

# FP7 SERIES

- FIBER SENSORS
- LASER SENSORS
- PHOTOELECTRIC SENSORS
- MICRO PHOTOELECTRIC SENSORS
- AREA SENSORS
- SAFETY LIGHT CURTAINS / SAFETY COMPONENTS
- PRESSURE / FLOW SENSORS
- INDUCTIVE PROXIMITY SENSORS
- PARTICULAR USE SENSORS
- SENSOR OPTIONS
- SIMPLE WIRE-SAVING UNITS
- WIRE-SAVING SYSTEMS
- MEASUREMENT SENSORS
- STATIC CONTROL DEVICES
- LASER MARKERS

Related Information ■ General terms and conditions..... F-3



RoHS compliance

## Automation Controls + Information Panasonic PLCs also control information

PLC

- HUMAN MACHINE INTERFACES
- ENERGY MANAGEMENT SOLUTIONS
- FA COMPONENTS
- MACHINE VISION SYSTEMS
- UV CURING SYSTEMS

### CONTROL MACHINERY AND FACILITIES

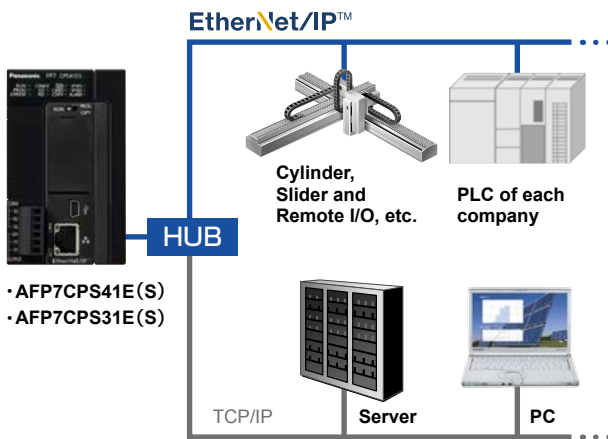
Along with operation speed and capacity, delivers ease of use for design, production, and maintenance

#### EtherNet/IP\* compatibility

Models with built-in Ethernet ports add functionality to CPU unit.

Easy connection with all kinds of robots and PLCs enables control and communication.

\*EtherNet/IP is a trademark of ODVA, Inc.



- AFP7CPS41E(S)
- AFP7CPS31E(S)

#### Cassette system

reduces unit cost and footprint

With ease and at low cost, extend the serial communication and analog functionality of CPU units.

#### Serial communication cassettes

- RS-232C
- RS-422 / RS-485
- 2 channels

#### Function cassettes

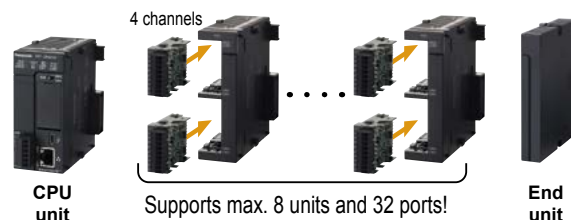
- Analog input
- Analog input and output
- Thermocouple input

#### Ethernet\* communication cassette

\*Ethernet is a registered trademark of Fuji Xerox Co., Ltd. and Xerox Corporation.



Moreover, when used as a serial communication unit, expansion to as many as 35 channels is possible. Reduces cost and footprint.



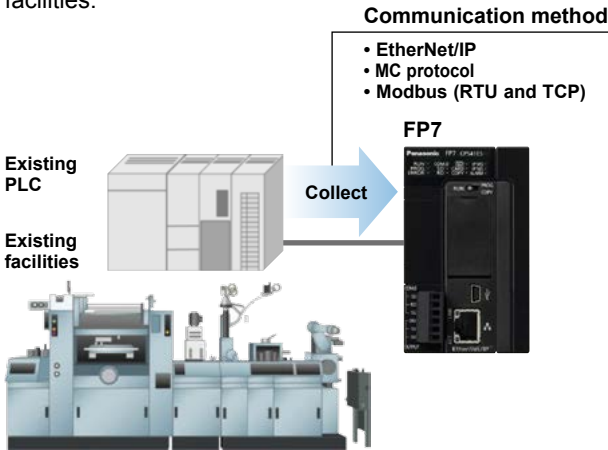
- Applications
- PLC
- Software
- Program Transfer
- Others
- FP7
- FP-X0
- FP0R
- FPΣ
- FP-X
- FP2SH
- FP-e

**COLLECT WORK SITE INFORMATION**

The FP7 can collect voltage, electric power, temperature, production output, alarm notifications, and other information

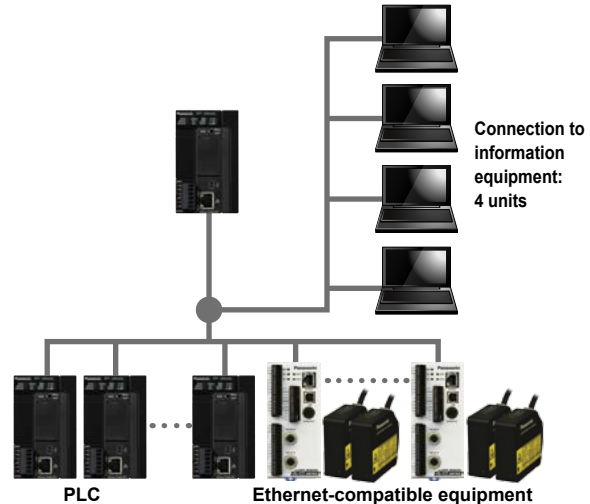
Equipped to deal with any protocol, it can be installed in existing facilities to enable collection of information.

To enable information collection, because the FP7 can deal with any protocol for Ethernet / serial communications, the FP7 can be installed in existing facilities.



**Communicating with up to 220 equipment units**

Communicate easily with many units, including automation control equipment such as PLCs and information equipment such as PCs.

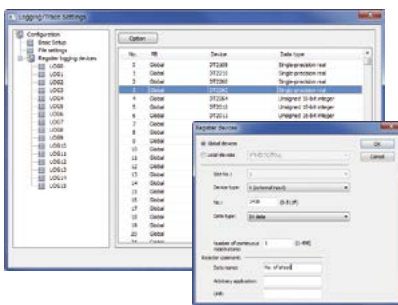


**LOGS COLLECTED INFORMATION**

The FP7 securely stores and carries out management of collected information assets

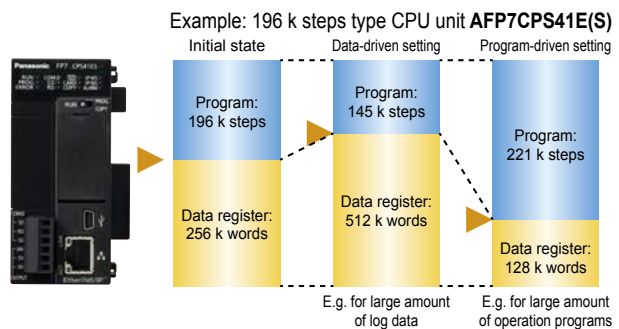
**Easy multiple concurrent logging**

Logging set up is done via the configuration screen. Moreover, it is possible to keep up to 16 files concurrently active.



• Various triggers: periodic, cycle, bit, startup, etc.

Use program and data register sharing to resolve data space shortage. No need repurchase expensive upgrade models.



**Protection of log data**

Diagnosis of rewrite life of SD memory card helps protect valuable information assets.

Note: Diagnosis possible when Panasonic industrial-spec SD memory cards are used.



**Reference value: for 196 k steps type CPU unit (Note)**

Program	234 k steps	221 k steps	196 k steps	145 k steps	52 k steps
Data register	64 k words	128 k words	256 k words	512 k words	976 k words

Note: For data register (DT), data up to 256 k words can be backed up.

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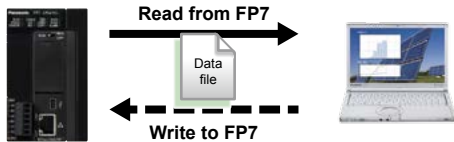
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**INFORMATION CAN BE TRANSFERRED TO DIFFERENT TYPES OF MEDIA**

**FP7 transmits information to PC, server or the cloud, etc.**

**Information can be transferred to different types of media**

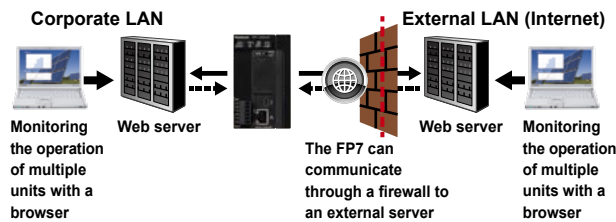
Allows the PC to read the logging data in the FP7's SD memory card and to write setting values and other parameters.



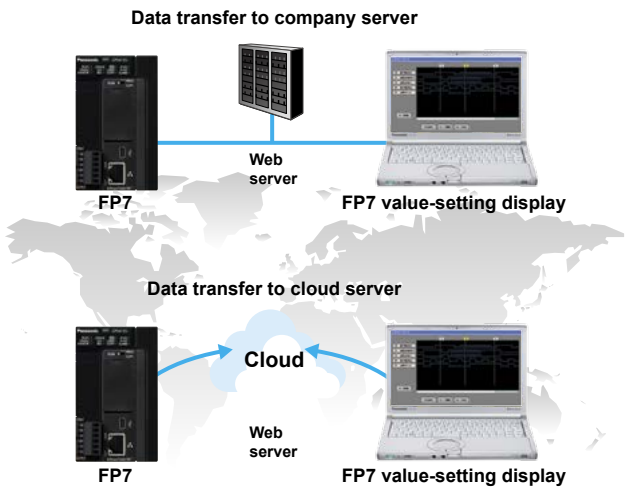
**Manage your records by summarizing measurement data from your sensors together with result information from the inspection machines.**

**HTTP(S) client function (SSL-compatible)**

Transfer data from the FP7 to a web server for easy viewing with a browser. Send and receive data from multiple FP7 units on a schedule controlled by the FP7. Communicate both inside the firewall on an intranet and outside the firewall to the wider world through the Internet.

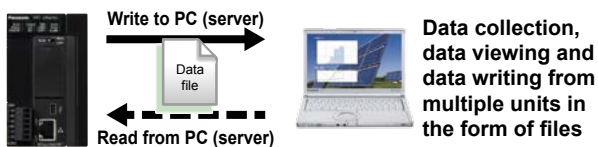


Allow users from around the world to access the current state of their equipment.



**FTP(S) client function (SSL-compatible)**

The FP7 can generate and write data files to an FTP server on a PC as well as read data files from the FTP server. The sessions use SSL, protecting IDs and passwords.



**Transfer electric power data from factories and offices to an FTP server on a regular basis.**

**CHECK INFORMATION AT YOUR FINGERTIPS**

**Data collected by the FP7 can be displayed in a web browser  
Via smartphone or PC, it's easy to check the current state of the work site**

**Web server function**

Monitor and control the **FP7** without the use of custom software. Users can check the accumulated data in the **FP7** with a browser.



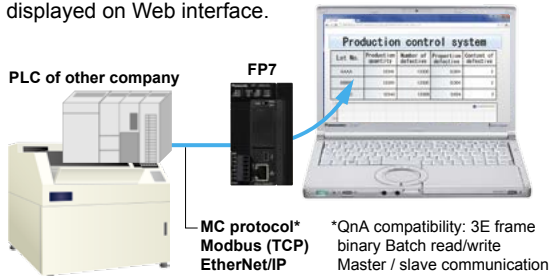
**1. Check out status of greenhouse / food processing**

With data always at hand, there's no need to go to the work site to check indoor temperature and humidity or the operation of pumps, heaters, and other equipment.



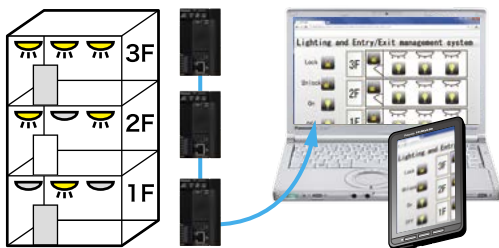
**2. Operational status and production log management for production line**

Operational status of the production line can be checked and traceability production control can be carried out. Current production line information can be collected and displayed on Web interface.



**3. Building lighting / entry and exit management**

Through a web interface, it is possible to check the status of lighting in buildings and apartments, and to building entries and exits.

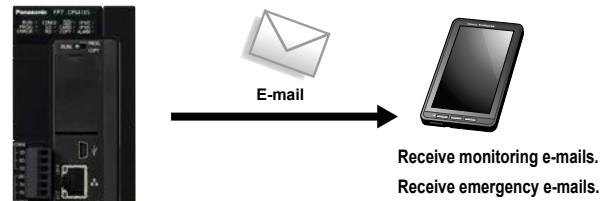


**Information updates viewable in e-mail.**

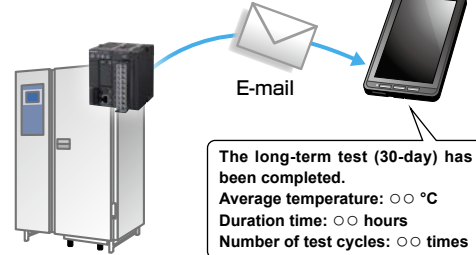
The managers can receive and view e-mailed malfunction notifications and daily reports of equipment operations.

**E-mail sending function (SSL-compatible)**

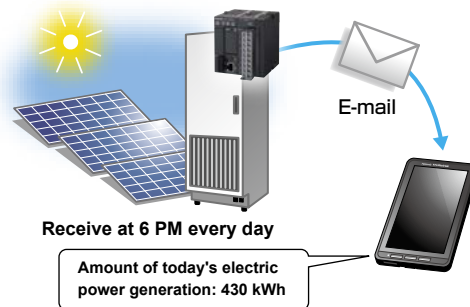
Use instructions and timings controlled by the **FP7** to send e-mails on a pre-set schedule or when a pre-set condition changes in the PLC. The e-mails can have data files attached and communication is SSL-capable to protect the e-mails.



**Send the results and a notice of completion when a long-term test is completed.**



**Receive a daily e-mail on your smartphone with the amount of electric power generated.**



For more information on web server function, please see this catalog.



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**MAINTENANCE**

**Historical archiving of program changes**

Operational events to CPU and program editing events are logged. Useful for debugging and tracing the cause of malfunctions

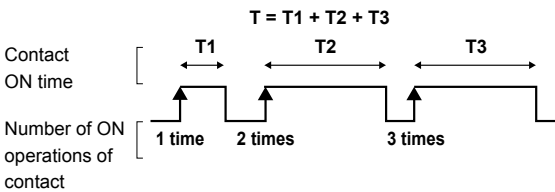
Date of occurrence	Time	Trigger
2014/11/21	14:05:35	Power: ON
2014/11/21	14:07:13	Open cover
2014/11/21	14:20:25	Insert SD memory card.
2014/11/21	14:30:19	Close cover
2014/11/21	14:31:00	Download program
2014/11/21	14:33:10	Switch operation mode to RUN
2014/11/21	14:35:12	Program edition during RUN
2014/11/21	14:35:32	Upload program
2014/11/21	14:40:07	Power: OFF

Note: Data logs are virtual.

**Set a maintenance schedule that is based on an automatic measurement of contact switching cycles or overall ON time**

Service intervals can be timed according to logged contact switching cycles, and power-on duration, thus enabling preventive maintenance of equipment and peripheral equipment.

- Input contacts (X):** Automatically measures and logs total ON times and number of ON operations of connected sensors.
- Output contacts (Y):** Automatically measures and logs total ON times and number of ON operations of connected actuators. The maintenance schedules for relays, motors, etc. can be optimized.

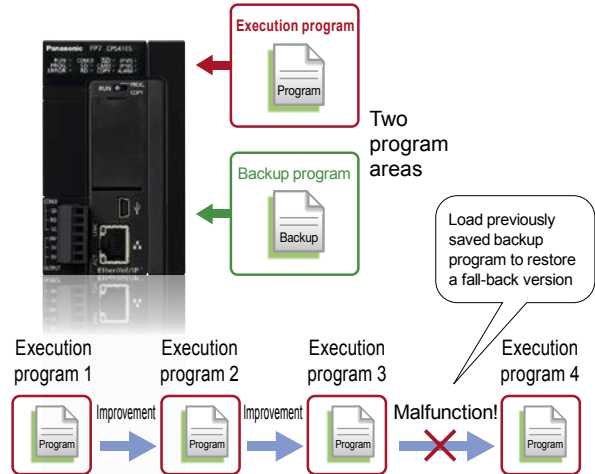


**Records the PLC's ON time**

Equipment operating time can be estimated. You can decide which equipment to give priority to reactivate if more than one item of equipment is idle.

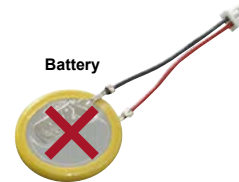
**The built-in program backup allows users to immediately recover factory default conditions**

The CPU unit can store two programs. In the event of fault, no SD memory card is needed to return to a previously saved backup program.



**No need to replace a battery by data back up function without battery**

Equipment maintenance tasks are reduced because battery is not required. And, to save power, equipment can be switched off without hesitation.



Item	Without battery	With battery
Program holding	Yes	Yes
Data register holding (Note 1)	Yes	Yes
Clock / calendar operation	No (Note 2)	Yes

Notes: 1) Data register (DT) of up to 256 k words can be backed up.  
 2) Clock / calendar operation can be held for about a week if the equipment is switched off. (Allow at least 30 minutes of equipment ON time.)

The built-in clock / calendar function can be adjusted via Ethernet. Adjustment at power start up allows the battery-free system to be configured.

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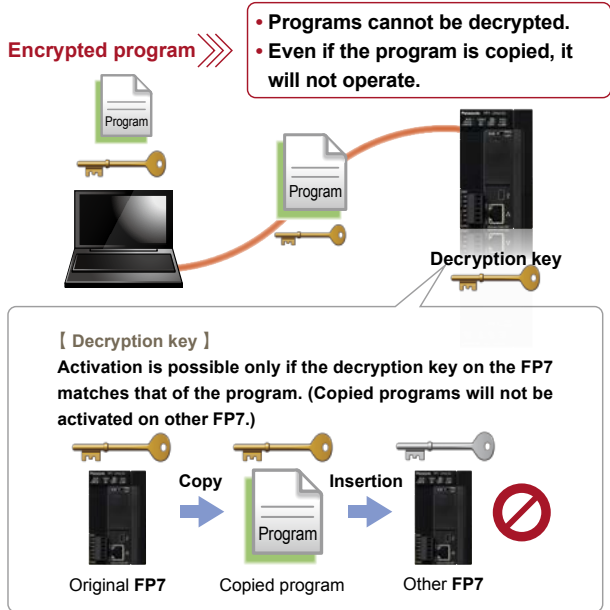
**SECURITY AND COMPACT DESIGN**

**Program level encryption ensures protection against copying program code**

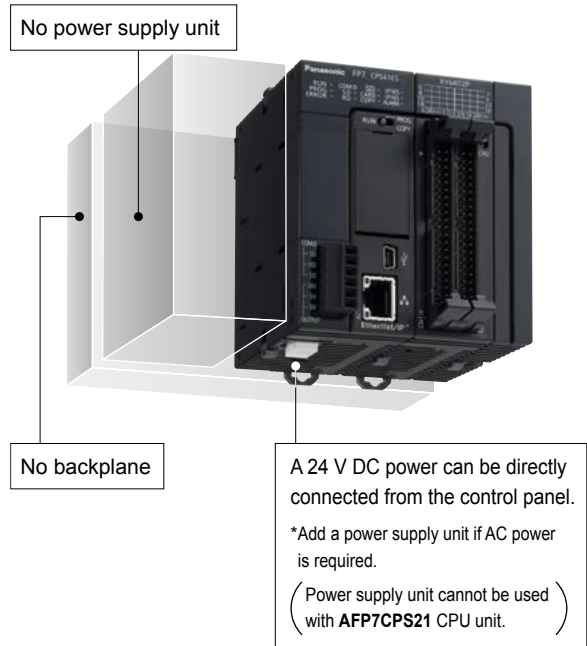
Security enhanced type

Any attempt to copy the installed equipment's program into a newly purchased FP7 will fail due to an unmatched decryption key, resulting in the equipment becoming inoperable.

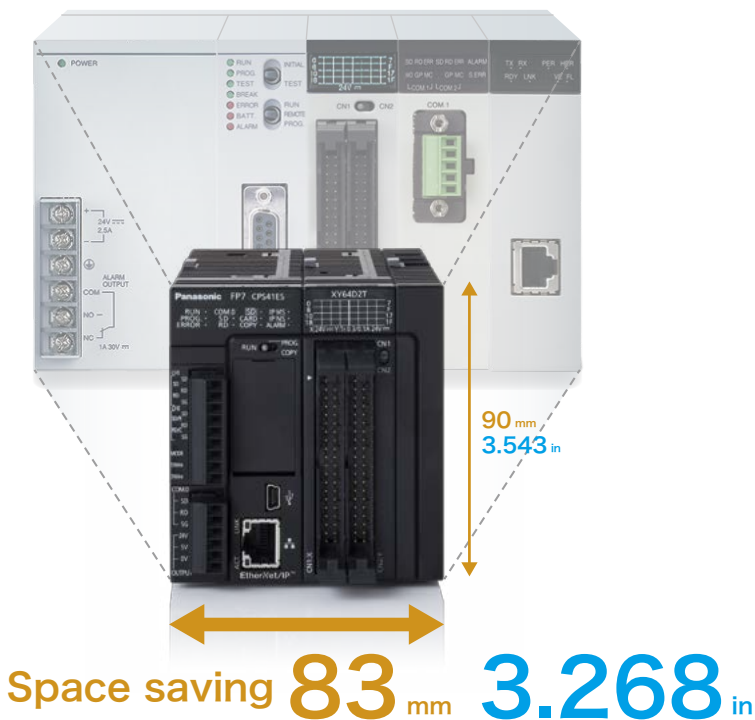
Note: When exporting to China, please use a CPU unit that does not have an encryption function.



**Without the requirement of a power supply unit or backplane, you can reduce the cost and footprint of your PLC configuration**



**A high performance PLC with a small footprint**



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### LINEUP

#### CPU units

##### Standard model



EtherNet/IP™  
**AFP7CPS41E**



EtherNet/IP™  
**AFP7CPS31E**



**AFP7CPS31**



**AFP7CPS21**

#### End unit



**AFP7END**

\*Included with CPU unit and Expansion slave unit

##### Standard model

##### Security enhanced type



EtherNet/IP™  
**AFP7CPS41ES**



EtherNet/IP™  
**AFP7CPS31ES**



**AFP7CPS31S**

#### Expansion units



Expansion master unit  
**AFP7EXPM**



Expansion slave unit  
**AFP7EXPS**

#### Power supply units



AC power supply unit  
**AFP7PSA1**



AC power supply unit (High-capacity type)  
**AFP7PSA2**

#### Add-on cassettes

##### Communication cassettes



RS-232C 1 channel  
**AFP7CCS1**



RS-232C 2 channels  
**AFP7CCS2**



RS-422 / RS-485 1 channel  
**AFP7CCM1**



RS-422 / RS-485 2 channels  
**AFP7CCM2**



RS-232C 1 channel and RS-485 1 channel  
**AFP7CCS1M1**

##### Function cassettes



Ethernet 1 channel  
**AFP7CCE1**



Analog input  
**AFP7FCAD2**



Analog input and output  
**AFP7FCA21**



Thermocouple input  
**AFP7FCTC2**

#### Serial communication unit



**AFP7NSC**  
\*Communication cassette is sold separately.  
\*Dedicated serial communication.

#### Digital input and output units

##### Input units



Terminal block 16 points, 12 to 24 V DC input  
**AFP7X16DW**



MIL connector 32 points, 24 V DC input  
**AFP7X32D2**



MIL connector 64 points, 24 V DC input  
**AFP7X64D2**

##### Output units



Terminal block 16 points, relay output  
**AFP7Y16R**



Terminal block 16 points, transistor output (sink)  
**AFP7Y16T**



MIL connector 32 points, transistor output (sink)  
**AFP7Y32T**



MIL connector 64 points, transistor output (sink)  
**AFP7Y64T**



Terminal block 16 points, transistor output (source)  
**AFP7Y16P**



MIL connector 32 points, transistor output (source)  
**AFP7Y32P**



MIL connector 64 points, transistor output (source)  
**AFP7Y64P**

##### Input and output units



MIL connector 32 points, 24 V DC input and 32 points, transistor output (sink)  
**AFP7XY64D2T**



MIL connector 32 points, 24 V DC input and 32 points, transistor output (source)  
**AFP7XY64D2P**

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<p><b>Analog input and output units</b></p>	 High-speed and high-accuracy type, 4 points, voltage and current <b>AFP7AD4H</b>	 High-speed and multi-channel type, 8 points, voltage and current <b>AFP7AD8</b>	<p><b>Temperature input units</b></p>	 Thermocouple input and analog input <b>AFP7TC8</b>		
<p>Input units</p>			<p>Thermocouple multiple analog input unit</p>			
<p>Output unit</p>	 High-speed and high-accuracy type, 4 points, voltage and current <b>AFP7DA4H</b>				<p>Resistance temperature detector input unit</p>	 Resistance temperature detector input <b>AFP7RTD8</b>
<p><b>Multi input and output units</b></p>	 Input: 16 points (DC / Counter etc.) Output: 16 points (Transistor / PWM etc.) <b>AFP7MXY32DWD</b>					
		 Positioning type Input: 16 points (DC / Counter etc.) Output: 16 points (Transistor / Positioning etc.) <b>AFP7MXY32DWDH</b>	<p><b>High-speed counter units</b></p>	 2 channels 16 MHz (for 2-phase, 4-multiple) 4 MHz (for individual input) <b>AFP7HSC2T</b>		
						 4 channels 16 MHz (for 2-phase, 4-multiple) 4 MHz (for individual input) <b>AFP7HSC4T</b>
<p><b>Positioning units</b></p>	 Transistor output 2 axes 500 kpps <b>AFP7PP02T</b>	 Transistor output 4 axes 500 kpps <b>AFP7PP04T</b>	 Line driver output 2 axes 4 Mpps <b>AFP7PP02L</b>	 Line driver output 4 axes 4 Mpps <b>AFP7PP04L</b>		
<p>Pulse train</p>						
<p><b>Pulse output units</b></p>	 Transistor output 2 axes 500 kpps <b>AFP7PG02T</b>	 Transistor output 4 axes 500 kpps <b>AFP7PG04T</b>	 Line driver output 2 axes 4 Mpps <b>AFP7PG02L</b>	 Line driver output 4 axes 4 Mpps <b>AFP7PG04L</b>		
<p><b>Motion control units</b></p>	 Real axis 16 axes Virtual axis 8 axes <b>AFP7MC16EC</b>	 Real axis 32 axes Virtual axis 16 axes <b>AFP7MC32EC</b>	 Real axis 64 axes Virtual axis 32 axes <b>AFP7MC64EC</b>			
<p><b>PHLS (remote I/O) units</b></p>	 <b>AFP7PHLSM</b>					
<p>PHLS master unit</p>						
<p><b>PHLS slave units</b></p>	 Compact type (e-CON) 8 points, 24 V DC input <b>AFPRP2X08D2E</b>	 Compact type (Connector-type terminal block) 16 points, 24 V DC input <b>AFPRP2X16D2</b>	 Standard type (Screw-type terminal block) 8 points, 24 V DC input <b>AFPRP1X08D2</b>	 Standard type (Screw-type terminal block) 16 points, 24 V DC input <b>AFPRP1X16D2</b>		
<p>Input type</p>						
<p><b>PHLS slave units</b></p>	 Compact type (Connector-type terminal block) 16 points, transistor output (sink) <b>AFPRP2Y16T</b>	 Compact type (Connector-type terminal block) 4 points, relay output <b>AFPRP2Y04R</b>	 Standard type (Screw-type terminal block) 16 points, transistor output (sink) <b>AFPRP1Y16T</b>			
<p>Output type</p>						
<p><b>PHLS slave units</b></p>	 Compact type (Connector-type terminal block) 8 points, 24 V DC input 8 points, transistor output (sink) <b>AFPRP2XY16D2T</b>	 Standard type (Screw-type terminal block) 8 points, 24 V DC input 8 points, transistor output (sink) <b>AFPRP1XY16D2T</b>				
<p>Input and output types</p>						

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- Software
- Program Transfer
- Others
- FP7**
- FP-X0**
- FP0R**
- FPΣ**
- FP-X**
- FP2SH**
- FP-e**

**CPU UNITS**



**Compact design and class-leading high performance**

**The function is expanded easily with cassette interface**

The function extension is possible without increasing the width of the unit. The cassettes support RS-232C, RS-422 and RS-485 for series communication, Ethernet communication and various analog input and output.

**High-capacity SD (SDHC) memory cards of up to 32 GB are supported**

Enables large storage for log data  
\*except for **AFP7CPS21**

**High performance**

Scan times of 20 μs or less and minimum execution times of 1 ms at 60 k steps. System is designed so that frequent Ethernet communication has almost no effect on processing speed.

**All communications ports are safely isolated**

Confidently use any port - RS-422 / RS-485 and LAN ports, as well as USB and RS-232C ports - each is isolated.

**High function types, increased security (encryption), are available**

Note: When exporting to China, please use a CPU unit that does not have an encryption function.

**SPECIFICATIONS**

**Control specifications**

Item		AFP7CPS41E(S) (Note 1)				
Memory capacity	Memory selection pattern (Note 2)	1	2	3 (Factory default)	4	5
	Program (steps) (Note 3)	234,000	221,500	196,000	144,500	51,500
	Data register (words) (Note 3)	65,536	131,072	262,144	524,288	999,424
	Number of max. program block (PB)	468	443	392	289	103

Item		AFP7CPS31E(S) / AFP7CPS31(S) (Note 1)			
Memory capacity	Memory selection pattern (Note 2)	1 (Factory default)	2	3	4
	Program (steps) (Note 3)	121,500	96,000	64,000	32,000
	Data register (words) (Note 3)	131,072	262,144	425,984	589,824
	Number of max. program block (PB)	243	192	128	64

Item		AFP7CPS21	
Memory capacity	Memory selection pattern (Note 2)	1 (Factory default)	2
	Program (steps) (Note 3)	64,000	32,000
	Data register (words) (Note 3)	131,072	262,144
	Number of max. program block (PB)	128	64

- Notes: 1) Products with an "S" at the end of a part number have the encryption function.  
 2) The factory default setting is pattern 3 for **AFP7CPS41E(S)** and pattern 1 for **AFP7CPS31E(S)**, **AFP7CPS31(S)** and **AFP7CPS21**.  
 3) For data register (DT), data up to 262,144 words can be backed up.

Item (Note 1)	AFP7CPS41E(S) / AFP7CPS31E(S) / AFP7CPS31(S) / AFP7CPS21
CE marking directive compliance	EMC Directive, RoHS Directive
Programming method	Relay symbol method
Control method	Cyclic operation method
Program memory	Built-in flash ROM (no backup battery required)
Operation speed	Basic instruction: Min. 11 ns/step ( <b>AFP7CPS21</b> : 14 ns/step)
External input (X) / output (Y)	8,192 points (Note 2) / 8,192 points (Note 2)
Internal relays (R)	32,768 points
System relays (SR)	Indicate operation status of various relays is shown.
Link relays (L)	16,384 points
Timers (T)	4,096 points: Timer capable of counting (units: 10 μs, 1 ms, 10 ms, 100 ms or 1 sec.) × 4,294,967,295
Counters (C)	1,024 points, Counter capable of counting 1 to 4,294,967,295
Link data registers (LD)	16,384 words
System data registers (SD)	Internal operation status of various registers is shown.
Index registers (I0 to IE)	15 long words / With switching function
Master control relay (MCR)	Unlimited
Number of labels (LOOP)	Max. 65,535 points for each program block (PB)
Differential points	Unlimited
Number of step ladders	Unlimited
Number of subroutines	Max. 65,535 points for each program block (PB)
Number of interrupt programs	1 periodical interrupt program
SD memory card function	SDHC memory cards of up to 32 GB are usable. *except for <b>AFP7CPS21</b>
Constant scan	Available (0 to 125 ms)
Clock / calendar (Note 3)	Year (last two digits), month, day, hours (24-hour display) minutes, seconds, day of week
Battery life	3.3 years or more (at +25 °C +77 °F) (when no power is supplied) *except for <b>AFP7CPS21</b>
Security function (Note 4)	Password / Restricted distribution / Read disable setting / Encryption
PLC link function	Max. 16 units, link relays: 1,024 points, link registers: 128 words. (Data transfer and remote programming are not supported) (Link area allocation is switchable between the first and the second half)

- Notes: 1) Products with an "S" at the end of a part number have the encryption function.  
 2) Hardware configuration governs the actually usable number of I/O points. When I/O points are not actually used, usable as internal relays.  
 3) Precision of calendar: At 0 °C +32 °F, 95 sec. or less error per month, at +25 °C +77 °F, 15 sec. or less error per month, at +55 °C +131 °F, 130 sec. or less error per month.  
 4) Encryption can be used for **AFP7CPS41ES**, **AFP7CPS31ES** and **AFP7CPS31S**.

**SPECIFICATIONS**

**COM port communication specifications**

Item	Specifications
Interface	RS-232C, three-wire system, 1 channel (Note)
Transmission distance	15 m <b>49.213 ft</b>
Transmission speed	300, 600, 1,200, 2,400, 4,800, 9,600, 19,200, 38,400, 57,600, 115,200, 230,400 bits/sec.
Communication method / Synchronous method	Half-duplex system / Start-stop synchronization system
Transmission format	Stop bit: 1 bit / 2 bits
	Parity: none / odd / even
	Data length: 7 bits / 8 bits
	Start code: with STX / without STX
	End code: CR / CR + LF / none / ETX
Data transmission order	Transmit from bit 0 in character units.
Communication mode	General-purpose communication, Computer link and MODBUS-RTU

Note: SD, RD and SG terminals are isolated from internal circuits.

**Dedicated power supply output port specifications for GT series programmable display**

Output terminal (Note 1)	Connecting programmable display model
5 V	For 5 V DC type <b>GT</b> series Programmable Display
24 V (Note 2)	For 24 V DC type <b>GT</b> series Programmable Display

Notes: 1) 5 V and 24 V DC types are not usable at the same time.  
 2) Use 21.6 to 26.4 V DC to power the CPU unit.  
 Please confirm the "GT Series Manual" for grounding of the **GT** series programmable display.  
 The **AFP7CPS21** is not provided with this port.

**LAN port communication specifications**  
 [except for **AFP7CPS31(S)** / **AFP7CPS21**]

Item	Specifications
Communication interface	Ethernet 100BASE-TX / 10BASE-T
Baud rate	100 Mbps, 10 Mbps auto negotiation function
Total cable length	100 m <b>328 ft</b> (500 m <b>1,640 ft</b> when a repeater is used)
Number of nodes	Max. 254 units
Number of simultaneous connections	Max. 220 connections (user connection: 216, system connection: 4)
Communication protocol (Communication layer)	TCP/IP, UDP
DNS	Supports name servers
DHCP / DHCPV6	Automatic IP address acquisition
FTP server / Client (SSL compatible)	Server function: file transfer, number of user: 3 Client function: data and file transfer
HTTP server / Client (SSL compatible)	Server function: system web, customer web (8 MB), number of concurrent session: 16 Client function: data transfer
SMTP client (SSL compatible)	Client function: mail transfer
SNTP	Time adjustment function
General-purpose communication	16 kB / 1 connection (user connection: 1 to 16)
Dedicated communication	Slave communication (MEWTOCOL-COM, MEWTOCOL7-COM, MEWTOCOL-DAT, MODBUS-TCP, MC protocol (Note))
	Master communication (MEWTOCOL-COM, MEWTOCOL-DAT, MODBUS-TCP, MC protocol (Note))

Note: MC protocol is a short form denoting MELSEC communication protocol; MELSEC is a registered trademark of Mitsubishi Electric Corporation.  
 QnA compatible 3E frame, only binary (bulk writing and bulk reading) use is available.

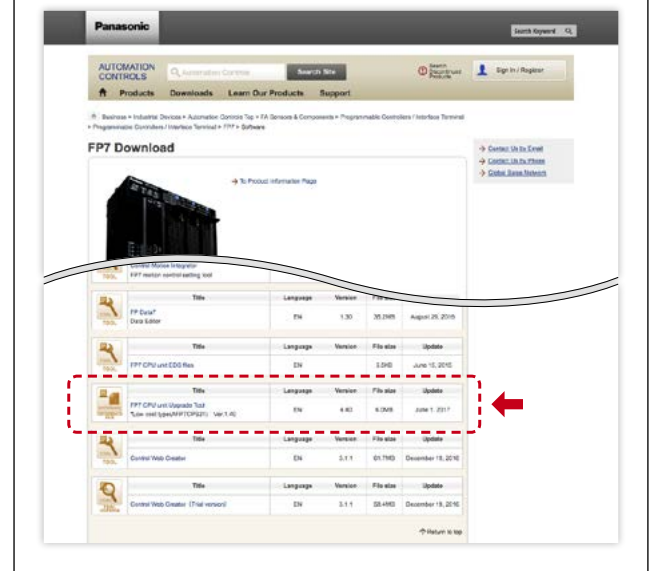
**Web server specifications**

Item	Specifications
Compatible CPU unit	Ver. 3.30 or later CPU unit with built-in Ethernet function
Web server	Number of simultaneous accesses: 16 sessions System Web: system monitor function Custom Web: 13.83 MB max. content capacity
<b>Control Web Creator</b> compatible OS	Windows® 7 or higher
Web server accessible browsers	Windows® Google Chrome Mozilla Firefox Opera Internet Explorer
	OS X Safari Google Chrome Mozilla Firefox
iOS	Safari Google Chrome
	Android Google Chrome

Notes: 1) Windows and Internet Explorer are registered trademarks or trademarks of Microsoft Corporation in the United States and other countries.  
 Google Chrome and Android are registered trademarks of Google Inc.  
 Safari and OS X are trademarks or registered trademarks of Apple Inc. in the United States.  
 iOS is a trademark or registered trademark of Cisco Systems, Inc. in the United States and other countries.  
 Firefox is a registered trademark of Mozilla Foundation in the United States and other countries.  
 Opera is a trademark or registered trademark of Opera Software ASA.  
 2) Please use the latest OS and browser versions.  
 Latest browser versions may not work with older models.

**Firmware can be updated to latest version!**

Update tool for latest firmware version is available on our website. Web server function can be added to CPU units listed above with built-in Ethernet function.



FIBER SENSORS

LASER SENSORS

PHOTO-ELECTRIC SENSORS

MICRO PHOTO-ELECTRIC SENSORS

AREA SENSORS

SAFETY LIGHT CURTAINS / SAFETY COMPONENTS

PRESSURE / FLOW SENSORS

INDUCTIVE PROXIMITY SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS

SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS

MEASUREMENT SENSORS

STATIC CONTROL DEVICES

LASER MARKERS

PLC

HUMAN MACHINE INTERFACES

ENERGY MANAGEMENT SOLUTIONS

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

Applications

PLC

Software

Program Transfer

Others

**FP7**

**FP-X0**

**FP0R**

**FPΣ**

**FP-X**

**FP2SH**

**FP-e**

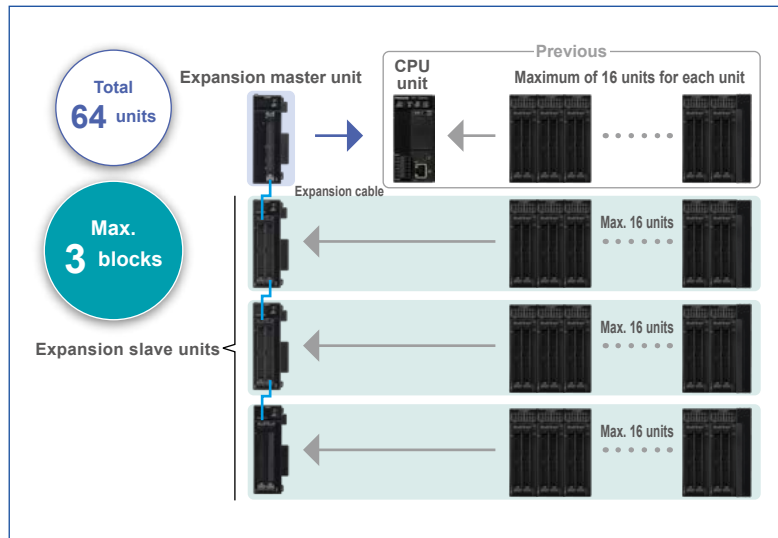
- FIBER SENSORS
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### EXPANSION UNITS



### Connect a maximum of 3 blocks and a total of 64 units

Three blocks can be expanded on one CPU unit.



### SPECIFICATIONS

Product name		Expansion master unit	Expansion slave unit
Item	Part No.	AFP7EXPM	AFP7EXPS
CE marking directive compliance		EMC Directive, RoHS Directive	
Number of expansion	Block	Max. 3 blocks (total 4 blocks)	
	Unit	Max. 48 units (total 64 units)	
Transmission distance	Distance between blocks	Length of expansion cable (0.5 m <b>1.640 ft</b> , 1 m <b>3.281 ft</b> , 3 m <b>9.843 ft</b> and 10 m <b>32.808 ft</b> )	
	Total extension	Max. 30 m <b>98.425 ft</b> (Expansion cable × 3 expansions) (Note 1)	
Current consumption (Note 2)		120 mA or less	100 mA or less
Max. allowable current		—	3.0 A (at 24 V DC power supply terminal)
Expansion bus connector		MIL 40 pins	MIL 40 pins × 2
Accessories		—	Power supply cable (Part No.: <b>AFPG805</b> ) End unit (Part No.: <b>AFP7END</b> )

- Notes: 1) Can support a maximum of 100 m **328 ft** length between blocks. Please inquire with us for details.  
 2) Differs depending on power supply voltage and number of expansion units.  
 3) You cannot use the expansion units with the **AFP7CPS21** CPU unit.

**ADD-ON CASSETTES (COMMUNICATION CASSETTES)**



**For communication with programmable displays or PCs and for data exchange between PLCs**

**Serial communication and Ethernet communication can be added to the CPU unit**

6 types are available including cassettes that support any combination of RS-232C, RS-422, RS-485 and Ethernet.

[Configuration example]



\* Ethernet function (including FTP server / client function, HTTP client function, Web server function and E-mail sending function) cannot be used in the **AFP7CCET1**.

**Protocol supports MODBUS-RTU**

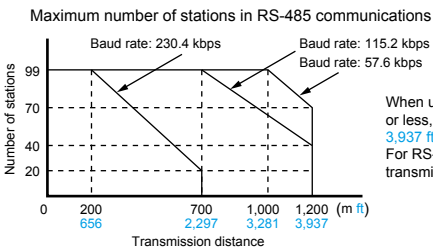
Communication can easily be accomplished using comfortable communication instructions.

Note: The **AFP7CCET1** supports MODBUS-RTU as well, and does not support MODBUS-TCP.

**SPECIFICATIONS**

Item	AFP7CCS1	AFP7CCS2 (Note 7)	AFP7CCM1 (Note 6)	AFP7CCM2 (Note 6)	AFP7CCS1M1
CE marking directive compliance	EMC Directive, RoHS Directive				
Interface	RS-232C 1 channel	RS-232C 2 channels	RS-422 or RS-485 1 channel	RS-422 or RS-485 2 channels	RS-232C 1 channel and RS-485 1 channel
Transmission distance	Max. 15 m <b>49.213 ft</b> (Note 2)		Max. 1,200 m <b>3,937 ft</b> at RS-485 mode (Note 3, 4) Max. 400 m <b>1,312 ft</b> at RS-422 mode (Note 3, 4)		Max. 15 m <b>49.213 ft</b> (RS-232C) (Note 2) Max. 1,200 m <b>3,937 ft</b> (RS-485) (Note 3, 4)
Transmission speed	300, 600, 1,200, 2,400, 4,800, 9,600, 19,200, 38,400, 57,600, 115,200, 230,400 bits/sec.				
Communication method	Half-duplex				
Synchronous method	Start-stop synchronization				
Transmission format	Stop bit: 1 bit / 2 bits				
	Parity: none / odd / even				
	Data length: 7 bits / 8 bits				
	Start code: with STX / without STX				
Data transmission order	End code: CR / CR + LF / none / ETX				
	Transmit from bit 0 in character units.				
Max. number of stations (Note 2, 3, 4)	_____		For program controlled communication: max. 99 (Note 8)		For program controlled communication: max. 99
	_____		For computer link: max. 99 (Note 8)		For computer link: max. 99
	_____		For PLC link: max. 16 (Note 8)		For PLC link: max. 16
	_____		For MODBUS-RTU: max. 99 (Note 8)		For MODBUS-RTU: max. 99

Notes: 1) When connecting a commercially available device that has an RS-485 / RS-422 interface, please confirm operation using the actual device. In some cases, the number of station units, transmission distance and communication speed vary depending on the connected device.



When using a transmission speed of 38.4 kbits/sec. or less, you can set up a maximum of 1,200 m **3,937 ft** and 99 units. For RS-422 setting, you can set up a maximum transmission distance of 400 m **1,312 ft**.

- Cable length should be no longer than 3 m **9.843 ft** if communicating at a rate of 38.4 kbits/sec. or higher. If you are using RS-232C wiring, shielded cable should be used to improve noise immunity.
- For RS-485 setting, the values for transmission distance, transmission speed and number of connected units should be within the values noted in the left graph.
- If mixed C-NET adapters are used, up to 32 units can be connected, but transmission speed will be limited to a maximum of 19.2 kbits/sec.
- The converter SI-35 manufactured by LINE EYE Co., Ltd. is recommendable for the RS-485 at the computer side. When you use the SI-35, please adjust time after **FP7** series PLC receives a command until it returns a response by a program.
- RS-422 or RS-485 can be selected using the DIP switch built into the communication cassette.
- Using the DIP switch built into the communication cassette allows the interface to be used as RS-232C 5-wire system × 1 channel.
- 1:1 for RS-422 interface

Item	AFP7CCET1
CE marking directive compliance	EMC Directive, RoHS Directive
Interface	Ethernet 100BASE-TX / 10BASE-TX
Communication speed	100 Mbps, 10 Mbps Auto negotiation function
Total cable length	100 m <b>328 ft</b> (500 m <b>1,640 ft</b> when a repeater is used)
Number of nodes	Max. 254 units
Number of simultaneous connections	Max. 4 connections (User connection: 3, System connection: 1)
Communication protocol (Communication layer)	TCP / IP, UDP
DHCP	Automatic IP address acquisition
General-purpose communication	4 kB / 1 connection
Dedicated communication	Slave communication (MEWTOCOL-COM, MEWTOCOL7-COM, MEWTOCOL-DAT)
	Master communication (MEWTOCOL-COM, MEWTOCOL7-COM, MEWTOCOL-DAT)

Notes: 1) Please connect the Ethernet cable with the power turned off.  
2) You cannot use this cassette "**AFP7CCET1**" with the serial communication unit.  
3) Ethernet function (including FTP server / client function, HTTP client function, Web server function and E-mail sending function) cannot be used.

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**ADD-ON CASSETTES (FUNCTION CASSETTES)**



**Add Analog I/O, temperature input function**

Analog I/O and temperature input functions can be added to the CPU unit

Low cost expansion of the CPU unit with an analog function is easy and installation space can be reduced.



**Analog cassette**

- Analog input (2 channels)
- Analog input and output (input: 2 channels, output: 1 channel)
- Thermocouple (2 channels)

**Low cost addition of functions**

Reduced cost and space are realized compared to the analog input and output unit.

**SPECIFICATIONS**

**Analog input cassette / Analog input and output cassette**

**Input specifications (AFP7FCAD2 / AFP7FCA21)**

Item	AFP7FCAD2 / AFP7FCA21	
CE marking directive compliance	EMC Directive, RoHS Directive	
Number of input points	2 channels (non-insulated between channels)	
Input range	Voltage	0 to 10 V / 0 to 5 V *Switch setting (individual settings possible)
	Current	0 to 20 mA
Digital conversion value	K0 to K4000	
Resolution	1/4000 (12 bits)	
Conversion speed	1 ms/channel	
Overall precision	±1 % F.S. or less (0 to +55 °C +32 to +131 °F)	
Input impedance	Voltage	1 MΩ
	Current	250 Ω
Absolute maximum input	Voltage	-0.5 V, +15 V
	Current	30 mA
Insulation method	<ul style="list-style-type: none"> <li>• Between analog input terminal and internal digital circuit: transformer insulation, isolation IC insulation</li> <li>• Between analog input terminal and analog output terminal: transformer insulation, isolation IC insulation</li> </ul>	
Connection method	Connector type terminal block	

Note: Input specifications of the analog I/O cassette and analog input cassette are the same.

**Analog input and output cassette**

**Output specifications (AFP7FCA21)**

Item	AFP7FCA21	
CE marking directive compliance	EMC Directive, RoHS Directive	
Number of output points	1 channel	
Output range	Voltage	0 to 10 V / 0 to 5 V *Switch setting
	Current	0 to 20 mA
Digital conversion value	K0 to K4000	
Resolution	1/4000 (12 bits)	
Conversion speed	1 ms/channel	
Overall precision	±1 % F.S. or less (0 to +55 °C +32 to +131 °F)	
Output impedance	0.5 Ω (voltage output)	
Max. output current	10 mA (voltage output)	
Absolute output load resistance	600 Ω or less (current output)	
Insulation method	<ul style="list-style-type: none"> <li>• Between analog input terminal and internal digital circuit: transformer insulation, isolation IC insulation</li> <li>• Between analog input terminal and analog output terminal: transformer insulation, isolation IC insulation</li> </ul>	
Connection method	Connector type terminal block	

Note: There is no analog output functionality in the analog input cassette.

**Thermocouple cassette**

**Specifications (AFP7FCTC2)**

Item	AFP7FCTC2	
CE marking directive compliance	EMC Directive, RoHS Directive	
Number of input points	2 channels (insulated between channels)	
Input range (Note)	K type thermocouple	-50.0 to 500.0 °C -58.0 to 932.0 °F
	J type thermocouple	-50.0 to 500.0 °C -58.0 to 932.0 °F
Digital conversion value	Normal time	K-500 to K5000
	When range over	K-501, K5001 or K8000
	When the thermocouple broken	K8000
	When data preparation	K8001
Resolution	0.2 °C (Display is 0.1 °C with the software averaging process.)	
Sampling cycle	100 ms / 2 channels	
Overall precision	±0.5 % F.S. or less and cold contact accuracy: 1.5 °C (0 to +55 °C +32 to +131 °F)	
Input impedance	344 kΩ	
Insulation method	<ul style="list-style-type: none"> <li>• Between thermocouple input terminal and internal digital circuit: transformer insulation, isolation IC insulation</li> <li>• Between thermocouples: transformer insulation, isolation IC insulation</li> </ul>	
Connection method	Connector type terminal block	

Note: Thermocouple setting can be switched with the switch on the front of the cassette.

- PLC
- HUMAN MACHINE INTERFACES
- ENERGY MANAGEMENT SOLUTIONS
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**DIGITAL INPUT AND OUTPUT UNITS**



**I/O points can be added as necessary**

**Input/output mixed units are available**

The necessary I/O points can be efficiently obtained, resulting in a compact PLC at reduced cost.

**The 64 points transistor output unit is designed for 300 mA current capacity**

The 64 points transistor output unit is equipped with 8 contact points with 300 mA current capacity. Large indicator lamps, magnetic contacts, etc. can be driven directly.



**The noise countermeasure is possible by an adjustment of the input time constants**

Response time can be selected from 0.1 ms, 0.5 ms, 1 ms, 5 ms, 10 ms, 20 ms or 70 ms, depending on the output equipment to be used.



**SPECIFICATIONS**

**Input specifications**

Item	DC input units			I/O mixed unit (input side)	
	16 points type	32 points type	64 points type	DC input / sink type	DC input / source type
Insulation method	Photocoupler				
Rated input voltage	12 to 24 V DC	24 V DC		24 V DC	
Rated input current	6 mA approx. (at 24 V)	2.7 mA		2.7 mA	3.4 mA
Impedance	3.6 kΩ	8.2 kΩ		8.2 kΩ	7.5 kΩ
Min. ON voltage / Min. ON current	9.6 V / 2 mA	19.2 V / 2.5 mA		19.2 V / 2.5 mA	
Max. OFF voltage / Max. OFF current	2.5 V / 1 mA	5 V / 1.5 mA		5 V / 1.5 mA	
Response time	OFF→ON	0.2 ms or less (Note 1)		0.2 ms or less (Note 1)	
	ON→OFF	0.2 ms or less (Note 1)		0.2 ms or less (Note 1)	
Input points per common	8 points/common	32 points/common		32 points/common	
Connection method	Terminal block (M3 terminal screws)	Connector (MIL-compliant 40 pins)	Connector (MIL-compliant 40 pins, two use)	Connector (MIL-compliant 40 pins)	

Notes: 1) Changeable by settable input time constant    2) CE marking directive compliance; EMC Directive, RoHS Directive

**Output specifications**

Item	Relay output unit	Transistor output units				I/O mixed unit (output side)	
	16 points type	16 points (NPN)	32 points (NPN)	64 points (NPN)	16 points (PNP)	32 points (NPN)	
Insulation method	Relay	Photocoupler					
Nominal switching capacity	2 A 250 V AC / 2 A 30 V DC	—	—	—	—	—	
Min. load	1 mA 100 mV DC (resistive load)	—	—	—	—	—	
Output type	—	Open collector					
Rated load voltage	—	5 to 24 V DC					
Operating load voltage range	—	4.75 to 26.4 V DC					
Max. load current	0.3 A (Y0 to Y7)	1 A	0.3 A (26.4 to 20.4 V DC) 30 mA (4.75 V DC)	0.3 A (20.4 to 26.4 V DC) 30 mA (4.75 V DC)	1 A	0.3 A (20.4 to 26.4 V DC) 30 mA (4.75 V DC)	
	0.1 A (other than that above)						0.1 A (20.4 to 26.4 V DC) 15 mA (4.75 V DC)
Common restriction	5 A	5 A	3.2 A/common		5 A	3.2 A/common	
Max. surge current	—	3 A	—	0.6 A	3 A	0.6 A	
OFF state leakage current	—	1 μA or less				1 μA or less	
ON state voltage drop	—	0.5 V or less				0.5 V or less	
Response time	OFF→ON	10 ms approx.	0.05 ms or less (at load current 0.5 mA or more)	0.1 ms or less (at load current 1 mA or more)	0.1 ms or less (at load current 2 mA or more)	0.05 ms or less (at load current 0.5 mA or more)	0.1 ms or less (at load current 2 mA or more)
	ON→OFF	8 ms approx.	0.3 ms or less (at load current 0.5 mA or more)	0.3 ms or less (at load current 1 mA or more)	0.3 ms or less (at load current 1 mA or more)	0.3 ms or less (at load current 0.5 mA or more)	0.3 ms or less (at load current 2 mA or more)
Life time	Mechanical life	2 × 10 <sup>7</sup> operations or more	—	—	—	—	—
	Electrical life	1 × 10 <sup>5</sup> operations or more	—	—	—	—	—
External power supply	Voltage	4.75 to 26.4 V DC				4.75 to 26.4 V DC	
	Current (at 24 V)	—	70 mA	110 mA	70 mA/common	70 mA	70 mA
Surge absorber	Snubber circuit (leakage current: 0.2 mA or less)	Zener diode				Zener diode	
Short circuit protection	—	—					
Output points per common	16 points/common	16 points/common	32 points/common		16 points/common	32 points/common	
External connection method	Terminal block (M3 terminal screws)	Terminal block (M3 terminal screws)	Connector (MIL-compliant 40 pins)	Connector (MIL-compliant 40 pins, two use)	Terminal block (M3 terminal screws)	Connector (MIL-compliant 40 pins)	

Note: CE marking directive compliance; EMC Directive, RoHS Directive (Only **AFP7Y16R** complies with Low Voltage Directive)

- FIBER SENSORS
- LASER SENSORS
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- MICRO PHOTO-ELECTRIC SENSORS
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- UV CURING SYSTEMS
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- Others
- FP7**
- FP-X0**
- FP0R**
- FPΣ**
- FP-X**
- FP2SH**
- FP-e**

## SPECIFICATIONS

### Output specifications

Item	Transistor output units			I/O mixed unit (output side)
	Source type (PNP open collector)			
	32 points type	64 points type	32 points type	
Insulation method	Photocoupler			
Output type	Open collector			
Rated load voltage	5 to 24 V DC			
Load voltage allowable range	4.75 to 26.4 V DC			
Max. load current	0.3 A (Y0 to Y7)	0.3 A (26.4 to 20.4 V DC)	0.3 A (20.4 to 26.4 V DC)	30 mA (4.75 V DC)
	0.1 A (other than that above)	30 mA (4.75 V DC)	0.1 A (20.4 to 26.4 V DC)	15 mA (4.75 V DC)
Common restriction	3.2 A/common			
Max. surge current	0.6 A			
OFF state leakage current	1 μA or less			

Item	Transistor output units			I/O mixed unit (output side)
	Source type (PNP open collector)			
	32 points type	64 points type	32 points type	
ON state maximum voltage drop	0.5 V or less			
Repose time	OFF→ON	0.1 ms or less (at load current 2 mA or more)		
	ON→OFF	0.5 ms or less (at load current 2 mA or more)		
External power supply	Voltage	4.75 to 26.4 V DC		
	Current (at 24 V)	130 mA	90 mA/common	90 mA
Surge absorber	Zener diode			
Short circuit protection				
Output points per common	32 points/common			
Operating mode indicator	32 points LED display (lights when ON)	32 points LED display (lights when ON, selectable by switch)		
	External connection method	Connector (MIL-compliant 40 pins)	Connector (MIL-compliant 40 pins, two use)	Connector (MIL-compliant 40 pins, one use)

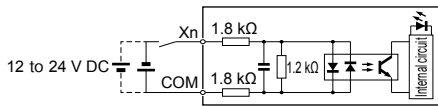
Note: CE marking directive compliance; EMC Directive, RoHS Directive

## I/O CIRCUIT DIAGRAMS

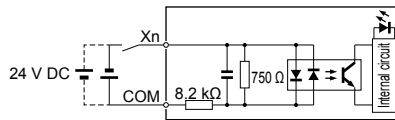
### DC input unit

#### Input circuit diagrams

[16 points]

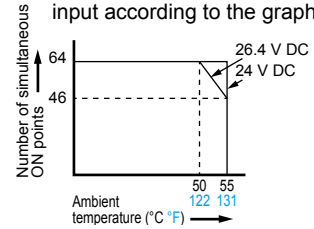


[32 points / 64 points]



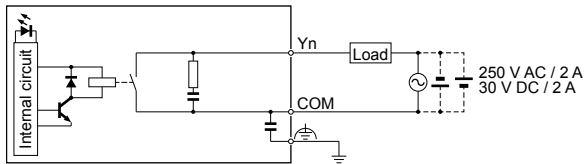
■ Limitations on simultaneous ON points [64 points]

Reduce simultaneous ON points of input according to the graph below.

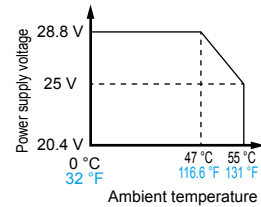


### Relay output unit

#### Output circuit diagram



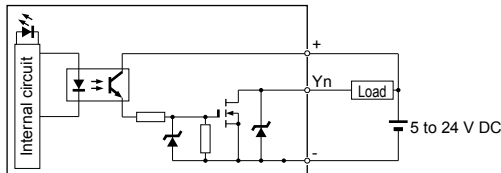
■ Limitations on power supply voltage  
Reduce power supply voltage according to the right graph by the ambient temperature.



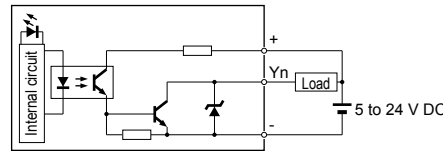
### Transistor output unit

#### Output circuit diagram

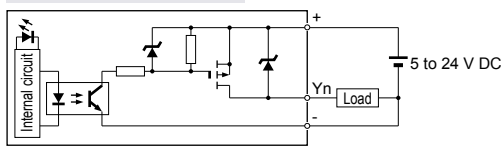
##### Sink type, 16 points



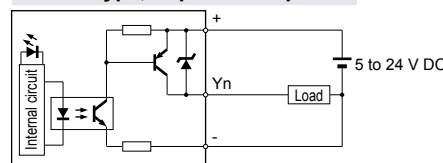
##### Sink type, 32 points / 64 points



##### Source type, 16 points

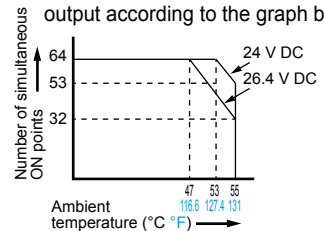


##### Source type, 32 points / 64 points

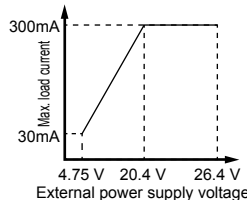


■ Limitations on simultaneous ON points [64 points]

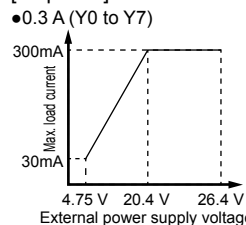
Reduce simultaneous ON points of output according to the graph below.



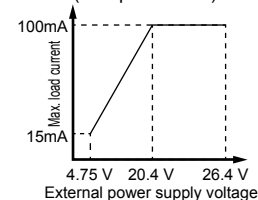
[32 points]



[64 points]



● 0.1 A (except Y0 to Y7)



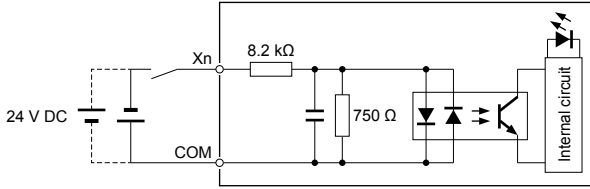
Reduce load current according to the right graph by the external power supply voltage.

**I/O CIRCUIT DIAGRAMS**

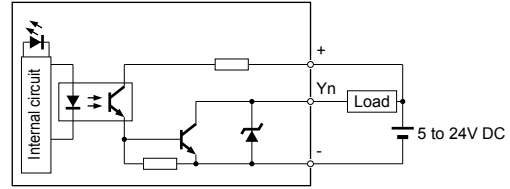
**I/O mixed unit**

**I/O circuit diagram**

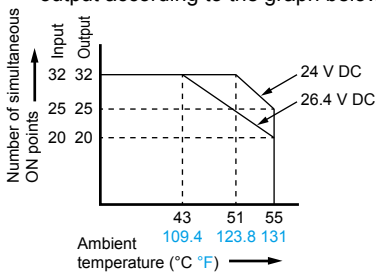
**Input circuit, sink type**



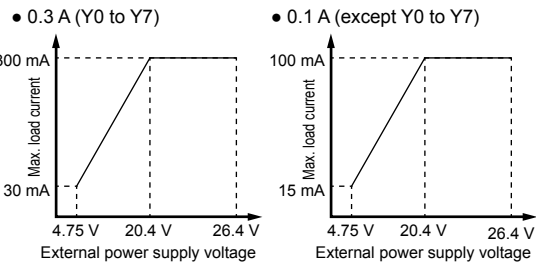
**Output circuit, sink type**



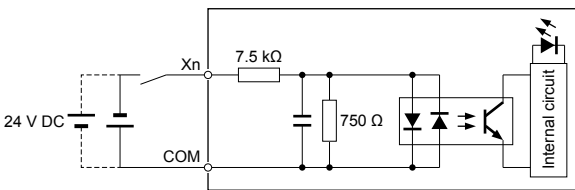
■ Limitations on simultaneous ON points (common to input and output)  
Reduce simultaneous ON points of input and output according to the graph below.



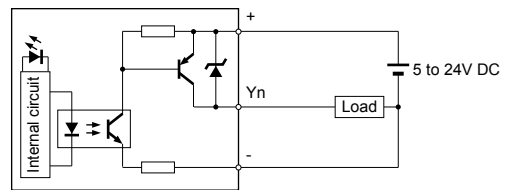
Reduce load current according to the graph below by the external power supply voltage.



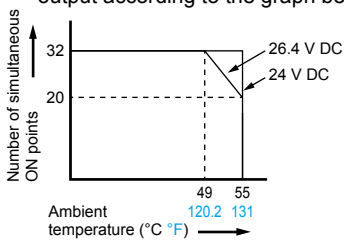
**Input circuit, source type**



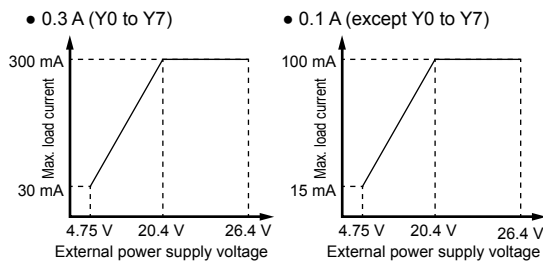
**Output circuit, source type**



■ Limitations on simultaneous ON points (common to input and output)  
Reduce simultaneous ON points of input and output according to the graph below.



Reduce load current according to the graph below by the external power supply voltage.



FIBER SENSORS

LASER SENSORS

PHOTO-ELECTRIC SENSORS

MICRO PHOTO-ELECTRIC SENSORS

AREA SENSORS

SAFETY LIGHT CURTAINS / SAFETY COMPONENTS

PRESSURE / FLOW SENSORS

INDUCTIVE PROXIMITY SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS

SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS

MEASUREMENT SENSORS

STATIC CONTROL DEVICES

LASER MARKERS

PLC

HUMAN MACHINE INTERFACES

ENERGY MANAGEMENT SOLUTIONS

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

Applications

PLC

Software

Program Transfer

Others

FP7

FP-X0

FP0R

FPΣ

FP-X

FP2SH

FP-e



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## ANALOG INPUT AND OUTPUT UNITS



**Channel insulation is switchable to support various devices**

**20 times faster conversion than in previous model: 25 μs/channel**

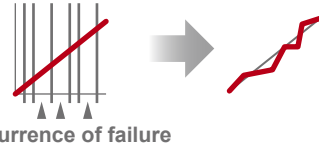
**High-speed sampling that doesn't depend on CPU unit scanning**

Sampling and data collection in the analog unit!

Use the measurement applications because with the fixed cycle, analog signal can be held in the buffer.

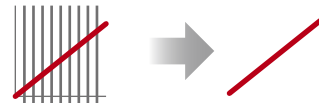
Dependent on scan of CPU unit

The scan gets delayed when the CPU unit slows down due to other processes and sampling becomes sporadic.



Sampling in the analog unit

Accurate sampling possible with fixed cycle.



**High-accuracy of ±0.05 % F.S. (at +25 °C +77 °F) can be achieved**

**Noise-resistant with isolated channels**

## SPECIFICATIONS

### Analog input specifications (AFP7AD4H / AFP7AD8)

Part No.		AFP7AD4H	AFP7AD8
Item	Number of channels	4 channels	8 channels
CE marking directive compliance		EMC Directive, RoHS Directive	
Input range (Resolution, Max. 16 bits)	Voltage (Note 1)	-10 to +10 V (resolution: 1/62,500) 0 to 10 V (resolution: 1/31,250) 0 to 5 V (resolution: 1/31,250) 1 to 5 V (resolution: 1/25,000) (Note 2)	
	Current	0 to 20 mA (resolution: 1/31,250) 4 to 20 mA (resolution: 1/25,000) (Note 2)	
Conversion speed	Voltage / current	25 μs/channel (at non-insulated channels) 5 ms/channel (at insulated channels)	25 μs/channel (at non-insulated channels)
		Overall accuracy	±0.05 % F.S. or less (at +25 °C +77 °F) ±0.1 % F.S. or less (at 0 to +55 °C +32 to +131 °F)
Input impedance	Voltage input / Current input	1 MΩ approx. / 250 Ω	
Max. input range		-15 to +15 V voltage input -2 to +30 mA current input	
Insulation method	Between input terminals and internal circuit	Photocoupler and isolated DC / DC converter	
	Between channels	PhotoMOS relay	
Digital processing	Averaging	Number of times	Setting range: 2 to 60,000 times
		Time duration	Time setting range: 1 to 1,500 ms (at non-insulated channels), 200 to 60,000 ms (at insulated channels)   Time setting range: 1 to 1,500 ms (at non-insulated channels)
	Moving	Range setting: 2 to 2,000 times	
	Scale conversion setting	Any value within ±30,000	
	Offset setting	Any value within ±3,000	
	Gain setting	Any value within 9,000 to 11,000	
Input range change method		Selectable per channel	
Conversion execution / non-execution channel setting		Selectable per channel unit	
Max. and min. value holding		Possible to make settings on a channel-by-channel basis	
Comparison of upper and lower limit values		Possible to make settings on a channel-by-channel basis (hysteresis)	
Broken wire detection		When less than 0.7 V / 2.8 mA (only when voltage input range 1 to 5 V or current input range 4 to 20 mA is set.)	When less than 2.8 mA (only when current input range 4 to 20 mA is set.)
Buffer function		3 trigger types: Soft trigger, External trigger and Input level	

Notes: 1) Please note that the digital converted value corresponding to about 2 V of analog input is stored in the input relay area (WX) for channels which are not connected to input when setting the voltage range with **AFP7AD8**.  
2) The full scale (F.S.) on the accuracy of an analog voltage input range from 1 to 5 V and that of an analog current input range from 4 to 20 mA are 0 to 5 V and 0 to 20 mA, respectively.

Part No.		AFP7AD4H	AFP7AD8	
Item	Number of channels	4 channels	8 channels	
Trigger input section	Insulation method	Photocoupler		
	Rated input voltage / Rated input current	24 V DC / 4.5 mA approx. (at 24 V DC)	24 V DC / 12 mA approx. (at 24 V DC)	
	Input impedance	5.1 kΩ approx.	2 kΩ approx.	
	Operating voltage range	21.6 to 26.4 V DC		
	Min. ON voltage / Min. ON current	19.2 V / 3.5 mA		
	Max. OFF voltage / Max. OFF current	5 V / 1.5 mA		
	Response time	OFF→ON	0.2 ms or less	0.1 ms or less
		ON→OFF	0.2 ms or less	0.1 ms or less
		Input points per common	2 points/common	1 point/common
	Connection method		Terminal block (M3 terminal screw)	

### Analog output specifications (AFP7DA4H)

Item		AFP7DA4H
CE marking directive compliance		EMC Directive, RoHS Directive
Number of output channels		4 channels
Output range (Resolution, Max. 16 bits)	Voltage	-10 to +10 V (resolution: 1/62,500) 0 to 10 V (resolution: 1/31,250) 0 to 5 V (resolution: 1/31,250) 1 to 5 V (resolution: 1/25,000)
	Current	0 to 20 mA (resolution: 1/31,250) 4 to 20 mA (resolution: 1/25,000)
Conversion speed	Voltage / current	25 μs/channel
Overall accuracy		± 0.1 % F.S. or less (at +25 °C +77 °F) ± 0.3 % F.S. or less (at 0 to +55 °C +32 to +131 °F)
Output impedance (voltage output)		0.5 Ω or less
Max. output current (voltage output)		10 mA
Permissible output load resistance (Current output)		500 Ω or less
Insulation method	Between the input terminals and internal circuit	Photocoupler and isolated DC / DC converter
	Between channels	Not insulated
Scale conversion setting		Any value within ±30,000
Offset and gain function	Offset setting	Any value within ±3,000
	Gain setting	Any value within 9,000 to 11,000
Output range change method		Selectable per channel
Conversion execution / non-execution channel setting		Selectable per channel unit
Upper and lower output limit clip function		Possible to make settings on a channel-by-channel basis
Analog output holding (in PROG mode)		Present value / any value / not holding
Connection method		Terminal block (M3 terminal screws)

**TEMPERATURE INPUT UNITS**



**High-speed, high-accuracy and multi-channel input**

**Easy to perform high-accuracy measurement**

Equipped with a variety of functions required for temperature measurement  
Easy to obtain measurement results

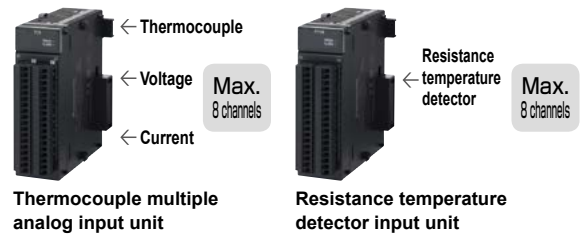
**Capable of high-speed and high-accuracy temperature input**

**Multi-channel input**

One unit can control the input of up to 8 channels.  
With so many channels, the unit eliminates the need to purchase additional units, reducing required space and costs.  
The thermocouple multiple analog input unit can also control voltage and current inputs.

Averaging processing	Number of times, time, moving
Insulation	Channels are insulated from one another and from the internal circuit.
Simple setting	Initial settings can be completed on the configuration screen.

	High-speed conversion	High-accuracy
Thermocouple multiple analog input unit	5 ms/channel (high-speed mode) 25 ms/channel (normal mode)	±0.1 % F.S. (at +25 °C +77 °F) ±0.3 % F.S. (at 0 to +55 °C +32 to +131 °F)
Resistance temperature detector input unit	25 ms/channel (normal mode)	



**SPECIFICATIONS**

Product name		Thermocouple multiple analog input unit
Item	Part No.	<b>AFP7TC8</b>
CE marking directive compliance		EMC Directive, RoHS Directive
Number of channels		8 channels
Input range (resolution)	Thermocouple (resolution: 0.1 °C)	K1: -100.0 to +600.0 °C / K2: -200.0 to +1000.0 °C J1: -100.0 to +400.0 °C / J2: -200.0 to +750.0 °C T: -270.0 to +400.0 °C / N: -270.0 to +1300.0 °C R: 0.0 to +1760.0 °C / S: 0.0 to +1760.0 °C B: 0.0 to +1820.0 °C / E: -270.0 to +1000.0 °C PLI1: 0.0 to +1390.0 °C / WRe5-26: 0.0 to +2315.0 °C
	Voltage	-10 to +10 V DC (resolution: 1/62,500) 0 to 5 V DC (resolution: 1/31,250) 1 to 5 V DC (resolution: 1/25,000) (Note 1) -100 to +100 mV DC (resolution: 1/62,500) Resolution: max. 16 bits
	Current	0 to 20 mA (resolution: 1/31,250) 4 to 20 mA (resolution: 1/25,000) (Note 1) Resolution: max. 16 bits
Conversion speed		5 ms/channel + 5 ms (Note 2) 25 ms/channel + 25 ms Add the drift compensation measuring time to the number of measuring channels.
Overall accuracy		±0.1 % F.S. or less (at +25 °C +77 °F) ±0.3 % F.S. or less (at 0 to +55 °C +32 to +131 °F)
Reference contact compensation accuracy		±1.0 °C (with thermocouple input)
Input impedance	Voltage / current	1 MΩ / 250 Ω
Insulation method	Between input terminals and internal circuit	Photocoupler and isolated DC/DC converter
	Between channels	PhotoMOS relay
Conversion execution / non-execution channel setting		Selectable per channel unit
Input range change method		Selectable per channel
Digital processing	Averaging	Number of times, time, moving
	Scale conversion setting	Any value within ±30,000 (Voltage and current range only)
	Offset setting	Any value within ±3,000
	Gain setting	±10 %
Comparison of upper and lower limit values		Possible to make settings on a channel-by-channel basis.
Max. and min. value holding		Possible to make settings on a channel-by-channel basis.
Broken wire detection		Available
Connection method		Connector type terminal block

Notes: 1) The full scale (F.S.) ranges of accuracy are 1 to 5 V DC for voltage and 0 to 20 mA for current input, respectively.  
2) The AC noise removal is disabled.

Product name		Resistance temperature detector input unit
Item	Part No.	<b>AFP7RTD8</b>
CE marking directive compliance		EMC Directive, RoHS Directive
Number of channels		8 channels
Input range (resolution)	Resistance temperature detector (resolution: 0.1 °C)	Pt100 (1): -100.0 to +200.0 °C Pt100 (2): -200.0 to +650.0 °C JPt100(1): -100.0 to +200.0 °C JPt100(2): -200.0 to +650.0 °C Pt1000: -100.0 to +100.0 °C
Conversion speed		25 ms/channel + 25 ms Add the drift compensation measuring time to the number of measuring channels.
Overall accuracy		±0.1 % F.S. or less (at +25 °C +77 °F) ±0.3 % F.S. or less (at 0 to +55 °C +32 to +131 °F)
Allowable signal source resistance		R.T.D. input: 30 Ω (three wires balanced)
Insulation method	Between input terminals and internal circuit	Photocoupler and isolated DC/DC converter
	Between channels	PhotoMOS relay
Conversion execution / non-execution channel setting		Selectable per channel unit
Input range change method		Selectable per channel
Digital processing	Averaging	Number of times, time, moving
	Offset setting	Any value within ±3,000
	Gain setting	±10 %
Comparison of upper and lower limit values		Possible to make settings on a channel-by-channel basis.
Max. and min. value holding		Possible to make settings on a channel-by-channel basis.
Broken wire detection		Available
Connection method		Connector type terminal block

- FIBER SENSORS
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- FP-e**



**HIGH-SPEED COUNTER UNITS**



**One of the fastest in industry added in lineup**

**Industry-leading class speed of 16 Mpps (for differential input and 2-phase, 4-multiple)**

Accurate, real-time surveillance of inverter and motor rotation speed variation.

**Supports 5 / 12 / 24 V DC and differential input.**

Supports wide range of interface from 12 to 24 V DC, 5 V DC and differential input with one unit.

**Powerful application support**

Input pulse string frequency (period) can be measured inside the unit with built in periodical pulse counter function. Built-in ring counter function can easily detect index table position. Line speed adjustment and work length measurement are available with built-in clock that allows accurate time measurement.

**Various functions can be used without a ladder program**

Capture function of count value	Finite difference calculation of capture value	Interrupt using comparison match
Comparison match and band comparison	Measurement of frequency and number of revolution	Reset of Z number and preset
Reset and preset of external signal	Built-in clock selection	

**SPECIFICATIONS**

Item		Type	2 channels type <b>AFP7HSC2T</b>	4 channels type <b>AFP7HSC4T</b>	
CE marking directive compliance			EMC Directive, RoHS Directive		
Input	Insulation method		Photocoupler		
	Rated input voltage		12 to 24 V DC / 3.5 to 5 V DC		
	Input impedance	24 V DC / 5 V DC	3.0 kΩ approx. / 390 Ω approx.		
	Usage voltage range	24 V DC / 5 V DC	10.8 to 26.4 V DC / 3.5 to 5.25 V DC		
	Min. ON voltage / Min. ON current	24 V DC	10 V DC / 4 mA		
		5 V DC	3.0 V DC / 4 mA		
	Min. OFF voltage / Min. OFF current	24 V DC	2.0 V DC / 2 mA		
		5 V DC	1.0 V DC / 0.5 mA		
Input time constant setting			None, 0.1 μs, 0.2 μs, 0.5 μs, 1.0 μs, 2.0 μs and 10.0 μs		
Count function	Number of counters		2 channels	4 channels	
	Counter type		Linear counter / Ring counter		
	Counting range		Signed 32-bit ( -2,147,483,648 to +2,147,483,647 )		
	Max. input frequency		4 MHz / 8 MHz for individual input (phases A and B) (Duty ratio 50 ±10 %) 4 MHz / 8 MHz for direction discrimination input (Duty ratio 50 ±10 %) 4 MHz / 8 MHz /16 MHz for 2-phase input (Duty ratio 50 ±10 %, Phase shifting below 5 %)		
	Input signal		Phases A, B and Z		
	External I/O	Control signal input: 4 points (2 points/ch)		Control signal input: 8 points (2 points/ch)	
		External output: 4 points (2 points/ch)		External output: 8 points (2 points/ch)	
	Counter input type		Individual input: 1 multiple, 2-multiple Direction discrimination input: 1 multiple, 2-multiple 2-phase input: 1 multiple, 2-multiple, 4-multiple		
Measurement function	Frequency measurement function		Measures the intervals between the variations of count values, and calculates the frequency.		
Comparison function	Target value match function		Depending on the count direction, sets or resets the output when the counter value reaches the target value.		
External output	Comparison result output function		Outputs the result of comparison function.		
Other functions	Capture function		Acquires the current count value from the edges of input signals, and stores it in the capture 0 register or capture 1 register. The value of the specified capture register will be overwritten by a new value and the old value will be discarded every time a counter value is captured.		
	Interrupt input function		Available (2 points/ch, Max. 8 points/unit) (Note 1, 2)		

Notes: 1) The interrupt input function can be used for 8 points per unit and for a maximum of 8 units (max. 64 points) in the whole system. However, the entire scan time slows down as more interrupt programs are used. Minimize the use of interrupt programs.  
2) The priority order for interrupt inputs is as follows; In a unit, from the smallest interrupt bit. In the whole system, from the smallest unit number.

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## POSITIONING UNITS



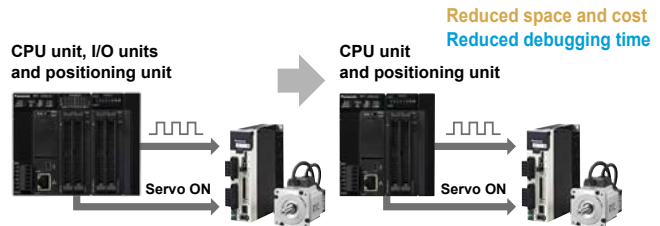
**Combined multi-axe control can be achieved at reduced cost**

**Equipped with electronic cam and electronic gear functions**

Ladder program is capable of controlling electronic cams and gears. Virtual axes are supported and operable without connecting to external encoders.

**Organized wiring to servo amplifier**

A servo ON output terminal is provided that allows simple and neat wiring to the servo amplifier. Also, wiring from the I/O unit is unnecessary, and a test run is possible by only a positioning soft tool.



**Dedicated configuration tool**

Start positioning dedicated configuration tool using **Control FPCWIN GR7**. Parameter and positioning operation settings can be made easily.

Test operation is also supported. Positioning operations can be checked even-while the CPU unit is in program mode.



## SPECIFICATIONS

Item	Specifications					
	2 axes type		4 axes type			
Part No.	AFP7PP02T	AFP7PP02L	AFP7PP04T	AFP7PP04L		
CE marking directive compliance	EMC Directive, RoHS Directive					
Output type	Transistor	Line driver	Transistor	Line driver		
Max. operation speed	500 kpps	4 Mpps	500 kpps	4 Mpps		
Number of axes controlled	2 axes		4 axes			
Interpolation control	2 axes linear interpolation and 2 axes circular interpolation		2 axes linear interpolation, 3 axes linear interpolation, 2 axes circular interpolation and 3 axes spiral interpolation			
Position command units	pulse μm (The minimum command unit can be selected from 0.1 μm or 1 μm.) inch (The minimum command unit can be selected from 0.0001 inch or 0.0001 inch.) degree (The minimum command unit can be selected from 0.1 degree or 1 degree.)					
Position command range	pulse: -1,073,741,823 to +1,073,741,823 pulse μm (0.1 μm): -107,374,182.3 to +107,374,182.3 μm μm (1 μm): -1,073,741,823 to +1,073,741,823 μm inch (0.0001 inch): -10,737.41823 to +10,737.41823 inch inch (0.001 inch): -107,374.1823 to +107,374.1823 inch degree (0.1 degree): -107,374.1823 to +107,374.1823 degree degree (1 degree): -1,073,741,823 to +1,073,741,823 degree					
Speed command range	pulse: 1 to 32,767,000 pps μm: 1 to 32,767,000 μm/sec. inch: 0.001 to 32,767.000 inch/sec. degree: 0.001 to 32,767.000 rev/sec. *Specify an output speed that is below the maximum operating speed.					
Automatic operation	Position control	Position command method	Absolute (Absolute position designation), Increment (Relative position designation)			
		Acceleration / deceleration method	Linear acceleration / deceleration, S-curve acceleration / deceleration			
		Acceleration time	0 to 10,000 ms (in increments of 1 ms)			
		Deceleration time	0 to 10,000 ms (in increments of 1 ms)			
		Number of positioning tables per axis	Standard area: 600 points, expansion area: 25 points			
		Control method	Independent	PTP control (E point control, C point control), CP control (P point control), Speed control (J point control)		
			2-axis interpolation	Linear	E point, P point and C point controls: Specify synthesis speed or major axis speed	
		Circular		E point, P point and C point controls: center point or passing point		
		3-axis interpolation	Linear	E point, P point and C point controls: Specify synthesis speed or major axis speed		
			Spiral	E point, P point and C point controls: center point or passing point		
Startup time	Standard area: 3 ms or less, expansion area: 5 ms or less					
Other function	Dwell time	0 to 32,767 ms (in increments of 1 ms)				

Item	Specifications			
	2 axes type		4 axes type	
Part No.	AFP7PP02T	AFP7PP02L	AFP7PP04T	AFP7PP04L
Manual operation	JOG operation	Acceleration / deceleration method	Linear acceleration / deceleration, S-curve acceleration / deceleration	
		Acceleration / deceleration time	0 to 10,000 ms (in increments of 1 ms)	
	Home return	Acceleration / deceleration method	Linear acceleration / deceleration	
		Acceleration / deceleration time	0 to 10,000 ms (in increments of 1 ms)	
Stop function	Return methods	7 methods: DOG method (3 types), Limit method (2 types), Data set method, Z-phase method		
	Pulser operation	Speed command range	Operates in synchronization with pulser input	
Synchronous operation function	Deceleration stop	Deceleration time	Deceleration time of running operation	
		Emergency stop	0 to 10,000 ms (in increments of 1 ms)	
	Limit stop	Deceleration time	0 to 10,000 ms (in increments of 1 ms)	
	Error stop	Deceleration time	0 to 10,000 ms (in increments of 1 ms)	
	System stop	Deceleration time	Immediate stop (0 ms), all axes stop	
Electronic gear function	Synchronous basic setting	Master axis	Existing axes, virtual axes or pulse input (1 to 4)	
	Slave axis	Max. 2 axes   Max. 4 axes		
	Operation setting	Gear ratio setting		
Electronic clutch function	Operation method	Direct method, Acceleration / deceleration method		
	Clutch ON trigger	Contact input		
Synchronous cam function	Clutch method	Direct method, Linear slip method		
	Electronic cam function	Cam curve	Select from 20 types	
		Resolution	Multiple curves can be specified within a phase (0 to 100 %).	
Other specifications	Output mode	Number of cam patterns	1,024, 2,048, 4,096, 8,192, 16,384, 32,768	
		4 to 16 (Depends on resolution)		
	High-speed counter function (Note)	Countable range	-1,073,741,823 to +1,073,741,823 pulse	
Built-in servo ON output	Input mode	Phase difference input, Direction distinction input, Individual input (transfer multiple available for each)		

Note: Pulser input and high-speed counter functions cannot be used simultaneously, as the same pulse input terminal is used.

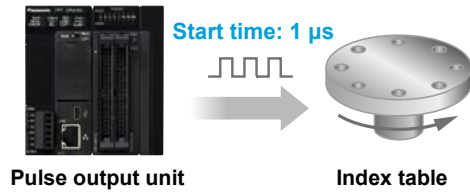
**PULSE OUTPUT UNITS**



**Super high-speed positioning control achieved**

**High-speed startup**

The pulse output request is received from the CPU unit and the startup speed up to output of the pulse is super high-speed of 1 μs. Tact time is reduced with repeat of short-distance positioning operations, etc.



**Neater wiring to servo and amplifier**

Equipped with a servo ON output terminal, wiring to the servo amplifier is neater.

**Replacement from FP2 series is easy**

Usage is same as the previous **FP2** positioning unit (multi-function type). Program transfer is easy.

**SPECIFICATIONS**

Item	AFP7PG02T	AFP7PG04T	AFP7PG02L	AFP7PG04L
CE marking directive compliance	EMC Directive, RoHS Directive			
Output type	Transistor		Line driver	
Occupied points	Each 32 points of I/O	Each 64 points of I/O	Each 32 points of I/O	Each 64 points of I/O
Number of axes controlled	2 axes, independent	4 axes, independent	2 axes, independent	4 axes, independent
Position command	Pulse (The program specifies whether increment or absolute is used.)			
	Command units	Signed 32 bits (+2,147,483,647 to -2,147,483,648 pulses)		
Speed command	Command range		1 pps to 4 Mpps (can set in 1 pps)	
	Command range	1 pps to 500 kpps (can set in 1 pps)		
Acceleration / deceleration command	Acceleration / deceleration	Linear acceleration / deceleration, S acceleration / deceleration		
	"S" Acceleration / deceleration	Can select from sin curve, secondary curve, cycloid curve and third curve.		
	Acceleration / deceleration time	0 to 32,767 ms (can set in 1 ms)		
Home return	Home return speed	Speed setting possible (changes return speed and search speed)		
	Input signal	Home input, near home input, limit input (+), limit input (-)		
	Output signal	Deviation counter clear signal		
Operation mode	E point control (linear and S acceleration / decelerations) P point control (linear and S acceleration / decelerations) Home return operation (home search) JOG operation (Note 1) JOG positioning operation Pulsar input function (Note 2) transfer multiplication ratio (× 1, × 2, × 5, × 10, × 50, × 100, × 500, × 1,000) Real-time frequency change Infinity output			
Startup time	0.02 ms, 0.005 ms or 0.001 ms selecting possible (Note 3)			
Output interface	Output mode			
	1 pulse output (pulse and sign), 2 pulse output (CW and CCW)			
High-speed counter function (Note 2)	Countable range			
	Signed 32 bits (+2,147,483,647 to -2,147,483,648 pulse)			
Other functions	Input mode			
	Two-phase input, direction distinction input, individual input (with multiplier function mode)			
External power supply	Startup using I/O contact Built-in limit (+) and limit (-) With servo ON output			
	Voltage	21.6 to 26.4 V DC		
	Current	50 mA (at 24 V)	90 mA (at 24 V)	50 mA (at 24 V) 90 mA (at 24 V)

Notes: 1) When linear acceleration / deceleration operation is selected, it is possible to change the target speed during operation.  
 2) Since the pulsar input function and the high-speed counter function use the same pulse input terminal, both functions cannot be used at the same time.  
 3) Startup time can be changed using the common memory control code setting. The factory (default) setting is 0.02 ms. Startup time is defined as the time between startup and output of the first pulse.

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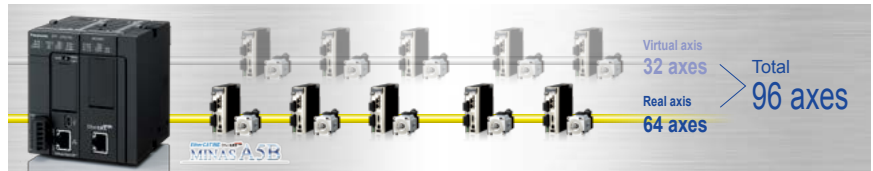
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**MOTION CONTROL UNIT EtherCAT TYPE**



**Motion control of up to 64 axes in one unit**

Control 64 axes of Panasonic servo motor MINAS A6B / A5B and 32 virtual axes. It is now easier to perform multiple axial control



- Up to 32 synchronous groups! (32 groups of 2 axes to 2 groups of 32 axes)
  - Industry's fastest class with 0.5 ms\* control cycle
  - Control system: Cyclic position control
  - Positioning table: 1,000 tables/axis
- \*4 axes (2-axis interpolation × 2 groups). Our company created send/receive allocation.

**SPECIFICATIONS**

Item	16 axes type	32 axes type	64 axes type	
CE marking directive compliance	EMC Directive, RoHS Directive			
Connected slave (Note 1, 2, 3)	Panasonic AC servo motor MINAS A6B / A5B series EtherCAT-compatible S-LINK V gateway controller SL-VGU1-EC			
Number of control axes	Real axis: 16 axes Virtual axis: 8 axes	Real axis: 32 axes Virtual axis: 16 axes	Real axis: 64 axes Virtual axis: 32 axes	
Communication cycle	0.5 ms / 1 ms / 2 ms / 4 ms			
Interpolation control	2-axis linear interpolation, 2-axis circular interpolation, 3-axis linear interpolation and 3-axis spiral interpolation			
Number of occupied I/O points	Input: 16 points, Output: 16 points			
Automatic operation Positioning control (CSP)	Position specification method	Absolute (specified absolute position), Increment (specified relative position)		
	Position specified unit	pulse µm (select a minimum instruction unit of 0.1 µm or 1 µm) inch (select a minimum instruction unit of 0.00001 inch or 0.0001 inch) degree (select a minimum instruction unit of 0.1 degree or 1 degree)		
	Position reference range	pulse: -2,147,483,648 to 2,147,483,647 pulse µm (0.1 µm): -214,748,364.8 to 214,748,364.7 µm µm (1 µm): -2,147,483,648 to 2,147,483,647 µm inch (0.00001 inch): -21,474.83648 to 21,474.83647 inch inch (0.0001 inch): -214,748.3648 to 214,748.3647 inch degree (0.1 degree): -214,748.3648 to 214,748.3647 degree degree (1 degree): -2,147,483.648 to 2,147,483.647 degree		
	Speed reference range	pulse: 1 to 2,147,483,647 pps µm: 1 to 2,147,483,647 µm/sec. inch: 0.001 to 2,147,483.647 inch/sec. degree: 0.001 to 2,147,483.647 rev/sec.		
	Acceleration / deceleration type	Linear acceleration / deceleration, S-shaped acceleration / deceleration		
	Acceleration / deceleration time	0 to 10,000 ms (adjustable in 1 ms increments)		
	Number of positioning tables	Each axis standard area: 1,000 points expansion area 100 points (24 axes in case of using simultaneous startup)		
	Control method	Independent	PTP control (E point control, C point control), CP control (P point control), Speed control (J point control)	
		2-axis interpolation	Linear interpolation	E point, P point and C point controls: Specify synthesis speed or major axis speed
			Circular interpolation	E point, P point and C point controls: Center point or passing point
3-axis interpolation		Linear interpolation	E point, P point and C point controls: Specify synthesis speed or major axis speed	
	Spiral interpolation	E point, P point and C point controls: Center point or passing point		
Other function	Dwell time	0 to 32,767 ms (adjustable in 1 ms increments)		

Item	16 axes type	32 axes type	64 axes type	
Manual operation	JOG / inching operation	Speed reference range	pulse: 1 to 2,147,483,647 pps µm: 1 to 2,147,483,647 µm/sec. inch: 0.001 to 2,147,483.647 inch/sec. degree: 0.001 to 2,147,483.647 rev/sec.	
		Acceleration / deceleration type	Linear acceleration / deceleration, S-shaped acceleration / deceleration	
		Acceleration / deceleration time	0 to 10,000 ms (adjustable in 1 ms increments)	
	Home return	Speed reference range	pulse: 1 to 2,147,483,647 pps µm: 1 to 2,147,483,647 µm/sec. inch: 0.001 to 2,147,483.647 inch/sec. degree: 0.001 to 2,147,483.647 rev/sec.	
		Acceleration / deceleration type	Linear acceleration / deceleration, S-shaped acceleration / deceleration	
		Acceleration / deceleration time	0 to 10,000 ms (adjustable in 1 ms increments)	
Return methods	DOG method (4 types), Limit method (2 types), Data set method, Z phase method, Stop-on-contact method (2 types)			
Stop function	Deceleration stop	Deceleration time	Axis operation mode startup time of activated axis	
	Emergency stop	Deceleration time	0 to 10,000 ms (adjustable in 1 ms increments)	
	Limit stop	Deceleration time	0 to 10,000 ms (adjustable in 1 ms increments)	
	Error stop	Deceleration time	0 to 10,000 ms (adjustable in 1 ms increments)	
	System stop	Deceleration time	Immediate stop (1 ms), all axes stop	
Synchronous operation function	Synchronous basic setting	Master axis	Selection possible of real axis and virtual axis	
		Slave axis	Virtual axis: Max. 8 axes/master    Virtual axis: Max. 16 axes/master    Virtual axis: Max. 32 axes/master	
	Electronic gear function	Operation setting	Gear ratio setting	
	Electronic clutch function	Operation method	Direct method, Acceleration / deceleration method	
		Clutch ON trigger	Contact input	
	Clutch method	Direct method, Linear slide method		
Electronic cam function	Cam curve	Select from 20 types		
	Resolution	Multiple curves can be specified within a phase (0 to 100 %).		
		1,024, 2,048, 4,096, 8,192, 16,384, 32,768		
Number of cam patterns	16 to 64 (Depends on resolution)	32 to 128 (Depends on resolution)	64 to 256 (Depends on resolution)	
Other specifications	Software limit function	Set range	pulse: -2,147,483,648 to 2,147,483,647 pulse µm (0.1 µm): -214,748,364.8 to 214,748,364.7 µm µm (1 µm): -2,147,483,648 to 2,147,483,647 µm inch (0.00001 inch): -21,474.83648 to 21,474.83647 inch inch (0.0001 inch): -214,748.3648 to 214,748.3647 inch degree (0.1 degree): -214,748.3648 to 214,748.3647 degree degree (1 degree): -2,147,483.648 to 2,147,483.647 degree	
			Torque judgment	Torque judgment Selection possible of active / non-active and error / warning 0.0 to ±500.0 %
	Monitor judgment	Actual speed judgment	Actual speed judgment Selection possible of active / non-active and error / warning 0.0 to ±5,000 rpm	
		Backup	Parameters and positioning data are saved to flash memory (battery free)	
Current consumption (at 24 V DC)		180 mA approx.		
Weight		150 g approx.		

- Notes: 1) A6B and SL-VGU1-EC are compatible with the FP7 motion control unit Ver.1.2 or later.  
 2) One unit or more of A6B or A5B must exist on the network. A6B and A5B can be used together.  
 3) The hub for EtherCAT / Ethernet cannot be used.

- Limit input CWL, CCWL monitor and proximity (DOG) monitor
- General-purpose input: 5 points, General-purpose output: 1 point (I/O from AMP)
- Auxiliary output contact and auxiliary output cord

**POWER SUPPLY UNITS**



**Announce system errors using the built-in external alarm**

**Equipped with system error alarm contact**

Output contact for system error external alarm is provided. If a power supply unit is used concurrently, no additional units are required.

**SPECIFICATIONS**

Item	AFP7PSA1	AFP7PSA2
CE marking directive compliance	EMC Directive, Low Voltage Directive, RoHS Directive	
Rated input voltage	100-240 V AC	
Allowable input voltage range	85-264 V AC	
Input power supply frequency	47 to 63 Hz	
Inrush current	40 A or less (Note 2)	
Input current	0.75 A or less	1.25 A or less
Rated output current (at 24 V)	1.0 A	1.8 A
Alarm contact capacity	1 A (30 V DC)	
Remaining lifespan counting function	Not available	Available (Note 1)

- Notes: 1) Alarm by CPU unit  
 2) On cold starting  
 3) Power supply unit cannot be used with **AFP7CPS21** CPU unit.

**SERIAL COMMUNICATION UNIT**



**Lineup of serial communication unit that can be expanded with a serial communication cassette**

**Two serial communication add-on cassettes can be installed**

A total of five types of cassettes can be freely combined in a combination of RS-232C, RS-422 or RS-485. Up to 4 channels can be supported in one unit.

**High expandability**

The number of serial communication channels can be increased by connecting a CPU unit. A CPU unit can be connected to maximum of 8 serial communications units.

Note: To connect serial communication unit, the CPU unit has to have firmware Ver. 1.2 or later, and to be running **FPWIN GR7** Ver. 1.3 or later.

**SPECIFICATIONS**

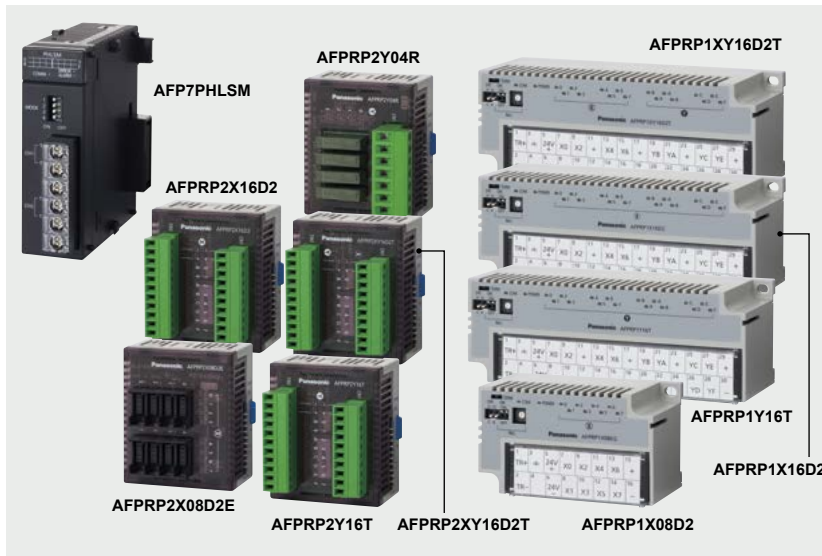
Item	AFP7NSC
CE marking directive compliance	EMC Directive, RoHS Directive
Number of communication cassette installations	Max. 2 cassettes
Number of installations to CPU unit	Max. 8 units

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## PHLS (REMOTE I/O) UNITS



**Speedy, resistant to noise Remote I/O Line up**

### High speed communication

A 12 Mbps maximum transmission speed can be selected. Fast response at update cycle of 1,000 points/2 ms can be achieved.

### High resistance to noise

Data can be transferred accurately, even in inadequate wiring environments.

### Various types of compact slave units

Compact slave units (60 × 70 × 40 mm **2.36 × 2.76 × 1.57 in**) are smaller than common screw terminal types and are lined up to contribute to space savings. A wide variety of slave units are available.

## SPECIFICATIONS

### Communication specifications (common)

Item	Specifications
Communication method	Two-wire system half duplex
Insulation method	Pulse transformer insulation
Communication speed	6 Mbps / 12 Mbps
Synchronous method	Bit synchronization
Error check	CRC-12
Communication distance	Total length 200 m <b>656 ft</b> (at 6 Mbps) / 100 m <b>328 ft</b> (at 12 Mbps) (Note)
Connection method	Multi-drop method
Impedance	100 Ω
Terminator	Mounted on unit
External interface	Master unit: terminal block (2 channels) Slave unit (standard type): screw-type terminal block Slave unit (compact type): connector-type terminal block

Note: Performance when the recommended cable is used. Use of the recommended cable is necessary to achieve the maximum transmission distance and number of slave units.

### Output side specifications (except relay)

Item	Specifications	
	Standard type	Compact type (except relay)
Insulation method	Photocoupler	Non-isolated
Output type	Sink type (Open collector output)	
Rated load voltage	20.4 to 28.8 V DC	
Max. control capacity	0.1 A/point	
Max. surge current	0.5 A	
OFF state leakage current	0.1 mA or less	
ON state maximum voltage drop	0.5 V or less	
Repose time	OFF→ON	0.05 ms or less
	ON→OFF	0.5 ms or less
Surge absorber	Zener diode	
Short circuit protection	None	

### Input side specifications

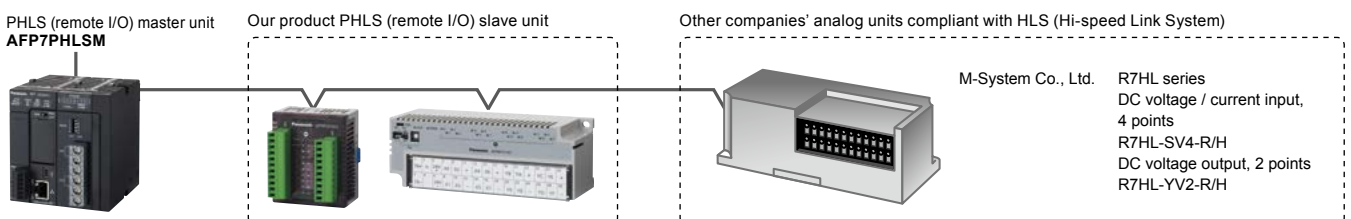
Item	Specifications	
	Standard type	Compact type
Insulation method	Photocoupler	Non-isolated
Rated input voltage	24 V DC	
Rated input current	3 mA approx.	4.3 mA approx.
Input impedance	7.5 kΩ approx.	5.6 kΩ approx.
Min. ON voltage / Min. ON current	15 V / 2 mA	17 V / 2 mA
Max. OFF voltage / Max. OFF current	5 V / 0.5 mA	
Response time	OFF→ON	1 ms or less
	ON→OFF	1 ms or less

### Output side specifications (relay)

Item	Specifications	
	Compact type (relay)	
Insulation method	Relay insulation	
Rated control capacity	1 A 250 V AC (2 A/common), 1 A 30 V DC (2 A/common)	
Min. load	0.1 mA, 100 mV (resistive load)	
Repose time	OFF→ON	10 ms or less
	ON→OFF	5 ms or less
Life time	Mechanical life	2 × 10 <sup>7</sup> operations or more
	Electrical life	1 × 10 <sup>5</sup> operations or more (switching frequency: 20 times/minute)
Surge absorber	None	
Short circuit protection	None	

### Introduction of remote analog units

Our PHLS (remote I/O) unit complies with HLS (Hi-speed Link System) specification. This product is used when you want to connect analog units from other manufacturers that comply with the HLS specification.



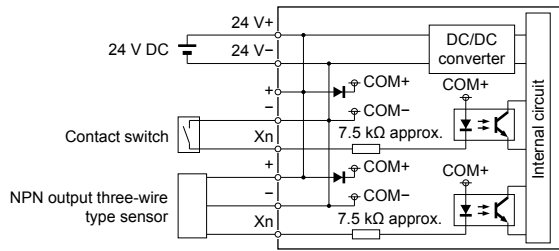
- Notes: 1) When using another company's HLS-compliant product, be sure to verify that the units operate correctly with the installed target equipment. Please contact the respective manufacturers for product details.  
2) Units other than the analog units shown above can also be connected. The following shows the communication specifications of our PHLS (remote I/O) master unit. Please select a unit that meets the specifications.

Communication method	Transmission speed	Connection method
Half-duplex communication (incompatible with full-duplex communication)	6 Mbps / 12 Mbps	Terminal block (connection via screw terminal)

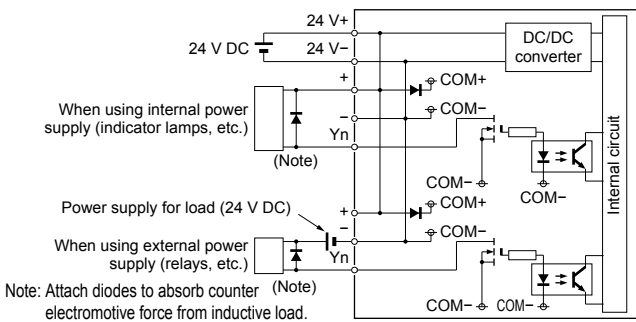
**I/O CIRCUIT DIAGRAMS**

**Standard type (screw-type terminal block)**

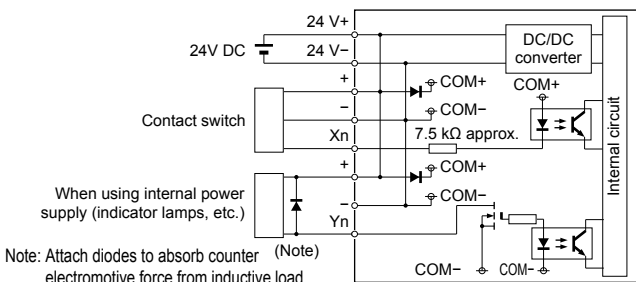
**AFPRP1X08D2 AFPRP1X16D2** Input type



**AFPRP1Y16T** Output type

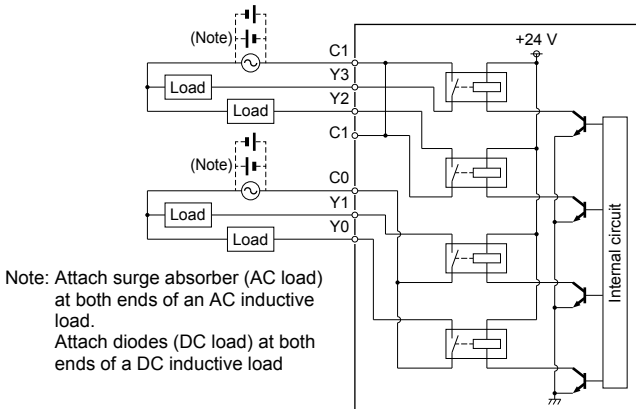


**AFPRP1XY16D2T** I/O mixed type



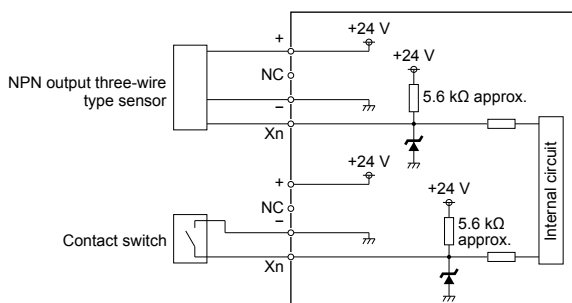
**Compact type (relay output)**

**AFPRP2Y04R** When connecting to separated common terminal



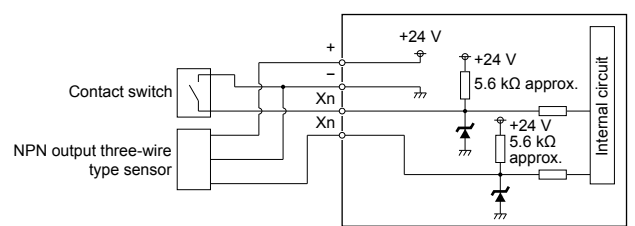
**Compact type (e-CON)**

**AFPRP2X08D2E**

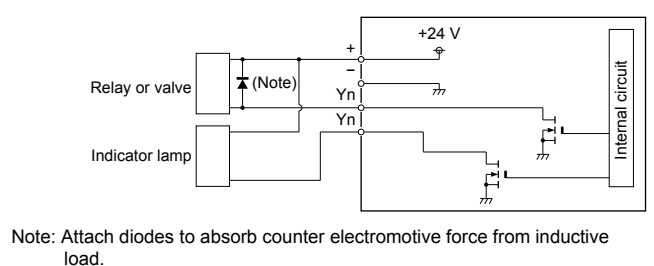


**Compact type (connector-type terminal block)**

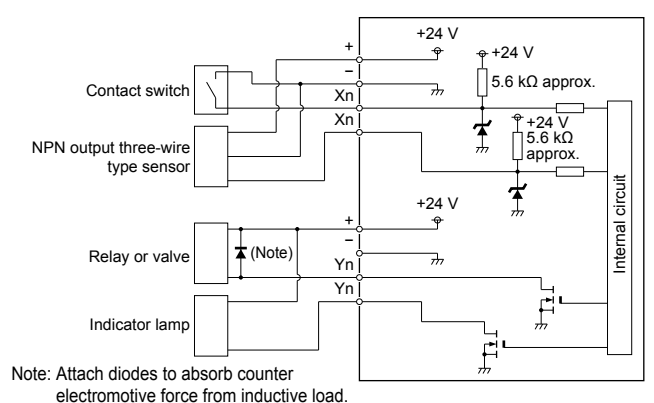
**AFPRP2X16D2** Input type



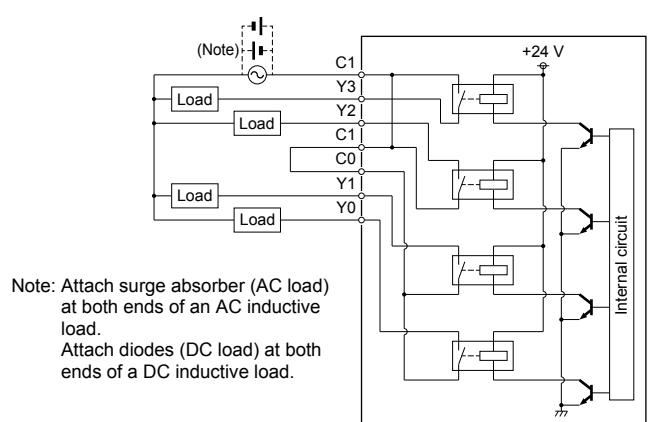
**AFPRP2Y16T** Output type



**AFPRP2XY16D2T** I/O mixed type



When connecting to shared common terminal



FIBER SENSORS

LASER SENSORS

PHOTO-ELECTRIC SENSORS

MICRO PHOTO-ELECTRIC SENSORS

AREA SENSORS

SAFETY LIGHT CURTAINS / SAFETY COMPONENTS

PRESSURE / FLOW SENSORS

INDUCTIVE PROXIMITY SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS

WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS

MEASUREMENT SENSORS

STATIC CONTROL DEVICES

LASER MARKERS

PLC

HUMAN MACHINE INTERFACES

ENERGY MANAGEMENT SOLUTIONS

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

Applications

PLC

Software

Program Transfer

Others

**FP7**

**FP-X0**

**FP0R**

**FPΣ**

**FP-X**

**FP2SH**

**FP-e**

## COMMON GENERAL SPECIFICATIONS

Item	Specifications
Ambient temperature	0 to +55 °C +32 to +131 °F, Storage: -40 to +70 °C -40 to +158 °F
Ambient humidity	10 to 95 % RH (at +25 °C +77 °F, no dew condensation allowed), Storage: 10 to 95 % RH (at +25 °C +77 °F, no dew condensation allowed)
Breakdown voltage	500 V AC for 1 minute (Note 2) (Note 3)
Insulation resistance	100 MΩ or more (at 500 V DC)
Vibration resistance	5 to 8.4 Hz, single amplitude of 3.5 mm 0.138 in, 1 sweep / 1 min. (IEC61131-2), 8.4 to 150 Hz, constant acceleration of 9.8 m/s <sup>2</sup> , 1 sweep / 1 min. (IEC61131-2), 10 times each in X, Y, and Z directions
Shock resistance	147 m/s <sup>2</sup> or more, 3 times each in X, Y, and Z directions (IEC61131-2)
Noise immunity	1,000 V [p-p] with pulse width 50 ns and 1 μs (using a noise simulator)
Operating condition	Free from corrosive gasses and excessive dust

Notes: 1) Please refer to the unit's specification sheet for details of breakdown voltage and insulation resistance.  
 2) Relay output of input and output unit: 2,300 V AC for 1 minute  
 3) Between analog input channels of analog input unit: 200 V AC for 1 minute Between channels of output unit: non insulation

## INDIVIDUAL GENERAL SPECIFICATIONS

Item	CPU units				Expansion units	
	AFP7CPS41E(S)	AFP7CPS31E(S)	AFP7CPS31(S)	AFP7CPS21	AFP7EXPM	AFP7EXPS
Rated voltage range	20.4 to 28.8 V DC				—	20.4 to 28.8 V DC
Current consumption	200 mA or less			150 mA or less	120 mA or less	100 mA or less
Net weight	220 g approx. (with terminal block and end unit)			180 g approx.	120 g approx.	200 g approx. (with end unit)

Item	Communication cassettes						Function cassettes		
	AFP7CCS1	AFP7CCS2	AFP7CCM1	AFP7CCM2	AFP7CCS1M1	AFP7CCET1	AFP7FCAD2	AFP7FCA21	AFP7FCTC2
Rated voltage range	—	—	—	—	—	—	—	—	—
Current consumption	35 mA or less (Note)	60 mA or less (Note)	60 mA or less (Note)	90 mA or less (Note)	70 mA or less (Note)	35 mA or less (Note)	40 mA or less (Note)	75 mA or less (Note)	45 mA or less (Note)
Net weight	25 g approx. (with terminal block)					20 g approx.	25 g approx. (with terminal block)		

Item	Digital input and output units											
	AFP7X16DW	AFP7X32D2	AFP7X64D2	AFP7Y16R	AFP7Y16T	AFP7Y32T	AFP7Y64T	AFP7Y16P	AFP7Y32P	AFP7Y64P	AFP7XY64D2T	AFP7XY64D2P
Rated voltage range	—	—	—	—	—	—	—	—	—	—	—	—
Current consumption	25 mA or less	30 mA or less	35 mA or less	180 mA or less	35 mA or less	50 mA or less	75 mA or less	35 mA or less	50 mA or less	75 mA or less	55 mA or less	55 mA or less
Net weight	125 g approx.	95 g approx.	110 g approx.	180 g approx.	125 g approx.	95 g approx.	115 g approx.	125 g approx.	95 g approx.	115 g approx.	115 g approx.	115 g approx.

Item	Analog input and output units			Temperature input units			Multi input and output unit		High-speed counter units	
	AFP7AD4H	AFP7DA4H	AFP7AD8	AFP7TC8	AFP7RTD8	AFP7MXY32DWD	AFP7MXY32DWDH	AFP7HSC2T	AFP7HSC4T	
Rated voltage range	—	—	—	—	—	—	—	—	—	
Current consumption	100 mA or less	250 mA or less	85 mA or less	80 mA or less	65 mA or less	100 mA or less	100 mA or less	65 mA or less	65 mA or less	
Net weight	130 g approx.	130 g approx.	130 g approx.	145 g approx.	145 g approx.	100 g approx.	100 g approx.	130 g approx.	130 g approx.	

Item	Positioning units				Pulse output units				Motion control unit			Serial communication unit	Power supply units	
	AFP7PP02T	AFP7PP04T	AFP7PP02L	AFP7PP04L	AFP7PG02T	AFP7PG04T	AFP7PG02L	AFP7PG04L	AFP7MC16EC	AFP7MC32EC	AFP7MC64EC	AFP7NSC	AFP7PSA1	AFP7PSA2
Rated voltage range	—	—	—	—	—	—	—	—	—	—	—	—	100-240 V AC	
Current consumption	120 mA or less	120 mA or less	120 mA or less	120 mA or less	65 mA or less	65 mA or less	65 mA or less	65 mA or less	180 mA approx.	180 mA approx.	180 mA approx.	50 mA or less (when without add-on cassette)	750 mA or less	1,250 mA or less
Net weight	145 g approx.	145 g approx.	145 g approx.	145 g approx.	130 g approx.	150 g approx.	130 g approx.	150 g approx.	150 g approx.	150 g approx.	150 g approx.	110 g approx.	240 g approx.	290 g approx.

Item	PHLS (remote I/O) units									
	AFP7PHLSM	AFPRP1X08D2	AFPRP1X16D2	AFPRP1Y16T	AFPRP1XY16D2T	AFPRP2X08D2E	AFPRP2X16D2	AFPRP2Y16T	AFPRP2XY16D2T	AFPRP2Y04R
Rated voltage range	20.4 to 28.8 V DC									
Current consumption	85 mA or less	100 mA or less	150 mA or less	75 mA or less	120 mA or less	100 mA or less	170 mA or less	40 mA or less	110 mA or less	85 mA or less
Net weight	110 g approx.	140 g approx.	210 g approx.	210 g approx.	210 g approx.	75 g approx.	75 g approx.	75 g approx.	75 g approx.	75 g approx.

Note: This value is the increase in CPU unit current consumption.

**PRODUCT TYPES**

**CPU units**

Product name	Standard program capacity	Max. program capacity	Operation speed	Ethernet function (Note 2)	SD memory card function	Encryption function (Note 3) (Note 4)	Part No.	
FP7 CPU units	196 k steps	234 k steps	From 11 ns	Built-in	Built-in	————	<b>AFP7CPS41E</b>	
	120 k steps	120 k steps	From 11 ns	Built-in	Built-in	————	<b>AFP7CPS31E</b>	
	120 k steps	120 k steps	From 11 ns	————	Built-in	————	<b>AFP7CPS31</b>	
	Security enhanced type	196 k steps	234 k steps	From 11 ns	Built-in	Built-in	Built-in	<b>AFP7CPS41ES</b>
		120 k steps	120 k steps	From 11 ns	Built-in	Built-in	Built-in	<b>AFP7CPS31ES</b>
		120 k steps	120 k steps	From 11 ns	————	Built-in	Built-in	<b>AFP7CPS31S</b>
Best value model	64 k steps	64 k steps	From 14 ns	————	————	————	<b>AFP7CPS21</b>	

Notes: 1) One end unit is attached to the CPU unit.  
 2) Ethernet function includes FTP server / client function, Web server function, HTTP client function, E-mail sending function and EtherNet/IP compatibility. Ethernet is a registered trademark of Fuji Xerox Co., Ltd. and Xerox Corporation. Ethernet/IP is a trademark of ODVA.  
 3) When exporting to China, please use a CPU unit that does not have an encryption function.  
 4) For CPU units with encryption function, please use the security enhanced type programming tools.

**Expansion units**

Product name	Specifications	Part No.
FP7 expansion master unit	Expansion of up to 3 slave units possible	<b>AFP7EXPM</b>
FP7 expansion slave unit (Note 1)	Up to 16 units can be connected to 1 slave unit.	<b>AFP7EXPS</b>
Expansion cables	Length: 0.5 m <b>1.640 ft</b>	<b>AFP7EXPCR5</b>
	Length: 1 m <b>3.281 ft</b>	<b>AFP7EXPC01</b>
	Length: 3 m <b>9.843 ft</b>	<b>AFP7EXPC03</b>
	Length: 10 m <b>32.808 ft</b>	<b>AFP7EXPC10</b>

Notes: 1) One end unit is attached to the expansion slave unit.  
 2) Expansion unit cannot be used with the **AFP7CPS21** CPU unit.

**Add-on cassettes**

Product name	Specifications	Part No.
FP7 communication cassettes	RS-232C, 1 channel (insulated)	<b>AFP7CCS1</b>
	RS-232C, 2 channels (insulated)	<b>AFP7CCS2</b>
	RS-422 or RS-485, 1 channel (insulated)	<b>AFP7CCM1</b>
	RS-422 or RS-485, 2 channels (insulated)	<b>AFP7CCM2</b>
	RS-232C, 1 channel (insulated) and RS-485, 1 channel (insulated)	<b>AFP7CCS1M1</b>
	Ethernet 100Base-TX / 10Base-T	<b>AFP7CCET1</b>
FP7 function cassettes	Analog input, 2 channels, voltage / current	<b>AFP7FCAD2</b>
	Analog input and output, input: 2 channels, output: 1 channel	<b>AFP7FCA21</b>
	Thermocouple input, 2 channels K / J	<b>AFP7FCTC2</b>

**Power supply units**

Product name	Input specifications	Output specifications	Other functions	Part No.
FP7 power supply units	100-240 V AC	24 V DC, 1.0 A	System error alarm output contact	<b>AFP7PSA1</b>
	100-240 V AC	24 V DC, 1.8 A	System error alarm output contact and remaining lifespan counting function	<b>AFP7PSA2</b>

Note: Power supply unit cannot be used with the **AFP7CPS21** CPU unit.

**Input and output units**

Product name	Type	Number of points	Connection method	Specifications	Part No.	
FP7 input units	DC input	16 points	Terminal block	12 to 24 V DC, common polarity: +/- common, input time constant setting	<b>AFP7X16DW</b>	
		32 points	MIL connector	24 V DC, common polarity: +/- common, input time constant setting	<b>AFP7X32D2</b>	
		64 points	MIL connector	24 V DC, common polarity: +/- common, input time constant setting	<b>AFP7X64D2</b>	
FP7 output units	Relay output	16 points	Terminal block	2 A/point, 5 A/common, 16 points/common (without relay socket)	<b>AFP7Y16R</b>	
		Transistor output, sink (NPN)	16 points	Terminal block	Load current: 1.0 A, 5 A/common, 16 points/common	<b>AFP7Y16T</b>
			32 points	MIL connector	Load current: 0.3 A, 3.2 A/common, 32 points/common	<b>AFP7Y32T</b>
	Transistor output, source (PNP)	64 points	MIL connector	Load current: 0.3 A / 0.1 A mixed, 3.2 A /common, 32 points/common	<b>AFP7Y64T</b>	
		16 points	Terminal block	Load current: 1.0 A, 5 A/common, 16 points/common	<b>AFP7Y16P</b>	
		32 points	MIL connector	Load current: 0.3 A, 3.2 A/common, 32 points/common	<b>AFP7Y32P</b>	
FP7 input and output mixed units	DC input transistor output, sink (NPN)	16 points	MIL connector	Load current: 0.3 A / 0.1 A mixed, 3.2 A /common, 32 points/common	<b>AFP7Y64P</b>	
		32 points	MIL connector	Load current: 0.3 A / 0.1 A mixed, 3.2 A /common, 32 points/common	<b>AFP7Y64P</b>	
	DC input transistor output, source (PNP)	Input: 32 points Output: 32 points	MIL connector	Input: 24 V DC, 32 points/common Output: load current: 0.3 A / 0.1 A mixed, 3.2 A/common, 32 points/common	<b>AFP7XY64D2T</b>	
	Input: 32 points Output: 32 points	MIL connector	Input: 24 V DC, 32 points/common Output: load current: 0.3 A / 0.1 A mixed, 3.2 A/common, 32 points/common	<b>AFP7XY64D2P</b>		

**Analog input and output units**

Product name	Specifications	Number of channels	Part No.
FP7 analog input unit (High-speed and multi-channel type)	Voltage / current, conversion rate: 25 μs/channel, resolution: max. 16 bits, accuracy: ±0.1 % F.S. or less (at +25 °C +77 °F)	8 channels	<b>AFP7AD8</b>
FP7 analog input unit (High-speed and high-accuracy type)	Voltage / current, conversion rate: 25 μs/channel, resolution: max. 16 bits, accuracy: ±0.05 % F.S. or less (at +25 °C +77 °F), insulation between channels	4 channels	<b>AFP7AD4H</b>
FP7 analog output unit (High-speed and high-accuracy type)	Voltage / current, conversion rate: 25 μs/channel, resolution: max. 16 bits, accuracy: ±0.05 % F.S. or less (at +25 °C +77 °F), insulation between channels	4 channels	<b>AFP7DA4H</b>

Note: Please note that the digital converted value corresponding to about 2 V of analog input is stored in the input relay area (WX) for channels which are not connected to input when setting the voltage range with **AFP7AD8**.

FIBER SENSORS  
 LASER SENSORS  
 PHOTO-ELECTRIC SENSORS  
 MICRO PHOTO-ELECTRIC SENSORS  
 AREA SENSORS  
 SAFETY LIGHT CURTAINS / SAFETY COMPONENTS  
 PRESSURE / FLOW SENSORS  
 INDUCTIVE PROXIMITY SENSORS  
 PARTICULAR USE SENSORS  
 SENSOR OPTIONS  
 SIMPLE WIRE-SAVING UNITS  
 WIRE-SAVING SYSTEMS  
 MEASUREMENT SENSORS  
 STATIC CONTROL DEVICES  
 LASER MARKERS  
**PLC**  
 HUMAN MACHINE INTERFACES  
 ENERGY MANAGEMENT SOLUTIONS  
 FA COMPONENTS  
 MACHINE VISION SYSTEMS  
 UV CURING SYSTEMS

Applications  
 PLC  
 Software  
 Program Transfer  
 Others  
**FP7**  
 FP-X0  
 FP0R  
 FPΣ  
 FP-X  
 FP2SH  
 FP-e

## PRODUCT TYPES

### Temperature input units

Product name	Specifications	Number of channels	Part No.
<b>FP7 thermocouple multiple analog input unit</b>	Thermocouple (K, J, T, N, R, S, B, E, PLII and WRe5-26), voltage / current, conversion rate: 5 ms/channel, resolution: max. 16 bits, accuracy: $\pm 0.1\%$ F.S. (at +25 °C +77 °F), insulation between channels	8 channels	<b>AFP7TC8</b>
<b>FP7 resistance temperature detector input unit</b>	Resistance temperature detector (Pt100, JPt100 and Pt1000), conversion rate: 25 ms/channel, accuracy: $\pm 0.1\%$ F.S. (at +25 °C +77 °F), insulation between channels	8 channels	<b>AFP7RTD8</b>

Note: The temperature input units are compatible with the **FP7** CPU units with firmware of Ver. 2.0 or later on p. 1288. The compatible version of **Control FPCWIN GR7** is 2.2 or later.

### Multi input and output unit

Product name	Specifications			Part No.
	Number of points	Connection method	Functions	
<b>FP7 multi input and output unit</b>	Input: 16 points Output: 16 points	MIL connector	Input: total 16 points, DC input: max. 16 points, high-speed counter: max. 4 channels (1 channel: 4 points), interrupt input: max. 8 points Output: total 16 points, transistor output: max. 16 points, pulse output: max. 4 channels (Note) (1 channel: 2 points), PWM output: max. 4 channels (1 channel: 1 point), comparison output: max. 8 points, positioning: max. 4 channels ( <b>AFP7MX32DWDH</b> only)	<b>AFP7MX32DWD</b>
	Positioning type			<b>AFP7MX32DWDH</b>

Note: Trapezoidal control with acceleration / deceleration not yet supported.

### High-speed counter units

Product name	Specifications				Part No.
	Input time constant	Number of counters	Counter type	Input type	
<b>FP7 high-speed counter units</b>	Selection type	2 channels	Liner counter / ring counter	Individual input: 1 multiple, 2-multiple Direction discrimination input: 1 multiple, 2-multiple 2-phase input: 1 multiple, 2-multiple, 4-multiple	<b>AFP7HSC2T</b>
	Selection type	4 channels	Liner counter / ring counter	Individual input: 1 multiple, 2-multiple Direction discrimination input: 1 multiple, 2-multiple 2-phase input: 1 multiple, 2-multiple, 4-multiple	<b>AFP7HSC4T</b>

### Positioning units

Product name	Specifications				Part No.
	Output type	Number of axes controlled	Operation speed	Functions	
<b>FP7 positioning units</b>	Transistor	2 axes	1 pps to 500 kpps	Electronic cam and electronic gear functions, linear interpolation, circular interpolation	<b>AFP7PP02T</b>
		4 axes			<b>AFP7PP04T</b>
	Line driver	2 axes	1 pps to 4 Mpps		<b>AFP7PP02L</b>
		4 axes			<b>AFP7PP04L</b>

### Pulse output units

Product name	Specifications			Part No.
	Output type	Number of axes controlled	Operation speed	
<b>FP7 pulse output units</b>	Transistor	2 axes	1 pps to 500 kpps	<b>AFP7PG02T</b>
		4 axes		<b>AFP7PG04T</b>
	Line driver	2 axes	1 pps to 4 Mpps	<b>AFP7PG02L</b>
		4 axes		<b>AFP7PG04L</b>

### Motion control units

Product name	Number of axis		Part No.
	Real axis	Virtual axis	
<b>FP7 motion control unit EtherCAT type</b>	16	8	<b>AFP7MC16EC</b>
	32	16	<b>AFP7MC32EC</b>
	64	32	<b>AFP7MC64EC</b>

\*EtherCAT is trademark or registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

### Serial communication unit

Product name	Number of communication cassette	Number of installations of CPU unit	Part No.
<b>FP7 serial communication unit</b>	Max. 2 cassettes	Max. 8 units	<b>AFP7NSC</b>

### PHLS (remote I/O) master unit

Product name	Max. points	Communication speed	Total distance	Max. number of connections	Part No.
<b>FP7 PHLS master unit</b>	1,008 points	6 Mbps / 12 Mbps	200 m <b>656 ft</b> (at 6 Mbps) / 100 m <b>328 ft</b> (at 12 Mbps)	63 slaves	<b>AFP7PHLSM</b>

**PRODUCT TYPES**

**PHLS (remote I/O) slave units**

Product name	Shape	Connection method	Type	Number of points	Specifications	Part No.
FP7 PHLS slave units	Standard type	Screw-type terminal block	DC input	8 points	24 V DC, common polarity: +, 8 points/common	AFPRP1X08D2
			DC input	16 points	24 V DC, common polarity: +, 16 points/common	AFPRP1X16D2
			Transistor output (sink)	16 points	Load current: 0.1 A, common polarity: -, 0.4 A/common, 16 points/common	AFPRP1Y16T
			DC input transistor output (sink)	Input: 8 points Output: 8 points	Input: 24 V DC, common polarity: +, 8 points/common Output: load current: 0.1 A, common polarity: -, 0.4 A/common, 8 points/common * Input / output common is shared.	AFPRP1XY16D2T
	Compact type	e-CON Connector-type terminal block	DC input	8 points	24 V DC, common polarity: +, 8 points/common	AFPRP2X08D2E
			DC input	16 points	24 V DC, common polarity: +, 16 points/common	AFPRP2X16D2
			Transistor output (sink)	16 points	Load current: 0.1 A, common polarity: -, 0.8 A/common, 16 points/common	AFPRP2Y16T
			Transistor output (sink)	Input: 8 points Output: 8 points	Input: 24 V DC, common polarity: +, 8 points/common Output: load current: 0.1 A, common polarity: -, 0.8 A/common, 8 points/common * Input / output common is shared.	AFPRP2XY16D2T
			Relay output	4 points	1 A / 1 point, 2 A/common, 2 points/common	AFPRP2Y04R

**Option**

Product name	Specifications	Part No.
FP-X backup battery (Common to FP-X)	Battery for back up of clock / calendar operation	AFPX-BATT

**Programming tools**

Product name	Type	Specifications	Part No.
Programming software for Windows® <b>Control FPIN GR7</b>	Japanese version	Supports only CPU without encryption function	AFPSGR7JP
	Security enhanced type	Supports both CPU with/without encryption function	AFPSGR7JPS
	English version	Supports only CPU without encryption function	AFPSGR7EN
	Security enhanced type	Supports both CPU with/without encryption function	AFPSGR7ENS
Programming software for Windows® <b>Control FPIN Pro7</b>	English, Japanese, Korean and Chinese	Supports all FP series PLCs (FP7 series: supports only CPU without encryption function)	AFPSPR7A
	Security enhanced type	Supports all FP series PLCs (FP7 series: supports both CPU with/without encryption function) * The encryption function will be offered in the future.	AFPSPR7AS

Notes: 1) Windows is registered trademark or trademark of Microsoft Corporation in the United States and other countries.  
2) When exporting to China, CPU unit without encryption function is required.

**Web screen creation tools**

Product name	Descriptions	Part No.
<b>Control Web Creator</b>	Windows version. Downloadable free of charge from our website. Please purchase Key unit separately.	AFPSWC
Key unit	License key for <b>Control Web Creator</b> . 1 license. For USB port.	AFPSWCKEY

Key unit  
**AFPSWCKEY**



\*Key unit is required to create Web content.  
You do not need Key unit to view Web content on a browser.

**Motion control setting tools**

Product name	Descriptions	Part No.
Motion control setting tool <b>Control Motion Integrator</b>	Windows version. Downloadable free of charge from our website. Please purchase Key unit separately.	AFPSMTJP
<b>Control Motion Integrator</b> Key unit	License key for <b>Control Motion Integrator</b> . 1 license. For USB port. Please purchase <b>Control Motion Integrator</b> if you use it after 60 days since installing it.	AFPSMTKEY

Key unit  
**AFPSMTKEY**



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MICRO PHOTO-ELECTRIC SENSORS

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**OPTIONS**

**Others**

Product name	Appearance	Descriptions	Part No.
End unit		Supplied with <b>FP7</b> CPU unit and expansion slave unit.	<b>AFP7END</b>
FP7 terminal block		Supplied with I/O unit and analog I/O unit with terminal block. (5 pieces)	<b>AFP7TER</b>
Discrete-wire connector set (40 leads)		Supplied with <b>FP7</b> input and output unit (MIL connector), high-speed counter unit, positioning unit and pulse output unit. (2 pieces)	<b>AFP2801</b>
Flat cable connector set (40 leads)		Supplied with <b>FP7</b> input and output unit (MIL connector), high-speed counter unit, positioning unit and pulse output unit. For simple connection using a flat cable. (2 pieces)	<b>AFP2802</b>
Multi-wire connector pressure contact tool		Necessary when wiring transistor output type connectors.	<b>AXY52000FP</b>
Motor driver I/F terminal II 1 shaft (Note)		Connectable MINAS series with <b>FP7</b> positioning unit, pulse output unit, <b>FPΣ</b> positioning unit, <b>FP2</b> positioning unit (multi-function type)	<b>AFP8503</b>
Motor driver I/F terminal II 2 shafts (Note)			<b>AFP8504</b>
MINAS A4 series / A5 series exclusive cable 1 m 3.281 ft		Connectable MINAS A4 series / A5 series with motor driver I/F terminal II	<b>AFP85151</b>
MINAS A4 series / A5 series exclusive cable 2 m 6.562 ft			<b>AFP85152</b>
Positioning connection cable 0.5 m 1.640 ft		Connectable <b>FP7</b> positioning unit, pulse output unit, <b>FPΣ</b> positioning unit, <b>FP2</b> positioning unit (multi-function type) with motor driver I/F terminal II	<b>AFP85100</b>
Positioning connection cable 1 m 3.281 ft			<b>AFP85101</b>

Note: Motor driver I/F terminal II (1 shaft and 2 shafts)

- Servo signal of **FP7** positioning unit and **FP7** pulse output unit can not be used.
- Please use the servo ON terminal of motor driver I/F terminal II.
- Timing input of **FP7** pulse output unit can not be used.

**Pressure contact for multi-wire**

Product name	Adapted cable size	Electric wire		Part No.
		Coated diameter	Remarks	
Pressure contact for multi-wire	AWG#22	ø1.5 to ø1.1 mm ø0.059 in to ø0.043 in	AWG#22: 12 wires / 0.18 stranded wire	<b>AXW7221FP</b>
	AWG#24		Stranded wire	
	AWG#26	ø1.3 to ø1.1 mm ø0.051 in to ø0.043 in	Stranded wire	<b>AXW7231FP</b>
	AWG#28		Stranded wire	

**OPTIONS**

**Connector terminals**

**Connector terminals recommended for use with the FP7**

●WAGO Company of Japan, Ltd

Connector terminal parts numbers

- PM-M32P-NR2081 <51308331> (straight, poles: 40P, for **FP7** circuits)
- PM-M32P-2081 <51308332> (angled, poles: 40P, for **FP7** circuits)
- IM-M2081-40PC-3A-FP <51308333> (angled, poles: 40P, one-to-one circuits)

**Connector terminals**



Cable parts numbers (MIL40P → MIL40P)

- PM-MM40SS-F1M <51227194> (Flexible cable)
- PM-MM40SU-F1M <51224816> (Flexible cable)
- PM-MM40SS-F1M-S <51255411> (Flexible cable / shielded)
- PM-MM40SU-F1M-S <51269259> (Flexible cable / shielded)
- PM-MM40SU-E1M <60254323> (Easy cable)

Notes: 1) With "SS" and "SU", the polar orientation of the cable is reversed on the PLC side MIL pole slot.  
2) Please inquire for lengths other than 1 m [3.281 ft.](#)

**Cables**



To learn more about connector terminals, please contact WAGO Company of Japan, Ltd  
<http://www.wago.co.jp/>

●TOYOGIKEN CO., LTD.

- PCN7-1H40 (crimping terminal type, poles: 40P)
- Cable: KB40N-1H1H-\*MB (AWG28, unshielded)
- \*Cable length (m ft): 0.5 [1.640](#) / 1 [3.281](#) / 1.5 [4.921](#) / 2 [6.562](#)

To learn more about connector terminals, please contact TOYOGIKEN CO., LTD.  
<http://www.togi.co.jp/en/>



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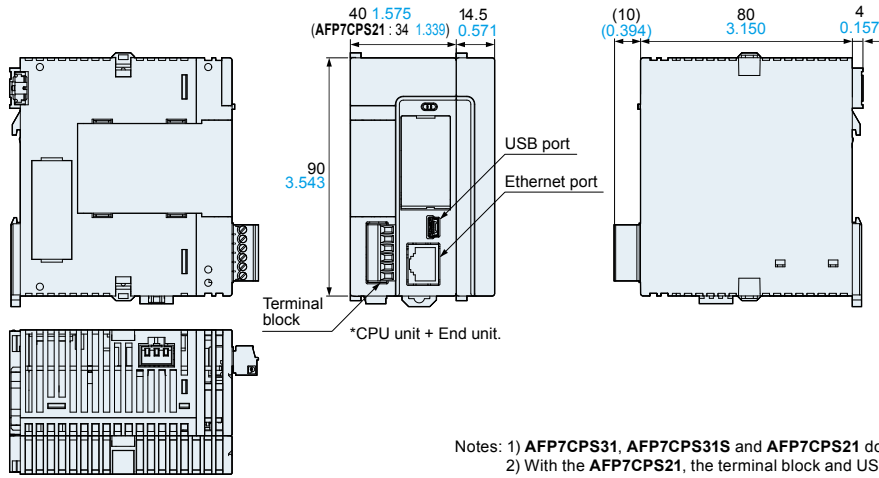


**DIMENSIONS (unit: mm in)**

The CAD data can be downloaded from our website.

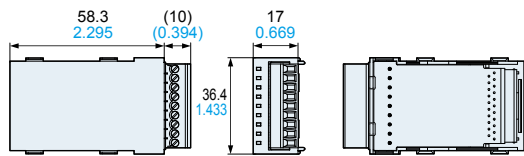
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**AFP7CPS41E AFP7CPS41ES AFP7CPS31E AFP7CPS31ES CPU units**  
**AFP7CPS31 AFP7CPS31S AFP7CPS21**

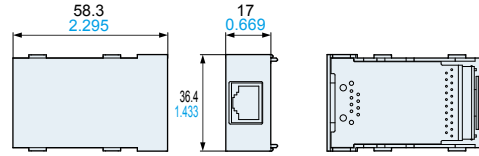


Notes: 1) AFP7CPS31, AFP7CPS31S and AFP7CPS21 do not have an Ethernet port.  
 2) With the AFP7CPS21, the terminal block and USB port are positioned differently.

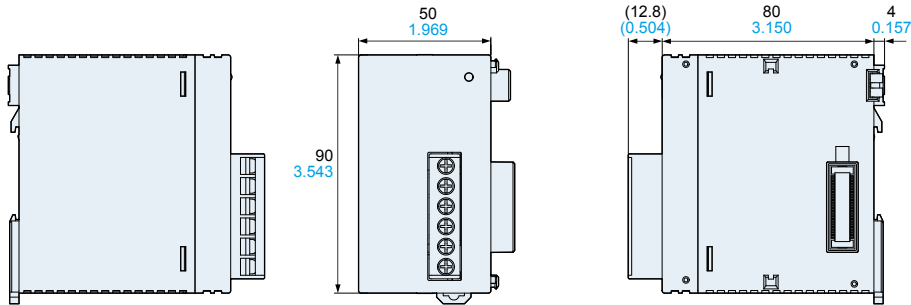
**AFP7CCS1 AFP7CCS2 AFP7CCM1 AFP7CCM2 Add-on cassettes**  
**AFP7CCS1M1 AFP7FCA21 AFP7FCAD2 AFP7FCTC2**



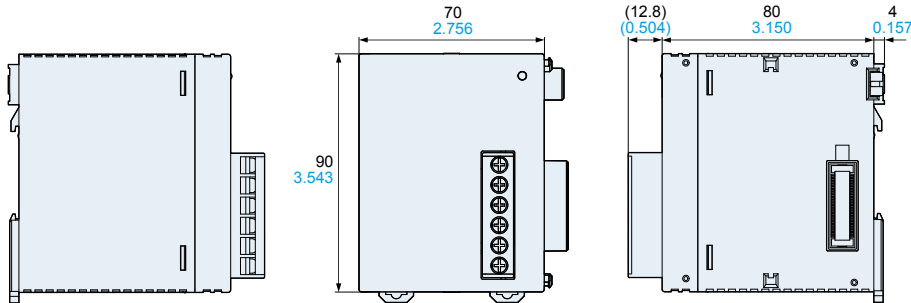
**AFP7CCET1 Add-on cassette**



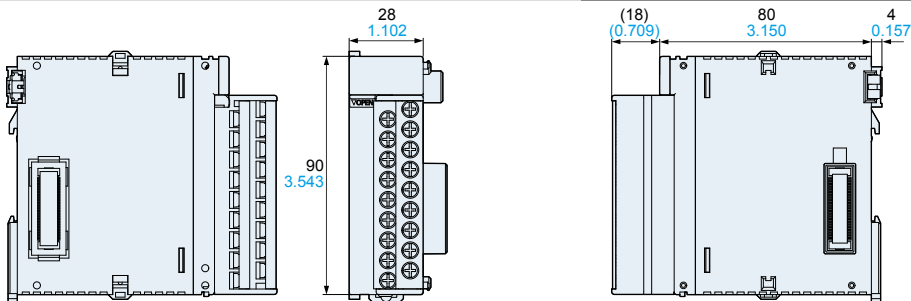
**AFP7PSA1 Power supply unit**



**AFP7PSA2 Power supply unit**



**AFP7X16DW AFP7Y16R AFP7Y16T AFP7Y16P AFP7AD4H AFP7AD8 AFP7DA4H Digital input and output units / Analog input and output units**

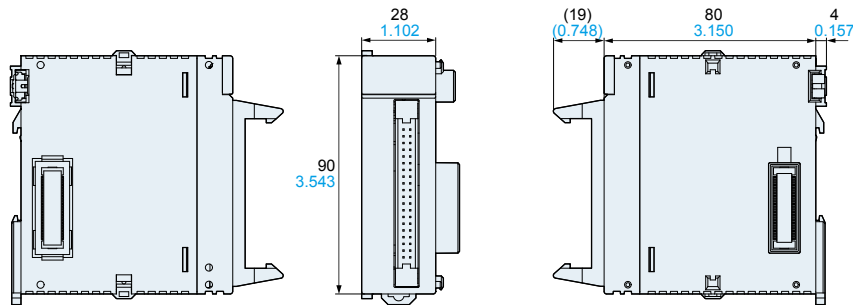


**DIMENSIONS (unit: mm in)**

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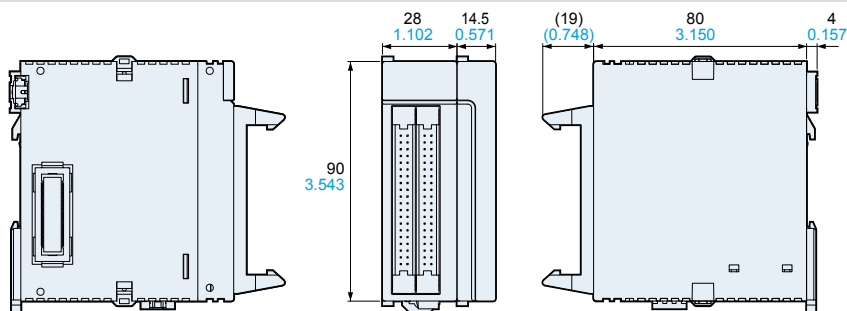
**AFP7EXPM AFP7X32D2 AFP7Y32T AFP7Y32P AFP7MXY32DWD**  
**AFP7MXYDWDH AFP7HSC2T AFP7PP02T AFP7PP02L AFP7PG02T AFP7PG02L**

Expansion master unit / Digital input and output units / Multi input and output units / High-speed counter unit / Positioning units / Pulse output units



**AFP7EXPS**

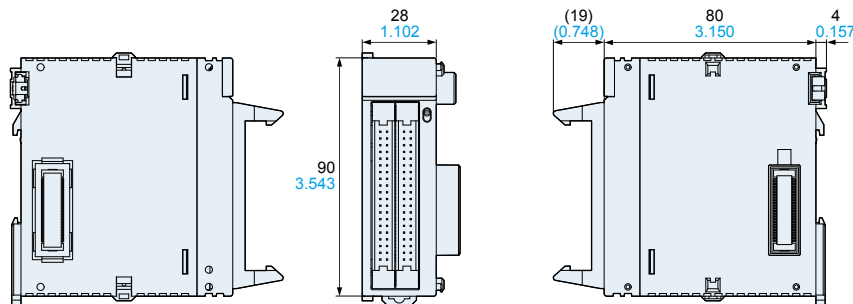
Expansion slave unit



\*Expansion slave unit + End unit.

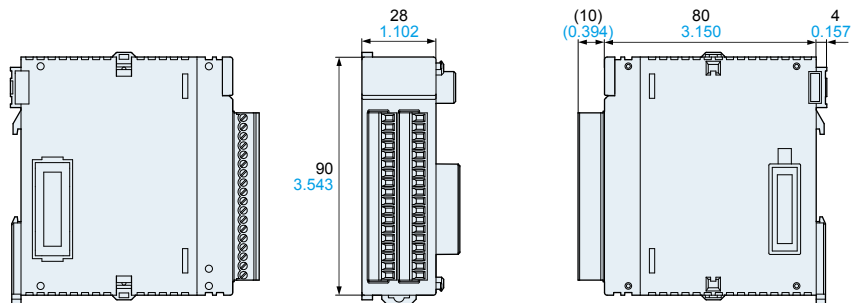
**AFP7X64D2 AFP7Y64T AFP7Y64P AFP7XY64D2T AFP7XY64D2P**  
**AFP7HSC4T AFP7PP04T AFP7PP04L AFP7PG04T AFP7PG04L**

Digital input and output units / High-speed counter unit / Positioning units / Pulse output units



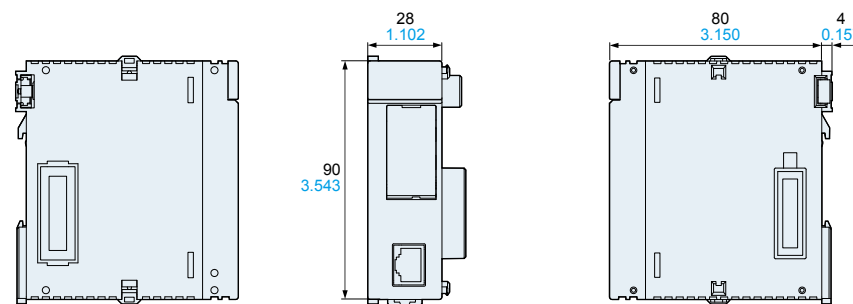
**AFP7TC8 AFP7RTD8**

Temperature input units



**AFP7MC16EC AFP7MC32EC AFP7MC64EC**

Motion control units



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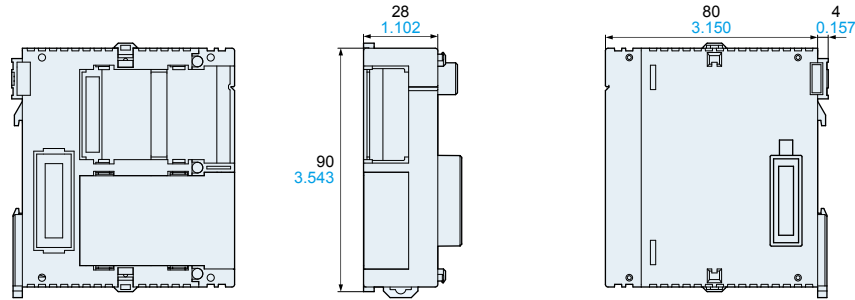
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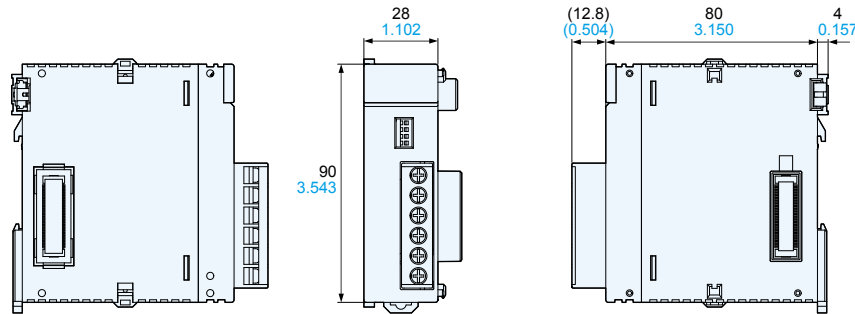
**AFP7NSC**

Serial communication unit



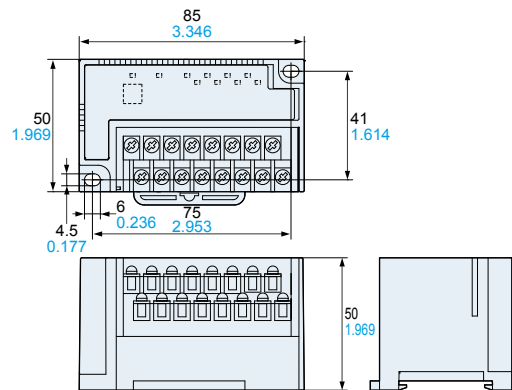
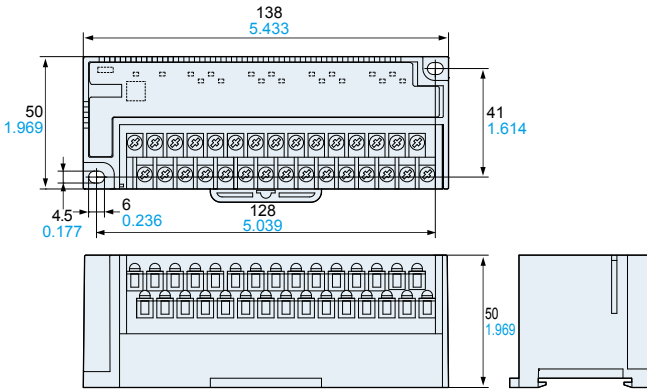
**AFP7PHLSM**

PHLS master unit



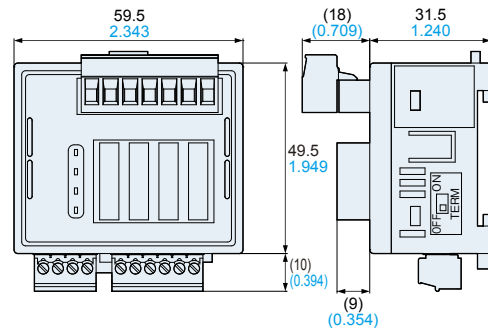
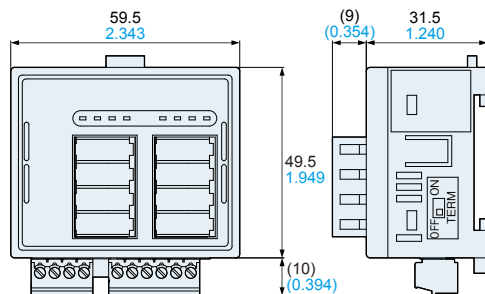
**AFPRP1X16D2 AFPRP1Y16T AFPRP1XY16D2T** PHLS slave units (standard type)

**AFPRP1X08D2** PHLS slave unit (standard type)



**AFPRP2X08D2E** PHLS slave unit (e-CON)

**AFPRP2Y04R** PHLS slave unit (connector type and relay output)



**AFPRP2X16D2 AFPRP2Y16T AFPRP2XY16D2T** PHLS slave units (connector type)

