Panasonic

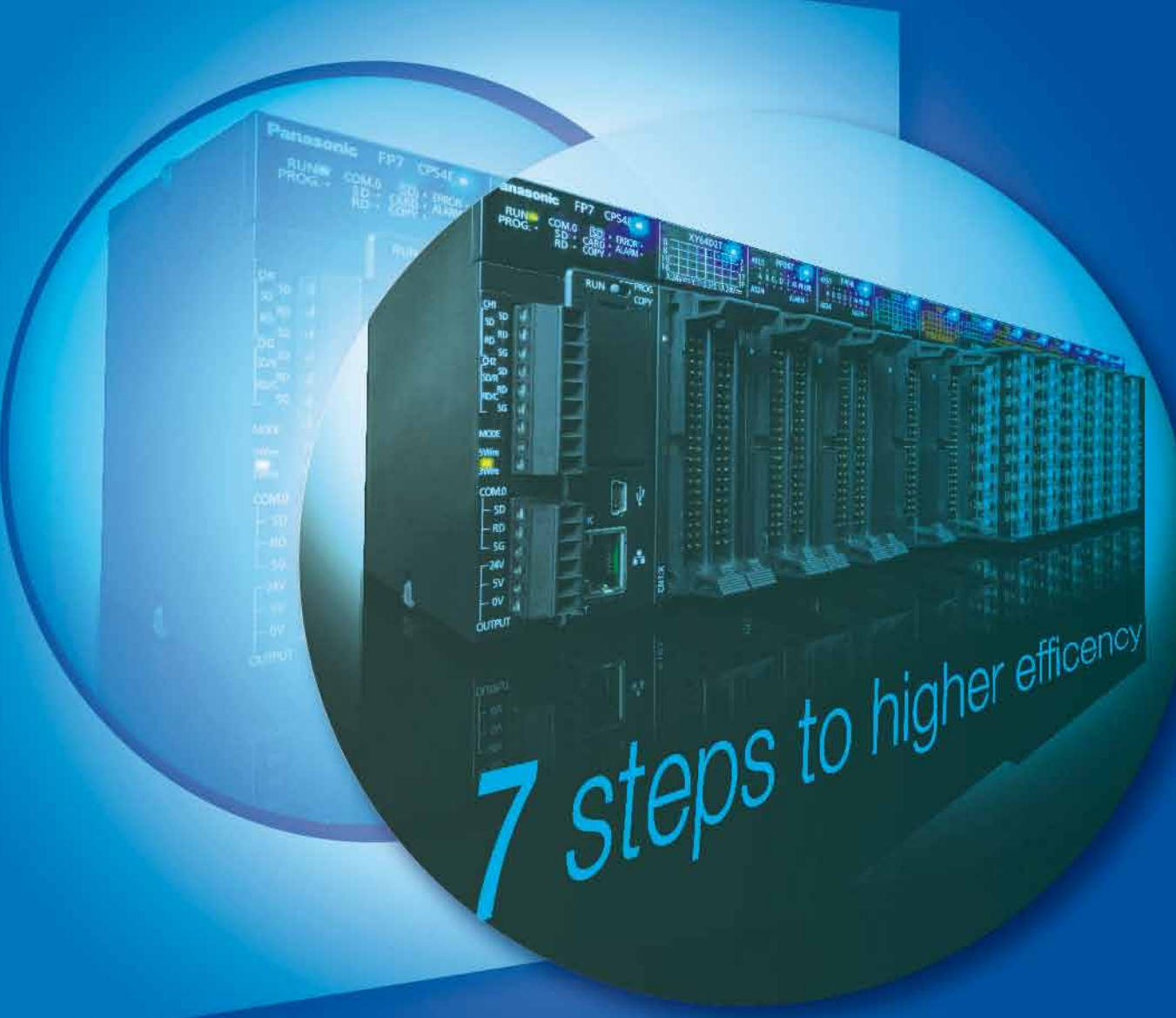**PROGRAMMABLE LOGIC CONTROLLER**

FP7 SERIES

7 steps to higher efficency

FP7: Panasonic know-how inside!

Panasonic has a large number of factories worldwide. All our industry PLCs contain the experience and expertise of our machine and production engineers.

FP7: Very fast & flexible

One of the fastest PLCs in the world: 11ns per program step! Program capacity of up to 220.000 steps, data memory of up to 500.000 words, and up to 32GB expandable memory using SDHC card.

FP7: very small & powerful
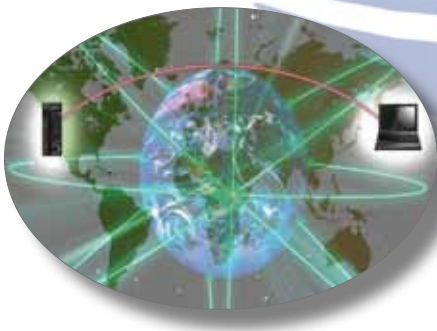
FP7: connects worlds

Programming, monitoring, remote control and communication with other automation devices is possible all over the world.

FP7: green & clean

Panasonic specifies 14 forbidden and hazardous substances, which are not used in our products. We permit less than one-tenth of the level allowed by the RoHS guideline for the 6 most important hazardous substances and we have forbidden the use of another 8 hazardous substances in our products that are not even covered by the RoHS guideline.

FP7 features

Compact design

Incorporates the functionality and performance of a modular PLC in an outstanding compact format

Local & remote connectivity

Dedicated to the total integration into Web applications

Security & reliability

Provides seven different security levels, automatically stores backup programs and allows users to update programs only after a functional check

Traceability

Traces the values of variables over a certain time frame during program execution

FP7: Seven steps to higher efficiency

Maintenance

Integrates several features that facilitate maintenance, diagnostics and troubleshooting

Performance

Equipped with a large memory capacity (up to 220k program steps or up to 500k data words) and a high-speed processor (11ns/step)
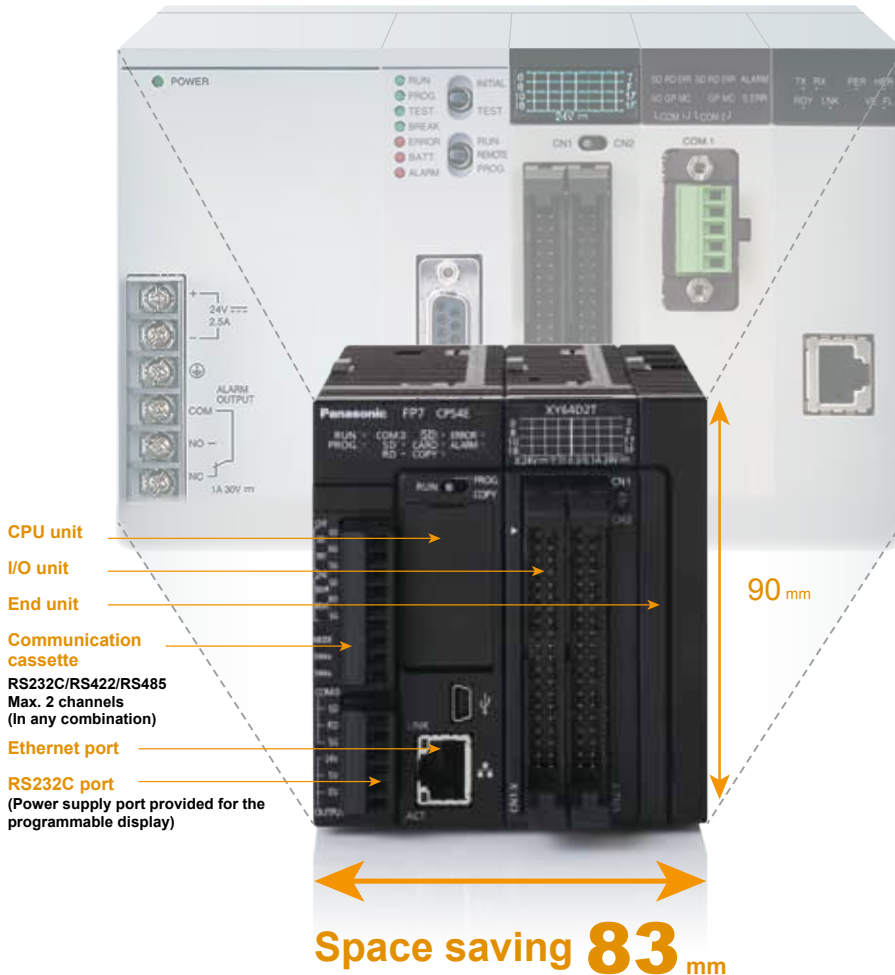
Advanced motion control cam & gear

Offers a variety of control options, from simple position control to synchronized control of multiple axes to advanced cam control and gearing

Content

① Compact design

The FP7 represents the top of the range of our PLCs and incorporates all the functionality and performance of a modular PLC in an outstanding compact format with a height of only 90mm!

CPU unit

I/O unit

End unit

Communication cassette
RS232C/RS422/RS485
Max. 2 channels
(In any combination)

Ethernet port

RS232C port
(Power supply port provided for the programmable display)

90 mm

Space saving 83 mm

No power supply unit needed

No power supply unit is needed if the CPU is directly connected to DC power. Expansion units are clipped together without backplane.

- Reduced costs
- Smaller footprint

No power supply unit

No backplane

Add a power supply unit if AC power is required.
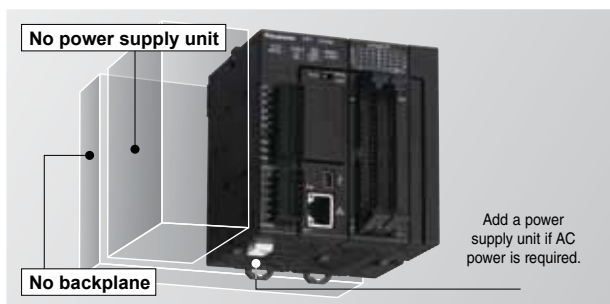
No communication unit needed

Enhancing communication features can be added using communication cassettes.

- Reduced costs
- Smaller footprint

RS232C x 1 channel
or
RS422/RS485 x 1 channel

RS232C x 2 channels
or
RS422/RS485 x 2 channels

RS232C x 1 channel
and
RS485 x 1 channel

No communication unit
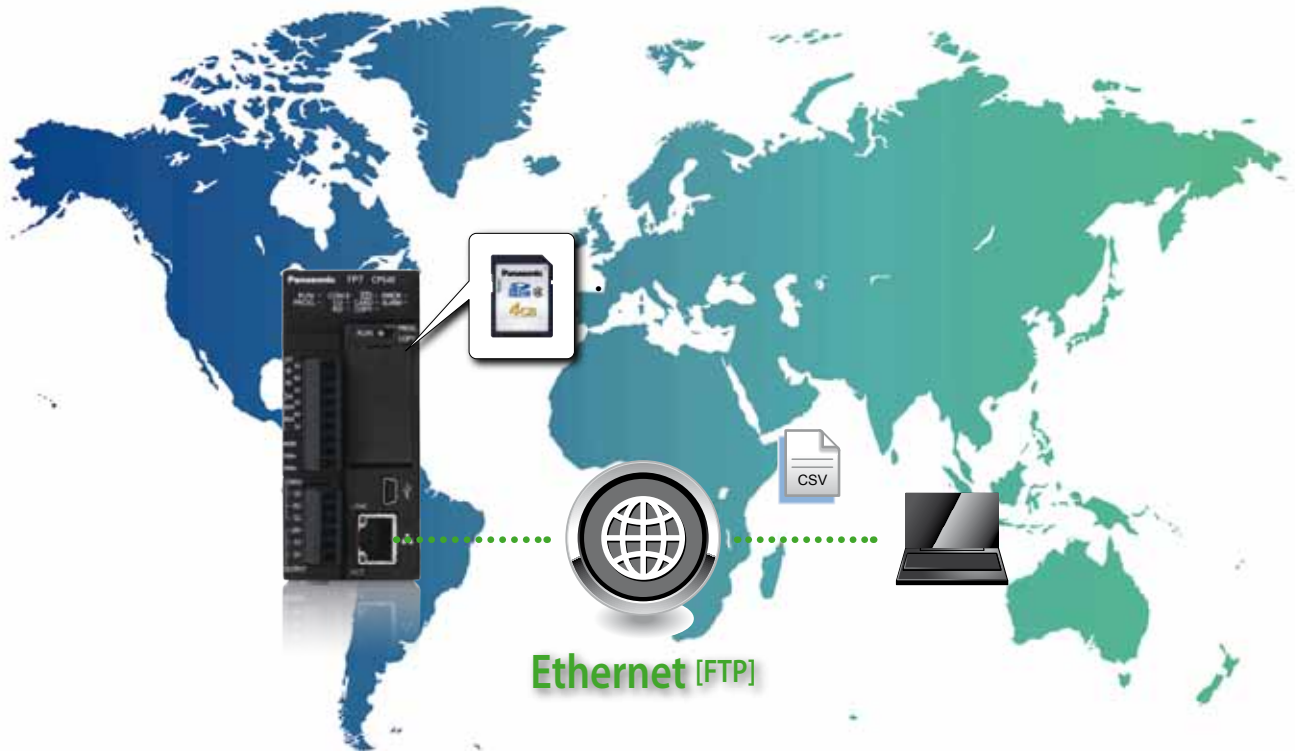
Local & remote connectivity

② The FP7 is dedicated to the total integration into Web applications. The standard CPU boards with Ethernet interface offer connectivity without limits, from remote programming to monitoring and data logging to FTP server and Modbus TCP.

Ethernet [FTP]

FP Web-Server main features:

Web-Server:
- PLC data presented as HTML pages
- Access via standard Internet browser
- HTML entry field for PLC data change
- Optional password protection
- Java applet functions library

Data logger:
- Logging of PLC data and saving it on an SD memory card or transmitting it via FTP (only possible when FP-WEBEXP is attached)

Email:
- PLC can send e-mails, also with PLC data attachments
- E-mail server access via LAN or Internet dial-up
- PLC defined or pre-stored mail text

RS232C device server:
- Ethernet ↔ RS232C conversion (MEWTOCOL)
- Transparent RS232C data tunnelling via Ethernet
- Programming and visualization access via Ethernet

Modem/Ethernet gateway:
- FP Web-Server can be dialed up via modem for local or network access
- One remote gateway for multiple FP Web-Servers in a local Ethernet network
- Remote password handling

Modbus-TCP communication:
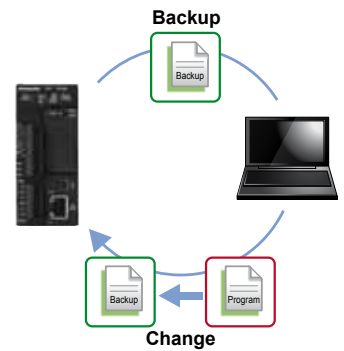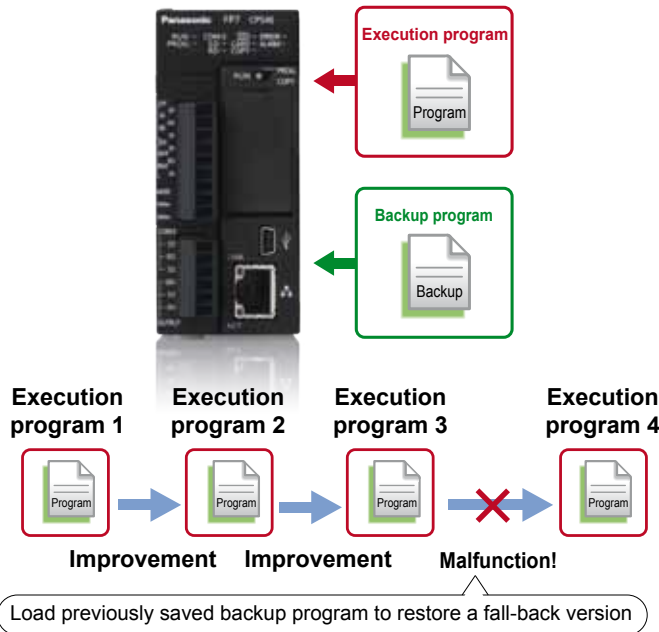- Modbus-TCP server or client for a PLC

③ Security & reliability

The PLC programs can be password protected. Additionally, seven different security levels can be set! 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.

Built-in program backup

- Production can resume in the event of fault
- Original program is immediately to hand

Two program areas

Execution program

Program

Backup program

Backup

Execution program 1	Execution program 2	Execution program 3		Execution program 4
Program	Program	Program	✕	Program
	Improvement	Improvement	Malfunction!	

Load previously saved backup program to restore a fall-back version

Backup

Backup

Program

Backup

Change

You can read a backup program from the programming software and write it into the execution program to return to the factory default program.

Update PLC program only after functional check

- Operation can be tested on SD memory card

New

Program

Main unit's old program
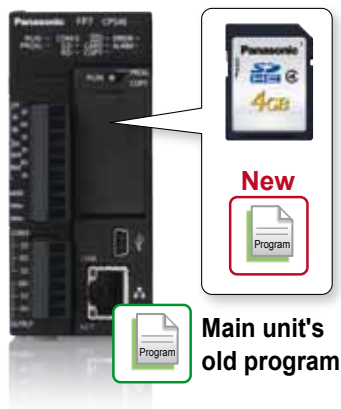
Program

❶ **Execute new program in SD memory card on FP7.**

Program ← Program **New**

❷ **Check operations under new program.**

Program Program **New**

❸ **Update main unit's old program to the new program if program functions correctly.**

Program → Program **New**

Traceability

④

Operational and program editing events are logged. Automatic logs of program download and upload are useful, especially for program debugging.

**Automatic recording of program change history**
• Useful for debugging

Date of occurrence	Time	Trigger
2012/11/21	14:05:35	Power: ON
2012/11/21	14:07:13	Open cover
2012/11/21	14:20:25	Insert SD memory card.
2012/11/21	14:30:19	Close cover
2012/11/21	14:31:00	Download program
2012/11/21	14:33:10	Switch operation mode to RUN
2012/11/21	14:35:12	Program edition during RUN
2012/11/21	14:35:32	Upload program
2012/11/21	14:40:07	Power: OFF

Visualization tool FP Data Analyzer
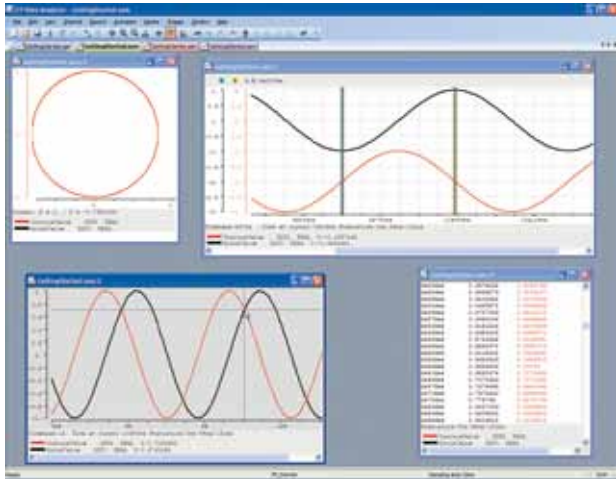
The FP Data Analyzer can be used to store recorded PLC data and to analyze it in offline mode. The tool can be used for:
• Failure diagnostics
• Finding and isolating failures
• Performance analyzes
• System optimization
• Scan time reduction
• Documenting support
• Machine maintenance
• Improving development

Fields of application

• Diagnosing unexpected behavior and errors on a machine
 With the FP Data Analyzer, you can connect to a PLC, configure data to be analyzed and set a trigger to start analysis when the error flag occurs. You can also set a pre-trigger time to check events that occurred before the error.
• Archiving of historical data from a plant
 You can connect the tool to a PLC and read the data to be archived. You can set the scan time to read the data once a day or every hour . You can also write a small function block that archives the data in an array in the PLC's memory. If the memory is full, you can connect the FP Data Logger to the PLC, upload the data, archive and analyze it.
• Observing multiple axis movement
• Using the XY mode, you can observe multiple axis movements. For example, you can watch the circular interpolated movement of two axes using FPΣ(Sigma).

⑤ Maintenance

The FP7 integrates several features that facilitate maintenance, diagnostics and troubleshooting. Set a maintenance schedule that is based on automatic measurement of contact switching cycles or overall ON time.

Hour meter operation
• Indication of maintenance schedule for peripheral equipment
• Indication of maintenance schedule for the PLC itself

Monitor input and output contact states.

Power-on time ≠ Equipment operating time

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.

$$T = T1 + T2 + T3$$

Contact ON time

| T1 | T2 | T3 |

Number of ON operations of contact
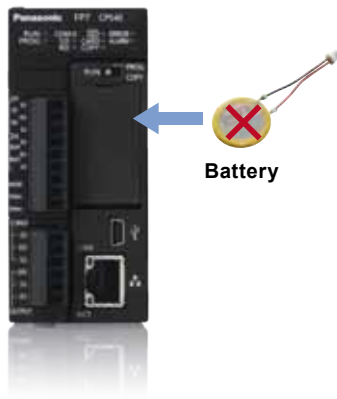
1 time   2 times   3 times
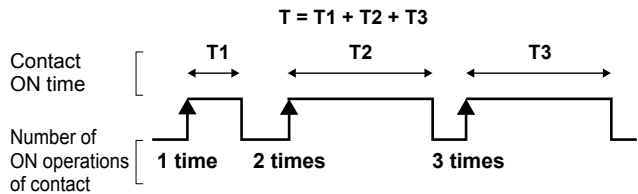
Records the PLC's ON time
Equipment operating time can be estimated. You can decide which equipment to give priority to reactivate if more than one item of equipment is idle.

Data backup without battery
• Simplified maintenance of equipment

Battery

Item	Without battery	With battery
Program holding	Yes	Yes
Data register holding	Yes	Yes
Clock / calendar operation	No [Note 1]	Yes

Note: 1) 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.)

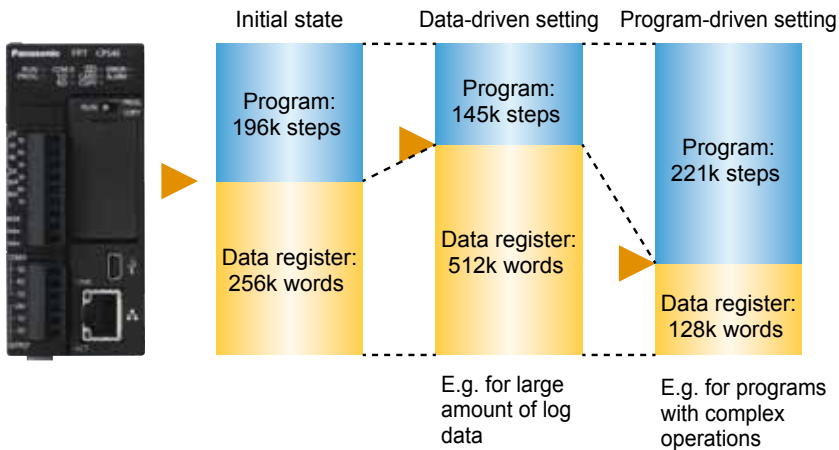**The built-in clock/calendar function can be adjusted via Ethernet.**

⑥ Performance

The FP7 has a large memory capacity for program and data (up to 220k program steps or up to 500k data words) and a high-speed processor (11ns/step). Control FPWIN Pro is (up- and downward) compatible with all Panasonic PLCs.

Shareable program and data memory
• Both expandable when more capacity needed
• No need to purchase upgrade models

Initial state   Data-driven setting   Program-driven setting

Program: 196k steps

Program: 145k steps

Program: 221k steps

Data register: 256k words

Data register: 512k words

Data register: 128k words

E.g. for large amount of log data

E.g. for programs with complex operations

AFP7CPS4E
Reference value: for 196k steps type CPU unit

Item	Specifications
234k steps approx.	64k words approx.
221k steps approx.	128k words approx.
196k steps approx.	256k words approx.
145k steps approx.	512k words approx.
52k steps approx.	976k words approx.

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

AFP7CPS3E/AFP7CPS3

Item	Specifications
120k steps approx.	128k words approx.
96k steps approx.	256k words approx.
64k steps approx.	416k words approx.
32k steps approx.	576k words approx.

AFP7DA4H

AFP7AD4H

New analog units with high-speed DA and AD conversion
• Conversion speed 20 times faster than in previous models
• High-accuracy control
• Noise-resistant with isolated channels

7

Advanced motion control (cam & gear)

FP7 programmable controllers are perfectly integrated with MINAS A5 servo drivers for accurate and sophisticated control in applications with up to 64 axes.

Besides, it is possible to set linear or sinusoidal acceleration and deceleration; startup/stop and speed changes are easy to accomplish in applications with high inertia loads.

FP7 positioning units can handle complex motion control tasks, e.g.
• Position and speed control
• Electronic cam control
• Axis synchronization operations (gear and clutch functions)
• Linear, circular and spiral interpolation (2/3 axes)

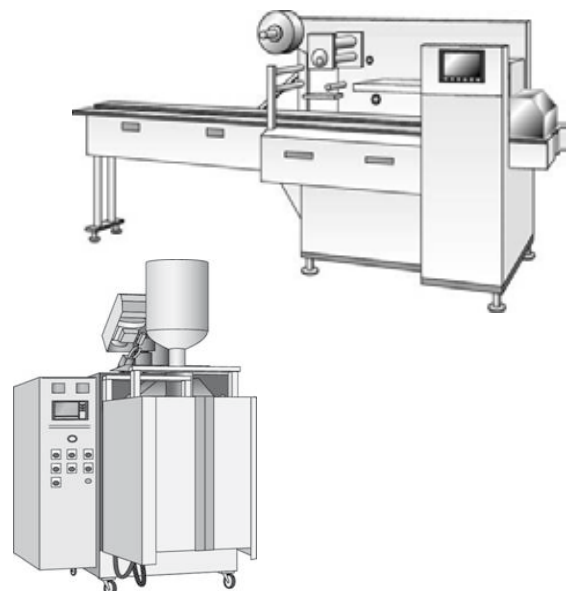AFP7PP02T   AFP7PP04T   AFP7PP02L   AFP7PP04L

Electronic cam control

Electronic cam control allows fast and precise movements and increases the productivity and dynamics in all non-linear movements. Using a configurator software, it is possible to create advanced motion profiles quickly and easily. The tool offers the possibility to insert electronic cam profiles for master and slave axes. Up to 16 cam profiles per slave axis and 20 different sections per master axis can be managed. The master axis can be either a physical or a virtual axis as well as an external encoder.

You can even manage complex movements in processes where you have to work on moving material without interruption, e.g. in wood, textile, plastic or paper applications with flying saws.

Typical applications

• Wrapping and packaging machines
• Bottling machines
• Binding machines
• Pick and place
• Assembly machines
• Molding and sealing machines
• Machines for binding
• Wood and metal machines
• Textile machines
• Cutting, welding, sawing

FP7 Lineup

CPU units

				End unit	
Standard model	**AFP7CPS4E**	**AFP7CPS3E**	**AFP7CPS3**		Included with CPU unit

Add-on cassettes

Communication cassettes	RS232C 1 channel **AFP7CCS1**	RS232C 2 channels **AFP7CCS2**	RS422/RS485 1 channel **AFP7CCM1**	RS422/RS485 2 channels **AFP7CCM2**

Communication cassette	RS232C 1 channel and RS485 1 channel **AFP7CCS1M1**

Power supply units

AC power supply units	AC power supply unit **AFP7PSA1**	AC power supply unit (High-capacity type) **AFP7PSA2**

Input and output units

Input units	Terminal block 16 points, 12 to 24V DC input **AFP7X16DW**	MIL connector 32 points, 24V DC input **AFP7X32D2**	MIL connector 64 points, 24V 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**
Output units	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, 24V DC input 32 points, transistor output (sink) **AFP7XY64D2T**	MIL connector 32 points, 24V DC input 32 points, transistor output (source) **AFP7XY64D2P**		

Analog input and output units

Input unit	High-speed and high-accuracy type 4 points, voltage and current **AFP7AD4H**
Output unit	High-speed and high-accuracy type 4 points, voltage and current **AFP7DA4H**

Positioning units

Pulse train	Transistor output 2 axes 500kpps **AFP7PP02T**	Transistor output 4 axes 500kpps **AFP7PP04T**	Line driver output 2 axes 4Mpps **AFP7PP02L**	Line driver output 4 axes 4Mpps **AFP7PP04L**

FP7 CPU units

Compact size with room for expansion functions

- Equipped with a cassette interface.
  Add-on cassettes can be added to the CPU to increase functionality without increasing the width of the unit. Communication cassettes support RS232C, RS422 and RS485 serial communications.

- Up to 16 different units can be connected to a single CPU.

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

- High performance (min. scan time 1ms, max. 20μs for 60k steps); the processing speed is less susceptible to frequent Ethernet communication

- GT power supply terminals for connecting 5V or 24VDC type GTseries programmable displays

AFP7CPS4E AFP7CPS3E AFP7CPS3

Performance specifications

Item	AFP7CPS4E
Program memory	Built-in flash ROM (no backup battery required)
Program capacity	19k steps (196,000)
Operation speed	Basic instruction: min. 11ns/step
External input (X)/output (Y)	8,192 points depending on hardware configuration
Internal relays (R)	32,768 points
System relays (SR)	Indicate operation status of various relays
Link relays (L)	16,384 points
Timers (T)	4,096 points
Counters (C)	1,024 points
Data registers (DT)	256k-words
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
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 32GB are usable.
Constant scan	Available (0 to 125ms)
Clock/calendar	Year (last two digits), month, day, hour (24-hour build-in display), minute, second and day of week
Battery backup	For Clock/calendar
Battery life	(Value applies when no power is supplied at all.) 3.3 years or more [actual usage value: 20 years approx. (at 25°C)]
Self-diagnostic function	Watchdog timer and program syntax check
Comment memory	3MB (no backup battery required)
PLC Link function	Max. 16 units, link relays: 1,024 points, link registers: 128 words. (Data transfer and remote programming are not supported)

Allowed momentary power off time 4ms (at 20.4V), 7ms (at 24V), 10ms (at 28.8V) [when directly connected to 24V DC)], 10ms [when AC power supply unit (AFP7P SA1/AFP7PSA2) is used]

Communication specifications

Item	Com port specifications
Interface	RS232C, 1 channel
Transmission distance	15m
Transmission speed	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400 bit/s
Communication method	Half-duplex
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
Communication mode	Programm controlled communication, MEWTOCOL-COM and MODBUS-RTU

Item	LAN port specifications
Communication interface	Ethernet 100BASE-TX/10BASE-TX
Baud rate	100Mbit/s, 10Mbit/s auto negotiation function
Total cable length	100m (500m when a repeater is used)
Number of nodes	Max. 254 units
Number of simultaneous connections	Max. 20 connections (user connections: 16, system connections: 4)
Communication protocol (Communication layer)	TCP/IP, UDP
DNS	Supports name servers
DHCP/DHCPV6	Automatic IP address acquisition
FTP server	File transfer, server function, number of users: 3
SNTP	Time synchronization

Item	USB port specifications
Standard	USB 2.0 fullspeed 12Mbit/s (USB miniB type)
Communication mode	MEWTOCOL-COM (Slave)

FP7 add-on cassettes

AFP7CCM2

AFP7CCS1M1

AFP7CCS1

AFP7CCS2

AFP7CCM1

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

- Serial communication functions can be added to the CPU.
  5 types are available including RS232C dedicated cassettes, cassettes to support either RS422 or RS485, and cassettes that support any combination of RS232C and RS485.

- Protocol supports MODBUS-RTU.
  Communication can easily be accomplished using comfortable communication instructions.

Maximum number of stations in RS485 communication

Baud rate: 230.4kbit/s   Baud rate: 115.2kbit/s

Baud rate: 57.6kbit/s

Number of stations

99
70
40
20

0   200   700   1000 1200   m

Transmission distance
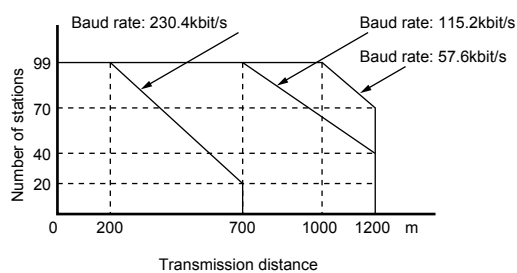
Specifications

Item	AFP7CCS1	AFP7CCS2	AFP7CCM1	AFP7CCM2	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. 15m		Max. 1,200m (RS485) or 400m (RS422)		Max. 15m (RS232C)	Max. 1,200m (RS485)
Transmission speed	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400 bit/s					
Communication method	Half-duplex					
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					
Max. number of stations	–	–	For programm controlled communication: max. 99	–	For programm controlled communication: max. 99	
			For MEWTOCOL COM: max. 99		For MEWTOCOL COM: max. 99	
			For PLC link: max. 16		For PLC link: max. 16	
			For MODBUS-RTU: max. 99		For MODBUS-RTU: max. 99 units	

FP7 analog input and output units

Channel insulation is switchable to support various devices

- 20 times faster conversion than in previous model

  A conversion rate of 25µs/channel is possible, 20 times faster than the previous model's 500µs/channel conversion speed. The system's production efficiency can be improved due to precise control. High-speed sampling can be achieved, independent of the PLC's scan time.

- High-accuracy control

  High-accuracy of ± 0.05% (at 25°C) of full scale can be achieved. The high-resolution performance allows users to achieve reliable control.

- Noise-resistant with isolated channels

  Channel insulation can be activated to guard against interference from other channels. No need to worry about the power supply system of the objects being measured.

AFP7DA4H

AFP7AD4H

Control specifications

Item			AFP7CPS4E
Number of input channels			4
Input range	Voltage		-10 to +10V (resolution: 1/62,500) 0 to 10V (resolution: 1/31,250) 0 to 5V (resolution: 1/31,250) 1 to 5V (resolution: 1/25,000)
	Current		0 to 20mA (resolution: 1/31,250) 4 to 20mA (resolution: 1/25,000)
Conversion speed	Voltage/current		25µs/channel (at non-insulated channels) 5ms/channel (at insulated channels)
Overall accuracy			± 0.05% F.S. or less (at 25°C) ± 0.1% F.S. or less (at 0–55°C)
Input	Voltage input		1MΩ
	Current input		250Ω
Max. input range			-15 to +15V voltage input -2 to +30mA current input
Insulation method	Between input terminals and internal circuit		Optocoupler and isolated DC/DC converter
	Between channels		PhotoMOS relay
Digital processing	Averaging	Number of times	Setting range: 2 to 60,000 times
		Time duration	Setting range: 1 to 1500ms (at non-insulated channels), 200 to 60,000ms (at insulated channels)
		Moving	Range setting: 2 to 2000 times
	Scale conversion setting		Any value within ±30,000
	Offset setting		Any value within ±3000
	Gain setting		Any value within 9000 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			Selectable for one channel
Comparison of upper and lower limit values			Selectaable per channel (hysteresis)
Broken wire detection			When less than 0.7V/2.8mA (only when voltage input range 1 to 5V or current input range 4 to 20mA is set.)
Connection method			Terminal block (M3 terminal screws)

Analog output specifications

Item			AFP7CPS4E
Number of output channels			4
Input range	Voltage		-10 to +10V (resolution: 1/62,500) 0 to 10V (resolution: 1/31,250) 0 to 5V (resolution: 1/31,250) 1 to 5V (resolution: 1/25,000)
	Current		0 to 20mA (resolution: 1/31,250) 4 to 20mA (resolution: 1/25,000)
Conversion speed	Voltage/current		25µs/channel (at non-insulated channels) 5ms/channel (at insulated channels)
Overall accuracy			± 0.1% F.S. or less (at 25°C) ± 0.3% F.S. or less (at 0 to 55°C)
Output impedance (voltage output)			0.5Ω or less
Max. output current (voltage output)			10mA
Permissible output load resistance (Current output)			500Ω or less
Insulation method	Between the input terminals and internal circuit		Optocoupler 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 ±3000
	Gain setting		Any value within 9000 to 11,000
Output range change method			Selectable per channel
Conversion execution/non execution channel setting			Selectable for one channel
Upper and lower output limit clip function			Selectable per channel
Analog output holding (in PROG mode)			Present value/any value/not holding
Connection method			Terminal block (M3 terminal screws)

AFP7XY64D2P
AFP7XY64D2T
AFP7Y64T
AFP7Y16R AFP7Y16T AFP7Y32T

AFP7Y16P AFP7Y32P AFP7Y64P

AFP7X16DW AFP7X32D2 AFP7X64D2

FP7 digital input and output units

I/O points can be added as necessary.

- Input/output mixed units are available.
  A single I/O mixed unit has 32 input points and 32 output points. The necessary I/O points can be efficiently obtained, resulting in a compact PLC at reduced cost. Dedicated input or output units are also available.

- Transistor output unit is designed for 300mA current capacity.
  The 64 points transistor output unit is equipped with 8 contact points with 300mA current capacity. Large indicator lamps, magnetic contacts, etc. that previously required relay outputs or external relays can be driven directly. Equipment can be made both more compact and cheaper.

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

Input/output specifications

Item	DC input units			I/O mixed unit (input side)
	16 points type	32 points type	64 points type	DC input/sink output type
Insulation method	Optocoupler			
Rated input voltage	12 to 24V DC	24V DC		24V DC
Rated input current	6mA approx. (at 24V)	2.7mA		2.7mA
Impedance	3.6kΩ	8.2kΩ		8.2kΩ
Min. ON voltage/min. ON current	9.6V/2mA	19.2V/2.5mA		19.2V/2.5mA
Max. OFF voltage/max. OFF current	2.5V/1 mA	5V/1.5mA		5V/1.5mA
Response time OFF → ON	0.1ms or less	0.2ms or less		0.2ms or less
Response time ON → OFF	0.2ms or less	0.2ms or less		0.2ms or less
Input points per common	8 points/common	32 points/common		32 points/common
Operating mode indicator	16 points LED display (lights when ON)	32 points LED display (lights when ON)		32 points LED display (lights when ON, selectable by switch)
Connection method	Terminal block	40-pin MIL connectors		40-pin MIL connectors

Note: Changeable by settable input time constant

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	Optocoupler			Optocoupler	
Nominal switching capacity	2A 250V AC/2A 30V DC	–	–	–	–	–
Min. load	1mA 100mV DC (resistive load)	–	–	–	–	–
Output type	–	Open collector				
Rated load voltage	–	5 to 24V DC				
Operating load voltage range	–	4.75 to 26.4V DC				
Max. load current — 0.3A (Y0 to Y7)	–	1A	0.3A (26.4 to 20.4V DC) 30mA (4.75V DC)	0.3A (20.4 to 26.4V DC) 30 mA (4.75V DC)	1A	0.3A (20.4 to 26.4V DC) 30mA (4.75V DC)
Max. load current — 0.1A (all)	–			0.1A (20.4 to 26.4V DC) 15 mA (4.75V DC)		0.1A (20.4 to 26.4V DC) 15mA (4.75V DC)
Max. surge current	–	3A	0.6A		3A	0.6A
OFF state leakage current	–	1µA or less			1µA or less	
ON state voltage drop	–	0.5 or less			0.5V or less	
Output points per common	16 points/common	16 points/common	32 points/common		16 points/common	32 points/common
Operation mode indicator	16 points LED display	16 points LED display	32 points LED display		16 points LED display	32 points LED display
Connection method	Terminal block	Terminal block	40-pin MIL connectors		Terminal block	40-pin MIL connectors

FP7 positioning units

High-accuracy positioning control can be achieved at reduced cost.

- Equipped with electronic cam and electronic gear functions
  Virtual axes are supported and operable without connecting to external encoders.

- Organized wiring to servo amplifier
  A servo ON output terminal is provided that allows simple and neat wiring to the servo amplifier.

- Dedicated configuration tool
  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.

AFP7PP02T AFP7PP04T AFP7PP02L AFP7PP04L

Item				Specifications			
				2 axes type		4 axes type	
Part Nr.				AFP7PP02T	AFP7PP02L	AFP7PP04T	AFP7PP04L
Output type				Transistor	Line driver	Transistor	Line driver
Max. operation speed				500kpps			
Number of axes controlled				2 axes linear interpolation and 2 axes circular interpolation		2 axes linear interpolation, 2 axes circular interpolation, 3 axes linear interpolation and 3 axes spiral interpolation	
Acceleration & deceleration time				0 to 10,000ms for automatic & manual operation (JOG operation & home return)			
Acceleration & deceleration method				Linear acceleration/deceleration, S-curve acceleration/deceleration for automatic & manual operation (JOG operation)			
Automatic operation	Position control	Position command method		Absolute/relative			
		Number of positioning tables per axis		Standard area: 600 points, expansion area: 25 points			
		Control method	Independent	For each axis; standard area: 600 points, expansion area: 25 points			
			2-axis interpolation Linear	E point, P point and C point controls: master 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			
			3-axis interpolation Spiral	E point, P point and C point controls: center point or passing point			
		Startup time		Standard area: 3ms or less, expansion area: 5ms or less			
		Dwell time	Max. 2 axes	0 to 32,767ms (in increments of 1ms)			
Manual operation	Home return	Acceleration & deceleration method		Linear acceleration/deceleration			
		Return methods		7 methods			
	Pulser operation	Speed command		Range operates in synchronization with pulser input			
Stop function				Deceleration stop, emergency stop, limit stop, error stop, system 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 & clutch function			Yes			
	Electronic cam function	Cam curve		Select from 20 types			
		Resolution		1024 to 32,768			
		Number of cam patterns		4 to 16			
Other specifications	Output mode			1 pulse output (pulse + direction), 2 pulse outputs (CW/CCW)			
	High-speed counter function	Countable range		−1,073,741,823 to +1,073,741,823 pulse			
		Input mode		Two-phase input, incremental/decremental control input, incremental/decremental input, individual input (with multiplier function mode)			
	Built-in servo ON output			Yes			

FP7 power supply units

Announce system errors using the built-in external alarm.

- Equipped with system error alarm contact
  Output contact for system error external alarm is provided.

AFP7PSA1

AFP7PSA2

Item	Specifications	
Part No.	AFP7PSA1	AFP7PSA2
Rated input voltage	100 to 240V AC	
Allowable input voltage range	85 to 264V AC	
Input power supply frequency	47 to 63Hz	
Inrush current	40A or less	
Input current	0.75A or less	1.25A or less
Rated output current (at 24 V)	1.0A	1.8A
Alarm contact capacity	1A (30V DC)	
Remaining lifespan counter	Not available	Available

Item	Specifications
Ambient temperature	0 to +55°C, at storage: -40 to +70°C
Ambient humidity	10 to 95% RH (at 25°C, no condensation), at storage: 10 to 95% RH (at 25°C, no condensation)
Breakdown voltage	500V AC for 1min.
Insulation resistance	100MΩ or more (at 500 V DC)
Vibration resistance	5 to 8.4Hz, single amplitude of 3.5mm 0.14 in, 1 sweep/min. (IEC61131-2); 8.4 to 150Hz, constant acceleration of 9.8m/s^2, 1 sweep/min. (IEC61131-2); for 10 min. each in X, Y, and Z directions
Shock resistance	147m/s^2 or more , 3 times each in X, Y, and Z directions (IEC61131-2)

Item	CPU unit	Communication cassettes					Power supply units	
	AFP7CPS4E	AFP7CCS1	AFP7CCS2	AFP7CCM1	AFP7CCM2	AFP7CCS1M1	AFP7PSA1	AFP7PSA2
Rated voltage range	20.4 to 28.8V DC	–	–	–	–	–	100 to 240V AC	100 to 240V AC
Current consumption	200mA or less	35mA or less	60mA or less	60mA or less	90mA or less	35mA or less	750mA or less	1,250mA or less
Net weight	220g approx. (with terminal block and end unit)	25g approx. (with terminal block)					240g approx.	290g approx.

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

Item	Analog input and output units		Positioning units			
	AFP7AD4H	AFP7DA4H	AFP7PP02T	AFP7PP04T	AFP7PP02L	AFP7PP04L
Rated voltage range	–	–	–	–	–	–
Current consumption	100mA or less	250mA or less	120mA or less	120mA or less	120mA or less	120mA or less
Net weight	130g approx.	130g approx.	145g approx.	145g approx.	145g approx.	145g approx.

FP-PS24 power supplies

24V DC power supplies

- Up to 91.5% efficiency (FP-PS24-060E)
- Current limiting and short circuit protection
- High power density with minimal losses
- Wide ambient temperature range from -10°C to +70°C, without performance loss
- Safety standards approved (IEC60950, UL60950, CSA22.2-60950, EN60950) tested by CSA
- Protection class II, without grounding
- Easy mounting and wiring
- Extremely compact with optimal air cooling

FP-PS24-120E
5.0A/24V DC

FP-PS24-060E
2.5A/24V DC

FP-PS24-024E
1.0A/24V DC

Item		FP-PS24-024E	FP-PS24-060E	FP-PS24-120E
Ambient temperature		-10°C to +70°C, without needing cooling fans		
Storage temperature		-25 to +85°C		
Humidity		Max. 95%, no condensation		
Vibration		IEC 60068-2-27, 20gto6ms, 10g–11ms; 4 shocks/axis, 18 shocks total		
Shock		IEC 60068-2-6, 2-17.8Hz: ±1.6mm; 17.8–500Hz: 2g 2 hours/axis		
Primary side	Rated input voltage	100–240V AC/DC, 50–60Hz		
	Power supply voltage	85–264V AC, 47–63Hz (DC 100–375V), wide range power supply, switching ranges unnecessary		
	Input current	Fulfills the requirements of EN61000-3-2 (limits for harmonic current emissions)		
	Fuse	Internal in power supply T4AH/250V, not accessible		
Secondary side	Output voltage	24VDC nominal		
	Accuracy, output voltage	±1% over the complete load and input voltage range		
	Adjustable range with potentiometer	23V–29V		
	Output capacity (max.)	1A continuous at 24V 1.25A (25% above nominal load) Dynamic for 7s, max.1.5A (50% above nominal load) dynamic for max. 2.5s	2.5A continuous at 24V 3.15A (25% above nominal load) Dynamic for 7s, max. 3.75A (50% above nominal load) dynamic for max. 2.5s	5.0A continuous at 24V 6.25A (25% above nominal load) dynamic for 7s, max.sec. 7.5A (50% above nominal load) dynamic for max. 3s
	Output capacity (min.)	0A		
	Current limiting (typ.)	2A continuous, 2A dynamic	2.7A continuous, 5A dynamic	5.3A continuous, 9.5A dynamic
	Ripple voltage (< 20MHz)	= 40m VSS measured at 20MHz, 50Ω terminated		
Efficiency	VAC = 230V	88.0%	91.5%	90.0%
	VAC = 115V	87.0%	90.0%	89.0%
	VAC = 100V	86.0%	88.0%	89.0%
Lifetime of the capacitors		All capacitors used are special 105°C long-life-types with a min. lifetime of 50,000 hours @ Tu = 50°C (air flow temperature)		
Safety and function tests		100% testing		
Startup duration		Depends on the load, typically 5-10ms		
Safety	Output	Safety extra low voltage (SELV) EN 60950		
	Class of protection	Class II (with additional constructive measures)		
	Degree of protection	IP20		
	Leakage current	Max. 0.25mA, 47–63Hz and max. 264V AC		
Protection and monitoring	Over-voltage protection	Yes, U1 limited to max. 35V		
	Short circuit protection	Yes, output is short circuit safe		
	Current limiting	In case of overload, the output voltage will be reduced down to approx. 17V. Below this the power supply will enter hicc-up mode to protect power supply and load from over temperature or burning.		
	No load operation	Yes, indefinite, no load safe		
	Overload protection	Yes		
Dimensions (D x W x H)		105.5 x 30 x 75mm	104.5 x 44.8 x 75mm	105.5 x 70 x 85mm
Weight		Approx. 170g	Approx. 250g	Approx. 500g

24VDC power supply units

Description	Part number
Power supply unit 24W (primary 100 to 240V AC, 2 x secondary 24VDC/1A, short circuit protected)	FP-PS24-024E
Power supply unit 60W (primary 100 to 240V AC, 2 x secondary 24VDC/2.5A, short circuit protected)	FP-PS24-060E
Power supply unit 120W (primary 100 to 240V AC, 2 x secondary 24VDC/5A, short circuit protected)	FP-PS24-120E

Product numbers

Product name		Power supply voltage	Operation speed	Max. program capacity	Ethernet function	Part No.
FP7 CPU units	196k steps standard model	24V DC	From 11ns	196k steps	Built-in	AFP7CPS4E
	120k steps standard model	24V DC	From 11ns	120k steps	Built-in	AFP7CPS3E
	120k steps standard model	24V DC	From 11ns	120k steps	–	AFP7CPS3.

Product name	Specifications	Part No.
FP7 communication cassettes	RS232C, 1 channel (insulated)	AFP7CCS1
	RS232C, 2 channels (insulated)	AFP7CCS2
	RS422 or RS485, 1 channel (insulated)	AFP7CCM1
	RS422 or RS485, 2 channels (insulated)	AFP7CCM2
	RS232C, 1 channel (insulated) and RS485, 1 channel (insulated)	AFP7CCS1M1

Product name	Input specifications	Output specifications	Other functions	Part No.
FP7 power supply units	100 to 240V AC	2V DC, 1.0A	System error alarm output contact	AFP7PSA1
	100 to 240V AC	24V DC, 1.8A	System error alarm output contact and remaining lifespan counter	AFP7PSA2

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

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

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

Control FPWIN Pro

Control FPWIN Pro is the Panasonic programming software developed according to the international standard IEC 61131-3 (for Windows® XP/Vista/7). Contol FPWIN Pro is the universal software for all Panasonic PLC's

- Programs written in Control FPWIN Pro 6 or earlier versions will run with Control FPWIN Pro 7
- Programs are compatible across FP series PLCs, e.g. FP0R will run with minor adjustments on FPΣ (Sigma) and FP7 PLCs
- FP7 PLCs and Control FPWIN Pro 7 offer the same flexible choice of editors and allow you to select the programming language you are most familiar with.

Navigators provide an overview, even for very complex projects

Toolbar contains icons for frequently used menus

Structured Text (ST) programming editor
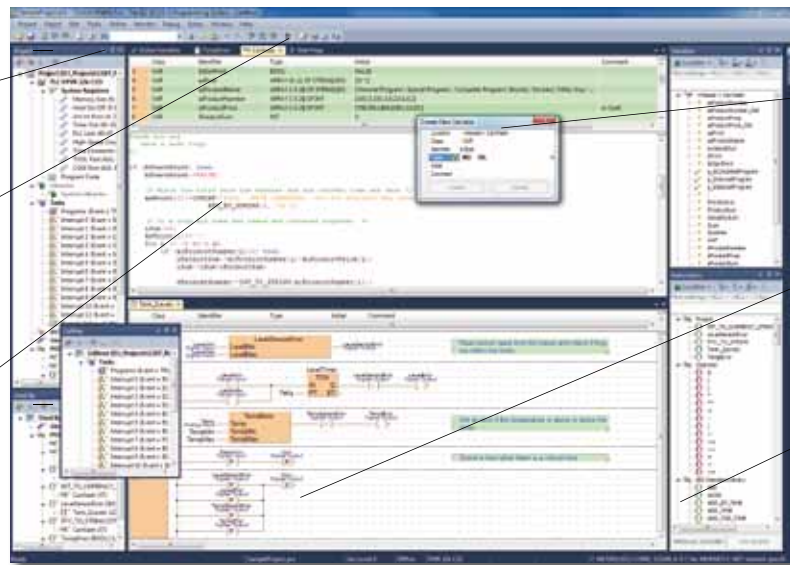
Declaration of variables

Ladder Diagram (LD) programming editor

Selection of instructions

Control FPWIN Pro highlights

- One software for all FP-series PLCs
- 5 programming languages: IL (Instruction List), LD (Ladder Diagram), FBD (Function Block Diagram), SFC (Sequential Function Chart), ST (Structured Text)
- 8 languages are fully supported: English, German, French, Italian, Spanish, Japanese, Korean, Chinese
- Well-structured through program organization units, task and project management
- Remote programming, service and diagnostics via modem or Ethernet
- Extensive comments and online documentation created hand in hand with the program
- Min. program size through optimized compiler
- Powerful debugging and monitoring tools provide information on the current status of the PLC.
- Comprehensive printed documentation and support for function blocks and libraries help to get your hardware running in record time while maintaining rigorous quality standards.
- Reuse of functions and function blocks saves time.

Control FPWIN Pro and its comprehensive, powerful libraries

The PLC programming software Control FPWIN Pro has been evolving for over 15 years, and along with it its libraries. As expected, the latest version of the software includes even more function blocks to help you efficiently program your PLC.

The innovations of this version include simplified handling of analog units, serial communication, the integrated clock and GT programmable displays. The online help was also improved in several key areas:

- Tables for slot number and corresponding address ranges are provided for analog expansion units.
- Explanations for DIP switch settings
- A/D value assignment tables
- Wiring instructions

Additional function blocks for simplifying work with analog values, e.g.:
- Scaling
- Averaging
- Assigning addresses for expansion units

The new function blocks for serial communication cover 90% of all practical applications, except for telecontrol. Moreover, diverse tasks for GT series programmable displays are now easy to manage, e.g. changing screens, adjusting brightness, or controlling control bits and words. Working with times and dates as well as calculations involving times and dates are now extensively supported.

The editors, such as the global variable list editor, offer quick info about PLC addresses, which makes adjusting addresses in the variable declarations as easy as pie.
You can drag & drop variables, function blocks, etc. from the navigation and selection panes into the program editors. You can copy & paste example programs in the online help into your editor and modify them as necessary.

Powerful libraries, programmed by experts

The **Control FPWIN Pro Web-Server library** allows you to take advantages of the FP Web-Server functions quickly and easily, e.g. sending an e-mail, controlling an FTP client, establishing a PPP connection, or synchronizing the clock with NTP.

The **Control FPWIN Pro Motion Control library** shortens the time required for commissioning, resets the motion controller, motor or an external encoder in regards to the PLC and, thanks to a high output frequency range, enables exact positioning and movement.

The **Control FPWIN Pro RTEX library** supports 3-axis spiral interpolation, access to MINAS A5N parameters (r/w) from the PLC via the RTEX network, and control of up to 8 axes with just one RTEX controller.

Product numbers

Description	Part number
Control FPWIN Pro 7 supports all FP series PLCs)	FPWINPRO7
Control FPWIN Pro 7 (upgrades the full version from Ver. 3 or higher to Ver.7)	FPWINPRO7-UPGRADE
Ethernet library	NCL-ET1-LIB
Process and temperature control library	NCL-PTC-LIB
Inverter serial communication library	NCL-ISC-LIB
GSM communication library	NCL-CG-LIB
Modem communication library	NCL-CMEU-LIB
Motion control library	NCL-MC-LIB
Modbus library, master and slave functionality	NCL-MODBUS-LIB
Control configurator MS open version	NCLCCMSLIB
Programming cable (FP0R/FP0/FP-e/FPG/FPX/FP2 Tool port to PC) miniDIN5 to 9-pin Sub-D; 2m	AFC8513D
Cable with USB 1.1 to RS232 with 9-pin Sub-D converter; 2m	CABUSBSER9D
Programming cable: USB A to USB B, 2m	AFPXCABUSB2D
Programming cable, USB A to mini USB B (5pin), 2m, USB2.0 compatible	CABMINIUSB5D
More ready-made libraries are available for download from internet: www.panasonic-electric-works.com	–

Notes

Further Panasonic products

Panasonic Electric Works offers a wide product range from one source, from individual components to complete systems. Technology support for advice, design-in, installation and commissioning by our qualified application engineers round off the Panasonic service profil.

Human Machine Interfaces

Our compact size, bright and easy-to-read Human Machine Interfaces can be used to visualize inspection results. Touch panels can even replace the standard keypad if you so desire.

Servo drives

Panasonic servo drives enable high performance motion control to be applied to almost all types of machines, including chip mounting machines and general industrial machines.

UV curing systems

Aicure UJ30 is a LED curing system that quickly hardens UV-sensitive resins such as adhesives, ink and coatings. Its cutting edge LED technology is especially suited for precise, high-intensity curing.

ACD components

Components such as Eco-POWER-METERS, timers/counters, temperature controllers, limit switches and fans round off our wide factory automation product range.
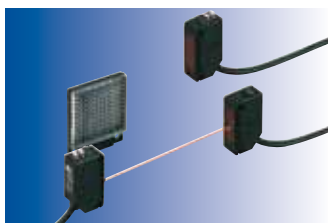
Sensors

As a pioneering manufacturer of sensors, Panasonic provides high performance sensors for a wide range of applications, facilitating factory automation in various types of production lines, such as those used for the manufacturing of semiconductors.

Laser Markers

Panasonic laser markers are ideal for non-contact, permanent labelling of most materials, e.g. plastics, glass, paper, wood and leather. Several CO_2 laser marking systems and a unique FAYb laser marker can be easily integrated into existing production systems for a great variety of labelling tasks.

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