Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

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Panasonic

Programmable Controller

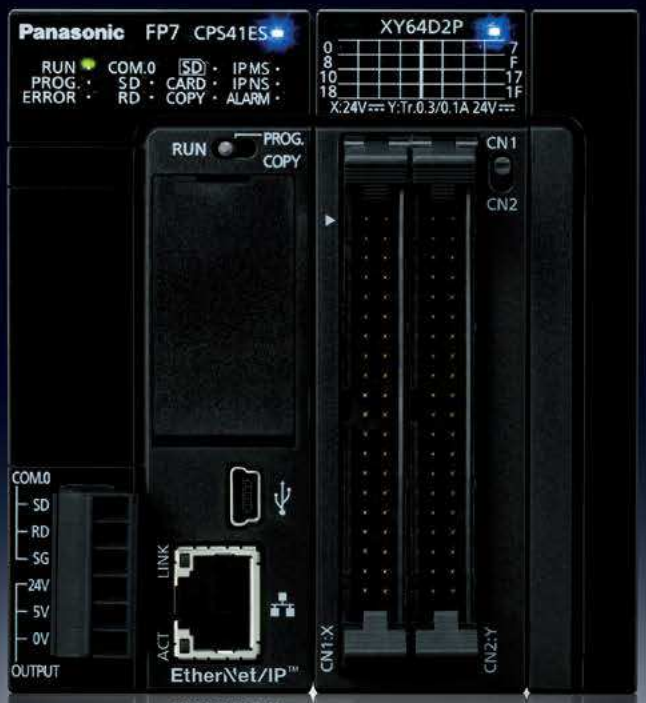
FP7 SERIES

CE Conforming to EMC Directive (except AFPRP2□)

c UL us Listing (except some models)

Automation Controls + Information

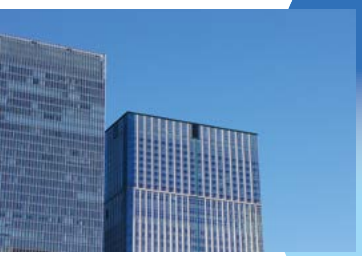
Panasonic PLCs also control information



2015.10 | panasonic.net/id/pidsx/global

Do more than just control machinery.

Automation Controls



Move

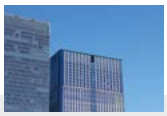
Collect **Store**

+ Information

Single PLC with two roles

Enter an era in which you can see the “current state” of the remote site.

Automation Controls


Move

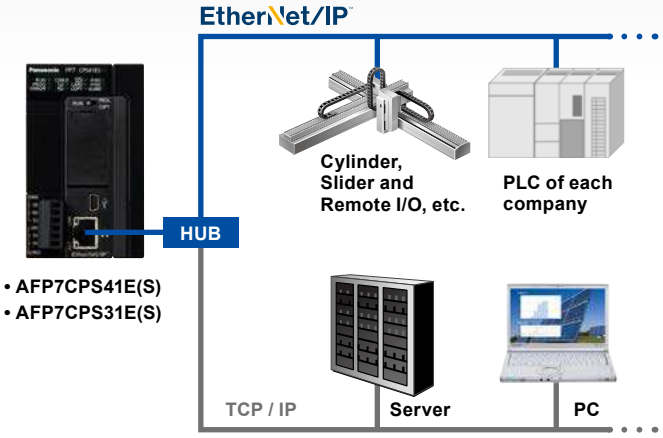
Control machinery and facilities

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

EtherNet/IP compatibility

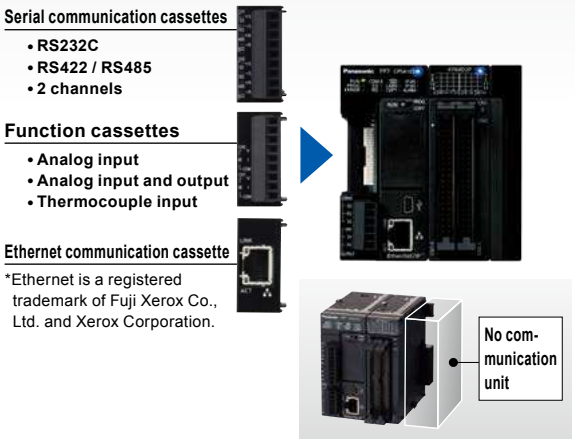
Models with built-in Ethernet ports add functionality to CPU unit.
Easy connection with all kinds of robots and PLCs enables control and communication.

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

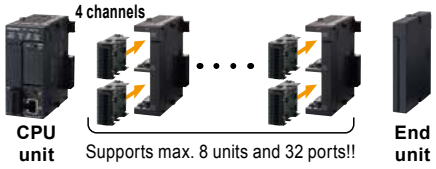


Cassette system reduces unit cost and footprint

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



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



High cost performance model CPU unit

Ideal for Simple Standalone Systems

Achieve high-performance extensibility, lower cost and slimmer form factor.

High cost performance model FP7 CPU unit
AFP7CPS21

Saves space and reduces cost

Another **FP7** advantage:
add-on cassette system
reduces unit cost and footprint.

Function cassettes
- Analog input
- Analog input and output
- Thermocouple input

Communication cassettes
- Serial
- Ethernet

16 intelligent units can be mounted

Low in cost, 16 intelligent units can be mounted.

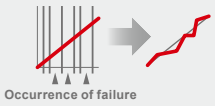
Analog input unit

Analog sampling that doesn't depend on CPU

Sampling and data collection in the analog unit!
Ideal for high-accuracy measurement applications because with the fixed cycle, analog signal can be held in the buffer

Dependent on scan of CPU

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



Sampling in the analog unit

Accurate sampling possible with fixed cycle.

- **Doesn't depend on CPU scanning**
- **Analog buffering**
- **High-speed conversion: 25 µs/ch**
- **Overall accuracy: ± 0.05 % F.S. (at +25 °C +77 °F)**

+ Information

Collect

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.

Communication method

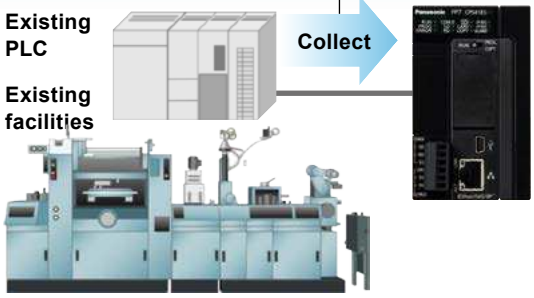
- **EtherNet/IP**
- **MC protocol**
- **Modbus (RTU and TCP)**

FP7

Existing PLC

Existing facilities

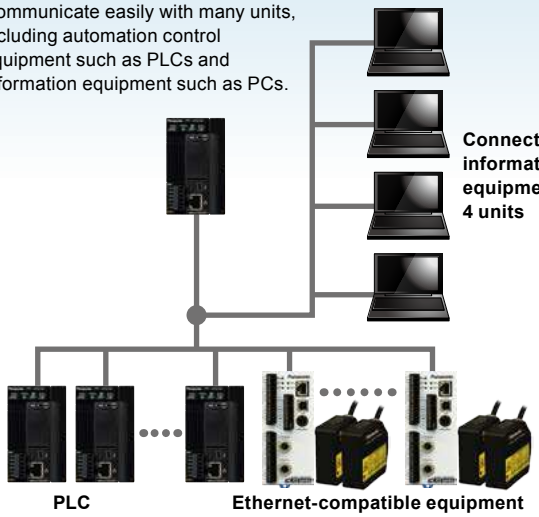
Collect



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.



Connection to information equipment: 4 units

PLC

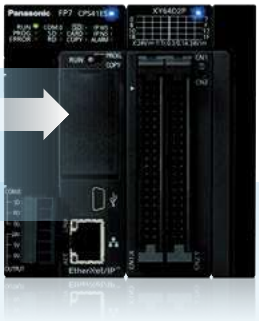
Ethernet-compatible equipment

Connection to automation control equipment: 216 units (Simultaneous connection: 16 units)

Store

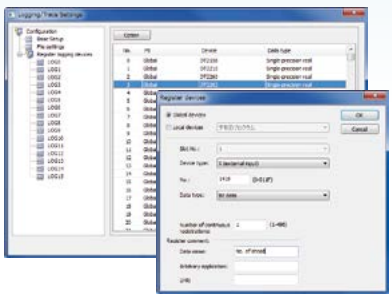
Logs collected information

The FP7 securely stores and carries out log 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.

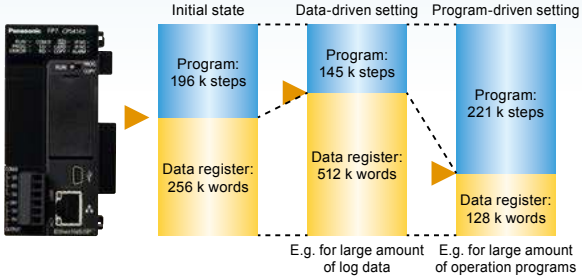
Protection of log data

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

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

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

Example: 196 k steps type CPU unit **AFP7CPS41E(S)**



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

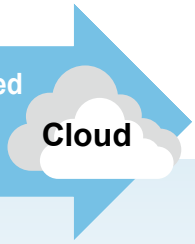
Note: For data register (DT), data up to 256 k words can be backed up.

+ Information

Transfer

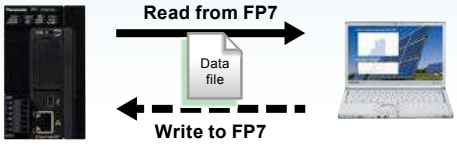
Information can be transferred to different types of media

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

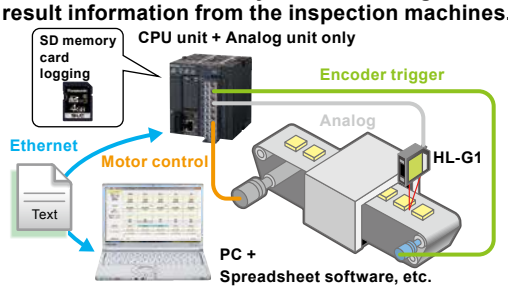


Information can be transferred to different types of media

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

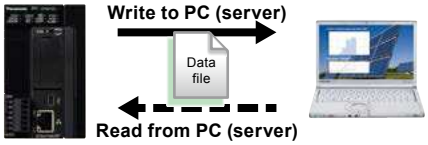


Manage your records by summarizing measurement data from your sensors together with result information from the inspection machines.



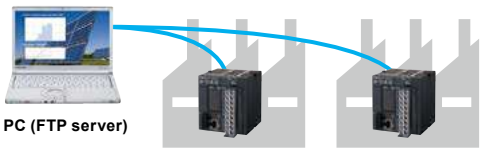
FTP(S) client function (SSL-compatible)

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.

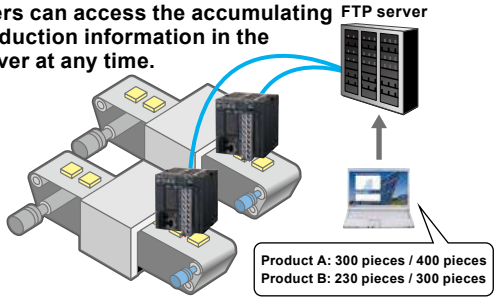


Data collection, data viewing and data writing from multiple units in the form of files

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

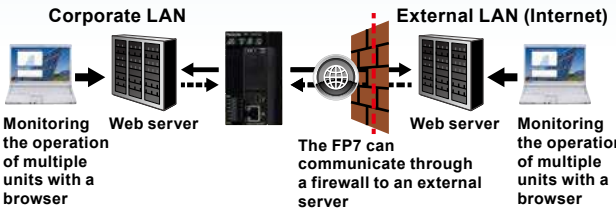


Users can access the accumulating production information in the server at any time.

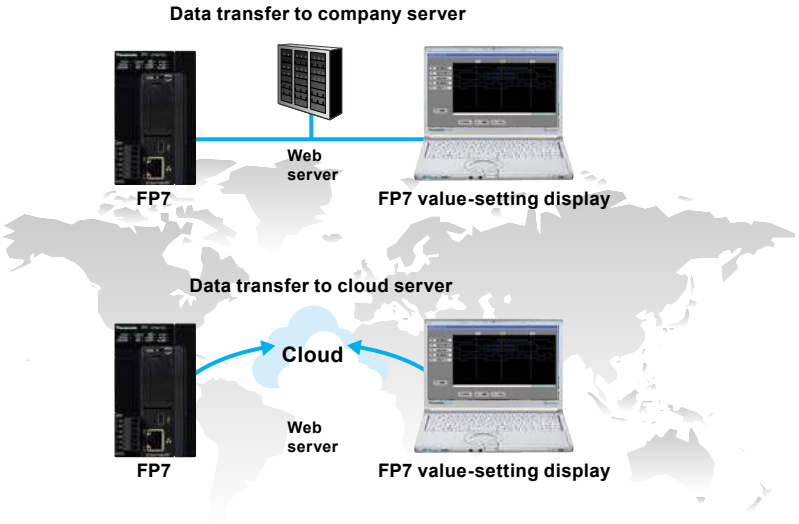


HTTP(S) client function (SSL-compatible)

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.



+ Information

Check

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.

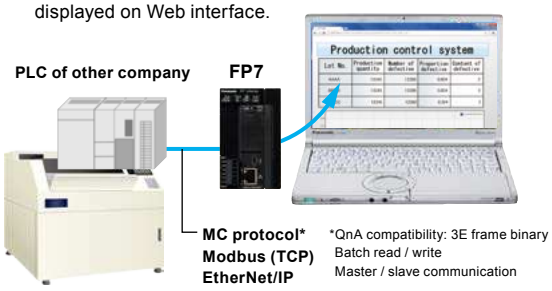
Operation can be monitored with a browser and control instructions can be sent from a browser.

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.

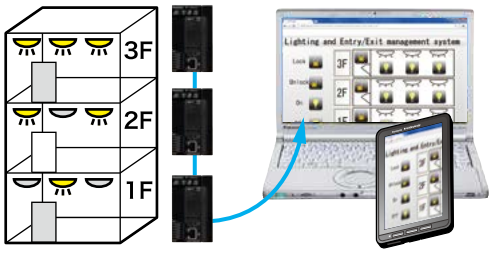
2. Operational status and production log management for production line

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.

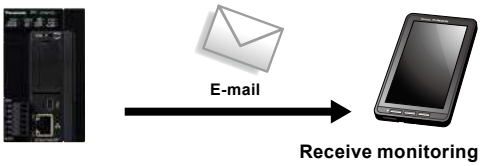


Information updates viewable in e-mail.

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

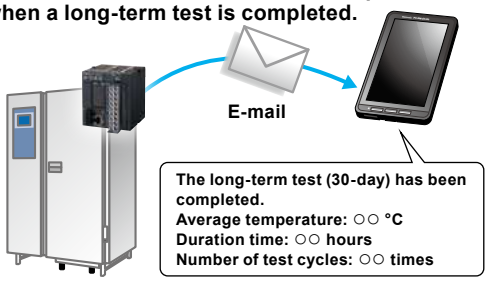
E-mail sending function (SSL-compatible)

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.

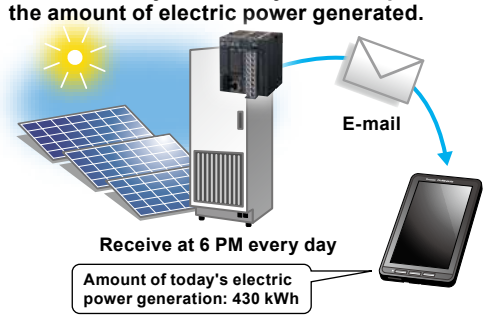


Receive monitoring e-mails.
Receive emergency e-mails.

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.

Maintenance

Historical archiving of program changes

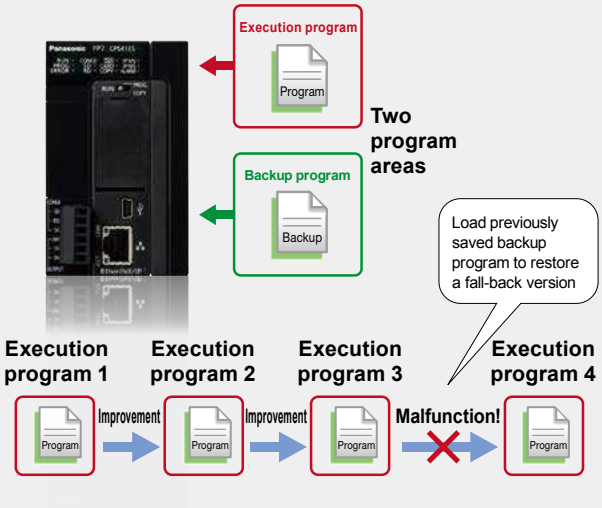
Operational events to CPU and program editing events are logged. Useful for debugging and tracing the cause of malfunctions

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

*Data logs are virtual.

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.

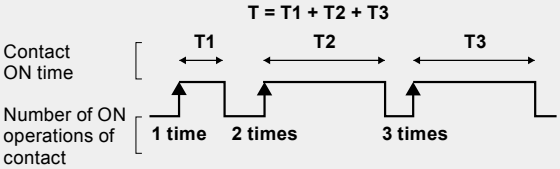


Set a maintenance schedule that is based on an automatic measurement of contact switching cycles or overall ON time.

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.

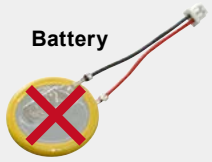


Records the PLC's ON time

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.

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.

Security and Compact design

Program level encryption ensures protection against copying program code.

Security enhanced type

Encrypted program

- **Programs cannot be decrypted.**
- **Even if the program is copied, it will not operate.**

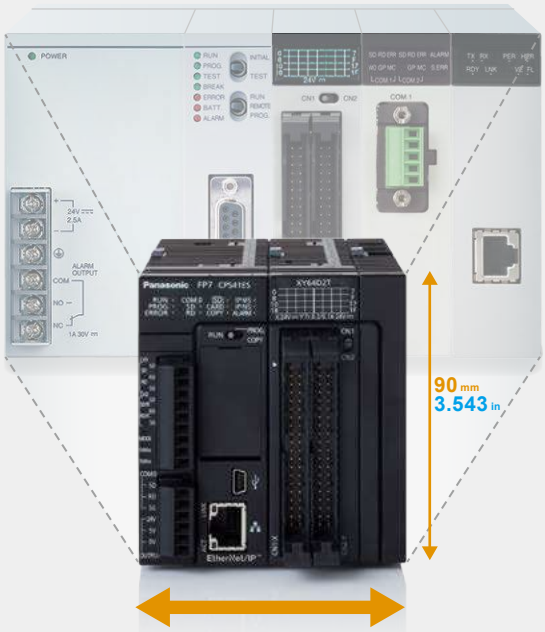
[Decryption key]

Activation is possible only if the decryption key on the **FP7** matches that of the program. (Copied programs will not be activated on other **FP7**.)

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.

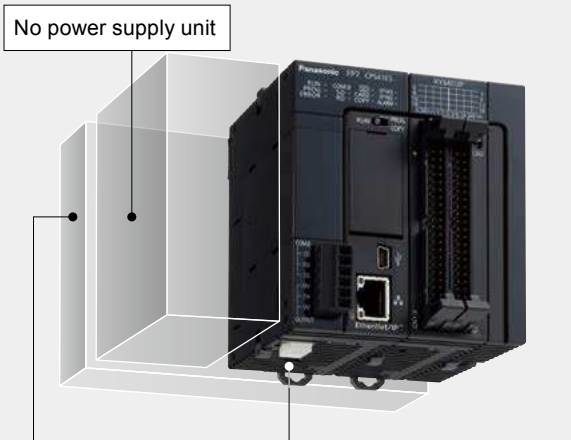
*When exporting to China, please use a CPU that does not have an encryption function.

A high performance PLC with a small footprint.



Space saving 83 mm 3.268 in

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



A 24 V DC power can be directly connected from the control panel.

*Add a power supply unit if AC power is required.

(Power supply unit cannot be used with **AFP7CPS21** CPU uint.)

FP7 series Lineup

CPU units
P.12

Standard model


EtherNet/IP
AFP7CPS41E


EtherNet/IP
AFP7CPS31E


AFP7CPS31


NEW
AFP7CPS21

Standard model
Security enhanced type


EtherNet/IP
AFP7CPS41ES


EtherNet/IP
AFP7CPS31ES


AFP7CPS31S

End unit


AFP7END
*Included with CPU unit and Expansion slave unit

Expansion units
P.13


NEW
Expansion master unit
AFP7EXPM


NEW
Expansion slave unit
AFP7EXPS

Power supply units
P.26

AC power supply units


AC power supply unit
AFP7PSA1


AC power supply unit (High-capacity type)
AFP7PSA2

Add-on cassettes
P.14 and 15

Communication cassettes


RS232C
1 channel
AFP7CCS1


RS232C
2 channels
AFP7CCS2


RS422 / RS485
1 channel
AFP7CCM1


RS422 / RS485
2 channels
AFP7CCM2


RS232C 1 channel and RS485 1 channel
AFP7CCS1M1


Ethernet
1 channel
AFP7CCET1

Function cassettes


Analog input
AFP7FCAD2


Analog input and output
AFP7FCA21


Thermocouple input
AFP7FCTC2

Serial communication unit
P.26


AFP7NSC
*Communication cassette is sold separately
*Dedicated serial communication

Digital input and output units
P.16 to 18

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
32 points, transistor output
(sink)
AFP7XY64D2T


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

Terminal block


AFP7TER
*included with I/O unit and Analog I/O unit with terminal block

Analog input and output units
P.19

Input units

Analog input unit
High-speed and high-accuracy type
4 points, voltage and current
AFP7AD4H

NEW
Analog input unit
High-speed and multi-channel type
8 points, voltage and current
AFP7AD8

Output unit

Analog output unit
High-speed and high-accuracy type
4 points, voltage and current
AFP7DA4H

Temperature input units
P.20

Thermocouple multiple analog input unit

Thermocouple input and analog input
AFP7TC8

Resistance temperature detector input unit

Resistance temperature detector input
AFP7RTD8

High-speed counter units
P.21

2 channels
16 MHz (for 2-phase, 4-multiple)
4 MHz (for individual input)
AFP7HSC2T

4 channels
16 MHz (for 2-phase, 4-multiple)
4 MHz (for individual input)
AFP7HSC4T

Positioning units
P.22

Pulse train

Transistor output
2 axes
500 kpps
AFP7PP02T

Transistor output
4 axes
500 kpps
AFP7PP04T

Line driver output
2 axes
4 Mpps
AFP7PP02L

Line driver output
4 axes
4 Mpps
AFP7PP04L

Pulse output units
P.23

Transistor output
2 axes
500 kpps
AFP7PG02T

Transistor output
4 axes
500 kpps
AFP7PG04T

Line driver output
2 axes
4 Mpps
AFP7PG02L

Line driver output
4 axes
4 Mpps
AFP7PG04L

PHLS (remote I/O) units
P.24 and 25

PHLS master unit

AFP7PHLSM

PHLS slave units
Input type

Compact type
(e-CON)
8 points, 24 V DC input
AFPRP2X08D2E

Compact type
(Connector-type terminal block)
16 points, 24 V DC input
AFPRP2X16D2

Standard type
(Screw-type terminal block)
8 points, 24 V DC input
AFPRP1X08D2

Standard type
(Screw-type terminal block)
16 points, 24 V DC input
AFPRP1X16D2

PHLS slave units
Output type

Compact type
(Connector-type terminal block)
16 points, transistor output (sink)
AFPRP2Y16T

Compact type
(Connector-type terminal block)
4 points, relay output
AFPRP2Y04R

Standard type
(Screw-type terminal block)
16 points, transistor output (sink)
AFPRP1Y16T

PHLS slave units
Input and output types

Compact type
(Connector-type terminal block)
8 points, 24 V DC input
8 points, transistor output (sink)
AFPRP2XY16D2T

Standard type
(Screw-type terminal block)
8 points, 24 V DC input
8 points, transistor output (sink)
AFPRP1XY16D2T

CPU units

Basic performance [For AFP7CPS41E(S)]

- Operation speed: Min. 11 ns/step
- Program capacity: 196 k steps
- Data registers: 256 k words
- Number of unit connection: Max. 16 units

Compact design and class-leading high performance

1. The function is expanded easily with cassette interface.

The function extension is possible without increasing the width of the unit.
The cassettes support RS232C, RS422 and RS485 for series communication, Ethernet communication and various analog input and output.

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

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

3. High performance (min. scan time 1ms, max. 20 µs for 60 k steps)

The processing speed is less susceptible to frequent Ethernet communication

4. All communications ports are safely isolated

Confidently use any port - RS422 / RS485 and LAN ports, as well as USB and RS232C ports - each is isolated.

5. High function types, increased security (encryption), are available.

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

Control specifications

Item		AFP7CPS41E(S) (Note 6)				
Memory capacity	Memory selection pattern (Note 1)	1	2	3 (Factory default)	4	5
	Program (steps) (Note 2)	234,000	221,500	196,000	144,500	51,500
	Data register (words) (Note 2)	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 6)			
Memory capacity	Memory selection pattern (Note 1)	1 (Factory default)	2	3	4
	Program (steps) (Note 2)	121,500	96,000	64,000	32,000
	Data register (words) (Note 2)	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 1)	1 (Factory default)	2
	Program (steps) (Note 2)	64,000	32,000
	Data register (words) (Note 2)	131,072	262,144
	Number of max. program block (PB)	128	64

Item	AFP7CPS41E(S) / AFP7CPS31E(S) / AFP7CPS31(S) / AFP7CPS21
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 (**AFP7CPS21**: 14 ns/step)
External input (X) / output (Y)	8,192 points (Note 4) / 8,192 points (Note 4)
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 **AFP7CPS21**
Constant scan	Available (0 to 125 ms)
Real time clock (Note 3)	Built in. Date backup with battery.
Battery life	3.3 years or more (at 25 °C 77 °F) (when no power is supplied) *except for **AFP7CPS21**
Security function (Note 5)	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) The factory default setting is pattern 3 for **AFP7CPS41E(S)** and pattern 1 for **AFP7CPS31E(S)**, **AFP7CPS31(S)** and **AFP7CPS21**.
2) For data register (DT), data up to 262,144 words can be backed up.
3) Precision of calendar; At 0 °C 32 °F, less than 95 seconds error per month, At 25 °C 77 °F, less than 15 seconds error per month, At 55 °C 131 °F, less than 130 seconds error per month
4) Hardware configuration governs the actually usable number of I/O points. When I/O points are not actually used, usable as internal relays.
5) Encryption can be used for **AFP7CPS41ES**, **AFP7CPS31ES** and **AFP7CPS31S**.
6) Products with an **"S"** at the end of a part number have the encryption function.

COM port communication specifications

Item	Specifications
Interface	RS232C, three-wire system, 1 channel (Note 1)
Transmission distance	15 m 49 ft
Transmission speed	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400 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: 1) 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 **GT** series Programmable Display
24 V (Note 2)	For 24 V DC type **GT** 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 check 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]

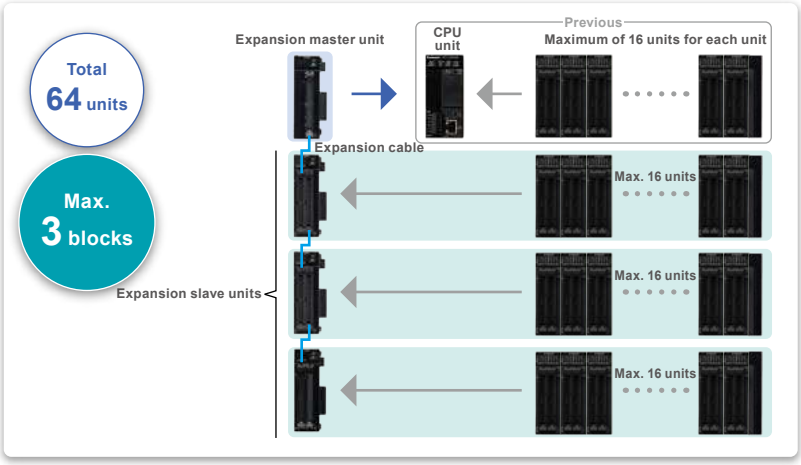
Item	Specifications
Communication interface	Ethernet 100BASE-TX / 10BASE-T
Baud rate	100 Mbps, 10 Mbps auto negotiation function
Total cable length	100 m 328 ft (500 m 1,640 ft when a repeater is used)
Number of nodes	Max. 254 units
Number of simultaneous connections	Max. 220 connections (user connection: 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 1)) Master communication (MEWTOCOL-COM, MEWTOCOL-DAT, MODBUS-TCP, MC protocol (Note 1))

Note: 1) 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.

Expansion units

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

Three blocks can be expanded on one CPU unit. Distributed installation achieved while maintaining high-speed bus transmission.



■ Specifications

Item	Product name / Part No.	Expansion master unit **AFP7EXPM**	Expansion slave unit **AFP7EXPS**
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 1.640 ft, 1 m 3.281 ft, 3 m 9.843 ft and 10 m 32.808 ft)	
	Total extension	Max. 30 m 98.425 ft (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
Net weight		120 g approx.	200 g approx. (including end unit)
Accessories		–	Power supply cable (Part No.: **AFPG805**) End unit (Part No.: **AFP7END**)

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.

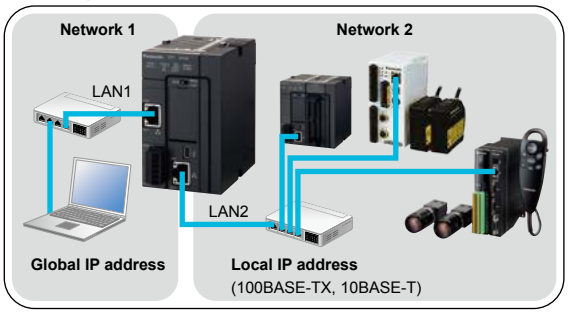
Add-on cassettes (communication cassettes)

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

1. Serial communication and Ethernet communication can be added to the CPU.

6 types are available including cassettes that support any combination of RS232C, RS485 and Ethernet.

[Configuration example]



2. Protocol supports MODBUS-RTU.

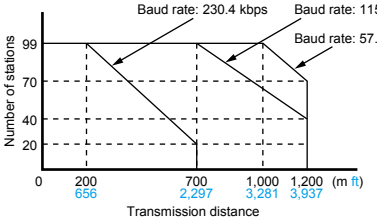
Communication can easily be accomplished using comfortable communication instructions.

■Specifications

Item	AFP7CCS1	AFP7CCS2 (Note 7)	AFP7CCM1 (Note 6)	AFP7CCM2 (Note 6)	AFP7CCS1M1	
Interface	RS232C, 1 channel	RS232C, 2 channels	RS422 or RS485, 1 channel	RS422 or RS485, 2 channels	RS232C, 1 channel and RS485, 1 channel	
Transmission distance	Max. 15 m 49 ft (Note 2)		Max. 1,200 m 3,937 ft at RS485 mode (Note 3 and 4) Max. 400 m 1,312 ft at RS422 mode (Note 3 and 4)		Max. 15 m 49 ft (RS232C) (Note 2)	Max. 1,200 m 3,937 ft (RS485) (Note 3 and 4)
Transmission speed	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400 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					
	End code: CR / CR + LF / none / ETX					
Data transmission order	Transmit from bit 0 in character units.					
Max. number of stations (Note 2, 3 and 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 RS485 / RS422 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.
2) Cable length should be no longer than 3 m 9.8 ft if communicating at a rate of 38.4 kbits/sec. or higher.
If you are using RS232C wiring, shielded cable should be used to improve noise immunity.
3) For RS485 setting, the values for transmission distance, transmission speed and number of connected units should be within the values noted in the graph below.

Maximum number of stations in RS485 communications



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 RS422 setting, you can set up a maximum transmission distance of 400 m 1,312 ft.

4) 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..
5) The converter SI-35 manufactured by LINE EYE Co., Ltd. is recommendable for the RS485 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.
6) RS422 or RS485 can be selected using the DIP switch built into the communication cassette.
7) Using the DIP switch built into the communication cassette allows the interface to be used as RS232C 5-wire system × 1 channel.
8) 1:1 for RS422 interface

Item	AFP7CCET1
Interface	Ethernet 100BASE-TX / 10BASE-TX
Communication speed	100 Mbps, 10 Mbps Auto negotiation function
Total cable length	100 m 328 ft (500 m 1,640 ft 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.

Add-on cassettes (function cassettes)

Add Analog I/O, temperature input function

1. 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)

2. Low cost addition of functions

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

ANALOG INPUT CASSETTE / ANALOG INPUT AND OUTPUT CASSETTE

■Input specifications (AFP7FCAD2 / AFP7FCA21)

	Item		AFP7FCAD2 / AFP7FCA21
Input specifications	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		• Between analog input terminal and internal digital circuit: transformer insulation, isolation IC insulation • Between analog input terminal and analog output terminal: transformer insulation, isolation IC insulation
	Connection method		Connector type terminal block

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

THERMOCOUPLE CASSETTE

■Specifications (AFP7FCTC2)

Item		AFP7FCTC2
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 32.36 °F (Display is 0.1 °C 32.18 °F 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 34.7 °F (0 to 55 °C 32 to 131 °F)
Input impedance		344 KΩ
Insulation method		• Between thermocouple input terminal and internal digital circuit: transformer insulation, isolation IC insulation • Between thermocouples: transformer insulation, isolation IC insulation
Connection method		Connector type terminal block

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

ANALOG INPUT AND OUTPUT CASSETTE

■Output specifications (AFP7FCA21)

	Item		AFP7FCA21
Output specifications	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		• Between analog input terminal and internal digital circuit: transformer insulation, isolation IC insulation • Between analog input terminal and analog output terminal: transformer insulation, isolation IC insulation
	Connection method		Connector type terminal block

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

Digital input and output units

* Photograph shows typical models for each shape.

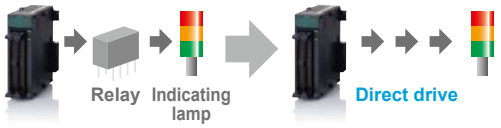
I/O points can be added as necessary.

1. Input/output mixed units are available.

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

2. 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.



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

Response speed 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.

■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	0.1 ms or less (Note)	0.2 ms or less (Note)		0.2 ms or less (Note)	
	ON→OFF	0.2 ms or less (Note)	0.2 ms or less (Note)		0.2 ms or less (Note)	
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)	

Note: Changeable by settable input time constant

■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			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)		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	
Repose 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	2×10^7 operations or more	–	–	–	–	–
	Electrical life	1×10^5 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)

■Output specifications

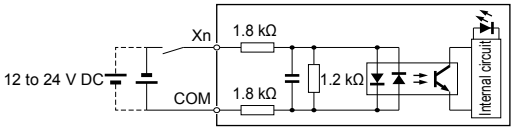
Item		Transistor output units		I/O mixed unit (output side)
		Source type (PNP open collector)		
		32 points type	64 points type	32 points type
Insulation method		Photocoupler		
Output type		Open collector		
Rated load voltage		5 to 24 V DC		
Load voltage allowable range		4.75 to 26.4 V DC		
Max. load current	0.3 A (Y0 to Y7)	0.3 A (26.4 to 20.4 V DC) 30 mA (4.75 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)		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)

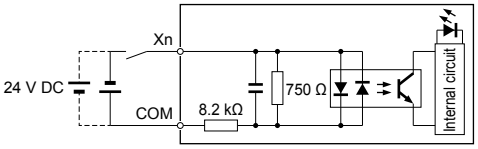
■I/O circuit diagrams

● DC input unit [input circuit diagrams]

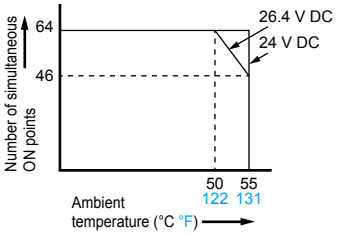
[16 points]



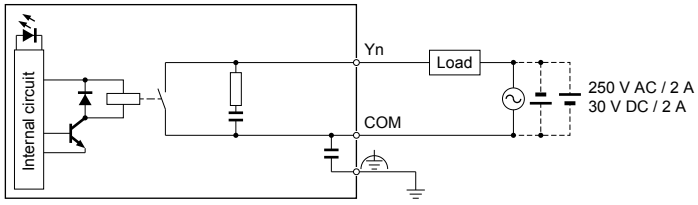
[32 points / 64 points]



Reduce simultaneous ON points according to the graph below.

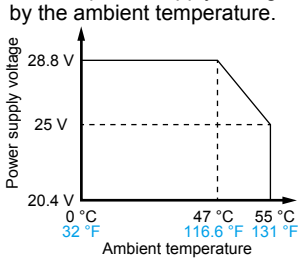


● Relay output unit [output circuit diagram]



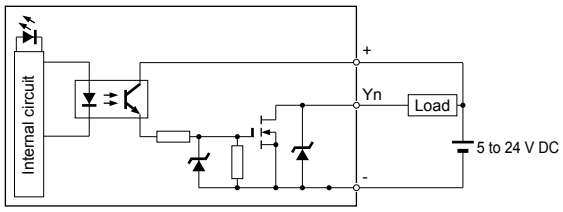
■Limitations on power supply voltage

Reduce power supply voltage according to the graph below by the ambient temperature.

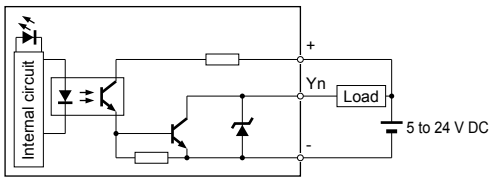


● Transistor output unit [output circuit diagram]

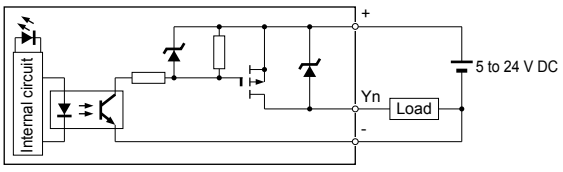
[Sink type, 16 points]



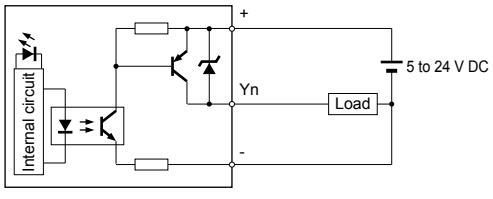
[Sink type, 32 points / 64 points]



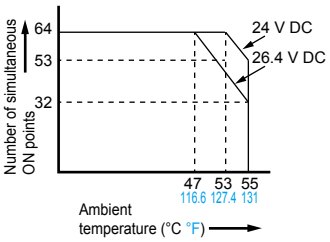
[Source type, 16 points]



[Source type, 32 points / 64 points]

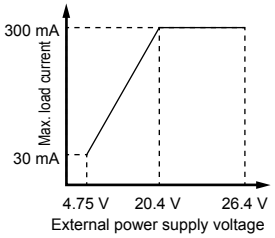


Limitations on simultaneous ON points [64 points]



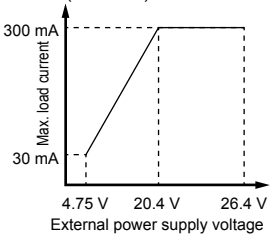
Note: Reduce load current according to the graph below by the external power supply voltage.

[32 points]

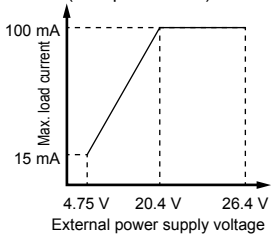


[64 points]

●0.3 A (Y0 to Y7)



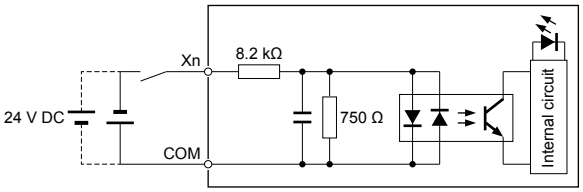
●0.1 A (except Y0 to Y7)



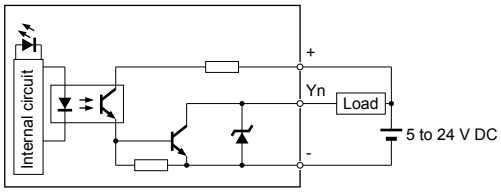
■I/O circuit diagrams

● I/O mixed unit [I/O circuit diagram]

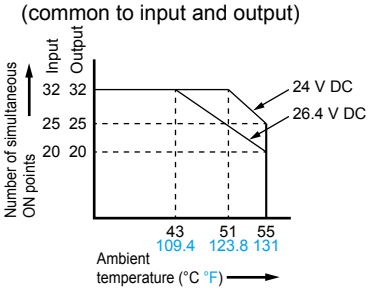
[Input circuit, sink type]



[Output circuit, sink type]

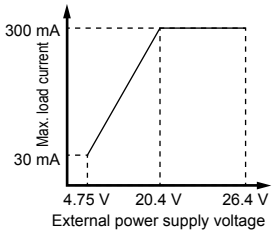


Limitations on simultaneous ON points (common to input and output)

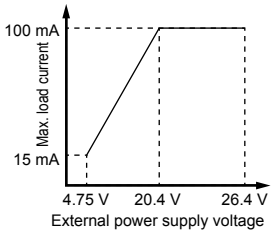


Note: Reduce load current according to the graph below by the external power supply voltage.

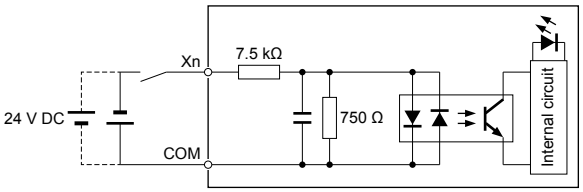
● 0.3 A (Y0 to Y7)



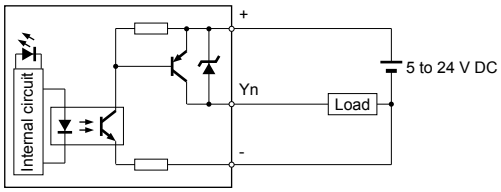
● 0.1 A (except Y0 to Y7)



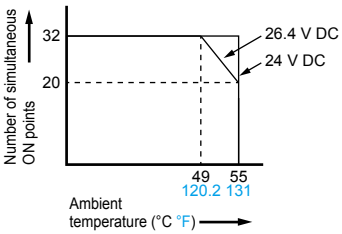
[Input circuit, source type]



[Output circuit, source type]

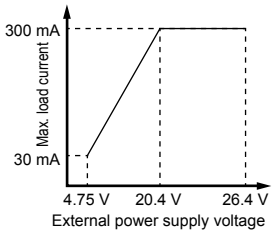


Limitations on simultaneous ON points (common to input and output)

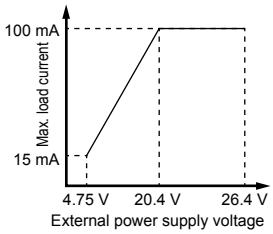


Note: Reduce load current according to the graph below by the external power supply voltage.

● 0.3 A (Y0 to Y7)



● 0.1 A (except Y0 to Y7)



Analog input and output units

Channel insulation is switchable to support various devices

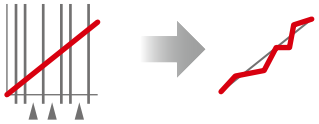
1. 20 times faster conversion than in previous model: 25 µs/channel

2. 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

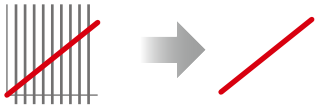
The scan gets delayed when the CPU slows down due to other processes and sampling becomes sporadic.



Occurrence of failure

Sampling in the analog unit

Accurate sampling possible with fixed cycle.



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

4. Noise-resistant with isolated channels

■Analog input specifications (AFP7AD4H / AFP7AD8)

Item \ Part No.			AFP7AD4H	AFP7AD8
Item	Number of channels		4 channels	8 channels
Input 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) (Note)	
	Current		0 to 20 mA (resolution: 1/31,250) 4 to 20 mA (resolution: 1/25,000) (Note)	
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)	±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)
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	

Note: 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.

Item \ 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
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

1. Easy to perform high-accuracy measurement

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

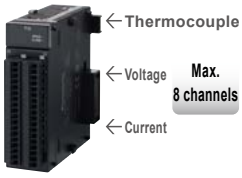
Averaging processing	Number of times, time, moving
Insulation	Channels are insulated from one another and from the internal circuit.
Simple setting	Initial settings can be completed on the configuration screen.

2. Capable of high-speed and high-accuracy temperature input

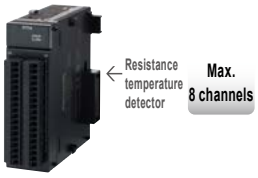
	High-speed conversion	High-accuracy
Thermocouple multiple analog input unit	5 ms/channel (high-speed mode) 25 ms/channel (normal mode)	±0.1 % F.S. (at 25 °C 77 °F) ±0.3 % F.S. (at 0 to 55 °C 32 to 131 °F)
Resistance temperature detector input unit	25 ms/channel (normal mode)	

3. 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.



Thermocouple multiple analog input unit



Resistance temperature detector input unit

■Specifications

Item \ Product name		Thermocouple multiple analog input unit
Part No.		AFP7TC8
Number of channels		8 channels
Input range (resolution)	Thermocouple (resolution: 0.1 °C 32.18 °F)	K1: -100.0 to 600.0 °C -148.0 to 1112.0 °F / K2: -200.0 to 1000.0 °C -328.0 to 1832.0 °F J1: -100.0 to 400.0 °C -148.0 to 752.0 °F / J2: -200.0 to 750.0 °C -328.0 to 1382.0 °F T: -270.0 to 400.0 °C -270.0 to 752.0 °F / N: -270.0 to 1300.0 °C -270.0 to 2372.0 °F R: 0.0 to 1760.0 °C 32.0 to 3200.0 °F / S: 0.0 to 1760.0 °C 32.0 to 3200.0 °F B: 0.0 to 1820.0 °C 32.0 to 3308.0 °F / E: -270.0 to 1000.0 °C -270.0 to 1832.0 °F PLII: 0.0 to 1390.0 °C 32.0 to 2534.0 °F / WRe5-26: 0.0 to 2315.0 °C 32.0 to 4199.0 °F
	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 33.8 °F (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.

Item \ Product name		Resistance temperature detector input unit
Part No.		AFP7RTD8
Number of channels		8 channels
Input range (resolution)	Resistance temperature detector (resolution: 0.1 °C 32.18 °F)	Pt100 (1): -100.0 to 200.0 °C -148.0 to 392.0 °F Pt100 (2): -200.0 to 650.0 °C -328.0 to 1202.0 °F JPt100(1): -100.0 to 200.0 °C -148.0 to 392.0 °F JPt100(2): -200.0 to 650.0 °C -328.0 to 1202.0 °F Pt1000: -100.0 to 100.0 °C -148.0 to 212.0 °F
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

High-speed counter units

One of the fastest in industry added in lineup

1. 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.

2. 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.

3. 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.

4. 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	4 channels type
Item \ Part No.			**AFP7HSC2T**	**AFP7HSC4T**
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) External output: 4 points (2 points/ch)	Control signal input: 8 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.

Positioning units

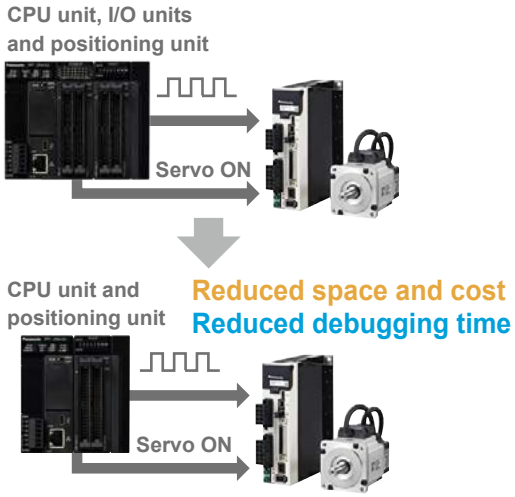
Combined multi-axle control can be achieved at reduced cost.

1. 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.

2. 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.



3. Dedicated configuration tool

Start positioning dedicated configuration tool using **Control FPWIN 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.

■Performance specifications

Item				Specifications			
				2 axes type		4 axes type	
Part No.				AFP7PP02T	AFP7PP02L	AFP7PP04T	AFP7PP04L
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 0.00001 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 (0.00001 inch): −10,737.41823 to +10,737.41823 inch inch (0.0001 inch): −107,374.1823 to +107,374.1823 inch degree (0.1 degree): −107,374,182.3 to +107,374,182.3 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			
			2-axis interpolation: 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			
			3-axis interpolation: 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)			
		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			
Stop function	Deceleration stop	Deceleration time	Deceleration time of running operation			
	Emergency stop	Deceleration time	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			
Synchronous operation function	Synchronous basic setting	Master axis	Existing axes, virtual axes or pulse input (1 to 4)			
		Slave axis	Max. 2 axes		Max. 4 axes	
	Electronic gear function	Operation setting	Gear ratio setting			
		Operation method	Direct method, Acceleration / deceleration method			
	Electronic clutch function	Clutch ON trigger	Contact input			
		Clutch method	Direct method, Linear slip method			
	Electronic cam function	Cam curve	Select from 20 types Multiple curves can be specified within a phase (0 to 100%).			
		Resolution	1024, 2048, 4096, 8192, 16384, 32768			
		Number of cam patterns	4 to 16 (Depends on resolution)			
Other specifications	Output mode		1 pulse output (pulse + direction), 2 pulse outputs (CW / CCW)			
	High-speed counter function (Note)	Countable range	−1,073,741,823 to +1,073,741,823 pulse			
		Input mode	Phase difference input, Direction distinction input, Individual input (transfer multiple available for each)			
	Built-in servo ON output					

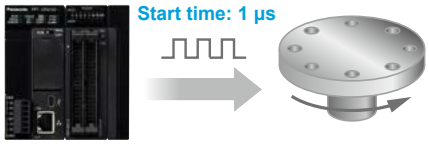
Note: Pulser input and high-speed counter functions cannot be used simultaneously, as the same pulse input terminal is used.

Pulse output units

Super high-speed positioning control achieved

1. Startup speed is fastest in industry*

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



2. Neater wiring to servo and amplifier

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

3. Replacement from FP2 series is easy

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

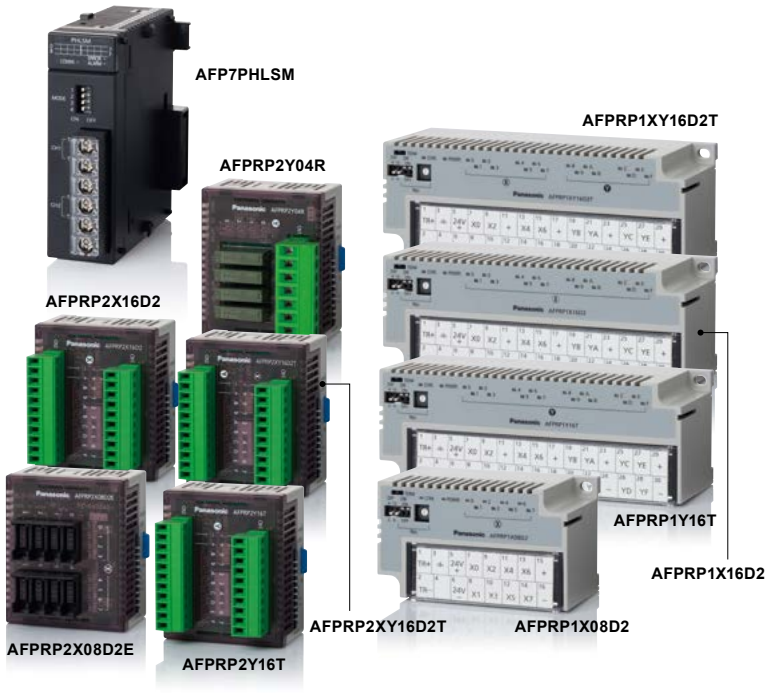
* Based on our research as of October, 2013

■Performance specifications

Item		AFP7PG02T	AFP7PG04T	AFP7PG02L	AFP7PG04L
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	Command units	Pulse (The program specifies whether increment or absolute is used.)			
	Max. pulse count	Signed 32 bits (+2,147,483,647 to -2,147,483,648 pulses)			
Speed command	Command range	1 pps to 500 kpps (can set in 1 pps)		1 pps to 4 Mpps (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 • Pulser input function (Note 2) transfer multiplication ratio (× 1, × 2, × 5, × 10, × 50, × 100, × 500, × 1000) • 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)			
	Input mode	Two-phase input, direction distinction input, individual input (with multiplier function mode)			
Other functions		• Startup using I/O contact • Built-in limit (+) and limit (−) • With servo ON output			
External power supply	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.

PHLS (remote I/O) units



Speedy, resistant to noise Remote I/O Line up

1. 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.

2. High resistance to noise
Data can be transferred accurately, even in inadequate wiring environments.

3. 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.

■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 656 ft (at 6 Mbps) / 100 m 328 ft (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.

■Input side specifications

Item		Specifications	
		Standard type	Compact type
Insulation method		Photocoupler insulation	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 (except relay)

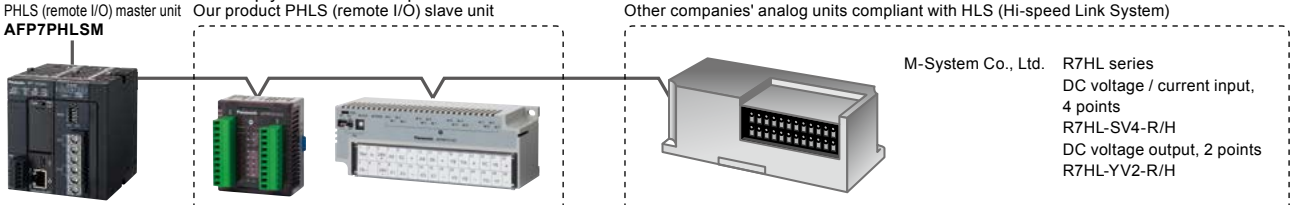
Item		Specifications	
		Standard type	Compact type (except relay)
Insulation method		Photocoupler insulation	Non-isolated
Output type		Sink type (Open collector output)	
Rated load voltage		20.4 to 28.8 V DC	
Max. control capacity		0.1 A/point	
Max. surge current		0.5 A	
OFF state leakage current		0.1 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	

■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 × 10^7 operations or more
	Electrical life	1 × 10^5 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.

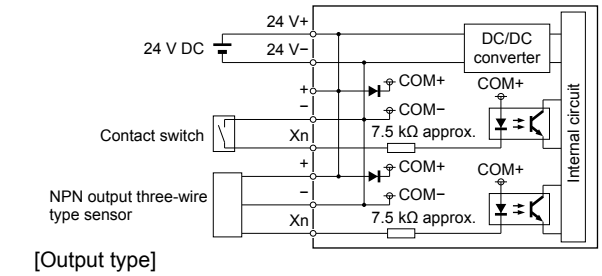
Communication method	Transmission speed	Connection method
Half-duplex communication (incompatible with full-duplex communication)	6 Mbps / 12 Mbps	Terminal block (connection via screw terminal)

■I/O circuit diagrams

● Standard type (screw-type terminal block)

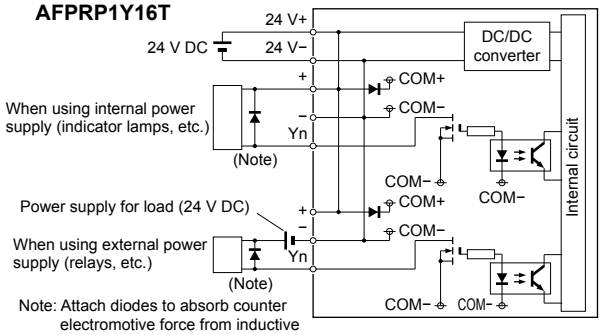
[Input type]

AFPRP1X08D2 / AFPRP1X16D2



[Output type]

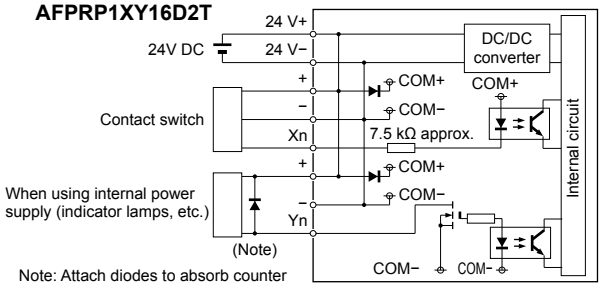
AFPRP1Y16T



Note: Attach diodes to absorb counter electromotive force from inductive load.

[I/O mixed type]

AFPRP1XY16D2T

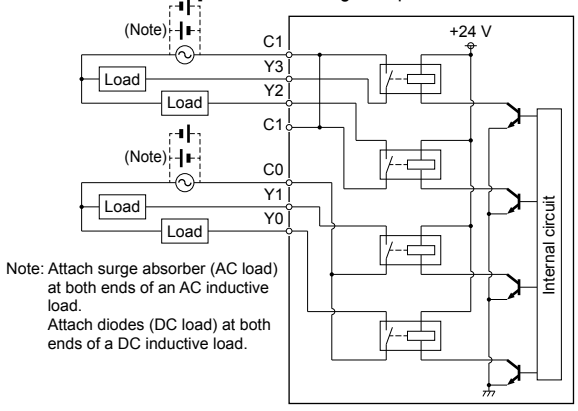


Note: Attach diodes to absorb counter electromotive force from inductive load.

● Compact type (relay output)

AFPRP2Y04R

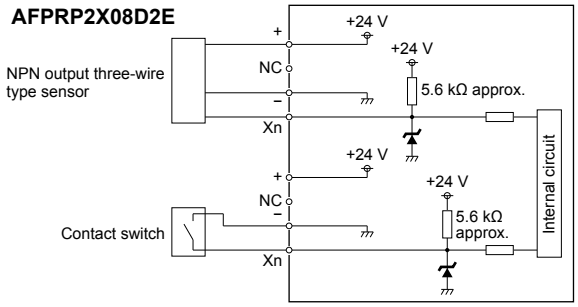
[When connecting to separated common terminal]



Note: Attach surge absorber (AC load) at both ends of an AC inductive load.
Attach diodes (DC load) at both ends of a DC inductive load.

● Compact type (e-CON)

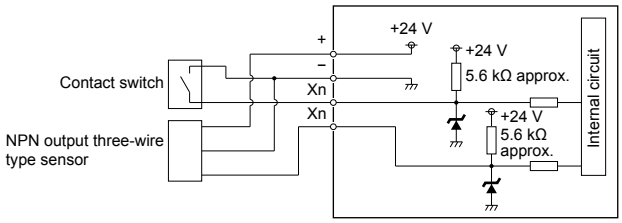
AFPRP2X08D2E



● Compact type (connector-type terminal block)

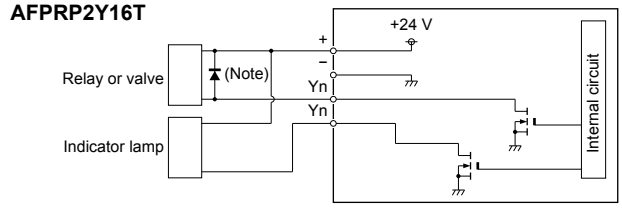
[Input type]

AFPRP2X16D2



[Output type]

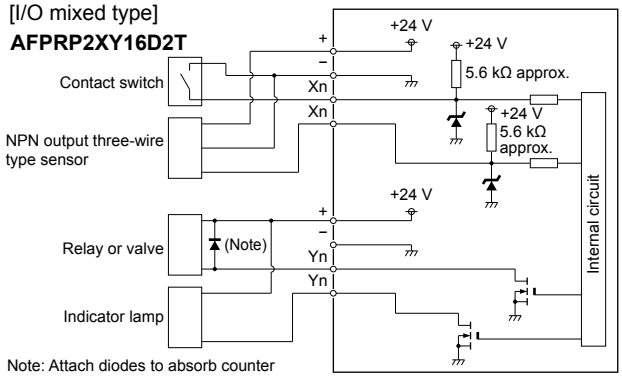
AFPRP2Y16T



Note: Attach diodes to absorb counter electromotive force from inductive load.

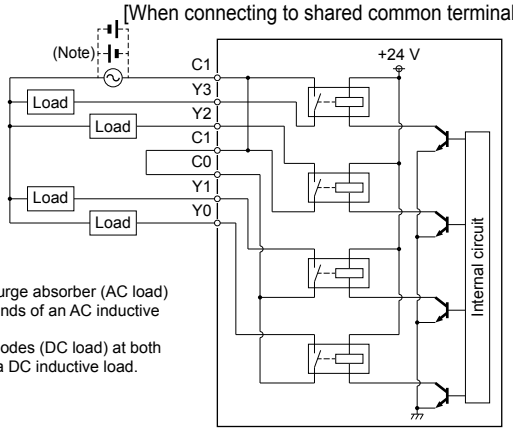
[I/O mixed type]

AFPRP2XY16D2T



Note: Attach diodes to absorb counter electromotive force from inductive load.

[When connecting to shared common terminal]



Note: Attach surge absorber (AC load) at both ends of an AC inductive load.
Attach diodes (DC load) at both ends of a DC inductive load.