2,3	Asynchronous
Load Save					

- 2. The confirmation message "Do you want to save setting to the engine?" appears. Click the [Yes] button.
- *1 If the setting has an error, an error message appears. (IPP Page 24 Network setting error information)

Question		×
?	Do you want to save setting to the engine?	
	Yes No	

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 network 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 following 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.

Motion Control Software SWM-G Operating Manual (SWMOS)

Network Setting Error	Information	×
No	Kind	Name
1	Critical	IP address duplication in master
This error occurred CC-Link IE TSN(Co Duplicate IP addres	l in the following mas mm1) uses for the following	ter setting.
	- ,-	~
No	Kind	Name
1	Critica	IP address duplication in master
2	Error	Axes map duplication in master
3	Error	Axes map duplication in communication
4	Critica	IP address duplication in the all communication
	Ignore	Error and Save Verification OK

4.4 Parameter Setting of the Servo Amplifier

Set the parameters of the drive unit to be used.

Set the servo amplifier (MR-J5-G) with MR Configurator2.

The following shows the procedure for setting the parameters of the servo amplifier as an example.

Parameter

No.	Name	Setting value
PA04.2	Servo forced stop selection	1: Disabled (The forced stop input EM1 and EM2 are not used)
PD01.2	Input signal automatic on selection	 Forward rotation stroke end (LSP) 1: Automatic on Reverse rotation stroke end (LSN) 1: Automatic on
PT01.1	Speed/acceleration/deceleration unit selection	1: (Speed: Command unit/s, acceleration/deceleration: Command unit/s ²)*1

*1 The command unit is fixed to pulse. Therefore, "pulse/s" is used as the speed unit instead of "r/min".

Precautions

- In the parameter change example, the input signal of the servo amplifier is not used. Configure the settings according to the safety measures required for the customer's intended use.
- The parameters of the servo amplifier are not managed in SWM-G.
- When the servo parameter [PT01.1 (Speed/acceleration/deceleration unit selection)] is set to "1: (Speed: Command unit/s, acceleration/deceleration: command unit/s²)", the digits may overflow since the command unit is 32-bit. In that case, adjust it using the gear on the servo amplifier side.

Point P

- MR Configurator2 is software for servo parameter setting, graph measurement/display, test operation, and others. This section describes the procedure for connecting the servo amplifier to a personal computer where MR Configurator2 has been installed and starting up the servo amplifier. For details of how to use MR Configurator2, refer to the following.
- MR Configurator2 Help
- Set the parameters for all the connected axes.

Parameter setting procedure

1. Start MR Configurator2. Select [Project] ⇒ [New] (1) from the menu and create a new project.



2. When a new project is created, the "New Project" screen appears. Click the [Switch to Multi-axis Project] button (2).

New Project (Single	Axis)	×
Model	MR-J5-G(-RJ)	~
Operation mode		×
Multi-ax. unification		~
Station	00	~
Option unit	No Connection	×
Com. speed Port No.	AUTO	
Com, speed Port No,	АUTO У	
Network/contro	leed/port No. automatically	
The last-used project the application is res	t will be opened whenever started	
	OK Cancel	
Switch to Multi-axis	Project	
witch the window by cli create multi-axis confi	king this button when you war guration.	nt

3. The screen is switched to the "New Project" screen of the multi-axis project. Set each item. For how to set the items, refer to the following.

New Project (Multi-axis)
Connection Network: CC-Link IE TSN M
Via: None PC side L/F
Connection I/F © Ethernet
Protocol UDP 🖌 Time-out 1 🐑 s (1-15)
Retry 0 💮 times (0-3)
Servo Amplifier Configuration Automatic Detection
Axis Model IP address
1 MR-J5-G(-RJ) 192.168.3.1
*The copied/pasted/deleted data includes not only the model of the servo amplifier but also the set data (servo parameter, etc.).
The last-used project will be opened whenever the application is restarted.
Communication Test OK Cancel
Switch to Single Axis Project (Servo Amplifier Direct Connection)
For Multi-axis Project, the setting value (like parameter) of servo amplifier is not read. Execute reading from servo amplifier on each corresponding screen.

IP Page 53 MR Configurator2 communication setting using the IP communication

4. When the setting is completed, click the [OK] button. The created project appears.

5. Double click [Axis1:MR-J5-G(-RJ) Standard] ⇒ [Parameter] (3) in the project window to display the parameter setting window. Select the group of the parameters to be set in the display selection tree (4) and set the parameters.

ſ	-								
	MELSOFT MR Configurator	2 New project - [Parameter S	etting]					- 0	×
	Project View File Parame	ter Setting(Z) Parameter	Safety Po	sitioning-da	ta Monitor Diagnosis Test Mode Adjustment	Tools	Window Help		_ @ ×
	: 🖻 🛤 📖 🖉 🚱 . 📆	🗖 📣 🖄 💷 🛲 🚛 🐼	n	T T	(h)				
				,	<u>~</u>				
	Project # X	Parameter Setting	g ×						4 P 🗕
	New project	🚺 🖬 Axis1 🛛 💌 🕂 Re	ead 🛛 🐻 Set	To Default	Verify 📳 Parameter Copy 📄 Parameter Block				
	- System Setting	Save As							
(3)	Parameter	Eurotion display							
(0)	Network Parame	Common	Common				Selected Items Write	Axis Writing	
	Safety Parameter	Absolute positi	No.	Abbr.	Name	Unit	Setting range	Axis1	^
	Point Table	- Position/speed	Operation r	node					
		 Servo adjustme 	Operation r	node				0 + Standard control	_
		- Positioning	PA01.1	**	Operation mode selection		0-8	0 : Standard Control -	=
		_I/O	PA01.4	**	Fully closed loop operation mode selection		0-1	0 : Disabled (Semi Cid -	
		- Servo amplifier	Component	narte				Setting	
		- Machine diagn	DA02.0.1	**	Deserve fine and a set of a		00.55	00 : Recent option is -	
(4)		DD Motor cont	PA02.0-1	MRD	Regenerative option selection		0-1000		
(')	1	- Fully closed loc	PC04.3	**	Encoder cable communication method selection		0-1	0:2-wire 🚽	
		Application fur	Protection	coordinatior	setting				
		🖃 🥅 List display 🦷	PC46.1	*	Converter stop mode selection		0-1	0 : Shut off converte 👻	
		- Basic	PC46.2	*	Protection coordination - Multiple connections selection		0-1	0 : Connect converte 🗸	
		- Gain/filter	PC46.3	*	Protection coordination - Final end setting		0-1	0 : End setting disabl 👻	
		- Extension	Network pr	otocol setti	ng				
		Extension 2	PN13.0-3	**	Network protocol setting		0000-0004	0000 : CC-Link IE TSI 👻	
			Control more	de					
			معمدما	**	6 · I · I · F			0 • Network standarc	
		Docking Help							Ψ×
	<								
	Ready	Servo amplifier co	onnection Et	hernet				OVR CAP NUM	SCRL //

· Setting the servo parameter [PA04.2(Servo forced stop selection)]

Select [Function display (List)] \Rightarrow [Common] \Rightarrow [Basic] \Rightarrow [Forced stop] in the display selection tree and set [PA04.2(Servo forced stop selection)] (5) to "1: Disabled (The forced stop input EM1 and EM2 are not used)".

Parameter Settin	ng X						4 ▷ ▾
🔳 Axis1 🛛 🖌 📲	tead [🚺 Se	t To Default	Verify 📳 Parameter Copy 📄 Parameter Block				
🖻 Open 💾 Save As	Copy	Paste 📉	Indo MRedo				
Function display Common	Common			[Selected Items Write	e Axi <u>s</u> Writing	
Absolute positi	No.	Abbr.	Name	Unit	Setting range	Axis1	<u>^</u>
Position/speed	Network p	rotocol setti	ng				
Servo adjustme	PN13.0-3	**	Network protocol setting		0000-0004	0000 : CC-Link IE TSI 👻	
Positioning	Control m	ode					
_1/0	PA01.0	**	Control mode selection		0-6	0 : Network standarc 👻	
Servo amplifier	Rotation of	lirection					
Machine diagn	PA14	*POL	Travel direction selection		0-1	0 : CCW or positive c 👻	3
- Linear control	PC29.3	*	Torque POL reflection selection		0-1	1 : Disabled 👻	
DD Motor cont	PT55.1	*	Homing POL reflection selection		0-1	0 : Disabled 🛛 👻	
 Fully closed loc 	Zero spee	d					
Application fur	PC07	ZSP	Zero speed		0-10000	50	
🔲 🥅 List display	Forced sta	p qu					
Basic	PA04.2	*	Servo forced stop selection		0-1	1 : Disabled (The f 🔻	
Gain/filter	Forced st	op decelerat	on function				
- Extension	PA04.3	*	Forced stop deceleration function selection		0-2	2 : Forced stop decel 👻	
-I/O	PC24	RSBR	Deceleration time constant at forced stop		0-20000	100	
	Vertical as	is freefall pr	evention				

· Setting the servo parameter [PD01.2(Input signal automatic on selection)]

Select [Function display (List)] \Rightarrow [I/O] \Rightarrow [Digital I/O] \Rightarrow [Device assignment] \Rightarrow [PD01.0-7(Input signal automatic ON selection 1)] (6) in the display selection tree and click the [Setting] button. When the "Auto ON Setting" screen appears, set [LSP] and [LSN] to "ON" in [Auto ON assignment] (7) and click the [OK] button. Set "00000C00" in the setting column.

Parameter Settin	gx						₫ ▷ ┯					
📕 Axis1 💌 🕂 R	ead 🚺 Set	To Default	😡 Verify 👖 Parameter Copy 📄 Parameter Block									
Dpen 💾 Save As 👔	Copy	aste 📩 U	ndo 🚰Redo									
E Function displa					<u></u>		1					
- Common	I/O				Selected Items Write	Axis Writing				(7)		
Absolute positi	No.	Abbr.	Name	Unit	Setting range	Axis1	<u>^</u>			(I)		
Position/speed	Digital I/O											
- Servo adjustme	Device sett	ng				Setting			Auto ON Sett	ing		
Positioning	PD03.0-1	*	Device selection DI1		00-FF	0A			Auto on sett			
	PD04.0-1	*	Device selection DI2		00-FF	OB			Auto ON assig	nment		
Serve amplifier	PD05.0-1	*	Device selection DI3		00-FF	22	=					
- Servo ampimer	PD51.0-1	*	Device selection DI3-2		00-7F	62			LSP	ON	OFF	
- Machine diagn	PD38.0-1	*	Device selection DI4		00-FF	2C			LSN	ON	OFF	
- Linear control	PD39.0-1	*	Device selection DI5		00-FF	2D			l			
DD Motor cont	PD07.0-1	*	Device selection DO1		00-FF	05						
- Fully closed loc	PD08.0-1	*	Device selection DO2		00-FF	04						
Application fur	PD09.0-1	*	Device selection DO3		00-FF	03						
😑 🥅 List display	Device assi	gnment				Setting						
- Basic	PD01.0-7	*DIA1	Input signal automatic ON selection 1		000000-00000FF0	0000000		(6)				
Gain/filter	Input filter								<u></u>			
- Extension	PD11.0	*	Input signal filter selection		0-В	7:3.500ms 👻						
_I/O M	ALM output										OK C	ancel
	PD14.1	*	Warning occurrence - Output device selection		0-1	0 : WNG signal turn (🚽	~					

· Setting the servo parameter [PT01.1(Speed/acceleration/deceleration unit selection)]

Select [List display] \Rightarrow [Positioning control] \Rightarrow [PT01 (Command mode selection)] (8) in the display selection tree and set "00000310" in the setting column.

Parameter Settin	ig X						< ▷ -
🔳 Axis1 🛛 💌 📲	ead [🖉 S	et To Default	Verify 👖 Parameter Copy 📄 Parameter Block				
🖻 Open 💾 Save As 🛛	Сору	Paste 📩	Jndo 📶 Redo	·			
 Linear control DD Motor cont 	Position	ing control		Selec	ted Items Write	lxi <u>s</u> Writing	
- Fully closed loc	No.	Abbr.	Name	Unit	Setting range	Axis1	~
Application fur	PT01	**CTY	Command mode selection		0000000-00000310	0000 0310	
ist display	PT02	*TOP1	Function selection T-1		00000001-10000001	0000 0001	
List display	PT03	*FTY	Feed function selection		0000000-00000300	0000 0000	
Basic	PT04		For manufacturer setting		0000000-0000000	0000 0000	
Gain/filter	PT05	ZRF	Homing speed	r/min mm/s	0.00-167772.15	100.00	
 Extension 	PT06	CRF	Creep speed	r/min mm/s	0.00-167772.15	10.00	
- I/O	PT07	ZST	Home position shift distance		.47483648-2147483647	0	
Extension 2	PT08	ZPS	Homing position data		.47483648-2147483647	0	
Extension 3	PT09	DCT	Travel distance after proximity dog		0-2147483647	1000	
Ontion	PT10	ZTM	Stopper type homing - Stopping time	ms	5-1000	100	
Createl	PT11	ZTT	Stopper type homing - Torque limit value	%	0.1-100.0	15.0	
- эресіаі	PT12	CRP	Rough match output range		0-2147483647	0	
Motor extensio	PT13		For manufacturer setting		0000000-00000000	0000 0000	
Multi encoder	PT14	*BKC	For manufacturer setting		0-0	0	
 Positioning cor 	PT15	LMP	Software position limit +		.47483648-2147483647	0	
- Network	PT16		For manufacturer setting		0000000-00000000	0000 0000	
Positioning ext	PT17	LMN	Software position limit -		.47483648-2147483647	0	
	PT18		For manufacturer setting		0000000-00000000	0000 0000	~

Point P

The command unit is fixed to pulse. Therefore, "pulse/s" is used as the speed unit instead of "r/min".

6. When the parameter setting is completed, click the [Axis Writing] button (9).

Parameter Settin	g X						۹ ۵	•
🔳 Axis1 🛛 🖌 📲 R	ead [🖉 S	et To Default	: 🌄 Verify 🛅 Parameter Copy 📄 Parameter Block					
🖻 Open 💾 Save As 👔	Сору	Paste 📩	Jndo 🔊 Redo	·				
Linear control 📐							.	
DD Motor cont	Position	ing control		Sele	cted <u>I</u> tems Write	Axis Writing		
- Fully closed loc	No.	Abbr.	Name	Unit	Setting range	Axis1		<u>^</u>
Application fur	PT01	**CTY	Command mode selection		0000000-0000031	0000 0310		
ist display	PT02	*TOP1	Function selection T-1		00000001-1000000	0000 0001		
Desis	PT03	*FTY	Feed function selection		0000000-00000300	0000 0000		
Dasic	PT04		For manufacturer setting		0000000-0000000	0000 0000		
Gain/filter	PT05	ZRF	Homing speed	r/min mm/s	0.00-167772.1	5 100.00		
- Extension	PT06	CRF	Creep speed	r/min mm/s	0.00-167772.1	5 10.00		
_I/O	PT07	ZST	Home position shift distance		.47483648-214748364	7 0		
- Extension 2	PT08	ZPS	Homing position data		.47483648-214748364	7 0		
Extension 3	PT09	DCT	Travel distance after proximity dog		0-214748364	7 1000		
Ontion	PT10	ZTM	Stopper type homing - Stopping time	ms	5-1000	100		
Created	PT11	ZTT	Stopper type homing - Torque limit value	%	0.1-100.0	15.0		
opecial	PT12	CRP	Rough match output range		0-214748364	7 0		
Motor extensio	PT13		For manufacturer setting		0000000-0000000	0000 0000		
– Multi encoder	PT14	*BKC	For manufacturer setting		0-0	0 0		
Positioning cor	PT15	LMP	Software position limit +		.47483648-214748364	7 0		
- Network	PT16		For manufacturer setting		0000000-0000000	0000 0000		
Positioning ext	PT17	LMN	Software position limit -		.47483648-2147483643	7 0		
	PT18		For manufacturer setting		0000000-0000000	0000 0000		~

7. When the message "Execute writing. Continue?" appears, click the [Yes] button.



8. Writing of the servo parameters is started and all the parameters are written to the servo amplifier.

Accessing Amplifier	X
Access to amplifier. Please wait for a moment.	
Axis1: PV Group writing	50%
Axis 1: PV Group writing is completed. Axis 1: PU Group writing is completed. Axis 1: PK Group writing is completed. Axis 1: PT Group writing is completed. Axis 1: PL Group writing is completed. Axis 1: PS Group writing is completed.	

9. When the writing is completed successfully, the message "Writing is completed. Please switch the power supply of the servo amplifier off and on again." appears. Click the [OK] button.



10. Turn on the control power supply of the servo amplifier again or click the [Software reset] icon (10) to reset the servo amplifier. (Servo parameters marked with * or ** in their abbreviations are enabled by turning on the control power supply again or clicking the [Software Reset] icon.)

	(10)							
MELSOFT MR Configurator2 No. 100 Million 200 Millio	ew project - [Parameter Setting]						- 0	×
i Project View Eile Parameter	Setting Parameter Safety Po	sitio <u>n</u> ing-da 🖻 🗔 🕅	ta <u>M</u> onitor	· Diagnosis Test Mode Adjustment Too	ls <u>W</u> indow <u>H</u> elp			_ @ ×
Project # ×	Parameter Setting ×							↓ ▶ ↓
New project System Setting Axis1:MR-J5-G(-RJ) Star	Axis1 Read C:	Set To Defa	ult 🌄 Verif	y 🚺 Parameter Copy 📄 Parameter Block Redo				
Parameter	DD Motor control Fully closed loop control	Positionir	ng control		Selec	ted Items Write	Axi <u>s</u> Writing	
Safety Parameter	Application function	No.	Abbr.	Name	Unit	Setting range	Axis1	^
Point Table	I ist display	PT01	**CTY	Command mode selection		0000000-00000310	0000 0310	
	Rasic	PT02	*TOP1	Function selection T-1		00000001-10000001	0000 0001	=
		PT03	*FTY	Feed function selection		0000000-00000300	0000 0000	
	Gain/filter	PT04		For manufacturer setting		0000000-00000000	0000 0000	
	- Extension	PT05	ZRF	Homing speed	r/min mm/s	0.00-167772.15	100.00	
	I/O	PT06	CRF	Creep speed	r/min mm/s	0.00-167772.15	10.00	
	- Extension 2	PT07	ZST	Home position shift distance		.47483648-2147483647	0	
	- Extension 3	PT08	ZPS	Homing position data		.47483648-2147483647	0	
	- Option	PT09	DCT	Travel distance after proximity dog		0-2147483647	1000	
	Special	PT 10	ZTM	Stopper type homing - Stopping time	ms	5-1000	100	
	Motor extension	PT11	ZTT	Stopper type homing - Torque limit value	%	0.1-100.0	15.0	
	Multi-seconder	PT12	CRP	Rough match output range		0-2147483647	0	
	Multi encoder	PT13		For manufacturer setting		0000000-00000000	0000 0000	
	- Positioning control	PT14	*BKC	For manufacturer setting		0-0	0	
	- Network	PT15	LMP	Software position limit +		.47483648-2147483647	0	
	Positioning extension 🟹	PT 16		For manufacturer setting		0000000-00000000	0000 0000	
<		PT17	LMN	Software position limit -		.47483648-2147483647	0	~
Ready	Servo amplifier conne	ection Ether	net			OVE		SCRL //

5 OPERATION EXAMPLE

5.1 Operation Check with Tool

This section describes the procedure for performing the JOG operation using an engineering tool.

1. Start SWMOS.

For how to start SWMOS, refer to the following.



- Change the axis parameters. The following shows an example of changing the parameters of axis 1 (Axis0).
 Gear ratio numerator (Gear Ratio Numerator): 67108864
 - Gear ratio denominator (Gear Ratio Denominator): 1000
- 4. When the parameters are changed, click the [Apply] button (3).

ltem	Axis0	Axis1	Axis2	Axis3	Axis4	Axis5	Axis6	Axis7	Axis8	Axis9	Axis10 ^
Axis Command Mode	Position	Position	✓ Position ✓	Position ~	Position ~	Position 🗸	Position 🗸	Position 🗸	Position 🗸	Position ~	Position `
Gear Ratio Numerator	67108864	1	1	1	1	1	1	1	1	1	1
Gear Ratio Denominator	1000	1	1	1	1	1	1	1	1	1	1
Direction	Normal	Normal	∽ Normal ∽	Normal ~	Normal 🗸	Normal '					
In Position Width[U]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Home Type	CurPos	CurPos	✓ CurPos ✓	CurPos 🗸	CurPos `						
Home Direction	Positive	Positive	∽ Positive →	Positive 🗠	Positive 🗸	Positive `					
Homing Vel. Fast[U/s]	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
Homing Vel. Fast Acc[U/s^2]	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
Homing Vel. Fast Dec[U/s^2]	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
Homing Vel. Slow[U/s]	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
Homing Vel. Slow Acc[U/s^2]	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
Homing Vel. Slow Dec[U/s^2]	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
Home Shift Distance[U]	0	0	0	0	0	0	0	0	0	0	0
OpenLoopHoming	Disable	/ Disable	∽ Disable ∽	Disable 🗸	Disable `						
Immediate Stop at LS	False	False	✓ False ✓	False 🗸	False `						
Quick Stop Deceleration[U/s^2]	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000
Limit Switch Direction	Normal	Normal	 Normal 	Normal ~	Normal ~	Normal 🗸	Normal V	Normal ~	Normal 🗸	Normal ~	Normal 👋

5. When the writing is completed, the message "All parameters have been saved." appears and the changes are applied to the engine immediately.



Point P

■Offline screen

To set the changed parameters with the same settings at the next startup, save the parameters to a file with the [Export File] button, and read the file in which the parameters are saved with the [Import File] button at the next startup. For details of the operations, refer to the following.

6. Control the axes. Click [Operation] ⇒ [Control Box] (4) in the ribbon.

						(4)						
SWMOS(S	SWM-G Operat	ing Station)									
Home	Configuratio	n Ope	ration	Analyzer	Tools	•						
	2	**		{			Ø				B	E-STOP :
StartComm	StopComm	ServoOn	ServoOff	AlarmReset	AllStop	ControlBox	SyncAxes	Position	I/OStatus	E-Stop	Release	OFF
Commu	nication			All Axis	Control			All S	Status		Emergen	су

- **7.** The "Axes Control Box" screen appears. Operating each button on the "Axes Control Box" screen starts or stops the communication and performs servo ON/OFF for the axis.
 - [Online]/[Offline] button: Starts/stops the communication.
 - [All Servo On] button: Performs servo ON for all axes.
 - [All Servo Off] button: Performs servo OFF for all axes.

Axes	Contro	ol B	ox							×
On	line	E	-Stop	All Servo On	All Servo Off		Al Alar Clea	l m ar		000~031 032~063 064~095 096~127
- 000	~007-				7 - 016	~0	23			
000	SvOf	f	Home	Alarm	016	S	vOff	Hor	ne	Alarm
001	SvOf	f	Home	Alarm	017	SvOff		Hor	ne	Alarm
002	SvOf	f	Home	Alarm	018	S	vOff	Hor	ne	Alarm
003	SvOf	f	Home	Alarm	019	S	vOff	Hor	ne	Alarm
004	SvOf	f	Home	Alarm	020	S	vOff	Home		Alarm
005	SvOf	f	Home	Alarm	021	S	vOff	Hor	ne	Alarm
006	SvOf	f	Home	Alarm	022	S	vOff	Hor	ne	Alarm
007	SvOf	f	Home	Alarm	023	S	vOff	Hor	ne	Alarm
- 008	~015-				- ⁰²⁴	~0	31 —			
008	SvOf	f	Home	Alarm	024	S	vOff	Hor	ne	Alarm
009	SvOf	f	Home	Alarm	025	S	vOff	Hor	ne	Alarm
010	SvOf	f	Home	Alarm	026	S	vOff	Hor	ne	Alarm
011	SvOf	f	Home	Alarm	027	S	vOff	Hor	ne	Alarm
012	SvOf	f	Home	Alarm	028	S	vOff	Hor	ne	Alarm
013	SvOf	f	Home	Alarm	029	S	vOff	Hor	ne	Alarm
014	SvOf	f	Home	Alarm	030	S	vOff	Hor	ne	Alarm
015	SvOf	f	Home	Alarm	031	S	vOff	Hor	ne	Alarm

■Online screen (All Servo OFF)

Axes	xes Control Box X										
Off	íline E	-Stop	All Servo On	All Servo Off	All Alar Clea	I 0 0 m 0 0 ar 0 0	000~031 032~063 064~095 096~127				
-000~007											
000	SvOff	Home	Alarm	016	SvOff	Home	Alarm				
001	SvOff	Home	Alarm	017	SvOff	Home	Alarm				
002	SvOff	Home	Alarm	018	SvOff	Home	Alarm				
003	SvOff	Home	Alarm	019	SvOff	Home	Alarm				
004	SvOff	Home	Alarm	020	SvOff	Home	Alarm				
005	SvOff	Home	Alarm	021	SvOff	Home	Alarm				
006	SvOff	Home	Alarm	022	SvOff	Home	Alarm				
007	SvOff	Home	Alarm	023	SvOff	Home	Alarm				
008	~015—			024 ר ר	~031 —						
008	SvOff	Home	Alarm	024	SvOff	Home	Alarm				
009	SvOff	Home	Alarm	025	SvOff	Home	Alarm				
010	SvOff	Home	Alarm	026	SvOff	Home	Alarm				
0 11	SvOff	Home	Alarm	027	SvOff	Home	Alarm				
012	SvOff	Home	Alarm	028	SvOff	Home	Alarm				
013	SvOff	Home	Alarm	029	SvOff	Home	Alarm				
014	SvOff	Home	Alarm	030	SvOff	Home	Alarm				
015	SvOff	Home	Alarm	031	SvOff	Home	Alarm				

■Online screen (All Servo ON)

Axes	Control	Box					×
Off	iine	E-Stop	All Servo On	All Servo Off	Al Alar Cle	I m ar	000~031 032~063 064~095 096~127
- 000	~007—			016 ۲	~023—		
000	SvOn	Home	Alarm	016	SvOff	Home	Alarm
0 01	SvOff	Home	Alarm	017	SvOff	Home	Alarm
002	SvOff	Home	Alarm	018	SvOff	Home	Alarm
003	SvOff	Home	Alarm	019	SvOff	Home	Alarm
004	SvOff	Home	Alarm	020	SvOff	Home	Alarm
005	SvOff	Home	Alarm	021	SvOff	Home	Alarm
006	SvOff	Home	Alarm	022	SvOff	Home	Alarm
007	SvOff	Home	Alarm	023	SvOff	Home	Alarm
- 008	~015—			024	~031—		
008	SvOff	Home	Alarm	024	SvOff	Home	Alarm
009	SvOff	Home	Alarm	025	SvOff	Home	Alarm
010	SvOff	Home	Alarm	026	SvOff	Home	Alarm
011	SvOff	Home	Alarm	027	SvOff	Home	Alarm
012	SvOff	Home	Alarm	028	SvOff	Home	Alarm
013	SvOff	Home	Alarm	029	SvOff	Home	Alarm
014	SvOff	Home	Alarm	030	SvOff	Home	Alarm
015	SvOff	Home	Alarm	031	SvOff	Home	Alarm

8. Check the axis status. Click [Operation] ⇔ [Position] (5) in the ribbon.



9. The [Axis Position] tab (6) appears. The axis status can be checked.

							(6)			
Engine Info Parameters					• X	Axis	Position			. ×
Essential Detailed						Page : 🐗	= 🔿 🖄 Select Statu	is Items	ig	
ltem	Axis0	Axis1	Axis2	Axis3	Ax ^	Axis	PosCmd	ActualPos	AlarmCode	Op
Axis Command Mode	Position ~	Position ~	Position ~	Position ~	Positic	00	0	0	-	IDLE
Gear Ratio Numerator	67108864	1	1	1	1	01				OFFLINE
	1000		1	1		02				OFFLINE
Gear Ratio Denominator	1000		-	1	<u> </u>	04	0	0		OFFLINE
Direction	Normal ~	Normal 🗸	Normal ~	Normal ~	Norm	05				OFFLINE
In Position Width[U]	1000	1000	1000	1000	10	06				OFFLINE
Home Type	CurPos ~	CurPos V	CurPos V	CurPos V	CurPe	07				OFFLINE
fine type	curros	Curr 05	Curr 05	cuir os	Cuirt	08				OFFLINE
Home Direction	Positive ~	Positive 🗸	Positive 🗸	Positive 🗸	Positiv	09	0			OFFLINE
Homing Vel. Fast[U/s]	10000	10000	10000	10000	100	10				OFFLINE
Homing Vel. Fast Acc[U/s^2]	10000	10000	10000	10000	100	12				OFFLINE
Liensing Vol. Fest Dest[1/242]	10000	10000	10000	10000	100	13				OFFLINE
Homing Vel. Fast Dec[U/s^2]	10000	10000	10000	10000		14				OFFLINE
Homing Vel. Slow[U/s]	10000	10000	10000	10000	100	15				OFFLINE
Homing Vel. Slow Acc[U/s^2]	10000	10000	10000	10000	100	1 6				OFFLINE
Harrian Val. Slave Das (11/242)	10000	10000	10000	10000	100	17				OFFLINE
Homing Vel. Slow Dec[0/s ⁻²]	10000	10000	10000	10000		18				OFFLINE
Home Shift Distance[U]	0	0	0	0	C	20				OFFLINE
OpenLoopHoming	Disable 🗸	Disable 🗸	Disable 🗸	Disable 🗸	Disab	21				OFFLINE
Immediate Stop at LS	False 🗸	False 🗸	False 🗸	False 🗸	False	22				OFFLINE
	100000	100000	100000	100000	100	23				OFFLINE
Quick Stop Deceleration[0/s··2]	100000	100000	100000	100000	100	24				OFFLINE
Limit Switch Direction	Normal ~	Normal ~	Normal ~	Normal ~	Norm Y	25				OFFLINE
					,	20				OFFLINE
Restore Default	e 🔲 Impor	t File	🥥 R	eferesh	Apply	28				OFFLINE
						29				OFFLINE

10. Select [Motor(CyclicSyncPos)] ⇔ [SingleControl] (7) in the navigation window to display the Single Control window. Select the [TestMove] tab ⇔ [Position] tab (8). Set the parameters (Jog Speed, Accel/Decel, Jerk Ratio) in "Jog" (9), and perform the JOG operation with the [JOG CCW] button or [JOG CW] button.

Navigator 4	Engine Info Pa	arameters Single Control	-	X Axis	Position			• ×
Swmos	🗆 😹 All Axes 🛛 🔿	TestMove IndexMove		Page: 🔶	🔹 🔿 🖄 Select Stat	us Items 🖄 Axis Con	ifig	
System Engine Engine Comma Comma Setup Parameters Horning Metwork/Localization Metwork/Localization Setup Parameters Horning Metwork/Control Metion GantyControl MotionBlock GantyControl MotionBlock GantyControl MationControl MationControl MationControl MaloaControl	 VIDAGE00 VIDAGE01 VIDAGE01<	Position Velocity Torque Axis Position Command Pos : 0 Actual Pos : 0 Op Status : DLE Jog Jog Speed : 10000 Accel/Decel : 10000 Accel / Decel : 10000 Actual Jerk Ratio : 0.75 SET Move AbsMove StepMove Profile Type : JerkRatio Velocity(U/s) : 10000 Accel[U/s^2] Jerk Acc Rati 100000 Decel[U/s^2] Jerk Acc Rati 100000 Decel[U/s^2] Jerk Acc Rati	Status NOT ORG POT Status NOT ORG POT Serveo Home Status Serveo Home Status Serveo Serveo Serveo Serveo Serveo Serveo Config Sop Config Serveo Config Serveo Config Serveo Config CW DG CCW Enable TrackBar Control 10000 SET Current Pos Set Serveo Current Pos Set Delay(ms): 100 CW Limit Postkore Stop Config CW Current Serveo Stop Delay(ms): 100 Check InPos	Avis 00 01 02 05 06 06 07 07 08 09 09 09 09 01 11 12 13 13 14 15 15 16 17 77 20 21 22 22 24 22 22 22 22 25 25 25 25 25	PosCmd	ActualPos 0 0 0 0 0 0 0 0 0 0 0 0 0	AlarmCode	Op IDLE OFFLINN OFFLINN OFFLINN OFFLINN OFFLINN OFFLINN OFFLINN OFFLINN OFFLINN OFFLINN OFFLINN OFFLINN OFFLINN OFFLINN OFFLINN OFFLINN OFFLINN OFFLINN



Press the [JOG CCW] button to perform operation in the address decreasing direction, and the [JOG CW] button to perform operation in the address increasing direction. For details of the JOG operation, refer to the following.

Motion Control Software SWM-G Operating Manual (SWMOS)

5.2 Operation Check with Sample Project

This section describes the programming procedure and basic programs.

When applying program examples provided in this manual to an actual system, ensure the applicability and confirm that it will not cause system control problems.

This section describes an example of a 1-axis system using a ball screw.



System configuration

This example uses the system configuration below.



· Connecting to the set NIC port is required.

Specifications

Item	Description	
Ball screw lead (PB)	10000[µm] (= 10[mm])	
Reduction ratio (NL/NM)	1/10 (load side [NL]/motor side [NM]) When the motor rotates 10 times, the ball screw on the load side rotates once.	
Encoder resolution	67108864 [pulse]	
Servo amplifier	MR-J5-G series	
Position command unit (user unit)	μm	
Speed command unit	μm/s	
Control cycle	1.0[ms]	

Servo parameter (axis 1)

For how to set the servo parameters, refer to the following.

Page 25 Parameter Setting of the Servo Amplifier

No.	Name	Setting value
PA04.2	Servo forced stop selection	1: Disabled (The forced stop input EM1 and EM2 are not used)
PD01.2	Input signal automatic on selection	 Forward rotation stroke end (LSP) 1: Automatic on Reverse rotation stroke end (LSN) 1: Automatic on
PT01.1	Speed/acceleration/deceleration unit selection	1: (Speed: Command unit/s, acceleration/deceleration: Command unit/s ²)

Program-side parameter (Axis0)

Parameter name	Setting value
Gear ratio Numerator	67108864
Gear ratio Denominator	1000

Sample program operations

The sample program is executed in the following processing order.

Processing order	Description	Details
1	Device creation	A device is an object of the SSCApi class that opened the communication channel with the SWM-G engine. Applications using the SWM-G library call the CreateDevice function at the start.
2	Communication start	The communication with the platform where the engine is operating is started with the StartCommunication function.
3	Servo ON	Many motion functions are arranged in the CoreMotion module. The SetServoOn function in the CoreMotion module is called to perform the servo ON.
4	Home position return	The home position return parameter is read with GetHomeParam. The home position return type is changed to the current position (CurrentPos), and the home position return parameter is set with the SetHomeParam function. The home position return is performed with the StartHome function.
5	Positioning operation ^{*1}	The motion profile is specified to perform the positioning operation with the StartMov function. The motion profile determines the movement speed from the current position to the target position, acceleration, and jerk shape.
6	Servo OFF	The servo OFF is performed with the SetServoOn function.
7	Communication stop	When the communication is started with StartCommunication, the device must be closed after the communication is stopped with StopCommunication.
8	Device closing	The application calls the CloseDevice function before the end.

*1 The settings of the positioning operation are as follows.

Item	Description
Motion profile	Trapezoid
Axis number	Axis0
Target position	100000[µm]
Target speed	25000[μm/s]
Acceleration	100000[μm/s ²]
Deceleration	100000[μm/s ²]
Opening the sample program

The sample project is stored in the following folder.

Copy the sample program to a location where it can be edited.

· Default storage destination folder at installation

Storage destination folder

C:\Program Files\MotionSoftware\SWM-G\Samples

The following example uses a sample program that is used to perform the basic operation of the servo axis.

1. Open the following solution file (03_MotorControl.sln) in the sample folder (Samples).

Solution file storage location

\Samples\Cpp\VSDDDD\1_BasicMotion\03_MotorControl\03_MotorControl.sln

- *1 DDD= Indicates the version of Visual Studio to be used. Select according to the version of Visual Studio to be used.
- *2 This explanation uses Visual Studio 2017.



2. Select [Build] ⇒ [Configuration Manager] (1) from the menu.



3. The "Configuration Manager" screen appears. Set "x64" (2) for [Active solution platform] and click the [Close] button to close the "Configuration Manager" screen.

Configuration Manager			?	×	
Active solution configuration:		Active solution platform:			
Debug	~	x64		~)	
Project contexts (check the project	configurations to build or d	win32 x64			- −(2)
Project	Configuration	<new></new>			()
03_MotorControl	Debug	x64		_	
		ſ	Clas	-	
		l	Clos	e	

4. Click [03_MotorControl] ⇒ [Source Files] and double-click [03_MotorControl.cpp] (3) in the Solution Explorer window. A source code opens, and the processing descriptions described in the sample program operation descriptions can be referred to.

03_MotorC	ontrol - Microsoft Visual Studio Express 2017 for Windows Desktop w Project Build Debug Team Tools Test Window Help		V P Quick Launch (Ctrl+Q)	
0 - 0 t	2 Project Band Bebag Fear Tools Fear Thirdew Fear	bugger + 🎜 📮 🔚 🖷 🗉	개 📕 위 해 개 💡	
g 03_MotorCor	trol.cpp 🧇 🗙		▼ Solution Explorer ▼ ‡ ×	
5 03_Motor	Control Global Scope)		- COA Io-ち 司 励 の A -	
1	/**************************************	***************/	+ Search Selection Fundament (Stale a)	
2	/* FILE : MotorControl.cpp	*/	search solution Explorer (Ctri+:)	
3	/* DESCRIPTION : Sample from device creation to motor operation	to device */	Solution '03_MotorControl' (1 project)	
4	/~ CIOSe	-/	▲ the O3_MotorControl	
6	/	7	References	
7	/**************************************	***************/	External Dependencies	
8	/* Header	*/	Source Files	
9	/**************************************	**************/	t+ 03_MotorControl.cpp	(3)
10	⊟#include "SSCApi.h"			
11	#include "CoreMotionApi.h"			
12	[#include <stalo.n></stalo.n>			
14	/**************************************	***************/		
15	/* Name Space	*/		
16	/**************************************	**************		
17	⊡using namespace sscApi;			
18	using namespace std;			
19				
20	/*************************************	*/		
21	/~ FUNCTION /************************************	-/	Despection T V	
23	/	,	Propentes · · · · ×	
24	/*	*/		
25	/* Function : tmain	*/		
26	/* Description : Main Function.	*/		
27	/*	*/		
28	⊟int _tmain(int argc, _TCHAR* argv[])			
29	{			
30	SSCAp1 SSCL1D;		*	
100 % 👻 🖣			→	
Output			- ₽ ×	
Show output	: from: 월 월 월 월	4 %		
I Ready	Ln 1Col 1	Ch 1 INS	↑ Add to Source Control ▲	

Parameter, positioning data setting

The sample project is designed to operate with the default parameters. Therefore, modify the gear setting and positioning data according to the program example setting.

Gear setting

Enter the following code.

If the gear setting fails, the message appears and the processing continues without setting.

```
double encoderPulsesPerRevolution = 67108864;
double encoderUserUnitsPerRevolution = 1000;
int err;
```

// Set the gear ratio.

err = sscLib_cm.config->SetGearRatio(0, encoderPulsesPerRevolution, encoderUserUnitsPerRevolution);

if (err != ErrorCode::None) {

printf("Failed to set gear ratio. Error=%d\n", err);

}



Positioning data modification

Modify the codes as follows.

//-----// Create a command value.
//-----Motion::PosCommand posCommand = Motion::PosCommand();
posCommand.profile.type = ProfileType::Trapezoidal;
posCommand.axis = 0;
posCommand.target = 100000;
posCommand.profile.velocity = 25000;
posCommand.profile.acc = 100000;
posCommand.profile.dec = 100000;



Build execution

1. Select [Build] ⇒ [Build Solution] (1) from the menu to execute the build.



2. When the build is completed, the output results are displayed in the output window.



Program execution

1. Select [Debug] ⇒ [Start Debugging] (1) to execute the program.



6 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.The license has not been registered.	Run the installer and set up the incomplete items. For details, refer to the following. Installation)
The communication is not established.	The network configuration setting is incorrect.	Check the master setting and the advanced setting of the network setting again, and rewrite the information to the engine.
	 The PDO information is insufficient. The ENI file is incorrect. 	 Check the remote station setting and the detail setting of the network setting again, and rewrite the information to the engine. Recreate the ENI file with EcConfigurator. If it is unclear in which platform the error has occurred when using 2 ports, check the output details on RTX Server. If the error has occurred in [CCLinkPlatform] correct the CC-Link IE TSN platform settings. If the error has occurred in [EcPlatform] correct the EtherCAT platform settings.
	The definition of the NIC to be used for the communication is incorrect.	Check the NIC setting again. (If an NIC other than I210 is used, convert I210 for RTX again.)
	The NIC has not been converted for RTX64.	Check Device Manager and check that the NIC to be used for the communication has been converted for RTX64.
	The HAL timer interval setting and PC performance are not good enough for the communication cycle setting and the number of control axes.	 Check if unnecessary simulation axes are operating. When the communication cycle is short, change the HAL timer interval from "100us" to "50us" or "20us". Adjust the time slot.
The screen turns blue, and cannot be executed.	Memory access violations of RTX have occurred.	 Disable the following Windows settings. Windows Memory Diagnostic Hyper-V Device Guard and Credential Guard (for Windows 10 Enterprise) For details, refer to the following. SWM-G User Manual
The axis operation is unstable.	"Hyper-Threading" of the CPU is enabled.	Disable "Hyper-Threading" of the CPU. For details, refer to the following. CJMotion Control Software SWM-G User's Manual (Installation)
The sample program or created program cannot be built.	The project setting of Visual Studio is incorrect.	Open the property page of the Visual Studio project and check the following settings. • Additional include directory setting for general C/C++ • Additional library directory setting for general linker • Post-build event setting after build events For details, refer to "Configuring a new C++ project" in the following manual.
The following message appears, and SWMOS does not start.	The versions of Windows and RTX are mismatched. (The version "2004 or later" of Windows10 and the version "3.7.2 or earlier" of RTX are used.)	Update RTX referring to "Applying the RTX update file" in the following manual. Important Control Software SWM-G User's Manual (Installation)
RTX Subsystem is in Exception state. Please check the RTX system. Do you want to open RTX Control Panel? (This program will be terminated)	A function that is not supported by RTX is enabled.	Disable the X2APIC function in the BIOS setting.
<u>Y</u> es <u>N</u> o		

APPENDIX

Appendix 1 SWM-G Setting Example by Application

Using the virtual axis

The virtual axis can be simulated by using the simulator platform (SimuPlatform).

The virtual axis can be used as an amplifier-less simulator, or as a synchronization master by using it with the real axis. Note that if the virtual axis is used with the real axis, the axis number is common to them.

Setting the virtual axis

- 1. Select [System] ⇒ [Engine] (1) in the navigation window on the "SWMOS" screen to display the Engine Info window.
- **2.** Select the [Engine Information] tab (2). In [Quick Setting] (3) under [Platform Setting], select the following, and click the [Save] button (4).
- Simulation × 2
- CC-Link IE TSN + Simulation
- CC-Link IE TSN \times 2 + Simulation \times 2
- EtherCAT + Simulation^{*1}
- EtherCAT + CC-Link IE TSN + Simulation^{*1}
- *1 When using SWM-G-N1 only



3. When the message "Do you want to save in Module.ini?" appears, click the [Yes] button.



4. When the message "Do you want to restart the SWM-GEngine?" appears, click the [Yes] button to restart the engine.



- **5.** After the engine is restarted, "Simulation" is displayed in [Platform Status] (5). It can be operated in the same way as a normal axis.
- When "Simulation \times 2" is set

						(5)			
Engine Info									
ngine Information Module Set	tting					•			
Engine Information				Plat	form Status-	•			
Engine Status :	Running	Engine Stop	Engine		Name	MasterNum	Version	Status	
Comm Status :	Stopped	Communication	Start	Si	imulation	-	3.4.3.2	Running	3
Engine Version :	3.4.3.2	Licensed Axes	Num : 16						
IMLib Version :	3.1	Loaded Modules	Count : 7	Devi	ices Status		1		_
Set Comm Cycle Info :				ID	Туре	Nam	e	Status	^
Platform Setting				0	LowPriority	SWMOS-Pla	atform	0.095/15sec	
Quick Setting			Common Setting	1	LowPriority	SWMOS-M	lotion	0.095/15sec	
Simulation x 2	~	Load Save	Message Level						

• When "CC-Link IE TSN + Simulation" is set

						(5)				
Engine Info										
Engine Information Module Set	ting					↓				
Engine Information				Platfo	orm Status –					1
Engine Status :	Running	Engine Stop	Factors		lame	MasterNum	Version	Status		
			Restart	CC-I	ink IE TSN	1	3.4.2.1	Running	g	
Comm Status :	Stopped	Communication Star		Sir	nulation	-	3.4.3.2	Running	g	
Engine Version :	3.4.3.1	Licensed Axes Num	: 16							
IMLib Version :	3.1	Loaded Modules Count	: 7	Devic	es Status				_)
Set Comm Cycle Info :		CC-Link IE TSN CycleTime : 1ms		ID	Туре	Name	2	Status	^	
Distform Catting				0	LowPriority	SWMOS-Pla	tform	0.080/15sec		
Quick Setting		- (0	mmon Setting_	1	LowPriority	SWMOS-M	otion	0.096/15sec		
CC Link IF TCN + Cinculation		u Load Save Me	sage Level							
CC-LINK IE I SIV + SIMULATION		V Lond Save	mina							

+ When "CC-Link IE TSN \times 2 + Simulation \times 2" is set

						(5)			
Engine Info									
ngine Information Module Se	atting					↓			
Engine Information				Platf	orm Status-				
Engine Status :	Running	Engine Stop	Engine	N N	lame	MasterNum	Version	Status	
Comm Chattan	Ciana d	Commission	Restart	CC-I	Link IE TSN	2	3.4.2.1	Runnin	g
Commistatus :	Stopped	Communication	Start	Si	mulation	-	3.4.3.2	Runnin	g
Engine Version :	3.4.3.1	Licensed Axes	Num : 16						
IMLib Version :	3.1	Loaded Modules C	Count : 7	Devic	ces Status				_
Set Comm Cycle Info :		CC-Link IE TSN CycleTime : 1ms,	1ms	ID	Туре	Nam	e	Status	^
Platform Setting				0	LowPriority	SWMOS-PI	atform	0.048/15sec	
Ouick Setting			Common Setting	1	LowPriority	SWMOS-N	lotion	0.033/15sec	
CC-Link IE TSN x 2 + Simulatio	on x 2	✓ Load Save	Message Level						
			Warning						

• When "EtherCAT + Simulation" is set

								(5)				
Engine Info												• ×
Engine Information Module Se	tting							+				
Engine Information						Platfo	orm Status-	•)
Engine Status :	Running		Engine Sto	р	Engine	N	lame	MasterNum	Version	Status		
Comm Status	Channel		Communication	Ctart	Restart	Et	herCAT	1	3.4.3.2	Runnin	g	
Commistatus .	stopped		communication	Start		Sir	nulation	-	3.4.3.2	Runnin	9	
Engine Version :	3.4.3.2		Licensed Axes	Num :	16	<u> </u>					_	
IMLib Version :	3.1		Loaded Modules	Count :	7	Devic	es Status					J
Set Comm Cycle Info :		Ether	CAT CycleTime : 1ms			ID	Туре	Nam	ne	Status	^	
Platform Setting						0	LowPriority	SWMOS-P	atform	0.080/15sec		
Quick Setting				Comr	non Setting	1	LowPriority	SWMOS-N	Aotion	0.096/15sec		
EtherCAT + Simulation		~ Loa	d Save	Messa	ge Level						-	
				Warni	ng V							

• When "CC-Link IE TSN + EtherCAT + Simulation" is set

						(5)			
Engine Info									
ngine Information Module Se	tting					•			
Engine Information				- Platfo	orm Status –	•			
Engine Status :	Running	Engine Stop	Engine	N	lame	MasterNum	Version	Status	
Comm Chattan a	C11	Communication Start	Restart	CC-L	ink IE TSN	1	3.4.2.1	Runnin	g
comm status :	Stopped	Communication start		Et	herCAT	1	3.4.3.2	Runnin	g
Engine Version :	3.4.3.2	Licensed Axes Num	: 16	Sir	nulation	-	3.4.3.2	Runnin	g
IMLib Version :	3.1	Loaded Modules Count	: 7	Devic	es Status				
Set Comm Cycle Info :	CC-Link IE	TSN CycleTime : 1ms / EtherCAT Cycle	Time : 1ms	ID	Туре	Nam	e	Status	^
Diatform Satting				0	LowPriority	SWMOS-PI	atform	0.080/15sec	
Quick Setting		Co	mmon Setting	1	LowPriority	SWMOS-N	lotion	0.080/15sec	
CC-Link IE TSN + EtherCAT +	Simulation	Load Save Mea	isage Level						

Α

Single turn (Unlimited length feeding)

Some axes, such as a rotating axis, do not have a linear movement range and can rotate in any direction indefinitely. Therefore, the position command of this axis can be excessive after rotating in one direction for a long time. To avoid this case, configure the position command as a "Single Turn Mode axis" so that it stays within a specific position range.

Setting procedure

- 1. Select [Setup] ⇒ [Parameters] (1) in the navigation window to display the Parameters window.
- **2.** Select the [Detailed] tab (2). Select the target axis (example: [00]Axis00) (3) in the axis tree and select the [Servo] tab (4).
- 3. Select "Enable" for [Single Turn Axis] and set a count value to [Single Turn Encoder Count].



- 4. When the setting is completed, click the [Apply] button (5).
- **5.** When the writing is completed, the message "0Axis parameters have been saved." appears.



Setting example

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The following shows a setting example when the Single Turn Mode axis is configured with one rotation of 360[degree].

Item	Setting value
Gear Ratio Numerator (gear numerator)	67108864
Gear Ratio Denominator (gear denominator)	360
Single Turn Axis	Enable
Single Turn Encoder Count	67108864

Example of a table mechanism with reducer

For the table mechanism with a reducer such as a timing belt or gear, rounding off the gear numerator setting value is required in addition to the electronic gear setting of SWM-G and an error may occur during the unlimited length feeding. In that case, the electronic gear setting can be configured without error by using the electronic gear of the servo amplifier.



Timing belt: 625/12544

Item	Setting value
Table	360[degree/rev]
Reduction ratio	625/12544
Servo motor encoder resolution	67108864[pulse/rev]

Setting procedure

Follow the setting procedure below.

- **1.** Determine the "Command unit per pulse" of the servo pulse command. (Example: Set "0.000001[degree]" per pulse.)
- 2. Calculate the electronic gear numerator (CMX) and electronic gear denominator (CDV) of the servo amplifier (MR-J5(W)-G).
- Electronic gear numerator (CMX) = 67108864 × 12544 = 841813590016
- Reduce CMX and CDV to "2147483647" or less. (Example: Reduce by "512".)
- Electronic gear numerator (CMX) = 841813590016 ÷ 512 = 1644167168
- Electronic gear denominator (CDV) = 225000000000 ÷ 512 = 439453125

Set the electronic gear numerator (CMX) to 1644167168 and the electronic gear denominator (CDV) to 439453125 for the servo amplifier (MR-J5(W)-G).

- 4. Set the electronic gear of SWM-G in a single turn.
- Gear numerator = 36000000[pulse] (360 ÷ 0.000001[degree]^{*1})
- · Gear denominator = 360[degree]
- *1 Command unit per pulse

Point P

When the electronic gear numerator (CMX) or electronic gear denominator (CDV) cannot be reduced to "2147483647" or less, reduce them by adjusting the command unit per pulse. If they cannot be reduced even after adjusting the command unit per pulse, set the approximate values. In that case, an error occurs in the unlimited length feeding.

Appendix 2 How to Use the IP Communication

IP communication setting procedure

The IP communication mixed function enables communications between applications that operate in the Windows space or RTX space and devices in the CC-Link IE TSN network via the SWM-G engine.

The IP communication mixed function can be used when SWM-G is in the communication state.



Setting procedure

To use the IP communication mixed function, configure the following settings.

(1) Enable Virtual NIC of RTX. (SP Page 46 Enabling Virtual NIC of RTX)

(2) Set the IP address of Virtual NIC seen from the Windows side. (Fig. Page 49 Setting the IP address of Virtual NIC seen from the Windows side)

(3) Set the IP communication mixed function in SWM-G. (FP Page 51 Setting the IP communication mixed function in SWM-G)

(4) Start RT-TCP/IP Stack. (SP Page 52 Starting RT-TCP/IP Stack)

The network address of the LAN used to connect the master or remote station is set to "192.168.3.0".

Read the IP addresses as necessary to prevent the duplication of them considering the operating environment.

Enabling Virtual NIC of RTX

- **1.** Select [RTX64 ### Runtime] ^{*1} ⇒ [Control Panel] (1) from the Windows start menu.
- *1 ### = RTX version



- 2. The "RTX64 ### Control Panel" screen^{*1} appears. Click [Configure the RT-TCP/IP Stack] (2).
- *1 ### = RTX version

First Steps Activate purchased components	Assign system processors Current: 1 RTSS / 1 Windows	RTX64 components: RTX64 3.7 Subsystem RTX64 3.7 RT-TCP/IP Stack	
Manage user permissions Subsystem Configure the RTSS Subsystem	Start/Stop the Subsystem The subsystem is started. (monitoring disabled)	Runtime Information	Copyright © 2010-2019 IntervalZero, Inc. All rights researed
Manage RTX64 devices RT-TCP/IP Stack and Drivers Configure the RT_TCP/IP Stack	Start/Stop the RT-TCP/IP Stack	Build Number: 4983	, angle recircu
Configure the KI-ICP/IP stack	The RT-TCP/IP stack is stopped.		

3. The "Configure the RT-TCP/IP Stack" screen appears. Click [Manage Interfaces and Filters] (3).

0

4. The "Manage Interfaces and Filters" screen appears. Select the existing "RTX64 Virtual Network Interface (Interface name: RtVirtualNic)" (4) and click the [×] button (5) to delete. Click the [+] button (6).

RTX64 3.7 Control Panel					-
Mar	nage Interfaces ar	nd Filters		Q	
TX64 Home > Confi	gure the RT-TCP/IP St	tack > Manage Interfaces and Filters			
Interface	Status	Property	Value		
Ktvirtualinic	Enabled	Device	RTX64 Virtual Net	work Interface	
		Driver name	RtVirtualNic.Rtdll		
		IPv4 configuration	Address	Netmask	
		5	192.168.100.50	255.255.255.0	
		Gateway	0.0.0.0		
		Location	0;0;0		
		Interrupt thread priority	64		
<	>	Interrupt processor	Default		
→ (+)(X)	Convert Devices	Maximum Transmission Unit (MTU)	1500		
\sim		lpv6 address	Auto		
		lpv6 prefix	64		
		Receive thread priority	63		
		Receive thread ideal processor	Default		
		Number of receive buffers	256		
		Number of transmit buffers	256		
		Interrupt type	MSI-X		
		Filter status	Disabled		
					liste w !
iecnnical Support RTX	64 Downloads				interval

5. The "Add Interface" screen appears. Set each item and click the [OK] button.

Item	Description
Device Name:	Select "RTX64 Virtual Network Interface".
Driver Name:	Select "C:\Program Files\MotionSoftware\SWM-G\Platform\CCLink\RtVirtualNic_SSS.rtdll". *: Click the [] button (7) to display the "Open" screen. Select a file from the folder and click [Open] button to select.
Friendly Name:	Enter an arbitrary name. <example> RtVN_SSS</example>
lpv4 address:	Set an arbitrary IP address. <example> 192.168.3.150</example>

Add Interface	-	⊐ ×	
Add Interface			
Device Name:	RTX64 Virtual Network Interface v		
Driver Name:	oftware¥SWM-G¥Platform¥CCLink¥RtVirtualNic_SSS.rtdll		—(7)
Friendly Name:	RtVN_SSS		
lpv4 address:	192.168.3.150		
Netmask:	255.255.255.0		
Location:	0;0;0		
	Ok	ancel	

6. The screen returns to the "Manage Interfaces and Filters" screen. The name "RTX64 Virtual Network Interface (Interface name: RtVN_SSS)" entered in "Friendly Name" is added. Set [Status] (8) of the added "RTX64 Virtual Network Interface (Interface name: RtVN_SSS)" to "Enable".

When the setting is completed, click the $[\times]$ button in the upper right of the screen to close the "Manage Interfaces and Filters" screen.

П. ма	mage Interfaces and	1 Filters		Q	
TX64 Home > Cont	figure the RT-TCP/IP Sta	ck > Manage Interfaces and Filters Properties for RtVN_SSS			
RtVN_SSS	Enabled ~	Property	Value		
		Device	RTX64 Virtual Net	work Interface	
		Driver name	C:¥Program Files	MotionSoftware¥SWM-G¥P	latform¥CCLink¥RtVirtual
		IPv4 configuration	Address	Netmask	-
			192.168.3.150	255.255.255.0	2
		Gateway	0.0.0.0		
		Location	0;0;0		
		Interrupt thread priority	64		
<	>	Interrupt processor	Default		
+ X	Convert Devices	Maximum Transmission Unit (MTU)	1500		
		Ipv6 address	Auto		
		lpv6 prefix	64		
		Receive thread priority	63		
		Receive thread ideal processor	Default		
		Number of receive buffers	256		
		Number of transmit buffers	256		
		Interrupt type	MSI-X		
		Filter status	Disabled		

Setting the IP address of Virtual NIC seen from the Windows side

Set the IP address of Virtual NIC on the Windows side.

Set an IP address different from the one set in "Enabling Virtual NIC of RTX" (🖙 Page 46 Enabling Virtual NIC of RTX).

- **1.** Select [Windows System] ⇒ [Control Panel] ⇒ [Network and Internet] ⇒ [View network status and tasks] ⇒ [Change adapter settings] from the Windows start menu to display the "Network Connections" screen.
- **2.** Right-click the network device whose device name is "Windows Virtual RTX64 Ethernet Adapter" (1) and select [Properties] (2).

👰 Network Conr	nections			_		×
$\leftarrow \rightarrow \cdot \cdot \uparrow$	👰 > Control Panel > Net	vork and Internet > Network Connection	ns v Ö Search	1 Network Con	nections	P
Organize 🔻	Enable this network device	Diagnose this connection Renam	e this connection »		- 💷	?
Ethen ad.m Intel(net elco.co.jp R) Ethernet Connection (2) I	Ethernet 3 Enable Status Diagnose Create Shortcut Delete Rename Properties				
2 items 1 item	n selected					8== 6

3. The "Properties" screen appears. Select "Internet Protocol Version 4 (TCP/IPv4)" (3) and click the [Properties] button (4).



4. The "Internet Protocol Version 4 (TCP/IPv4) Properties" screen appears. Select "Use the following IP address" and set "IP address" and "Subnet mask".

<Example> IP address: 192.168.3.50, Subnet mask: 255.255.255.0

Internet Protocol Version 4 (TCP/IPv4) Properties							
General							
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.							
Obtain an IP address automatically							
Use the following IP address:]						
IP address:	192.168.3.50						
Subnet mask:	255.255.255.0						
Default gateway:							
Obtain DNS server address automatically							
Use the following DNS server add	resses:						
Preferred DNS server:							
Alternate DNS server:							
Validate settings upon exit Advanced							
	OK Cancel						

5. When the setting is completed, click the [OK] button, close the "Internet Protocol Version 4 (TCP/IPv4) Properties" screen, and close all the screens to end the setting.

Setting the IP communication mixed function in SWM-G

Enable the IP communication mixed function. Set it with VNTx defined in the network.

- **1.** Select [SWMOS] ⇔ [Network] ⇔ [Comm1] (1) in the navigation window on the "SWMOS" screen to display the Comm1 window.
- 2. Select [CC-Link IE TSN] (2) in the [Comm1] tree. Select [Master Setting] ⇒ [IP address (IP Addr)] (3) to set the IP address (example: 192.168.3.253), and click the [Advanced Setting] button (4).



3. The "Master Advanced Setting" screen appears. Select "VNTx" (5).

In addition, change the time slot setting as necessary. Since the IP communication is performed only in the time slot "TSLT0", the IP packet does not compress the communications of other time slots. When expanding the IP communication bandwidth, increase the ratio of "TSLT0" as long as the bandwidths of other time slots can be secured sufficiency.

Set them in TSLT (6) defined in the network. (Example: 0: 0.25, 1: 0.5, 2: 0.25)

4. When the setting is completed, click the [OK] button to close the "Master Advanced Setting" screen.

Master Advanced Setting			×
Advanced Setting			
Time Sync Protocol : IEEE8	02.1AS ~	TSLT: 0: 0.25 1: 0	0.5 2: 0.25
BroadcastMsFrame	CyclicSsMeasure	UselPAsAxisIndex	PPMode
MasterOpWaitTime :	10000	AnnouncePeriod :	0
PriorityWaitTime :	100	PdelayPeriod :	0
SlaveScanWaitTime :	100	PdelayTimeout :	-3
NetworkConfigWaitTime :	2000	SyncFailCount :	3
SlaveConfigWaitTime :	100	SyncFailDiff :	4096
CyclicConfigWaitTime :	100	DatalinkErrorPeriod :	3
InaccessCount :	3	SlavelnitThread :	16
TransmitTimeout :	30	CycleMode :	1
SyncPeriod :	-3		
		Default	OK Cancel

5. Return to the Comm1 window. Click the [Save to Project] button to save the setting file.

For the saving operation of the setting file, refer to the following.

Page 21 Saving the settings

6. Click the [Save to Engine] button to write the set information to the SWM-G engine.

For the writing operation to the SWM-G engine, refer to the following.

Page 23 Writing to the SWM-G engine

7. The definition file is loaded and used when the next communication starts.

■ Starting RT-TCP/IP Stack

To use the IP communication mixed function, starting RT-TCP/IP Stack from RTX Control Panel is required.

- **1.** Select [RTX64 ### Runtime] ^{*1} ⇒ [Control Panel] (1) from the Windows start menu.
- *1 ### = RTX version



- 2. The "RTX64 ### Control Panel" screen^{*1} appears. Click the [▶] button (2) in "Start/Stop the RT-TCP/IP Stack" to start RT-TCP/IP Stack. When RT-TCP/IP Stack starts, the [▶] button changes to a [■] button. Click the [■] button to stop RT-TCP/IP Stack.
- *1 ### = RTX version

Activate purchased components	Assign system processors Current: 1 RTSS / 1 Windows	RTX64 components: RTX64 3.7 Subsystem RTX64 3.7 RT-TCP/IP Stack	
Subsystem		Runtime Information	
Configure the RTSS Subsystem	Start/Stop the Subsystem The subsystem is started. (monitoring disabled)	IntervalZero RTX64 3.7 Edition: Solo Version: 3.7.0 Build Number: 4983	Copyright © 2010-2019 IntervalZero, Inc. All rights reserved.
RT-TCP/IP Stack and Drivers		-	
Configure the RT-TCP/IP Stack	Start/Stop the RT-TCP/IP Stack The RT-TCP/IP stack is stopped.		

3. When the setting is completed, click the [×] button in the upper right of the screen to close the "Manage Interfaces and Filters" screen.

MR Configurator2 communication setting using the IP communication

This section describes how to connect MR Configurator2 to the servo amplifier using the IP communication function. The IP communication function enables communications with devices in the CC-Link IE TSN network via the SWM-G engine. The servo parameters can be set via the CC-Link IE TSN network.

Connection procedure

1. In SWMOS, click [Operation] ⇒ [StartComm] (1) in the ribbon to start the communication.



2. Start MR Configurator2. Select [Project] ⇒ [New] (2) from the menu to create a new project.

1	MELSOFT MR Configura	tor2 New pr	
Pro	oject View Parameter	Safety	
(2)→	New	Ctrl+N	
: E	Open	Ctrl+O	
	Close		
	Save	Ctrl+S	
	Save As		
	Delete		
	Read Other Format	•	
	Write Other Format	•	
	System Setting		
:	Print Preview		
<u>i</u> 2	Print	Ctrl+P	
-	Exit MR Configurator2	Alt+F4	

3. When a new project is created, the "New Project" screen appears. Click the [Switch to Multi-axis Project] button (3).



Α

4. The screen is switched to the "New Project" screen of the multi-axis project. Set each item. (Example) Set the following items.

	Item		Setting value
(4)	Connection Network		CC-link IE TSN
(5)	Via		None
(6)	PC side I/F	Connection I/F	Ethernet
		Protocol	UDP
		Time-out	1
		Retry	0
(7)	Servo Amplifier	Model	MR-J5-G(-RJ)
	Configuration	IP address	192.168.3.1

5. When the setting is completed, turn on the control circuit power supply of the servo amplifier and click the [Communication Test] button (8).



6. When the communication is succeeded, the message "The connection succeeded" appears. Click the [OK] button.



7. The screen returns to the "New Project" screen. Click the [OK] button to close the screen. With the above settings, MR Configurator2 can be connected to the servo amplifier using the IP communication function.

Transmission line type

Star topology/line topology

Connect the personal computer in star topology or line topology using Ethernet cables.

Star topology and line topology can be combined in a network.

CC-Link IE TSN Class

Select either of the following items according to the devices to be connected.

Connected device information	System configuration	Switching hub	Supported standard
CC-Link IE TSN Class B only	Select this if the system is to be configured without connecting CC-Link IE TSN Class A devices.	TSN hub (CC-Link IE TSN Class B switching hub)	IEEE802.1AS
Mixture of CC-Link IE TSN Class B/A or CC-Link IE TSN Class A only	Select this if a CC-Link IE TSN Class A device or Ethernet device is connected to the configuration of CC-Link IE TSN Class B devices only.	General-purpose hub (CC-Link IE TSN Class A switching hub)	IEEE1588

Appendix 4 Absolute Position Detection System

Setting the servo amplifier

When using the absolute position detection system in the servo amplifier (MR-J5(W)-B), set the following servo parameters.

· Servo parameter

No.	Name	Setting value
PA03.0	Absolute position detection system selection	1: Enabled (Absolute position detection system)
PC29.5	[AL.0E3 Absolute position counter warning] selection	0: Disabled
PC41.0	[AL.090.1 Homing incomplete] detection selection	1: Disabled

Since SWM-G does not manage the parameters of the servo amplifier, setting "Absolute position detection system selection" to "1: Enabled" causes the following servo alarms/warnings.

When [AL.025 Absolute position erased] occurs, turn on the control circuit power supply of the servo amplifier and clear the warning.

- [AL.025 Absolute position erased]
- [AL.090 Homing incomplete warning]
- [AL.0E3 Absolute position counter warning]

Restoring the current value

The absolute encoder parameter assumes that the axis moves within the range between $-(2^{31})$ and $2^{31}-1$ [pulse] (before applying the gear ratio).

When the axis moves at or below $-(2^{31})$ [pulse] or beyond $2^{31}-1$ [pulse], the absolute encoder parameter cannot apply the home position correctly. When the axis moves at or below $-(2^{31})$ [pulse] or beyond $2^{31}-1$ [pulse], the current position is required to be manually restored.

The following describes how to restore the current position manually using a sample program.

The sample program is stored in the following folder.

Sample program (default)

C:\Program Files\MotionSoftware\SWM-G\Samples\Extra\AbsoluteEncoder

Processing descriptions

Before stopping the SWM-G engine, save the following current value restoration data in a file, and restore the current value based on the saved current value restoration data, ABS counter acquired from the servo amplifier, and Encoder Command at the startup at the next startup of the SWM-G engine.

The sample program can execute the processing before stopping the engine and the processing after starting the engine.

Current value restoration data

Data	Description
Encoder Command	Encoder Command in the axis state (32-bit integral command position to be sent to the servo)
Encoder Command(64bit)	ABS counter (Obj.2B0Dh) of the servo amplifier and encoder value (64 bits) generated in Encoder Command
Pos Cmd	Pos Cmd in the axis state (axis command position)
Absolute Encoder Home Offset	The value of the absolute encoder home position offset of the axis parameter

Descriptions of the sample program

The sample program is a project of Visual Studio.

The sample program outputs files such as current value restoration data. "C:\Temp" is specified as the output destination

folder of the file in the program. Change it as necessary.

Execute the sample program with the SWM-G engine running.

When the program AbsoluteEncoder is executed, the following console menu is displayed.

Enter the processing number (0 to 2) and press Enter.

- 0:Execution of processing before stopping.
- 1:Execution of processing after starting.
- 2:End Program

The processing when the processing number (0 to 2) is selected is as follows.

- [0]: The processing before stopping the SWM-G engine is executed. The current value restoration data is saved.
- [1]: The processing after starting the SWM-G engine is executed. The current value is restored.
- [2]: The program is ended.

Function list

The following shows the list of functions. For other details, check the descriptions of the program.

No.	Function name	Name	Description
1	_tmain()	Main processing	Executes each processing by entering numerical values. (Target axes: 0 axis) • 0: Executes the processing before stopping the SWM-G engine. • 1: Executes the processing after starting the SWM-G engine. • 2: Ends the program. The following is the menu for debug. • 100: Parameter export • 101: Parameter import • 102: Acquired data display The code for debug is enabled by defining "DEBUG_CODE".
2	ProcessingBeforeEngineStop()	Processing before stopping the SWM-G engine	Saves the current value restoration data.
3	ProcessingAafterEngineStart()	Processing after starting the SWM-G engine	Restores the current value from the current value restoration data.
4	ReadAbsCounter()	ABS counter reading	Reads the ABS counter (Obj.2B0Dh) from the servo amplifier.
5	ExportData()	Current value restoration data saving	Saves the current value restoration data.
6	ImportData()	Current value restoration data reading	Reads the current value restoration data.
7	Make64bitEncoderCommand()	Encoder Command (64-bit) generation	Generates the Encoder Command (64-bit) value from Encode Command and the ABS counter.
8	MakeMovementAndTurnAmount()	Movement amount/turn amount calculation	Calculates the movement amount (encoder value) and turn amount with the values before and after stopping the engine.
9	RestoreAbsoluteEncoderHomeOffset()	Current value restoration (when the single turn is enabled)	Restores the current value when the single turn is enabled.
10	GetAndExportAll()	Parameter export	Exports the parameters to a file. (For debag)
11	ImportAndSetAll()	Parameter import	Imports the parameters to a file. (For debag)

Appendix 5 How to Create a New Program

This section describes how to create a C++ project using the SWM-G library.



For details of the languages and versions supporting the SWM-G library, refer to the following.

Creation procedure

The following describes how to create a Visual C++ project using Visual Studio 2017 as an example.

1. Select [File] ⇒ [New Project] (1) from the menu.



2. The "New Project" screen appears. Select [Installed] ⇒ [Visual C++] (2) to display the templates that can be used in Visual C++. Select [Console App] (3), enter the project name, storage location, and solution name, and click the [OK] button.



3. Create a Visual C++ project.



4. Select [Build] ⇒ [Configuration Manager] (4) from the menu.



5. The "Configuration Manager" screen appears. Set "x64" (5) for [Active solution platform] and click the [Close] button to close the "Configuration Manager" screen.

Configuration Manager			?	×	
Active solution configuration	on:	Active solution platform:			
Debug	~	x64		~	
Project contexts (check the	project configurations to build or d	x64			-(5)
Project	Configuration	<new></new>			(0)
SampleProgram	Debug	<pre><edit></edit></pre>			
			Close	e	

- **6.** Next, open the property page of the project. Select [Project] ⇒ [□□□ Properties] (6) from the menu.
- *1 DDD= Indicates the created project name.



7. The "Property Pages" screen appears. Select [Configuration Properties] ⇒ [C/C++] ⇒ [General] (7) to display the items under [General]. Select [Additional Include Directories], click the [] button (8), and select [<Edit...>] (9).

Configuration: Active(Debug)	 Platform: x64 		 Configuration Manager
Configuration Properties	Additional Include Directories		
General	Additional #using Directories	<pre>Fdit></pre>	L
Debugging	Debug Information Format		continue (/ZI)
VC++ Directories	Support Just My Code Debugging	Yes (/JMC)	
C/C++	Common Language RunTime Support		
General	Consume Windows Runtime Extension		
Optimization	Suppress Startup Banner	Yes (/nologo)	
Preprocessor	Warning Level	Level3 (/W3)	
Code Generation	Treat Warnings As Errors	No (/WX-)	
Language Deserve iled blooders	Warning Version		
Output Files	Diagnostics Format	Classic (/diagnostics:classic)	
Browse Information	SDL checks	Yes (/sdl)	
Advanced	Multi-processor Compilation		
All Options			
Command Line			
Linker			
Manifest Tool			
XML Document Generator			
Browse Information			
Build Events			
Custom Build Step			
Code Analysis			
	Additional Include Directories		
	Specifies one or more directories to add to the	e include nath: senarate with semi-c	clons if more than one

8. The "Additional Include Directories" screen appears. Add the include folder in the SWM-G installation folder. Enter the path of the following include folder and click the [OK] button.



9. The screen returns to the "Property Pages" screen. The entered include folder is displayed.

SampleProgram Property Pages		? ×
Configuration: Active(Debug)	✓ Platform: x64	✓ Configuration Manager
Configuration Properties	Additional Include Directories	C:¥Program Files¥MotionSoftware¥SWM-G¥Include;%(Addit
General	Additional #using Directories	
Debugging	Debug Information Format	Program Database for Edit And Continue (/ZI)
VC++ Directories	Support Just My Code Debugging	Yes (/JMC)
▲ C/C++	Common Language RunTime Support	
General	Consume Windows Runtime Extension	
Optimization	Suppress Startup Banner	Yes (/nologo)

10. Select [Configuration Properties] ⇒ [Linker] ⇒ [General] (10) to display the items under [General]. Select [Additional Library Directories], click the [] button (11), and select [<Edit...>] (12).

10 Output File \$(OutDir)\$(TargetName)\$(TargetExt) Show Progress Not Set 10 C/C++ Debugging V++ Directories C/C++ C/C++ Linker Input Bable Incremental Linking Now Progress Not Set Version Enable Incremental Linking Yes (/INCREMENTAL) Suppress Startup Banner Yes (/NOLOGO) Ignore Import Library No Register Output No Register Output No Per-user Redirection No Per-user Redirection No Advanced All Options Command Line Prevent DII Binding Treat Linker Warning As Errors Force File Output Creeret DI Binding Treat Linker Warning As Errors Force File Output Creet File Output Creet File Output Creet File Output Creade Hot Patchable Image Specify Section		Configuration: Active(Debug)	✓ Platform:	x64		~	Configuration M	anager	
Additional Library Directories Allows the user to override the environmental library path. (/LIBPATH:folder)	10)—	Configuration Properties General Debugging VC++ Directories P C/C++ Linker General Input Manifest File Debugging System Optimization Embedded IDL Windows Metadata Advanced All Options Command Line P Manifest Tool XML Document Generator Broike Information Build Events D Custom Build Step D Custom Build Step D Custom Build Step D Code Analysis	Output File Show Progress Version Enable Incremental I Suppress Startup Bai Ignore Import Librar Register Output Per-user Redirection Additional Library D Link Library Depend Use Library Depende Link Status Prevent DII Binding Treat Linker Warning Force File Output Create Hot Patchabl Specify Section Attri	inking iner y encies ncy Inputs I As Errors e Image butes	S(OutDir)S(TargetNamu Not Set Yes (/INCREMENTAL) Yes (/NOLOGO) No No No No (<edit> no</edit>	e)\$(TargetExt)			—(1 —(1
			Additional Library Direct Allows the user to overri	t ories de the environmen	tal library path. (/LIBPATH:fo	older)			

11. The "Additional Library Directories" screen appears. Add the library folder in the SWM-G installation folder. Enter the path of the following library folder and click the [OK] button.

Library folder (defa	ault)	
C:\Program Files\MotionS	oftware\SWM-0	3\Lib
Additional Library Directories	?	×
	1 × ×	Ŷ
C:¥Program Files¥MotionSoftware¥SWM-0	F¥Lib	^
<	>	, Ť
Evaluated value:		
C:#Program Files#MotionSoftware#SWM-G	3¥Lib	0
<	3	
Inherited values:		
		^
		\sim
Inherit from parent or project defaults	Macros	>>
	OK Cance	el
42		

12. The screen returns to the "Property Pages" screen. The entered library folder is displayed.



13. Select [Configuration Properties] ⇒ [Linker] ⇒ [Input] (13) to display the items under [Input]. Select [Additional Dependencies], click the [] button (14), and select [<Edit...>] (15).

		_					
Configuration: Active(Deb	ug) ·	 Platform: 	х64		~	Configuration Ma	anager
Configuration Propertie	5 Add	itional Depend	dencies	lib;uuid.lib;odbo.	32.lib;odbccp32.lib;9	6(AdditionalDepend	lencies 🗸 🗸
General	Igno	re All Default I	Libraries	<edit></edit>			
Debugging	Igno	re Specific Def	fault Libraries				
VC++ Directories	Mod	lule Definition	File				
▷ C/C++	Add	Module to As	sembly				
(Linker	Emb	ed Managed F	Resource File				
General	Ford	e Symbol Refe	erences				
Input	Dela	y Loaded Dlls					
Manifest File	Asse	mbly Link Res	ource				
Debugging							
Ontimization							
Embedded IDI							
Windows Metad	ata						
Advanced							
All Options							
Command Line							
Manifest Tool							
XML Document Gen	erator						
Browse Information							
Build Events							
Custom Build Step							
Code Analysis							
	Additio	nal Dependen	cies				
	Specifie	additional ite	ems to add to the li	nk command line. [i.e. k	ernel32.lib]		
<	>				,		

14. The "Additional Dependencies" screen appears. Add the libraries. Enter the following libraries and click the [OK] button.

Library
AdvancedMotionApi.lib
CompensationApi.lib
CoreMotionApi.lib
EventApi.lib
IMDII.lib
IOApi.lib
LogApi.lib
UserMemoryApi.lib
SSCApi.lib
legacy_stdio_definitions.lib ^{*1}
legacy_stdio_wide_specifiers.lib ^{*1}

*1 Add this library only when Visual Studio 2015 or later is used.

Additional Dependencies		?	×
AdvancedMotionApi.lib CompensationApi.lib CoreMotionApi.lib			^
<			>
Evaluated value:			
AdvancedMotionApi.lib CompensationApi.lib			^
CoreMotionApi.lib <			>
Inherited values:			
kernel32.lib user32.lib gdi32.lib			^
winspool.lib			~
Inherit from parent or project defaults		Macro	os>>
	ОК	Can	cel

15. The screen returns to the "Property Pages" screen. The entered library is displayed.

SampleProgram Property Pages		? ×
Configuration: Active(Debug)	✓ Platform: x64	✓ Configuration Manager
Configuration Properties	Additional Dependencies	AdvancedMotionApi.lib;CompensationApi.lib;CoreMotionApi.l 🗸
General	Ignore All Default Libraries	
Debugging	Ignore Specific Default Libraries	
VC++ Directories	Module Definition File	
▷ C/C++	Add Module to Assembly	
▲ Linker	Embed Managed Resource File	
General	Force Symbol References	
Input	Delay Loaded Dils	
Manifest File Debugging	Assembly Link Resource	

16. Windows applications created by using the SWM-G library do not operate unless "IMDII.dll" exists in the application directory. Define this DLL in the build event so that the DLL is automatically copied to the application directory every time the application compiles it.

Select [Configuration Properties] \Rightarrow [Build Events] \Rightarrow [Post-Build Event] (16) to display the items under [Post-Build Event]. Select [Command Line], click the [\bigtriangledown] button (17), and select [<Edit...>] (18).

	SampleProgram Propert	ty Pages						? ×	
(16)	Configuration: Activ General Debugging VC++ Director b C/C++ b Linker b Manifest Tool b XML Documen b Brows Inform b Brows Inform b Brows Inform Custom Build b Custom Build b Code Analysis	e(Cebug) erties ies t Generator ation vent ent Event Step	Command Line	x64	C <edit></edit>		Configuration	n Manager	⊷(17) —(18)
	<	>				OK	Cancel	Apply	

17. The "Command Line" screen appears. Add a command line. Enter the following command line and click the [OK] button.

Command line			
copy /y "C:\Program Files\I	NotionSoftware\SWN	M-G\lib\IMDII.dll" "\$(OutDir)"	
Command Line	?	×	
copy /y "C:¥Program Files¥MotionSoftware¥	SWM-G¥lib¥lMDII.dll" "\$(OutDir)"	* ^	
<	2	>	
valuated value:			
copy /y "C:¥Program Files¥MotionSoftware¥	SWM-G¥lib¥lMDII.dll" "C:\Sample	e\ ^	
<	:	>	
	Macros	< <21	
	OK Cance	cel	

18. The screen returns to the "Property Pages" screen. The entered command line is displayed. Click the [OK] button to apply the settings and close the "Property Pages" screen.



19. The C++ application using the SWM-G library needs to include the header files supporting the library to be used. For the files including the main routine, add the following header files.

Header file #include "AdvancedMotionApi.h" #include "CompensationApi.h" #include "CoreMotionApi.h" #include "CoreMotionApi.h" #include "IOApi.h" #include "IOApi.h" #include "LogApi.h" #include "SSCApi.h"

20. The configuration of the C++ project has been completed.

Point P

For details of how to use the SWM-G library, refer to the following.

Appendix 6 How to Set the MR Configurator2 Alarm Occurrence Time

This section describes how to correct the alarm occurrence times in the alarm history displayed on the "alarm display" of MR Configurator2 when the times do not match with the Windows "Current date and time" (Japan Standard Time).

Setting procedure (for Japan time zone)

This setting is necessary for sending commands to the remote station. Commands directly edit the CUI (CC-Link Unit Information) file for each device.

1. Start Windows Explorer, and open the following folder.

2. Select the file of the remote station for which the time will be set, and open it with a text editor.

I I I I I I I I I I I I I I I I I I I					- 0	×
\leftrightarrow \rightarrow \uparrow \uparrow This PC \rightarrow Windows (C:) \rightarrow (cui		✓ ひ Search c	ui		
💻 This PC	^	Name	Date modified	Туре	Size	
illi 3D Objects		swmos-192168003001	1/11/2023 4:36 PM	Text Document	2 KB	
Desktop		swmos-192168003002	1/11/2023 4:36 PM	Text Document	4 KB	
Documents		swmos-192168003003	1/11/2023 4:36 PM	Text Document	3 KB	
🕹 Downloads		swmos-192168003010	1/11/2023 4:36 PM	Text Document	2 KB	
h Music		swmos-192168003011	1/11/2023 4:36 PM	Text Document	2 KB	
Pictures		swmos-192168003004	11/29/2022 1:35 PM	Text Document	1 KB	
Videos		swmos-192168003005	11/29/2022 1:35 PM	Text Document	1 KB	
cui	d.					
lntel						
Melservo						
PerfLogs						

3. The CUI file of the selected remote station is displayed.

🗐 swmos-192168003001 - Notepad	-	×
File Edit Format View Help		
		^
[init2preop]		
[preop2init]		
[b. cohranze]		
[preop2safeop]		- 6
SDODownload: 0,0x1600,0x1,4,0x1d010110,1		
SDODownload: 0,0x1600,0x2,4,0x60600008,1		
SDODownload: 0,0x1600,0x3,4,0x607a0020,1		
SDODownload: 0,0x1600,0x4,4,0x60ff0020,1		
SDODownload: 0,0x1600,0x5,4,0x60400010,1		
SDODownload: 0,0x1600,0x6,4,0x60e00010,1		
CDOD		

4. Add a command to the [preop2safeop] section of the CUI file.

The contents of the command specify the time difference between UTC and Japan in minutes. (Example: 9 hours \times 60 minutes = 540 minutes)



5. When the command has been added to the CUI file, save the CUI file and close it.



For details of CUI file operation commands, refer to the following.

Precautions

- This setting requires directly editing the CUI file.
- CUI files cannot be opened during communication. Edit the CUI file after stopping communication.
- When the network configuration setting is updated (a CUI file is updated) in SWMOS, the command must be set again.

REVISIONS

*The manual number is given on the bottom left of the back cover.				
Revision date	*Manual number	Description		
February 2021	IB(NA)-0300562ENG-A	First edition		
November 2021	IB(NA)-0300562ENG-B	■Added or modified parts Chapter 6		
June 2022	IB(NA)-0300562ENG-C	■Added or modified parts Appendix 6		
February 2023	IB(NA)-0300562ENG-D	Added or modified parts Chapter 1, Section 1.2, 2.1, Chapter 4, Section 4.1, 4.2, 4.3, Chapter 6, Appendix 1, 2, 3, 5, 6, 7		
May 2023	IB(NA)-0300562ENG-E	■Added or modified parts Section 1.1, 4.1, 4.4, Appendix 1, 2, 4,		
August 2024	IB(NA)-0300562ENG-F	 Added or modified parts INTRODUCTION, RELEVANT MANUALS, TERMS, Section 1.1, 1.2, 2.1, 2.2, Chapter 4, Section 4.2, 4.3, 5.1, Chapter 6, Appendix 1, 6 Deleted Appendix 7 		

Japanese manual number: IB-0300559-F

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