

## Programmable Controller

FP0R SERIES



(Except with RS-485 port)

## The Standard of Ultra-compact PLCs

Large Capacity Program and Data Memory

Ultra-high Speed Processing

Multi-axis Control available without Expansion

Battery-less Automatic Backup of All Data



# FPO<sup>R</sup> brings Outstanding Functionality and the Ultra-compact Size

**Smallest class**

The control unit is small at 90 mm 3.54 in in height and 25 mm 0.98 in in width. Even when expanded with three expansion units, the total width only 100 mm 3.94 in.

The ultra-compact body size facilitates miniaturization of control panels. Perfect for desktop tools and inspection devices. Can be built into hand-carried devices.

**Ultra compact**  
I/O points  
Min. 10 points  
Max. 128 points

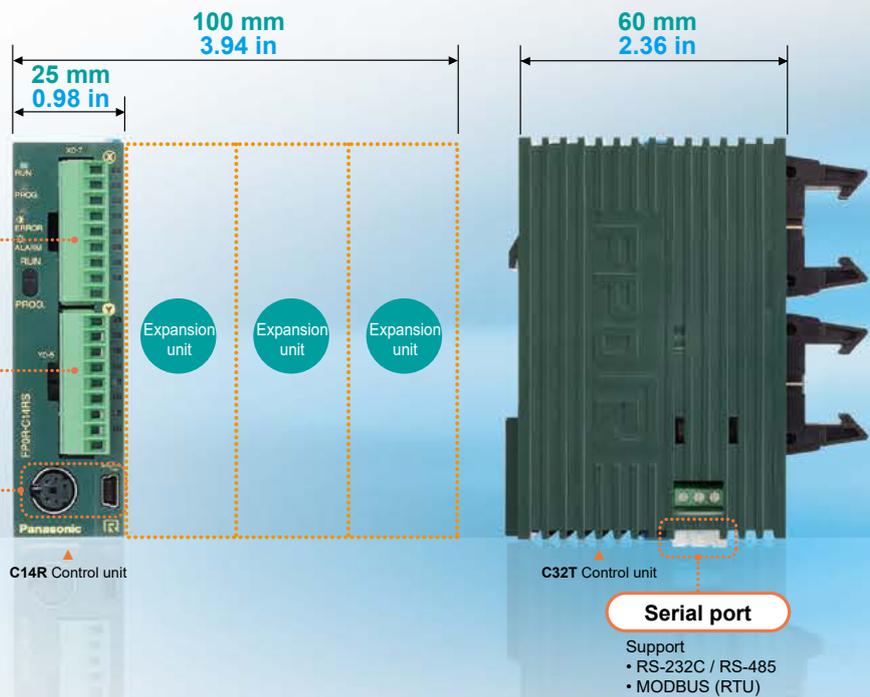
The number of I/O points is expandable up to 128 by adding three expansion units having 32 I/O points each to one control unit equipped with 32 I/O points.

**Input/Output terminals**

Only one cable is required for communications with the "Control FPWIN Pro7" or "Control FPWIN GR7" programming tool.

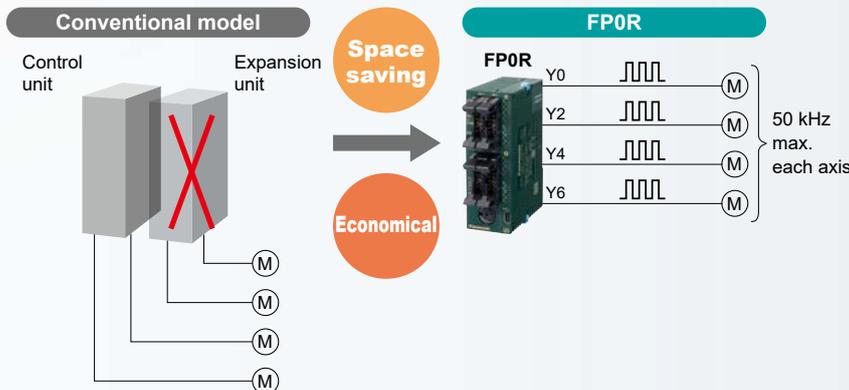
**Tool ports**

Equipped with both USB 2.0 and RS-232C ports.



## Multi-axis (4-axis) control is available without expansion units.

The built-in 4-axis pulse outputs allow multi-axis motor control without positioning units or other expansion units.



## Control of 31 servo motor shafts

Can be connected using a MINAS A6 series Panasonic Industry servo motor and Modbus RTU. Please refer to P. 5 for details.

## Full-fledged positioning functions

A variety of dedicated instructions enable high-accuracy positioning.

## Built-in high speed counter

A single-phase 6 points or 4 points (50 kHz max. each), 2-phase 3 points or 2 points (15 kHz max. each) high speed counter is built in.

## Ultra-high speed processing

Ultra-high speed: 80 ns/step (ST instructions)

\* Within a range of 0 to 3,000 steps. Processing of the 3,001st and later steps is 580 ns, 1.5 times faster than the conventional model.

Note: Unit expansion increases the base time.

Base scan time:  
I/O refresh + base time

Without expansion units: 0.2 ms or less

With expansion units: 0.2 ms or less + (1 x Number of expansion units) ms

# Performance in

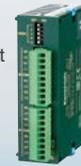


Worldwide simultaneous launch of the 3-year warranty  
For details, visit the following website:  
[www3.panasonic.biz/ac/efasys/warranty](http://www3.panasonic.biz/ac/efasys/warranty)

## Makeover for Analog Units Greatly Improved Performance, Extended Functions



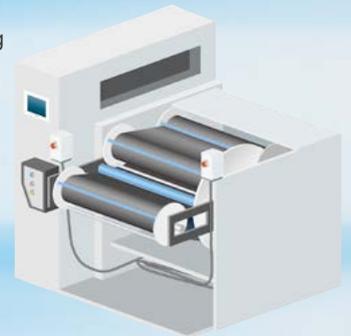
Analog 4 channels input unit  
**AFP0RAD4**  
Analog 2 channels input /  
1 channel output unit  
**AFP0RA21**



Analog 8 channels input unit  
**AFP0RAD8**  
Analog 4 channels output unit  
**AFP0RA4**  
Analog 4 channels input /  
2 channels output unit  
**AFP0RA42**

### Higher resolution: 14 bits (previously 12 bits)

Higher resolution: 12 bits → 14 bits (analog input, output)  
Higher precision: ±0.6 % → ±0.2 % (at 25 °C 77 °F)  
Achieve high-resolution analog control  
in applications such as film  
winding, tension control, winding  
speed control, and other  
operations.



### Enables move to multi-channel systems and optimization

Up to 8-channel input: Easier transition to multi-channel systems  
And, with free combination of input/output, systems can be optimized.

### Select among 6 input ranges (analog input unit) and 6 output ranges

Five selectable input settings: ±10 V, ±5 V, 0 to +10 V, 0 to +5 V, 0 to 20 mA  
(6 input setting: ±10 V, ±5 V, 0 to +10 V, 0 to +5 V, 0 to 20 mA and  
±100 mV, 6 output setting: ±10 V, ±5 V, 0 to +10 V, 0 to +5 V, 0 to 20  
mA and 4 to 20 mA)  
With ±10 V support it is even possible to control the rotation of motors.

### Easy backward compatibility

Use compatibility mode to retain existing ladder programming.  
You can use a DIP switch to enable compatibility mode, which allows  
operation at 12-bit resolution (using program resources).

### Can also be used with other PLCs outside the FP0R series

Use in connection with **FP0H**, **FP-XH**, and **FP-X0** series PLCs is  
possible.



## Battery-less automatic backup of all data

The F type (**FP0R-F32**) has a built-in FeRAM, which is a cutting-edge device that allows the automatic saving of all data without a backup battery.

- There is no need to worry about data loss after a long vacation.
- Battery replacement is no longer necessary when shipping or transferring the unit overseas.
- Replacement of equipment and restoration of idle equipment is easy.
- The unit can be powered off flexibly on weekends or at other non-operating times, promoting energy saving.

## Large capacity independent comment memory

Program maintenance and management become easier.

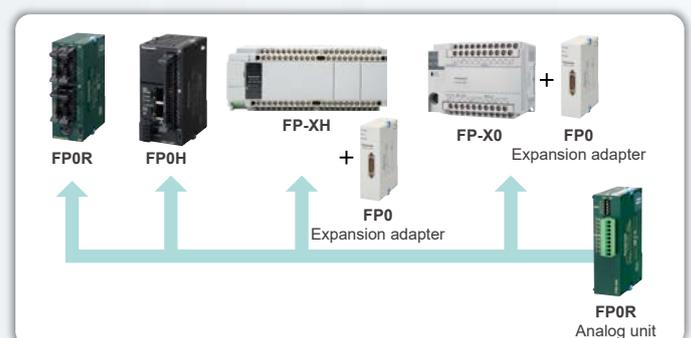
## USB tool port provided as standard equipment

Programming work becomes simpler, easier, and quicker, improving the production efficiency.

## Large capacity program

Program capacity: 32 k steps \*1, Data register: 32 k words \*1

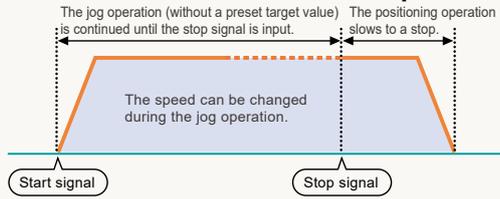
\*1: C10, C14 or C16 control unit: Program capacity of 16 k steps and data register of 12 k words



# POSITIONING

## Jog positioning control (F171 instruction)

The motion can be started without a preset target value. When a stop signal is input, the target value is set, and the motion is slowed to a stop.



**Useful for**

- Labelers: Stopping the motion at a constant distance from the point where a label end detection signal is triggered
- Processing machines: Stopping the motion at a constant distance from the point where a processing object edge detection signal is triggered, and cut/drill the object

## Changing the speed (available for F171 and F172 instructions)

The target speed can be changed by an external signal input during the jog operation or trapezoidal control operation.



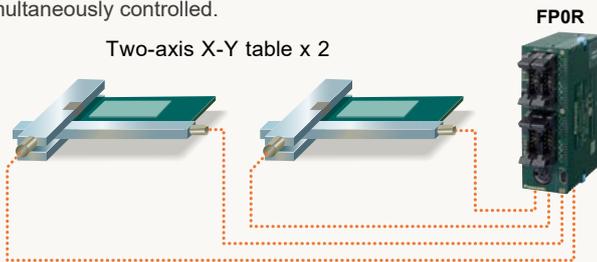
**Useful for**

- Speed synchronization of transfer or processing equipment.

## Built-in 4-axis pulse outputs (Transistor output type)

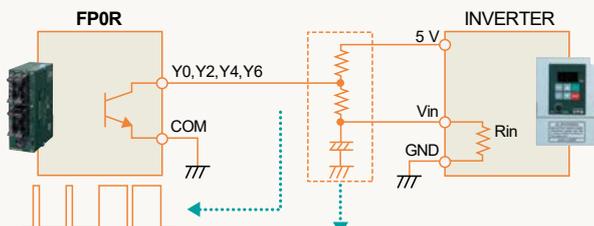
Two sets can simultaneously undergo two-axis linear interpolation.

No complicated speed calculation or programming is required. Two-axis linear interpolation is available by using the F175 dedicated instruction. Two sets such as two X-Y tables, for example, can be simultaneously controlled.



## Built-in multipoint PWM outputs (4 channels)

The pulse output port of FP0R can also serve as a PWM output port. One of the application examples is an analog voltage output, which can be used for inverter speed control.



The speed can be controlled by changing the ON width of the PWM output.

The unit can also serve as an analog voltage output when a smoothing capacitor is inserted in the circuit.

## Individual settings for acceleration and deceleration (available for F171, F172, and F174 instructions)

The acceleration time and deceleration time can be individually set.

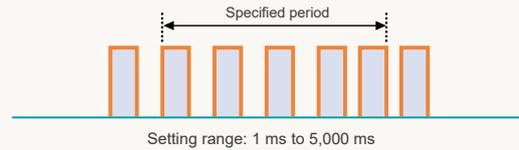


**Useful for**

- Labelers: Starting the operation at a relatively low acceleration to prevent tape from breaking  
Stopping the operation at high deceleration when detecting the label end to save the tape
- Lifts: Optimizing the acceleration and deceleration during ascending and descending transfers.

## Measuring the pulse frequency (F178 instruction)

Pulses input in a specified period by a single instruction are counted, and the frequency is calculated.



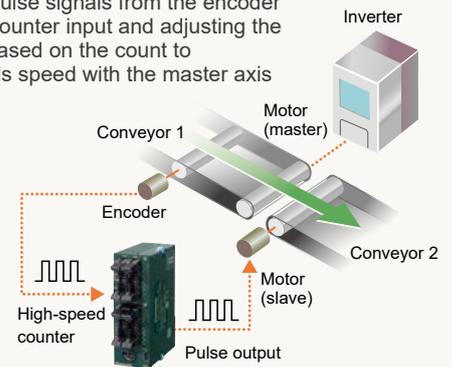
**Useful for**

- Detection of motor rotation speed for encoder feedback control

## High-speed counters and pulse outputs

Ladder programs can be combined to create an application for counting pulse signals from the encoder and adjusting the pulse output frequency based on the count to synchronize the slave axis speed with the master axis speed.

In the right-hand figure, the speed of conveyor 1, which is inverter-controlled, is measured based on the encoder pulse count, and pulses are output to the slave motor (for jog operation) according to the measured speed in order to synchronize the speed of conveyor 2.



## ■ PLC link (MEWNET-W0)

Contact data can be shared among up to 16 PLC units, including FP0R, FPΣ, FP-X, FP2SH, and a mixture of them, without the need for programs.



### Application examples

Use two FP0R units to control the assembly and transfer sections of a small machine respectively, connect them via the PLC link, and share one display

### RS-485

Up to 16 units connectable

RS-485 / 16 stations / 115.2 kbps / 1200 m 3937 ft



\*Orders no longer accepted for the FPΣ, FP-X and FP2SH

### Application examples

Management of manufacturing line operations

## ■ RS-485 serial communication

### Compatible with both Modbus master and slave RTU.

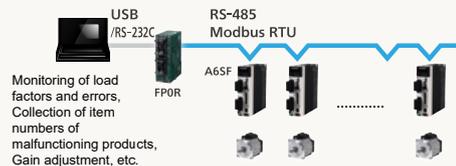
This feature expands applications for the eco-conscious business field, and is ideal for the control of air conditioners, temperature, and electrical power.



### • Control of 31 servo motor shafts

Can be connected using a MINAS A6 series Panasonic Industry servo motor and Modbus RTU. Motor control and monitoring are achieved via minimal wiring.

Motor information collection and adjustment are possible from the host PC via Modbus RTU communication.

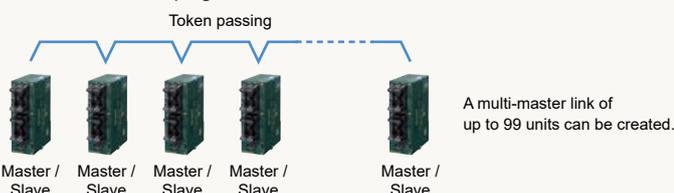


	Conventional model	Latest model
	FP0R pulse output	FP0R & MINAS A6 Modbus
Control capability	50 kHz	Infinite*
Max. number of controllable shafts	4 shafts	31 shafts

\* No limits apply for serial communication. Resolutions is decided by setting on the amplifier side.

### • Up to 99 units can be connected.

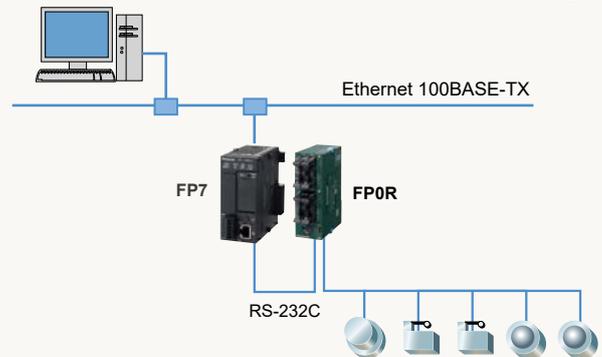
When 17 or more FP series units need to be linked, you can link up to 99 units by using the Modbus function instead of MEWNET-W0. Since each FP0R unit can be either a master or a slave, a multi-master link can be created by passing a token from a user program.



## ■ FP Web server function

### The FP0R operation status can be monitored on a Web browser.

The FP0R operation status can be monitored on a Web browser by connecting FP7 and FP0R via RS-232C and making required settings using dedicated software (Control Web Creator).



## ■ RS-232C general-purpose serial communications

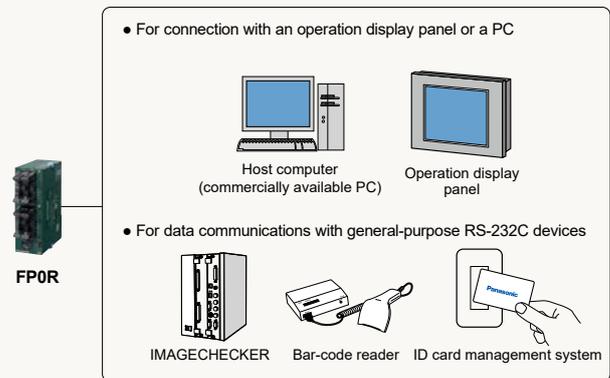
### The control unit has an RS-232C port for serial communications.

The RS-232C port allows for direct connection to an operation display panel or a PC. Also, it facilitates bi-directional data communications with bar-code readers and other RS-232C devices.

\*: The port block has S, R, and G terminals for connection.

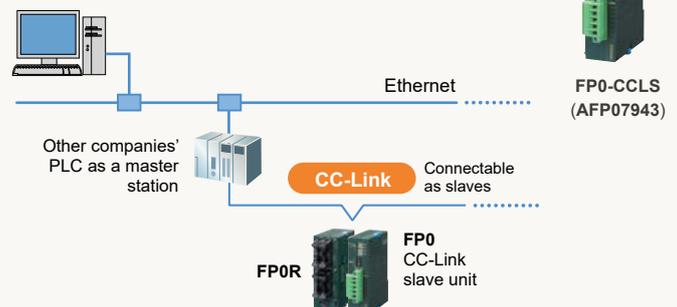
Operation display panels can also be connected to the tool port.

\*: Both the relay output and transistor output types of control unit equipped with an RS-232C port are available.



## ■ CC-Link slave unit

This unit is compatible with CC-Link, which is an open network, and capable of reading/writing four-word data through a maximum of 16 input and 16 output points.

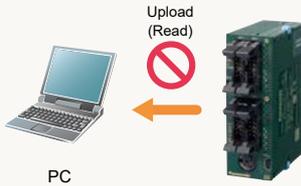


# OTHER USEFUL FUNCTIONS

## Program protection

### Program upload protection setting

User programs can be protected from unauthorized copying by disabling program upload using our software, **FPWIN**. This function is useful for users who manage original programs on a PC.



### Eight-character password

Since uppercase and lowercase alphanumeric characters can be used, there are approx. 218 trillion possible password combinations. If an incorrect password is entered three times in a row, a cold reboot is required. This function is useful for users who upload programs from **FP0R**.

## Built-in real-time clock (T type only)

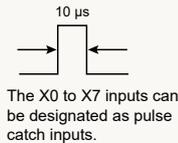
The clock allows for year, month, day, hour, minute, and second data processing. The clock data can be linked to periodic monitoring of production data and operation status, and the management of error history records.

## Interrupt input

This function takes in input signals at high speed regardless of the scan time and instantly executes the interrupt program. This is useful for high-accuracy positioning control or control of defective item ejector valves. The X0 to X7 inputs can be designated as interrupt inputs (**C10**: X0 to X5).

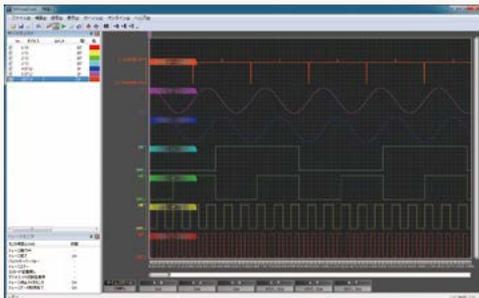
## Pulse catch

This function can take in 10 μs short pulse inputs and is therefore ideal for taking in signals from a sensor to detect small components.



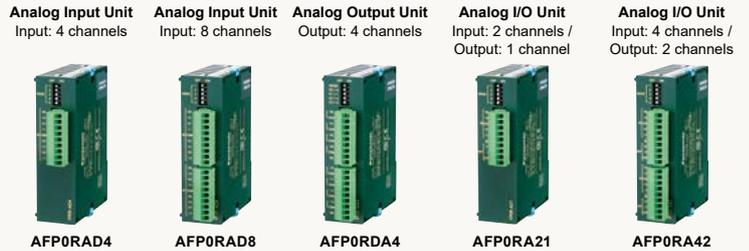
## Debugging

The trace function records contact ON/OFF status and data changes per each scan and allows them to be displayed in a graph on the time chart in the **Control FPWIN GR7** programming software.



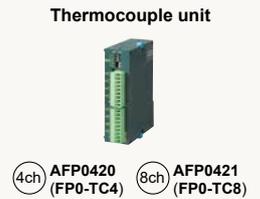
## Analog units

Makeover for analog units. Lineup includes five types: 4 channels or 8 channels analog input type, 4 channels analog output type, and analog I/O type with either 2 channels input / 1 channel output or 4 channels input / 2 channels output. Features high 14 bits resolution and high precision of ±0.2 % (at 25 °C 77 °F) in a compact body.



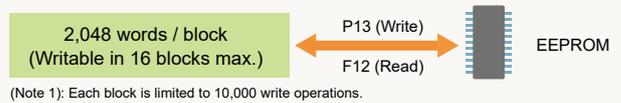
## Temperature controller

- A temperature control program can be written in only one line by using a PID instruction (F356 EZPID), facilitating temperature control programming by a PLC, which had previously been considered difficult.
- The total accuracy is ±0.8°C ±33.44°F (K, J and T range). Two types are available: 4-channel and 8-channel types. Up to three units can be connected, allowing high-accuracy multi-point PID control of a maximum of 24 channels.



## EEPROM data saving (F12 and P13 instructions)

All **FP0R** series models are equipped with EEPROM, which can electrically rewrite data and retain data without the need for voltage supply. Setting data and production result data can be written and saved by the P13 instruction, and read out by the F12 instruction when necessary.



## Program download in RUN mode (Comment writable)

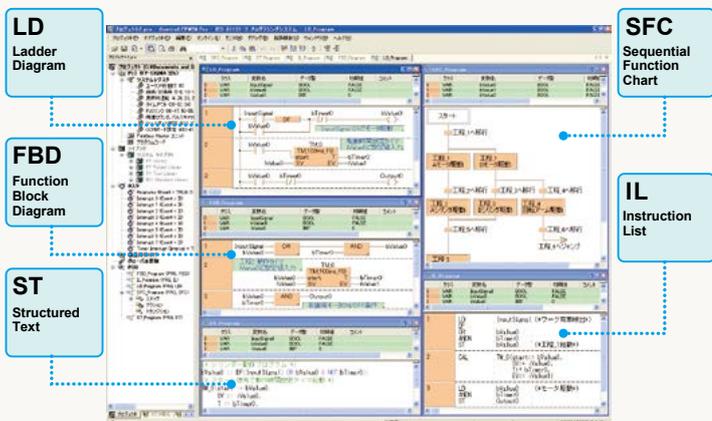
Even while the equipment is operating with **FP0R** in RUN mode, a whole program edited offline can be downloaded to **FP0R**, and comments can be written simultaneously. Programs can be changed without stopping a running production line.



# PROGRAMMING SOFTWARE

## Control FPWIN Pro7 (IEC61131-3 compliant Windows version software)

Compliant with international standard IEC61131-3  
Programming software approved by PLC Open



### Features

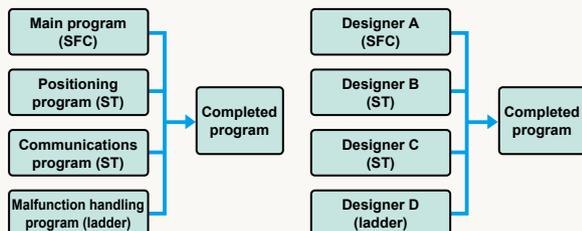
- Five programming languages can be used.**  
Programming can be done using the language most familiar to the developer or using the language most suited to the process to be performed. High-level (structured text) languages that allow structuring, such as C, are supported.
- Easy to reuse well-proven programs**  
Efficiency when writing programs has been greatly increased by being able to split programming up for each function and process using structured programming.
- Keep know-how from getting out**  
By "black boxing" a part of a program, you can prevent know-how from leaking out and improve the program's maintainability.
- Uploading of source programs from PLC possible.**  
Maintainability increased by being able to load programs and comments from the PLC.
- Programming for all models in the FP series possible.**

- Programming in the language most suited to the process**

Easy-to-understand, efficient programs can be created, for example, by using a ladder program for machine control or ST for communications control.

- Programming in the language you are good at**

Programming time can be greatly reduced by the easy ability to split and then integrate programming for each function and process.



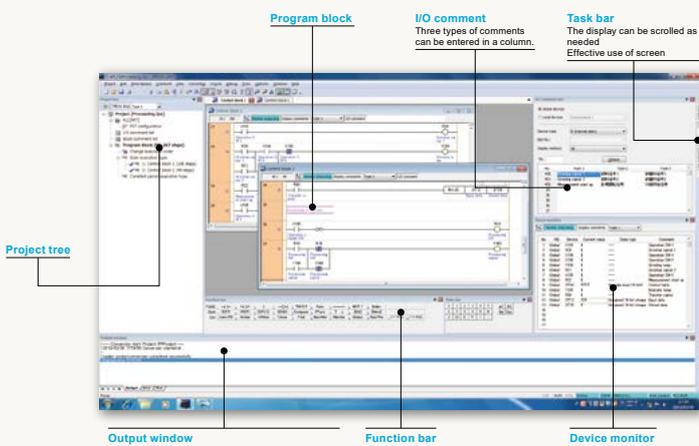
### Operational Environment

OS	Windows® 7 SP1 or later (32-bit / 64-bit) / 8 (32-bit / 64-bit) / 8.1 (32-bit / 64-bit) / 10 (32-bit / 64-bit) / 11 (64-bit) (Note 1)
Hard disk capacity	At least 600 MB
CPU	Intel®Core™ 2 Duo 2 GHz or higher (recommended) (Note 2)
Onboard memory	At least 1 GB (recommended)
Screen resolution	1,280 × 800 or more (recommended)
Applicable PLC	All FP series

Notes: 1) Windows is a registered trademark or trademark of Microsoft Corporation in the United States and other countries.  
2) Intel® Core™ is a trademark or registered trademark of Intel Corporation or its subsidiaries in the United States and other countries.

## Control FPWIN GR7 (Windows version software)

The ladder programming software for FP series Highly operational software tool for maximizing convenience in the field



### Features

- Time-saving software that can be used in various work situations including configuration, editing programming, searching, monitoring, debugging, and security.**
- Creation of split program ladders is possible.**
- High level instructions can be easily input by simply selecting, in order, in accordance with the instructions NAVI.**

### Operational Environment

OS	Windows® 7 SP1 or later (32-bit / 64-bit) / 8 (32-bit / 64-bit) / 8.1 (32-bit / 64-bit) / 10 (32-bit / 64-bit) / 11 (64-bit) (Note 1)
Hard disk capacity	At least 120 MB
CPU	Intel®Core™ 2 Duo 2 GHz or higher (recommended) (Note 2)
Onboard memory	At least 1 GB (recommended)
Screen resolution	1,280 × 800 or more (recommended)
Applicable PLC	FP7 / FP0R / FP-X / FP-X0 / FPΣ / FP2SH (Note 3)

Notes: 1) Windows is a registered trademark or trademark of Microsoft Corporation in the United States and other countries.  
2) Intel® Core™ is a trademark or registered trademark of Intel Corporation or its subsidiaries in the United States and other countries.  
3) FP0H is compatible with Ver. 2.18 or later and FP0R is compatible with Ver. 2.9 or later. (For creating divided programs, FP0R version 1.20 or later is required.)  
FP-X, FP-X0, FPΣ and FP2SH are compatible with Ver. 2.14 or later

# PART NUMBER LIST

## Control units

<p><b>10 points</b> Input: 6 / Relay output: 4</p> <p>Terminal block type</p>  <p><b>AFP0RC10RS</b> with RS-232C <b>AFP0RC10CRS</b> with RS-485 <b>AFP0RC10MRS</b></p>	<p><b>10 points</b> Input: 6 / Relay output: 4</p> <p>Connector type</p>  <p><b>AFP0RC10RM</b> with RS-232C <b>AFP0RC10CRM</b></p>	<p><b>14 points</b> Input: 8 / Relay output: 6</p> <p>Terminal block type</p>  <p><b>AFP0RC14RS</b> with RS-232C <b>AFP0RC14CRS</b> with RS-485 <b>AFP0RC14MRS</b></p>	<p><b>14 points</b> Input: 8 / Relay output: 6</p> <p>Connector type</p>  <p><b>AFP0RC14RM</b> with RS-232C <b>AFP0RC14CRM</b></p>
<p><b>16 points</b> Input: 8 / Transistor output: 8</p> <p>MIL connector type</p>  <p><b>AFP0RC16T</b> <b>AFP0RC16P</b> with RS-232C <b>AFP0RC16CT</b> <b>AFP0RC16CP</b> with RS-485 <b>AFP0RC16MT</b> <b>AFP0RC16MP</b></p>	<p><b>32 points</b> Input: 16 / Transistor output: 16</p> <p>MIL connector type</p>  <p><b>AFP0RC32T</b> <b>AFP0RC32P</b> with RS-232C <b>AFP0RC32CT</b> <b>AFP0RC32CP</b> with RS-485 <b>AFP0RC32MT</b> <b>AFP0RC32MP</b></p>	<p><b>32 points</b> Input: 16 / Transistor output: 16</p> <p>MIL connector type</p>  <p><b>T type</b> with RS-232C <b>AFP0RT32CT</b> <b>AFP0RT32CP</b> with RS-485 <b>AFP0RT32MT</b> <b>AFP0RT32MP</b></p>	<p><b>32 points</b> Input: 16 / Transistor output: 16</p> <p>MIL connector type</p>  <p><b>F type</b> with RS-232C <b>AFP0RF32CT</b> <b>AFP0RF32CP</b> with RS-485 <b>AFP0RF32MT</b> <b>AFP0RF32MP</b></p>

## Expansion units

<p><b>8 points</b> Input: 8</p> <p>MIL connector type</p>  <p><b>AFP0RE8X</b></p>	<p><b>8 points</b> Input: 4 / Relay output: 4</p> <p>Terminal block Connector type</p>   <p><b>AFP0RE8RS</b> <b>AFP0RE8RM</b></p>	<p><b>8 points</b> Relay output: 8</p> <p>Terminal block type</p>  <p><b>AFP0RE8YRS</b></p>	<p><b>8 points</b> Transistor output: 8</p> <p>MIL connector type</p>  <p><b>AFP0RE8YT</b> <b>AFP0RE8YP</b></p>	<p><b>32 points</b> Input: 16 / Transistor output: 16</p> <p>MIL connector type</p>  <p><b>AFP0RE32T</b> <b>AFP0RE32P</b></p>
<p><b>16 points</b> Input: 16</p> <p>MIL connector type</p>  <p><b>AFP0RE16X</b></p>	<p><b>16 points</b> Transistor output: 16</p> <p>MIL connector type</p>  <p><b>AFP0RE16YT</b> <b>AFP0RE16YP</b></p>	<p><b>16 points</b> Input: 8 / Transistor output: 8</p> <p>MIL connector type</p>  <p><b>AFP0RE16T</b> <b>AFP0RE16P</b></p>	<p><b>16 points</b> Input: 8 / Relay output: 8</p> <p>Terminal block Connector type</p>   <p><b>AFP0RE16RS</b> <b>AFP0RE16RM</b></p>	

## Intelligent units

<p><b>Analog input unit, Input: 4 channels</b></p>  <p><b>AFP0RAD4</b></p>	<p><b>Analog input unit, Input: 8 channels</b></p>  <p><b>AFP0RAD8</b></p>	<p><b>Analog output unit, Output: 4 channels</b></p>  <p><b>AFP0RDA4</b></p>	<p><b>Analog I/O unit, Input: 2 channels / Output: 1 channel</b></p>  <p><b>AFP0RA21</b></p>	<p><b>Analog I/O unit, Input: 4 channels / Output: 2 channels</b></p>  <p><b>AFP0RA42</b></p>
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## Intelligent units Units in common with FP0

<p><b>Thermocouple unit</b></p>  <p>4ch <b>AFP0420</b> (FP0-TC4)</p>  <p>8ch <b>AFP0421</b> (FP0-TC8)</p>
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## Link and Communication units Units in common with FP0

<p><b>CC-Link slave unit</b></p>  <p><b>AFP07943</b> (FP0-CCLS)</p>	<p><b>KS1 Signal converter</b></p>  <p><b>AKS1202</b></p>
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# INSTALLATION AND OPTIONS

## ■ Installation

The control unit width is only 25 mm 0.98 in\*. Even when expanded to allow for 128 I/O points, the total width is only 105 mm 4.13 in.

The control unit is pocket-sized: W 25 x H 90 x D 60 mm W 0.98 x H 3.54 x D 2.36 in.

The number of I/O points can be expanded up to 128. Even with the maximum expansion, the size is only W 105 x H 90 x D 60 mm W 4.13 x H 3.54 x D 2.36 in. The ultra-compact body size and installation area facilitate the miniaturization of target machines, equipment, and control panels.

\*: The 32 I/O points type control unit is 30 mm 1.18 in in width.

### ● Three options for installation methods

The control unit can be directly mounted on a panel by using the optional flat type mounting plate.



DIN rail



Slim type mounting plate

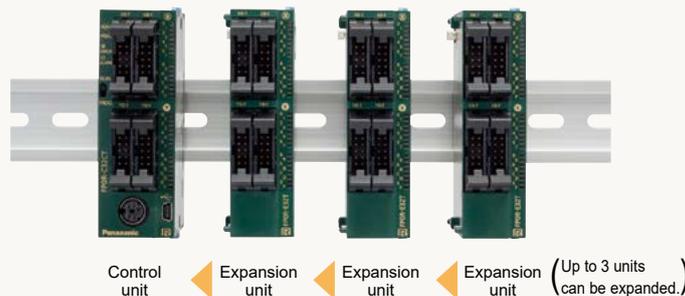


Flat type mounting plate\*

\*: Cannot be used when expanded.

Up to three expansion units can be directly connected without connection cables.

The expansion units can be directly connected to the control unit with a simple operation using the expansion connector and lock lever on the side of the unit. Dedicated cables or backplanes are not necessary for expansion.



A terminal block type and a connector type are available. Both can be detached for easy wiring.

## ■ Options

### ● Wiring tools



**Multi-wire connector pressure contact tool**  
Necessary when wiring transistor output type connectors.

Part number: **AXY52000FP**

### ● Parts for mounting



#### FP0 Slim type mounting plate

Screw-stop attachment plate, Slim model

Part number: **AFP0803** (including 10 pieces)



#### Flat type mounting plate

Screw-stop attachment plate, Flat model

Part number: **AFP0804** (including 10 pieces)

### ● Pressure contact for multi-wire

AWG22 or AWG24, outer diameter of coating  $\phi$ 1.5 to 1.1, stranded wire

Part number: **AXW7221FP**  
(5 pins per 1 series)

AWG26 or AWG28, outer diameter of coating  $\phi$ 1.3 to 1.1, stranded wire

Part number: **AXW7231FP**  
(5 pins per 1 series)

\* AWG22 is a 12/0.18 stranded wire.

### ● I/O cables



#### Relay output molex type I/O cable

Loose-wiring cable (9 leads) with molex socket attached at one end, AWG20, 0.5 mm<sup>2</sup>, 1 set: 2 cables (blue & white)

< Length: 1 m 3.28 ft > 2 cable set

Part number: **AFP0551**

Orders to end on September 30, 2024

< Length: 3 m 9.84 ft > 2 cable set

Part number: **AFP0553**

Orders to end on September 30, 2024



#### Transistor output type I/O cable

Loose-wiring cable (10 leads) with connectors attached at one end, AWG22, 0.3 mm<sup>2</sup>, 1 set: 2 cables (blue & white)

< Length: 1 m 3.28 ft > 2 cable set

Part number: **AFP0521**

< Length: 3 m 9.84 ft > 2 cable set

Part number: **AFP0523**

### ● Flat cable connector set (10 leads)

Part number: **AFP0808** (including 4 pieces)

Orders to end on September 30, 2024

Notes: 1) One I/O cable set (2 cables) is necessary with the following models: **C10RS / C10RM, C14RS / C14RM, E8RS / E8RM, E16RS / E16RM**

2) One I/O cable set (2 cables) is necessary with the following models: **C16T / E16X, E16T / E16YT**

3) Two I/O cable sets (total 4 cables) are necessary with the following models: **C32T / E32T**

### ● Maintenance parts



#### Terminal socket

Attaches to relay output and terminal block types.

Part number: **AFP0802** (2 sockets per pack)



#### Molex socket

Attaches to relay output and molex connector types.

Part number: **AFP0801** (2 sockets per pack)



#### Wire-press socket

Attaches to transistor output type.

Part number: **AFP0807** (2 sockets per pack)



#### FP0R Power cable (Length: 1 m 3.28 ft)

Attaches to FP0R control unit.

Part number: **AFP0805** (1 cable per pack)

# OPTIONS

## ■ OPTIONS

### ● RT-3 unit relays (Power PhotoMOS relay type)



#### RT-3 unit relay

Contact arrangement	Type	Rated input voltage	RT-3 Unit relay		
			Product No.	Part No.	Packing quantity
1 Form A × 4	DC only (equipped with AQZ102)	12 V DC	RT3SP1-12V	AY34001	Inner carton: 1 piece Outer case: 20 pieces
		24 V DC	RT3SP1-24V	AY34002	
	AC / DC dual use (equipped with AQZ204)	12 V DC	RT3SP2-12V	AY35001	
		24 V DC	RT3SP2-24V	AY35002	

\*1: Only for use with Power PhotoMOS relays. Cannot be equipped with PA relays.  
\*2: Please consult us other contact arrangement.

### ● 4-point terminals



Mountable relays  
Power PhotoMOS relay  
(voltage sensitive type)



#### 4-point terminals

Type	Rated input voltage	Part No.
PA relay and Voltage sensitive type power PhotoMOS relay type	12, 24 V DC	AY30000

Packing quantity: inner carton: 1 piece, outer case: 20 pieces

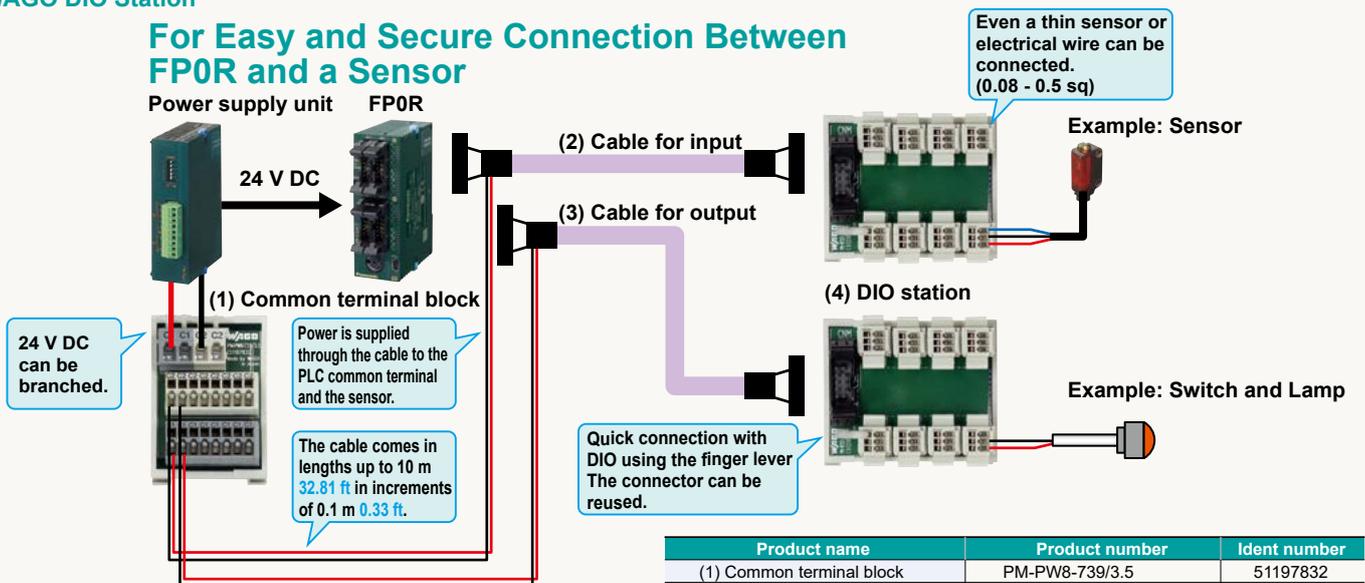
#### Mountable relays for 4-point terminal

Product name	Part No.
Power PhotoMOS relay (voltage sensitive type)	AQZ10*D (DC only)
	AQZ20*D (AC / DC dual use)

Note: Never mount relays into this product other than those given above.  
Doing so will cause malfunction, breakdown, and breakdown of the connected product.

### ● WAGO DIO Station

#### For Easy and Secure Connection Between FP0R and a Sensor



(2)(3) Cable specifications  
AWG28, Rated voltage: 30 V  
Outer diameter of sheath:  $\phi$  4.4  $\phi$  0.17  
Minimum allowable bending radius: R = 13.2  
Power supply wire: 0.3 sq, 250 mm 9.84 in

Product name	Product number	Ident number
(1) Common terminal block	PM-PW8-739/3.5	51197832
(2) PM flexible cable for input	PM-FP0X-M733SS-F1M	51251907
(3) PM flexible cable for output	PM-FP0Y-M733SS-F1M	51251909
(4) 8 points, MIL-DIO station	PM-M733-3X8PC-S1	51238076

Contact WAGO Kontakttechnik GmbH & Co. KG for inquiries about DIO Station.  
URL: <https://www.wago.com/global/>

## ■ OPTIONS

### ● Connector terminals

## Introducing connector terminals that can be used with the FP0R



Manufactured by TOYOGIKEN CO., LTD.  
 PCN7-1H20 (crimping terminal type, poles: 20P)  
 Cable: Panasonic cable for FP0R (special order)  
 SA14083-01-\*M (terminal side 20P ⇔ PLC side 10P × 2, unshielded)  
 \*Cable length (m ft): 0.5 1.640 / 1 3.281 / 1.5 4.921 / 2 6.562 / 3 9.843

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

## ■ Compatibility between FP0 and FP0R

### Programs

FP0R has an "FP0-compatible mode". This mode provides conditions for functions, memory areas, system registers, etc. identical to those of FP0. If programs in FP0 are transported to FP0R, FP0R can function identically as FP0 did (with some exceptions described below).

### Installation

The shape, outside dimensions, installation method, and the connector pin arrangement are identical to those of FP0.

This high degree of compatibility ensures easy and worry-free replacement of FP0 with FP0R even if the device or machine to be manufactured is identical.

- It is recommended that Control FPCWIN Pro7 or FPCWIN GR should be used for transporting FP0 programs to FP0R.

\*FPCWIN GR7 is not supported.

Before an FP0 program is downloaded to FP0R, a message stating "Switch to FP0-compatible mode for the download?" appears. If "Yes" is chosen, FP0R will automatically be set in FP0-compatible mode.



- FP0 specification items not covered by FP0-compatible mode (See "FP0R User's Manual" for details.)

Item	FP0	FP0R (FP0-compatible mode)
Instruction P13: EEPROM write time	5 ms / block (256 blocks max.: 1,280 ms)	100 ms in units of 32 blocks (256 blocks max.: 800 ms) * Writing even only one block takes 100 ms.
Instruction F170: PWM output frequency range	0.15 Hz to 1 kHz	6 Hz to 1 kHz
High-speed counter/pulse output elapsed value	± 24 bits	± 32 bits
Instruction F168: Home return	The elapsed value is not counted during home return.	The elapsed value is counted during home return.
Instruction F169: Pulse output	"Non-counting mode" selectable	Counted and added even when "non-counting mode" is selected
Instruction F144: Serial data communications	Transmittable data size: Unlimited	Transmittable data size: 2,048

\*The F type has no compatible functions because it does not correspond to any units of the conventional FP0 series.

# SPECIFICATIONS

## Performance specifications (FP0R Control units)

Product type of FP0R control unit		C10 (Relay output type only)	C14 (Relay output type only)	C16 (Transistor output type only)	C32 (Transistor output type only)	T32 (Transistor output type only)	F32 (Transistor output type only)	
Programming method / Control method		Relay symbol / Cyclic operation						
Number of I/O points	No expansion (Control unit only)	10 points [Input: 6, Relay output: 4]	14 points [Input: 8, Relay output: 6]	16 points [Input: 8, Transistor output: 8]	32 points [Input: 16, Transistor output: 16]	32 points [Input: 16, Transistor output: 16]		
	With expansion 1 * Same type of control and expansion units	Max. 58 points	Max. 62 points	Max. 112 points	Max. 128 points	Max. 128 points		
	With expansion 2 * Mix type of relay and transistor units	Max. 106 points	Max. 110 points	Max. 112 points	Max. 128 points	Max. 128 points		
Program memory		EEPROM (no backup battery required)						
Program capacity		16 k steps			32 k steps			
Number of instructions	Basic	110 approx.						
	High-level	210 approx.						
Operation speed		Basic instructions: 0.08 μs Min. Timer instructions: 2.2 μs Min. High-level instructions: 0.32 μs (MV instruction) Min. 3,001st and later steps Basic instructions: 0.58 μs Min. Timer instructions: 3.66 μs Min. High-level instructions: 1.62 μs (MV instruction) Min.						
Operation memory	Relay	Internal relay (R)		4,096 points				
		Timer / Counter (T / C)		1,024 points				
	Memory area	Data register (DT)		12,315 words		32,765 words		
		Index register (IX, IY)		14 words (IO to ID)				
Master control relay points (MCR)		256 words						
Number of labels (JMP and LOOP)		256 labels						
Differential points		Equivalent to the program capacity						
Number of step ladder		1,000 stages						
Number of subroutines		500 subroutines						
Special functions	High speed counter (HSC)	Single-phase 6 points (C10: Single-phase 4 points) (50 kHz max. each) or 2-phase 3 points (C10: 2-phase 2 points) (15 kHz max. each) (Note)						
	Pulse output	Not available		4 points (50 kHz max. each) Two channels can be controlled individually. (Note)				
	PWM output	Not available		4 points (6 Hz to 4.8 kHz)				
	Pulse catch input / interrupt input	Total 8 points (with high speed counter)						
	Interrupt program	Input: 8 programs (6 programs for C10 only) / Periodic: 1 program / High speed counter match, Pulse output match: 4 programs						
	Periodical interrupt	In units of 0.5 ms: 0.5 ms to 1.5 sec. / In units of 10 ms: 10 ms to 30 sec.						
	Constant scan	In units of 0.5 ms: 0.5 ms to 600 ms						
	RS-232C port	One RS-232C port is mounted on each of C10CRS, C10CRM, C14CRS, C14CRM, C16CT, C16CP, C32CT, C32CP, T32CT, T32CP, F32CT and F32CP type (3P terminal block) Transmission speed (Baud rate): 2,400 to 115,200 bits/s, Transmission distance: 15 m 9.8 ft. Communication method: half duplex						
RS-485 port	One RS-485 port is mounted on each of C10MRS, C14MRS, C16MT, C16MP, C32MT, C32MP, T32MT, T32MP, F32MT and F32MP type (3P terminal block) Transmission speed (Baud rate): 115.2 kbps (It is possible to change to 19.2 kbps by the setting.), Transmission distance: 1,200 m 3,937 ft. Communication method: half duplex							
Maintenance	Memory backup	Program and system register	Stored program and system register in EEPROM					
		Operation memory	Stored fixed area in EEPROM Counter: 16 points Internal relay: 128 points Data register: 315 words			Backup of the entire area by a built-in secondary battery	Backup of the entire area by FeRAM (without the need for a battery)	
	Self-diagnostic function	Watchdog timer (690 ms approx.), Program syntax check						
	Real-time clock function	Not available				Available	Not available	
	Other functions	Rewriting in RUN mode (Simultaneous rewriting capacity: 512 steps), Download in RUN mode (All programs), Password function (4-digit, 8-digit), Read protection setting						

Note: For the limitations while operating units, see the manual.

## General specifications (FP0R Control units)

Item	Specifications
Rated voltage	24 V DC
Operating voltage range	20.4 to 28.8 V DC
Allowed momentary power off time	C10, C14, C16: 5 ms (at 20.4 V DC), 10 ms (21.6 V DC or higher) C32, T32, F32: 10 ms (20.4 V DC or higher)
Ambient temperature	0 to +55 °C 32 to +131 °F
Storage temperature	-40 to +70 °C -40 to +158 °F (-20 to +70 °C -4 to +158 °F for T32 only)
Ambient humidity	10 to 95% RH (at +25 °C 77 °F, no condensation)
Storage humidity	10 to 95% RH (at +25 °C 77 °F, no condensation)
Breakdown voltage (Detection current: 5 mA)	Input terminals - output terminals, Output terminals - power and functional ground terminals --- Transistor output: 500 V AC for 1 minute (Relay output: 1,500 V AC for 1 minute) / Input terminals - power and functional ground terminals, Functional ground terminal - power terminal --- Transistor output: 500 V AC for 1 minute (Relay output: 500 V AC for 1 minute) / Output terminals - output terminals (different common terminals) --- Relay output: 1,500 V AC for 1 minute
Insulation resistance (Test voltage: 500 V DC)	Input terminals - output terminals, input terminals - power and functional ground terminals, output terminals - power and functional ground terminals, functional ground terminal - power terminal --- Transistor output: 100 MΩ minimum (relay output: 100 MΩ minimum) / Output terminals - output terminals (different common terminals) --- Relay output: 100 MΩ minimum
Vibration resistance	5 to 9 Hz, single amplitude of 3.5 mm, 1 sweep/min; 9 to 150 Hz, constant acceleration of 9.8 m/s <sup>2</sup> , 1 sweep/min; for 10 min each in X, Y, and Z directions
Shock resistance	147 m/s <sup>2</sup> or more, 4 times each in X, Y, and Z directions
Noise immunity	1,000 V (p-p) with pulse widths 50 ns and 1 μs (using a noise simulator) (Power supply terminal)
Operating condition	Free from corrosive gasses and excessive dust

## Input specifications (Common to control units and expansion units) (As for the limitation on the number of simultaneous ON points, please refer to the manual.)

Item	Specifications	
	Control unit	Expansion unit
Rated input voltage	24 V DC	
Operating voltage range	21.6 to 26.4 V DC	
Rated input current	2.6 mA approx. (at 24 V DC)	4.7 mA approx. (at 24 V DC)
Input impedance	9.1 kΩ approx.	5.1 kΩ approx.
Input points per common	6 points / common (C10), 8 points / common (C14, C16), 16 points / common (C32, T32, F32)	
Min. ON voltage / ON current	19.2 V / 2 mA	
Max. OFF voltage / OFF current	2.4 V / 1.2 mA	
Response time	OFF → ON: 20 μs or less * An input time constant (0.1 to 64 ms) can be set. ON → OFF: Same as above	2 ms or less Same as above
Insulation method	Photocoupler	

Note: Since the response time of X0 to X7 is very fast (for high-speed counter input) the FP0 happens to chattering noise as an input signal. To prevent this, it is recommended that the timer should be put in the ladder program.

# SPECIFICATIONS

## Output specifications (Common to control units and expansion units)

### 1. Relay output type

(As for the limitation on the number of simultaneous ON points, please refer to the manual.)

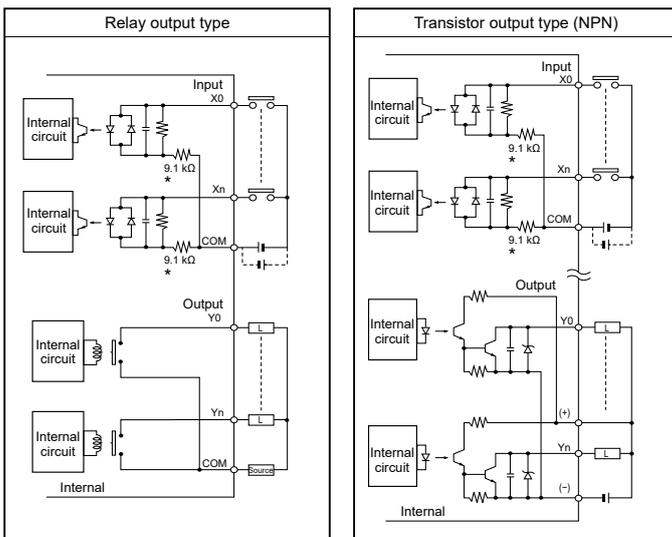
Item	Specifications	
Output type	1a	
Rated control capacity	2 A 250 V AC, 2 A 30 V DC (4.5 A / common)	
Response time	OFF → ON	10 ms approx.
	ON → OFF	8 ms approx.
Life time	Mechanical	2 x 10 <sup>7</sup> operations or more
	Electrical	10 <sup>6</sup> operations or more
Surge absorber	None	
Output points per common	2 points / common + 1 point / common + 1 point / common (C10), 4 points / common + 1 point / common + 1 point / common (C14)	

### 2. Transistor output type

Item	Specifications	
	NPN	PNP
Output type	Open collector	
Rated load voltage	5 to 24 V DC	24 V DC
Load voltage allowable range	4.75 to 26.4 V DC	21.6 to 26.4 V DC
Max. load current	C16, C32, T32 and F32: 0.2 A / point (Max. 1 A per common terminal) E16, E32, E8Y and E16Y: 0.3 A / point (Max. 1 A per common terminal)	
OFF state leakage current	1 μA or less	
ON state voltage drop	0.2 V DC or less	
Response time	OFF → ON	20 μs or less (Load current: 5 mA or more), 0.1 ms or less (Load current: 0.5 mA or more) (Note)
	ON → OFF	40 μs or less (Load current: 5 mA or more), 0.2 ms or less (Load current: 0.5 mA or more) (Note)
External power supply	Voltage	21.6 to 26.4 V DC
	Current	C16, E16T and E8YT: 30 mA or less C32, T32, F32, E32T and E16Y: 60 mA or less C16, E16P and E8YP: 35 mA or less C32, T32, F32, E32P and E16YP: 70 mA or less
Surge absorber	Zener diode	
Output points per common	8 points / common (C16), 16 points / common (C32, T32, F32)	
Insulation method	Photocoupler	

Note: For expansion unit: 1 ms or less

## I/O circuit diagrams



Note: For transistor output types, make sure that the externally supplied voltage between the (+) and (-) terminal is between 21.6 and 26.4 V DC.  
\*For expansion unit: 5.1 k Ω

## Analog unit specifications

Item	Product name	Analog input units		Analog I/O units (Only input section)	
		AFP0RAD4	AFP0RAD8	AFP0RA21	AFP0RA42
Number of input / output channels		4 / 0	8 / 0	2 / 1	4 / 2
Input range (digital input range (Note 1))	Voltage	-10 to +10 V 14 bits (-8,000 to +8,000) -5 to +5 V 14 bits (-8,000 to +8,000) 0 to +10 V 14 bits (0 to +16,000) 0 to +5 V 14 bits (0 to +16,000)			
	Current	-100 to +100 mV 12 bits (-2,000 to +2,000) (Note 2)			
Absolute maximum input	Voltage	±15 V			
	Current	±30 mA			
Input impedance	Voltage	1 M Ω approx.			
	Current	250 Ω approx.			
Max. resolution		14 bits (1/16,000)			
Overall accuracy	Voltage	at ±100 mV: ±0.6 % F.S. or less (at +25 °C +77 °F) ±1.0 % F.S. or less (at 0 to +55 °C +32 to +131 °F) Other: ±0.2 % F.S. or less (at +25 °C +77 °F) ±0.4 % F.S. or less (at 0 to +55 °C +32 to +131 °F)			
	Current	±0.3 % F.S. or less (at +25 °C +77 °F) ±0.6 % F.S. or less (at 0 to +55 °C +32 to +131 °F)			
Conversion speed		2 ms/all channels			
Other functions		Averaging processing (moving, number of times) Compatibility function for existing programs (12 bits)			
Insulation method	Between input terminals and internal circuit	Photocoupler and isolated DC/DC converter			
	Between channels	Not insulated			

Notes: 1) For products with analog input unit Ver. 1.1 or earlier, or analog I/O units, a digital exchange value equivalent to analog input of approx. 2 V will be displayed for channels to which input is not connected. For products with analog input unit Ver. 1.2 and later, the value is equivalent to approx. 0 V.  
2) Equipped in products Ver. 1.2 and later (12 bits mode only)

Item	Product name	Analog output unit		Analog I/O units (Only output section)	
		AFP0RA4	AFP0RA21	AFP0RA42	
Number of input / output channels		0 / 4	2 / 1	4 / 2	
Output range (analog output setting range)	Voltage	-10 to +10 V 14 bits (-8,000 to +8,000) -5 to +5 V 14 bits (-8,000 to +8,000) 0 to +10 V 14 bits (0 to +16,000) 0 to +5 V 14 bits (0 to +16,000)			
	Current	0 to 20mA 14 bits (0 to +16,000) 4 to 20mA 14 bits (0 to +16,000)			
Output impedance	Voltage	0.5 Ω or less			
Max. output current	Voltage	±10 mA			
Permissible output load resistance	Current	500 Ω or less			
Max. resolution		14 bits (1/16,000)			
Overall accuracy	Voltage	±0.2 % F.S. or less (at +25 °C +77 °F) ±0.4 % F.S. or less (at 0 to +55 °C +32 to +131 °F)			
	Current	±0.3 % F.S. or less (at +25 °C +77 °F) ±0.6 % F.S. or less (at 0 to +55 °C +32 to +131 °F)			
Conversion speed		500 μs/all channels			
Other functions		Compatibility function for existing programs (12 bits)			
Insulation method	Between output terminals and internal circuit	Photocoupler and isolated DC/DC converter			
	Between channels	Not insulated			

## Thermocouple unit specifications (FP0 Expansion units)

Item	Specifications	
Number of input points	4-channel, 8-channel (The number of input points can be changed 2, 4, 6 and 8 channels.)	
Input range	Range for K and J	-100.0 to +500.0 °C/-148.0 to +790.0 °F (Note 1)
	Range for T	-100.0 to +400.0 °C/-148.0 to +752.0 °F
	Range for R	0 to +1500.0 °C/32.0 to +1590.0 °F (Note 1)
Digital output	K and J (when using °C): K -1000 to K5000 K and J (when using °F): K -1480 to K7900 (Note 1) (When range over using °C: K-1001, K5001 or K8000) (When range over using °F: K-1481, K7901 or K8000) (When the thermocouple broken: K8000) (Note 2) (Until the temperature can be measured at the initial startup: K8001) (Note 3)	
	T (when using °C): K -1000 to K4000 T (when using °F): K -1480 to K7520 (When range over using °C: K -1001, K4001 or K8000) (When range over using °F: K -1481, K7521 or K8000) (When the thermocouple broken: K8000) (Note 2) (Until the temperature can be measured at the initial startup: K8001) (Note 3)	
	R (when using °C): K0 to K15000 R (when using °F): K320 to K15900 (Note 1) (When range over using °C: K 0, K15001 or K16000) (When range over using °F: K 0, K15901 or K16000) (When the thermocouple broken: K16000) (Note 2) (Until the temperature can be measured at the initial startup: K16001) (Note 3)	

Item	Specifications
Resolution	0.1 °C
Sampling cycle (Note 5)	300 ms: when using 2 channels for an input points (Note 4) 700 ms: when using 6 channels for an input points (Note 4)
	500 ms: when using 4 channels for an input points (Note 4) 900 ms: when using 8 channels for an input points (Note 4)
Overall accuracy	Range for K and J (-100 to 500 °C): ±0.8 °C or less
	Range for T (-100 to 400 °C): ±0.8 °C or less
	Range for R (0 to 99.9 °C): ±3 °C or less (100 to 299.9 °C): ±2.5 °C or less (300 to 1,500 °C): ±2 °C or less
Input impedance	1 M Ω or more
Insulation method	• Between thermocouple input terminals and FP0 internal circuits: Photo-coupler insulation, DC/DC converter insulation • Between thermocouple input terminal channels: PhotoMOS relay insulation
Number of I/O contact points	32 input contact points (Note 6)

Notes: 1) The measurement range available for degree Celsius is not available for degree Fahrenheit, of which the upper-limit measurement is set lower than degree Celsius, since the digital value (temperature value displayed) for degree Fahrenheit is bigger than that for degree Celsius.  
2) When the thermocouple is broken, the digital value will become K8000 or K16000 within 70 seconds since broken. Practice in the ladder program a process for avoiding a risk, would be resulting from a broken thermocouple, and exchange the thermocouple.  
3) Until the conversion data will be ready after the initial startup was made, the digital value shows K8001 or K16001. Those are not a temperature data. Create a ladder program, so that they are not acquired as a temperature data.  
4) The settings of the input channel selection switch.  
5) Conversion values for 6-time measurements (6 from the latest 8 measurements, excluding the max. and min.) are averaged, so that it takes time for the digital value to be displayed due to the rapid temperature change.  
6) The control unit reads the data for 2 channels per 1 scan by the control unit. Read data by utilizing the sample program given in the product specifications and manual.

# SPECIFICATIONS

## ■ CC-Link slave unit specifications (FP0 Expansion units)

### 1. Communication specifications

Item	Specifications		
Version	CC-Link Ver.1.10		
Communication method	Broadcast polling method		
Transmission speed	10 Mbits/s, 5 Mbits/s, 2.5 Mbits/s, 625 kbits/s, 156 kbits/s		
Max. transmission distance (Note)	Ver.1.10 CC-Link cable	CC-Link cable	
	CC-Link high-performance cable		
	10 Mbits/s	100 m <b>328 ft</b>	100 m <b>328 ft</b>
	5 Mbits/s	160 m <b>525 ft</b>	150 m <b>492 ft</b>
	2.5 Mbits/s	400 m <b>1,312 ft</b>	200 m <b>656 ft</b>
625 kbits/s	900 m <b>2,952 ft</b>	600 m <b>1,969 ft</b>	
	156 kbits/s	1,200 m <b>3,937 ft</b>	1,200 m <b>3,937 ft</b>
Interface	RS-485		
Station type	Remote device station		
Number of occupied stations	1 station		

Note: Length of the multi-drop connected cables at both ends

The cable length has restrictions in communication speed, CC-Link version, and dedicated cables to be used.

For details concerning the CC-Link, refer to the CC-Link Partner Association.

When an FP0 thermocouple unit is used with an FP0 CC-Link slave unit, the measurement accuracy of the thermocouple unit which is installed on the left of the CC-Link slave unit is as shown in the table below.

Thermocouple		Standard specifications	When CC-Link slave unit with a thermocouple unit
K, J and T		0.8 °C <b>33.44 °F</b>	2 °C <b>35.6 °F</b>
R	0 to 99.9 °C <b>32 to 211.82 °F</b>	3 °C <b>37.4 °F</b>	6 °C <b>42.8 °F</b>
	100 to 299.9 °C <b>212 to 571.82 °F</b>	2.5 °C <b>36.5 °F</b>	5 °C <b>41 °F</b>
	300 to 1,500 °C <b>572 to 2,732 °F</b>	2 °C <b>35.6 °F</b>	4 °C <b>39.2 °F</b>

## ■ Current consumption

Type of unit	Control unit current consumption (24 V DC)	Expansion unit current consumption (24 V DC)	
FP0R control units	C10	100 mA or less	—
	C14	120 mA or less	—
	C16	70 mA or less	—
	C32	90 mA or less	—
	T32		
	F32		
FP0R expansion units	AFP0RE8X	10 mA or less	—
	AFP0RE8R	10 mA or less	50 mA or less
	AFP0RE8YR	10 mA or less	100 mA or less
	AFP0RE8YT/P	15 mA or less	—
	AFP0RE16X	10 mA or less	—
	AFP0RE16R	20 mA or less	100 mA or less
	AFP0RE16T/P	20 mA or less	—
	AFP0RE16YT/P	25 mA or less	—
	AFP0RE32T/P	35 mA or less	—

Type of unit	Control unit current consumption (24 V DC)	Expansion unit current consumption (24 V DC)	
FP0R intelligent units	AFP0RAD4	45 mA or less	—
	AFP0RAD8	45 mA or less	—
	AFP0RDA4	10 mA or less	180 mA or less
	AFP0RA21	10 mA or less	80 mA or less
	AFP0RA42	10 mA or less	120 mA or less
FP0 intelligent units	FP0-TC4	25 mA or less	—
	FP0-TC8		
Communication units	FP0-CCLS	40 mA or less	40 mA or less
	AFP15402 (C-NET adapter)	50 mA or less	—

#### ● Control unit current consumption

This refers to the current consumed via the power supply connector of the control unit. If expansion units or intelligent units are added, the current is increased by the value indicated above.

#### ● Expansion unit current consumption

This refers to the current consumed via the power supply connector of the expansion unit. Units with no value indication don't have a power supply connector.

# PRODUCT TYPES

## 1 Control units

Product name	Built-in memory (Program capacity)	Specifications					Part number						
		Number of I/O points		Power supply voltage	Input	Output		Connection type					
FP0R-C10 Control Unit	EEPROM (16 k steps)	10	Input: 6 Output: 4	24 V DC	24 V DC Sink/Source (±common)	Relay: 2 A	Terminal block	AFP0RC10RS					
							Molex connector	AFP0RC10RM					
							Terminal block	AFP0RC10CRS					
							Molex connector	AFP0RC10CRM					
with RS-485 port						Terminal block	AFP0RC10MRS						
FP0R-C14 Control Unit	EEPROM (16 k steps)	14	Input: 8 Output: 6	24 V DC	24 V DC Sink/Source (±common)	Relay: 2 A	Terminal block	AFP0RC14RS					
							Molex connector	AFP0RC14RM					
							Terminal block	AFP0RC14CRS					
							Molex connector	AFP0RC14CRM					
with RS-485 port						Terminal block	AFP0RC14MRS						
FP0R-C16 Control Unit	EEPROM (16 k steps)	16	Input: 8 Output: 8	24 V DC	24 V DC Sink/Source (±common)	Transistor NPN: 0.2 A	MIL connector	AFP0RC16T					
						Transistor PNP: 0.2 A		AFP0RC16P					
						Transistor NPN: 0.2 A	MIL connector	AFP0RC16CT					
						Transistor PNP: 0.2 A		AFP0RC16CP					
						with RS-485 port					Transistor NPN: 0.2 A	MIL connector	AFP0RC16MT
						Transistor PNP: 0.2 A	AFP0RC16MP						
FP0R-C32 Control Unit	EEPROM (32 k steps)	32	Input: 16 Output: 16	24 V DC	24 V DC Sink/Source (±common)	Transistor NPN: 0.2 A	MIL connector	AFP0RC32T					
						Transistor PNP: 0.2 A		AFP0RC32P					
						Transistor NPN: 0.2 A	MIL connector	AFP0RC32CT					
						Transistor PNP: 0.2 A		AFP0RC32CP					
						with RS-485 port					Transistor NPN: 0.2 A	MIL connector	AFP0RC32MT
						Transistor PNP: 0.2 A	AFP0RC32MP						
FP0R-T32 Control Unit with RS-232C port and Real-time clock function	EEPROM (32 k steps)	32	Input: 16 Output: 16	24 V DC	24 V DC Sink/Source (±common)	Transistor NPN: 0.2 A	MIL connector	AFP0RT32CT					
Transistor PNP: 0.2 A	AFP0RT32CP												
FP0R-T32 Control Unit with RS-485 port and Real-time clock function	EEPROM (32 k steps)	32	Input: 16 Output: 16	24 V DC	24 V DC Sink/Source (±common)	Transistor NPN: 0.2 A	MIL connector	AFP0RT32MT					
Transistor PNP: 0.2 A	AFP0RT32MP												
FP0R-F32 Control Unit with RS-232C port and Battery-less automatic all data backup function	EEPROM (32 k steps)	32	Input: 16 Output: 16	24 V DC	24 V DC Sink/Source (±common)	Transistor NPN: 0.2 A	MIL connector	AFP0RF32CT					
						Transistor PNP: 0.2 A		AFP0RF32CP					
FP0R-F32 Control Unit with RS-485 port and Battery-less automatic all data backup function	EEPROM (32 k steps)	32	Input: 16 Output: 16	24 V DC	24 V DC Sink/Source (±common)	Transistor NPN: 0.2 A	MIL connector	AFP0RF32MT					
						Transistor PNP: 0.2 A		AFP0RF32MP					

Note: A power cable (Part number: **AFP0805**) is supplied with the control units.

## 2 Expansion units

Product name	Specifications					Part number		
	Number of I/O points		Power supply voltage	Input	Output		Connection type	
FP0R-E8 Expansion Unit	8	Input: 8	—	24 V DC Sink/Source (±common)	—	MIL connector	AFP0RE8X	
	8	Input: 4 Output: 4	24 V DC	24 V DC Sink/Source (±common)	Relay: 2 A	Terminal block	AFP0RE8RS	
						Molex connector	AFP0RE8RM	
	8	Output: 8	24 V DC	—	—	Relay: 2 A	Terminal block	AFP0RE8YRS
	8	Output: 8	—	—	—	Transistor NPN: 0.3 A	MIL connector	AFP0RE8YT
8	Output: 8	—	—	—	Transistor PNP: 0.3 A	MIL connector	AFP0RE8YP	
FP0R-E16 Expansion Unit	16	Input: 16	—	24 V DC Sink/Source (±common)	—	MIL connector	AFP0RE16X	
	16	Input: 8 Output: 8	24 V DC	24 V DC Sink/Source (±common)	Relay: 2 A	Terminal block	AFP0RE16RS	
						Molex connector	AFP0RE16RM	
	16	Input: 8 Output: 8	—	—	—	Transistor NPN: 0.3 A	MIL connector	AFP0RE16T
	16	Input: 8 Output: 8	—	—	—	Transistor PNP: 0.3 A	MIL connector	AFP0RE16P
	16	Output: 16	—	—	—	Transistor NPN: 0.3 A	MIL connector	AFP0RE16YT
16	Output: 16	—	—	—	Transistor PNP: 0.3 A	MIL connector	AFP0RE16YP	
FP0R-E32 Expansion Unit	32	Input: 16 Output: 16	—	24 V DC Sink/Source (±common)	—	MIL connector	AFP0RE32T	
	32	Input: 16 Output: 16	—	24 V DC Sink/Source (±common)	—	MIL connector	AFP0RE32P	

Notes: 1) The relay output type expansion units come with a power cable (part number: **AFP0581**).  
(The transistor output type expansion units need no power cable.)  
2) The terminal block type relay output units have two terminal blocks (9 pins) made by Phoenix.  
Use a 2.5 mm **0.10 inch** wide screwdriver. Preferably use the specific terminal block screwdriver (part number: **AFP0806**, Phoenix type code SZS0, 4 x 2.5 mm **0.10 inch**) or equivalent.

3) The connector type relay output units have two connectors made by Nihon Molex (Molex type code 51067-0900, 9 pins). Use the specific Molex connector press-fit tool (part number: **AFP0805**, Nihon Molex type code 57189-5000) or equivalent.  
4) The MIL connector type has a press-fit socket for wire-pressed terminal cable and contacts.  
Use the press-fit tool (part number: **AXYS2000FP**) for wire-pressed terminal cable.

# PRODUCT TYPES

## ③ Intelligent units

Product name	Specifications	Product number	Part number
FP0R Analog Input Unit	<Input specifications> Number or channels: 4 channels Voltage -10 to +10 V, -5 to +5 V, 0 to +10 V, 0 to +5 V (Resolution: 1/16,000) Current 0 to 20 mA (Resolution: 1/16,000)	—	AFP0RAD4
FP0R Analog Input Unit	<Input specifications> Number or channels: 8 channels Voltage -10 to +10 V, -5 to +5 V, 0 to +10 V, 0 to +5 V (Resolution: 1/16,000) Current 0 to 20 mA (Resolution: 1/16,000)	—	AFP0RAD8
FP0R Analog I/O Unit	<Input specifications> Number or channels: 2 channels Voltage -10 to +10 V, -5 to +5 V, 0 to +10 V, 0 to +5 V (Resolution: 1/16,000) Current 0 to 20 mA (Resolution: 1/16,000)	—	AFP0RA21
	<Output specifications> Number or channels: 1 channel Voltage -10 to +10 V, -5 to +5 V, 0 to +10 V, 0 to +5 V (Resolution: 1/16,000) Current 0 to 20 mA, 4 to 20 mA (Resolution: 1/16,000)		
FP0R Analog I/O Unit	<Input specifications> Number or channels: 4 channels Voltage -10 to +10 V, -5 to +5 V, 0 to +10 V, 0 to +5 V (Resolution: 1/16,000) Current 0 to 20 mA (Resolution: 1/16,000)	—	AFP0RA42
	<Output specifications> Number or channels: 2 channels Voltage -10 to +10 V, -5 to +5 V, 0 to +10 V, 0 to +5 V (Resolution: 1/16,000) Current 0 to 20 mA, 4 to 20 mA (Resolution: 1/16,000)		
FP0R Analog Output Unit	<Output specifications> Number or channels: 4 channels Voltage -10 to +10 V, -5 to +5 V, 0 to +10 V, 0 to +5 V (Resolution: 1/16,000) Current 0 to 20 mA, 4 to 20 mA (Resolution: 1/16,000)	—	AFP0RDA4
FP0 Thermocouple Unit	K, J, T and R thermocouple, Resolution: 0.1°C	FP0-TC4	AFP0420
	K, J, T and R thermocouple, Resolution: 0.1°C	FP0-TC8	AFP0421

## \* Previous model substitution table

Analog type		Previous model	New model
Input		—	AFP0RAD4
		AFP0401	AFP0RAD8
Output	Voltage	AFP04121	AFP0RDA4
	Current	AFP04123	
Input / Output		AFP0480	AFP0RA21
		—	AFP0RA42

## ④ Link and communication units

Product name	Specifications	Power supply voltage	Product number	Part number
FP0 CC-Link Slave Unit	This unit is for making the <b>FP0</b> function as a slave station of the CC-Link. Only one unit can be connected to the furthest right edge of the <b>FP0</b> expansion bus.  (Note 1): Accuracy will change if an <b>FP0</b> thermocouple unit is used at the same time. For details, please refer to the catalog or to the CC-Link Unit manual.	24 V DC	FP0-CCLS	AFP07943

## ⑤ Programming tools

Product name	Specifications	Part number
Windows® version tool software <b>Control FPWIN Pro7</b> (Compliant with IEC61131-3)	Supports all <b>FP</b> series PLCs ( <b>FP7</b> series: Supports only CPU without encryption function) Supports English, Japanese, Chinese and Korean	CD-ROM for Windows® <b>AFPSPR7A</b>
	Security enhanced type Supports all <b>FP</b> series PLCs ( <b>FP7</b> series: Supports both CPU with / without encryption function) * The encryption function will be offered in the future. Supports English, Japanese, Chinese and Korean	CD-ROM for Windows® <b>AFPSPR7AS</b>
Windows® version tool software <b>Control FPWIN GR7</b> (FP0R is compatible with Ver. 2.9 or later.)	Supports <b>FP7</b> and <b>FP0R</b> (Supports only CPU without encryption function) Japanese version	CD-ROM for Windows® <b>AFPSGR7JP</b>
	Supports <b>FP7</b> and <b>FP0R</b> (Supports only CPU without encryption function) English version	CD-ROM for Windows® <b>AFPSGR7EN</b>
	Security enhanced type Supports <b>FP7</b> and <b>FP0R</b> (Supports both CPU with / without encryption function) Japanese version	CD-ROM for Windows® <b>AFPSGR7JPS</b>
	Supports <b>FP7</b> and <b>FP0R</b> (Supports both CPU with / without encryption function) English version	CD-ROM for Windows® <b>AFPSGR7ENS</b>

\*Windows is trademarks or registered trademarks of Microsoft Corporation in the United States and other countries.

\*\*When exporting to China, CPU unit without encryption function is required.

## 6 Options and maintenance parts

Product name	Specifications	Part number
Multi-wire connector pressure contact tool	Necessary when wiring transistor output type connectors.	<b>AXY52000FP</b>
<b>FP0</b> Slim type Mounting plate	Screw-stop attachment plate for <b>FP0</b> expansion unit. Slim model.	<b>AFP0803</b> (set for 10)
<b>FP0</b> Flat type Mounting plate	Screw-stop attachment plate for <b>FP0</b> control unit. Flat model.	<b>AFP0804</b> (set for 10)
Relay output Molex type I/O cable	Loose-wiring cable (9 leads) with molex socket attached at one end, AWG20, 0.5 mm <sup>2</sup> , 1 set: 2 cables (blue & white).	Length: 1 m <b>3.3 ft</b> <b>AFP0551</b> (2 cables set) <small>Orders to end on September 30, 2024</small>
		Length: 3 m <b>9.8 ft</b> <b>AFP0553</b> (2 cables set) <small>Orders to end on September 30, 2024</small>
Transistor output type I/O Cable	Loose-wiring cable (10 leads) with connectors attached at one end, AWG22, 0.3 mm <sup>2</sup> , 1 set: 2 cables (blue & white)	Length: 1 m <b>3.3 ft</b> <b>AFP0521</b> (2 cables set)
		Length: 3 m <b>9.8 ft</b> <b>AFP0523</b> (2 cables set)
Flat cable connector set	Flat cable connector set (10 leads)	<b>AFP0808</b> (including 4 pieces) <small>Orders to end on September 30, 2024</small>
Terminal socket	Attaches to relay output and terminal block type. Maintenance part	<b>AFP0802</b> (2 sokets per pack)
Molex socket	Attaches to relay output and Molex connector types. Maintenance part	<b>AFP0801</b> (2 sokets per pack)
Wire-press socket	Attaches to MIL connector type. Maintenance part	<b>AFP0807</b> (2 sokets per pack)
Power cable for control unit	Attaches to <b>FP0R</b> control unit. Maintenance part Length: 1 m <b>3.3 ft</b>	<b>AFPG805</b> (1 cable per pack)
Power cable for expansion unit	Attaches to expansion unit. Maintenance part Length: 1 m <b>3.3 ft</b>	<b>AFP0581</b> (1 cable per pack)
Pressure contact for multi-wire	AWG22, outer diameter of coating ø1.5 to 1.1, 12/0.18 stranded wire	<b>AXW7221FP</b> (5 pins per 1 series)
	AWG24, outer diameter of coating ø1.5 to 1.1, stranded wire	
	AWG26, outer diameter of coating ø1.3 to 1.1, stranded wire	<b>AXW7231FP</b> (5 pins per 1 series)
	AWG28, outer diameter of coating ø1.3 to 1.1, stranded wire	

# DIMENSIONS (Unit: mm in)

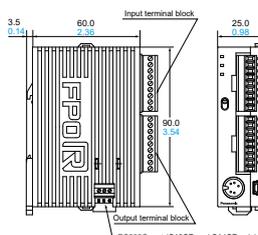
## Control units and Expansion units \* For the relay output type, the terminal block type is listed as the representative type.

### Control units

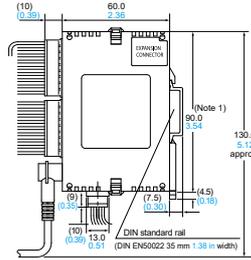
**C10RS, C10RM, C10CRS, C10CRM, C10MRS, C14RS, C14RM, C14CRS, C14CRM and C14MRS**

### Expansion units

**E8RS, E8RM, E8YRS, E16RS and E16RM**



<Reference measuring for wiring>



### Terminal array

	C10RS/C10RM	C14RS/C14RM	E8RS/E8RM	E16RS/E16RM/E8YRS
Input	X0	X0	X0	X0
	X1	X1	X1	X1
	X2	X2	X2	X2
	X3	X3	X3	X3
	X4	X4	X4	X4
	X5	X5	X5	X5
	(NC)	X6	(NC)	X6
Output	COM	COM	COM	COM
	Y0	Y0	Y0	Y0
	Y1	Y1	Y1	Y1
	(NC)	Y2	(NC)	Y2
	COM	Y3	(NC)	Y3
	COM	Y4	(NC)	Y4
	COM	Y5	(NC)	Y5
COM	Y6	(NC)	Y6	
COM	Y7	(NC)	Y7	
COM	COM	COM	COM	

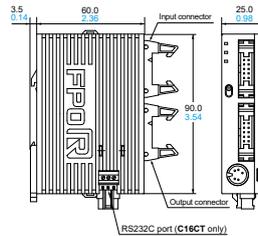
Notes: 1) DIN rail is attached on the center of the unit.  
2) The AFP0RE8YRS is not equipped with an input terminal block.

### Control units

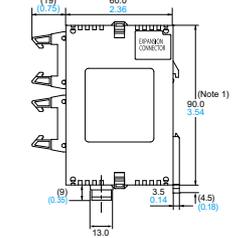
**C16T, C16P, C16CT, C16CP, C16MT and C16MP**

### Expansion units

**E16T, E16P, E8X, E8YT and E8YP**



<Reference measuring for wiring>



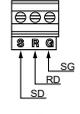
### Terminal array

Input (8 points / common)

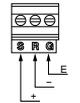
X0	X1
X2	X3
X4	X5
X6	X7
COM	COM

Y0	Y1
Y2	Y3
Y4	Y5
Y6	Y7
(+)	(-)

### RS232C port Terminal array



### RS485 port Terminal array



Note: Two COM terminals on the input circuit are connected inside the unit.

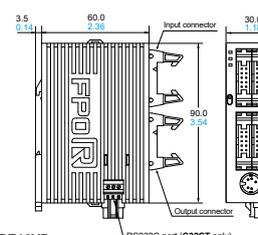
Notes: 1) DIN rail is attached on the center of the unit.  
2) The AFP0RE8X has no output connector.  
3) The AFP0RE8YT and AFP0RE8YP has no input connector.

### Control units

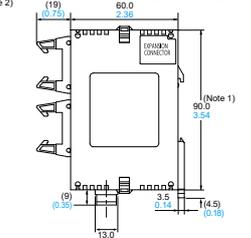
**C32T, C32CT, C32P, C32CP, C32MT, C32MP, T32CT, T32CP, T32MT, T32MP, F32CT, F32CP, F32MT and F32MP**

### Expansion units

**E32T, E32P, E16X, E16YT and E16YP**



<Reference measuring for wiring>



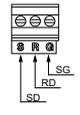
### Terminal array

Input (16 points / common)

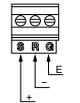
X0	X1	X8	X9
X2	X3	XA	XB
X4	X5	XC	XD
X6	X7	XE	XF
COM	COM	COM	COM

Y0	Y1	Y8	Y9
Y2	Y3	YA	YB
Y4	Y5	YC	YD
Y6	Y7	YE	YF
(+)	(-)	(+)	(-)

### RS232C port Terminal array



### RS485 port Terminal array



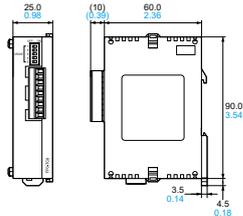
Notes: 1) Four COM terminals on the input circuit are connected inside the unit.  
2) Two (+) terminals and two (-) terminals on the output circuit are connected respectively inside the unit.

Notes: 1) DIN rail is attached on the center of the unit.  
2) The AFP0RE32T, AFP0RE32P, AFP0RE16X, AFP0RE16YT and AFP0RE16YP are 25 mm 0.98 in each.  
3) The AFP0RE16X has no output connector.  
4) The AFP0RE16YT and AFP0RE16YP has no input connector.

## FPOR Analog units

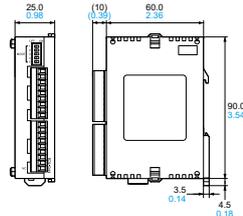
**AFP0RAD4  
AFP0RA21**

<Reference measuring for wiring>



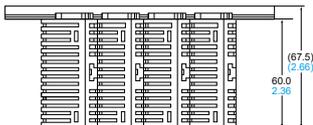
**AFP0RAD8  
AFP0DA4  
AFP0RA42**

<Reference measuring for wiring>

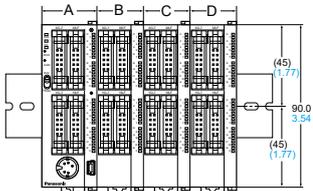


## External Dimensions During Expansions

### Top view (with DIN rail attached)



### Front view



### A + B + C + D dimensions (mm in)

Control unit	A + B + C + D dimensions (mm in)			
	A	A→B	A→C	A→D
C10RS	25 0.98	50 1.97	75 2.95	100 3.94
C16T				
C10CRS				
C16CT				
C10RM				
C16CP				
C10CRM	30 1.18	55 2.17	80 3.15	105 4.13
C10MRS				
C16MT				
C14RS				
C14CRS				
C14RM				
C14CRM	30 1.18	55 2.17	80 3.15	105 4.13
C14MRS				
C32T				
C32CT				
C32P				
C32CP				
T32CT	30 1.18	55 2.17	80 3.15	105 4.13
F32CT				
F32CP				
T32MT				
F32MT				
F32MP				

# WH SERIES LINEUP

## List of related products [Web-based HMI] Programmable display WH series



### Add “IoT” to machines with the displays Ready for Industrial IoT

Providing new information to the production site with web technology  
Wide selection of screen sizes up to 21.5 inch wide

#### Advanced model WHA1

16,770,000 colors    Max. 21.5 inch    SD memory card  
Capacitive type    Front pure glass    Web server

Equipped with 3 Ethernet ports\* and a capacitive type, the large, high end model enables gesture control.

#### Standard model WHS1

65,536 colors    Resistive film type  
Web server

Standard model with mid-sized, wide resistive film type for users with focused needs.

\*AWHA1C050 is equipped with two Ethernet ports.



	AWHA1C215	AWHA1C156	AWHA1C101	AWHA1C070	AWHA1C050		AWHS1R101	AWHS1R070	AWHS1R043
Screen size	21.5 inch wide	15.6 inch wide	10.1 inch wide	7 inch wide	5 inch wide	Screen size	10.1 inch wide	7 inch wide	4.3 inch wide
Resolution	Full HD 1920 × 1080	HD 1366 × 768	WXGA 1280 × 800	WVGA 800 × 480	WVGA 800 × 480	Resolution	WSVGA 1024 × 600	WVGA 800 × 480	WQVGA 480 × 272
Memory (RAM)	2 GB	2 GB	1 GB	1 GB	512 MB	Memory (RAM)	512 MB	512 MB	512 MB

## Main unit

Type	Descriptions						Part No.	
	Display	Touch switch	Power supply	Communication		USB		SD
				Ethernet	Serial			
Advanced model	21.5 inch wide TFT	Capacitive type	24 V DC	3 ports	1 port RS-232C / RS-422 / RS-485 *Software configurable	2 ports	1 slot	AWHA1C215
	15.6 inch wide TFT							AWHA1C156
	10.1 inch wide TFT							AWHA1C101
	7.0 inch wide TFT							AWHA1C070
	5.0 inch wide TFT							AWHA1C050
Standard model	10.1 inch wide TFT	Resistive film type	24 V DC	1 port	1 port RS-232C / RS-422 / RS-485 *Software configurable	1 port	—	AWHS1R101
	7.0 inch wide TFT							AWHS1R070
	4.3 inch wide TFT							AWHS1R043

## Tool software

Product name	Descriptions	Remarks
<b>xAscender Studio</b>	Screen configuration tool for WH series programmable displays	You can download “xAscender Suite” for free from our website. (Membership registration is required.) “xAscender Suite” includes “xAscender Studio” and “xAscender Client”.
<b>xAscender Client</b>	Tool to enable remote viewing of WH series programmable displays	

## Introduction of Motors for industrial application



### • AC servo motors MINAS A6 series

- Make motors lighter and more compact.
- Frequency response: 3,200 Hz
- Achieve smoother, high accuracy positioning.
- Achieve high protective performance that complies with protection level IP67 for servo motor.

## 3 year warranty

Factory Automation Devices Products



### Market Trend

To reduce the usage of earth's resources, demand for a longer product lifecycle increases.

### Company direction

Pursue and supply high quality standard products which can be safely used in long term.

### Disclaimer

The applications described in the catalog are all intended for examples only. The purchase of our products described in the catalog shall not be regarded as granting of a license to use our products in the described applications. We do NOT warrant that we have obtained some intellectual properties, such as patent rights, with respect to such applications, or that the described applications may not infringe any intellectual property rights, such as patent rights, of a third party.

**Panasonic**  
INDUSTRY

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