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SYSTEMSMEASUREMENT
SENSORSSTATIC
CONTROL
DEVICESLASER
MARKERS

PLC

HUMAN MACHINE
INTERFACESENERGY
MANAGEMENT
SOLUTIONS

FA COMPONENTS

MACHINE VISION
SYSTEMSUV CURING
SYSTEMS

Applications

PLC

Software

Program
Transfer

Others

FP7

FP-X0

FP0R

FPΣ

FP-X

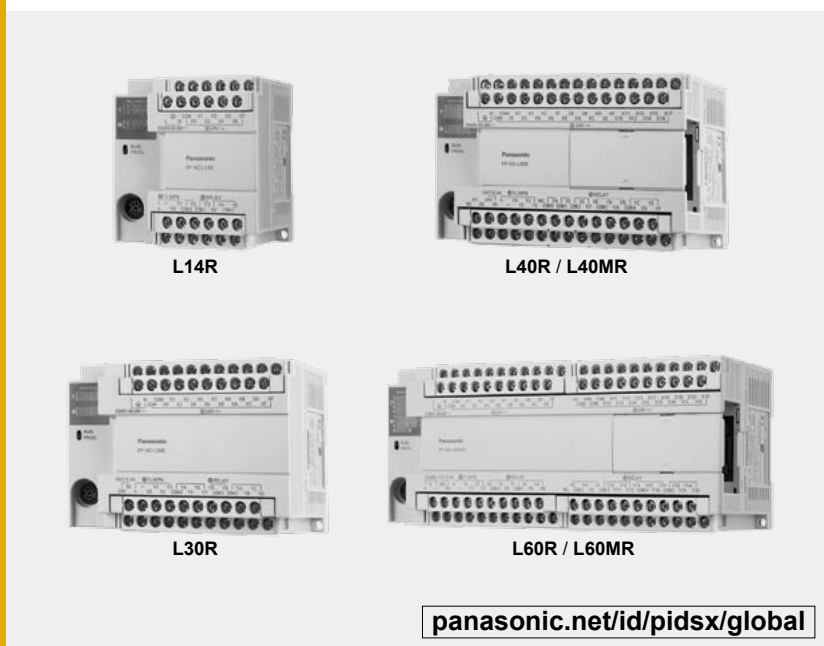
FP2SH

FP-e

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

CE

RoHS compliance



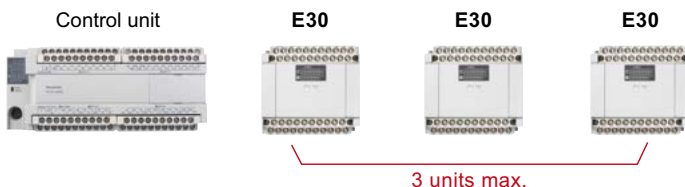
New multi-functional & Economical PLC

Plenty of I/O points -150 points max.

L40□ / L60□

If the customer can not predict the number of I/O points needed by his machineries and devices in the future, he will feel hesitant and uncomfortable. But, the I/O number of **FP-X0** can reach 150 points max. by using the **FP-X** expansion unit. Therefore, the customer's discomfort and hesitation can be eliminated.

- The maximum number of expansion unit is up to 3 units.



150 points max.



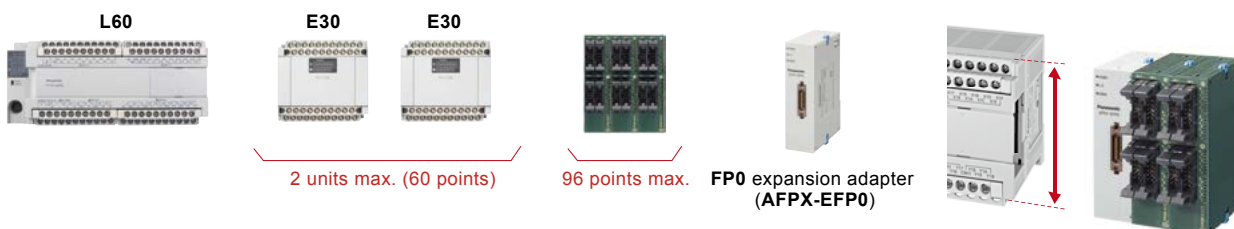
The cable between the units can be bent to realize the side-by-side installation, thus saving the installation space.

Further expansion and more functions achieved by using the existing FP0R expansion unit easily

L40□ / L60□

The maximum number of **FP0R** expansion unit is up to 3 after all the control units are equipped with adapters. A wider range of application can be achieved by using [transistor output], [analog I/O], [thermocouple input] and [I/O LINK (network)].

Only one **FP0** expansion adapter can be installed on the control unit. In addition, two **FP-X** expansion units can be installed after the adapter is installed.



Besides the supplied expansion cable of 8 cm 3.150 in, 30 cm 11.811 in and 80 cm 31.496 in types are also sold separately. They can be bent or straightened. (The total extension length is within 160 cm 62.992 in.)

Both of them are 90 mm 3.543 in and can be installed in the cabinet.

Super-high processing speed

Super-high speed of 80 ns/step for 0 to 3,000 steps (ST command). 580 ns/step processing speed for 3,001 steps or more (Only for **L40□** and **L60□**).

Pulse output function / High-speed counter function

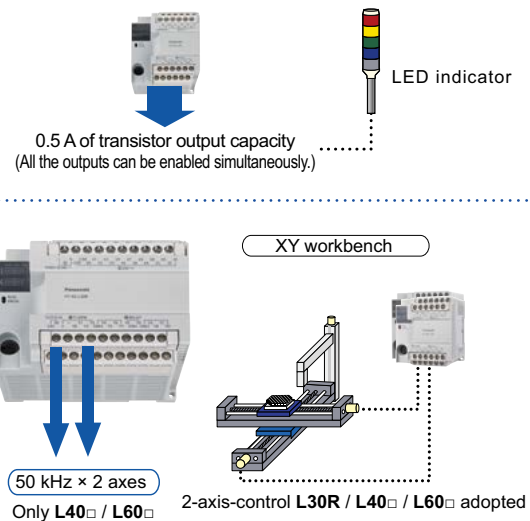
The pulse output function of **FP-X0** (1-axis for **L14R** and 2-axis for **L30R** / **L40□** / **L60□**) is built in the body of the control unit. Compared with the previous PLC that must use the advanced or specific positioning units or more than two multi-axis control devices, **FP-X0** only uses one unit basically, thus saving the space and reducing the cost.

Built-in 4-point high-speed counter

4-point for 1-phase or 2-point for 2-phase (X0 to X3)

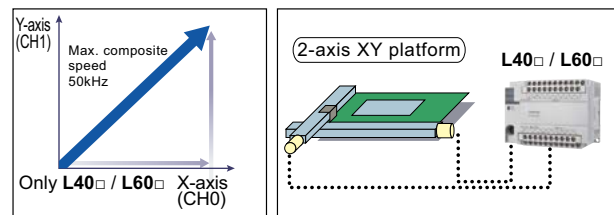


Body equipped with combined relay and transistor output



Adopting 2-axis linear interpolation **L40□ / L60□**

2-axis linear interpolation is a kind of function that controls 2 motor axes and makes the robot arm and tool head carry out diagonal line moving simultaneously, which is applied in the stacker's picking & mounting components, the control of XY workbench and the baseplate cutting etc.



PART NUMBER LIST

FP-X0 Control unit

Product name	Power supply	Specifications				Part No.
			Program capacity	Analog input	RS-485 communication	
FP-X0 L14R	100-240 V AC	24 V DC input, 8 points 0.5 A/5 to 24 V DC transistor output, 2 points 2 A relay output, 4 points	2.5 k steps	—	—	AFPX0L14R
FP-X0 L30R	100-240 V AC	24 V DC input, 16 points 0.5 A/5 to 24 V DC transistor output, 4 points 2 A relay output, 12 points	2.5 k steps	—	—	AFPX0L30R
FP-X0 L40R	100-240 V AC	24 V DC input, 24 points 0.5 A/5 to 24 V DC transistor output, 4 points 2 A relay output, 12 points	8 k steps	10 bits, 2 channels	—	AFPX0L40R
FP-X0 L40MR	100-240 V AC	24 V DC input, 24 points 0.5 A/5 to 24 V DC transistor output, 4 points 2 A relay output, 12 points	8 k steps	10 bits, 2 channels	Available	AFPX0L40MR
FP-X0 L60R	100-240 V AC	24 V DC input, 32 points 0.5 A/5 to 24 V DC transistor output, 4 points 2 A relay output, 24 points	8 k steps	10 bits, 2 channels	—	AFPX0L60R
FP-X0 L60MR	100-240 V AC	24 V DC input, 32 points 0.5 A/5 to 24 V DC transistor output, 4 points 2 A relay output, 24 points	8 k steps	10 bits, 2 channels	Available	AFPX0L60MR

Note: 24 V DC input: ± common

Expansion unit

FP-X expansion I/O unit and **FP0R** unit can be used.

But **FP0** adapter for **FP-X** expansion are required when **FP0R** expansion units are used.

Software tools (Refer to operation manual for the details.)

Product name	Software classification	Part No.
FPWIN GR Ver. 2.91 over	Japanese version with supplied cable kit	AFPS10122
	English version Full type	AFPS10520
	Korean version	AFPS10920
FPWIN GR7 Ver. 2.14 over	Japanese version	AFPSGR7JP
	Security enhanced type	AFPSGR7JPS
	English version	AFPSGR7EN
FPWIN Pro7	Security enhanced type	AFPSGR7ENS
	Japanese, English, Chinese, Korean	AFPSPR7A
	Security enhanced type	AFPSPR7AS

Other cables and maintenance parts

Product name	Specifications	Part No.
Backup battery	For data storage backup and calendar/clock backup	AFP8801
FP-X expansion cable (Note)	8 cm 3.150 in	AFPX-EC08
	30 cm 11.811 in	AFPX-EC30
	80 cm 31.496 in	AFPX-EC80
Cable for FP and computer connection (M5 type)	3 m Round D-SUB, 9-pin, L-shaped type	AFC8503
	8.43 ft Round D-SUB, 9-pin, Straight type	AFC8503S
FP0 power cable	For the adaptor for FP0 expansion, 1 m 3.281 ft long	AFP0581
FP0 installation bracket (Long-strip type)	For FP0 expansion unit, 10 pieces per package	AFP0803

Note: The cables for expansion can be extended to 160 cm **62.992 in** max.

FIBER SENSORS

LASER SENSORS

PHOTOELECTRIC SENSORS

MICRO PHOTOELECTRIC SENSORS

AREA SENSORS

SAFETY LIGHT CURTAINS / SAFETY COMPONENTS

PRESSURE / FLOW SENSORS

INDUCTIVE PROXIMITY SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS

SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS

MEASUREMENT SENSORS

STATIC CONTROL DEVICES

LASER MARKERS

PLC

HUMAN MACHINE INTERFACES

ENERGY MANAGEMENT SOLUTIONS

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

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Program Transfer

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FP7
FP-X0
FP0R
FPΣ
FP-X
FP2SH
FP-e

SPECIFICATIONS

Performance specifications

Items		Specifications					
		L14R	L30R	L40R	L40MR	L60R	L60MR
Controllable I/O points	Control unit	DC input 8 points, Relay output 4 points, Transistor output 2 points	DC input 16 points, Relay output 10 points, Transistor output 4 points	DC input 24 points, Relay output 12 points, Transistor output 4 points		DC input 32 points, Relay output 24 points, Transistor output 4 points	
	When using FP-X E16 expansion I/O units	—	—	88 points max. (3 expansion units max.)		108 points max.	
	When using FP-X E30 expansion I/O units	—	—	130 points max. (3 expansion units max.)		150 points max. (3 expansion units max.)	
	When using FP0R expansion units	—	—	196 points max. (3 expansion units max.)		216 points max. (3 expansion units max.)	
Programming method / Control method		Relay symbol / Cyclic operation					
Program memory		Built-in Flash-ROM (Free of backup battery)					
Program capacity		2.5 k steps		8 k steps			
No of instruction	Basic commands	114 kinds approx.					
	High-level commands	230 kinds approx.					
Processing speed		0.08 μs/step for basic commands 0.32 μs for high-level commands (MV commands)		3 k steps: 0.08 μs/step for basic commands, 0.32 μs for high-level commands (MV commands) After 3 k steps: 0.58 μs/step for basic commands, 1.62 μs for high-level commands (MV commands)			
		Basic time	0.15 ms or less	0.18 ms or less	0.31 to 0.35 ms or less		0.34 to 0.39 ms or less
I/O refreshing + basic time		When using E16: 0.4 ms × No. of units When using E30: 0.5 ms × No. of units When using FP0 expansion adapters: 1.4 ms + the refreshing time of the FP0 expansion unit					
Memory for processing	Relays	External input (X) (Note 1)	960 points		1,760 points		
		External output (Y) (Note 1)	960 points		1,760 points		
		Internal relay (R)	1,008 points		4,096 points		
		Special internal relay (R)	224 points				
		Timer/Counter (T/C)	256 points (Note 2)		1,024 points (Note 2)		
	Memory area	Link relay (L)	—		2,048 points		
		Data register (DT)	2,500 words		8,192 words		
		Special data register (DT)	420 words				
		Link data register (LD)	—		256 words		
		File registration (FL)	—				
Index register (I)		14 words (IO to ID)					
Differential points		Equivalent to program capacity					
Master control relay (MCR)		32 points		256 points			
Label number (JP+LOOP)		100 points		256 points			
No. of step programs		128 (Engineering)		1,000 (Engineering)			
No. of subroutines		100		500			
No. of interrupt programs		Input: 8 programs, timing: 1 program					
Sampling trace		—		Available			
Comments storage		All of the I/O comments, explanations and block comments can be saved. (Free of backup battery, 328 k bytes)					
PLC link function		—		Available			
Constant scan		In unit of 0.5 ms: 0.5 ms to 600 ms					
Password		Available (4 or 8 digits)					
Upload protection		Available					
Self-diagnosis function		Checks of the watchdog timer and the program syntax					

Items		Specifications					
		L14R	L30R	L40R	L40MR	L60R	L60MR
Program editing during Run		Available (Capacity modified simultaneously: 128 steps) But comments cannot be modified during the process.		Available (Capacity modified simultaneously: 512 steps) But comments can be modified during the process.			
Downloading during Run		Available					
High-speed counter (Note 3, 4)	Body input	1-phase, 4-channel (20 kHz max.) and 2-phase, 2-channel (20 kHz max.)		1-phase, 4-channel (50 kHz max.) and 2-phase, 2-channel (20 kHz max.)			
Pulse output/PWM output (Note 3, 4)	Body output	Pulse: 1-channel (20 kHz max.) PWM: 1-channel (1.6 kHz max.)	Pulse: 2-channel (20 kHz max.) PWM: 2-channel (1.6 kHz max.)	Pulse: 2-channel (50 kHz) PWM: 2-channel (3.0 kHz max.)			
Pulse catch input / Interrupt program		8 points (High-speed counting and interrupt input included)					
Periodical interrupt		0.5 ms unit: 0.5 ms to 1.5 sec., 10 ms unit: 10 ms to 30 sec.					
Analog input		—		2-channel (For inputting any of the following items in each channel)			
				Potentiometer input Min. resistance value of potentiometer: 5 kΩ 10-bit resolution (K0 to K1000) Accuracy ± 1.0% F.S.+ accuracy of external resistors			
				Thermistor input For inputting the resistance value of the thermistor (Min. resistance value of external thermistors + external resistance value > 2 kΩ) 10-bit resolution (K0 to K1023) Accuracy ± 1.0% F.S.+ accuracy of external thermistors			
				Voltage input Absolute max. input voltage: 10 V 10-bit resolution (K0 to K1023) Accuracy ± 2.5% F.S. (F.S. = 10 V)			
Calendar/clock		—		Available			
Flash ROM backup (Note 5)	Backup made according to commands of F12 and P13	Data memory (2,500 words)		Data memory (8,192 words)			
	Automatic backup when power OFF	Counter: 6 points (C250 to C255) Process value of the counter: 6 points (EV250 to EV255) Internal relays: 5 points (WR58 to WR62) Data memory: 300 words (DT2200 to DT2499)		Counter: 16 points (C1008 to C1023) Process value of the counter: 16 points (EV1008 to EV1023) Internal relays: 8 points (WR248 to WR255) Data memory: 302 words (DT7890 to DT8191)			
Backup battery		—		Available (Backup lasting for the whole process)			
RS485 communication port		—			Available	—	Available

- Notes: 1) The actual usable points depend on the combination of the hardware.
2) The points of the timer can be added as required.
3) The rated voltage is 24 V DC at +25 °C +77 °F. The frequency may fall according to the changes of the voltage, temperature and operating conditions.
4) The maximum frequency may vary with the difference of the operating method.
5) The allowable writing operation is within 10,000 times. Areas to be held and not held can be specified using the system registers.

SPECIFICATIONS

General specifications

Items	Specifications
CE marking directive compliance	Low Voltage Directive, EMC Directive, RoHS Directive
Operating temperature	0 to +55 °C +32 to +131 °F
Storage temperature	-40 to +70 °C -40 to +158 °F
Operating humidity	10 to 95% RH (at +25 °C +77 °F , no dew condensation allowed)
Storage humidity	10 to 95% RH (at +25 °C +77 °F , no dew condensation allowed)
Withstand voltage (Note 1,2)	Input terminals ⇔ Relay output terminals
	All of the transistor output terminals ⇔ All of the relay output terminals
	All of the input terminals ⇔ All of the power supply terminals and functional ground terminals
	All of the relay output terminals ⇔ All of the power supply terminals and functional ground terminals
	All of the transistor output terminals ⇔ All of the power supply terminals and functional ground terminals
Insulation resistance (Note 1)	Power supply terminals ⇔ Ground terminals
	Input terminals ⇔ Transistor output terminals
	Input terminals ⇔ Output terminals
	All of the transistor output terminals ⇔ All of the relay output terminals
	All of the input terminals ⇔ All of the power supply terminals and functional ground terminals
Vibration resistance	5 to 8.4 Hz, 3.5 mm 0.138 in amplitude in one direction, 1 scan/1 minute
	8.4 to 150 Hz, fixed acceleration of 9.8 m/s ² , 1 scan/1 minute
	10 minutes in X, Y, Z direction each
Shock resistance	147 m/s ² , 4 times in X, Y, Z directions each
Noise immunity	1,500 V [p-p] pulse width 50 ns, 1 μs (Measured from noise simulation method AC power supply terminals)
Operating environment	No corrosive gases or too much dust
Overvoltage class	II
Pollution level	2
Net weight	L14R: 280 g approx., L30R: 450 g approx., L40R / L40MR: 530 g approx., L60R / L60MR: 730 g approx.

Notes: 1) The programmable port, RS-485 communication port and the internal digital circuit part are non-insulation type.
2) The cut-off current is 5 mA (The default value when shipped from the factory).

Power supply specifications

AC power supply

Items	Specifications
	L14R L30R, L40R, L40MR, L60R, L60MR
Rated voltage	100-240 V AC
Applied voltage range	85-264 V AC
Inrush current	35 A max. (at 240 V AC and +25 °C +77 °F) 40 A max.(at 240 V AC and +25 °C +77 °F)
Momentary power off time	10 ms (when 100 V AC used)
Frequency	50/60 Hz (47 to 63 Hz)
Leakage current	0.75 mA max.between the input and protective ground terminals
Service life of built-in power supply	20,000 h (at +55 °C +131 °F)
Fuse	Built-in (replacement disabled)
Insulation system	Transformer isolation
Screw of terminal block	M3

Universal power supply for input (output) (L30R / L40□ / L60□ only)

Items	Specifications
Rated output voltage	24 V DC
Applied voltage range	21.6 to 26.4 V DC
Rated output current	0.3 A
Overcurrent protection (Note)	Yes
Screw of terminal block	M3

Note: Output short protection is a temporary overcurrent protection. When the short is detected, all the power supplies of PLC will be turned OFF.
If the current load out of this specification is connected and in consecutive over-loaded status, failures may occur.

DIMENSIONS (Unit: mm in)

AFPX0L14R Control unit		AFPX0L30R Control unit	
AFPX0L40R AFPX0L40MR Control units		AFPX0L60R AFPX0L60MR Control units	

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