Technical Information

TI 34M06Z42-01E

Range-free Controller FA-M3
System Upgrade Guide

Leading Edge Controller

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YOKOGAWA
Yokogawa Electric Corporation

TI 34M06Z42-01E
2026.04 4th Edition (YK)

1. Introduction

The FA-M3 has been used in many systems since its debut in December 1992. Early systems now require replacement of parts with service life for preventive maintenance or system upgrade.

The operational economy of a system declines as it ages due to more frequent aged deterioration related failures, obsolete functions and higher system maintenance cost. Customers need to carry out appropriate upgrade to lower cost and increase future corporate competitiveness.

This document focuses on the description of system upgrade to the latest product models.

■ NOTE

- Information in this document is current as of Apr. 2026 and subject to change without notice. Contact Yokogawa's sales representative for the latest information.

- For engineering support, contact Yokogawa's sales representative:

  Refer to Yokogawa's website:
  https://www.yokogawa.com/ioc/w-locations/ioc-w-locations-index-en.htm

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1.1 Merits of System Upgrade

■ Benefit from the latest technologies

- Technologies that were not well established when existing systems were introduced can be put into practical use, and applied to system control to greatly enhance efficiency.

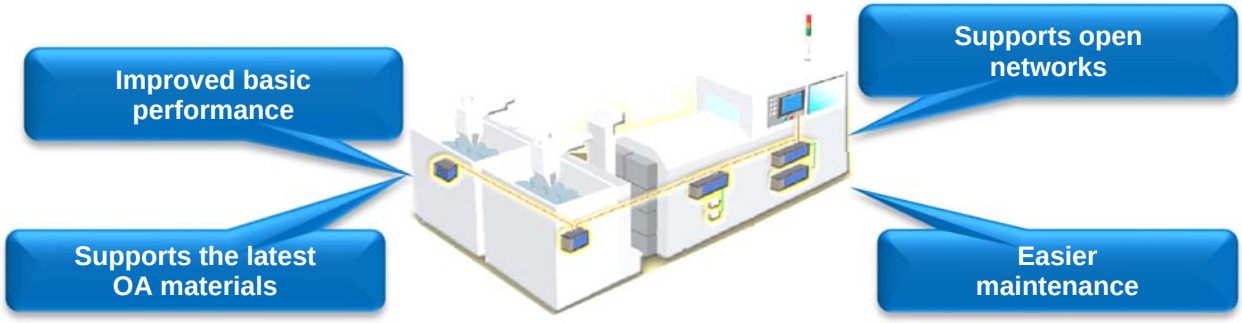
■ Benefit from improved basic performance

- Much faster controllers and the latest control equipment such as FA servo and general-purpose inverters greatly improve system productivity and economy.

■ Benefit from networking

- Remote monitoring /control systems enable operation status of devices to be monitored and maintained remotely over the Internet and intranets. Adoption of an open network as represented by FLnet allows flexible selection of equipment from different vendors.

Figure 1.1 Merits of system upgrade



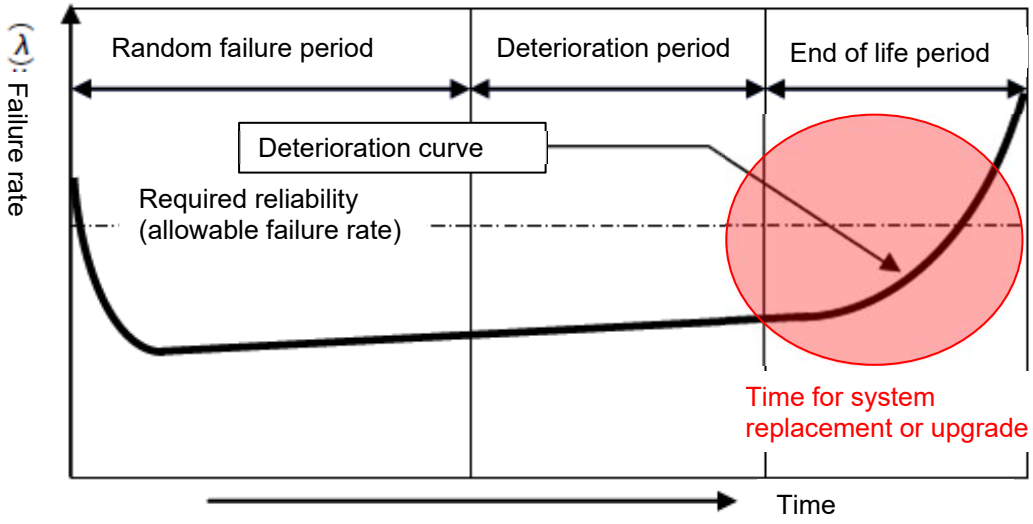
2. System Degradation and Recommended Replacement Cycle

2.1 Aged deterioration of system

■ **The failure rate of a system can be taken as the total failure rates of its component parts. It has been shown empirically that the deterioration of component parts is greatly affected by installation environmental conditions as described below:**

- Temperature: Failure rate doubles when temperature is 10°C higher
- Humidity: Corrosion of contacts accelerate when humidity exceeds 60%
- Corrosive gas: Causes corrosion of contacts
- Dust: Causes short circuit failures and corrosion

Figure 2.1. Aged deterioration of systems (Bathtub curve)



2.2 Recommended replacement cycle for FA-M3

■ Recommended replacement cycle: 10 years

However, modules that use parts with service life have the following cycles.

- Modules that use aluminum electrolytic capacitors: 8 years
- Modules that use relays

  Electrical life: 100 thousand cycles,
  mechanical life: 20 million operations

- Modules that use photocouplers: 5 years

  When used in high temperatures (about 45°C or higher)

IMPORTANT

- Recommended replacement cycle is a time period for preventive maintenance of parts with service life, but is not a guarantee against random failures.
- Recommended replacement cycle is a guide, and varies with operating conditions.

2.3 Examples of failure of parts with service life

■ Aluminum electrolytic capacitor

- Generally, electrostatic capacitance drops, and electrolyte leakage appears after 8 and 15 years respectively, and may cause power output interruptions, changes in signal characteristics at power on/off and circuit malfunction, etc.

■ Relays

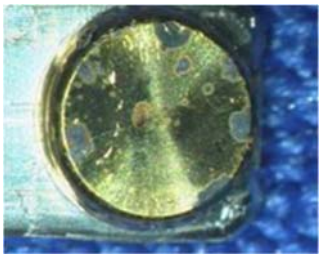
- Small relays have a mechanical life due to mechanical wear.
- Prolonged use may result in insulation degradation due to formation of products of corrosion or conductive dust deposit, or poor contact due to entry of dust and foreign substances at contact points or corrosive film build-up on contact surfaces. Replacement at the recommended replacement cycle is advisable.

■ Photocoupler

- Generally, the light-emitting element of a photocoupler has an expected life, and in some FA-M3 modules, wearout failures appear after about 5 to 6 years depending on temperature and other environment conditions.

Figure2.2 Electrolyte leakage

Figure 2.3 Corrosion of contacts



2.4 Modules that use parts with service life

■ Modules that use aluminum electrolytic capacitors

Recommended replacement cycle: 8 years

Table 2.1 Modules that use ﾚ electrolytic capacitors

Category	Model name		
Power supply module	F3PU□□-□N	F3PU□□-□S	
CPU/power supply module for Value set	F3SP05-0P	F3SP08-□P	
Analog input module	F3AD04-0N	F3AD04-0R	F3AD04-0V
	F3AD08-1N	F3AD08-1V	F3AD08-4V
	F3AD08-1R		
Analog output module	F3DA02-0N	F3DA04-1N	F3DA08-5N
Temperature control/monitoring module	F3CT04-□N	F3CR04-□N	
PID control module	F3CV04-1N		
Positioning module	F3NC5□-0N	F3NC61-0N	

■ Modules that use relays

Electrical service life: 100 thousand times or more

Mechanical service life: 20 million times or more

Table 2.2 Modules that use relays

Category	Model name		
Power supply module	F3PU□□-□N	F3PU□□-□S	
CPU/power supply module for Value set	F3SP05-0P	F3SP08-□P	
Relay output module	F3YC08-0N	F3YC08-0C	F3YC16-0N

IMPORTANT

- The CPU module uses a large capacity lithium battery, which has continuous backup capacity beyond its service life (10 years) but replacement (for each module) at end of service life is recommended.

■ Modules that use photocouplers (with recommended replacement cycle below 10 years)

Recommended replacement cycle: 5 years (When used in high temperature environment (about 45°C or higher))

Table 2.3 Modules that use photocouplers

Category	Model name		
FA link module	F3LP01-0N		
FA link H module	F3LP02-0N		
High-speed counter module	F3XP01-0H	F3XP02-0H	
Analog input module	F3AD04-0N	F3AD04-0R	F3AD04-0V
	F3AD08-1N	F3AD08-1V	F3AD08-4V
	F3AD08-1R		
Temperature control/PID module	F3CU04-0N	F3CU04-1N	
Temperature monitoring module	F3CX04-0N		

3. System Upgrade Procedure

3.1 Upgrading FA-M3

■ Evolution of FA-M3

● The evolution of FA-M3 since its debut in 1992 has always considered upward compatibility so an existing FA-M3 system can be easily migrated to the latest FA-M3V.

■ Upgrade procedure

● **STEP 1: Select replacement module**

Select a replacement module by referring to replacement product table.

● **STEP 2: Convert ladder programs**

Ladder programs are upward compatible so existing programs developed using earlier programming tools can be converted for new programming environment.

● **STEP 3: Other changes**

・Adjust for higher processing speed

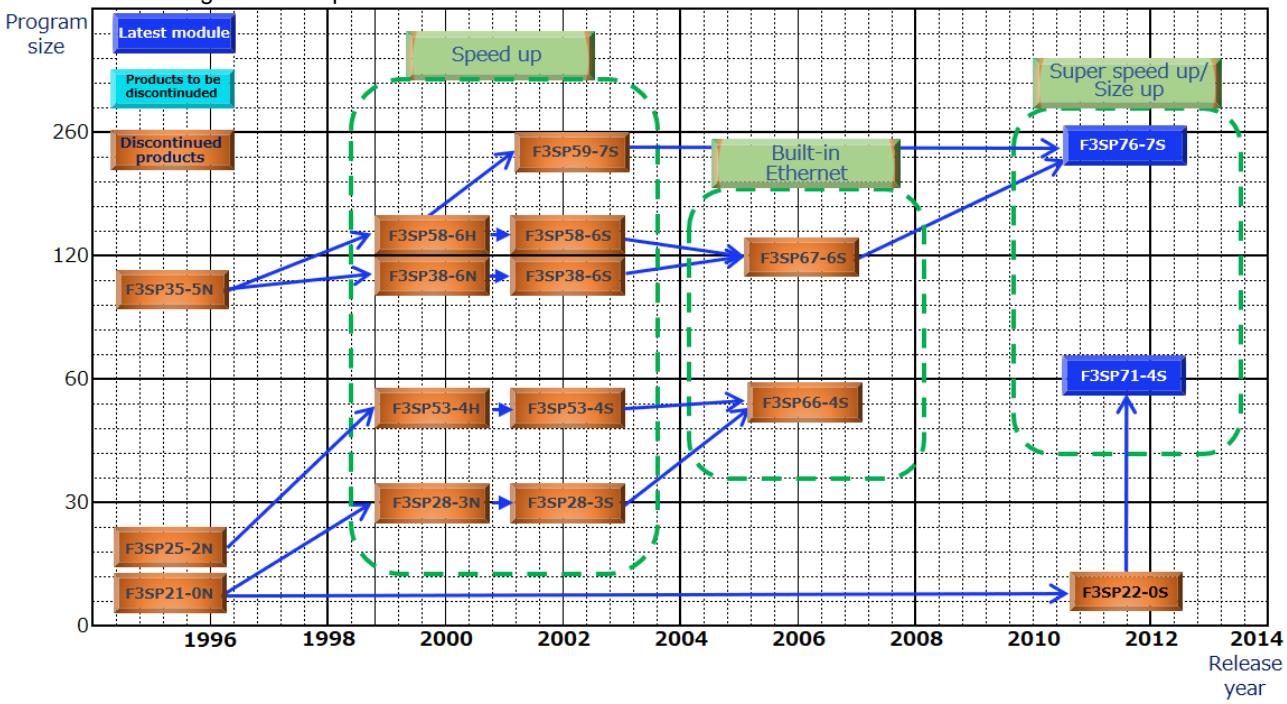
The faster processor in the latest sequence CPU module allows a much shorter scan time. Timing adjustment might be necessary for scan-time dependent processing.

・Modify ladder program after upgrading special module

Some special module models are software incompatible with replacement products. Replacement guides are available for these.

3.2 Sequence CPU module evolution

Figure 3.1 Sequence CPU module evolution



3.3 Select replacement module (STEP1)

3.3.1 Replacement product table: Sequence CPU module

Table 3.1 Replacement products for discontinued sequence CPU modules

Item	Discontinued product	Replacement product	Compatible	Main changes	Programming tool
Sequence CPU	F3SP20-0N	F3SP71-4S	✓	High-speed/larger memory	WideField3
	F3SP30-0N	F3SP71-4S	✓	High-speed/larger memory/built-in Ethernet	WideField3
	F3SP21-0N	F3SP22-0S	✓	High-speed/larger memory	WideField3
	F3SP25-2N	F3SP71-4S	✓	High-speed/larger memory/built-in Ethernet	WideField3
	F3SP35-5N	F3SP76-7S	✓	High-speed/larger memory/built-in Ethernet	WideField3
	F3SP28-3N	F3SP71-4S	✓	High-speed/larger memory/built-in Ethernet	WideField3
	F3SP28-3S	F3SP71-4S	✓	High-speed/larger memory/built-in Ethernet	WideField3
	F3SP38-6N	F3SP76-7S	✓	High-speed/larger memory/built-in Ethernet	WideField3
	F3SP38-6S	F3SP76-7S	✓	High-speed/larger memory/built-in Ethernet	WideField3
	F3SP53-4H	F3SP71-4S	✓	High-speed/larger memory/built-in Ethernet	WideField3
	F3SP53-4S	F3SP71-4S	✓	High-speed/larger memory/built-in Ethernet	WideField3
	F3SP58-6H	F3SP76-7S	✓	High-speed/larger memory/built-in Ethernet	WideField3
	F3SP58-6S	F3SP76-7S	✓	High-speed/larger memory/built-in Ethernet	WideField3
	F3SP59-7S	F3SP76-7S	✓	High-speed/larger memory/built-in Ethernet	WideField3
	F3SP66-4S	F3SP71-4S	✓	High-speed/larger memory/no SIO port/USB1.1 →2.0	WideField3
	F3SP67-6S	F3SP76-7S	✓	High-speed/larger memory/no SIO port/USB1.1 →2.0	WideField3
	F3SP22-0S*1	F3SP71-4S	✓	High-speed/larger memory/built-in Ethernet	WideField3

*1: Scheduled to be discontinued on 1 April 2026.

■ Compatibility

● Ladder programs running on discontinued sequence CPU modules can run on replacement CPU models by updating the ladder programming tool.

■ Precautions

● Programming tool

Latest programming tool WideField3 is required for using the latest F3SP7□-□S CPU module. WideField3 is downward compatible with earlier CADM3, WideField and WideField2.

● About F3SP7□-□N

F3SP7□-□N has been changed to F3SP7□-□S since January 2012 along with functional upgrade. F3SP7□-□S should be used in future system upgrade.

● About multi-CPU configuration

F3SP7□-□□ cannot be used with AT compatible CPU modules and some old sequence CPU module types in a multi-CPU configuration.
See reference "5.2 Restrictions on CPU module installation" for more details.

3.3.2 Communication interfaces of sequence CPU

■ Changes

- **The replacement sequence CPU module has an Ethernet port.**
- **F3SP7□-□S has no RS-232C port. If a touch panel etc. was connected via RS-232C, it is necessary to switch to Ethernet or go via a PC link module.**
- **Dedicated ROM pack for program backup has been substituted by a general-purpose SD card, which can also be used to store device data.**

Figure 3.2 Interface of sequence CPU

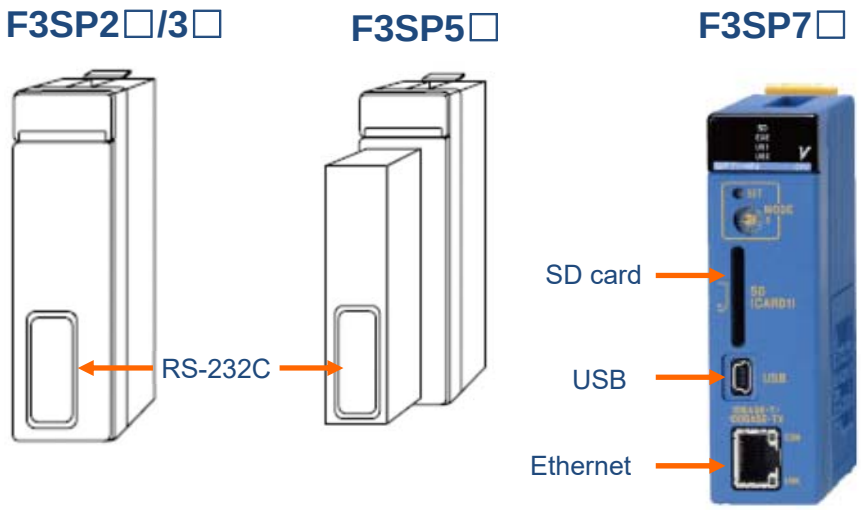


Table 3.2 Interfaces of F3SP2□/3□/5□

Item	Media	Purpose
Communication	RS-232C	Programming and connection of display
Memory	Dedicated ROM pack	Program backup

Table 3.3 Interfaces of F3SP7□

Item	Media	Purpose
Communication	Ethernet	Connection of PC and display
	USB	Programming
Memory	SD (SDHC)	Data storage and program backup

3.3.3 Migrating from ROM packs

■ When upgrading to F3SP7□-□S

- **F3SP7□-□S uses general-purpose SD card for backing up ladder programs but does not support ROM pack.**
- **Use SD card to back up ladder programs.**
- **The SD card supports various functions including backing up ladder programs, saving device data and “PC-less” maintenance.**

■ When upgrading to F3SP22-0S

- **F3SP22-0S supports ROM packs.**
- **F3SP22-0S supports the following ROM packs:**

  ・RK33-0N RK73-0N

3.3.4 Replacement product table: Power supply/basic I/O modules

Table 3.4 Replacement products for power supply/basic I/O modules

Item	Discontinued product	Replacement product	Compatible	Changes
AC power supply	F3PU01-0N	F3PU10-0S	✓	Supports AC100-240V/Consolidated with F3PU10-0S
	F3PU10-0N	F3PU10-0S	✓	Terminal screws M3.5→M4
	F3PU20-0N	F3PU20-0S	✓	Terminal screws M3.5→M4
	F3PU30-0N	F3PU30-0S	✓	Terminal screws M3.5→M4
DC power supply	F3PU16-0N*1	F3PU16-0S	✓	Terminal screws M3.5→M4
	F3PU26-0N*1	F3PU26-0S	✓	Terminal screws M3.5→M4
	F3PU36-0N	F3PU36-0S	✓	Terminal screws M3.5→M4
DI	F3XD□□-□N	F3XD□□-□F	✓	Input response time selectable
DO	F3YD32-1A	F3YD32-1P	✓	Short-circuit protector added
	F3YD32-1B	F3YD32-1R	✓	Short-circuit protector added
	F3YD64-1A	F3YD64-1P	✓	Short-circuit protector added
	F3YD64-1F			
DI/O	F3WD□□-□N	F3WD□□-□P	✓	Input response time selectable Short-circuit protector added
	F3WD□□-□F	F3WD□□-□P	✓	

*1 Scheduled to be discontinued on 31 March 2019

3.3.5 Replacement product table: Value/Value−2

Table 3.5 Replacement products for discontinued Value sets

Item	Discontinued product	Replacement product	Compatible	Changes
Value set	F3SC21-1N	F3BU04-0N F3PU10-0S F3SP71-4S F3WD64-3P	✓	①About Value/Value-2 ・Sale of Value/Value-2 sets has ended. ・Individual modules need to be purchased henceforth. ②Replacement precautions ・Requires Programming Tool WideField3. ・As the CPU module has higher processing speed, verify system operation after replacement. ・The power supply module uses M4 instead of M3 terminal screws. (applicable only when replacing F3SC21-1N)
	F3SC22-1F	F3BU04-0N F3PU10-0S F3SP71-4S F3WD32-3F	✓	
	F3SC23-1F			
	F3SC22-1A	F3BU04-0N F3PU10-0S F3SP71-4S F3XD16-3F F3YD14-5A	✓	
	F3SC23-1A			
	F3SC22-2F	F3BU04-0N F3PU10-0S F3SP71-4S F3WD64-3P	✓	
	F3SC23-2P			
	F3SC23-2F			
	F3SC23-6P	F3BU04-0N F3PU10-0S F3SP71-4S F3WD64-4P	✓	
Service items for Value set	F3SP05-0P	F3PU10-0S F3SP71-4S	✓	
	F3SP08-□P			

3.3.6 Compatibility of basic I/O modules

■ Hardware

● Replacement models use the same terminal block, connector, and pin arrangement as discontinued products so are usable once replaced.

● Latest output modules have built-in short-circuit protector.

■ Configuration

● Replacement input module has wider range of input response speed options.

・Old product (model suffix N): Input response time: 16 ms, 1 ms
・Latest product (model suffix F): input response time: Always, 62.5 μs, 250 μs, 1 ms, 16 ms

Note: 64-point module has no 16 ms option.

■ Programs

● No ladder program change needed for upgrading to replacement product.

Figure 3.3 Appearance of basic I/O modules

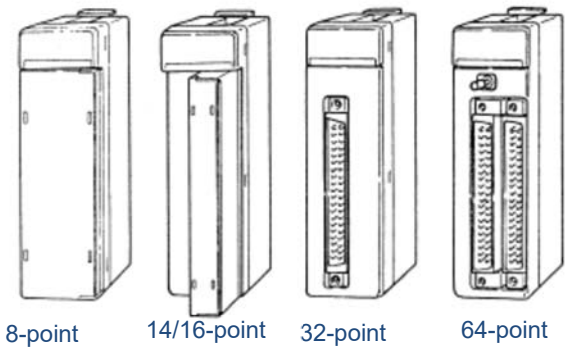
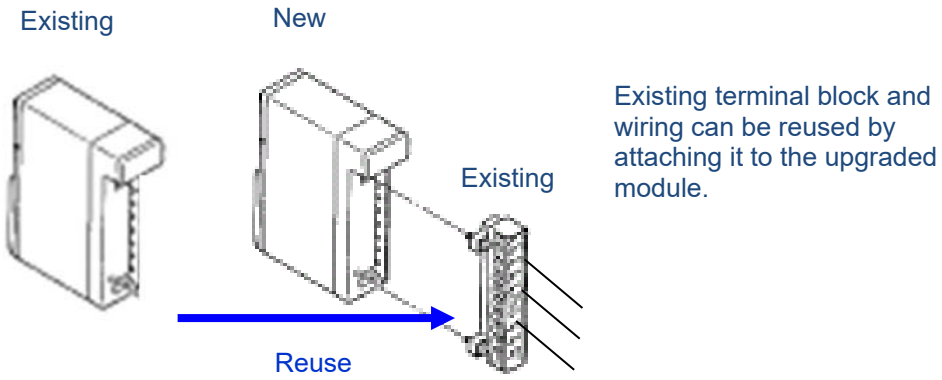


Figure 3.4 Reusing terminal block



3.3.7 Replacement product table: Special modules

Table 3.6 Replacement products for discontinued special modules

Item	Discontinued product	Replacement product	Compatible	Changes
Analog output	F3DA02-0N	F3DA04-6R	△	Terminal arrangement changed (common terminals independent of output type) Output type set by software (-10 to 10 V range by default). Output behavior at startup differs (no output until setting is written) High impedance.
	F3DA04-1N		△	
	F3DA08-5N	F3DA08-5R	△	Output behavior at startup differs (no output until setting is written)
Analog input	F3AD04-0V	F3AD04-5V	✓	Upward compatible. Wiring and terminal block cannot be reused. Different external dimensions (depth); terminal block mounting position is in front.
	F3AD04-0N	F3AD04-5R	✓	
	F3AD04-0R		✓	
	F3AD08-1V	F3AD08-5V	✓	Upward compatible. Wiring and terminal block can be reused. External dimensions (depth) differs; terminal block mounting position is in front.
	F3AD08-1N	F3AD08-5R	✓	
	F3AD08-1R		✓	
	F3AD08-4V	F3AD08-4W	✓	
High-speed data acquisition	F3HA08-0N	F3HA06-1R	△	No or minor modification of application programs needed after replacement if module is used as a high-speed AD conversion module, which refers only to constantly updated data without using its data acquisition function. Application is incompatible and needs modification if the data acquisition function or acquisition-related filter function etc. is used.
		F3HA12-1R	△	
PID/Temperature control	F3CV04-1N	F3CU04-1S	×	Software modification is needed.
	F3CR04-0N	F3CU04-0S	×	Software modification is needed.
	F3CR04-1N	F3CU04-1S	×	Software modification is needed.
	F3CT04-0N	F3CU04-0S	×	Software modification is needed.
	F3CT04-1N	F3CU04-1S	×	Software modification is needed.
Positioning	F3YP04-0N	F3YP24-0P	×	Software modification is needed.
	F3YP08-0N	F3YP28-0P	×	Software modification is needed.
	F3YP14-0N	F3YP24-0P	×	Software compatible. However, the number of installable modules changed from 36 (288 axes) to 16 (128 axes). Hardware incompatible. Need to review external wiring such as changing from 5VDC to 24VDC.
	F3YP18-0N	F3YP28-0P	×	
Personal computer link	F3LC11-2N	F3LC11-2F	△	Upward-compatible. Beware of position of rotary switch. Software modification is needed only if using events.
	F3LC11-1N	F3LC11-1F	△	
Ladder communication	F3RZ81-0N	F3RZ81-0F	×	Software modification is needed. For 1 channel.
		F3RZ82-0F	×	Software modification is needed. For 2 channels.
	F3RZ91-0N	F3RZ91-0F	×	Software modification is needed.
Ethernet	F3LE01-5T	F3LE01-1T	✓	Software compatible but has no AUI port and has different look (e.g. connector location.)
	F3LE01-0T	F3LE01-1T	✓	Software compatible but has different look (e.g. connector location.)
	F3LE11-0T	F3LE11-1T	✓	Software compatible but has different look (e.g. connector location.)
	F3LE12-0T	F3LE12-1T	✓	Software compatible but has no AUI port and has different look (e.g. connector location.)
FL-net	F3LX01-0N	F3LX02-2N	✓	Software compatible. Beware of FL-net version. F3LX01 (Ver.1) and F3LX02 (Ver.2) cannot be mixed.
	F3LX02-1N	F3LX02-2N	✓	Software compatible but has no AUI port and has different look (e.g. connector location.)

Item	Discontinued product	Replacement product	Compatible	Changes
NX autonomous distributed	F3NX01-0N	F3NX01-2N	✓	Software compatible but has no AUI port and has different look (e.g. connector location.)
	F3NX01-1N	F3NX01-2N	✓	Software compatible but has no AUI port and has different look (e.g. connector location.)
FA link H	F3LP01-0N	F3LP02-0N*2 (F3LP□□-□N*3)	✓	(Software compatible but hardware incompatible. New and old products cannot be mixed)
	F3LP02-0N*2	(F3LP□□-□N*3)	✓	(Software compatible but hardware incompatible. New and old products cannot be mixed)
Fiber-optic FA link H	F3LP12-0N*2	None	-	Replace with combination of FL-net and optical cable converter.
μ bus	F3LU01-0N	None	-	Need to replace with YHLS etc.
Modem	F3LM01-1N	F3LC11-1F	-	Replace with combination of F3LC11-1F and external analog modem.

*1 F3DA04-6R/DCR with default current (4 to 20 mA) output type is available for customers using current output. Contact Yokogawa's sales representative for details.

*2 Scheduled to be discontinued on 31 March 2019

*3 New product scheduled for sale in December 2018.

3.3.8 Application compatibility of special modules

■ As replacement models become more powerful, application modification is needed for some special modules.

■ Even with application compatibility, processing timing may change due to faster processing speed so you should always verify system operation after module upgrade.

3.4 Convert ladder programs (STEP2)

3.4.1 Ladder programming tools table

■ Sequence CPU modules versus programming tools

● **WideField3 is required for using the latest F3SP7□/F3SP22 CPU modules.**

Table 3.7 Sequence CPU modules versus programming tools

Release year	CPU model		1995	1999	2002	2011
		Programming tool	CADM3	WideField	WideField2	WideField3
		Availability for sale	SF511	SF610	SF620	SF630
1993	F3SP20-0N	Discontinued	✓			
1993	F3SP30-0N	Discontinued	✓			
1995	F3SP21-0N	Discontinued	✓	✓	✓	✓
1995	F3SP25-2N	Discontinued	✓	✓	✓	✓
1995	F3SP35-5N	Discontinued	✓	✓	✓	✓
1999	F3SP28-3N	Discontinued		✓	✓	✓
1999	F3SP38-6N	Discontinued		✓	✓	✓
1999	F3SP53-4H	Discontinued		✓	✓	✓
1999	F3SP58-6H	Discontinued		✓	✓	✓
2002	F3SP28-3S	Discontinued			✓	✓
2002	F3SP38-6S	Discontinued			✓	✓
2002	F3SP53-4S	Discontinued			✓	✓
2002	F3SP58-6S	Discontinued			✓	✓
2002	F3SP59-7S	Discontinued			✓	✓
2006	F3SP66-4S	Discontinued			✓	✓
2006	F3SP67-6S	Discontinued			✓	✓
2011	F3SP22-0S	Discontinued				✓
2012	F3SP71-4S	Available				✓
2012	F3SP76-7S	Available				✓

3.4.2 Ladder program conversion and compatibility

■ WideField3's conversion feature

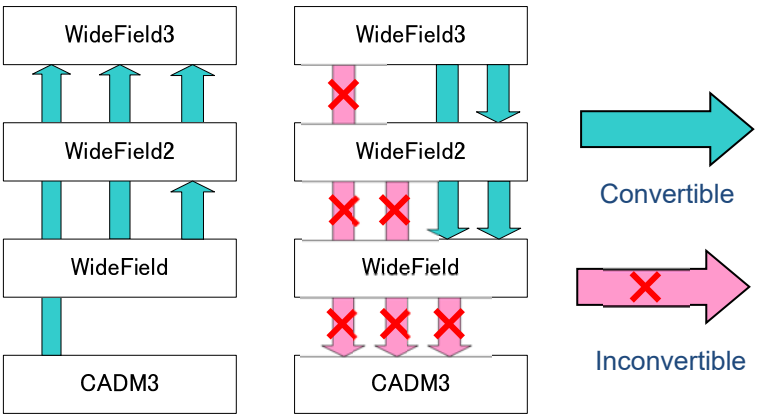
● **CADM3, WideField and WideField2 projects can be converted to WideField3 format by loading them into WideField3.**

Figure 3.5 Conversion illustration

■ Upward and downward compatibility

● **A project converted to WideField3 can also be saved in the old format.**

Figure 3.6 Upward and downward compatibility



Upward compatible			Yes/No
CADM3	⇒	WideField	✓
CADM3	⇒	WideField2	✓
CADM3	⇒	WideField3	✓
WideField	⇒	WideField2	✓
WideField	⇒	WideField3	✓
WideField2	⇒	WideField3	✓

Downward compatible			Yes/No
WideField	⇒	CADM3	×
WideField2	⇒	CADM3	×
WideField3	⇒	CADM3	×
WideField2	⇒	WideField	✓
WideField3	⇒	WideField	✓
WideField3	⇒	WideField2	✓

3.4.3 Converting ladder programs (CADM3)

■ Converting from CADM3 to WideField3

● **CADM3 will not run under the latest Windows so you need to port files including the executable from the PC running CADM3 to the PC running WideField3.**

● **Files to be ported**

Executable program file: extension = .PRG
Block files: extensions = .BLK .OBT .CMT
Macro blocks: extensions = .MBL .MOB .MCM

Table 3.8 Programming tool versus supported OS

OS	CADM3	WdeField	WideField2	WideFiled3
MS-DOS	✓			
Windows95	✓	✓		
Windows98		✓	✓	
WindowsNT	✓	✓		
Windows2000			✓	
WindowsME			✓	
WindowsXP			✓	
WindowsVista			✓	
Windows7				✓
Windows8,8.1				✓
Windows10				✓
Windows11				✓

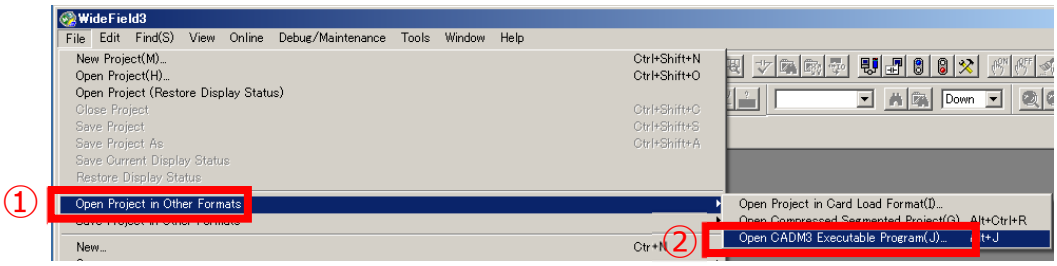
IMPORTANT

- In CADM3, project (executable program) and blocks are stored in a folder (directory) with a name defined by a user using CAM3's initial design menu. Normally, programs to be ported are stored near individually defined directories. (In CADM 3, folder name and project name do not match.)

■ Converting files

● **Opening an executable by selecting [Open File in other formats] automatically converts it to WideField3 format.**

Figure 3.7 Conversion window

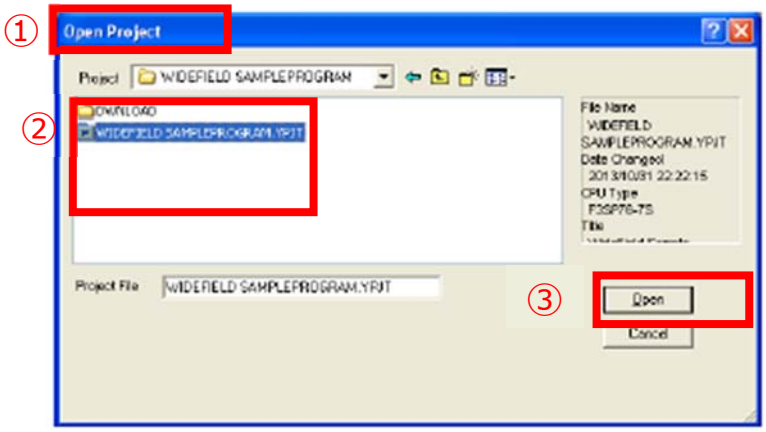


3.4.4 Converting ladder program (WideField/WideField2)

■ Converting from WideField/WideField2 to WideField3

● **In WideField3, select [Open Project] and specify a WideField/WideField2 project to automatically convert it to WideField3 format.**

Figure 3.8 Conversion Window



● **A ladder program edited in WideField3 can also be converted and saved in an earlier (WideField/WideField2) format.**

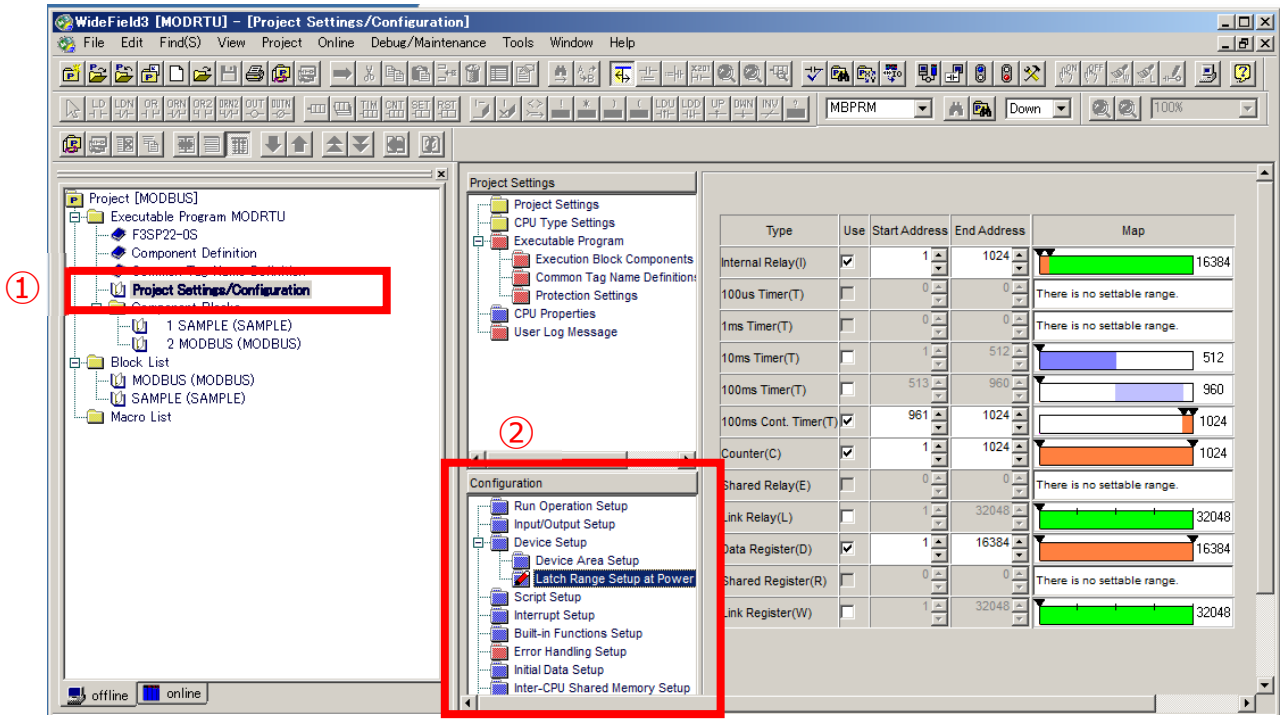
Figure 3.9 Downgrade and Save window

3.4.5 Modifying Configuration after conversion

■ Redefine configuration

- **Configuration revert to factory settings if the CPU model name is changed.**
- **Need to redefine configuration values after changing CPU type.**
- **Redefine configuration such as run operation setup, input/output setup, device setup etc.**

Figure 3.10 Configuration window (Latch Range Setup example)



3.4.6 Configuration precautions

CAUTION

① Simultaneity of shared devices
For F3SP28 and newer sequence CPU modules, shared device data can be specified as Simultaneous or Non-simultaneous in the configuration. If compatibility with the old CPU is required when upgrading F3SP20/30/21/25/35, specify as Non-simultaneous (default setting is Simultaneous).

② Direct Refresh (DREF) instruction related precaution
For CPU F3SP28 or later, set terminal usage of output relays (Y) to be refreshed by a DREF instruction in a program as “Not Used“ in the configuration. If specified as “Use” or “Use with SCB,” the values one scan earlier may be overwritten with the values output by the DREF instruction as output refreshing is executed concurrently with instructions.

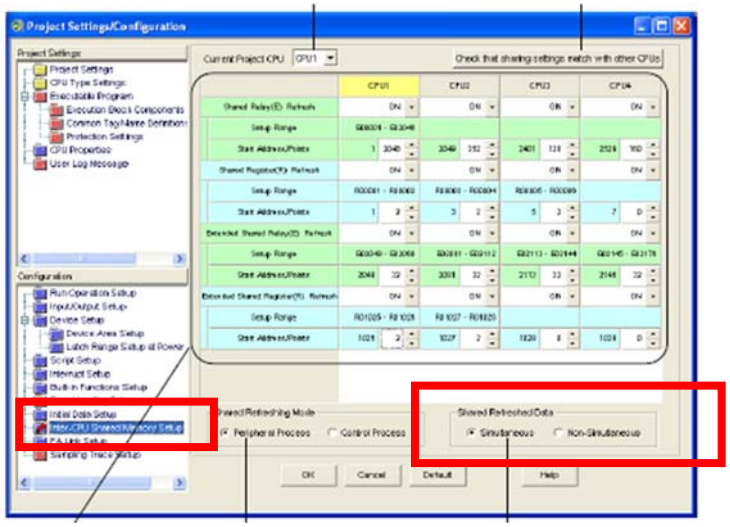


Figure 3.11 Configuration (shared memory setup)

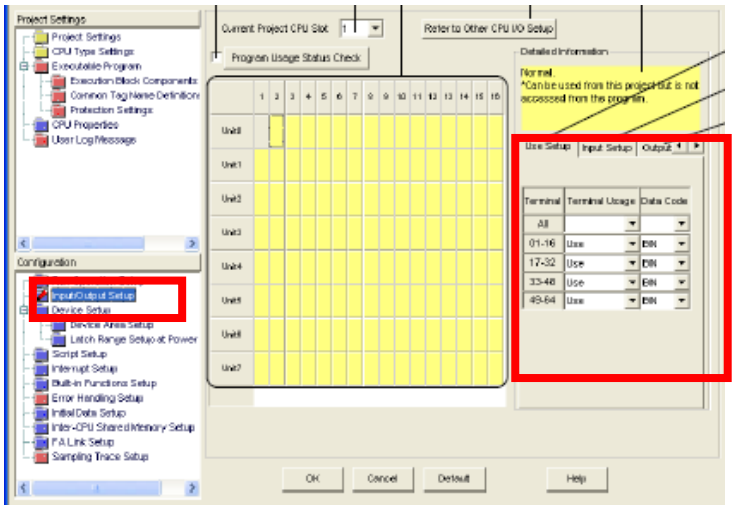


Figure 3.12 Configuration (Input/output setup)

3.5 Other changes (STEP3)

3.5.1 Tuning for improved basic performance

■ Verify application execution on faster replacement module

● **Processing timing may change due to faster processing speed. After module upgrade, verify system operation, especially:**

- Processing dependent on the scan time of the sequence CPU
- Refresh processing of sequence CPU
- Response time of Ethernet and other communications
- Replacement of HRD/HWR instructions with READ/WRITE instructions
  If the replacement pose difficulties due to scan time or other circumstances, consider switching to F3SP71-4S/F3SP76-7S.

3.5.2 Basic operation of sequence CPU

■ Replacement model F3SP7□ operation at power on

● **When a battery error occurs, CPU behaves similarly as when using a ROM pack of F3SP2□/3□/5□; the ERR LED turns on, and then immediately goes off, the RUN LED turns on, and operation starts. Devices specified to be latched when a power failure occurs are cleared before operation starts. If you wish to prevent starting the operation when devices specified to be latched are cleared, add a program that suppresses the start of the operation if the special relay M194 (battery error) is on.**

3.5.3 When replacing special modules

■ Replacement guides for ladder program migration

- **As described in 3.3.7 “Replacement product table: Special modules”, ladder programs may be incompatible between a discontinued special module and its replacement product.**

- **Various migration guides are available for download from the PLC (FA-M3)/RTOS Controller (e-RT3) web page on the following FAM3 partner portal (member registration and login is required).**

  https://partner.yokogawa.com/global/itc/index.htm

Table 3.9 Technical Information (TI)

Document Title	Document No.
Range-free Controller FA-M3 Migration Guide for Obsoleted Models	TI 34M06Z41-01E
BASIC CPU Module Replacement Guide (BASIC CPU → Sequence CPU)	TI 34M06Z41-02E
FA-M3 System Upgrade Guide (AS-interface → DeviceNet)	TI 34M06H33-01E
FA-M3 System Upgrade Guide (PROFIBUS-DP → DeviceNet)	TI 34M06H34-01E
FA Link H Module → FL-net Interface Module Replacement Guide	TI 34M06H43-01E
Temperature Module Replacement Guide	Contact Yokogawa’s sales representative.

4. Upgrading related equipment

4.1 Upgrading SCADA

■ VDS/ASTMAC version upgrade

For VDS, which is used as an FA-M3 operation monitoring package, update it to the latest release (R7.20 for F3SPV9) to tap on new features and the latest personal computer operating system.

- Latest VDS release: R8
- “Update kit" is available for easy, economical version update
- Release of update summary:
  VDS R8 Migration Guide (Doc#: TI 34P02V07-01E)

Note: ASTMAC is scheduled for end-of-sale in March 2018. Custom orders including update kits will no longer be available then.

5. Reference information

5.1 Sequence CPU specifications comparison

Table 5.1 Specifications comparison of sequence CPU V series and R series

Item		F3SP71-4S	F3SP76-7S	F3SP66-4S	F3SP67-6S	F3SP22-0S
Program size		60Kstep	260Kstep	56Kstep	120Kstep	30Kstep
Project size		120KStep	520Kstep	112Kstep	240Kstep	
Interface	Ethernet	✓		✓		×
	SD card	✓ (SDHC compatible)		✓		×
	RS-232C	×		✓		✓
	USB	✓		✓		×
Basic instructions		3.75ns min. per instruction		17.5ns min. per instruction		45ns min. per instruction
Application instructions		7.5ns min. per instruction		70ns min. per instruction		180ns min. per instruction
Sensor control	Cycle	100µs-25.0ms		200µs-25.0ms		200µs-25.0ms
	Resolution	10µs		100µs		100µs
Device/ memory size	Input/output	4,096	8,192	4,096	8,192	4,096
	Internal relays	16,384	65,535	16,384	32,768	16,384
	Data registers	16,384	65,535	16,384	32,768	16,384
	File registers	32,768	262,144	32,768	262,144	32,768
	Cache registers	131,072	524,288	×		×
	Constant definition area	16384 words	32768 words	16384 words	32768 words	×
	RAMDISK	4MB		4MB		×
Security	Login control	✓		×		×
	Operation log	✓		×		×
	Password	✓		✓		✓
Download tag definitions		✓		✓		✓
Programming tool		WideField3		WideField2 or later		WideField3
Current consumption		460mA		850mA		450mA

CAUTION

WideField3 R4.05 or later must be used to use F3SP22-0S in up to 30K steps. When using WideField3 R4.04 or earlier, there is a limit of up to 10K steps.

Table 5.2 Specifications comparison of sequence CPU R series (F3SP28/F3SP38)

Item		F3SP28-3N	F3SP28-3S	F3SP38-6N	F3SP38-6S
Program size		30Kstep		120Kstep	
Project size					
Interface	Ethernet	×		×	
	SD card	×		×	
	RS-232C	✓		✓	
	USB	×		×	
Basic instructions		45ns min. per instruction		45ns min. per instruction	
Application instructions		180ns min. per instruction		180ns min. per instruction	
Sensor control	Cycle	200µs-25.0ms		200µs-25.0ms	
	Resolution	100µs		100µs	
Device/memory size	Input/output	4,096		8,192	
	Internal relays	16,384		32,768	
	Data registers	16,384		32,768	
	File registers	32,768		262,144	
	Cache registers	×		×	
	Constant definition area	×		×	
	RAMDISK	×		×	
Security	Login control	×		×	
	Operation log	×		×	
	Password	✓		✓	
Download tag definitions		×	✓	×	✓
Programming tool		WideField or later	WideField2 or later	WideField or later	WideField2 or later
Current consumption		450mA		450mA	

Table 5.3 Specifications comparison of sequence CPU R series (F3SP53/F3SP58/F3SP59)

Item		F3SP53-4H	F3SP53-4S	F3SP58-6H	F3SP58-6S	F3SP59-7S
Program size		56Kstep		120Kstep		254Kstep
Project size						360Kstep
Interface	Ethernet	×		×		×
	SD card	×		×		×
	RS-232C	✓		✓		✓
	USB	×		×		×
Basic instructions		17.5ns min. per instruction		17.5ns min. per instruction		17.5ns min. per instruction
Application instructions		70ns min. per instruction		70ns min. per instruction		70ns min “per instruction
Sensor control	Cycle	200µs-25.0ms		200µs-25.0ms		200µs-25.0ms
	Resolution	100µs		100µs		100µs
Device/memory size	Input/output	4,096		8,192		8,192
	Internal relays	16,384		32,768		65,535
	Data registers	16,384		32,768		65,535
	File registers	32,768		262,144		262,144
	Cache registers	×		×		×
	Constant definition area	×		×		×
	RAMDISK	×		×		×
Security	Login control	×		×		×
	Operation log	×		×		×
	Password	✓		✓		✓
Download tag definitions		×	✓	×	✓	✓
Programming tool		WideField or later	WideField2 or later	WideField or later	WideField2 or later	WideField2 or later
Current consumption		890mA		890mA		920mA

Table 5.4 Sequence CPU specifications comparison

Item		F3SP21-0N	F3SP25-2N	F3SP35-5N	F3SP20-0N	F3SP30-0N
Program size		10Kstep	20Kstep	100Kstep	10Kstep	20Kstep
Project size						
Interface	Ethernet	×	×	×	×	×
	SD card	×	×	×	×	×
	RS-232C	✓	✓	✓	✓	✓
	USB	×	×	×	×	×
Basic instructions		180ns min. per instruction	120ns min. per instruction	90ns min. per instruction	180ns min. per instruction	90ns min. per instruction
Application instructions		360ns min. per instruction	240ns min. per instruction	180ns min. per instruction	360ns min. per instruction	180ns min. per instruction
Sensor control	Cycle	×	×	×	×	×
	Resolution	×	×	×	×	×
Device/memory size	Input/output	2,048	4,096	8,192	2,048	2,048
	Internal relays	4,096	8,192	16,384	4,096	8,192
	Data registers	5,120	8,192	8,192	5,120	8,192
	File registers	×	32,768	32,768	×	×
	Cache registers	×	×	×	×	×
	Constant definition area	×	×	×	×	×
	RAMDISK	×	×	×	×	×
Security	Login control	×	×	×	×	×
	Operation log	×	×	×	×	×
	Password	✓	✓	✓	✓	✓
Download tag definitions		✓	✓	✓	✓	✓
Programming tool		CADM3 or later	CADM3 or later	CADM3 or later	CADM3 or later	CADM3 or later
Current consumption		350mA	420mA	560mA	325mA	405mA

5.2 List of end-of-sale (EOS) products

For product availability, refer to the following list of end-of-sale products, which is downloadable from the FA-M3 website.

◆ **List of end-of-sale products for FA-M3/e-RT3**
https://web-material3.yokogawa.com/TI34M06Z40-01E.pdf

Revision Information

Title : FA-M3 System Upgrade Guide
Document No.: TI 34M06Z42-01E

Apr. 2026/ 4th Edition
Revised due to the order entry stop for F3SP22-0S related products

Sep. 2021/ 3rd Edition
Expanded program size of F3SP22-0S

June, 2018/ 2nd Edition
Format change, content added and revised

June, 2017/ 1st Edition
New publication

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