



FACTORY AUTOMATION

Mitsubishi Electric AC Servo System Personal Computer Embedded Type Servo System Controller Motion Control Software SWM-G



March 2021

New Product Release
SV2103-1E



CC-Link IETSU

**Software-based controller for high-precision motion control.
Create new value together in a PC-based environment.**

MELIPC × SWM-G × MELSERVO-J5

Add New Value to Manufacturing Equipment



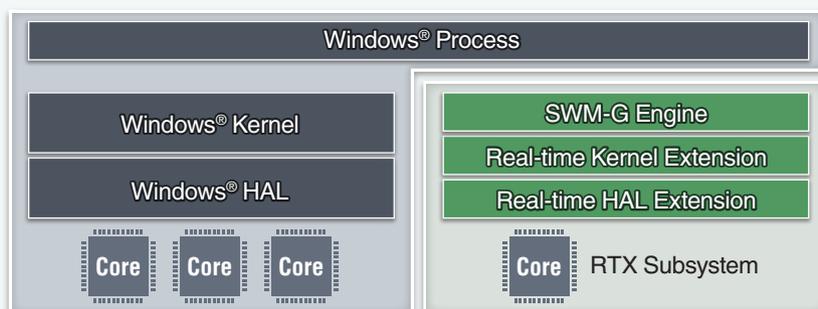
CC-Link I/TSN

Covering a Wide Range of Multi-Axis Applications

- SWM-G Motion Control Software is available in 16 to 128-axis control models, enabling multi-axis synchronization of various scales of machines.

<p>Chemical mechanical polishing devices</p>	<p>Etching devices</p>	<p>Flip chip bonders</p>
<p>Taping devices</p>	<p>Electronic parts assembling machines</p>	<p>Mounters</p>

- A CPU core of the industrial personal computer is assigned for running SWM-G processing, and that enables SWM-G to perform a high-speed, real-time operation without being affected by the operation on Windows®.



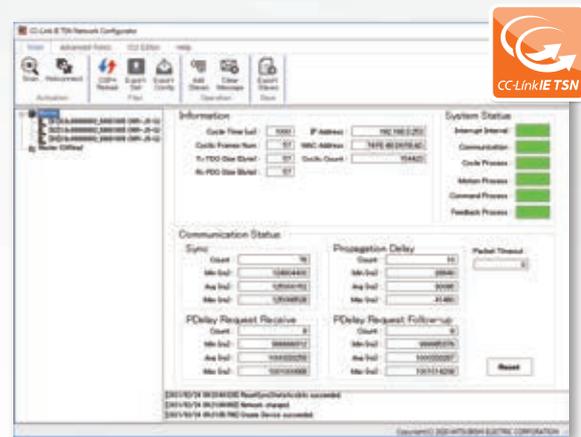


▶ Reduced Machine Design and Startup Time

- The integrated test tool SWM-G Operating Station covers the development processes of SWM-G from design to simulation, contributing to reduction in the total cost of ownership.
- The network management tool CC-Link IE TSN Configurator enables users to set the network configuration and check the communication status, leading to reduced design time.



SWM-G Operating Station



CC-Link IE TSN Configurator

▶ Maintenance Solution by MELIPC with SWM-G installed

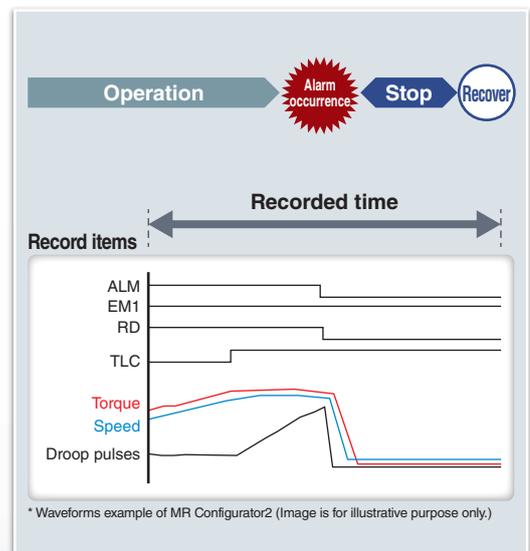
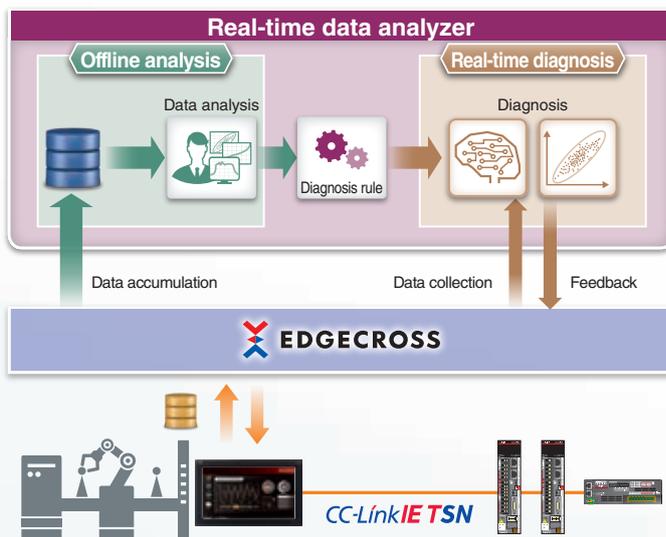
When SWM-G is installed and operated on the MELIPC (industrial personal computer), the system offers a powerful maintenance solution utilizing the Edgexcross-compatible software.

[Predictive/preventive maintenance]

- The user application collects data of machine diagnosis function, etc. from MR-J5-G through the communication API of SWM-G.
- The MELIPC analyzes the collected data by using the Edgexcross-compatible real-time data analyzer.

[Corrective maintenance]

- SWM-G collects data from the drive recorder of MR-J5-G through TCP/IP communications, which reduces troubleshooting time.



CC-Link IE TSN

Motion Control Software

SWM-G NEW



Installed on a personal computer, SWM-G Motion Control Software can perform motion and network control.

- Supports a CC-Link IE TSN servo control system with the personal computer where RTX64 (real-time extension) is installed. (RTX64 is included with SWM-G.)
- Meets various application needs by offering various types of motion control, such as positioning, synchronous, cam, speed, and torque control using API library for motion control.
- Utilizes network control to connect and set various slave devices (remote I/O modules, etc.) and TCP/IP devices.

Product Lines



Download Motion Control Software from Mitsubishi Electric FA global website.



SWM-G Motion Control Software

- SWM-G Engine
- SWM-G API
- Network API
- SWM-G Operating Station
- CC-Link IE TSN Configurator
- Real Time OS



Purchase the USB key (license).

USB key

- For 16 axes
- For 64 axes
- For 32 axes
- For 128 axes

CC-Link IE TSN

Motion Control Software*1

SWM-G NEW

- Maximum number of control axes: 128
- Minimum operation cycle*2: 125 μ s
- Programming language: Visual C ++[®]

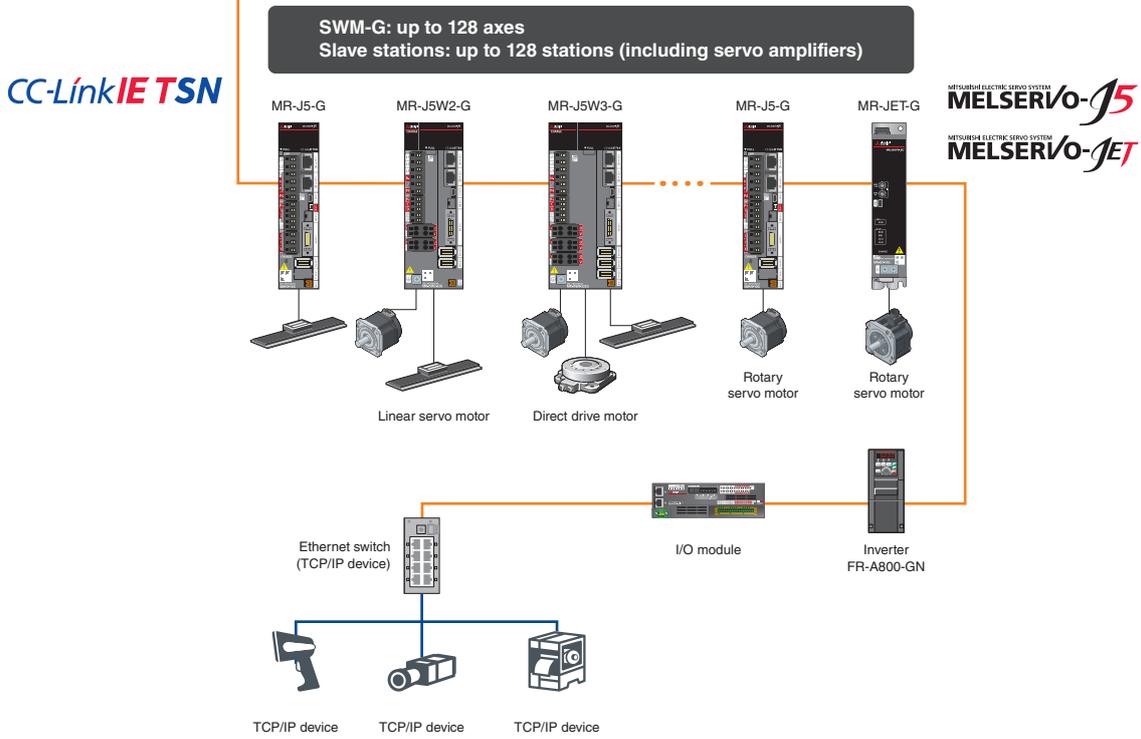
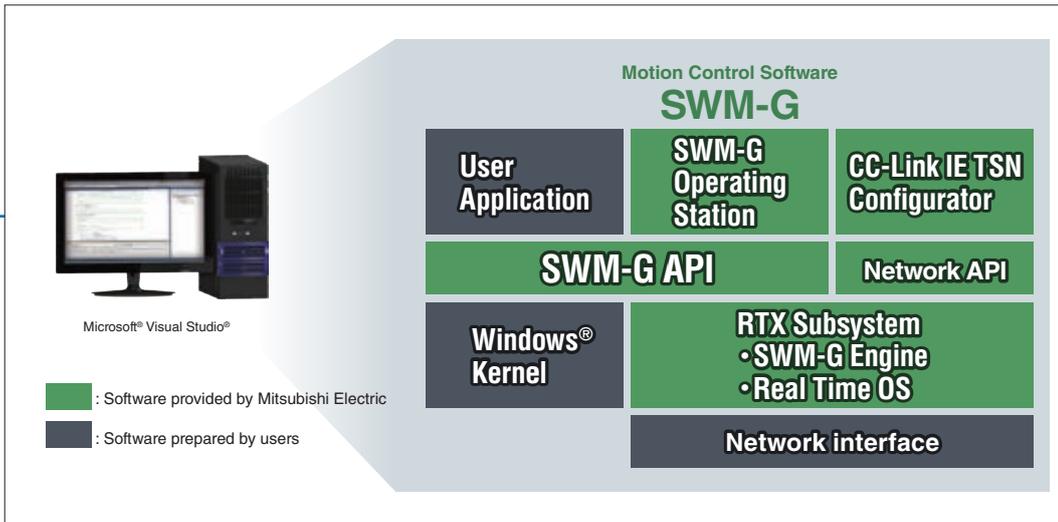
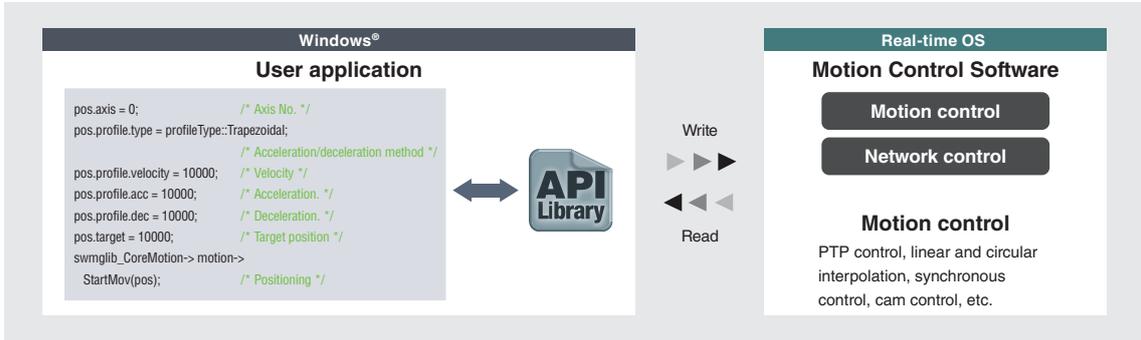
USB key for Motion Control Software

- MR-SWVG16-U: 16 axes
- MR-SWVG32-U: 32 axes
- MR-SWVG64-U: 64 axes
- MR-SWVG128-U: 128 axes

*1. SWM-G Motion Control Software includes SWM-G Engine, SWM-G API, Network API, SWM-G Operating Station, CC-Link IE TSN Configurator, and Real Time OS (RTX64).

*2. The minimum operation cycle depends on the number of control axes and the CPU of the personal computer.

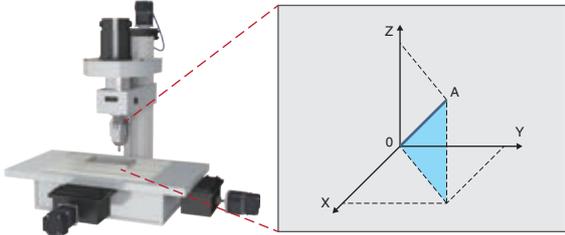
System Configuration



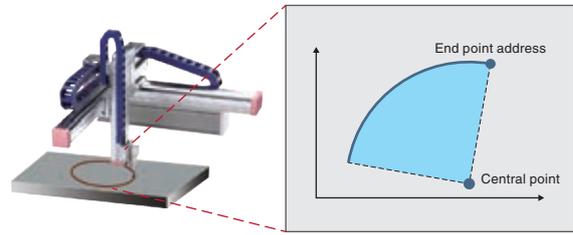
* Motion Control Software can function as a master station of CC-Link IE TSN.
 The following functions are not provided: sub-master station, local station, multi-master configuration, backup/restore function, and data communication function with standard stations.

Positioning Control

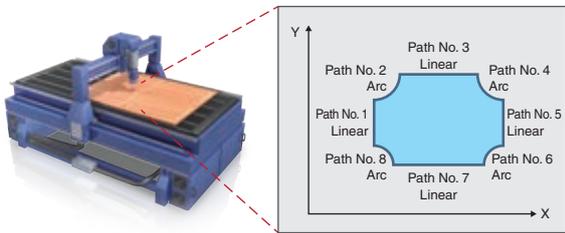
Linear interpolation



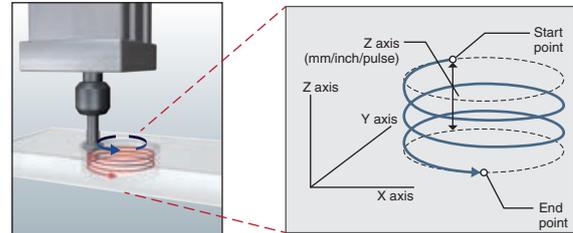
Circular interpolation



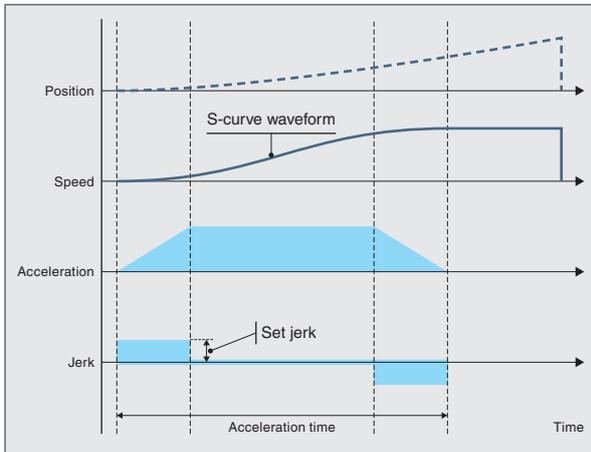
Continuous path control (path interpolation)



Helical interpolation



Jerk acceleration/deceleration



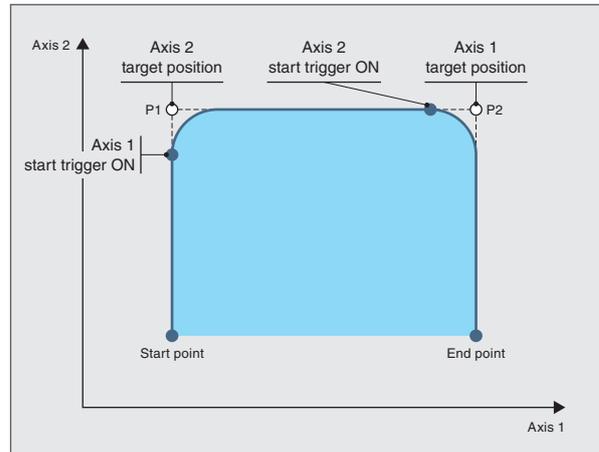
In this method, an axis can be accelerated gradually through adjusting jerk so that the vibrations of the machine can be minimized.

In the example above, the constant positive jerk is applied at the start of the operation to achieve smooth acceleration. When the axis is shifted to the constant-speed operation, the same amount of negative jerk is applied.

Adjusting jerk in this way achieves smooth acceleration/deceleration while also shortening the time it takes to reach the target speed.

The speed creates a S-curve shape.

Triggered motion



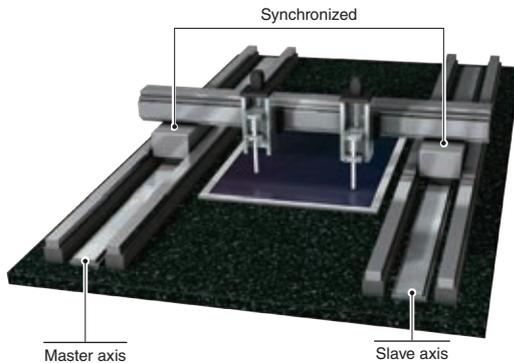
The triggered motion is a type of command that delays the execution of the motion command until the specified trigger condition is satisfied.

Axes can be started automatically based on the specified conditions by using this command, reducing the cycle time of conveyor systems, etc.

In the operation example above, right after the axis 2 starts execution of normal motion commands, the axis 1 executes the triggered motion command (delaying the execution of the command until the condition is satisfied).

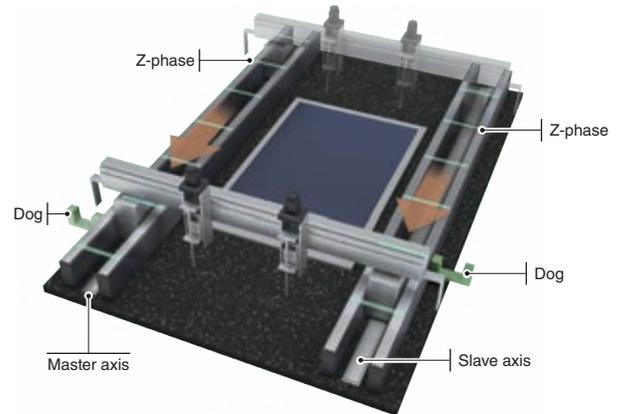
When the condition is satisfied (start trigger ON) during the axis 2 operation, the axis 1 starts executing the motion command.

Synchronous control (tandem drive)



Motion Control Software enables tandem operation where the same commands can be outputted to master and slave axes.

Gantry home position return



After the master and slave axes pass their respective dogs, the gantry home position return stops both of the axes at the Z-phase of the master axis. This method enables two or more axes to execute home position return simultaneously, supporting gantry systems.

A Wide Variety of Features

Hot connect (disconnection/reconnection)

The hot connect enables a topology change during operation without requesting a communication stop. The user application disconnects and reconnects the network through API library.

Position synchronous output (cam switch)

The output signal is turned on when a specified condition is satisfied. This function can be used as an alternative to a limit switch.

Pitch error compensation

The set offset is applied at regularly spaced command positions. The position error of ball screws can be compensated, improving the operation accuracy.

Acceleration/deceleration methods

The controller offers 24 types of acceleration/deceleration methods, such as trapezoidal, S-curve, jerk ratio, parabolic, sine curve, time acceleration trapezoidal, etc. Select the method according to your application.

Monitoring of servo data

The controller obtains the status data of servo amplifiers, such as machine diagnosis information and encoder temperature, via CC-Link IE TSN. This enables visualization of machine status.

Touch probe (mark detection)

The current value of the servo motor can be read when the touch probe signal is inputted. Software and hardware touch probes are available. Select the touch probe according to your application.

Backlash compensation

The set offset is applied when the axis changes the travel direction. The backlash of ball screws can be compensated, which improves operation accuracy of machines.

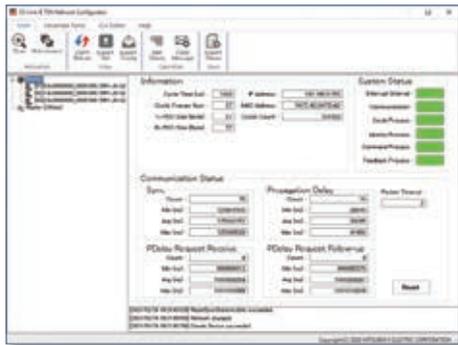
Integrated Test Tool SWM-G Operating Station



This tool provides a variety of features - parameter settings required for application development and the test operation for JOG, inching, and positioning operations. In addition, each axis status and sampled waveforms can be displayed to help user check the start timing and the operation pattern.

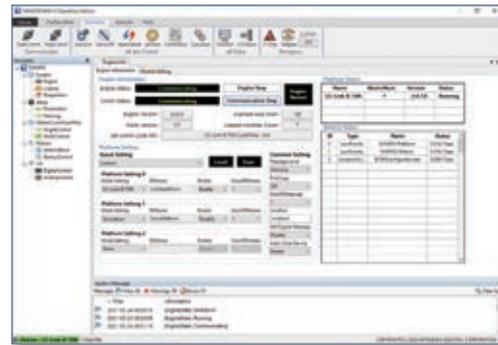
CC-Link IE TSN Configurator (settings for CC-Link IE TSN)

- Communication setting with MR-J5-G (communication cycle)
- Communication status check



SWM-G Operating Station (motion settings, monitor tool)

- Axis parameter setting and axis monitor
- Test operation (for servo ON, JOG, PTP, etc.)



Settings for CC-Link IE TSN-Compatible Devices

The settings of the network and servo amplifiers can be conducted through the single network line of CC-Link IE TSN.

[CC-Link IE TSN Configurator]

CC-Link IE TSN Configurator is the network management tool of CC-Link IE TSN that enables users to set the network and check the communication status.

- Easy network configuration
- System and communication status check

[MR Configurator2*2]

MR Configurator2 enables users to easily set and adjust multiple servo amplifiers through CC-Link IE TSN which enables mixing of TCP/IP communication and other communications.

- Supports MR-J5-G
- Manages a multi-axis system as one project
- Offers an easy-to-set user interface for machine diagnosis function



*2. MR Configurator2 is not included with SWM-G Motion Control Software.

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Operating environment

Item	Specifications
Personal computer	Microsoft® Windows® supported personal computer
OS	Microsoft® Windows® 10 (Home, Pro, Enterprise, Education, IoT Enterprise LTSC ^(Note 1)) (64-bit)
CPU	Intel® Atom™ 2 GHz, 2Core or higher is recommended
Memory	4 GB or more
Free hard disk space	For installation: 5 GB or more free hard disk capacity
Network interface (recommended network interface cards)	Intel® I210 (Vendor ID: 0x8086, Device ID: 0X1533) Intel® I350 (Vendor ID: 0x8086, Device ID: 0X1521) Intel® I211-AT (Vendor ID: 0x8086, Device ID: 0X1539)

Notes: 1. Windows® 10 IoT Enterprise LTSC is recommended.

Motion Control Software

Item	Specifications	
Maximum number of control axes ^(Note 2)	16, 32, 64, 128	
Communication cycle (operation cycle settings) [μs]	125, 250, 500, 1000, 2000, 4000, 8000	
Network	CC-Link IE TSN	
CC-Link IE TSN certified class	B	
Communication specifications	Mixture of hot connect, SDO communication, TCP/IP communication	
Development environment	• Microsoft® Visual Studio® 2017, 2019 • Programming languages supported by API library: C/C++, .NET (C#, VB.NET, etc.)	
Functions	Control method	Position, speed, torque
	Positioning	Up to 128 axes simultaneously (absolute value command, relative value command) Override is possible
	Acceleration/deceleration processing	Trapezoidal, S-curve, jerk ratio, parabolic, sine, time acceleration trapezoidal, etc. (24 types in total)
	Interpolation	2- to 4-axis linear interpolation, 2-axis/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
	JOG operation	Provided
	Real-time control	Event, triggered motion, position synchronous output
	Synchronous control	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 per communication cycle, phase operation, clutch
	Home position return ^(Note 3)	Home position return using the Z-phase, home position sensor, limit sensor, limit proximity sensor, external input signal, mechanical end, and gantry axis can be performed.
	I/O size	Input: 8000 bytes, output: 8000 bytes
Compensation function	Backlash/pitch error compensation, plane strain (straightness) compensation	
Auxiliary function	Touch probe, logging	

Notes: 2. The maximum number of control axes differs among the USB keys for Motion Control Software.

3. SWM-G does not support the home position return mode of the servo amplifier.

CC-Link IE TSN

Item	Specifications
Communications speed [bps]	1G/100M ^(Note 4)
Maximum stations per network	128 stations
Connection cable	Ethernet cable (category 5e or higher, double shielded/STP) straight cable
Maximum distance between stations [m]	100
Topology ^(Note 5)	Line, star, line/star mixed topologies
Communications method	Time-sharing method
Maximum transient transmission capacity	1920 bytes

Notes: 4. A 1 Gbps device and a 100 Mbps device cannot be used on the same network.

5. Use a switching hub (certified class: B) for star topology.

Product list

Product name	Model	Applications
Motion Control Software ^(Note 6)	SW1DNN-SWMG-M	• SWM-G Engine • SWM-G Operating Station • Network API • SWM-G API • CC-Link IE TSN Configurator • Real Time OS (RTX64)
USB key for Motion Control Software	MR-SWMG16-U	Maximum number of control axes: 16, USB key (license)
	MR-SWMG32-U	Maximum number of control axes: 32, USB key (license)
	MR-SWMG64-U	Maximum number of control axes: 64, USB key (license)
	MR-SWMG128-U	Maximum number of control axes: 128, USB key (license)
MR Configurator2 ^(Note 7)	SW1DNC-MRC2-E	Setup software for AC servo amplifiers and motors

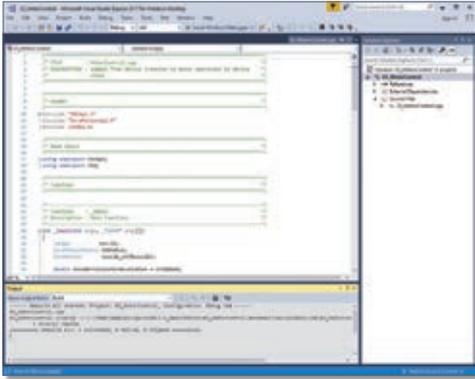
Notes: 6. Download and install Motion Control Software from Mitsubishi Electric FA global website.

7. If you have MELSOFT iQ Works, GX Works3, GX Works2, MT Works2, EM Software Development Kit, or CW Configurator, MR Configurator2 is available for free download.

Programming Utilizing API Library

■ Development environment *1 (Microsoft® Visual Studio®)

Add the SWM-G API library to the project of Microsoft® Visual Studio® and create a user program.



- C++, C# compile
- Debug of C language programs

*1. Prepare a development environment with Microsoft Visual Studio®.

■ A program that starts positioning

```

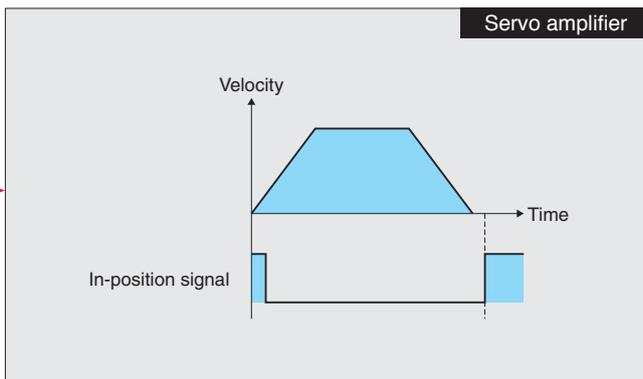
void sample()
{
    Motion::PosCommand pos;

    /* Position command data settings */
    pos.axis = 0;                /* Axis = axis 0 */
    pos.profile.type = ProfileType::Trapezoidal;    /* Acceleration = trapezoidal */
    pos.profile.velocity = 10000.0;    /* Velocity = 10000.0 [U/s] */
    pos.profile.acc = 10000.0;        /* Acceleration = 10000.0 [U/s^2] */
    pos.profile.dec = 10000.0;        /* Deceleration = 10000.0 [U/s^2] */
    pos.target = 30000.0;            /* Travel distance = 30000.0 [U] */

    /* Relative positioning start */
    err = sscLib_cm.motion->StartMov(&pos);
    if (err != ErrorCode::None) { /* Error processing */ }

    /* Waiting for positioning completion */
    sscLib_cm.motion->Wait(0);
}
    
```

User program



■ A program that continuously starts positioning of another axis based on the specified trigger condition

```

void sample()
{
  Motion::PosCommand pos;
  Motion::TriggerPosCommand tpos;

  /* Position command data settings (axis 0) */
  pos.axis = 0; /* Axis = axis 0 */
  pos.profile.type = ProfileType::Trapezoidal; /* Acceleration = trapezoidal */
  pos.profile.velocity = 10000.0; /* Velocity = 10000.0 [U/s] */
  pos.profile.acc = 10000.0; /* Acceleration = 10000.0 [U/s^2] */
  pos.profile.dec = 10000.0; /* Deceleration = 10000.0 [U/s^2] */
  pos.target = 30000.0; /* Travel distance = 30000.0 [U] */

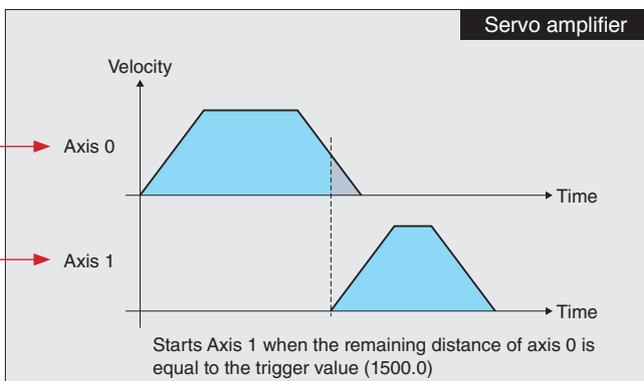
  /* Relative positioning start (axis 0) */
  err = sscLib_cm.motion->StartMov(&pos);
  if (err != ErrorCode::None) { /* Error processing */ }

  /* Triggered motion position command data settings (axis 1) */
  tpos.axis = 1; /* Axis = axis 1 */
  tpos.profile.type = ProfileType::Trapezoidal; /* Acceleration = trapezoidal */
  tpos.profile.velocity = 10000.0; /* Velocity = 10000.0 [U/s] */
  tpos.profile.acc = 10000.0; /* Acceleration = 10000.0 [U/s^2] */
  tpos.profile.dec = 10000.0; /* Deceleration = 10000.0 [U/s^2] */
  tpos.target = 20000.0; /* Travel distance = 20000.0 [U] */
  tpos.trigger.triggerAxis = 0; /* Trigger axis = axis 0 */
  tpos.trigger.triggerType = TriggerType::RemainingDistance; /* Trigger condition = remaining distance */
  tpos.trigger.triggerValue = 1500.0; /* Remaining distance = 1500.0 [U] */

  /* Triggered motion relative positioning start (axis 1) */
  err = sscLib_cm.motion->StartMov(&tpos);
  if (err != ErrorCode::None) { /* Error processing */ }

  /* Waiting for positioning completion */
  sscLib_cm.motion->Wait(1);
}

```



API library

Simpler programming by using a dedicated library suite for access to Motion Control Software.

■ Main functions of API library

Class	Function	Description
SSCApi	StartEngine	Starts SWM-G engine.
	StopEngine	Stops SWM-G engine.
	CreateDevice	Create a device to interface with the SWM-G engine.
	CloseDevice	Closes a device.
	StartCommunication	Starts communication with the servo network.
	StopCommunication	Stops communication with the servo network.
CoreMotion	GetStatus	Reads the current system status from SWM-G engine.
AxisControl	SetServoOn	Executes servo on or servo off.
	SetAxisCommandMode	Sets the command mode of the axis.
	GetAxisCommandMode	Obtains the command mode of the axis.
	GetPosCommand	Obtains the commanded position of the axis.
	GetPosFeedback	Obtains the feedback position of the axis.
	GetVelCommand	Obtains the commanded velocity of the axis.
Config	GetVelFeedback	Obtains the feedback velocity of the axis.
	SetParam	Sets the system parameters.
	GetParam	Obtains the system parameters.
	SetAxisParam	Sets the axis parameters.
	GetAxisParam	Obtains the axis parameters.
	Export	Exports the system and axis parameters to xml file.
Home	Import	Imports the system and axis parameters from xml file.
	StartHome	Starts home position return.
Motion	SetCommandPos	Sets the commanded position to a specified value.
	StartPos	Executes positioning (absolute position).
	StartMov	Executes positioning (relative position).
	StartLinearIntplPos	Starts linear interpolation (absolute position).
	StartLinearIntplMov	Starts linear interpolation (relative position).
	StartCircularIntplPos	Starts circular interpolation (absolute position).
	StartCircularIntplMov	Starts circular interpolation (relative position).
	StartHelicalIntplPos	Starts helical interpolation (absolute position).
	StartHelicalIntplMov	Starts helical interpolation (relative position).
	StartJog	Starts JOG operation.
	Stop	Decelerates the axis to stop.
	ExecQuickStop	Decelerates the axis to stop with Quick Stop Dec parameter.
	ExecTimedStop	Decelerates the axis to stop with the specified time.
	Wait	Executes the blocking wait command.
	Pause	Pauses the positioning operation.
	Resume	Restarts the paused positioning operation.
	OverridePos	Overrides the target position (absolute position) during positioning operation.
	OverrideMov	Overrides the target position (relative position) during positioning operation.
	OverrideProfile	Overrides the velocity pattern during positioning, JOG operation, and speed control.
	StopJogAtPos	Decelerates the axis in JOG operation to stop at the specified position.

Class	Function	Description
Sync	SetSyncMasterSlave	Establishes synchronization between the master and slave axes.
	ResolveSync	Cancels synchronization of the specified slave axes.
Velocity	StartVel	Starts speed control.
	Stop	Stops speed control.
Torque	StartTrq	Starts torque control.
	StopTrq	Stops torque control.
AdvMotion	CreatePathIntplBuffer	Assigns the buffer memory for path interpolation to an axis.
	FreePathIntplBuffer	Frees up the buffer memory for path interpolation.
	StartPathIntplPos	Starts path control (absolute position).
	StartPathIntplMov	Starts path control (relative position).
	StartPathIntpl3DPos	Starts 3D path interpolation (absolute position).
	StartPathIntpl3DMov	Starts 3D path interpolation (relative position).
AdvSync	StartECAM	Starts E-CAM control.
	StopECAM	Stops E-CAM control.
Event	SetEvent	Sets an event.
	SetSoftwareTouchProbe	Sets the parameter of the software touch probe channel.
	GetSoftwareTouchProbeStatus	Obtains the parameters and the current status of software touch probe.
	SetHardwareTouchProbe	Sets the parameters of hardware touch probe.
	GetHardwareTouchProbeStatus	Obtains the parameters and the current status of hardware touch probe.
	StartPSO	Starts the position synchronous output channel.
Io	SetOutBit	Sets the output bit values.
	SetOutByte	Sets the output byte values.
	SetOutAnalogDataShort	Sets two-byte output data.
	GetInBit	Obtains the input bit values.
	GetInByte	Obtains the input byte values.
	GetInAnalogDataShort	Obtains two-byte input data.
UserMemory	SetMBit	Sets the user memory bit values.
	SetMByte	Sets the user memory byte values.
	SetMAnalogDataShort	Sets two-byte user memory data.
	GetMBit	Obtains the user memory bit value.
	GetMByte	Obtains the user memory byte value.
	GetMAnalogDataShort	Obtains two-byte user memory data.
Log	StartLog	Starts logging data.
	StopLog	Stops logging data.
	SetLog	Specifies the data to be collected by logging operation.
CCLink	StartHotconnect	Starts the hot connect.
	SdoDownload	Downloads the specified SDO data.
	SdoUpload	Uploads the specified SDO data.
	SetAxisMode	Sets the control mode of the specified slave axis.
	StartAxisHM	Starts HM mode control of the specified slave axis.
	SlmpSendBySlaveId	Transmits SLMP to the specified slave axis.

Driving a wide range of motors

Servo amplifier

MELSERVO-J5 Series

Rotary servo motor Linear servo motor Direct drive motor
HK Series **LM Series** **TM Series**



MITSUBISHI ELECTRIC SERVO SYSTEM
MELSERVO-J5

Servo amplifier

MELSERVO-JET Series

Rotary servo motor Linear servo motor
HG Series **LM Series**



MITSUBISHI ELECTRIC SERVO SYSTEM
MELSERVO-JET

CC-Link IE TSN

Product Lines

Servo amplifier



CC-Link IE TSN MR-J5-G

Supports Ethernet-based CC-Link IE TSN, featuring high-speed, large-capacity communication (1 Gbps). Command communication cycle of $\geq 31.25 \mu\text{s}$ and speed frequency response of 3.5 kHz enable advanced motion control.



CC-Link IE TSN MR-J5W2-G MR-J5W3-G

Drives two to three servo motors. This simplifies wiring, saves energy, and enables a compact machine at a lower cost.



Simple converters

MR-CM

MR-J5

Utilizing a common bus connection conserves energy through the efficient use of regenerative power. Wiring can be simplified, and installation space can be saved by reducing the number of molded-case circuit breakers and magnetic contactors.



CC-Link IE TSN MR-JET-G

Supports Ethernet-based CC-Link IE TSN, featuring high-speed, large-capacity communication (1 Gbps). Command communication cycle of $\geq 125 \mu\text{s}$ and speed frequency response of 2.5 kHz enable advanced motion control.

Servo motors

[Rotary servo motors]

HK series: servo motors with a 26-bit batteryless absolute position encoder **MR-J5**



Small capacity,
low inertia

HK-KT Series

Rated speed:
3000 r/min*¹
Max. speed:
6700 r/min*¹



Medium capacity,
medium inertia

HK-ST Series

Rated speed:
2000 r/min*¹
Max. speed:
4000 r/min*¹



Medium capacity,
ultra-low inertia

HK-RT Series

Rated speed:
3000 r/min
Max. speed:
6700 r/min*¹



HG series: servo motors with a 22-bit absolute position encoder **MR-JET**



Small capacity, low inertia

HG-KNS Series

Rated speed: 3000 r/min
Max. speed: 6000 r/min



Medium capacity, medium inertia

HG-SNS Series

Rated speed: 2000 r/min
Max. speed: 3000 r/min*¹

*1. The speed varies by the models.

[Linear servo motors]



Core type

LM-H3 Series

Max. speed:
3 m/s
Rated thrust:
70 N to 960 N
Max. thrust:
175 N to 2400 N

MR-J5

MR-JET



Core type

LM-AJ Series

Max. speed:
2 to 6.5 m/s
Rated thrust:
68.1 N to 446.8 N
Max. thrust:
214.7 N to 1409.1 N

MR-J5

MR-JET



Core type
(natural/liquid cooling)

LM-F Series

Max. speed:
2 m/s
Rated thrust:
300 to 1200 N
(natural cooling)
600 to 2400 N
(liquid cooling)
Max. thrust:
1800 to 7200 N
(natural/liquid cooling)

MR-J5



Coreless type

LM-U2 Series

Max. speed:
2 m/s
Rated thrust:
50 N to 800 N
Max. thrust:
150 N to 3200 N

MR-J5



Core type with magnetic
attraction counter-force

LM-K2 Series

Max. speed: 2 m/s
Rated thrust: 120 N to 2400 N
Max. thrust: 300 N to 6000 N

MR-J5

[Direct drive motors] **MR-J5**



Low-profile flange type

TM-RG2M Series

Low-profile table type

TM-RU2M Series

Rated torque: 2.2 to 9 N·m
Max. torque: 8.8 to 27 N·m



High-rigidity

TM-RFM Series

Rated torque: 2 to 240 N·m
Max. torque: 6 to 720 N·m

Products Supporting SWM-G Motion Control Software

Industrial personal computer

MELIPC Series

Inverter

FR-A800 Series

Block-type
remote I/O modules



CC-Link I^E TSN

MELIPC series

SWM-G Motion Control Software can be installed and operated on MELIPC series MI3000, MI2000, and MI1000.



 **EDGE CROSS**
MI3000

MI3000 is equipped with Intel® Core™ i3 CPU and pre-installed GT SoftGOT2000. The large screen and high resolution LCD panel is used for data display and touch operation.



 **EDGE CROSS**
MI2000

Intel® Core™ i3 CPU realizes simple analysis/diagnosis/monitoring of collected data, contributing to quality improvement.



 **EDGE CROSS**
MI1000

Energy saving Intel® Atom™ E3826 in a compact 26-mm-tall module enables computer functions.

Inverter



FR-A800 series
FR-A800-GN

The extensive range of high-value, next-generation inverters delivers outstanding drive performance in any environment, and a wealth of functionality covering startup to maintenance.



FR-E800 series
FR-E800-E/SCE

World's smallest class inverter with high functionality. Connectivity with various networks will enable smart factories and infrastructures in various fields.

Input modules



Model		Input type (DC input)	Input points	Rated input voltage/current	Wiring type
Spring-clamp terminal block	NZ2GN2S1-32D	Positive common Negative common	32	24 V DC (6 mA)	1-wire
	NZ2GN2B1-32D	Positive common Negative common	32	24 V DC (6 mA)	1-wire
Screw terminal block	NZ2GN2S1-32D	Positive common Negative common	32	24 V DC (6 mA)	1-wire
Sensor connector (e-CON)	NZ2GNCE3-32D	Positive common	32	24 V DC (6.6 mA)	3-wire
40-pin connector	NZ2GNCF1-32D	Positive common Negative common	32	24 V DC (6.6 mA)	1-wire

Output modules



Model		Output type (Transistor output)	Output points	Rated load voltage/Max. load current	Wiring type
Spring-clamp terminal block	NZ2GN2S1-32T	Sink	32	12/24 V DC (0.5 A)	1-wire
	NZ2GN2S1-32TE	Source	32	12/24 V DC (0.5 A)	1-wire
Screw terminal block	NZ2GN2B1-32T	Sink	32	12/24 V DC (0.5 A)	1-wire
	NZ2GN2B1-32TE	Source	32	12/24 V DC (0.5 A)	1-wire
40-pin connector	NZ2GNCF1-32T	Sink	32	12/24 V DC (0.5 A)	1-wire

I/O combined modules



Model		Input type (DC input)	Input points	Rated input voltage/current	Output type (Transistor output)	Output points	Rated load voltage/Max. load current	Wiring type
Spring-clamp terminal block	NZ2GN2S1-32DT	Positive common	16	24 V DC (6 mA)	Sink	16	24 V DC (0.5 A)	1-wire
	NZ2GN2S1-32DTE	Negative common	16	24 V DC (6 mA)	Source	16	24 V DC (0.5 A)	1-wire
Screw terminal block	NZ2GN2B1-32DT	Positive common	16	24 V DC (6 mA)	Sink	16	24 V DC (0.5 A)	1-wire
	NZ2GN2B1-32DTE	Negative common	16	24 V DC (6 mA)	Source	16	24 V DC (0.5 A)	1-wire
Sensor connector (e-CON)	NZ2GNCE3-32DT	Positive common	16	24 V DC (6.6 mA)	Sink	16	24 V DC (0.5 A)	3-wire

Analog input modules



Model		Input type	Number of channels
Spring-clamp terminal block	NZ2GN2S-60AD4	Analog voltage/current input	4
Screw terminal block	NZ2GN2B-60AD4	Analog voltage/current input	4

Analog output modules



Model		Output type	Number of channels
Spring-clamp terminal block	NZ2GN2S-60DA4	Analog voltage/current output	4
Screw terminal block	NZ2GN2B-60DA4	Analog voltage/current output	4

Mitsubishi Electric Solutions

e-F@ctory

Maximize productivity and reduce costs with an intelligent smart factory solution

Intelligent smart factories utilize high-speed networks with large data bandwidths to meet current manufacturing needs. The combination of CC-Link IE TSN and Mitsubishi Electric's e-F@ctory solution ensures robust integration between IT and factory automation systems, providing an intelligent smart factory solution that reduces total cost while improving operations, production yield, and efficient management of the supply chain. e-F@ctory is the Mitsubishi Electric solution for adding value across the manufacturing enterprise by enhancing productivity, thereby simultaneously reducing maintenance and operating costs, and enabling the seamless flow of information throughout the plant. e-F@ctory uses a combination of factory automation and IT technologies in combination with various best-in-class partner products through its alliance program.



CC-Link IE TSN

- IT integration
- Open technology

- High speed, Time synchronization
- Network integration

MELSEC iQ-R
GOT2000

MELSEC iQ-F

MITSUBISHI ELECTRIC SYNO SYSTEM
MELSER I/O-15
MELFA FR

FREQROL-A800/E800
MITSUBISHIELECTRIC
CNC C80

SMART FACTORY

Productivity

Quality

Flexibility

Maintenance

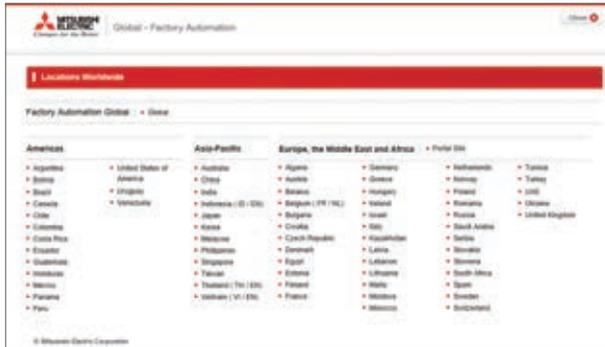
Mitsubishi Electric FA Global Website

Mitsubishi Electric Factory Automation provides a mix of services to support its customers worldwide, through a consolidated global website. It offers a selection of support tools and a window to its local Mitsubishi Electric sales and support network.

Global & Local Websites

Mitsubishi Electric Factory Automation
Global website
www.MitsubishiElectric.com/fa

 Worldwide



Local websites



Global website

e-Manual Viewer

The e-Manual viewer is a next-generation digital manual offered by Mitsubishi Electric that consolidates factory automation products manuals into an easy-to-use package with various useful features integrated into the viewer. The e-Manual allows multiple manuals to be cross-searched at once, further reducing time for setting up products and troubleshooting.



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Windows®



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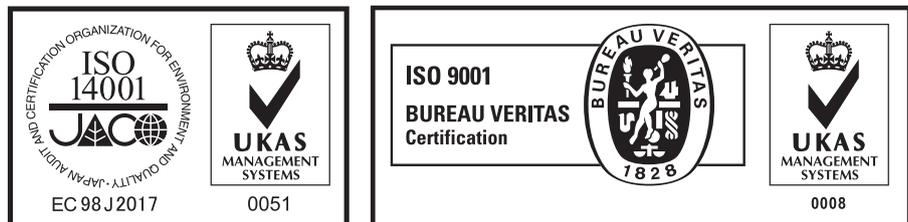
Android™



Mitsubishi Electric AC Servo System Personal Computer Embedded Type Servo System Controller Motion Control Software SWM-G

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Mitsubishi Electric Corporation Nagoya Works is a factory certified for ISO14001 (standards for environmental management systems) and ISO9001 (standards for quality assurance management systems)



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