

YOKOGAWA 



FA-M3
REVOLUTION

Equipment Revolution!

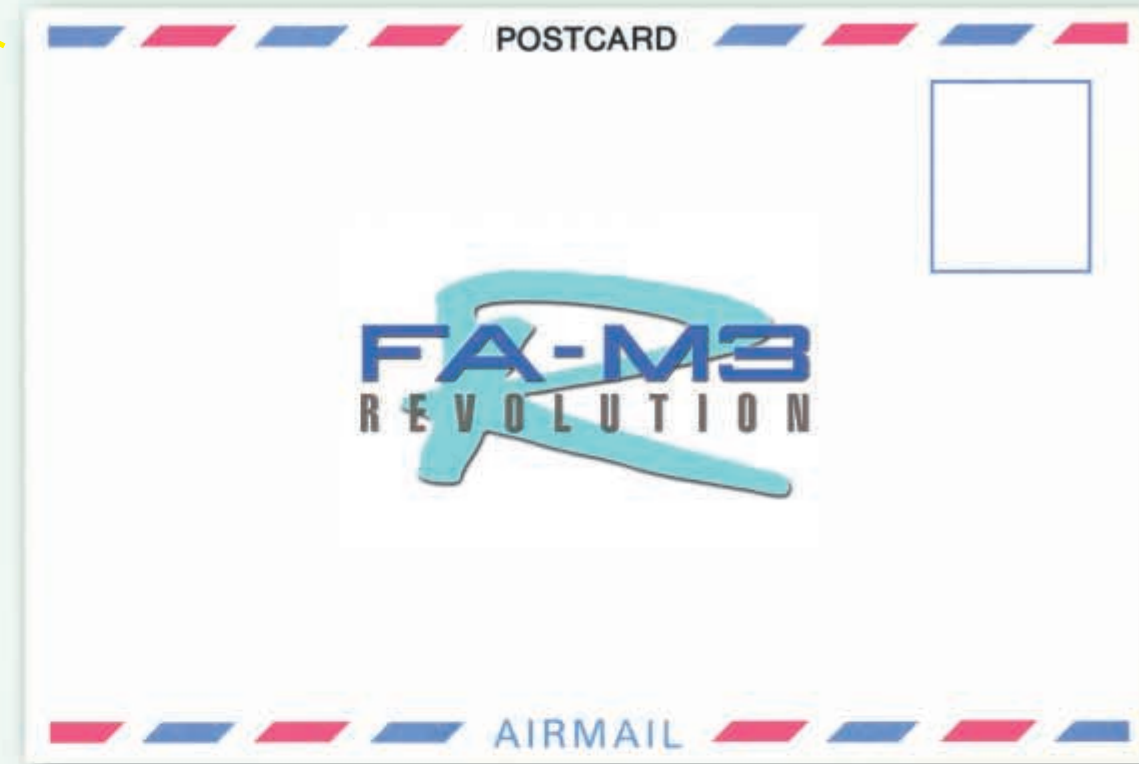
Evolution to Revolution

The debut of the newly named "FA-M3 R", evolved from the Range-free Multi-controller FA-M3 will help the user revolutionize his system with its drastically improved added value.

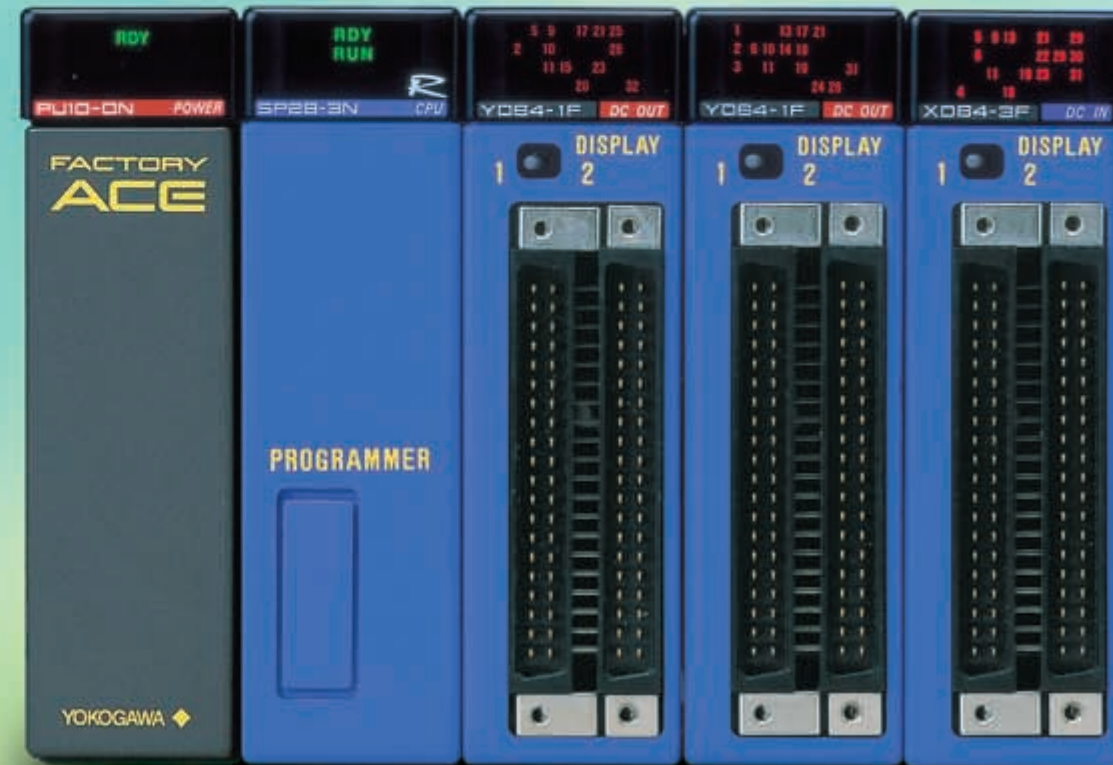
- Fast** 20,000 Steps within 1ms
FA-M3 R features a minimum scan time of 200μs, and is faster than microcomputer boards.
- Compact** Post Card Size
So compact and light, FA-M3 R takes up a space of only 147 (W) x 100(H) x 88 (D), yet allows up to 192 points.
- Smart** Max. 8192 Points, 310K Words
FA-M3 R is the result of a quest for high performance and advanced functions. It offers high cost performance, too.

New-Generation Controller FA-M3

As Small As a Post Card



192 points in Such a Compact Body



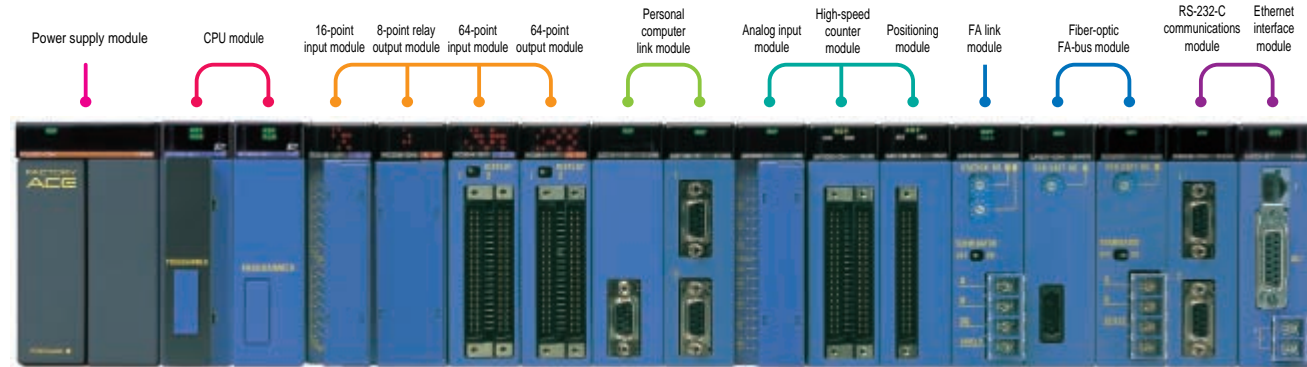
Range Free

Just Combine Modules that Suit Your Applications!



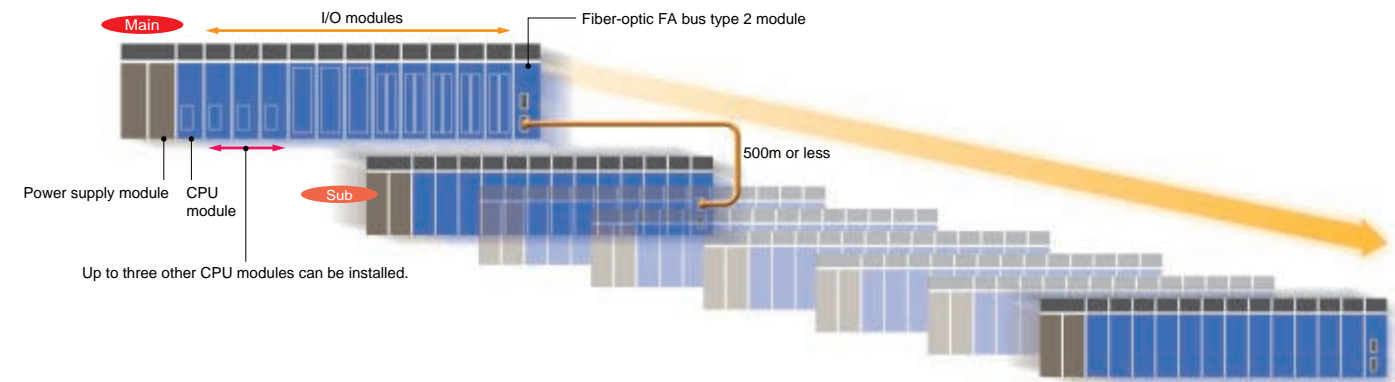
FA-M3 R is a range-free controller that allows the building of any size of system, from small to large. The system can consist of various modules of the same size, resulting in space saving and cost reduction.

FA-M3 R not only provides expansion capability, irrespective of system size, but also allows use of common spare parts. Expand the system by just adding desired modules of the same size. Installation takes up only a small space inside the control panel, allowing standardization and efficiency improvement of interior design. FA-M3 R is a PLC that helps the developer expand his imagination to build a system and realizes the control that suits individual needs of application.



■ Main Unit and Sub Unit

The main unit can accommodate up to seven sub units (i.e. input/output modules). This provides up to 8192 range-free I/O points.



Up to three other CPU modules can be installed.

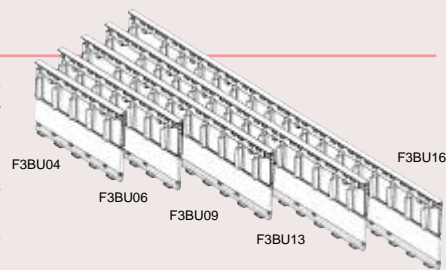
Multi CPU

FA-M3 offers a variety of CPU modules such as sequence and BASIC modules. By configuring a unit with different CPU modules, the existing PLC concept will be improved and a versatile system can be built.



■ Base Module

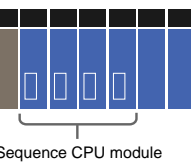
FA-M3 offers five types of base modules which can be freely installed: 4-slot, 6-slot, 9-slot, 13-slot and 16-slot types. The 4- and 6-slot modules employ a single power supply, making the system even more compact.



Sequence CPU module

F3SP21 / F3SP28 / F3SP38 / F3SP53 / F3SP58 / F3FP36

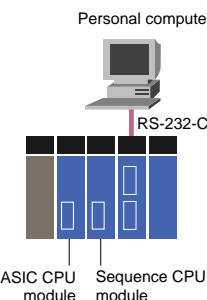
FA-M3 can accommodate up to four sequence CPU modules. This is useful when you want to improve the operating ratio of certain system components, integrate the basic program data with data of other programs, divide processing control, or when you want to use certain CPUs for particular jobs according to the size of the system or program. Types, other than Sequence CPU modules can also be included in the four CPU modules.



BASIC CPU module

F3BP20 / F3BP30

This module is useful when you want to write a program in BASIC language or when communication modules that cannot be controlled by a ladder sequence are required, or advanced processing is needed. It is also possible to use this module with a sequence CPU module to transfer data and ladder sequence.





High-Speed and Wide Area of Control *20,000 Steps per Millisecond*



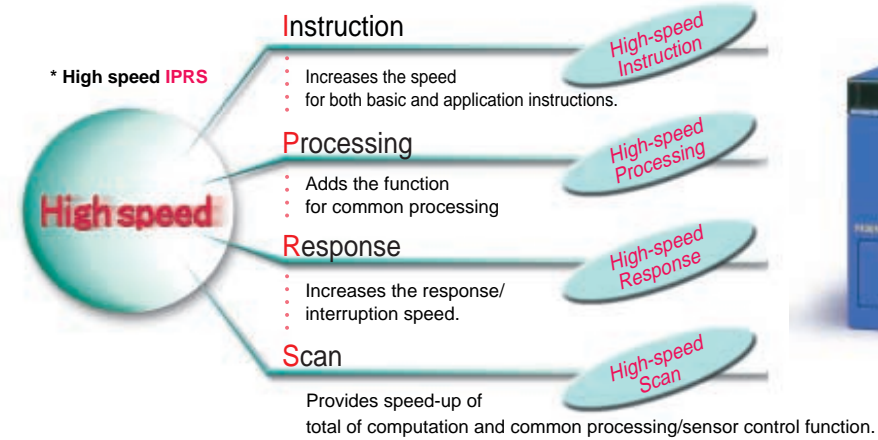
Quest for High-speed Performance Leading to Improved Productivity

High-speed control, improvement of product quality, elimination of external controller, reduction of tact time and instantaneous response

Sequence CPU module F3SP28 / F3SP38 / F3SP53 / F3SP58

Based on the High-speed IPRS Concept that Seeks High-speed Performance from Every Point of View.

The design of FA-M3 R is based on the "High speed IPRS"* design concept, to achieve high-speed performance that satisfies developers' expectations. Analysis has been conducted from every angle to provide a controller featuring ultra high-speed and stable control, link function and network. Increase in speed leads to higher operational stability. FA-M3 R can improve not only the accuracy and productivity of the system but can be used as a controller for next generation systems.



Ultra Fast Processing Speed

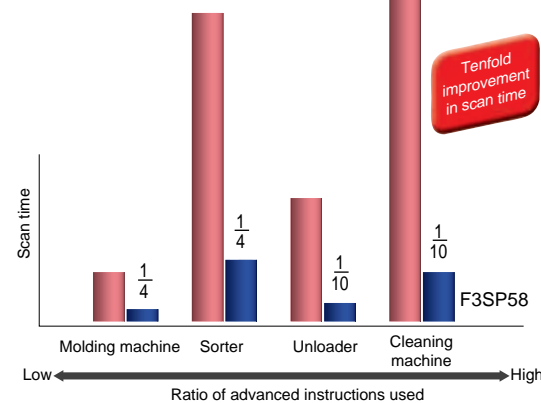
Reduces tact time and improves quality. Fast scan time of 20,000 steps/ms* (four times as fast as the conventional model)

To make the best of the advanced functions and performance of the system, computation speed has to be improved. To improve productivity, operation ease and provide network and troubleshooting functions, the ladder program uses application instructions, especially advanced instructions, more than basic instructions. To respond to such needs, FA-M3 R can improve the scan time to 20,000 steps per millisecond for conventional programs (ratio of application instructions used: approx. 50%). With actual advanced application programs, the scan time can be improved by 4 to 11 times.

*: This scan time is taken under certain conditions. The scan time varies with the program content and system configuration.

Processing speed of sequence CPU

Instruction	F3SP53, F3SP58
LO / AND / OR	17.5 to 3.5 ns
Timer	175 ns
Move	70 ns
Compare	70 ns
Add/subtract	105 ns
Logical operation	105 ns

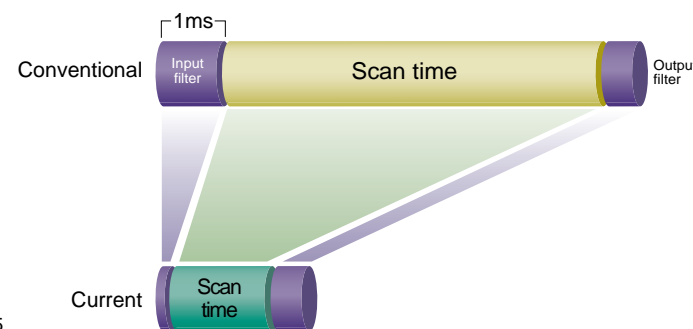


* For actual application programs (compared to Yokogawa's conventional models)

Reduced I/O Response Time

Improves productivity and quality by increasing response. Digital filter: Min. 0 ms

Although FA-M3 R enables fast processing thanks to improved scan time, it increases the ratio of input/output time. As a solution, attention was paid to the total response time (input → program execution (processing) → output) and setting variable time constants to "0" was made possible. This has improved response time (circuit delay: Min. 100 us). In addition, use of the high-speed contact output module (F3XD16-3H) will enable data input with a response time of 10 μs.



Instantaneous Response to Interruption

Interruption response time: 100 μs

Response time for interruptions from DC input modules is as high as 100 μs. This means that the system can immediately respond to changes in inputs, enabling instantaneous high-speed control.

Dual-purpose Sensor Control Function

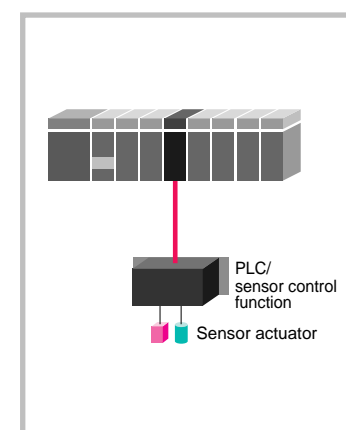
Requires no separate controller.

Constant scan time for sensor control function: Min. 200 μs

For instance, to respond at intervals of a few hundred microseconds, it is normal that a fast-response compact PLC or sensor control function is installed separately from a PLC. The sensor control function of FA-M3 R offers multi scan processing that enables high-speed response. This allows constant scan to be performed with main scan simultaneously

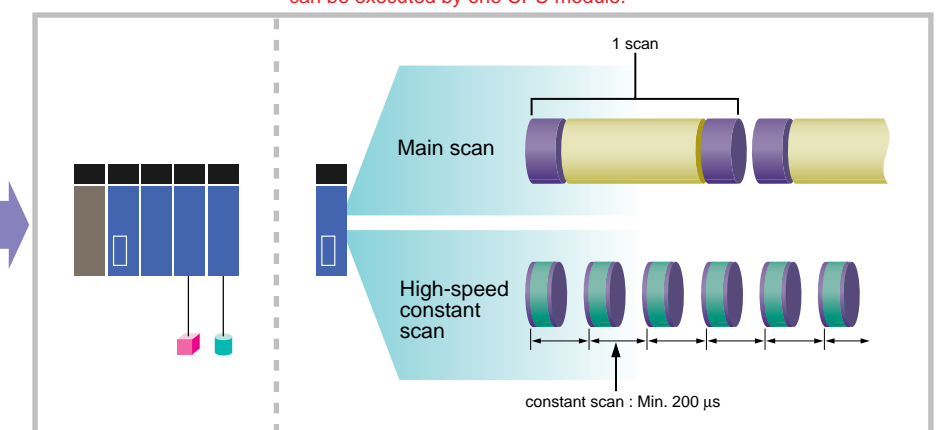
without being influenced by the scan time that increases due to advanced function/performance and troubleshooting function of the system. This is suitable for applications in which a high level of machining accuracy is required, since one block (program) can be run at high-speed constant intervals (200 μs or more) apart from the main scan.

● With conventional PLC



● With FA-M3 R.....

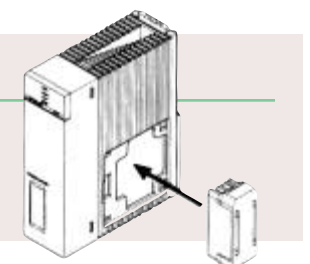
The number of PLC units can be reduced since two ladder programs can be executed by one CPU module.



■ Backup by ROM pack

- RK10-0N 5,000 ladder steps
- RK30-0N 20,000 ladder steps
- RK33-0N 56,000 ladder steps

- RK53-0N 100,000 ladder steps
- RK73-0N 120,000 ladder steps



Reuse of Programs

Improved Effectiveness of Total Design from Planning to Maintenance

Custom design, reusability, ease of maintenance, development by two or more engineers, improvement of software quality, reduction of development period

FA-M3 Programming Tool WideField



Supports Any Kind of Programming.

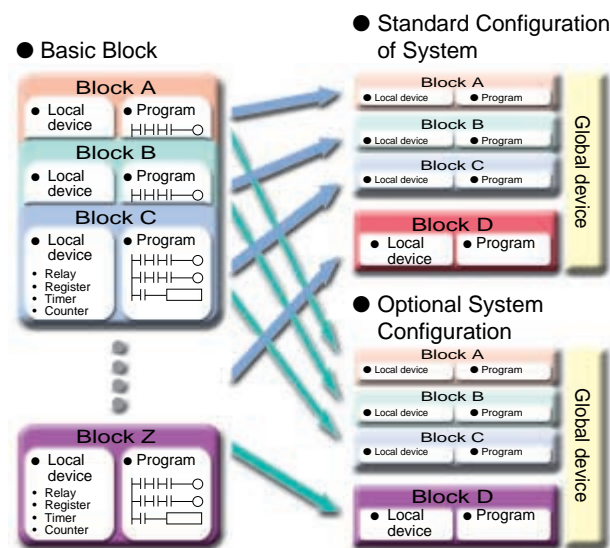
Improvement of program development effectiveness is a universal theme for PLC. In particular, reuse of programs yields high quality, short-term development and low development investment. FA-M3 offers "WideField" with newly created concept "Object ladder" that inherits the conventional structured-ladder programming method. The birth of WideField is based on the concept that any balls will be caught on the baseball ground, regardless of the direction from which they come. This means that the tool must be easy for the developer to use at any stage of programming. All possible problems that might occur during development of user programs were examined in the quest for a next-generation controller, improved efficiency of custom design and reduced TCO. WideField runs on Windows and provides abundant functions that can drastically increase program development efficiency.

*: Object ladder is the program development concept integrating both programs and devices into blocks for each function to improve customization efficiency.

Object Ladder with High Reusability

Increases reusability by setting independent blocks and macros.

Local devices, which are key elements of object ladder, are assigned as physically independent devices, even though they are registered under the same device names in multiple blocks. As a result, they are not considered as the same devices. In addition, since a ladder program and local devices can be treated collectively, blocks can also be treated independently. This increases flexibility of reuse and custom design of programs, allowing development of the programs to be shared by two or more engineers. Similarly, a component macro is a macro into which local devices are integrated, allowing programs to be handled as components.

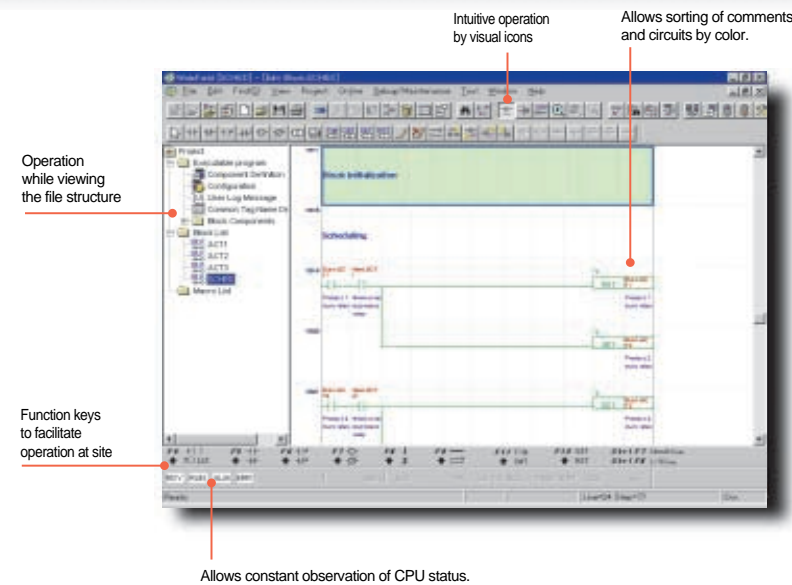
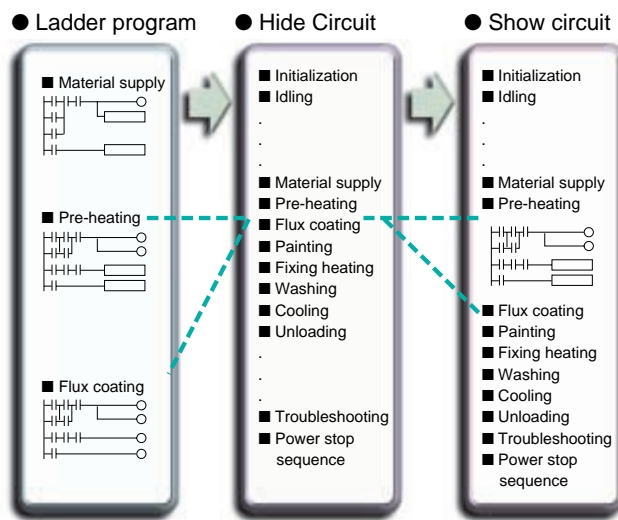


Easy Debugging with Index View

Makes observation easy and improves efficiency of reuse.

Optimization of jobs is the fundamental of efficiency improvement. Use of an index view during debug, which is inevitably required when developing or reusing a program, gives the feeling of improvement in the efficient reuse of an existing program.

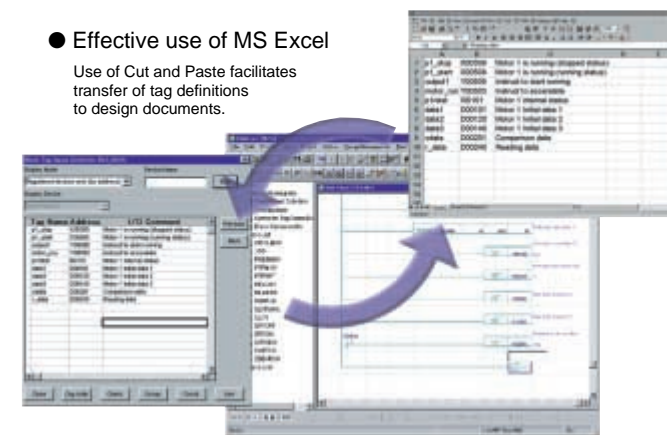
By leaving circuit comments of a ladder program as they are and hiding the remaining program sections, the program can be treated as a content, helping the user to view the main structure of the program at a glance. This lets the user see the flow of the whole work picture prior to debug work, resulting in increased effectiveness.



Working with Familiar Environment - Windows

Makes easy to transfer data with Windows application programs.

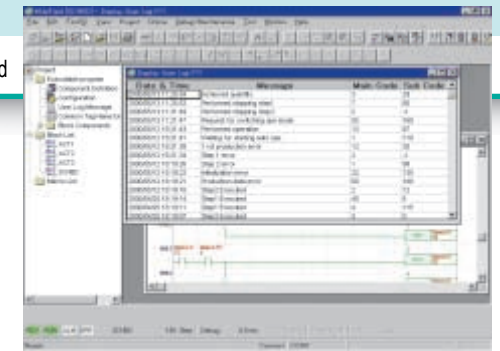
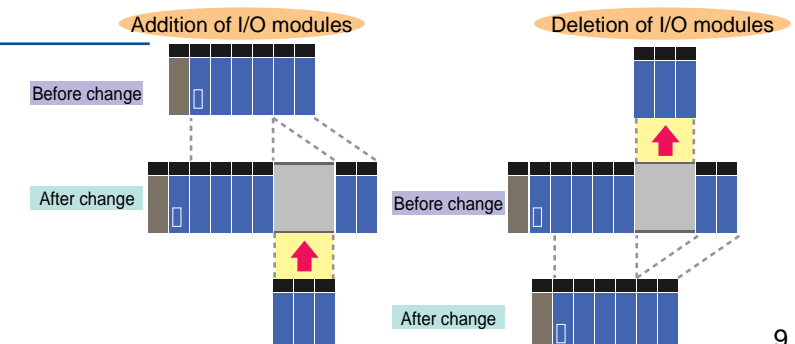
WideField provides functions such as OLE support to make the best use of Windows. For instance, device and comment data can be copied from MS Excel to WideField simply by dragging it with the mouse. WideField also allows use of various Windows functions, including the Drag and Drop function for dragging circuits and copying them from WideField to MS Word in the preparation of design documents etc.



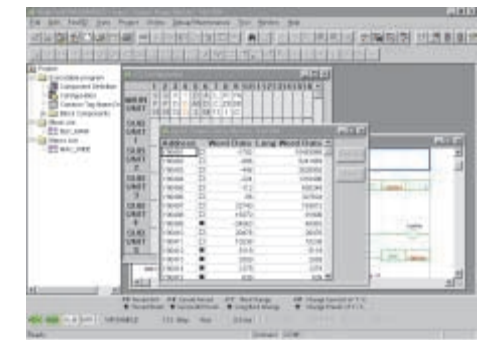
Module and I/O Slot Move Function

Allows collective change of install positions of I/O modules.

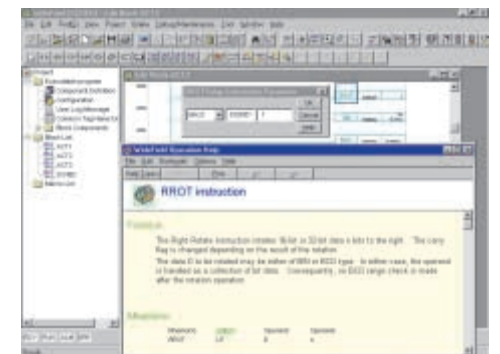
WideField allows easy modification of the program required as result of change of install positions, such as addition/deletion of I/O modules. Addition and deletion of options from the standard system configuration can be made collectively by software.



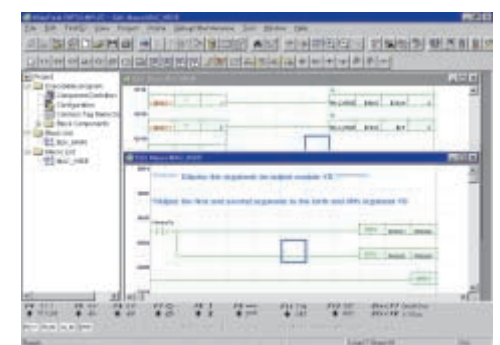
● User log



● Device monitor



● Help



● Macro edit

Open Network

Truly Open Network, Supporting Ethernet and DeviceNet.

Allows global purchase, real-time observation of production information and dynamic production instruction.

Remote Operation Maintenance and Engineering Via Ethernet

The remote OME* (Remote Operation Maintenance & Engineering) utilizing Ethernet, which is the default standard open network, provides various functions offering high-speed performance. FA-M3 is the only controller that allows programming via Ethernet. Since information such as images and audio can be transferred using a camera or telephone, verification of the situation is effective. This will provide immediate relief to developers for such worries as extra man-hours required due to minor trouble, excessively frequent business trips and delay of problem information.

* Remote OME is a general term given to the mechanism that enables remote maintenance of equipment located at distant sites. It has been proposed by and is a registered trademark of Yokogawa.

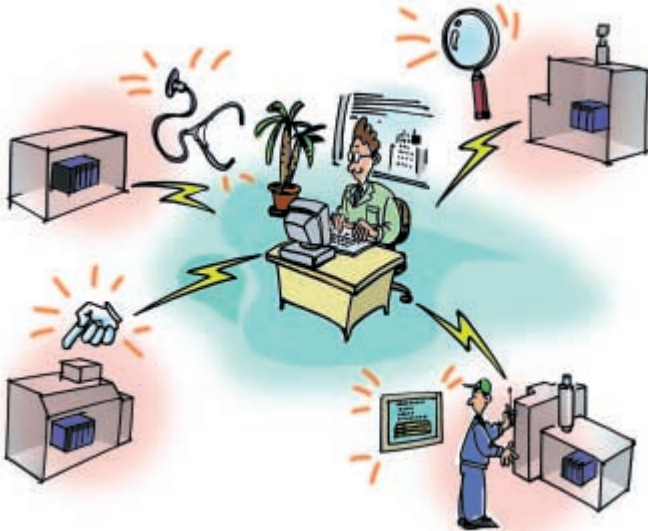


Image Viewing via Ethernet

Network Camera for Remote Maintenance

AXIS 200 + Camera Server
The AXIS 200 full-color, digital network camera and the Camera Server from AXIS Communications bring you a real-time view of the remote location.



Ethernet Interface Module

F3LE01-5T



Network with a variety of functions

The Ethernet interface module is not only the best choice for information communications network but also provides remote OME that utilizes Ethernet communication functions. It allows the user to run a ladder program on a personal computer and provides various functions suitable for remote maintenance of the system, such as monitoring of system operation status and instruction data.

Item	Specification	
Communication protocol	TCP/IP, UDP/IP, ICMP, ARP	
Access control method	CSMA/CD	
Transmission rate	10Mbps	
Transmission mode	Baseband	
Maximum segment length	10BASE5	500m (extendable up to 2.5km when repeater is used)
	10BASE-T	100m
Maximum number of nodes	100/segment (10BASE5)	
	2/segment (10BASE-T)	

DeviceNet Interface Module

F3LD01-0N



Improves productivity using multi-vendor network.

This interface module conforms to "DeviceNet", which is the world's standard open field network. It has also been introduced as the standardized sensor bus by SEMI (Semiconductor Equipment and Materials Institute). It transfers various data, such as ON/OFF data, analog data and data consisting of several tens of bytes, as well as setting/maintenance information, and allows connection of up to 63 compatible devices of world wide manufacturers at the maximum transfer rate of 500Kbps for the maximum transmission distance of 500 meters (at 125Kbps). It supports a variety of applications flexibly, resulting in drastically improved productivity and ease of maintenance.

Item	Specification
Interface	Conforms to DeviceNet.
Transmission rate	125/250/500Kbps (selectable by switch)
Transmission media	5-wire cable (2for signal,1for shield,2for power)
Transmission distance	Maximum cable length of main line: 500m (Transmission rate: 125Kbps when only thick cables are used)
Connection method	Multi-drop, T-junction
Number of nodes	64 (including master)



ODVA (Open DeviceNet Vendor Association, Inc.) is a nonprofit organization established by equipment vendors, for the main purpose of maintenance and promotion of the DeviceNet specifications. The number of members is 240 or more including Yokogawa.

A Wide Range of Modules

Abundant Product Lineup Enabling the User to Choose According to His Needs!

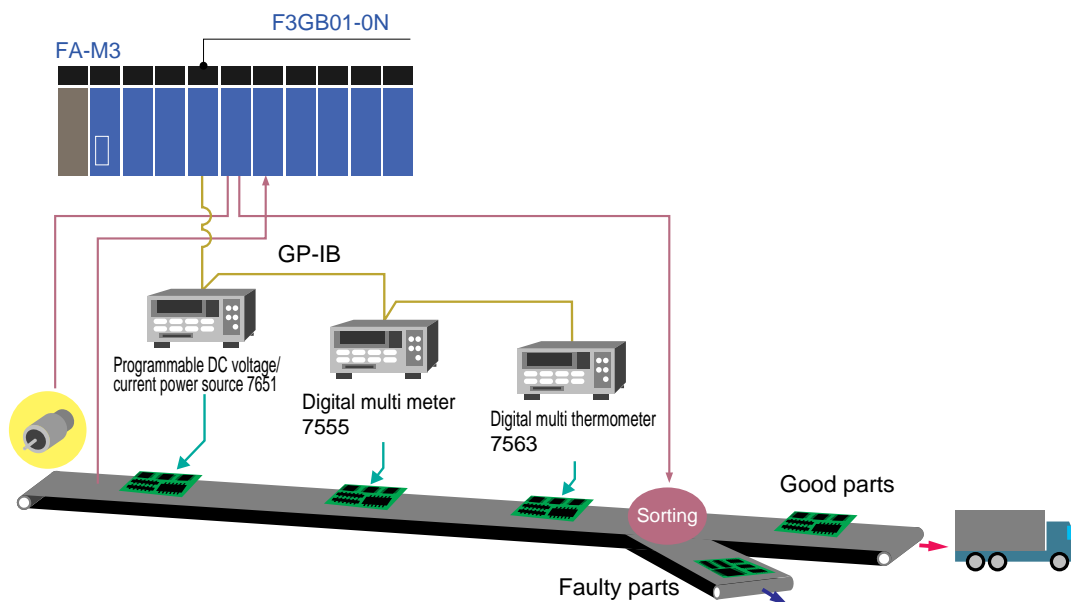
GP-IB Communications Module F3GB01-0N



Best solution for automation of inspection system.

- Carries out both measurement and control even if it is small.
- Builds an advanced inspection system.
- Allows simple and high-speed communication with GP-IB devices.
- Requires BASIC language only to build a system.
- Requires ladder language only to communicate with GP-IB devices.

Item		Specification
Interface		Conforms to the ANSI/IEEE Standard 488.
Transmission mode		8-bit parallel, half-duplex
Connection type		Star, multidrop
Number of devices		15 Max.
Handshake System		3-wire handshaking
Transmission distance	Total cable length	20m Max.
	Between devices	4m Max.
	Total distance by devices	2m Max. (x number of devices)
Interface		24-pin receptacle connector (IEEE-488)
Setting	Device address	0 to 30
	Delimiter code	CR+LF, CR, EOI or Others
	Controller	Yes or No
Current consumption		250mA



FA-M3 Value F3SC22-1F/F3SC22-2F/F3SC22-1A

Excellent Purchase Value

This model comes complete with CPU, power supply and I/O modules as a set at a reasonable price. However, it still inherits the abundant functions and excellent performance of the Range-free Multi-controller FA-M3 and supports a wide range from small (30 points) to large. The user can start with the minimum range and expand the system later. The same spare parts can be used for FA-M3 of any CPU type, and additionally the FA-M3 programming tool "WideField" can be used.





● Controls Any Types of Motor.

Positioning Module (advanced model with positioning pulse output) F3NC11-0N / F3NC12-0N



Offers advanced functions and ease of operation.

This module is suitable for positioning type servo motors/drivers and pulse motors/drivers. The operation speed, target position and direction can be changed during positioning. The pulse output circuit can be chosen from line driver or open collector, and the pulse can be output at a maximum pulse rate of 250Kbps.

Positioning Module (model with multi-channel pulse output) F3YP04-0N / F3YP08-0N



Requires only one slot to control eight axes.

This module can carry out motor control for 4 or 8 axes with only single slot size. Cost per axis is very low, allowing the building of a multi-axis positioning control system of up to 288 axes. This module is suitable for positioning type servo and pulse motors. Thanks to the high-speed response of FA-M3, only 6ms is required to start motors, resulting in drastically reduced tact time.

Positioning Module (model with analog voltage output) F3NC51-0N / F3NC52-0N



Can control any motors with starting time of 6 ms.

This module enables feedback control for 2 axes with single slot size. Only 6 ms is required to start motors, resulting in drastically reduced tact time to 1/5 (compared to Yokogawa's conventional model). The maximum speed is 2Mpps. It supports absolute encoders for any type of servo motors, and can carry out 2-step and 3-step (S-shaped) acceleration/deceleration control in addition to trapezoid acceleration/deceleration control. Furthermore, it allows various positioning control such as speed change, target position change and arc interpolation during operation.

● Free Expansion and Distribution of PLC



FA Link H Module F3LP02-0N

Uses twisted-pair cables to achieve the maximum transmission rate.

Fiber-optic FA Link H Module F3LP12-0N

Uses fiber-optic cables to prevent noise influence.

The FA link H module is fast. It uses shielded twisted-pair cables to achieve the maximum transmission rate of 1.25Mbps and is the best choice to connect machines. The fiber-optic FA link H module uses fiber-optic cables to support the maximum transmission distance of 10km at the transmission rate of 1.25Mbps.

Item	Specification	
	F3LP02-0N	F3LP12-0N
Number of stations	Max. 32	
Link relays	2048	
Link registers	2048	
Communication method	Token bus	Token ring
Transmission media	Shielded twisted-pair cable (AWG-20 recommended)	2-wire fiber-optic cable
Transmission distance	1 km/500 m/250 m/100 m	Maximum total distance: 10 km
Transmission rate	125K/250K/625K/1.25M bps	1.25M bps

Personal Computer Link Module F3LC11-1F / F3LC12-1F / F3LC11-1N / F3LC11-2N



The best choice for connecting to the user's personal computer or a display

This module is designed to establish a link between upper-level computer, such as a personal computer and a FA computer, and display via RS-232-C or RS-422-A/485 interface. It enables read/write to all the devices of FA-M3. Read/write to the devices can still be performed even if the ladder program is in halt. Furthermore, it allows reading of various information related to the program as well as error history. Use of F3LC11-2N allows up to 32 FA-M3 units to be connected to an upper-level computer.

Item	Specification	
	F3LC11-1F	F3LC12-1F
Interface	EIA RS-232-C compliant	
Transmission method	Half-duplex	
Transmission distance	Total distance: 15 m	
Transmission rate	300 / 600 / 1200 / 2400 / 4800 / 9600 / 14,400 / 19,200 / 28,800 / 38,400 / 57.6 k / 76.8 k / 115.2 Kbps	
Item	Specification	
	F3LC11-1N	F3LC11-2N
Interface	EIA RS-232-C compliant	EIA RS-422-A/EIA RS-485 compliant
Transmission method	Half-duplex	Half-duplex, 4-wire/2-wire
Transmission distance	Total distance: 15 m	Total distance: 1200 m
Transmission rate	300 / 600 / 1200 / 2400 / 4800 / 9600 / 19200 bps	

Fiber-Optic FA Bus Type 2 Module F3LR02-0N



Establishes instantaneous transmission remote I/O.

This module is designed to build a remote I/O system using a fiber-optic FA bus. In addition to ultra high-speed transmission (1024 points/ms), it features a maximum distance of 500m between slave stations, a maximum total distance of 1.4km and allows up to 32 slave stations to be connected. This makes the module best suited to a multi distributed system. Connection can be made by various methods including star and daisy chain.

Item	Specification
Transmission method	Daisy chain, loop
Transmission media	2-wire fiber-optic cable
Transmission distance	Max. total distance: 1.4 km (when 3 stations are connected)
Transmission rate	10M bps

Item	Specification					
	F3YP04-0N	F3YP08-0N	F3NC11-0N	F3NC12-0N	F3NC51-0N	F3NC52-0N
Number of axes	4	8	1	2	1	2
Control	Control method	Open loop control by positioning pulse output		Semi-closed loop by encoder feedback (speed voltage output)		
	Speed instruction	—		-10 to 10V		
	Encoder	—		<ul style="list-style-type: none"> Incremental encoder (A/B phase) when line driver is set for 2Mpps (max.) / 4-multiplication Absolute encoder 		
Output pulse	• RS-422A compliant differential output (max. 250,000pps)		<ul style="list-style-type: none"> • RS-422A compliant differential output (max. 249,750pps) • Open collector output (Restriction on the maximum pulse rate due to load capacitance) (50kpps or lower recommended) 			
	Control mode					
Positioning control	Positioning control			Positioning control, speed control, speed—position control switching		
	Interpolation method	Axis-by-axis independent interpolation, multiaxial linear interpolation (set by CPU)		Axis-by-axis independent interpolation, multiaxial linear interpolation (set by CPU), biaxial arc interpolation (set by CPU)		
	Command position	-134,217,728 to 134,217,727 pulses		-8,388,608 to 8,388,608 pulses		
	Command speed	0.1 to 250,000 pulses/s		0.1 to 249,750 pulses/s		
	Function	On-route operation				
	Function	Target position/speed change during operation				
Speed control	Command speed	—		Absolute/relative position setting		
	Function	—		Axis feed by manual pulse input		
Acceleration/deceleration	Command speed	—		-294,750 to 249,750 pulses/s		
	Function	—		-2M to 2M pulses/s		
Acceleration/deceleration	Acceleration/deceleration method	Trapezoid			Trapezoid, 2-step, S-shaped (3-step)	
	Acceleration/deceleration time	0 to 32767ms, settable for acceleration and deceleration separately				
Home position search	Search method	User-settable by inputting home position or limit, encoder (Z phase) can be used	User-settable by inputting home position, proximity-to-home position or limit, encoder (Z phase) can be used		User-settable by inputting home position, external trigger or limit	
	Search speed	User-settable				
External contact output	Deviation pulse clear signal			Servo ON, driver reset, brake OFF		
External contact input	Limit switch, home position, emergency stop		Limit switch, home position, near home position, external trigger, emergency stop		Limit switch, driver alarm, home position, external trigger, general-purpose input, emergency stop	
Data backup	By CPU module					



Temperature Control and Monitoring Module

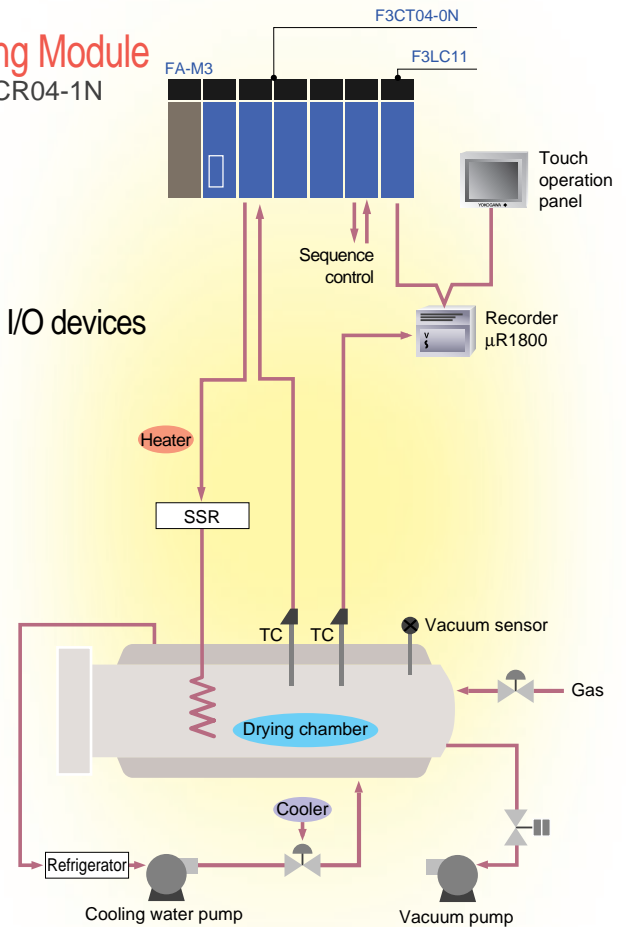
F3CT04-0N / F3CT04-1N, F3CR04-0N / F3CR04-1N

PID Control Module

F3CV04-1N

Provides a wide range of variation according to the type of I/O devices

- Allows ON/OFF control, PID control and heating/cooling PID control.
- Allows 4-point thermo-coupler or voltage (mV) input adjustment, 4-point resistance temperature detector (RTD) adjustment and 4-point DC voltage input control. Monitoring can be performed at 4 points.
- Provides the **SUPER** function as a standard feature to ensure accurate control. The **SUPER** function is employed in Yokogawa's temperature controllers to perform not only auto tuning but also suppress overshooting using fuzzy theory.
- Provides a maximum sampling interval of 125ms (500ms for 4 channels).
- Allows various operation mode switching including A/M switching and RUN/STOP switching.
- Allows complex loop control, such as cascade control, by combining ladder or BASIC application programs.
- Provides a loop-back function to allow easy debug of the system.
- Allows two alarm points to be set for each channel. In addition to eight alarm types, standby/no standby can also be selected.



Item		Specification				
		F3CT04-0N	F3CT04-1N	F3CR04-0N	F3CR04-1N	F3CV04-1N
Number of loops		4				
Insulation method	Between I/O terminals and internal circuit	Photo-coupler				
	Between output terminals	Not insulated				
Input section	Input type	Thermo-coupler (14 types), DC voltage (2 types), same range selected for 4 channels		Resistance temperature detector (2 types), same range selected for 4 channels		DC voltage (5 types), same range selected for 4 channels
	Input sampling interval	500 ms (4 CH), 250ms (2 CH)*1, or 125 ms (1CH)*1				
	Input impedance	1MΩ or more		—		1MΩ or more
	Allowed signal impedance	250 Ω or less		10 Ω or less per wire (no difference among 3 wires allowed)		2 KΩ or less
	Burnout detection function	Yes		Yes		—
Output section	Output type	Time proportioning PID (Open collector output)	Yes (ON/OFF control, forward/reverse)			—
		Time proportioning PID (Voltage pulse output)	Yes (ON/OFF control, forward/reverse)			—
	Continuous PID (4 to 20mA output)	No	Yes (ON/OFF control, forward/reverse)	No	Yes (ON/OFF control, forward/reverse)	
Control section	Control function	PID control, heating/cooling control *2, preset value output *3				
	Control interval	Same as input sampling (fixed at 500ms in the case of heating/cooling control and preset value output)				
	Loop-back function	Yes				

*1: The values given in () indicate the maximum number of channels which can be used by one module in the case of input sampling interval of 250ms and 125ms.

*2: For heating/cooling control output, the analog output module or contact output module is also used.

*3: The control target values are output.

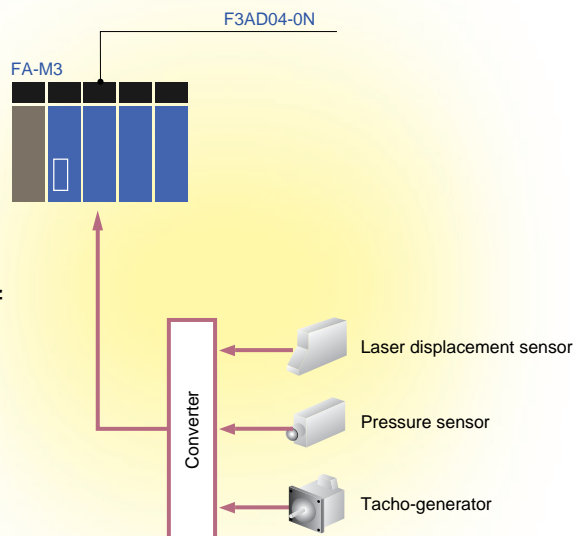


Analog Input Module

F3AD04-0N / F3AD08-1N

Analog Output Module

F3DA02-0N / F3DA04-1N / F3DA08-5N



High-speed conversion/high accuracy and high level of noise proof

- The external input signal range can be selected from three ranges (0 to 5V/1 to 5V/-10 to 10V), and output signal range can be selected from two ranges (-10 to 10V/4 to 20mA DC).
- Four or eight inputs can be read and scanned as they are switched by multiplexer. One D/A converter output is distributed to 2 or 4 output points by multiplexer, and the output for each output point is retained.
- Introduction of input filter and scaling processing function allows the user to process data in a way that suits the user's application.

Item	Specification				
	F3AD04-0N	F3AD08-1N	F3DA02-0N	F3DA04-1N	F3DA08-5N
Number of I/O points	4	8	2	4	8
I/O signal range	0 to 5 V DC 1 to 5 V DC -10 to 10 V DC		-10 to 10 V DC 4 to 20 mA DC (one line common, floating type)		-10 to 10 V DC *2 (one line common, floating type)
Insulation method	Insulated by photo-coupler				
Input impedance	1MΩ or more				
Allowed load resistance	—		5 KΩ or less for voltage output 600 Ω or less for current output		5 KΩ or more
Resolution (12-bit A/D or D/A)	0 to 5 V/1 to 5 V DC: 1.43 mV -10 to 10 V DC: 5.71 mV		5.7 mV for voltage output 5.7 μA for current output		5.7 mV
Total accuracy	23±2°C : ±0.2% 0~55°C : ±0.5%				
Conversion speed	1ms x number of input points		2 ms (fixed)		2 ms (fixed)
External supply power	—		24 V DC±10% : 150 mA		24 V DC±10% : 180 mA
Scaling	Any value from -20,000 to 20,000 can be set.				
Filter	Whether the filter is to be used or not can be set for each channel.		—		

*1: Selectable by software for each channel.

*2: Selectable by connection terminal for each channel.

Peripheral Devices

The Following Peripheral Devices are Available for Use with FA-M3.

Terminal Block Unit

TA40-0N

Thin connector size.

Reduces the size of distribution panel.

Connector Terminal Block

TA50-□N / TA60-0N

Connector Terminal Block Cable

KM55-0□□

Various kinds of connector terminal block with various cable lengths

Optic-fiber Cable

KM60 / KM61 / KM62 / KM67

Cables for fiber-optic FA-bus module and fiber-optic FA link module

Simulation Input Switch

S9307UF

Very useful for the development and debugging of programs.

Simulation switch for 32-point input terminal *

*: Only one switch can be installed at a time in each module.

Blank Module

F3BL00-0N

Can be installed in empty slots to create a neat appearance.

Specification

■ Performance Specifications/Ladder Sequence Devices

Item		Specification							
		F3SP08 NEW	F3SP21	F3SP28 NEW	F3SP38 NEW	F3SP53 NEW	F3SP58 NEW		
Performance	Control method	Repeating operation (by stored program)							
	I/O control method	Refresh method / Direct I/O command							
	Programming language	Structured-ladder language, object ladder language, mnemonic language							
	Number of I/O points	Max. 2048	Max. 2048	Max. 4096	Max. 8192 (including remote I/O)	Max. 4096	Max. 8192 (including remote I/O)		
	Program capacity (ROM can be used)	Max. 10K steps	Max. 10K steps	Max. 30K steps	Max. 120K steps	Max. 56K steps	Max. 120K steps		
	Number of program blocks	Max. 32			Max. 1024				
	Number of instructions	Basic instruction	25 types			33 types			
		Application instruction	227 types			312 types			
	Instruction execution time	Basic instruction	0.18 to 0.36 μs/instruction		0.045 to 0.18 μs/instruction		0.0175 to 0.07 μs/instruction		
		Application instruction	0.36 μs/instruction or longer		0.18 μs/instruction or longer		0.07 μs/instruction or longer		
	Scan time observation time	10 to 200ms variable (settable on 1ms basis)							
	Power-on or restoration of power after power failure	Auto start, auto restart (auto recording of power ON/OFF time and momentary power failure occurrence time)							
Other functions	<ul style="list-style-type: none"> • Sensor control function *1 (scan time 200 μs to 25 ms) • Configuration function (device capacity, data lock-up range at power failure, designation of output at error) • Constant scan function (1ms to 190 ms, settable on 0.1 ms basis) • Debug function (forced set/reset, online edit etc.) • Error log save function (64 items), user-definable log save function • Data/clock function (year/month/day/hour/minute/second/day of the week) • Program protect function • Program data write to ROM • Sampling trace function *1 • Personal computer link function (transmission rate 115K bps *1) 								
Ladder sequence device	Input relay	X	2048 points		4096 points	8192 points	4096 points	8192 points	
	Output relay	Y							
	Internal relay	I	4096 points		16384 points	32768 points	16384 points	32768 points	
	Shared relay		—	2048 points	2048 points				
	Extended shared relay	E	—		2048 points				
	Link relay	L	2048 points		8192 points	16384 points	8192points	16384 points	
	Special relay	M	2048 points		9984 points				
	Timer	100 μs timer*2	—						
		1ms timer *3							
		10ms timer	T	512 points		2048 points	3072 points	2048 points	3072 points
		100ms timer							
	Continuous 100ms timer								
	Counter	C	512 points		2048 points	3072 points	2048 points	3072 points	
	Data register	D	5120 points		16384 points	32768 points	16384 points	32768 points	
	File register hold type	B	—		32768 points	262144 points	32768 points	262144 points	
	Link register	W	2048 points		8192 points	16384 points	8192 points	16384 points	
	Special register	Z	512 points		1024 points				
	Index register	V	32 points		256 points				
	Shared register		—	1024 points	1024 points				
	Extended shared register	R	—	—	3072 points				
Label	—	64		1024					
Interruption handling routine	—	4							
Constant	Decimal constant	—	16-bit instruction -32768 to 32767 32-bit instruction -2147483648 to 2147483647						
	Hexadecimal constant	—	16-bit instruction \$0 to \$FFFF 32-bit instruction \$0 to \$FFFFFFFF						

*1: Not available with F3SP08 and F3SP21.

*2: The maximum number of settable points is 16 for F3SP28, F3SP38, F3SP52 and F3SP58.

*3: The maximum number of settable points is 16 for F3SP08 and F3SP21.

■ Performance Specifications for BASIC CPU Modules

Item	F3BP20	F3BP30
Programming language	YM-BASIC/FA	
Control method	Interpreter type (with pre-run function)	
Number of tasks	1	
Program capacity	120K bytes (ROM can be used)	510K bytes (ROM can be used)
Shared device *	Shared register (R): Max. 1024 points	
Other functions	<ul style="list-style-type: none"> • Configuration function (setting user/common/area size etc.) • Program development and debug function • Common data access (write/read) by personal computer link module • Program resident function 	<ul style="list-style-type: none"> • Error log save function • Data/clock function (year/month/day/hour/minute/second/day of the week) • Program data write to ROM

* Shared relays and extended shared relays/registers cannot be used.

■ General Specifications

Item	Specification				
	F3PU10-0N	F3PU20-0N	F3PU16-0N NEW	F3PU26-0N	
Power	Supply voltage	100 to 240 V AC, single-phase, 50/60 Hz		24 V DC	
	Supply voltage fluctuation range	85 to 264 V AC, 50/60 Hz±3 Hz		15.6 to 31.2 V DC	
	Power consumption	35 VA max.	85 VA max.	15.4 W max.	33.1 W max.
	Allowable momentary power failure time	20 ms			
	Fail output	Provided on front terminal block of power supply module, contact rating: 24 V DC (both normal open and normal close terminals are provided)			
Withstanding voltage	1500 V AC for 1 minute (between AC external terminals (collective) and FG terminal)		1500 V AC for 1 minute (between DC external terminals (collective) and FG terminal)		
Insulation resistance	500 V DC, 5 MΩ or more (between AC external terminals (collective) and FG terminal)		500 V DC, 5 MΩ or more (between DC external terminals (collective) and FG terminal)		
Environment	Operating ambient temperature	0 to 55 °C			
	Operating ambient humidity	10 to 90 %RH (no condensation allowed)			
	Ambient storage temperature	-20 to 75 °C			
	Ambient storage humidity	10 to 90 %RH (no condensation allowed)			
	Operating atmosphere	No corrosive gas, no excessive amount of dust			
	Grounding	JIS class 3			
	Noise immunity	Noise voltage 1500 Vp-p, measured by noise simulator with noise width of 1us, rise time of 1ns and repeating frequency of 25 to 60 Hz			
	Vibration strength	Conforms to JIS C0911, frequency 10 to 55 Hz, amplitude 0.15 mm Frequency 55 to 150 Hz, acceleration 9.8 m/s ² Swept 10 times in each X, Y and Z direction (1 octave, 1 minute)			
Mechanical shock resistance	Conforms to JIS C 0911, 98 m/s ² , 3 times in each of three directions				
Structure/ Appearance	Structure	Built into panel			
	Cooling method	Natural cooling			
	Mounting method	Direct (with 4 or 5 screws (M4, 12 mm)), DIN rail (except for F3BU16-0N)			
	Paint color	Light cobalt blue: Munsell 6.2 PB4.6/8.8 or equivalent, lamp black: Munsell 0.8 Y2.5/0.4 or equivalent			
	Weight	Approx. 2.4 kg when 13-slot base module is fully occupied with contact modules.			

■ Software Packages

Category	Name	Type Name	Category
Development tool	FA-M3 programming tool WideField	SF610-ECW	Windows 95, 98, NT4.0 compatible, English version, CD-ROM NEW
	Ladder diagram support program M3	SF510-E3W	PC-DOS (IBM-PC/AT compatible), Windows 95, NT4.0 compatible, English version
	Sequence programming tool for Windows POPMUSCAT	SF850-EW3	Windows 95, NT compatible English version
	BASIC programming tool M3 for Windows	SF560-ECW	Windows 95, 98, NT4.0 compatible, English version, CD-ROM

Some personal computers and printers cannot be used even if they are of the same series from the same manufacturer, due to CPU type, clock frequency or number of printable digits. Personal computers with a built-in hard disk are recommended. For personal computers and printers other than those recommended, contact Yokogawa's sales office to check whether they can be used.

■ Component List

Category	Name	Type name	Style	Specification
Base	Base module *1	F3BU04-0N	—	Power supply (F3PU10-0N) + 4 slots (CPU+I/O)
		F3BU06-0N	—	Power supply (F3PU10-0N) + 6 slots (CPU+I/O)
		F3BU09-0N	—	Power supply (F3PU20-0N/F3PU26-0N) + 9 slots (CPU+I/O)
		F3BU13-0N	—	Power supply (F3PU20-0N/F3PU26-0N) + 13 slots (CPU+I/O)
		F3BU16-0N	—	Power supply (F3PU20-0N/F3PU26-0N) + 16 slots (CPU+I/O)
Power supply	Power supply module	F3PU10-0N	—	100 to 240 V AC (for 4 and 6 slots)
		F3PU20-0N	—	100 to 240 V AC (for 9,13 and 16 slots)
		F3PU16-0N	—	24 V DC (for 4 and 6 slots) NEW
		F3PU26-0N	—	24 V DC (for 9, 13 and 16 slots)
CPU	Sequence CPU module	F3SP21-0N	—	Ladder 10K steps, basic instruction 0.18 μs or longer, with memory
		F3SP28-3N	—	Ladder 30K steps, basic instruction 0.045 μs or longer, with memory NEW
		F3SP38-6N	—	Ladder 120K steps, basic instruction 0.045 μs or longer, with memory NEW
		F3SP53-4H	—	Ladder 56K steps, basic instruction 0.0175 μs or longer, with memory NEW
		F3SP58-6H	—	Ladder 120K steps, basic instruction 0.0175 μs or longer, with memory NEW
	BASIC CPU module	F3FP36-3N	—	SFC/ladder language, ladder program 40K steps, contact/coil 0.09 μs/instruction
		F3BP20-0N	—	BASIC language, 120K bytes
FA-M3 value	Value (with I/O)	F3SC22-1F	—	Consists of F3SP08-0P, F3BU04-0N and F3WD32-3F NEW
		F3SC22-2F	—	Consists of F3SP08-0P, F3BU04-0N and F3WD64-3F NEW
		F3SC22-1A	—	Consists of F3SP08-0P, F3BU04-0N, F3XD16-3F and F3YD14-5A NEW
	Spare	F3SP08-0P	—	Sequence CPU (ladder 10K steps) with power supply NEW
Memory	ROM pack	RK10-0N	—	Ladder 5K steps (for F3SP21)
		RK30-0N	—	Ladder 20K steps (for F3SP20)
		RK33-0N	—	Ladder 56K steps (for F3SP21/28/38/53/58) NEW
		RK53-0N	—	Ladder 100K steps (for F3SP21, F3BP30) NEW
		RK73-0N	—	Ladder 120K steps (for F3SP28/38/53/58) NEW
I/O module	Input module	F3XA08-1N	—	100-120 V AC, 8 points Terminal block
		F3XA08-2N	—	200-240 V AC, 8 points Terminal block
		F3XH04-3N	—	High-speed input with pulse catch function, 24 V DC, 4 points Terminal block
		F3XC08-0N	—	No-voltage contact input, 8 points Terminal block
		F3XD08-6F	—	For both DC input sink/source, 12-24 V DC, 8 points Terminal block NEW
		F3XD16-3F	—	For both DC input sink/source, 24 V DC, 16 points Terminal block NEW
		F3XD16-4F	—	For both DC input sink/source, 12 V DC, 16 points Terminal block NEW
		F3XD16-3H	—	DC input, positive common, 24 V DC, 16 points (high-speed input) Terminal block NEW
		F3XD32-3F	—	For both DC input sink/source, 24 V DC, 32 points Connector *2 NEW
		F3XD32-4F	—	For both DC input sink/source, 12 V DC, 32 points Connector *2 NEW
		F3XD32-5F	—	TTL input, 5 V DC, 32 points Connector *2 NEW
	Output module	F3XD64-3F	—	For both DC input sink/source, 24 V DC, 64 points Connector *2 NEW
		F3XD64-4F	—	For both DC input sink/source, 12 V DC, 64 points (8x8) Connector *2 NEW
		F3XD64-6M	—	For both DC input sink/source, 12-24 V DC, 64 points (8x8) Connector *2
		F3YA08-2N	—	Triac (100/240 V AC), 1 A, 8 points Terminal block
		F3YC08-0C	—	Relay (24 V DC, 100-240 V AC), 2 A, individual common, 8 points Terminal block NEW
		F3YC08-0N	—	Relay (24 V DC, 100-240 V AC), 2 A, 8 points Terminal block
F3YC16-0N		—	Relay (24 V DC, 100-240 V AC), 2 A, 16 points Terminal block	
F3YD04-7N		—	TR output, 24 V DC, 2A, independent common: 4 points Terminal block	
F3YD08-6A		—	TR output, sink, 12-24 V DC, 1 A, 8 points Terminal block	
F3YD08-6B		—	TR output, source, 12-24 V DC, 1 A, 8 points Terminal block	
I/O module	Output module	F3YD14-5A	—	TR output, sink, 12-24 V DC, 0.5 A, 14 points Terminal block
		F3YD14-5B	—	TR output, source, 12-24 V DC, 0.5 A, 14 points Terminal block
		F3YD32-1A	—	TR output, sink, 12-24V DC, 0.1 A, 32 points Connector *2
		F3YD32-1B	—	TR output, source, 12-24 V DC, 0.1 A, 32 points Connector *2
		F3YD32-1T	—	TTL output, 5 V DC, 16 mA, 32 points Connector *2
		F3YD64-1F	—	TR output, sink, 12 V DC, 0.1 A, 64 points Connector *2 NEW
		F3YD64-1M	—	TR output, matrix scan, 12/24 V DC, 64 points (8x8) Connector *2
		F3WD64-3F	—	Input, TR output, sink, 24 V DC, 32 points each Connector *2 NEW
		F3WD64-4F	—	Input, TR output, sink, 12 V DC, 32 points each Connector *2 NEW
		Analog I/O/ temperature module	Analog input module	F3AD04-0N
F3AD08-1N	—			0-5V/1-5 V DC, -10-10 V DC input, 8 points Terminal block
Analog output module	F3DA02-0N		—	-10-10 V DC, 4-20 mA DC output, 2 points Terminal block
	F3DA04-1N		—	-10-10 V DC, 4-20 mA DC output, 4 points Terminal block
	F3DA08-5N		—	-10-10 V DC output, 8 points Terminal block
Temperature control and monitoring module	F3CT04-0N		—	TC input, 4-loop, 0.5s scan, PID, ON/OFF control Terminal block
	F3CT04-1N		—	F3CT04-0N with continuous PID output (4-20 mADC) Terminal block
	F3CR04-0N		—	RTD input, 4-loop, 0.5 scan, PID, ON/OFF control Terminal block
	F3CR04-1N		—	F3CT04-0N with continuous PID output (4-20 mADC) Terminal block
PID control module	F3CV04-1N		—	1-5 V input, 4-loop, 0.5 s scan, PID, ON/OFF control Terminal block

*1: The rail mount kit must be purchased separately.

*2: The connector for external connection and connector cover must be purchased separately.

(Note) For coating treatment, contact Yokogawa's sales office.



Category	Name	Type name	Style	Specification
Communications module	Personal computer link module	F3LC11-1N	—	RS-232-C port (x1) Connector
		F3LC11-2N	—	RS-422 / RS-485 1 port Terminal block
		F3LC11-1F	—	1 RS-232-C port, modem interface function Connector NEW
		F3LC12-1F	—	2 RS-232-C ports, modem interface function Connector NEW
	DeviceNet interface module	F3LD01-0N	—	Max. 500K bps, Device Net port (x1), master/scanner function Connector
	Ethernet interface module	F3LE01-5T	—	10M bps, 10BASE5/10BASE-T
	RS-232-C communications module	F3RS22-0N	—	Max. 19200 bps, RS-232-C port x 2 (for F3BP20, F3BP30) Connector
	RS-422 communications module	F3RS41-0N	—	Max. 19200 bps, RS-422/RS-485 port x 1, (for F3BP20, F3BP30) Terminal block
	Ladder communications module	F3RZ81-0N	—	Max. 19200 bps, RS-232C port x 1 Connector
	F3RZ91-0N	—	Max. 19200 bps, RS-422/RS-485 port x 1 Terminal block	
GP-IB communications module	F3GB01-0N	—	GP-IB port x 1 Connector	
FA link / fiber-optic FA-bus module	FA link H module	F3LP02-0N	—	Max. 32 stations, max. transmission distance 1km, transmission rate 1.25M bps Terminal block
	Fiber-optic FA link H module	F3LP12-0N	—	Max. 32 stations, max. transmission distance 10 km, max. distance between stations 1 km, transmission rate 1.25M bps Connector
	Fiber-optic FA-bus module	F3LR01-0N	—	Max. 7 stations, max. transmission distance 200m, transmission rate 10M bps Connector
	Fiber-optic FA-bus Type 2	F3LR02-0N	—	Max. 32 stations, max. transmission distance 1.4 km, max. distance between stations 500 m, transmission rate 10M bps Connector
Counter/positioning module	High-speed counter module	F3XP01-0H	—	Up/down counter, phase difference, pulse + direction, addition/subtraction etc, 400K pbs (x4 multiplication), 1 channel, 32 bits Connector *3
		F3XP02-0H	—	Up/down counter, phase difference, pulse + direction, addition/subtraction etc, 400K pbs (x4 multiplication), 2 channel, 32 bits Connector *3
	Pulse input module	F3XS04-3N	—	Ring-up counter, 0-20K Hz, 24 V input, 4 channels, 16 bits Terminal block
		F3XS04-4N	—	Ring-up counter, 0-20K Hz, 24 V input, 4 channels, 16 bits Terminal block
	Positioning module (with multi-channel pulse output)	F3YP04-0N	—	4 axes, amx. 250K bps, PTP Connector *3
		F3YP08-0N	—	8 axes, amx. 250K bps, PTP Connector *3
	Positioning module (advanced model with positioning pulse output)	F3NC11-0N	—	1 axis, max. 250K bps, PTP and linear interpolation, advanced interpolation, position/speed change during operation Connector *3
		F3NC12-0N	—	2 axes, max. 250K bps, PTP and linear interpolation, advanced interpolation, position/speed change during operation Connector *3
	Positioning module (with analog voltage output)	F3NC51-0N	—	1 axis, speed instruction voltage output type Connector *3
F3NC52-0N		—	2 axes, speed instruction voltage output type Connector *3	

*3: The connector for external connection and connector cover must be purchased separately.
 (Note) For coating treatment, contact Yokogawa's sales office.

■ Peripheral Devices

Category	Name	Type name	Style	Specification
Peripheral device	CPU port / D-sub 9-pin conversion cable	KM10-0C	—	D-sub 9-pin, female, cable length approx. 0.5 m
	Cable for programming tool	KM11-2T	—	Compatible with IBM-PC/AT compatible, approx. 3 m long
		KM11-3T	—	Compatible with IBM-PC/AT compatible, approx. 5 m long
		KM11-4T	—	Compatible with IBM-PC/AT compatible, approx. 10 m long
	Cable for terminal block	KM55-□□□	—	Cable between module and terminal block, 0.5 m (005) to 3 m (030) in steps of 0.5 m
	Cable for optic-fiber FA bus (for inside panel)	KM60-S06	—	For inside panel, cable length approx. 0.6 m
		KM60-001	—	For inside panel, cable length approx. 1 m
		KM60-003	—	For inside panel, cable length approx. 3 m
Cable for optic-fiber FA bus (for indoor)	KM61-□□□	—	For indoor, cable length *	
Cable for optic-fiber FA bus (for outdoor)	KM62-□□□	—	For outdoor, cable length *	
	KM67-□□□	—	For outdoor, cable length *	
Spare parts	Terminal block unit	TA40-0N	—	Converts 40 point I/O connector to European type terminal block.
		TA50-0N	—	Connector terminal block (40 points), M3.5 screw
		TA50-1N	—	Connector terminal block (40 points), M3 screw
		TA60-0N	—	Connector terminal block (40 points), European type
	Blank module	F3BL00-0N	—	For empty I/O slots

*: Contact a Yokogawa's sales office.

■ External Dimensions (when DIN rail is used)

Unit: mm

Base module	Number of slots	Number of I/O slots*	Total width
F3BU04-0N	4	3	147
F3BU06-0N	6	5	205
F3BU09-0N	9	8	322
F3BU13-0N	13	12	439
F3BU16-0N	16	15	527

* The number of available I/O slots is indicated when one CPU module is installed.

■ Manuals

Name	Document No.
Hardware Manual	IM34M6C11-01E
Analog Input/Output Modules	IM34M6H11-01E
Serial Communication Modules	IM34M6H21-01E
Ladder Communication Modules	IM34M6H22-01E
Ethernet Interface Module	IM34M6H24-01E
DeviceNet Interface Module	IM34M6H28-01E
Personal Computer Link Modules	IM34M6H41-02E
FA-Link H Module and Fiber-optic FA Link H Module	IM34M6H43-01E
Fiber-optic FA-bus Module and Fiber-optic FA-bus Type 2 Module	IM34M6H45-01E
High-speed Counter Modules	IM34M6H53-01E
Pulse Input Module	IM34M6H54-01E
Positioning Modules (with Multi-channel Pulse Output)	IM34M6H55-01E
Positioning Modules (with Pulse Output)	IM34M6H57-01E
Positioning Modules (with Analog Voltage Output)	IM34M6H58-01E
Temperature Control and Monitoring Modules and PID Control Module	IM34M6H61-01E
Sequence CPU Modules -Functions (for F3SP21, F3SP25 and F3SP35)	IM34M6P12-02E
Sequence CPU Modules -Instructions	IM34M6P12-03E
Sequence CPU Modules -Functions (for F3SP28, F3SP38, F3SP53 and F3SP58)	IM34M6P13-01E
Sequence CPU Moddule (for F3FP36)	IM34M6P22-01E
Personal Computer Link Command	IM34M6P41-01E
Ladder Diagram Support Program M3*1	IM34M6Q13-01E
FA-M3 Programming Tool WideField Documents Set*2	IM34M6Q14-00E
BASIC CPU Modules and YM-BASIC/ FA Programming Language	IM34M6Q22-01E
BASIC Programming Tool M3 for Windows	IM34M6Q22-02E
BASIC Programming Tool M3 for Windows Read Me First	IM34M6Q22-11E
POPMUSCAT Sequence Programming Tool for Windows	IM34M6Q51-01E

*1: Supplied with a software package.

*2: FA-M3 Programming Tool WideField (IM34M6Q14-01E) and FA-M3 Programming Tool WideField-Application (IM34M6Q14-02E) are supplied as a set, but not supplied with a software package.

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M3

⚠ Caution

- For correct use of the product, read the respective documentation thoroughly.
- If the product may be used for a system which directly involves the life of a human and thus for which the appropriate safety integrity is required, please contact the sales representative.