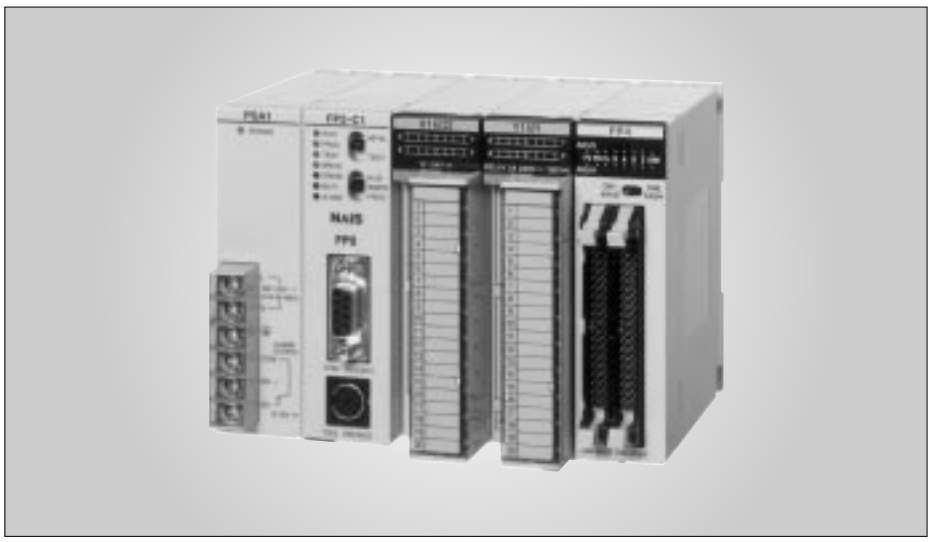
Medium and Large PLC

FP2/FP2SH

FP3/FP10SH

FP2

The functions for a medium-scale PLC are squeezed into a compact body. Perfect when combining various devices.



■ Features

1. Compact body of only W140 × H100 mm* W 5.512 × H 3.937 inch.

The functions for a medium-scale PLC are squeezed into a compact body which requires minimal installation area for an overall reduction in the device size.

* The five-module type. The depth is 108.3 mm 4.263 inch.

2. Module specifications that allow you to design as you desire.

Backplanes for 5, 7, 9, 12, and 14 modules are available, and since the units have the same width, you can choose the most economical design for your application.

3. Standard equipped with RS232C port.

RS232C port allows connection with operation display panels and host computers, as well as remote surveillance using modems.

4. Different memory options are available to meet your application.

Memory units for comment, calendar timer, expansion RAM, and ROM operation are available so you can add just the options you need.

5. Use instructions that support data processing.

Supports real number operation instructions allowing simplified programs for data processing and more.

■ Power supply / I/O Specifications

Item	Description
Power supply	100 V to 120 V AC / 200 V to 240 V AC/ 100 V to 240 V AC, 24 V DC (varies with different models)
Input	12 V to 24 V DC, 24 V DC ±common
Output	Relay 2 A to 5 A / Transistor 0.1 A to 0.5 A (varies with different models)

■ Performance Specifications

Item		Description
Number of I/O points		Up to 768 points
Expansion		Up to 1 board Total number of points: 1,600 Remote I/O 2,048 points
Operation speed		0.35 µs/step (Basic instuction)
Built-in memory		RAM (ROM is optional)
Memory capacity		Approx.16k steps
Operation memory	Internal relay	4,048 points
	Timer/Counter(T/C)	1,024 points in total
	Data register	6,000 words

■ Special Functions

Item	Description
Analog I/O	Can be used with the addition of analog input and analog output units and installation of a CPU unit with analog I/O.
High speed counter	Available by adding high-speed counter unit. (Max. 200 kHz)
Pulse output	Positioning unit 2-axis Positioning unit 4-axis
RS232C port	RS232C port is standard equipment on CPU unit. Expandable by adding C.C.U. and serial data unit.
Interrupt input	Available by adding high-speed counter unit and pulse I/O unit.

■ Special Network Functions

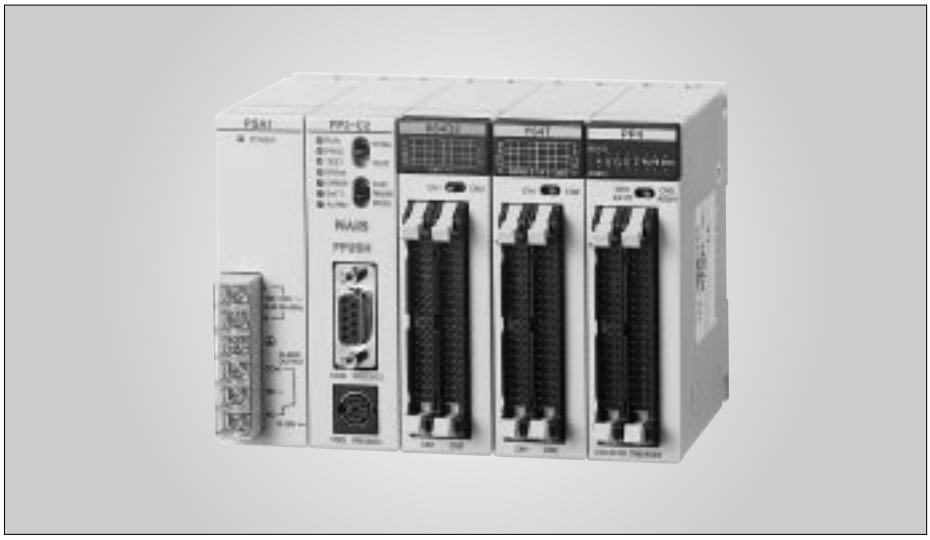
Item	Description
Remote I/O	S-LINK, MEWNET-F
Link between PLCs	MEWNET-W (Wire) MEWNET-W2 (Wire)
Computer link	Linkable by using tool port or COM. port on CPU unit. Also available by adding C.C.U.
Modem connection	Available

■ Other Built-in Functions

Item	Description
Program block-edit during RUN	Available
Constant scan	Available
Adjustable input time filtering	Not available
Clock/Calendar function	Can be used with the addition of the calendar function option.

FP2SH

Scanning time of 1 ms for 20k steps. A high-performance model for high-speed operation.



■ Features

1. Scanning time of 1 ms for 20k steps.
With an operating speed at the top of its class, super high-speed processing is made possible. The result is a dramatically decreased tact time and high-speed device.

2. Large programming capacity of up to 120k steps.
Both the large programming capacities of 60k and 120k are available depending on the model.

3. Optional small PC card is also available.
The small PC card is available for programming backup or data memory expansion. This allows data processing of great amounts of data.

4. Built-in comment and calendar timer functions.
These functions, options with the FP2, are built right into the FP2SH.

* The I/O unit and intelligent unit are the same for the FP2 series.

■ Power supply / I/O Specifications

Item	Description
Power supply	100 V to 120 V AC / 200 V to 240 V AC / 100 V to 240 V AC, 24 V DC (varies with different models)
Input	12 V to 24 V DC, 24 V DC ±common
Output	Relay 2 A to 5 A / Transistor 0.1 A to 0.5 A (varies with different models)

■ Performance Specifications

Item		Description
Number of I/O points		Up to 768 points
Expansion		Up to 1 board Total number of points:1,600 Remote I/O 8,192 points
Operation speed		0.03 µs/step (Basic instuction)
Built-in memory		RAM (ROM/Small PC card is optional)
Memory capacity		Approx. 60k steps/Approx. 120k steps (varies with defferent models)
Operation memory	Internal relay	14,192 points
	Timer/Counter(T/C)	3,072 points in total
	Data register	10,240 words
	File register	32,765 words × 3 banks

■ Special Functions

Item	Description
Analog I/O	Available by adding analog input and analog output units.
High speed counter	Available by adding high-speed counter unit. (Max. 200 kHz)
Pulse output	Positioning unit 2-axis Positioning unit 4-axis
RS232C port	RS232C port is standard equipment on CPU unit. Expandable by adding C.C.U. and serial data unit.
Interrupt input	Available by adding high-speed counter unit and pulse I/O unit.

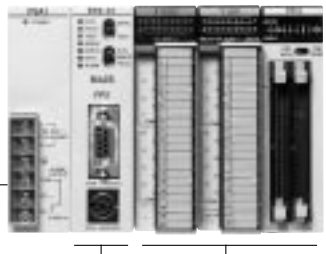
■ Special Network Functions

Item	Description
Remote I/O	S-LINK, MEWNET-F
Link between PLCs	MEWNET-W (Wire) MEWNET-W2 (Wire)
Computer link	Linkable by using tool port or COM. port on CPU unit. Also available by adding C.C.U.
Modem connection	Available

■ Other Built-in Functions

Item	Description
Program block-edit during RUN	Available
Constant scan	Available
Adjustable input time filtering	Not available
Clock/Calendar function	Built-in type

FP2/FP2SH Table of Units



Power supply unit

100 V AC 2.5 A
type
FP2-PSA1

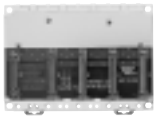
200 V AC 2.5 A
type
FP2-PSA2

100-240 V AC 5 A
type
FP2-PSA3

24 V DC 5 A
type
FP2-PSD2

Backplanes

(For use with both master backplanes and expansion backplanes. Only the 5-module type cannot be used with expansion backplanes.)



5-module type
FP2-BP05

7-module type
FP2-BP07

9-module type
FP2-BP09

12-module type
FP2-BP12

14-module type
FP2-BP14

CPU unit FP2

Standard type
FP2-C1

CPU unit
with 64-point input
FP2-C1D

CPU unit
with analog I/O
FP2-C1A

CPU unit
with S-LINK
FP2-C1SL

FP2SH

60k steps
Standard type
FP2-C2

60k steps
for small PC card
FP2-C2P

120k steps
for small PC card
FP2-C3P

I/O units

16-point DC input type
FP2-X16D2

16-point transistor output type (NPN)
FP2-Y16T

16-point transistor output type (PNP)
FP2-Y16P

6-point relay output type (5 A)
FP2-Y6R

16-point relay output type (2 A)
FP2-Y16R

32-point DC input type
FP2-X32D2

32-point trasistor output type (NPN)
FP2-Y32T

32-point transistor output type (PNP)
FP2-Y32P

64-point DC input type
FP2-X64D2

64-point transistor output type (NPN)
FP2-Y64T

64-point transistor output type (PNP)
FP2-Y64P

32-point input/output mixed type (NPN)
FP2-XY64D2T
FP2-XY64D7T

32-point input/output mixed type (PNP)
FP2-XY64D2P
FP2-XY64D7P

Optional memory

For FP2

FP2-EM1
FP2-EM2

FP2-EM3
FP2-EM6
FP2-EM7

Type of memory unit

Part No.	Comment input function	Clock / Calendar function	16k expansion RAM	ROM socket
FP2-EM1	Available	Available	Not available	Not available
FP2-EM2	Available	Available	Available	Not available
FP2-EM3	Available	Available	Available	Available
FP2-EM6	Not available	Not available	Available	Available
FP2-EM7	Not available	Not available	Not available	Available

F-ROM
FP2-EM4

EP-ROM
FP2-EM5

For FP2SH

Memory unit with ROM socket
FP2-EM7

F-ROM
AFP5208

EP-ROM
AFP5209

Small PC card
F-ROM
AIC50020

Small PC card
SRAM
AIC52000

Analog I/O units

Analog input unit
FP2-AD8

Analog output unit
FP2-DA4

Positioning control and Calculation units

Positioning unit (2-axis)
FP2-PP2

Positioning unit (4-axis)
FP2-PP4

High-speed counter unit
FP2-HSCT

Pulse I/O unit
FP2-PXYT

Serial data control units

Serial data unit
FP2-SDU

Operation display panel / Computer interface units

Computer communication unit
FP2-CCU

Link-related units

Multi-wire link unit
FP2-MW

S-LINK unit
FP2-SL2

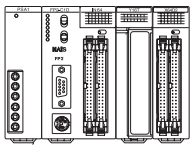
ET-LAN unit
FP2-ET1

FP2/FP2SH Basic Configurations and Control I/O Points

■ Basic Configurations and I/O Points

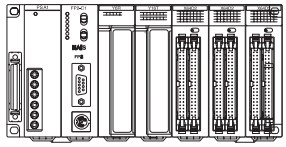
Note: This shows the configuration when a 1-module CPU unit and power supply unit are used.

● 5-module type



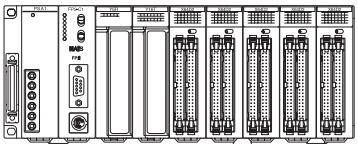
48 points : using 16-point I/O
192 points : using 64-point I/O

● 7-module type



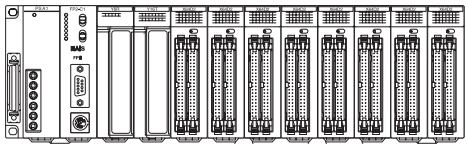
80 points : using 16-point I/O
320 points : using 64-point I/O

● 9-module type



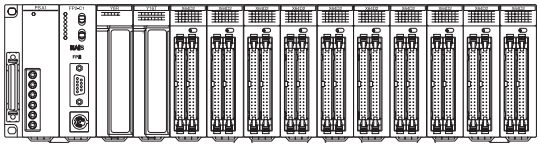
112 points : using 16-point I/O
448 points : using 64-point I/O

● 12-module type



160 points : using 16-point I/O
640 points : using 64-point I/O

● 14-module type



192 points : using 16-point I/O
768 points : using 64-point I/O

■ The building-block type for freedom in the combination of devices.

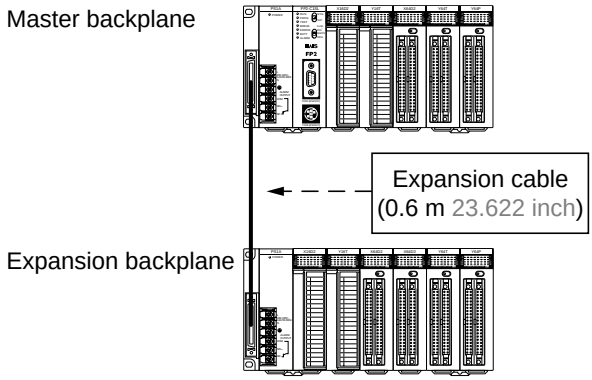
- I/O units, intelligent units, power supply unit and backplanes can be commonly used for the FP2 and the FP2SH.
- Most of the I/O units and intellgent units can be almost freely connected any combination, but in the layout, you should check the following points when selecting your units :
  ①The limitations on the type of unit. (See page 76.)
  ②The limitations on the number of module of the backplane. (See page 77.)
  ③The limitations on the internal current consumption of each unit. (See page 78.)
- I/O unit can be freely located on each backplane. I/O allocation can also be made on programming tool to allow you to perform system design and to meet specification changes.

■ Backplanes come in five types: 5/7/9/12/14 modules.

- The number of I/O points can be expanded up to 768 points with a single board.
- Master and expansion backplanes are available in five types: 5 modules, 7 modules, 9 modules, 12 modules, and 14 modules.
- Each of 16 and 64-point I/O units is capable of controlling up to the following numbers of the points as shown below.

Type	16-point I/O	64-point I/O
5 modules	48 points	192 points
7 modules	80 points	320 points
9 modules	112 points	448 points
12 modules	160 points	640 points
14 modules	192 points	768 points

■ I/O Configurations When Expanded



Combination of backplane		No. of modules that can be used	Number of points
7-module	7-module	11	176 points : using 16-point I/O 704 points : using 64-point I/O
7-module	9-module	13	208 points : using 16-point I/O 832 points : using 64-point I/O
9-module	9-module	15	240 points : using 16-point I/O 960 points : using 64-point I/O
7-module	12-module	16	256 points : using 16-point I/O 1,024 points : using 64-point I/O
7-module	14-module	18	288 points : using 16-point I/O 1,152 points : using 64-point I/O
9-module	12-module		
9-module	14-module	20	320 points : using 16-point I/O 1,280 points : using 64-point I/O
12-module	12-module	21	336 points : using 16-point I/O 1,344 points : using 64-point I/O
12-module	14-module	23	368 points : using 16-point I/O 1,472 points : using 64-point I/O
14-module	14-module	25	400 points : using 16-point I/O 1,600 points : using 64-point I/O

Notes:
• There is no restriction on the sequence.
• The 5-module backplane cannot be used with expansion set.

■ Only one backplane can be added for expansion.

● When 14-module boards with 64-point I/O units are set up, up to the following number of points become controllable.

Master backplane	Expansion backplane

768 points + 832 points = total 1,600 points

Note: When both the CPU unit and power supply unit are single module size.

■ Use of remote I/O system allows more expansion of I/O points.

● The remote I/O system increases the number of control I/O points up to the numbers shown in the table below.

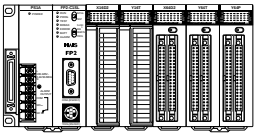
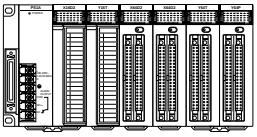
CPU unit type	Expansion	Remote I/O
FP2	Up to 1,600 points	Up to 2,048 points
FP2SH	Up to 1,600 points	Up to 8,192 points

● When the I/O devices are in separate locations or when you want to make the control panel smaller, expand the number of I/O points used by remote I/O. When the I/O devices are located close together or high-speed response is required, expand the number of I/O points used by the expansion backplane.

● For remote I/O, the S-LINK, which allows T-shaped wiring of the sensors and terminals, and the large-scale MEWNET-F are available.

FP2/FP2SH Limitation by Type of Unit

■ Limitation by Type of Unit

Backplanes and units used / System configuration	Backplane (5-module type)	Backplane (7-, 9-, 12-, 14- module typs)	Power supply unit	CPU unit	Input unit	Output unit	I/O mixed unit	Analog input unit	Analog output unit	High-speed counter unit	Pulse I/O unit	Positioning unit	Serial data unit	Computer communication unit	Multi-wire link unit: MEWNET-F mode	Multi-wire link unit: MEWNET-W mode	Multi-wire link unit: MEWNET-W2 mode	ET-LAN unit
CPU backplane Install in order from the left to the right, the power supply unit, the CPU unit, the I/O and the intelligent units. 	A	A	A	A	A	A	A	A	A	A *1	A *1	A	A	A *2	A *3	A *2	A *2	A *2
Expansion backplane Install in order from the left to the right, the power supply unit, the I/O and the intelligent units. 	N/A	A	A	N/A	A	A	A	A	A	A *1	A *1	A	A	N/A	A *3	N/A	N/A	N/A

A: Available N/A: Not available

Notes:

*1: When “Mode B: Unit with interrupt function” has been specified, the unit will be treated as an interrupt unit, and 8 interrupts per unit will be available for use. However, when “Mode B” has been set for the unit, 2 units can be used with 1 CPU unit.
When “Mode C: Intelligent unit that generate interrupts” has been specified, and 1 interrupt per unit will be available for use. However, when “Mode C” has been set for the unit, 8 units can be used with 1 CPU unit.

*2: Check the limitations on combining link units given below.

*3: In the MEWNET-F mode, up to four units counting the CPU and expansion sides.

■ Limitations on Combining Link Units

Unit type and mode	When CPU unit is FP2	When CPU unit is FP2SH
Computer communication unit	Only 1 unit (see note)	Up to 5 units when combined with computer communication units and multi-link units (MEWNET-W mode). Up to 2 units when a PLC link is included.
Multi-wire Link unit (MEWNET-W mode)	Up to 3 units when combined with computer communication units. Up to 2 units when a PLC link is included.	
Multi-wire Link unit (MEWNET-W2 mode) ET-LAN unit	Up to 3 units. Up to 2 units when a PLC link is included.	Up to 8 units. Up to 2 units when a PLC link is included.

Note:

Depending on the location of the connected boards and the commands used for communication, up to 3 units can be used. For more details, refer to the limitations on communication given on the next page and the Computer Communication Unit Manual.

FP2/FP2SH Limitation by Number of Module

■ Limitation by Number of Module

Size of the unit and backplane indicated in module units
With the FP2, the word “module” is used to describe the type of unit and backplane. One module consists of one unit attachment guide per backplane.

There are 1-module and 2-module type units
Most units use only one module during installation, but some units use two modules for the power supply unit and CPU unit.

● **2-module type units**

Type	Part No.
Power supply unit 100 to 240 V AC input type 5 A output type	FP2-PSA3
Power supply unit 24 V DC input type	FP2-PSD2
CPU unit with 64-point input	FP2-C1D
CPU unit with analog I/O	FP2-C1A
CPU unit with S-LINK	FP2-C1SL

1-module type　　2-module type

■ Cautions when Selecting FP2SH

● **Some optional memory units cannot be used.**
Only the memory unit FP2-EM7 can be used with the FP2SH CPU unit (model FP2-C2). The FP2 memory units FP2-EM1, EM2, EM3, and EM6 cannot be used.

● **The optional ROM type is different.**
Only the ROMs (AFP5208 or AFP5209) can be used with the FP2SH CPU unit (model FP2-C2). The FP2 ROMs (FP2-EM4 and FP2-EM5) cannot be used.

● **The backup battery type is different.**
The backup battery (AFP8801) for the FP2SH CPU unit is equipped with a connector. The backup battery (AFC8801) for the FP2 CPU unit cannot be used.

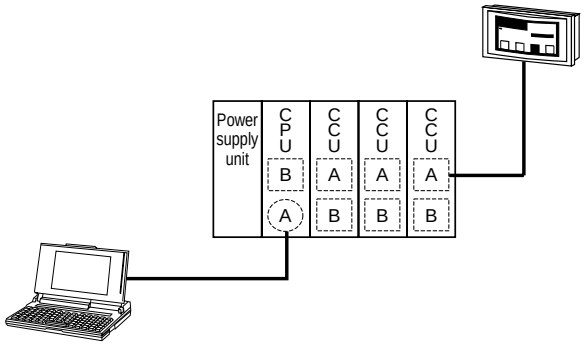
● **Clock/calendar and comment input functions are built-in.**
These functions are built into the FP2SH CPU unit and therefore no option is required.

● **About the ROM operation function for small PC card compatible CPU unit**
CPU units that are compatible with the small PC card (FP2-C2P and FP2-C3P) are built-in with F-ROM that can be used for program memory. The internal F-ROM cannot be replaced.

● **About small PC cards for the FP2SH**
The SRAM type small PC cards (AIC52000) have an internal secondary battery for memory backup. When used for the first time, it must be turned on for 24 hours or more to ensure a complete charge. Once fully recharged, memory backup is possible for more than three months after the power is turned off. Under normal conditions, use it connected to the PLC so that it is constantly supplied with power. If it is not recharged regularly, the backup period and operational life may be reduced. Note that replacement of the backup battery is not possible.

■ Limitations on Communication for the FP2 CPU Unit

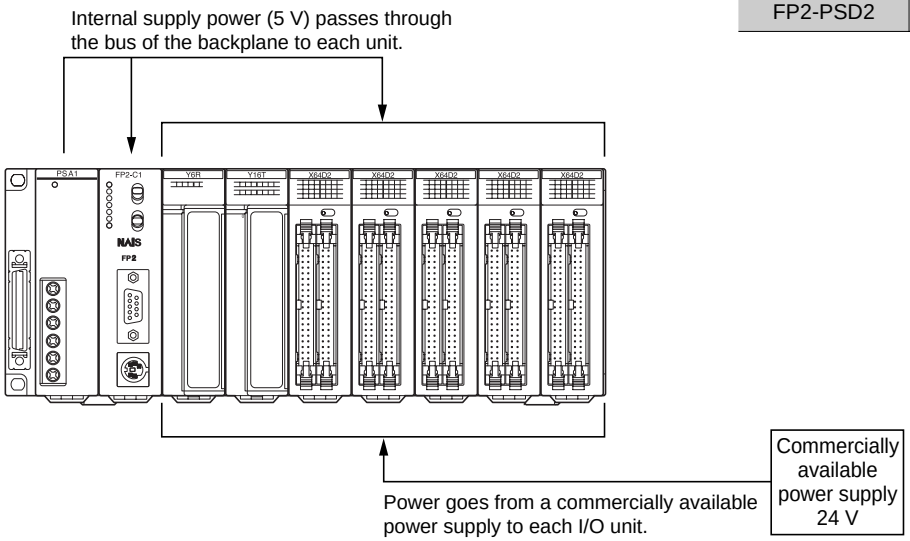
● **When FP2 CPU units and computer communication units are used together and the commands or responses for multiple frames are sent or received at one port, and error is returned from the other ports and communication is not possible. Combinations that are affected by this limitation are given below.**
(1) CPU unit tool port and computer communication unit COM.1 port.
(2) CPU unit COM. port and computer communication unit COM.2 port.
Example: While a program is sent from tool port of the CPU unit, the display panel connected to the COM.1 port of the computer communication unit turns to a communication error.



Note: This also covers accessing from other stations connected with a link unit.

FP2/FP2SH Limitations on Current Consumption

Power supplly unit	Rated current (5 V)
FP2-PSA1	2.5 A
FP2-PSA2	2.5 A
FP2-PSA3	5 A
FP2-PSD2	5 A



■ Internal and External Power Supplies

Internal power supply (5 V DC)

- 5 V power supply used for driving the internal circuit of each unit is supplied from the power supply unit through the internal bus of the backplane.

External power supply (24 V DC)

- 24 V power supply used as the input power supply of input units and the output circuit driving power of output units is supplied from the external terminal.
- For 24 V power supply, a commercial power supply unit is used.

■ Combining Units and Selecting a Backplane

- The power consumed by each unit is shown in the next page. Give consideration to the combination of units so that the rated capacity of the 5 V and 24 V power supplies should not exceeded.

Examples of current consumption calculation

The table below shows the combinations of a 8-slot backplane and typical units.

Item	Quantity	5 V current consumption (mA)	24 V current consumption (mA)
CPU unit (FP2-C1)	1	410	0
Master backplane (FP2-BP09)	1	60	0
Input unit (FP2-X16D2)	3	60 × 3 = 180	8 × 16 × 3 = 384
Output unit (FP2-Y16R)	4	120 × 4 = 480	160 × 4 = 640
Total current consumption		1,130	1,024

■ Table of Current Consumption (5 V power supply)

Item			Part No.	5 V power consumption (mA)
FP2 CPU unit			FP2-C1	410 mA or less
			FP2-C1D	530 mA or less
			FP2-C1SL	630 mA or less
			FP2-C1A	1060 mA or less
FP2SH CPU unit			FP2-C2	750 mA or less
			FP2-C2P	750 mA or less
			FP2-C3P	750 mA or less
Backplane			FP2-BP05	5 mA or less
			FP2-BP07	60 mA or less
			FP2-BP09	60 mA or less
			FP2-BP12	60 mA or less
			FP2-BP14	60 mA or less
Input unit	DC input	16-point terminal block, 12 V to 24 V DC	FP2-X16D2	60 mA or less
		32-point connector, 24 V DC	FP2-X32D2	80 mA or less
		64-point connector, 24 V DC	FP2-X64D2	100 mA or less
Output unit	Relay output	6-point terminal block	FP2-Y6R	50 mA or less
		16-point terminal block	FP2-Y16R	120 mA or less
	Transistor output	16-point terminal block, NPN	FP2-Y16T	100 mA or less
		32-point connector, NPN	FP2-Y32T	130 mA or less
		64-point connector, NPN	FP2-Y64T	210 mA or less
		16-point terminal block, PNP	FP2-Y16P	80 mA or less
		32-point connector, PNP	FP2-Y32P	130 mA or less
		64-point connector, PNP	FP2-Y64P	210 mA or less
I/O mixed unit	32-point 24 V DC input/32-point connector, NPN output type		FP2-XY64D2T FP2-XY64D7T	160 mA or less
	32-point 24 V DC input/32-point connector, PNP output type		FP2-XY64D2P FP2-XY64D7P	160 mA or less
Intelligent unit	Analog input unit		FP2-AD8	500 mA or less
	Analog output unit		FP2-DA4	600 mA or less
	High-speed counter unit		FP2-HSCT	450 mA or less
	Pulse I/O unit		FP2-PXYT	500 mA or less
	Positioning unit	2-axis type	FP2-PP2	225 mA or less
		4-axis type	FP2-PP4	400 mA or less
	Serial data unit		FP2-SDU	60 mA or less
	Computer communication unit (C.C.U.)		FP2-CCU	60 mA or less
	S-LINK unit	128 points, 1 ch	FP2-SL2	130 mA or less
	Multi-wire link unit		FP2-MW	220 mA or less
	ET-LAN unit		FP2-ET1	670 mA or less

■ Table of Current Consumption (24 V power supply)

Item			Part No.	24 V power consumption (mA)
Input unit	DC input	16-point terminal block, 12 V to 24 V DC	FP2-X16D2	8 mA or less/point
		32-point connector, 24 V DC	FP2-X32D2	4.3 mA or less/point
		64-point connector, 24 V DC	FP2-X64D2	4.3 mA or less/point
Output unit	Relay output	6-point terminal block	FP2-Y6R	70 mA or less
		16-point terminal block	FP2-Y16R	160 mA or less
	Transistor output	16-point terminal block, NPN	FP2-Y16T	120 mA or less
		32-point connector, NPN	FP2-Y32T	140 mA or less
		64-point connector, NPN	FP2-Y64T	250 mA or less
		16-point terminal block, PNP	FP2-Y16P	70 mA or less
		32-point connector, PNP	FP2-Y32P	150 mA or less
		64-point connector, PNP	FP2-Y64P	270 mA or less
I/O mixed unit	32-point 24 V DC input / 32-point connector, NPN output type		FP2-XY64D2T FP2-XY64D7T	Input : 4.3 mA or less/point
				Output : 120 mA or less
	32-point 24 V DC input / 32-point connector, PNP output type		FP2-XY64D2P FP2-XY64D7P	Input : 4.3 mA or less/point
				Output : 130 mA or less

Notes:
- The input unit displays the current flowing to the internal circuit. The other units display the current value required to drive the internal circuit. This value dose not include the load current of the output unit.
- Refer to the manual of the each unit you are using to confirm the current consumed at 24 V by S-LINK related unit and the positioning unit.

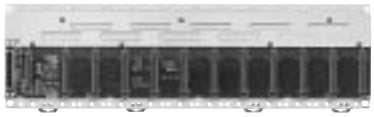
FP2/FP2SH Backplane/Expansion Cable/Dummy Unit

Superb fiexibility allows you to expand your system as your control needs grow.

5-module type
(for CPU backplane)
FP2-BP05

7-module type
(for CPU and expansion backplane)
FP2-BP07

9-module type
(for CPU and expansion backplane)
FP2-BP09



12-module type
(for CPU and expansion backplane)
FP2-BP12

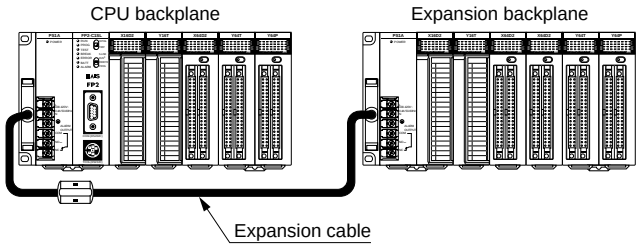
14-module type
(for CPU and expansion backplane)
FP2-BP14

■ Features

1. **You can choose from types 5 to 14-module sizes.**
   Five types of backplanes are available for you to choose the type that bestfits the scale of your application. By expanding from a small scale, you can expand to up to 25 modules.
2. **Easy-maintenance backplanes.**
   Units can be removed from the backplane separately for easy maintenance.
3. **The backplanes can be used as master and expansion backplanes.**
   The backplanes can be used on both the CPU side or expansion side (excluding the 5-module type).

■ Expansion of Backplane

Only one backplane can be added-on for expansion.
Any backplane other than a 5-module type can be used for expansion.



Notes:
• A power supply unit is also necessary on an expansion backplane.
• Do not install a CPU unit on an expansion backplane.

Expansion cable (60 cm 23.622 inch)
Cable connecting backplane on CPU side with backplane on expansion side.

Part number: FP2-EC

■ Weight List

Part No.	Weight
FP2-BP05	Approx. 180 g 6.349 oz
FP2-BP07	Approx. 280 g 9.876 oz
FP2-BP09	Approx. 350 g 12.345 oz
FP2-BP12	Approx. 470 g 16.577 oz
FP2-BP14	Approx. 530 g 18.694 oz
FP2-EC	Approx. 190 g 6.702 oz

FP2/FP2SH Power Supply Unit

Four types are available to match the input voltage and capacity for your application.

100 V AC, 2.5 A type
FP2-PSA1

200 V AC, 2.5 A type
FP2-PSA2

100 V to 240 V AC, 5 A type
FP2-PSA3

24 V DC, 5 A type
FP2-PSD2

■ Features

1. **3 types selectable depending on the rated voltage and output capacity.**
2. **High capacity type is also available for a lot of modules usage.**

Perfect for when there are many intelligent units and modules.

■ Specifications

Item		FP2-PSA1	FP2-PSA2	FP2-PSA3	FP2-PSD2
Input	Rated voltage	100 to 120 V AC	200 to 240 V AC	100 to 240 V AC	24 V DC
	Current consumption	0.4 A or less (at 100 V AC)	0.2 A or less (at 200 V AC)	0.7 A or less (at 100 V AC) 0.4 A or less (at 200 V AC)	2.5 A or less
	Surge current	40 A or less (at 55°C 131°F)		30 A or less (at 25°C 77°F)	10 A or less
	Rated frequency	47 Hz to 63 Hz			
	Operating voltage range	85 to 132 V AC	170 to 264 V AC	85 to 264 V AC	20.4 to 31.2 V DC*
Output	Output capacity at 5 V	Max. 2.5 A		Max. 5 A	
Alarm contact capacity		30 V DC 1 A			
Alarm contact operation		When the ALARM LED of CPU unit is lit			
Alarm contact type		1c contact			
Leakage current		Between input and ground terminals, 0.75 mA or less			
Breakdown voltage		1500 V AC for 1 minute (between input and ground terminals)			
Insulation resistance		100 MΩ 500 V DC (between input and ground terminals)			
Guaranteed lifetime		20,000 hours at 55°C 131°F			
Overcurrent protection function		Built-in overcurrent protection			
Fuse		Built-in type			
Terminal screw		M3			
Weight		Approx. 180 g 6.349 oz	Approx. 180 g 6.349 oz	Approx. 280 g 9.876 oz	Approx. 300 g 10.581 oz
Module size		1 module	1 module	2 module	2 module

Note:
* Allowable voltage fluctuation range after startup for the FP2-PSD2 is –35% to +30%. At startup, apply –15% to +30% the rated voltage for 100 ms or more.

FP2/FP2SH CPU Unit

Seven types are available for you to choose from depending on your required operation speed, memory capacity, and functionality.

Standard type
FP2 CPU unit
FP2-C1

FP2 CPU unit with
64-point input
FP2-C1D

FP2 CPU unit with
analog I/O
FP2-C1A

FP2 CPU unit with
S-LINK
FP2-C1SL

60k steps
standard type
FP2SH CPU unit
FP2-C2

60k steps
for small PC card
FP2SH CPU unit
FP2-C2P

120k steps
for small PC card
FP2SH CPU unit
FP2-C3P

■ Types of FP2 CPU Units

- Standard type
- CPU unit with 64-point input
- CPU unit with analog I/O

Equipped with 4 analog input channels and 1 analog output channel.

- CPU unit with S-LINK

Equipped with S-LINK 2 ports.

■ Types of FP2SH CPU Units

- 60k steps standard type
- 60k steps for small PC card
- 120k steps for small PC card

■ Specifications

Item		FP2 CPU unit	FP2SH CPU unit		
Part number		FP2-C1 FP2-C1D FP2-C1A FP2-C1SL	FP2-C2	FP2-C2P	FP2-C3P
Operation speed	Basic	0.35 µs or more	0.03 µs or more		
	High-level	0.93 µs or more	0.06 µs or more		
Program capacity	Built-in RAM	16k steps	60k steps		120k steps
	w / expansion	32k steps	Not available		
Controllable I/O Points	No expansion	Max. 768 points	Max. 768 points		
	w / expansion	Max. 1,600 points	Max. 1,600 points		
	w / remote I/O	Max. 2,048 points	Max. 8,192 points		
Operation memory	Internal relay	4,048 points	14,192 points		
	Data register	6,000 words	10,240 words		
Optional memory		F-ROM/EP-ROM	F-ROM / EP-ROM	Small PC card (F-ROM/SRAM)	
Comment memory		Optional memory unit	Available		
Clock/Calendar function		Optional memory unit	Available		

■ Weight List

Part No.	Weight
FP2-C1	Approx. 130 g 4.586 oz
FP2-C1D	Approx. 220 g 7.760 oz
FP2-C1A	Approx. 260 g 9.171 oz
FP2-C1SL	Approx. 250 g 8.818 oz
FP2-C2	Approx. 130 g 4.586 oz
FP2-C2P	Approx. 170 g 5.996 oz
FP2-C3P	Approx. 170 g 5.996 oz

FP2/FP2SH Optional Memory

Add to CPU units to expand functionality or increase memory capacity.

■ Memory Units for FP2

For FP2

Expansion memory unit
Writing of comments possible.
Clock/Calendar function
Part number: FP2-EM1

For FP2

Expansion memory unit
Writing of comments possible.
Clock/Calendar function
Expands program memory to 16k steps.
Part number: FP2-EM2

■ Expansion Memory Unit with Socket and ROM for Program Storage and ROM Operation

For FP2

Expansion memory unit with socket
Writing of comments possible.
Clock/Calendar function
Expands program memory to 16k steps.
Part number: FP2-EM3

For FP2

Expansion memory unit with socket
Expands program memory to 16k steps.
Part number: FP2-EM6

For FP2/FP2SH

Expansion memory unit with socket
ROM socket only
Part number: FP2-EM7

For FP2

F-ROM
FLASH ROM for program copying and ROM operation.
Equivalent to the SST-29EE010-120-4C-PH.
Enables writing with the operation of the programming tools when attached to the CPU unit.
Part number: FP2-EM4

For FP2

EP-ROM
EP-ROM for program storage and ROM operation.
Equivalent to the M27C1001-12F1 (SGS-THOMSON MICROELECTRONICS).
A ROM writer (commercially available) is required for writing.
Part number: FP2-EM5

For FP2SH

F-ROM
FLASH ROM for program copying and ROM operation.
Equivalent to the SST-29EE020-150-4C-PH.
Enables writing with the operation of the programming tools when attached to the CPU unit.
Part number: AFP5208

For FP2SH

EP-ROM
EP-ROM for program storage and ROM operation.
Equivalent to the M27C2001-150F1 (SGS-THOMSON MICROELECTRONICS).
A ROM writer (commercially available) is required for writing.
Part number: AFP5209

■ Small PC Card for FP2SH

For FP2SH

Small PC card (F-ROM)
F-ROM for program storage and card operation. Perfect for saving the program.
When used for data memory, can be used for reading only.
Part number: AIC50020

For FP2SH

Small PC card (SRAM)
SRAM for program storage and data memory expansion. Perfect for expanding data memory.
Part number: AIC52000

■ Weight List

Part No.	Weight
FP2-EM1	Approx. 10 g 0.353 oz
FP2-EM2	Approx. 15 g 0.529 oz
FP2-EM3	Approx. 25 g 0.882 oz
FP2-EM6	Approx. 25 g 0.882 oz
FP2-EM7	Approx. 25 g 0.882 oz
FP2-EM4	Approx. 10 g 0.353 oz
FP2-EM5	Approx. 10 g 0.353 oz

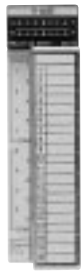
FP2/FP2SH I/O Unit (Terminal Block Type)

The terminal block can be removed and installed with one touch.
An I/O unit that makes maintenance simpler than ever.

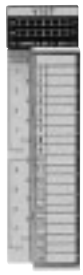
DC input unit — Relay output unit — Transisitor output unit

16-point DC input
FP2-X16D2

6-point relay output
FP2-Y6R



16-point relay output
FP2-Y16R



16-point transistor output (NPN)
FP2-Y16T

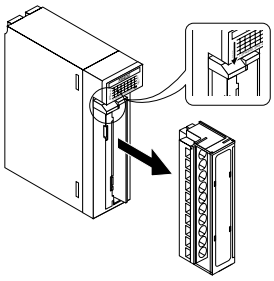
16-point transistor output (PNP)
FP2-Y16P

■ Features

1. The LED display is easy to read.

2. The terminal block can be installed and removed at a single touch.

The block can be installed and removed with the wiring connections intact, when connecting wiring or carrying out maintenance.



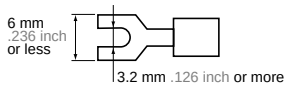
3. A special cover prevents screws from falling out.

4. The 6-point relay output unit "FP2-Y6R" conforms to CE marking category Ⅲ.

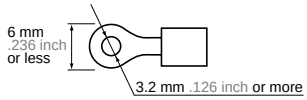
● Pressure connection terminals

M3 terminal screws are used for the terminals of input and output units. The following pressure connection terminals are recommended for the wiring to the terminals.

Fork type terminal



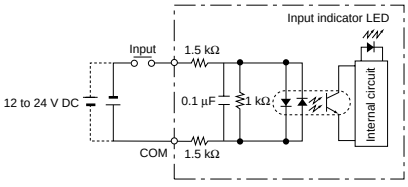
Round type terminal



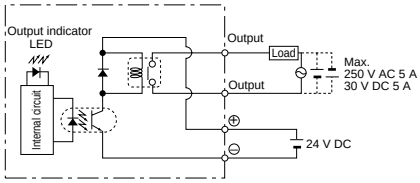
Terminal type	Part number	Suitable wires
Round type	1.25-MS3	0.25 to 1.65 mm²
Fork type	1.25-B3A	
Round type	2-MS3	1.04 to 2.63 mm²
Fork type	2-N3A	

■ Internal Circuit

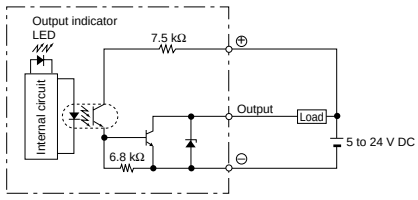
FP2-X16D2



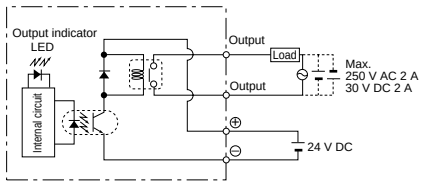
FP2-Y6R



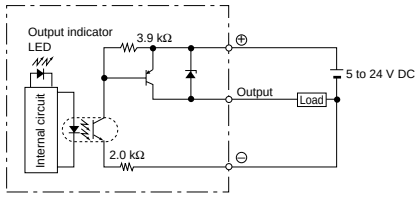
FP2-Y16T



FP2-Y16R



FP2-Y16P



■ Input Spesifications

Item		16-point DC input type
		FP2-X16D2
Insulation method		Optical coupler
Rated input voltage		12 to 24 V DC
Rated input current		Approx. 8 mA (at 24 V DC)
Input impedance		Approx. 3 KΩ
Min. ON voltage/Min. ON current		9.6 V/4 mA
Max. OFF voltage/Max. OFF current		2.5 V/1 mA
Response time	OFF → ON	0.2 ms or less
	ON → OFF	0.2 ms or less
Input points per common		8 points/commom Either the positive or negative of the input power supply can be connected to common terminal.
Operating indicator		16-dot LED display (lit when ON)
Connection method		Terminal block (M 3 screw)
Weight		Approx. 140 g 4.938 oz

■ Output Specifications

Item		Relay output unit		Transistor output unit	
		6-point type *1	16-point type	NPN Open collector 16-point type *2	PNP Open collector 16-point type *2
		FP2-Y6R	FP2-Y16R	FP2-Y16T	FP2-Y16P
Insulation method		Optical coupler	Optical coupler	Optical coupler	Optical coupler
Rated control capacity		5 A 250 V AC (10 A/common), 5 A 30 V DC (10 A/common) min. load: 100 mA, 10 V (resistor load)	2 A 250 V AC (5 A/common), 2 A 30 V DC (5 A/common) min. load: 100 µA, 100 mV (resistor load)	–	–
Rated load voltage		–	–	5 to 24 V DC	5 to 24 V DC
Maximum load current		–	–	0.5 A (at 12 to 24 V DC), 0.1 A (at 5 V DC)	0.5 A (at 12 to 24 V DC), 0.1 A (at 5 V DC)
Maximum surge current		–	–	3 A, 10 ms or less	3 A, 10 ms or less
OFF state leakage current		–	–	1 µA or less	1 µA or less
ON state maximum voltage drop		–	–	0.5 V or less	0.5 V or less
Response time	OFF → ON	10 ms or less	10 ms or less	0.1 ms or less	0.1 ms or less
	ON → OFF	8 ms or less	8 ms or less	0.3 ms or less	0.3 ms or less
Life time	Mechanical	20,000,000 operations or more	20,000,000 operations or more	–	–
	Electrical	100,000 operations or more	100,000 operations or more	–	–
Power supply for driving internal circuit	Voltage	24 V DC ± 10% (21.6 to 26.4 V DC)	24 V DC ± 10% (21.6 to 26.4 V DC)	4.75 to 26.4 V DC	4.75 to 26.4 V DC
	Current	70 mA or less	160 mA or less	120 mA or less (at 24 V DC)	70 mA or less (at 24 V DC)
Surge adsorber		None	None	Zener diode	Zener diode
Relay socket		Without relay socket	Without relay socket	–	–
Fuse ratings		–	–	None	None
Output points per common		2 points/common	8 points/common	8 points/common	8 points/common
Operating indicator		6-dot LED display (lit when ON)	16-dot LED display (lit when ON)	16-dot LED display (lit when ON)	16-dot LED display (lit when ON)
Connection method		Terminal block (M 3 screw)	Terminal block (M 3 screw)	Terminal block (M 3 screw)	Terminal block (M 3 screw)
Weight		Approx. 170 g 5.997 oz	Approx. 190 g 6.702 oz	Approx. 150 g 5.291 oz	Approx. 150 g 5.291 oz

Notes:
*1) For each common 1 pin, use at a current capacity of 5 A or less.
*2) The maximum load current of transistor output unit is limited by the voltage of external power supply.

FP2/FP2SH I/O Units (Connector Type)

Connector type input/output units allow high-density mounting

DC input unit — Transistor output unit — I/O mixed unit

32-point
DC input
FP2-X32D2

64-point
DC input
FP2-X64D2

32-point
transistor output
(NPN) FP2-Y32T
(PNP) FP2-Y32P

64-point
transistor output
(NPN) FP2-Y64T
(PNP) FP2-Y64P

32-point input/output
(NPN) FP2-XY64D2T
(PNP) FP2-XY64D2P

■ Features

1. Ample inputs/outputs are provided for each mounting surface.
There are no restrictions on the number of mounting units, enabling unlimited expansion.

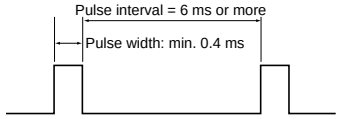
2. The LED display is easy to read.

3. Connector terminals, relay terminals, and dedicated cables are used to minimize wiring.
Various types of terminals and dedicated cables are available, eliminating delays caused by wiring.
For information on applicable models of connectors, terminals and dedicated cables, refer to pages 177 to 180.

4. A full lineup of input/output mixed units, including those with an ON pulse catch input function, is available.

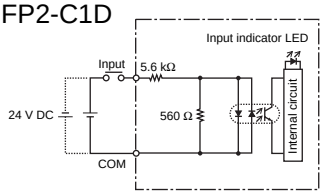
● **ON pulse catch input function**
The ON pulse catch input function has a delay circuit built into the input and is used in combination with a periodic interrupt function to make possible the reading of ON pulses with extremely small widths.

Readable pulse signals;
- Minimum pulse width: 0.4 ms
- Pulse interval: 6 ms or more

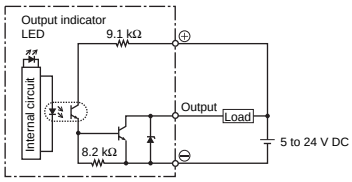


■ Internal Circuit

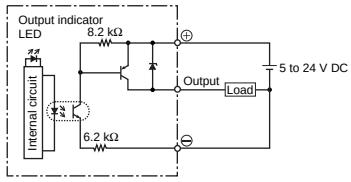
FP2-X32D2
FP2-X64D2
FP2-C1D



FP2-Y32T
FP2-Y64T

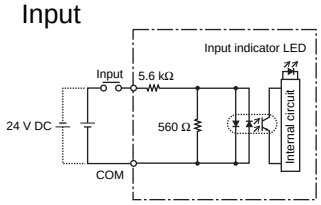


FP2-Y32P
FP2-Y64P

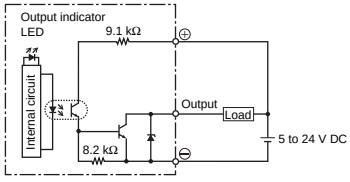


FP2-XY64D2T
FP2-XY64D7T

Input

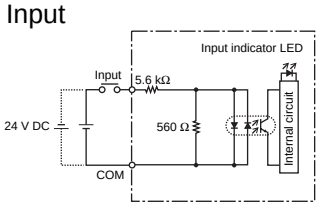


Output

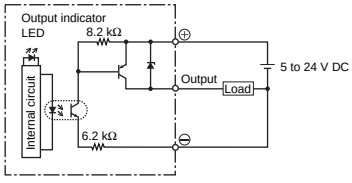


FP2-XY64D2P
FP2-XY64D7P

Input



Output



■ Input Specifications

Item	DC input unit		I/O mixed unit (input side)		I/O mixed unit with ON pulse catch input (Input side)		CPU unit with 64-point input
	32-point DC input type	64-point DC input type	32-point DC input type	DC input type/ Transistor output (PNP) type	DC input type/ Transistor output (NPN) type	DC input type/ Transistor output (PNP) type	
	FP2-X32D2	FP2-X64D2	FP2-XY64D2T	FP2-XY64D2P	FP2-XY64D7T	FP2-XY64D7P	FP2-C1D
Insulation method	Optical coupler	Optical coupler	Optical coupler	Optical coupler	Optical coupler	Optical coupler	Optical coupler
Rated input voltage	24 V DC	24 V DC	24 V DC	24 V DC	24 V DC	24 V DC	24 V DC
Rated input current	Approx. 4.3 mA (at 24 V DC)	Approx. 4.3 mA (at 24 V DC)	Approx. 4.3 mA (at 24 V DC)	Approx. 4.3 mA (at 24 V DC)	Approx. 4.3 mA (at 24 V DC)	Approx. 4.3 mA (at 24 V DC)	Approx. 4.3 mA (at 24 V DC)
Input impedance	Approx. 5.6 kΩ	Approx. 5.6 kΩ	Approx. 5.6 kΩ	Approx. 5.6 kΩ	Approx. 5.6 kΩ	Approx. 5.6 kΩ	Approx. 5.6 kΩ
Min. ON voltage/ Min. ON current	19.2 V/4 mA	19.2 V/4 mA	19.2 V/4 mA	19.2 V/4 mA	19.2 V/4 mA	19.2 V/4 mA	19.2 V/4 mA
Max. OFF voltage/ Max. OFF current	5.0 V/1.5 mA	5.0 V/1.5 mA	5.0 V/1.5 mA	5.0 V/1.5 mA	5.0 V/1.5 mA	5.0 V/1.5 mA	5.0 V/1.5 mA
Response time: OFF → ON	0.2 ms or less	0.2 ms or less	0.2 ms or less	0.2 ms or less	0.2 ms or less (X0 to X1F)	0.2 ms or less (X0 to X1F)	0.2 ms or less
Response time: ON → OFF	0.3 ms or less	0.3 ms or less	0.3 ms or less	0.3 ms or less	0.3 ms or less (X0 to X1B) 1.0 to 5.0 ms or less (X1C to X1F)	0.3 ms or less (X0 to X1B) 1.0 to 5.0 ms or less (X1C to X1F)	0.3 ms or less
Input points per common	32 points/common	32 points/common	32 points/common	32 points/common	32 points/common	32 points/common	32 points/common
Operating indicator	32-dot LED display (Lights when ON)	32-dot LED display (Lights or switches when on)	32-dot LED display (Lights or switches when on)	32-dot LED display (Lights or switches when on)	32-dot LED display (Lights or switches when on)	32-dot LED display (Lights or switches when on)	32-dot LED display (Lights or switches when on)
Connection Method	One 40-pin connectors	Two 40-pin connectors	Two 40-pin connectors	Two 40-pin connectors	Two 40-pin connectors	Two 40-pin connectors	Two 40-pin connectors
Weight	Approx. 100g 3.527 oz	Approx. 120g 4.233 oz	Approx. 120g 4.233 oz	Approx. 120g 4.233 oz	Approx. 120g 4.233 oz	Approx. 120g 4.233 oz	Approx. 220g 7.760 oz

Note: The number of ON points which can be actuated at the same time is limited by the input voltage and the ambient temperature.

■ Output Specifications

Item	32-point transistor output type		64-point transistor output type		I/O mixed unit (output side)		I/O mixed unit with ON pulse catch input (Output side)	
	NPN open collector	PNP open collector	NPN open collector	PNP open collector	DC input type/ Transistor output (NPN) type	DC input type/ Transistor output (PNP) type	DC input type/ Transistor output (NPN) type	DC input type/ Transistor output (PNP) type
	FP2-Y32T	FP2-Y32P	FP2-Y64T	FP2-Y64P	FP2-XY64D2T	FP2-XY64D2P	FP2-XY64D7T	FP2-XY64D7P
Inslation method	Optical coupler	Optical coupler	Optical coupler	Optical coupler	Optical coupler	Optical coupler	Optical coupler	Optical coupler
Rated load voltage	5 to 24 V DC	5 to 24 V DC	5 to 24 V DC	5 to 24 V DC	5 to 24 V DC	5 to 24 V DC	5 to 24 V DC	5 to 24 V DC
Maximum load current	0.1 A (at 12 to 24 V DC), 50 mA (at 5 V DC)	0.1 A (at 12 to 24 V DC), 50 mA (at 5 V DC)	0.1 A (at 12 to 24 V DC), 50 mA (at 5 V DC)	0.1 A (at 12 to 24 V DC), 50 mA (at 5 V DC)	0.1 A (at 12 to 24 V DC), 50 mA (at 5 V DC)	0.1 A (at 12 to 24 V DC), 50 mA (at 5 V DC)	0.1 A (at 12 to 24 V DC), 50 mA (at 5 V DC)	0.1 A (at 12 to 24 V DC), 50 mA (at 5 V DC)
Maximum surge current	0.3 A	0.3 A	0.3 A	0.3 A	0.3 A	0.3 A	0.3 A	0.3 A
OFF state leakage current	1 µA or less	1 µA or less	1 µA or less	1 µA or less	1 µA or less	1 µA or less	1 µA or less	1 µA or less
ON state maximum voltage drop	1 V or less (at 6 to 26.4 V DC), 0.5 V or less (at 6 V DC or less)	1.5 V or less (at 6 to 26.4 V DC), 0.5 V or less (at 6 V DC or less)	1 V or less (at 6 to 26.4 V DC), 0.5 V or less (at 6 V DC or less)	1.5 V or less (at 6 to 26.4 V DC), 0.5 V or less (at 6 V DC or less)	1 V or less (at 6 to 26.4 V DC), 0.5 V or less (at 6 V DC or less)	1.5 V or less (at 6 to 26.4 V DC), 0.5 V or less (at 6 V DC or less)	1 V or less (at 6 to 26.4 V DC), 0.5 V or less (at 6 V DC or less)	1.5 V or less (at 6 to 26.4 V DC), 0.5 V or less (at 6 V DC or less)
Response time: OFF → ON	0.1 ms or less	0.1 ms or less	0.1 ms or less	0.1 ms or less	0.1 ms or less	0.1 ms or less	0.1 ms or less	0.1 ms or less
Response time: ON → OFF	0.3 ms or less	0.3 ms or less	0.3 ms or less	0.3 ms or less	0.3 ms or less	0.3 ms or less	0.3 ms or less	0.3 ms or less
Power supply for driving internal circuit: Voltage	4.75 to 26.4 V DC	4.75 to 26.4 V DC	4.75 to 26.4 V DC	4.75 to 26.4 V DC	4.75 to 26.4 V DC	4.75 to 26.4 V DC	4.75 to 26.4 V DC	4.75 to 26.4 V DC
Power supply for driving internal circuit: Current	140 mA or less (at 24 V DC)	150 mA or less (at 24 V DC)	250 mA or less (at 24 V DC)	270 mA or less (at 24 V DC)	120 mA or less (at 24 V DC)	130 mA or less (at 24 V DC)	120 mA or less (at 24 V DC)	130 mA or less (at 24 V DC)
Surge absorber	Zener diode	Zener diode	Zener diode	Zener diode	Zener diode	Zener diode	Zener diode	Zener diode
Fuse ratings	None	None	None	None	None	None	None	None
Output points per common	32 points/ common	32 points/ common	32 points/ common	32 points/ common	32 points/ common	32 points/ common	32 points/ common	32 points/ common
Operating indicator	32-dot LED display (Lights when ON)	32-dot LED display (Lights when ON)	32-dot LED display (Lights or switches when on)	32-dot LED display (Lights or switches when on)	32-dot LED display (Lights or switches when on)	32-dot LED display (Lights or switches when on)	32-dot LED display (Lights or switches when on)	32-dot LED display (Lights or switches when on)
Connection method	One 40-pin connectors	One 40-pin connectors	Two 40-pin connectors	Two 40-pin connectors	Two 40-pin connectors	Two 40-pin connectors	Two 40-pin connectors	Two 40-pin connectors
Weight	Approx. 100 g 3.527 oz	Approx. 100 g 3.527 oz	Approx. 120 g 4.233 oz	Approx. 120 g 4.233 oz	Approx. 120 g 4.233 oz	Approx. 120 g 4.233 oz	Approx. 120 g 4.233 oz	Approx. 120 g 4.233 oz

Notes:
- The number of ON points which can be actuated at the same time is limited by the input voltage and the ambient temperature.
- The maximum load current is limited by the voltage of external power supply.

FP2/FP2SH Analog I/O Unit

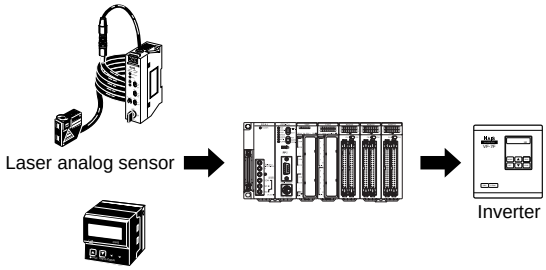
Supports ranges for voltage, current, and temperature sensors.

■ Configuration

Analog input unit
FP2-AD8

Analog output unit
FP2-DA4

CPU unit
with analog I/O
FP2-C1A



■ Features

1. Supports ranges for voltage, current, and temperature sensors.

This one unit can be used as a voltage, current, and temperature sensor. For analog output, choose voltage or current. Using different ranges for voltage and current is also possible.

2. Equipped with multiple channels.

The input unit is equipped with 8 channels and the output unit is equipped with 4 channels. This means control of multiple channels in a reduced amount of space. CPU units with analog I/O are equipped with 4 input channels and 1 output channel.

3. High-speed conversion with 500 µs for each channel.

The conversion time for the voltage and current I/O is only 500 µs/channel for high-speed processing.

4. I/O refresh method.

Since the scanning and output of the I/O data is allocated to the I/O, complicated programming is unnecessary.

● **Regarding selection**

With the FP2 analog input unit, you can write the code specified in the shared memory by the user program so that multiple ranges can be selected in one unit; however, this is not possible with the combinations given below.

– For both current input and thermocouple input
– For both current input and R.T.D. (resistance thermometer device) input
– For current input and ±100 mV

■ Performance Specifications

1. Analog input

Item		Analog input unit FP2-AD8	CPU unit with analog I/O FP2-C1A
Number of input points		8 channels	4 channels
Input range (resolution)	Voltage	±10 V (1 / 65536), 1 to 5 V (1 / 13107), ±100 mV (1 / 65536)	
	Current	±20 mA (1 / 32768), 4 to 20 mA (1 / 13107)	
	Thermocouple	S: 0 to +1500°C (0.1°C) 32 to +2732°F (32.18°F) J: –200 to +750°C (0.1°C) –328 to +1382°F (32.18°F) K: –200 to +1000°C (0.1°C) –328 to +1832°F (32.18°F) T: –200 to +350°C (0.1°C) –328 to +662°F (32.18°F) R: 0 to +1500°C (0.1°C) 32 to +2732°F (32.18°F)	
	R.T.D.	Pt100: –100 to +500°C (0.1°C) –148 to 932°F (32.18°F) Pt1000: –100 to +100°C (0.1°C) –148 to +212°F (32.18°F)	
Conversion speed	Voltage input	500 µs / channel (±100 mV: 650 µs / channel)	
	Current input		
	Thermocouple input	90 ms / channel	
	R.T.D. input		
Overall accuracy		Max. ±1.0% F.S. (0 to 55°C) (32 to 131°F) (*Note)	
Insulation method		• Between analog input terminal and FP2 internal circuits: Optical coupler insulation • Between analog input channels: Non insulation	
Digital output	Averaging	3 to 64 times/ each channels	
	Offset setting	K-2047 to K+2047 / each channels	
Broken wire sensing		Only thermocouple range or R.T.D. range / each channels	
Input range change method		All channels: By dip switch setting Each channels: By shared memory setting	
Weight		Approx. 160g 5.644 oz	Approx. 260g 9,171 oz

Note:
The full scale (F.S.) for each of analog input voltage 1 to 5 V, current 4 to 20 mA and T range of thermocouple is ±10 V, ±20 mA and –200 to 1,000°C –328 to +1,832°F, respectively.

2. Analog output

Item		Analog output unit FP2-DA4	CPU unit with analog I/O FP2-C1A
Number of output points		4 channels	1 channel
Output range (digital input)	Voltage	±10 V (K–2048 to K+2047)	
	Current	0 to 20 mA (K0 to K4095)	
Resolution		1 / 4096	
Conversion speed		500 µs / channel	
Overall accuracy		Max. ±1.0% F.S. (0 to 55°C) (32 to 131°F)	
Insulation method		• Between analog output terminal and FP2 internal circuits: Optical coupler insulation • Between analog output channels: No insulation	
Analog output (at PROG. mode)		Hold / Non-hold setting by shared memory setting	
Weight		Approx. 160 g 5.644 oz	Approx. 260 g 9.171 oz

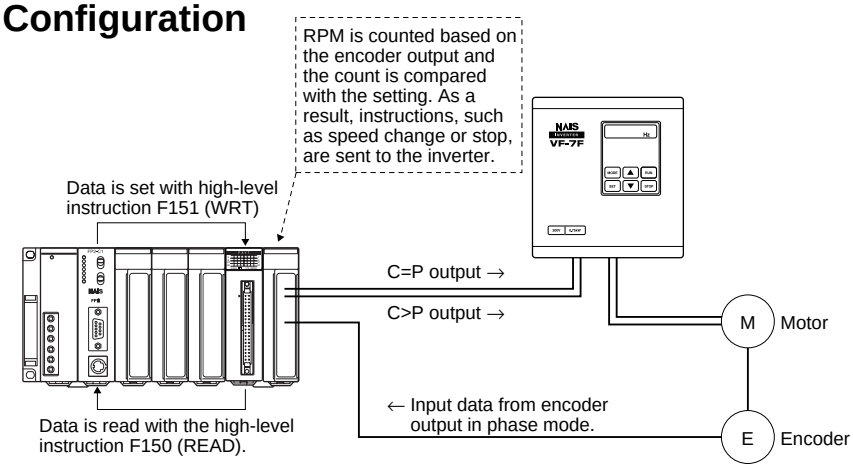
FP2/FP2SH High-Speed Counter Unit Pulse Input/Output Unit

Interruption, counting, pulse output, and PWM output: each function concentrated in a single unit.

High-speed counter unit
FP2-HSCT

Pulse output unit
FP2-PXYT

■ Configuration



■ Features

1. High-speed counting: 200 kcount/s
Fine control is possible with a maximum 200 kHz of high-speed counter input on 4 built-in channels. The time-constant input switching function also allows the sensitivity to be changed in counting situations that are prone to error.

2. Built in: 8 comparative output
For the 4 high-speed counter channels there is discretionary allocation for 8 built-in output contacts. The counter stepping can be altered.

3. Equipped with interrupter function
The interrupter program can be set to start when an elapsed value is reached or by timing with an input signal from the outside. Even with equipment that operates at high speeds, if trouble occurs, there is no delay in control and irregularity avoided.

4. Both pulse output* and PWM output* are possible
Able to deal with pulse output at up to a maximum of 100 kpps and PWM output control at up to a maximum of 30 kpps.

5. Highly efficient integrated system
High-speed counter, interruption, normal I/O, pulse output* and PWM output* functions are all built into a single unit. Systems can be built that are economical and waste-free.

*Pulse output function and PWM output function are built in to the pulse I/O unit only.

■ Performance Specifications

Item			FP2 High-speed counter unit (FP2-HSCT)	FP2 Pulse I/O unit (FP2-PXYT)
Input	Insulation method		Photocoupler insulation	
	Rated input voltage		24 V DC	
	Rated input current		Approx. 7.5 mA (when using 24 V DC)	
	Input impedance		Approx. 3.2 kΩ	
	Usage voltage range		20.4 V DC to 26.4 V DC	
	Min. ON voltage/ Min. ON current		19.2 V DC/6 mA	
	Min. OFF voltage/ Min. OFF current		5.0 V DC/1.5 mA	
	Response time*1	OFF → ON	1 µs or less	
		ON → OFF	2 µs or less	
	Input time constant setting		None, 4 µs, 8 µs, 16 µs, 32 µs (set in 2-input units)	
	Common method		16 points/common (+ common)	
Counter	No. of counter channels		4 channels	
	Calculation range		32-bit with sign (–2,147,483,648 to +2,147,483,647)	
	Max. calculation speed*1		200 kHz	
	Input modes		3 modes (direction control, individual input, phase input)	
	Min. input pulse width*1		2.5 µs	
	Other		8 comparison outputs, multiplier function (1, 2, 4)	
Interrupt	No. of interrupt points*2		None, 1/unit, 8/unit (set with mode setting switches)	
	Interrupt processing delays		160 µs max. (when using FP2 CPU unit) 50 µs max. (when using FP2SH CPU unit)	
Output unit specifications	Insulation method		Photocoupler insulation	
	Rated load voltage		5 to 24 V DC	
	Rated load voltage range		4.75 to 26.4 V DC	
	Max. load current		0.1 A (A11 to A18, B11 to B14 pins), 0.8 A (B15 to B18 pins)	
	Leakage current when off		1 µA max.	
	Max. voltage drop when on		0.5 V max.	
	Response time	OFF → ON	1 µs max.	
		ON → OFF	1 µs max.	
	Surge killer		Zener diode	
	Common method		16 points/common	
	External power supply	Voltage	20.4 to 26.4 V DC	
		Current	90 mA (at 24 V DC)	
Counter	Comparison output		8 points (A11 to A18 pins)	
Pulse output	Channels		—	4CH (B11 to B18 pins)
	Max. output frequency*3			100 kHz
	Output modes			2 modes (direction control, individual output)
PWM output	No. of output points			4CH (B15 to B18 pins)
	Max. load current			0.8 A
	Cycle*3			1 Hz to 30 kHz
	Duty*3			0 to 100% (unit: 1%)
Weight			Approx. 110 g 3.9 oz	Approx. 130 g 4.6 oz

Notes:
*1) This value is effective when the input time constant (filter) setting is set to "No setting".
*2) If interrupts are used at the 1/unit setting, the interrupt from the external input terminal B1 (X8) or the interrupt program from the comparison 0 (one of among INT16 to INT23) is booted.
*3) At maximum load current and resistance load. There may be distortion in the output waveform, depending on the load current and type of load.

FP2/FP2SH Positioning Unit

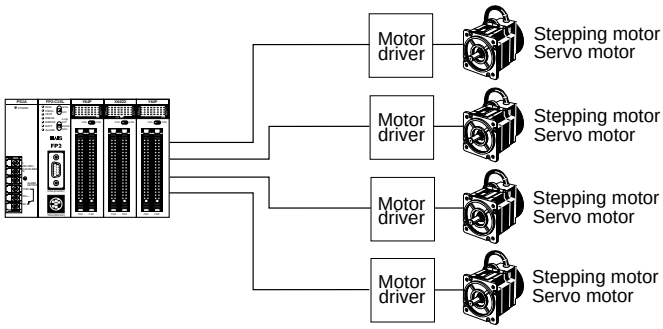
Super high-speed control with a start up time of less than 0.1 ms and maximum frequency of 1 Mpulse/s.

Positioning unit (2-axis)
FP2-PP2

Positioning unit (4-axis)
FP2-PP4

■ Configuration

● Maximum control of 4-axis with one unit



*Compatible with pulse train input type drivers.

■ Features

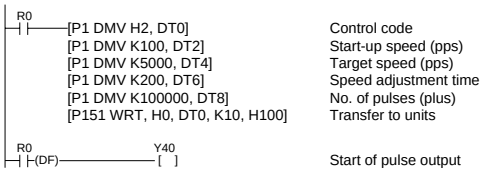
1. 0.1 ms high-speed drive reduces tact-time.

* Start up time is the time from reception of the CPU unit startup command to release of the pulse output by the positioning unit.

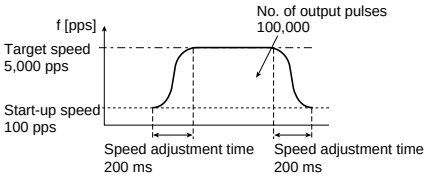
2. Maximum 1M pulse/s command gives high-speed, high-precision positioning.

3. 4-axis per unit gives versatility and saves space.

4. Simplified parameter and data settings give automatic speed adjustment.



5. "S (sign-shaped)" acceleration/deceleration function gives smooth starting and stopping.



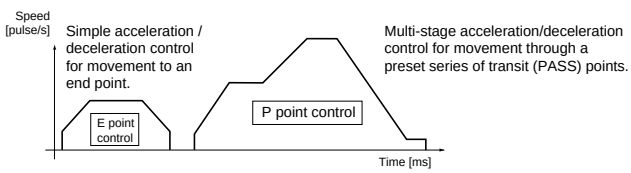
6. The pulse input function allows users to send in real time using a manual pulse generator. (Maximum 1000 multiplication with the transfer multiple function.)

■ Performance Specifications

Item		FP2-PP2	FP2-PP4
Number of axes controlled		2 axes, independent	4 axes, independent
Position command	Command units	Pulse unit (The program specifies whether increment or absolute is used.)	
	Command range	Signed 32 bits, (–2,147,483,648 to +2,147,483,647 pulses)	
Speed instruction	Command range	• When line driver operation is used: 1 pulse/s to 1M pulse/s (settings in units of 1 pps are possible) • When open collector operation is used: 1 pulse/s to 200k pulse/s (settings in units of 1 pps are possible)	
	Acceleration/ Deceleration method	Linear acceleration/deceleration, "S" acceleration/ deceleration (approximates the shape of an "S")	
	Acceleration/ Deceleration time	0 to 32,767 ms	
Home return	Home return speed	Speed settings possible (return speed and search speed changes)	
	Input terminals	Home input and near home input	
Operation mode		E point control (linear or "S" acceleration/deceleration can be selected)*1 P point control (linear or "S" acceleration/deceleration can be selected)*1 Homing function (linear or "S" acceleration/deceleration can be selected) JOG operation function (linear or "S" acceleration/deceleration can be selected)*2 Pulse input function (1, 2, 5, 10, 50, 100, 500, or 1000 can be selected for transfer multiple)	
Startup time		Less than 0.1 ms	
Output mode		Switching between Pulse/Sign mode and CW/CCW mode (using the selector switch on the back of the unit)	
Other functions		Output for deviation counter clear signal	
External power supply*3		24 V DC (21.6 to 26.4 V DC)	24 V DC (21.6 to 26.4 V DC)
Weight		Approx. 125 g 4.409 oz	Approx. 150 g 5.291 oz

Notes:

*1) E point control and P point control refer to the acceleration/deceleration control methods shown in the diagram.



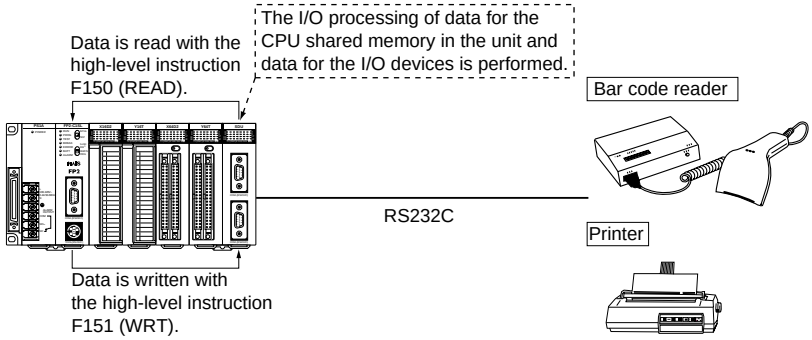
*2) Changes in the target speed are possible during operation when linear acceleration/deceleration is selected.

*3) Power is supplied from an external power supply equipment to the connector of unit.

FP2/FP2SH Serial Data Unit

■ Configuration

Serial Data Unit
FP2-SDU



■ Features

1. Data input/output is executed by sequence command

Reading can be performed simply by using high-level instruction F150 (READ), and writing by using high-level instruction F151 (WRT). Since the subsequent processing is performed by the serial data unit through memory shared by the CPU unit, it is not necessary to work out a complicated program.

2. Free combination of I/O devices

It is possible to use it in three ways: input only, output only, and input and output.

3. 500 bytes of data can be transmitted and received at a time

4. No limitation on the number of units used

The number of units used is not limited.

5. Can also be used as a C-NET master station.

The FP2/FP2SH can also be used as the data collection terminal for our C-NET network. Refer to “C-NET” on page 146.

● **Regarding selection**

When a display panel that supports our protocol or computer is connected, use the Computer Communication Unit on the next page or the COM port of the CPU unit.

■ Performance Specifications

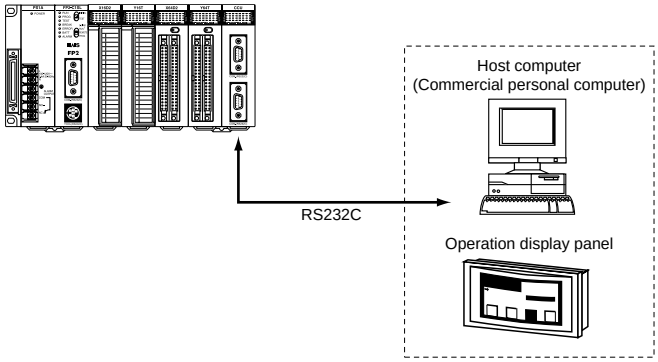
Item	Description
Interface	Two RS232C ports
Transmission speed (Baud rate)	19,200/9,600/4,800 bits/s, selectable using dip switch*
Communication method	Half duplex
Synchronous method	Start-stop synchronous method
Transmission format	ASCII
Transmission data format	Stop bit: 1-bit*
	Parity: Valid (odd)*
	Character bits: 7-bit/8-bit, selectable using dip switch
Data transmission order	0 bit first in units of characters
Transmission unit	In units of messages to the end terminal code (Length can be changed.)
End terminal code	CR (0DH)(*Note)
Maximum message length	Max. 500 characters/ frame (including end and start terminlal codes)
Interface with FP2 CPU unit	Shared memory method (data read out and write using F150/F151 instruction)
Weight	Approx. 120 g 4.233 oz

Note:
* Selects the transmission speed “300/600/1,200/2,400 bits/s”, stop bit “2-bit”, parity “invalid, even” and end terminal code “optional code, CR and LF, ETX” using shared memory.

FP2/FP2SH Computer Communication Unit

■ Configuration

Computer Communication Unit
FP2-CCU



■ Features

1. Connectable with operation display panel

Connection with an operation display panel is possible. A communication program is unnecessary.

2. Economical peer-to-peer communication with a personal computer is possible.

This unit can be directly connected with a personal computer through RS232C to collect and write data from it without building up a large-scale network.

3. One unit is equipped with two ports.

One unit is equipped with two RS232C interface ports.

4. No communication program is needed on the PLC. (Computer link function)

The PLC automatically returns responses using the FP series' MEWTOCOL communication protocol so that there's no need to prepare a communication program at the side of the PLC.

5. Connection with modem

It is possible to receive data over public telephone lines from another PLC, by connecting modem with your PLC. (Only the COM2 port and only reception.)

● **Regarding selection**

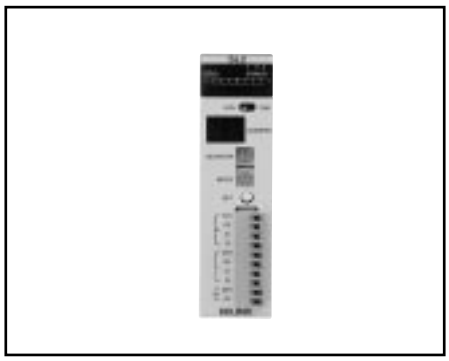
For systems using the FP2 CPU unit with multiple display panels and computers connected, depending on the location of the port used for connection and the commands used, communication may be hindered and not performed properly. Check the operating conditions in the manual and select the units according to your applications.
(See page 76.)

■ Performance specifications

Item		Description	
Interface		Two RS232C ports	
Transmission speed (Baud rate)		19,200/9,600/4,800 bits/s, selectable using dip switch	
Communication method		Half duplex	
Synchronous method		Start-stop synchronous method	
Transmission format		ASCII	
Transmission data format		Stop bit: 1-bit	
		Parity: Valid (odd)	
		Character bits: 7-bit/8-bit, selectable using dip switch	
Data transmission order		0 bit first in units of characters	
End terminal code		CR (0DH)	
Computer link (COM.1, COM.2)	Transmission unit	Header(%) to terminator (CR)	Once transmission rights from the host computer are received, communication is started. The communication protocol is MEWTOCOL-COM.
	Maximum message length	Max. 118 characters/frame (including "%" and "CR")	
Modem connection		Only the COM.2 port and only for reception. The transmission speed (baud rate) is fixed to 9,600 bits/s.	
Weight		Approx. 120 g 4.233 oz	

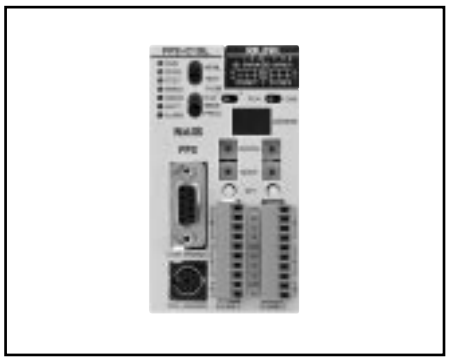
FP2/FP2SH Network-Related Unit

■ Remote I/O Related Units



S-LINK unit
Master station for the S-LINK system from SUNX, Limited. Equipped with one port and control of up to 128 points is possible.

Part number: FP2-SL2



CPU unit with S-LINK
CPU unit with master station functionality for the S-LINK system from SUNX, Limited. Equipped with two ports and control of up to 256 points is possible.

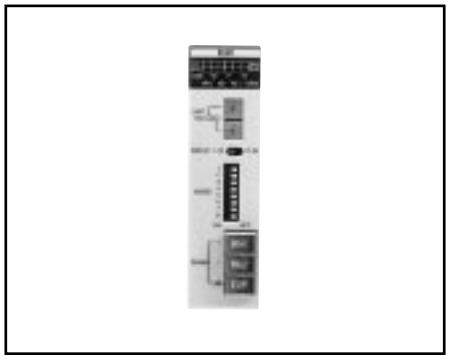
Part number: FP2-C1SL

■ Weight List

Part No.	Weight
FP2-C1SL	250 g 8.818 oz
FP2-SL2	120 g 4.233 oz
FP2-MW	110 g 3.880 oz

■ Units Supporting Linking Between PLCs (MEWNET-W and MEWNET-W2) and Remote I/O (MEWNET-F)

For details about MEWNET-W, MEWNET-W2 and MEWNET-F, refer to page 138 to 141.

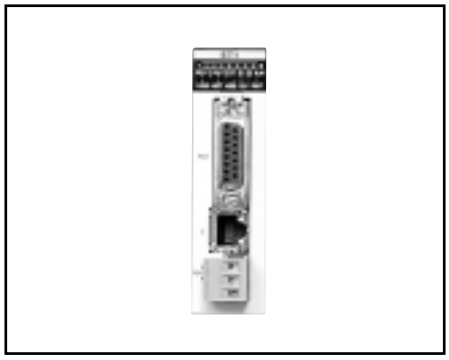


Multi-wire link unit
Link unit supporting PLC links and remote I/O. Wiring using twisted pair cable is possible.

Part number: FP2-MW

■ Linkage-related Unit

For details about Ethernet, refer to page 143.



ET-LAN unit
Linking unit compatible with Ethernet (100BASE-TX/10BASE-T/10BASE5)
This unit enables linkage between PCs and computer through UTP cable or transceiver cable.

Part number: FP2-ET1

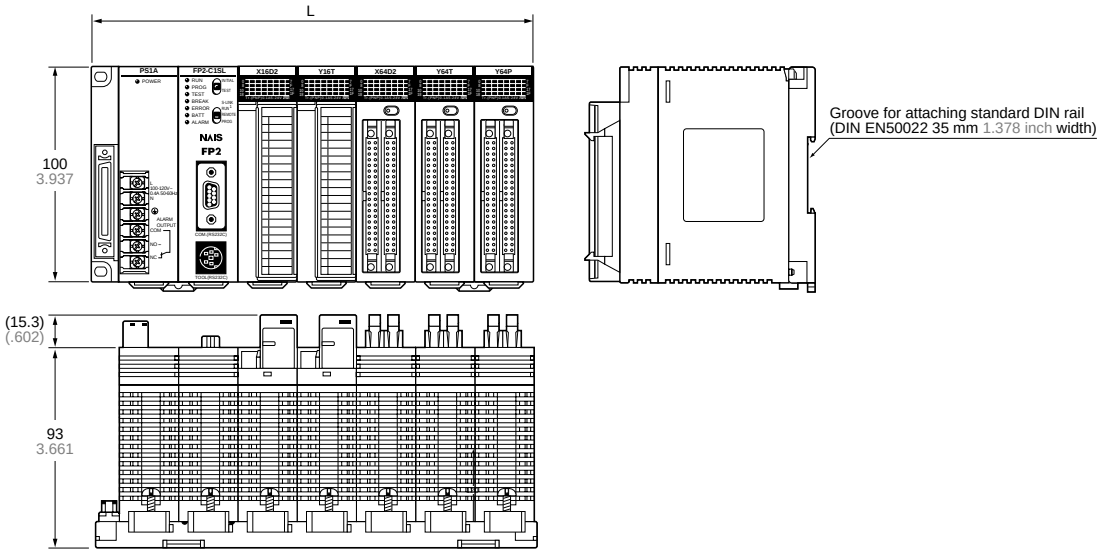
FP2/FP2SH Specifications

■ General Specifications (For FP2/FP2SH)

Item	Descriptions
Ambient temperature	0 to 55°C 32 to 131°F
Storage temperature	–20 to +70°C –4 to +158°F
Ambient humidity	30 to 85 % RH (non-condensing)
Storage humidity	30 to 85 % RH (non-condensing)
Breakdown voltage	1,500 V AC, 1 minute between AC external terminal and frame ground
	500 V AC, 1 minute between DC external terminal and frame ground
Insulation resistance	100 MΩ or more (measured with a 500 V DC megger testing) between external terminal and frame ground
Vibration resistance	10 to 55 Hz, 1 cycle/min.: double amplitude of 0.75 mm 0.030 inch, 10 min. on 3 axes
Shock resistance	98 m/s^2 or more, 4 times on 3 axes
Noise immunity	1,500 V(p-p) with pulse widths 50 ns and 1 µs (based on in-house measurements)
Operating conditions	Free from corrosive gases and excessive dust

Note:
When using an analog unit, the range of ambient temperature during operation will differ depending on the number of channels used.

■ Dimensions (For FP2/FP2SH) (mm inch)



Type	5-module	7-module	9-module	12-module	14-module
L (mm inch)	140 5.512	209 8.228	265 10.433	349 13.740	405 15.945

Note: The illustration above shows the 7-module type. The 5-module type does not have an expansion connector.

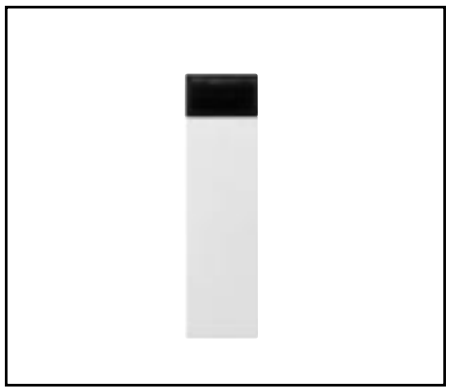
■ Performance Specifications

Item			FP2 CPU unit	FP2SH CPU unit
			FP2-C1, FP2-C1D FP2-C1A, FP2-C1SL	FP2-C2, FP2-C2P FP2-C3P
Program method/control method			Relay symbol/cyclic operation	
Controllable I/O points	Basic construction		Max. 768 points (12 modules)	
	Expanded construction		Max. 1,600 points (25 modules)	
	Using remote I/O system		Max. 2,048 points (using S-Link or MEWNET-F system)	Max. 8,192 points (using S-LINK or MEWNET-F system)
Program capacity	Internal memory		Approx. 16k steps	Approx. 60k steps (FP2-C3P: approx. 120k steps)
	Using expansion memory		Approx. 32k steps (*Note 8)	—
Number of instructions	Basic		95 types	95 types
	High-level		428 types	431 types
Operation speed (typical value)	Basic instructions		From 0.35 µs per instruction	From 0.03 µs per instruction
	High-level instructions		From 0.93 µs per instruction	From 0.06 µs per instruction
Operation memory points	Relays	External input relay (X)	2,048 points (*Note 2)	8,192 points (*Note 2)
		External output relay (Y)	2,048 points (*Note 2)	8,192 points (*Note 2)
		Internal relays (R)	4,048 points (*Note 1)	14,192 points (*Note 1)
		Timer/Counter (T/C)	Total 1,024 points (*Note 1)	Total 3,072 points (*Note 1)
			Timer: Units of 1 ms, 10 ms, 100 ms and 1s counts up to 32,767 × each unit. Counter: 1 to 32,767 counts	
		Link relays (L)	2,048 points (*Notes 1 and 3)	10,240 points (*Notes 1 and 3)
		Pulse relays (P)	1,024 points (*Note 1)	2,048 points (*Note 1)
		Alarm relays (E)	Not available	2,048 points (*Note 1)
	Memory areas	Data registers (DT)	6,000 words (*Note 1)	10,240 words (*Note 1)
		File registers (FL)	0 to 14,333 words (when expanding: 0 to 30,717 words) (*Note 1)	32,765 words × 3 banks (*Note 1)
		Link data registers (LD)	256 words (*Notes 1 and 4)	8,448 words (*Notes 1 and 4)
		Timer/Counter set value area (SV)	1,024 words	3,072 words
		Timer/Counter elapsed vaiue area (EV)	1,024 words	3,072 words
		Index registers (I0 to ID)	14 words	14 words × 16 banks
Differential points			Unlimited number of points	
Auxlliary timer			Unlimited number of points, down type timer (0.01 to 327.67 s)	
Shift register			Max. 253 points	Max. 887 points
Master control relay points (MCR)			256 points	256 points (For FP2-C3P, 1st program: 256 points/2nd program: 256 points)
Number of labels (JP and LOOP)			Total: 256 points	256 points (For FP2-C3P, 1st program: 256 points/2nd program: 256 points)
Number of step ladder			1,000 steps (*Note 1)	1,000 steps (FP2-C3P: 1st program only)
Number of subroutine			100 subroutines	
Number of interrupt program			1 program (periodical interrupt: allows setting of the time interval within the range from 0.5 ms to 1.5 s) (FP2-C3P: 1st program only)	
Comment input function			Available (*Note 6)	Available (built-in type)
Clock/calendar function			Year, month, day, hour, minute, second and day of week (*Notes 5 and 6) (Available for FP2SH)	
Link functions			PC link, computer link, remote programming, Modem and data transfer	
Self-diagnostic functions			Watchdog timer, memory malfunction detection, I/O malfunction detection, backup battery malfunction detection, program syntax check, etc.	
Other functions			ROM operation function (*Note 7), program block edition during RUN mode, forced input/output, interrupt processing, test run, constant scan and machine language program	
Memory backup time (Lithium battery storage time)			Min. 10,000 hours (typical: approx. 13,000 hours)	Min. 3,500 hour (typical: approx. 31,000 hours)
	When installed expansion memory unit	FP2-EM1	Min. 9,000 hours (typical: approx. 12,000 hours)	—
		FP2-EM2 FP2-EM3	Min. 8,000 hours (typical: approx. 12,000 hours)	—
		FP2-EM6	Min. 8,500 hours (typical: approx. 12,500 hours)	—
		FP2-EM7	Min. 10,000 hours (typical: approx. 13,000 hours)	Min. 3,500 hour (typical: approx. 31,000 hours)

Notes:
*1) Hold or non-hold type can be set using the system registers.
*2) The number of programmable points is as shown in the table above; however, the number of points that can be used for external I/O is restricted by the number of I/O unit.
*3) Can also be used as internal relays.
*4) Can also be used as data registers.
*5) Precision of calendar timer:
At 0°C 32°F, less than 90-second error per month.
At 25°C 77°F, less than 40-second error per month.
At 55°C 131°F, less than 98-second error per month.
*6) The expansion memory unit (FP2-EM1, FP2-EM2 or FP2-EM3) is required.
*7) The expansion memory unit (FP2-EM3, FP2-EM6 or FP2-EM7) is required.
*8) The expansion memory unit (FP2-EM2, FP2-EM3 or FP2-EM6) is required.

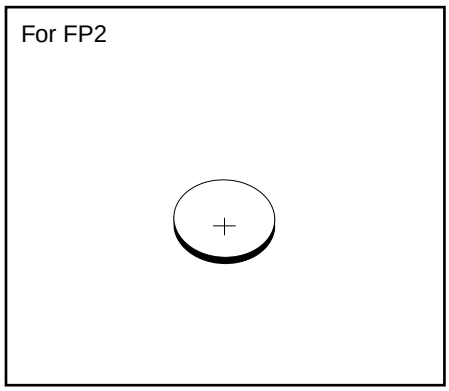
FP2/FP2SH Options

■ Fittings

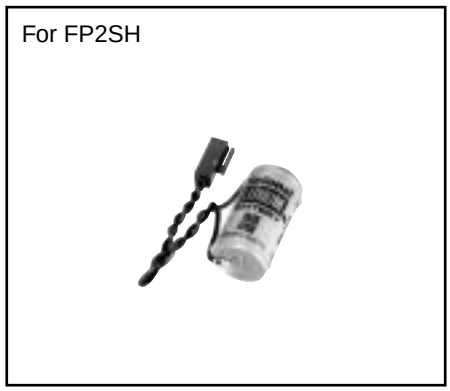


FP2/FP2SH dummy unit
Unit for vacant slot terminal cover.
Part number: FP2-DM

■ Spare Parts

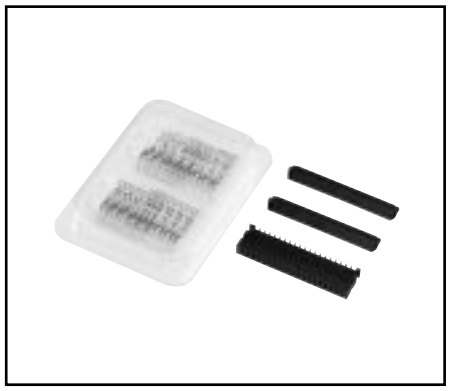


Spare battery (Lithium battery)
For FP2 CPU unit. Equivalent to the commercially available CR2450.
Part number: AFC8801

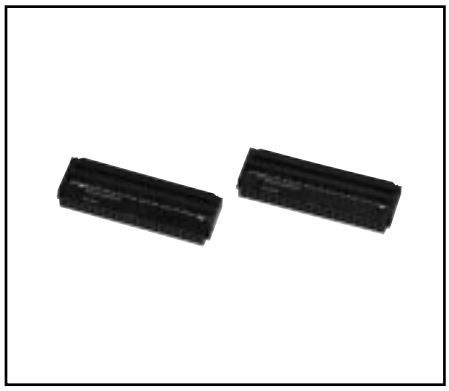


Spare battery (Lithium battery)
For FP2 CPU unit. For use together with the conventional FP3/FP10SH products.
Part number: AFP8801

■ Connecting Components



Discrete-wire connector set (supplied)
FP2 I/O unit and positioning unit supplied.
Part number: AFP2801 (2 pieces)



Flat cable connector set
For FP2 I/O unit and positioning unit. For simple connection using a flat cable.
Part number: AFP2802 (2 pieces)

Terminals are also available to reduce the procedures required for wiring the FP2 I/O and positioning units.
See from pages 177 to 180.