



for a greener tomorrow



**MITSUBISHI
ELECTRIC**

Changes for the Better

FACTORY AUTOMATION

MELSEC iQ-F Series

Simple Motion Module FX5-40SSC-S

FX5-80SSC-S **NEW**

e-Factory

SERVO SYSTEM CONTROLLER



MELSEC iQ-F
series

**Superior Motion Control
with Easy Settings**

GLOBAL IMPACT OF MITSUBISHI ELECTRIC



Through Mitsubishi Electric's vision, "Changes for the Better" are possible for a brighter future.

Changes for the Better

We bring together the best minds to create the best technologies. At Mitsubishi Electric, we understand that technology is the driving force of change in our lives. By bringing greater comfort to daily life, maximizing the efficiency of businesses and keeping things running across society, we integrate technology and innovation to bring changes for the better.

Mitsubishi Electric is involved in many areas including the following

Energy and Electric Systems

A wide range of power and electrical products from generators to large-scale displays.

Electronic Devices

A wide portfolio of cutting-edge semiconductor devices for systems and products.

Home Appliance

Dependable consumer products like air conditioners and home entertainment systems.

Information and Communication Systems

Commercial and consumer-centric equipment, products and systems.

Industrial Automation Systems

Maximizing productivity and efficiency with cutting-edge automation technology.

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The next level of industry

MELSEC iQ-F series

Witness the evolution of the micro PLC.
Designed on the concepts of outstanding performance, superior drive control,
and user centric programming,
MELSEC-F Series has been reborn as the MELSEC iQ-F Series.
From standalone use to networked system application,
MELSEC iQ-F series brings your business to the next level of industry.



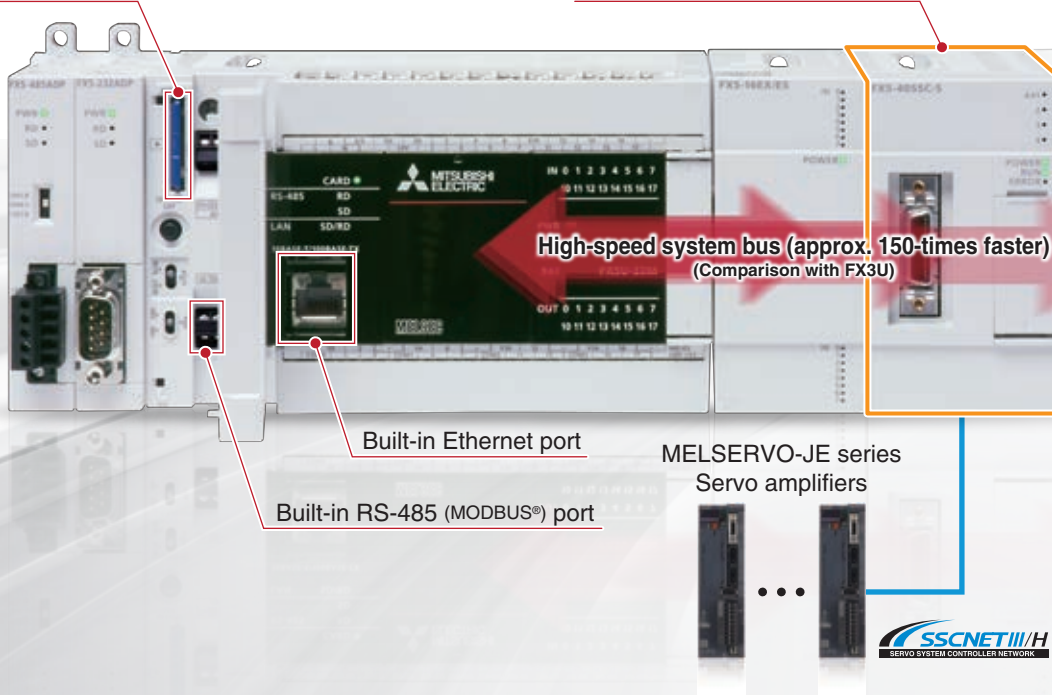
FX5-40SSC-S
FX5-80SSC-S **NEW**

Superior Drive Control Achieved

Simple Motion Module

Built-in
SD memory card slot

Simple Motion Module
FX5-40SSC-S: Up to 4 axes
FX5-80SSC-S: Up to 8 axes **NEW**



Built-in Ethernet port

Built-in RS-485 (MODBUS®) port

MELSERVO-JE series
Servo amplifiers

Synchronous/Cam Controls Contribute to Higher Performance of Small-sized Equipment

The Simple Motion module is provided with synchronous and cam controls required for food processing machines and packaging machines. Combined with the Mitsubishi Electric's high-performance servo amplifier, the Simple Motion module enables downsizing of machinery while achieving outstanding performance. In addition, our extensive engineering environment allows you to create desired systems with ease.

Central Control via SSCNET III/H Boosts Efficiency in Startup

The Simple Motion module can consolidate multiple servo amplifier parameters, shortening the startup time further. Also, operation information, such as power consumption and total power consumption of the servo amplifiers, can be monitored in real time, which enables further reduction in maintenance time.

Solutions

The Simple Motion Module Expands Choices for Multi-Axis Control and High Performance

► Rotary Knife

Sheet can be cut accurately at high speed by using synchronous control, cam control, and mark detection function. Additionally, cam data for the rotary knife axis can be easily created with the cam auto-generation function, which enables further reduction in programming time.



MELSEC iQ-F series



Positioning Control

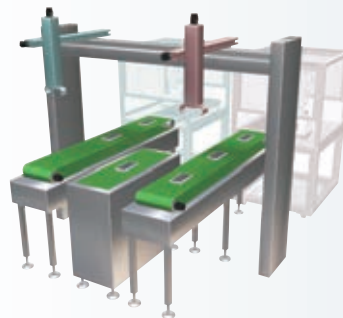
Advanced Sync.

Mark Detection

Cam Auto-Generation

► Material Handling Machines

The machine can move workpieces easily from one line to another by using a combination of linear interpolation, 2-axis circular interpolation, and continuous trajectory control. Smooth trajectory can be traced with S-curve acceleration/deceleration function. As a result, the machine vibration can be minimized.



MELSEC iQ-F series



Linear Interpolation

Circular Interpolation

Trajectory Control

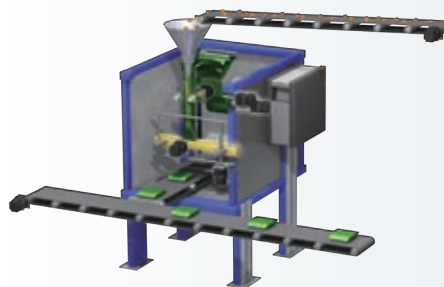
S-curve Accel./decel.

► Packing Machines

When the machine packs food, the whole process is synchronized by using advanced synchronous and cam controls. The high synchronization between the conveying roller axis and the sealing & cutting axis improves the packing accuracy, achieving high-quality production.

Upgraded

Peripherals such as a belt conveyor, can be easily added because up to 8 output axes are connectable.



MELSEC iQ-F series



Positioning Control

Advanced Sync.

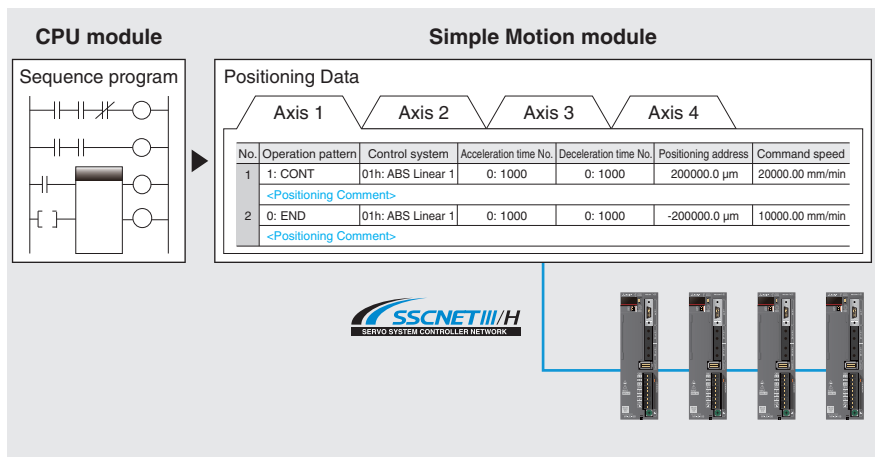
Cam Control

Cutting-edge Technologies Packed in a Compact Module

► Basic Positioning Control

Positioning Control

Positioning control is easily performed with a sequence program starting positioning data of a point table. To respond to extensive applications, various positioning controls are available: Linear interpolation, 2-axis circular interpolation, fixed-pitch feed, and continuous trajectory controls, etc.



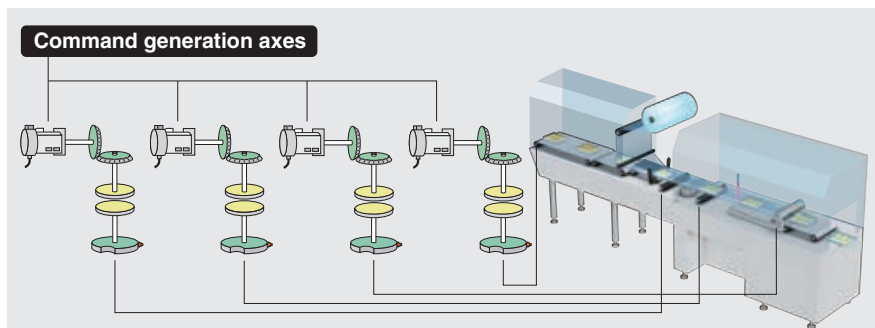
► Synchronous/Cam controls

Advanced Sync. Cam Auto-Generation

● Advanced synchronous control

The advanced synchronous control is the software-based control that can be used as an alternative to mechanical control such as gear, shaft, clutch, speed change gear, and cam.

The settings are easily made with parameters on MELSOFT GX Works3. In addition, the output axes for the synchronous control are operated with a cam.

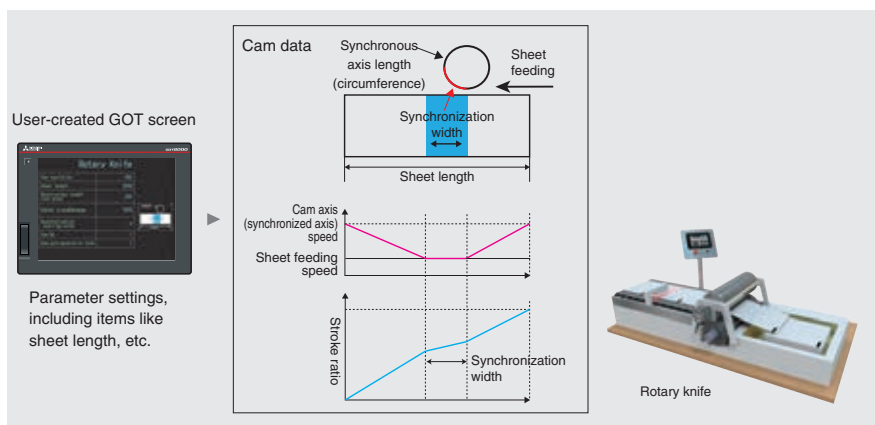


[Command generation axis]

Command generation axis is the axis that performs only the command generation. It is controlled independently of other axes connected to servo amplifiers. (not counted as a control axis)

● Cam auto-generation

Cams for rotary knife can be generated automatically. An ideal cam data can be created just by registering sheet length, synchronous width, and cam resolution to the specified device memory on GOT screen.

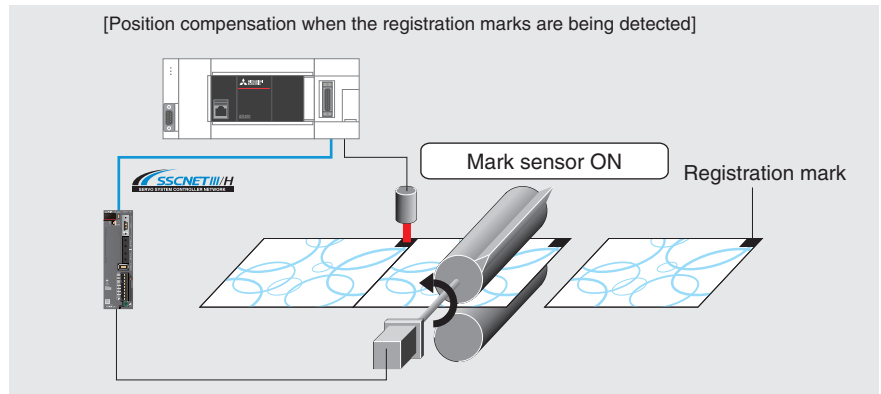




➤ Mark Detection Function



The actual position of the servo motor can be obtained based on the inputs from the sensor that detects the registration marks printed on the high-speed moving film. By compensating the cutter axis position errors based on those inputs from the sensor, the film can be cut at the set position.



➤ Supporting the Servo High-speed Synchronous Network "SSCNET III/H"

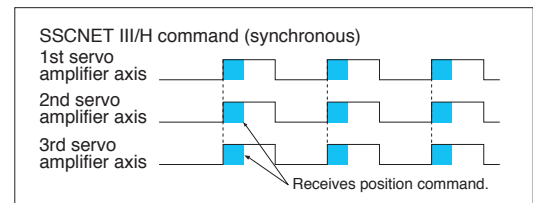
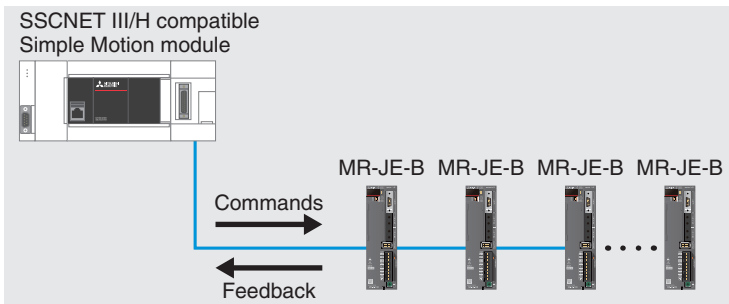


● Three times faster communications speed

Communications speed is increased to 150 Mbps full duplex (equivalent to 300 Mbps half duplex), three times faster than the conventional speed. SSCNET III/H achieves faster system response, multiple-axis operation, and reduced wiring.

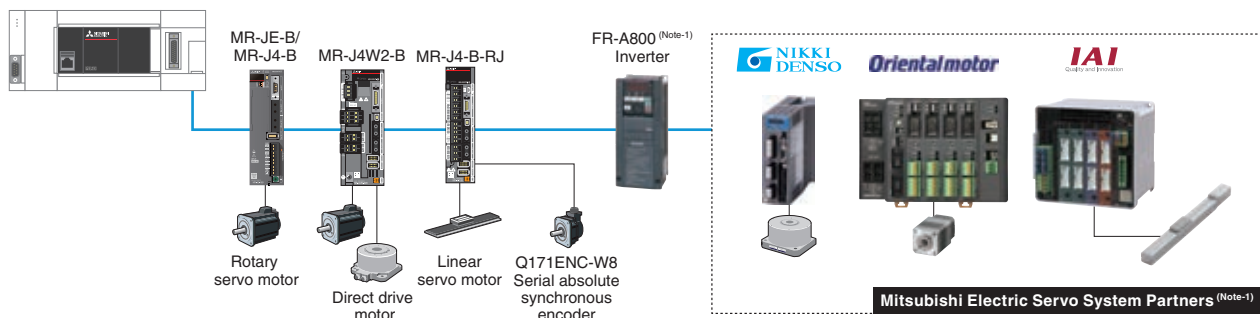
● Synchronous communications

Synchronous communications are achieved with SSCNET III/H, offering technical advantages for machines in printing and food processing industry that require deterministic control.



● Connection with various drive products Upgraded

Not only rotary servo motors but also linear servo motors, direct drive motors, FR-A800 series inverters, and products of Mitsubishi Electric servo system partners are connectable.



(Note-1): When using a partner product or the inverter FR-A800, use one whose version supports the Simple Motion module.

Easy point-and-click programming architecture

MELSOFT GX Works3



This software supports the whole product development cycle - creation, startup, debugging and maintenance of sequence programs, parameters, positioning/cam data.

➤ Designed for Efficiency and Ease of Use over a Whole Development Process

System configuration through point-and-click

A system can be configured just through drag and drop of a necessary module name from the list.

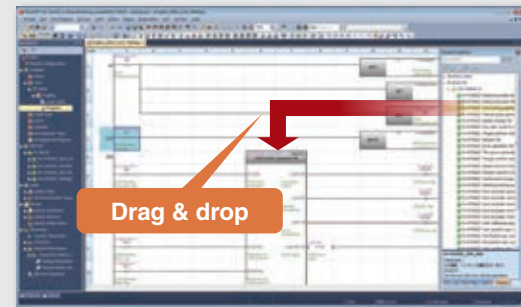
[Module configuration]



Easy programming using module FB

A sequence program can be created through drag & drop of module FB to the editor.

[Sequence program]



System design

Programming

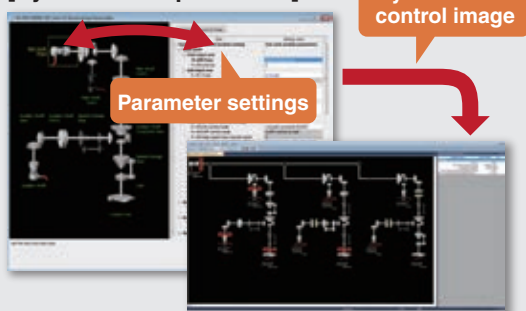
Startup

Maintenance

Only parameter settings required

Synchronous control is achieved just by setting parameters on the synchronous parameter screen with an image of mechanical mechanism.

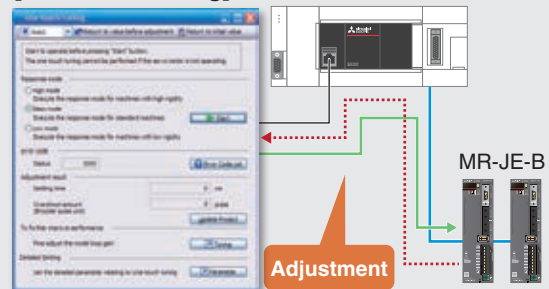
[Synchronous parameter]



Quick startup and adjustment

Servo amplifier settings and adjustment can be done without unplugging the cables.

[One-touch tuning]



Reliable basic performance and advanced ease-of-use

MITSUBISHI SERVO AMPLIFIERS & MOTORS

MELSERVO-JE



Advanced ease-of-use without compromising high performance.
The reliable basic performance and the advanced servo gain adjustment boost machine performance further.

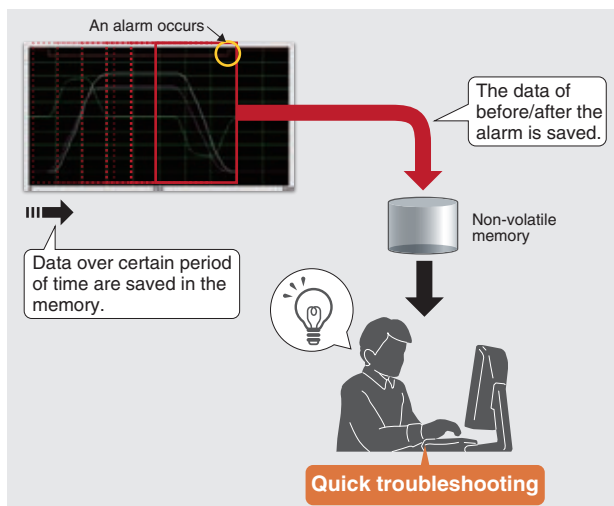
➤ Reliable Basic Performance

MELSERVO-JE series with class top-level basic performance enables shorter settling time and reduced cycle time, boosting machine performance in combination with the Simple Motion module.

- Speed frequency response of 2.0 kHz
- High-resolution encoder of 131072 pulses/rev
- Dramatically reduced torque ripple during conduction
- Absolute position detection system configurable with ease
- Compliance to global standards (European EC directives, etc.)

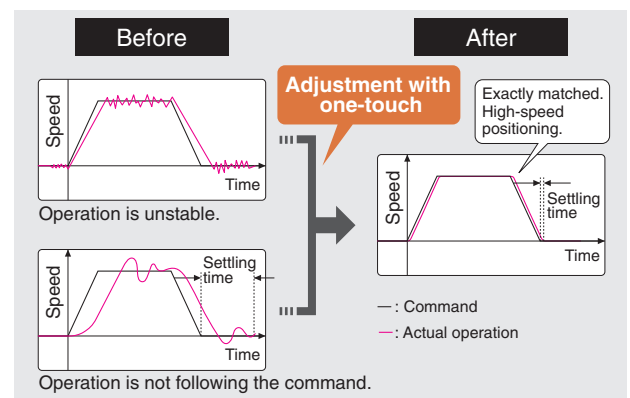
➤ Large-capacity Drive Recorder for Quick Troubleshooting

The drive recorder saves data of before/after the alarms in the non-volatile memory of the servo amplifier. This helps you investigate the condition of before/after the alarm in details through those data, enabling quick troubleshooting.



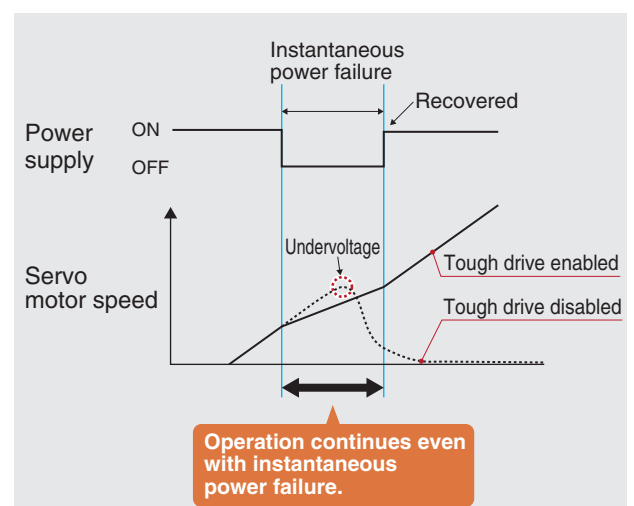
➤ Servo Gain Adjustment with One-touch Ease

Mitsubishi Electric's unique "One-touch tuning" enables servo gain adjustment with one-touch ease. Machine performance is utilized to the fullest using the advanced vibration suppression control function.

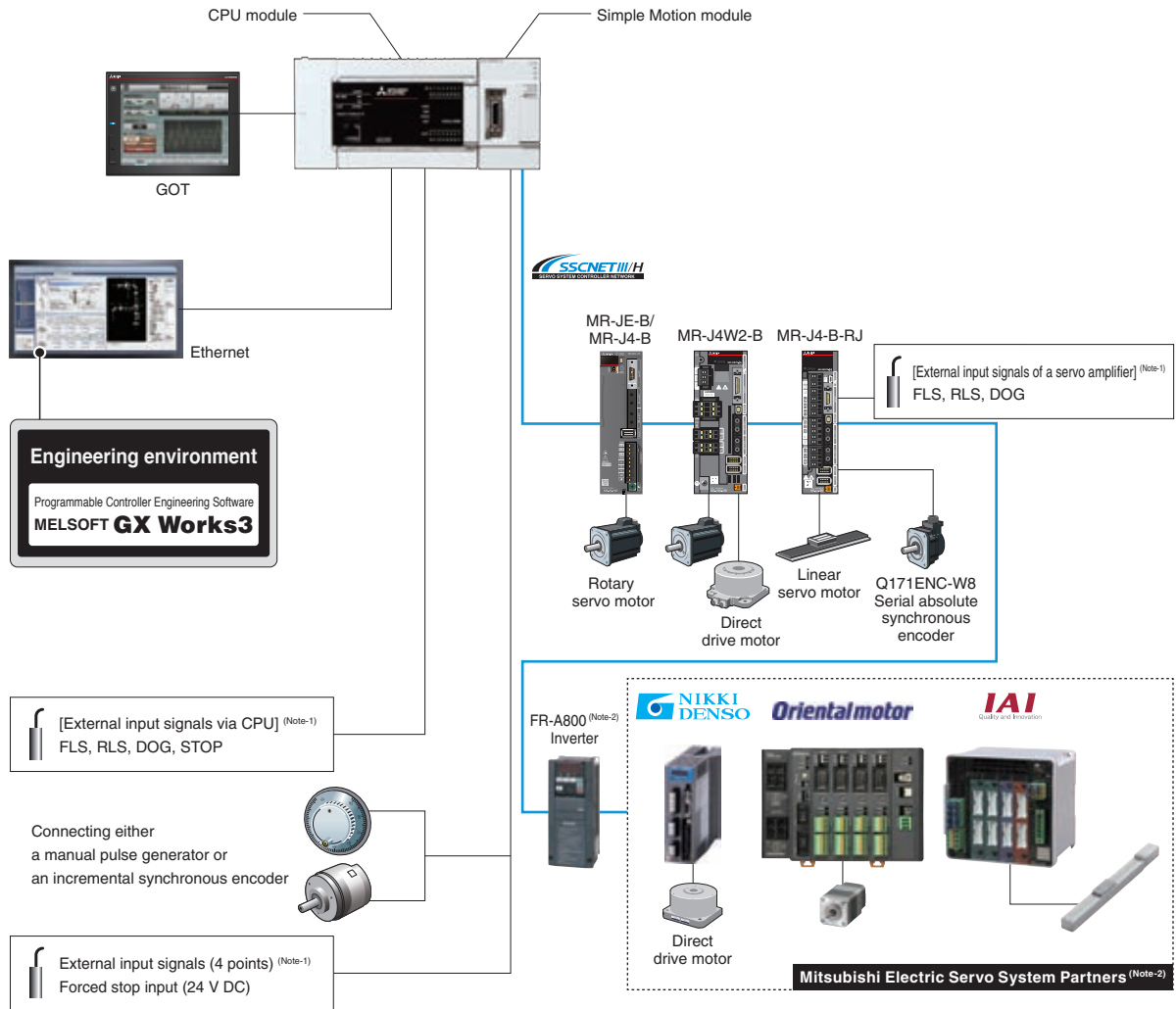


➤ Instantaneous Power Failure Tough Drive

When an instantaneous power failure is detected, this function allows the servo amplifier to use the electric energy charged in the main circuit capacitor in the servo amplifier to avoid an alarm occurrence, increasing the operating rate of the machine even with an unstable power supply.



System configuration



(Note-1): An input destination of external input signals (FLS, RLS, DOG, STOP) is changed by parameters.

(Note-2): When using a partner product or the inverter FR-A800, use one whose version supports the Simple Motion module.

MELSEC iQ-F series product lineup

MELSEC iQ-F series



Expansion adapter
(Up to 6 modules)

CPU modules

Expansion modules
(Up to 16 modules)

● CPU modules

FX5U

Terminal block type



FX5UC

Connector type



● Expansion adapters

• Communication adapter (RS-232C, RS-485)

• Analog I/O adapter

● Expansion modules

• I/O module
• Intelligent function module (Simple Motion module, network module, etc.)

• Connector conversion module
• Bus conversion module
• Extension power supply module

Control specifications

Item		Specifications	
		FX5-40SSC-S	FX5-80SSC-S
Number of control axes		Up to 4 axes	Up to 8 axes
Operation cycle (operation cycle settings) [ms]		0.888ms, 1.777ms	
Interpolation function		Linear interpolation (Up to 4 axes), Circular interpolation (2 axes)	
Control modes		Positioning control, Trajectory control (both linear and arc), Speed control, Speed-torque control, Tightening & Press-fit control	
Acceleration/deceleration process		Trapezoidal acceleration/deceleration, S-curve acceleration/deceleration	
Compensation function		Backlash compensation, Electronic gear, Near pass function	
Synchronous control	Input axis	Servo input axis, Synchronous encoder axis, Command generation axis	
	Output axis	Cam axis	
Cam control	Number of cam registration ^(Note-1)	Up to 64	Up to 128
	Cam data type	Stroke ratio data type, Coordinate data type	
	Cam auto-generation	Cam auto-generation for rotary knife	
Control unit		mm, inch, degree, pulse	
Number of positioning data		600 data (positioning data No. 1 to 600)/axis	
Backup		Parameters, positioning data, and block start data can be saved on flash ROM (battery-less backup)	
Home position return	Home position return method	Proximity dog method, Count method 1, Count method 2, Data set method, Scale home position signal detection method, Driver home position return ^(Note-2)	
	Fast home position return	Provided	
	Auxiliary functions	Home position return retry, Home position shift	
Positioning control	Linear control	Linear interpolation (up to 4 axes) ^(Note-3) (Vector speed, Reference axis speed)	
	Fixed-pitch feed	Fixed-pitch feed control (up to 4 axes)	
	2-axis circular interpolation	Auxiliary point-specified circular interpolation, Central point-specified circular interpolation	
	Speed control	Speed control (up to 4 axes)	
	Speed-position switching	INC mode, ABS mode	
	Position-speed switching	INC mode	
	Current value change	Positioning data, Start No. for a current value changing	
	NOP instruction	Provided	
	JUMP instruction	Unconditional JUMP, Conditional JUMP	
	LOOP, LEND	Provided	
High-level positioning	Block start, Condition start, Wait start, Simultaneous start, Repeated start		
Manual control	JOG operation	Provided	
	Inching operation	Provided	
	Manual pulse generator	Possible to connect 1 module (Incremental), Unit magnification (1 to 10000 times)	
Expansion control	Speed-torque	Speed control without positioning loops, Torque control, Tightening & press-fit control	
Absolute position system		Made compatible by setting a battery to servo amplifier	
Synchronous encoder interface		Up to 4CH (Total of the internal interface, via PLC CPU interface, and servo amplifier interface)	
Functions that limit control	Internal interface	1CH (Incremental)	
	Speed limit	Speed limit value, JOG speed limit value	
	Torque limit	Torque limit value same setting, Torque limit value individual setting	
	Forced stop	Valid/Invalid setting	
	Software stroke limit	Movable range check with current feed value, Movable range check with machine feed value	
Functions that change control details	Hardware stroke limit	Provided	
	Speed change	Provided	
	Override	1 to 300 [%]	
	Acceleration/deceleration time change	Provided	
	Torque change	Provided	
Other functions	Target position change	Target position address and speed are changeable	
	M-code output	Provided	
	Step function	Deceleration unit step, Data No. unit step	
	Skip function	Via PLC CPU, Via external command signal	
Teaching function	Teaching function	Provided	
	Parameter initialization function	Provided	
External input signal setting function		Via CPU, Via servo amplifier	
Amplifier-less operation function		Provided	
Mark detection function		Regular mode, Specified Number of Detections mode, Ring Buffer mode	
	Mark detection signal	Up to 4 points	
	Mark detection setting	16 settings	
Optional data monitor function		4 points/axis	
Driver communication function		Provided	
SSCNET connect/disconnect function		Provided	
Digital oscilloscope function ^(Note-4)	Bit data	16CH	
	Word data	16CH	

(Note-1): The number of cam registration changes depending on memory capacity, cam resolution, and number of coordinates.

(Note-2): The home position return method set in a driver (a servo amplifier) is used.

(Note-3): 4-axis linear interpolation control is enabled only at the reference axis speed.

(Note-4): 8CH word data and 8CH bit data can be displayed in real time.

Module specifications



Item		Specifications		
		FX5-40SSC-S	FX5-80SSC-S	
Number of control axes		Up to 4 axes	Up to 8 axes	
Servo amplifier connection method		SSCNET III/H		
Maximum overall cable distance [m(ft.)]		400 (1312.32)	800 (2624.67)	
Maximum distance between stations [m(ft.)]		100 (328.08)		
Peripheral I/F		Via CPU module (Ethernet)		
Manual pulse generator operation function		Possible to connect 1 module		
Synchronous encoder operation function		Possible to connect 4 modules (Total of the internal interface, via PLC CPU interface, and servo amplifier interface)		
Input signals (DI)	Number of input points	4 points		
	Input method	Positive common/Negative common shared (Photocoupler isolation)		
	Rated input voltage/current	24 V DC/ Approx. 5 mA		
	Operating voltage range	19.2 to 26.4 V DC (24 V DC +10%/-20%, ripple ratio 5% or less)		
	ON voltage/current	17.5 V DC or more/ 3.5 mA or more		
	OFF voltage/current	7 V DC or less/ 1.0 mA or less		
	Input resistance	Approx. 6.8 kΩ		
	Response time	1 ms or less (OFF→ON, ON→OFF)		
Forced stop input signal (EMI)	Number of input points	1 point		
	Input method	Positive common/Negative common shared (Photocoupler isolation)		
	Rated input voltage/current	24 V DC/ Approx. 5 mA		
	Operating voltage range	19.2 to 26.4 V DC (24 V DC +10%/-20%, ripple ratio 5% or less)		
	ON voltage/current	17.5 V DC or more/ 3.5 mA or more		
	OFF voltage/current	7 V DC or less/ 1.0 mA or less		
	Input resistance	Approx. 6.8 kΩ		
	Response time	4 ms or less (OFF→ON, ON→OFF)		
Signal input form		Phase A/Phase B (magnification by 4/magnification by 2/ magnification by 1), PULSE/SIGN		
Manual pulse generator/ Incremental synchronous encoder signal	Differential output type (26LS31 or equivalent)	Input pulse frequency	Up to 1 Mpulse/s (After magnification by 4, up to 4 Mpulse/s)	
		Pulse width	1 μs or more	
		Leading edge/trailing edge time	0.25 μs or less	
		Phase difference	0.25 μs or more	
		Rated input voltage	5.5 V DC or less	
		High/Low-voltage	2.0 to 5.25 V DC/0 to 0.8 V DC	
		Differential voltage	±0.2V	
		Cable length	Up to 30 m (98.43ft.)	
	Voltage-output/ Open-collector type (5 V DC)	Input pulse frequency	Up to 200 kpulse/s (After magnification by 4, up to 800 kpulse/s)	
		Pulse width	5 μs or more	
		Leading edge/trailing edge time	1.2 μs or less	
		Phase difference	1.2 μs or more	
		Rated input voltage	5.5 V DC or less	
		High/Low-voltage	3.0 to 5.25 V DC/2 mA or less, 0 to 1.0 V DC/5 mA or more	
		Cable length	Up to 10m (32.81ft.)	
		24 V DC internal current consumption [A]		0.25
Mass [kg]		0.30		
Exterior dimensions [mm(inch)]		90.0 (3.55)(H) × 50.0 (1.97)(W) × 83.0 (3.27)(D)		

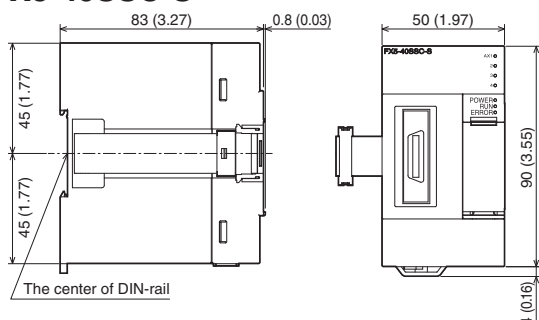
Applicable CPU

PLC CPU	FX5U, FX5UC
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Exterior dimensions

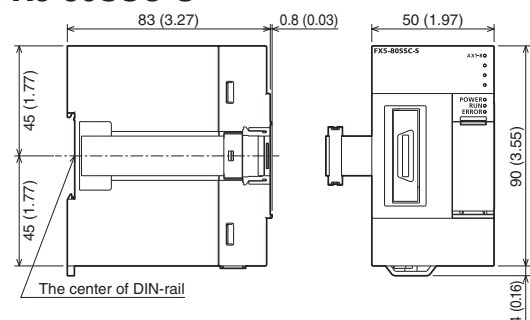
Simple Motion module

FX5-40SSC-S



[Unit: mm (inch)]

FX5-80SSC-S



[Unit: mm (inch)]

Components

Simple Motion dedicated equipment

Item	Model	Specifications	Standards		
Simple Motion module	FX5-40SSC-S	Up to 4 axes	CE, UL, KC		
	FX5-80SSC-S	Up to 8 axes	CE, UL, KC		
Internal I/F connector set	LD77MHIOCON	Incremental synchronous encoder/Mark detection signal interface connector set	–		
SSCNET III cable	MR-J3BUS_M	<ul style="list-style-type: none"> Simple Motion module ↔ Servo amplifier Servo amplifier ↔ Servo amplifier 	Standard code for inside panel	0.15m (0.49ft.), 0.3m (0.98ft.), 0.5m (1.64ft.), 1m (3.28ft.), 3m (9.84ft.)	–
	MR-J3BUS_M-A		Standard cable for outside panel	5m (16.40ft.), 10m (32.81ft.), 20m (65.62ft.)	–
	MR-J3BUS_M-B		Long distance cable	30m (98.43ft.), 40m (131.23ft.), 50m (164.04ft.)	–
Manual pulse generator	MR-HDP01	Number of pulses per revolution: 25pulse/rev (100pulse/rev after magnification by 4), Permitted speed: 200r/min (Normal rotation)	–		

Servo amplifiers

Model	Description
MR-JE-B	SSCNET III/H compatible servo amplifier rated output: 0.1 to 3kW
MR-J4-B(-RJ)	SSCNET III/H compatible servo amplifier rated output: 0.1 to 55kW
MR-J4W2-B	SSCNET III/H 2-axis servo amplifier rated output: 0.2 to 1kW
MR-J4W3-B	SSCNET III/H 3-axis servo amplifier rated output: 0.2 to 0.4kW

Product introduction

Manual pulse generator on the market

Mitsubishi Electric has confirmed the operation of the following manual pulse generators. Contact each manufacturer for details.

Product	Model	Description	Manufacturer
Manual pulse generator	UFO-M2-0025-2Z1-B00E	Number of pulses per revolution: 25pulse/rev (100pulse/rev after magnification by 4), Permitted speed: 200r/min (Normal rotation)	Nemicon Corporation

Engineering environment

Engineering software list

Product	Model	Description	
MELSOFT GX Works3	SW1DND-GXW3-E	Sequence program creation, Simple Motion module settings	DVD-ROM
MELSOFT iQ Works	SW2DND-IQWK-E	FA Engineering Software ^(Note-1) <ul style="list-style-type: none"> System Management Software [MELSOFT Navigator] Programmable Controller Engineering Software [MELSOFT GX Works3] Motion Controller Engineering Software [MELSOFT MT Works2] Screen Design Software [MELSOFT GT Works3] Robot Total Engineering Support Software [MELSOFT RT ToolBox2 mini] Inverter Setup Software [MELSOFT FR Configurator2] 	DVD-ROM

(Note-1): Refer to each product manual for software needed for the model.

Operating environment

Item	Description
OS	Microsoft® Windows® 10 (Home, Pro, Enterprise, Education) (64bit/32bit) Microsoft® Windows® 8.1 (64bit/32bit), Microsoft® Windows® 8.1 (Enterprise, Pro) (64bit/32bit) Microsoft® Windows® 8 (64bit/32bit), Microsoft® Windows® 8 (Enterprise, Pro) (64bit/32bit) Microsoft® Windows® 7 (Enterprise, Ultimate, Professional, Home Premium, Starter) (64bit/32bit) Microsoft® Windows Vista® (Enterprise, Ultimate, Business, Home Premium, Home Basic) (32bit) Microsoft® Windows® XP Service Pack3 or later (Professional, Home Edition) (32bit)
CPU	Intel® Core™2 Duo Processor 2 GHz or more recommended
Required memory	For 32-bit edition: 1GB or more recommended For 64-bit edition: 2GB or more recommended
Available hard disk capacity	When installing MELSOFT GX Works3: HDD available capacity is 5GB or more.
Optical drive	DVD-ROM supported disk drive
Monitor	Resolution 1024 × 768 dots or higher

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MODBUS is a registered trademark of Schneider Electric.
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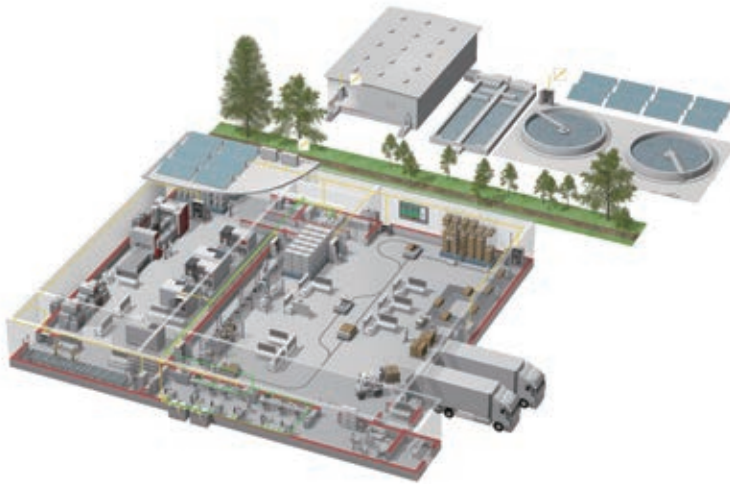
Precautions before use

This publication explains the typical features and functions of the products herein and does not provide restrictions or other information related to usage and module combinations. Before using the products, always read the product user manuals. Mitsubishi Electric will not be held liable for damage caused by factors found not to be the cause of Mitsubishi Electric; opportunity loss or lost profits caused by faults in Mitsubishi Electric products; damage, secondary damage, or accident compensation, whether foreseeable or not, caused by special factors; damage to products other than Mitsubishi Electric products; or any other duties.

For safe use

- To use the products given in this publication properly, always read the relevant manuals before beginning operation.
- The products have been manufactured as general-purpose parts for general industries, and are not designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the products for special purposes such as nuclear power, electric power, aerospace, medicine or passenger-carrying vehicles, consult with Mitsubishi Electric.
- The products have been manufactured under strict quality control. However, when installing the products where major accidents or losses could occur if the products fail, install appropriate backup or fail-safe functions in the system.

YOUR SOLUTION PARTNER



Mitsubishi Electric offers a wide range of automation equipment from PLCs and HMIs to CNC and EDM machines.

A NAME TO TRUST

Since its beginnings in 1870, some 45 companies use the Mitsubishi name, covering a spectrum of finance, commerce and industry.

The Mitsubishi brand name is recognized around the world as a symbol of premium quality.

Mitsubishi Electric Corporation is active in space development, transportation, semi-conductors, energy systems, communications and information processing, audio visual equipment and home electronics, building and energy management and automation systems, and has 237 factories and laboratories worldwide in over 121 countries.

This is why you can rely on Mitsubishi Electric automation solution - because we know first hand about the need for reliable, efficient, easy-to-use automation and control in our own factories.

As one of the world's leading companies with a global turnover of over 4 trillion Yen (over \$40 billion), employing over 100,000 people, Mitsubishi Electric has the resource and the commitment to deliver the ultimate in service and support as well as the best products.



Low voltage: MCCB, MCB, ACB



Medium voltage: VCB, VCC



Power monitoring, energy management



Compact and Modular Controllers



Inverters, Servos and Motors



Visualisation: HMIs



Numerical Control (NC)



Robots: SCARA, Articulated arm



Processing machines: EDM, Lasers, IDS



Transformers, Air conditioning, Photovoltaic systems

* Not all products are available in all countries.

MELSEC iQ-F Series Simple Motion Module FX5-40SSC-S/FX5-80SSC-S

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