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Panasonic
Programmable Controller FP2

06/2005

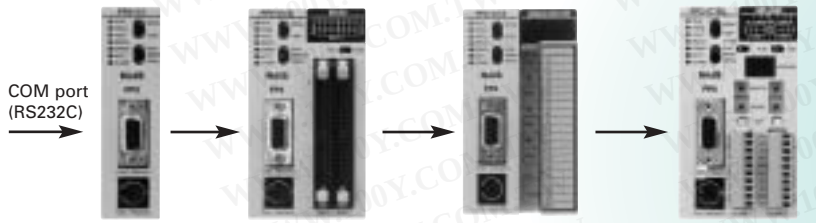
FP2 – Smart PLC with Numerous Functions

For a wide range of applications

CPU Units

Seven CPU types are available according to the application.

The series features seven types of CPU units including the standard type CPU unit. This ensures the effective use of slots and avoids the high costs of purchasing the CPU unit and high-function units separately. The CPU with integrated network function enables the simple, decentralised construction of your controller concept.

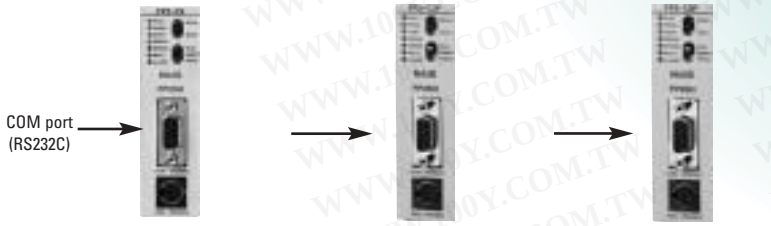


Standard CPU unit **FP2-C1**

CPU unit with 64-point input **FP2-C1D**

CPU unit with analogue I/O Input 4 points, Output 1 point **FP2-C1A**

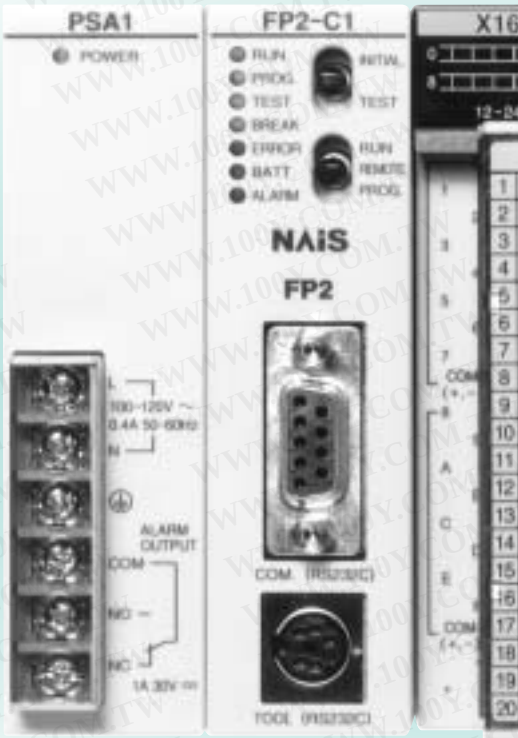
CPU unit with 2 S-LINK Interfaces **FP2-C1SL**



Standard type CPU unit **FP2-C2**

CPU unit, 60k with IC card interface **FP2-C2P**

CPU unit, 120k with IC card interface **FP2-C3P**



Sequence control

The programme capacity and number of control points needed to function as a mid-size PLC.

If the 14-module type is used in the master backplane and expansion backplane, the maximum number of control I/Os is 1,600. When remote I/O is used, a maximum of 8,192 points can be controlled.

The FP2SH CPU has a high processing speed of 30ns per basic instruction, which is at the top of its class. Large programming capacities of 60k and 120k are available, depending on the model, and can be expanded optionally using an IC memory card. This allows great amounts of data to be processed.

Easy programming

- FP2 is programmable with NAiS Control FPWIN Pro in 5 IEC 61131-3 languages:
  - Ladder Diagram
  - Instruction List
  - Function Block Diagram
  - Sequential Function Chart
  - Structured Text
- Reuse of user defined, already tested functions, fuction blocks and POUs
- Comprehensive documentation and help files

Intelligent and powerful instruction set

- The FP2 uses the proven and powerful command set used by the Matsushita FP Series Programmable Controllers.
- In addition, the FP2 has several new and powerful instructions, such as:
  - Floating-Point Math
  - String instruction for communication
  - PID Control instructions and many others

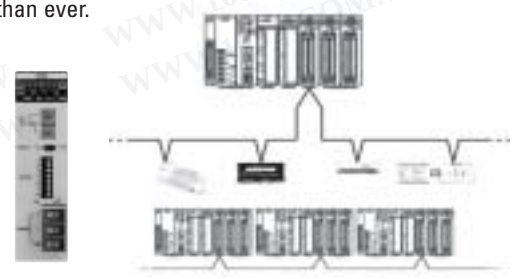
Network functions

For everything from simple reduced-wiring networks to full-scale information networks

- **MEWNET-W / MEWNET-F**

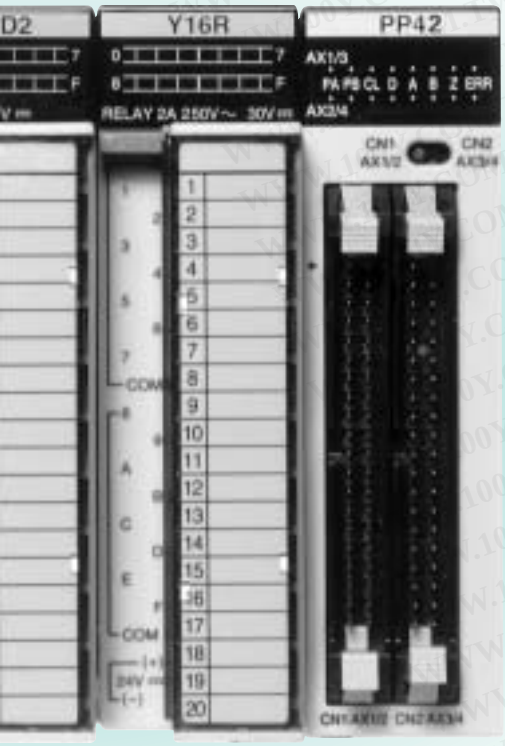
The MEWNET-W network comprises PLCs connected by twisted pair cable to enable data sharing and transfer between PLCs. The MEWNET-F network comprises I/O slave stations connected by two-wire cable which enables remote I/O control from the PLC.

The FP2 Series includes a 'Multi-wire link unit' which can function both as a MEWNET-W/MEWNET-W2 link unit and as a MEWNET-F master unit. This unit is designed to make the construction of FA networks easier than ever.



- **Ethernet**

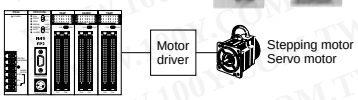
The ET-LAN unit connects the FP2 system to the bus system Industrial Ethernet. This enables access to all devices of the controller at a rate of max. 100Mbit per second.



Positioning control

Offering high-resolution positioning at low cost.

The FP2 Series positioning unit has a maximum pulse output of 4Mpps and starts at a high speed of 0.005msec - from reception of the positioning command from the CPU to generation of the pulse. This helps to achieve low-cost tact-time reduction and true positioning control. The FP2-PP4 positioning units can control 4 axes in one unit.

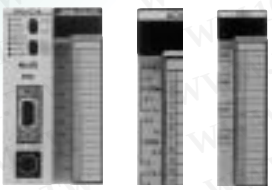


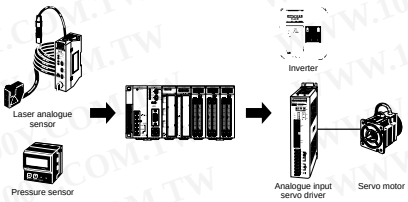
*Compatible with pulse input drives.

Analogue control

With range switching, the system can handle all types of analogue equipment. A thermocouple or resistance thermometer bulb can also be directly connected.

The FP2 Series includes analogue input and output units and a CPU unit equipped with an analogue I/O port comprising four range-swichable inputs and one output. The system is therefore able to handle all types of analogue control.



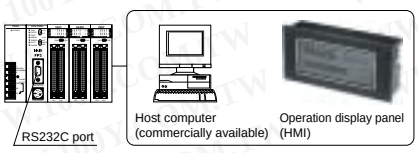


Communication functions

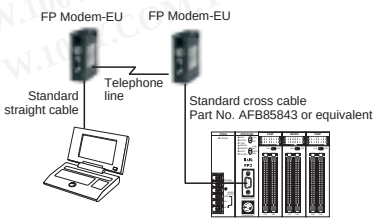
CPU unit features an RS232C port as standard.

All CPU units in the FP2 Series have an RS232C port as standard. This allows a direct link to be created with a personal computer or an operation display panel. If a modem is connected, the interface can also be used for data transmission to remote locations and program amendment and upgrading. If the C-NET unit is connected to the RS232C port, data can easily be exchanged between various PLCs.

• Hook up directly to an operation display panel or computer

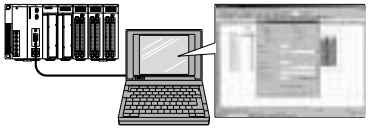


• Data transmission to PLC at remote location via modem



• PCWAY permits easy information collection

Data can be easily collected in the PLC using the "PCWAY" Excel add-in utility. In addition to direct connections with a computer and PLC, "PCWAY" can also abtain information from networked PLCs or via modem.



• PROFIBUS FMS/DP

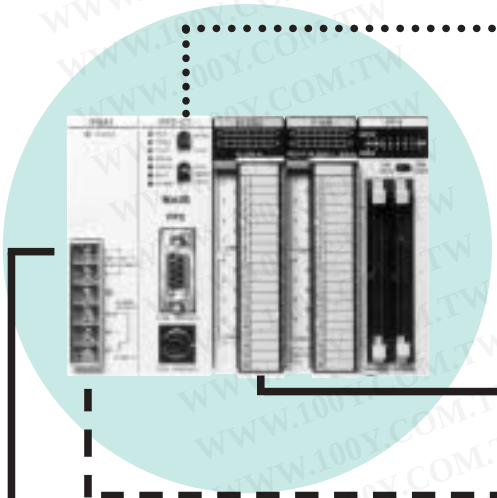
PROFIBUS FMS/DP master units enable open communication interfaces.

• S-LINK

S-LINK replaces the loom of cables by dealing with the signal at its source. Each I/O module is connected to a flat cable with four leads. The T structure of the network is especially suited for machines and assembly lines, but also for internal building systems, e.g. fire alarms, lighting. The FP2 CPU with integrated S-LINK interface has two terminal ports, the S-LINK communication module has one port. Up to 128 I/Os can be connected per network branch.

FP2 Series

System Configuration



FP2 CPU units

Standard type CPU unit
FP2-C1

CPU unit with 64-point input
FP2-C1D

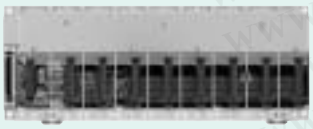
CPU unit with analogue I/O
FP2-C1A

CPU unit with S-LINK
FP2-C1SL

Backplanes

5-module type
(for CPU backplane not expandable)
FP2-BP05

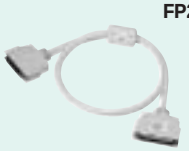
7-module type
(for CPU and expansion backplane)
FP2-BP07



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



Expansion cable 60cm
FP2-EC

Dummy unit
FP2-DM

Expansion memory unit and ROM

Comment input and calendar
FP2-EM1

Expansion RAM, comment input and calendar
FP2-EM2

ROM socket, expansion RAM, comment input and calendar
FP2-EM3

FROM
FP2-EM4

EPROM
FP2-EM5

ROM socket and expansion RAM
FP2-EM6

ROM socket
FP2-EM7

Only for FP2SH

FROM
AFP5208

EPROM
AFP5209

Power supply units

100VAC, 2.5A type
FP2-PSA1

200VAC, 2.5A type
FP2-PSA2

100-240VAC, 5A type
FP2-PSA3

24VDC, 5A type
FP2-PSD2

100-240VAC, 2.1A type
24VDC output
FP-PS24-050E

FP2 Series

System Configuration

FP2SH CPU units

FP2SH 60k
FP2-C2

with IC card interface!

FP2SH 60k
FP2-C2P

FP2SH 120k
FP2-C3P

I/O units

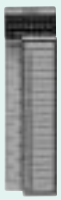
■ Input unit

16-point DC input
FP2-X16D2

32-point DC input
FP2-X32D2

64-point DC input
FP2-X64D2

■ Output unit



16-point transistor output (NPN)
FP2-Y16T

32-point transistor output (NPN)
FP2-Y32T

64-point transistor output (NPN)
FP2-Y64T

16-point transistor output (PNP)
FP2-Y16P

32-point transistor output (PNP)
FP2-Y32P

64-point transistor output (PNP)
FP2-Y64P

6-point relay output
FP2-Y6R

16-point relay output
FP2-Y16R

■ I/O mixed unit

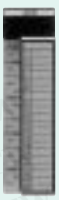
64-point 32 input/32 input (NPN)
FP2-XY64D2T

64-point 32 input/32 input (PNP)
FP2-XY64D2P

64-point 32 input/32 output (NPN) with ON pulse catch input
FP2-XY64D7T

64-point 32 input/32 output (PNP) with ON pulse catch input
FP2-XY64D7P

■ Analogue I/O



Analogue input unit
FP2-AD8

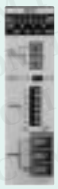
Analogue output unit
FP2-DA4

■ Communication and networking units

FMS/DP-Master PROFIBUS unit
FP2-FMS/DP-M

DP-Master PROFIBUS unit
FP2-DP-M

ET-LAN unit
FP2-ET1



Multi-wire link unit
FP2-MW

S-LINK unit
FP2-SL2

Serial data unit
FP2-SDU

Computer Communication unit
FP2-CCU

■ Positioning and counting units

Positioning unit transistor output (2-axis)
FP2-PP21

Positioning unit transistor output (4-axis)
FP2-PP41

Positioning unit line driver output (2-axis)
FP2-PP22

Positioning unit line driver output (4-axis)
FP2-PP42

Pulse I/O unit
FP2-PXYT

High Speed Counter unit
FP2-HSCT

FP2 Series

Unit Combination and Limitation

Unit combination

The FP2 uses a backplane designed for easy maintenance.
The backplane is selected to match the scope of control, and various units can be placed on it in a flexible configuration. Units can be added and removed individually, making it easy to accommodate changes and to carry out maintenance.

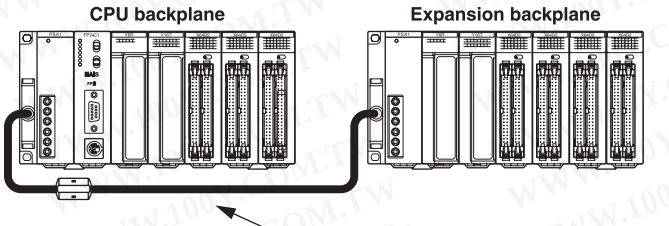
The building block scheme allows you to combine units as desired.

- Five types of backplanes are available for the FP2. A variety of input/output units can be installed as desired on the backplane.
- Although most of the I/O units and intelligent units can be combined freely in the layout, you should check the following three points when selecting your units:
  - Restrictions on unit types
  - Limitations on current consumption
  - Limitations on the number of modules of the backplane

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.

2-module units
2 modules type power supply units and 2 modules type CPU units are available as shown below:

Type	Order number
100-240VAC 5A type power supply unit	FP2-PSA3
24VAC 5A type power supply unit	FP2-PSD2
CPU unit with 64-point input	FP2-C1D
CPU unit with analogue I/O	FP2-C1A
CPU unit with S-LINK (master)	FP2-C1SL



Order number	Length
FP2-EC	60cm

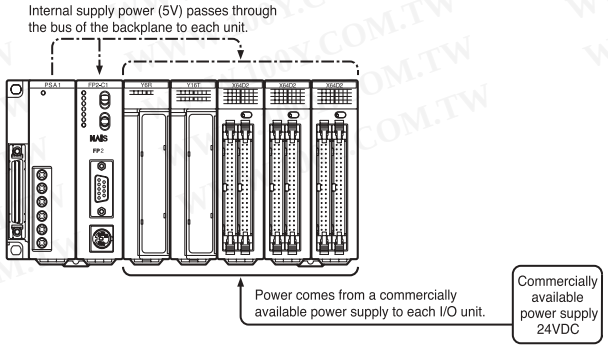
Expansion of Backplane

Expansion is simply connecting a new backplane with a special expansion cable.
All backplanes except for the 5-module type can be used for expansion.

Limitations on current consumption

- **Internal supply power (5VDC)**
  The 5VDC power used for driving the internal circuit of each unit is supplied from the power supply unit through the internal bus of the backplane.
- **External supply power (24VDC)**
  The 24VDC power supply used to supply the input of each unit and to drive the output units' output circuit is supplied by an external source. For the 24V power supply, use the NAiS FP Power Supply (FPPS24050E) or an other commercially available power supply.
- **Combining units and selecting a backplane**
  The current consumption by each unit is shown below. Consider the combination of units so as not to exceed the rated capacity of 5VDC and 24VDC power supplies.
- **Example of current consumption calculation**
  The table below shows the combination of typical units on a 9-module type backplane.

power supply unit	Rated current (at 5V)
FP2-PSA1	2.5A
FP2-PSA2	2.5A
FP2-PSA3	5A
FP2-PSD2	5A



Type	Number of units and backplane used	Current consumption at 5VDC (mA)	Current consumption at 24VDC (mA)
CPU unit (FP2-C1)	1	410	0
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

FP2 Series

Current Consumption

Table of current consumption at 5VDC/24VDC

5VDC is supplied by the FP2 power supply unit (FP2-PSA1, FP2-PSA2, FP2-PSA3 or FP2-PSD2).
24VDC is supplied by the separate FP power supply FP-PS24-050E.

Type			Order number	Current consumption at 5VDC (mA)	Current consumption at 24VDC (mA)
FP2 CPU unit (same with expansion memory unit installed)			FP2-C1	410 or less	—
			FP2-C1D	530 or less	
			FP2-C1A	1,100 or less	
			FP2-C1SL	630 or less	
FP2SH CPU units (same with expansion memory unit installed)			FP2-C2	750 or less	—
			FP2-C2P	750 or less	
			FP2-C3P	750 or less	
Backplane			FP2-BP05	5 or less	—
			FP2-BP07	60 or less	
			FP2-BP09	60 or less	
			FP2-BP12	60 or less	
			FP2-BP14	60 or less	
Input unit	DC input	16-point terminal type, 12 to 24VDC	FP2-X16D2	60 or less	8 or less/point
		32-point connector type, 24VDC	FP2-X32D2	80 or less	4.3 or less/point
		64-point connector type, 24VDC	FP2-X64D2	100 or less	4.3 or less/point
Output unit	Relay output	6-point terminal type	FP2-Y6R	50 or less	70 or less
		16-point terminal type	FP2-Y16R	120 or less	160 or less
	Transistor output	16-point terminal, NPN type	FP2-Y16T	100 or less	120 or less
		32-point connector, NPN type	FP2-Y32T	130 or less	120 or less
		64-point connector, NPN type	FP2-Y64T	210 or less	250 or less
		16-point terminal, PNP type	FP2-Y16P	80 or less	70 or less
		32-point connector, PNP type	FP2-Y32P	130 or less	130 or less
		64-point connector, PNP type	FP2-Y64P	210 or less	270 or less
I/O mixed unit	32-point 24VDC input/32-point connector, NPN output type		FP2-XY64D2T, FP2-XY64D7T	160 or less	Input: 4.3 or less/point Output: 120 or less
	32-point 24VDC input/32-point connector, PNP output type		FP2-XY64D2P, FP2-XY64D7P	160 or less	Input: 4.3 or less/point Output: 130 or less
Intelligent unit	Positioning unit	2-axis type, transistor output	FP2-PP21	200 or less	(*Note)
		2-axis type, line driver output	FP2-PP22	200 or less	
		4-axis type, transistor output	FP2-PP41	350 or less	
		4-axis type, line driver output	FP2-PP42	350 or less	
	Pulse I/O unit, NPN and PNP type		FP2-PXYT	500 or less	200mA
	High-speed counter unit, NPN and PNP type		FP2-HSCT	450 or less	200mA
	Analogue input unit		FP2-AD8	500 or less	—
	Analogue output unit		FP2-DA4	600 or less	—
	PROFIBUS unit (FMS/DP-Master)		FP2-FMS/DP-M	500 or less	—
	PROFIBUS unit (DP-Master)		FP2-DP-M	500 or less	—
	ET-LAN unit		FP2-ET1	670 or less	—
	Multi-wire link unit		FP2-MW	220 or less	—
	S-LINK unit		FP2-SL2	130 or less	—
	Computer communication unit		FP2-CCU	60 or less	—
	Serial data unit		FP2-SDU	60 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 does not include the load current of the output unit.
- Refer to the manual of the positioning unit you are using to confirm the current consumed at 24V unit.

FP2 Series

CPU Units

Standard type CPU unit **FP2-C1**

CPU unit with 64-point input **FP2-C1D**

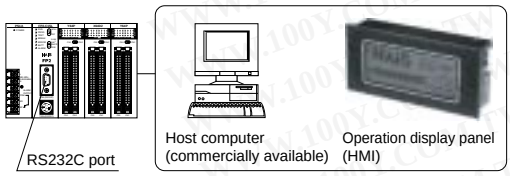
CPU unit with analogue I/O **FP2-C1A**

CPU unit with S-LINK **FP2-C1SL**

Features

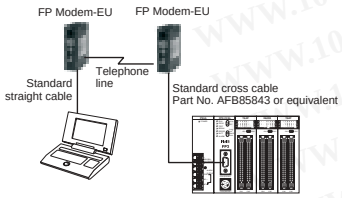
COM. port (RS232C) provided as standard equipment

• Hook up directly to an operation display panel or computer.



• Using the 'PCWAY' movement data storage software programme enables data to be incorporated easily into Excel, without requiring any programming.

• Remote monitoring using a modem connection.



Communication port supports communication at 115.2Kbps

Both the TOOL port (RS232C) and the COM port (RS232C) provided as a standard feature support communication at 115.2Kbps. This enables high-speed communication when transferring programmes and when connected to external devices.

Ample programme capacity

In addition to an ample programme capacity of 16k steps for normal use, expansion memory can be used to extend the programme capacity to 32k steps.

Full line-up of advanced CPU units enable CPUs to be selected based on the application.

Advanced packaging is available for individual applications, enabling a highly customized system architecture at a low price.

Main performance specifications

Item		Description
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 MEWNET-F or S-LINK), max. 5,000 process data and I/O points (using PROFIBUS)
Operation speed (typical value)	basic instructions	from 0.35μs per instruction
	high-level instructions	from 0.93μs per instruction
Internal memory		S-RAM
Programme capacity	internal memory	approx. 16k steps
	using expansion memory	approx. 32k steps
Operation memory	internal relays (R)	4,048 points
	timer/counter (T/C)	total 1,024 points
	data registers (DT)	6,000 words

RS232C port communication specifications

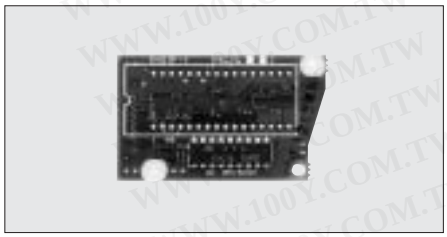
Item	Description	
	1:1 communication	1:N communication
Communication method	half duplex	half duplex
Synchronization method	start-stop synchronous system	
Communication path	RS232C cable	two-core cable (VCTF 0.75mm² x 2C)
Transmission distance	max. 15m	max. 1,200m
Transmission speed (Baud rate)	1,200bps/2,400bps/ 4,800bps/9,600bps/ 19,200bps/38,400bps/ 57,600bps/115.2Kbps	9,600bps/19,200bps
Transmission code	ASCII	
Transmission format	stop bit: 1 bit/2 bits parity check: none/even/odd character bits: 7 bits/8 bits	

Communication specifications when using modem function

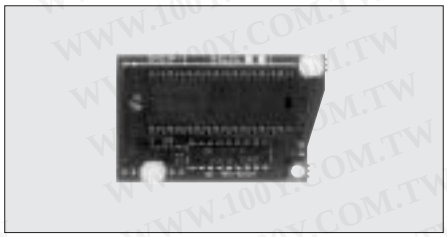
Item	Description	
	1:1 communication	1:N communication
Communication method	half duplex	
Synchronization method	start-stop synchronous system	
Transmission speed (Baud rate)	2,400bps/4,800bps/ 9,600bps/19,200bps	9,600bps/19,200bps
Transmission code	ASCII	
Transmission format	character bit: 7 bits, parity check: odd and stop bit: 1 bit / character bit: 8 bits, parity check: none and stop bit: 1 bit	

FP2 Series

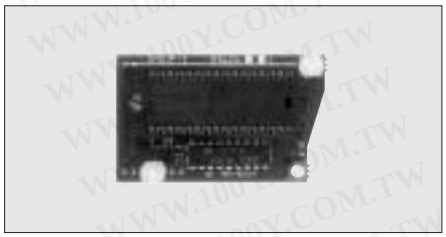
Optional Memory



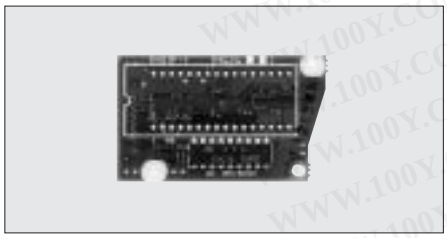
■ **Comment input and calendar type**
Order number: FP2-EM1



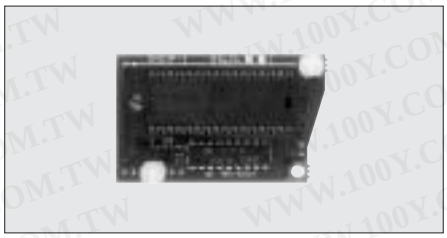
■ **ROM socket and expansion RAM type**
Order number: FP2-EM6



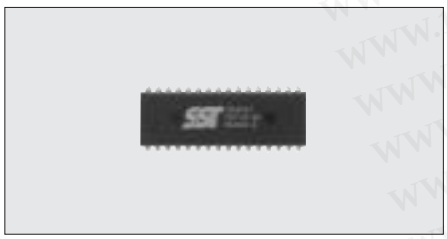
■ **ROM socket**
Order number: FP2-EM7



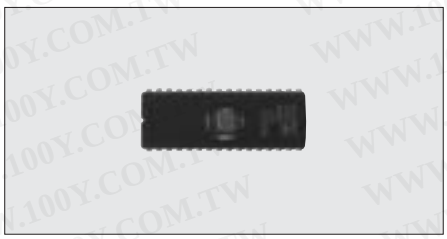
■ **Expansion RAM, comment input and calendar type**
Order number: FP2-EM2



■ **ROM socket, expansion RAM, comment input and calendar type**
Order number: FP2-EM3



■ **FROM**
Order number: FP2-EM4



■ **EPROM**
Order number: FP2-EM5

Type of expansion memory unit

Item	Order number					Description
	FP2-EM1	FP2-EM2	FP2-EM3	FP2-EM6	FP2-EM7	
Comment input function	Available	Available	Available	Not available	Not available	Writes the I/O comments, annotations, and inline comments in the programme to the FP2 CPU unit.
Calendar function	Available	Available	Available	Not available	Not available	Allows operations using the calendar function.
Expansion RAM	Not available	Available	Available	Available	Not available	Increases the programme memory from approx. 16k to approx. 32k. Also enables use of the trace function.
ROM socket	Not available	Not available	Available	Available	Available	Enables the programme to be copied to ROM for ROM operation.

Type of ROM

Type	Order number	Description
FROM	FP2-EM4	Equivalent to the 29EE010-120-4C-PH. (SILICON STORAGE TECHNOLOGY INC.) Enables writing with the operation of the programming tools when attached to the CPU unit.
EPROM	FP2-EM5	Equivalent to the M27C1001-12F1 (SGS-THOMSON MICROELECTRONICS). A ROM writer (commercially available) is required for writing.

FP2 Series

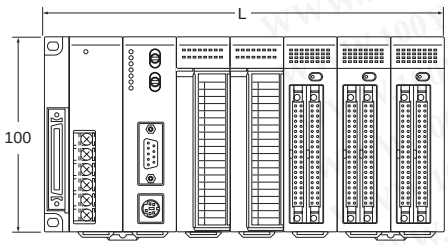
Specifications

General specifications

Item	Description
Ambient temperature	0 to 55°C
Storage temperature	–20 to +70°C
Ambient humidity	30 to 85% RH (non-condensing)
Storage humidity	30 to 85% RH (non-condensing)
Breakdown voltage	1,500VAC, 1 minute between AC external terminal and frame ground
	500VAC,1 minute between DC external terminal and frame ground
Insulation resistance	100MΩ or more (measured with a 500VDC megger testing) between external terminal and frame ground
Vibration resistance	10 to 55Hz, 1 cycle/min: double amplitude of 0.75mm, 10min. on 3 axes
Shock resistance	98m/s² or more, 4 times on 3 axes
Noise immunity	1,500Vp-p with pulse widths 50ns and 1µs (based on in-house measurements)
Operating conditions	Free from corrosive gases and excessive dust

Dimensions

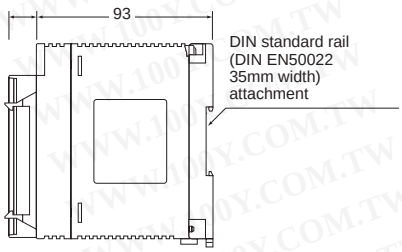
5, 7, 9, 12 and 14-module type



Number of modules	L: width
5	140
7	209
9	265
12	349
14	405

Common type

(mm)



Approvals and certifications

1.) For Europe - CE

EMC Directive (89/336/EEC)
(73/23/EEC)
EN 50081-2: 1993
EN 50082-2: 1995

Low Voltage Directive
VDE 0160: 1988 (EN 50178: 1995)
(Overvoltage Category II,
non-mains-circuit, pollution degree 2)
EN 61131-2: 1995)

2.) For America – UL, CSA, cUL (File E96300)

FP2 Series

Specifications

Performance specifications

Item		FP2 CPU unit: FP2-C1, FP2-C1D, FP2-C1A, FP2-C1SL
Programme 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 MEWNET-F or S-LINK), max. 5,000 process data and I/O points (using PROFIBUS)
Programme memory	internal memory	RAM
	optional memory	EPROM/FROM
Programme capacity (*Note 2)	internal memory	approx. 16k steps
	using expansion memory	approx. 32k steps (*Note 8)
Number of instructions	basic instructions	96 types
	high-level instructions	428 types
Operation speed (typical value)	basic instructions	from 0.35μs per instruction
	high-level instructions	from 0.93μs per instruction
Operation memory points for relays	internal relays (R)	4,048 points (*Note 1)
	timer/counter (T/C)	total 1,024 points (*Note 1) - timer: Units of 1ms, 10ms, 100ms and 1s counts up to 32,767 x each unit. - counter: 1 to 32,767 counts
	link relays (L)	2,048 points (*Notes 1 and 3)
	pulse relays (P)	1,024 points (*Note 1)
	alarm relays (E)	Not available
Operation memory points for memory areas	data registers (DT)	6,000 words (*Note 1)
	file registers (FL)	0 to 14,333 words (when expanding: 0 to 30,717 words) (*Note 1)
	link data registers (LD)	256 words (*Notes 1 and 4)
	timer/counter set value area (SV)	1,024 words
	timer/counter elapsed value area (EV)	1,024 words
	index registers (I0 to ID)	14 words
Differential points		unlimited number of points
Auxiliary timer		unlimited number of points, down type timer (0.01 to 327.67s)
Shift register		max. 253 points
Master control relay points (MCR)		256 points
Number of labels (JP and LOOP)		total: 256 points
Number of step ladder		1,000 steps (*Note 1)
Number of subroutine		100 subroutines
Number of interrupt programme		1 programme (periodical interrupt: allows setting of the time interval within the range from 0.5ms to 1.5s)
Comment input function		available (*Note 6)
Sampling trace function		max. 4,000 words (1,000 samples) for 16 contacts and 3 words/sample (*Note 8)
Clock/calendar function		year, month, day, hour, minute, second and day of week (*Notes 5 and 6)
Link functions		PC link, computer link, remote programming, PROFIBUS (EN50170), MODEM and data transfer
Self-diagnostic functions		watchdog timer, memory malfunction detection, I/O malfunction detection, backup battery malfunction detection, programme syntax check, etc.
Other functions		ROM operation function (*Note 7), programme block edition during RUN mode, forced input/output, interrupt processing, test run, constant scan and machine language programme
Memory backup time (lithium battery storage time)	CPU unit only	min. 10,000 hours (typical: approx. 13,000 hours)
	when installed expansion memory unit: FP2-EM1	min. 9,000 hours (typical: approx. 12,000 hours)
	when installed expansion memory unit: FP2-EM2, FP2-EM3	min. 8,000 hours (typical: approx. 12,000 hours)
	when installed expansion memory unit: FP2-EM6	min. 8,500 hours (typical: approx. 12,500 hours)
	when installed expansion memory unit: FP2-EM7	min. 10,000 hours (typical: approx. 13,000 hours)

Notes:
(*1): Hold or non-hold type can be set using the system registers.
(*2): The programme capacity can be changed using the system registers
(*3): Can also be used as internal relays.
(*4): Can also be used as data registers.
(*5): Precision of calendar timer:
At 0°C, less than 90-second error per month.
At 25°C, less than 40-second error per month.
At 55°C, 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.

FP2SH Series

CPU Units

Unit types

Standard type
CPU unit
FP2-C2

CPU unit, 60k
with IC card interface
FP2-C2P

CPU unit, 120k
with IC card interface
FP2-C3P

The high-spec CPUs in the FP2 Series!

Features

- **High operation speed**
  Boosting a processing speed of 0.03μs per basic instruction steps of the sequencing programme, the system can execute a programme of approx. 20k steps in a scan time of 1ms.

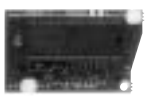
- **High programme capacity**
  At 60k or 120k, depending on model, programme capacity rivals that of large machines.

- The CPU unit features an RS232C port as standard.

- 2 types of CPU units which enable the use of IC cards as an option are also available.

IC memory
card
2MB SRAM

IC memory
card
2MB F-ROM



ROM socket
FP2-EM7

FROM
AFP5208

EPROM
AFP5209

FP2SH Series

Specifications

FP2SH performance specifications

Item		FP2SH CPU unit: FP2-C2, FP2-C2P, FP2-C3P
Programme 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. 8,192 points (using MEWNET-F or S-LINK)
Programme memory	internal memory	RAM
	optional memory	EPROM/FROM
Programme capacity (*Note 2)	internal memory	FP2-C2/FP2-C2P: approx. 60k steps, FP2-C3P: approx. 120k steps
	using expansion memory	-
Number of instructions	basic instructions	95 types
	high-level instructions	434 types
Operation speed (typical value)	basic instructions	from 0.03μs per instruction
	high-level instructions	from 0.06μs per instruction
Operation memory points for relays	internal relays (R)	14,192 points (*Note 1)
	timer/counter (T/C)	total 3,072 points (*Note 1) - timer: Units of 1ms, 10ms, 100ms and 1s counts up to 32,767 x each unit. - counter: 1 to 32,767 counts
	link relays (L)	10,240 points (*Notes 1 and 3)
	pulse relays (P)	2,048 points (*Note 1)
	alarm relays (E	2,048 points (*Note 1)
Operation memory points for memory areas	data registers (DT)	10,240 words (*Note 1)
	file registers (FL)	32,765 words x 3 banks
	link data registers (LD)	8,448 words (*Notes 1 and 4)
	timer/counter set value area (SV)	3,072 words
	timer/counter elapsed value area (EV)	3,072 words
	index registers (I0 to ID)	14 words x 16 banks
Differential points		unlimited number of points
Auxiliary timer		unlimited number of points, down type timer (0.01 to 327.67s)
Shift register		max. 887 points
Master control relay points (MCR)		256 points (For FP2-C3P: 1st program: 256 points / 2nd program: 256 points)
Number of labels (JP and LOOP)		256 points (For FP2-C3P: 1st program: 256 points / 2nd program: 256 points)
Number of step ladder		1,000 steps (For FP2-C3P: 1st program only)
Number of subroutine		100 subroutines
Number of interrupt programme		1 programme (periodical interrupt: allows setting of the time interval within the range from 0.5ms to 1.5s)
Comment input function		available (internal function)
Clock/calendar function		year, month, day, hour, minute, second and day of week (*Note 5)
Link functions		PC link, computer link, remote programming, PROFIBUS (EN50170), MODEM and data transfer
Self-diagnostic functions		watchdog timer, memory malfunction detection, I/O malfunction detection, backup battery malfunction detection, programme syntax check, etc.
Other functions		ROM operation function (*Note 6), forced input/output, interrupt processing, test run, constant scan and machine language programme
Memory backup time (lithium battery storage time)	CPU unit only	min. 3,500 hours (typical: approx. 31,000 hours)
	when installed expansion memory unit (FP2-EM7)	min. 3,500 hours (typical approx. 31,000 hours)

Notes:
(*1): Hold or non-hold type can be set using the system registers.
(*2): The programme capacity can be change using the system registers.
(*3): Can also be used as internal relays.
(*4): Can also be used as data registers.
(*5): Precision of calendar timer:
At 0°C, less than 57-second error per month.
At 25°C, less than 88-second error per month.
At 55°C, less than 88-second error per month.
(*6): For FP2-C2 the expansion memory unit (FP2-EM7) is required.

FP2 Series

I/O Units (Terminal type)

DC input unit

16-point DC input
FP2-X16D2

Transistor output unit

16-point transistor output (NPN)
FP2-Y16T

16-point transistor output (PNP)
FP2-Y16P

Overvoltage Category III

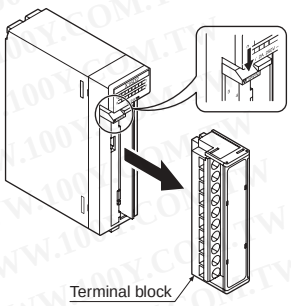
Relay output unit

6-point relay output
FP2-Y6R

16-point relay output
FP2-Y16R

Features

- **The LED display is easy to read.**
- **The terminal block can be installed and removed with a single touch.**
  The block can be installed and removed with the wiring connections intact, when connecting wiring or carrying out maintenance.



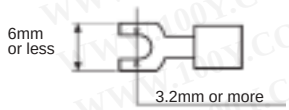
- **A special cover prevents screws from falling out.**
- **The 6-point relay output unit 'FP2-Y6R' conforms to 'Overvoltage Category III (VDE0110)'.**

- **Suitable wires**

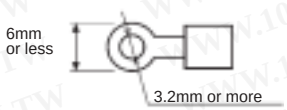
Size	Torque
AWG22 to AWG14 (0.3mm² to 2.0mm²)	0.5 to 0.6Nm

- **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

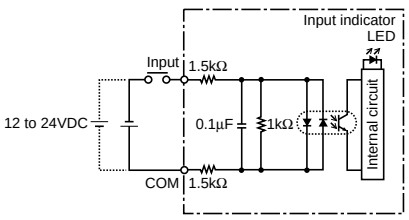


Round type terminal

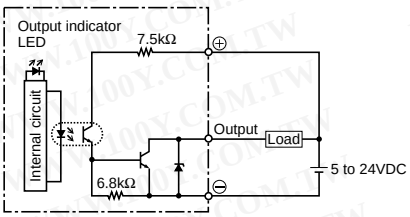


Internal circuit

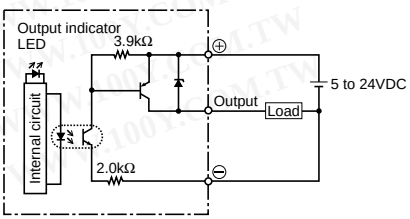
FP2-X16D2



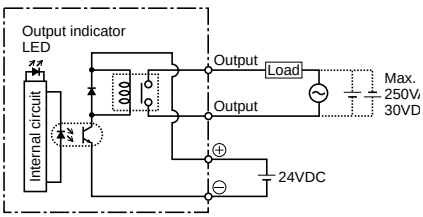
FP2-Y16T



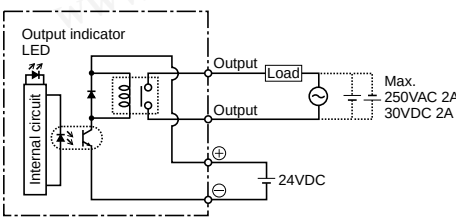
FP2-Y16P



FP2-Y6R



FP2-Y16R



FP2 Series

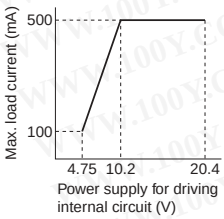
I/O Units (Terminal type)

Input specifications

Item		16-point DC input type FP2-X16D2
Insulation method		optical coupler
Rated input voltage		12 to 24VDC
Rated input current		approx. 8mA (at 24VDC)
Input impedance		approx. 3kΩ
Input voltage range		10.2 to 26.4VDC (max. input current: 10mA)
Min. ON voltage/Min. ON current		9.6V/4mA
Max. OFF voltage/Max. OFF current		2.5V/1mA
Response time	OFF => ON	0.2ms or less
	ON => OFF	0.2ms or less
Internal current consumption (at 5VDC)		60mA or less
Input points per common		8 points/common. 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 (M3 screw)
Weight		approx. 140g

Note:
(see output specifications):

The load current will vary depending on the power supply for driving the internal circuit. Adjust the load current referring to the following range.



Output specifications

Item		16-point Transistor output (NPN) type FP2-Y16T	16-point Transistor output (PNP) type FP2-Y16P
Insulation method		optical coupler	optical coupler
Rated load voltage		5 to 24VDC	5 to 24VDC
Load voltage range		4.75 to 26.4VDC	4.75 to 26.4VDC
Maximum load current (*Note)		0.5A (at 12 to 24VDC), 0.1A (at 5VDC)	0.5A (at 12 to 24VDC), 0.1 A (at 5VDC)
Maximum surge current		3A, 10ms or less	3A, 10ms or less
OFF state leakage current		1μA or less	1μA or less
ON state maximum voltage drop		0.5V or less	0.5V or less
Response time	OFF => ON	0.1ms or less	0.1ms or less
	ON => OFF	0.3ms or less	0.3ms or less
Internal current consumption (at 5VDC)		100mA or less	80mA or less
Power supply for driving internal circuit	Voltage	4.75 to 26.4VDC (*Note)	4.75 to 26.4VDC (*Note)
	Current	120mA or less (at 24VDC)	70mA or less (at 24VDC)
Surge absorber		zener diode	zener diode
Fuse ratings		none	none
Output points per common		8 points/common	8 points/common
Operating indicator		16-dot LED display (lit when ON)	16-dot LED display (lit when ON)
Connection method		terminal block (M3 screw)	terminal block (M3 screw)
Weight		approx. 150g	approx. 150g

Overvoltage Category III

Item		6-point Relay output type FP2-Y6R	16-point Relay output type FP2-Y16R
Insulation method		optical coupler	optical coupler
Rated control capacity		5A 250VAC (10A/common), 5A 30VDC (10A/common) (*Note) min. load: 100mA, 10V (resistor load)	2A 250VAC (5A/common), 2A 30VDC (5A/common) min. load: 100μA, 100mV (resistor load)
Response time	OFF => ON	10ms or less	10ms or less
	ON => OFF	8ms or less	8ms 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
Internal current consumption (at 5VDC)		50mA or less	120mA or less
Power supply for driving internal circuit	Voltage	24VDC ± 10% (21.6 to 26.4VDC)	24VDC ± 10% (21.6 to 26.4VDC)
	Current	70mA or less	160mA or less
Surge absorber		none	none
Relay socket		without relay socket	without relay socket
Output points per common		8 points/common	8 points/common
Operating indicator		6-dot LED display (lit when ON)	16-dot LED display (lit when ON)
Connection method		terminal block (M3 screw)	terminal block (M3 screw)
Weight		approx. 170g	approx. 190g

Note:
For each common 1 pin, use at a current capacity of 5A or less.

FP2 Series

I/O Units (Connector Type)

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

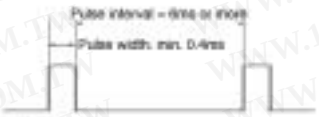
32-point input / 32-point output (NPN) FP2-XY64D2T (PNP) FP2-XY64D2P

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 36 to 37.
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.

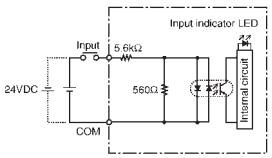


Readable pulse signals:
- Minimum pulse width: 0.4 ms
- Pulse interval: 6 ms or more

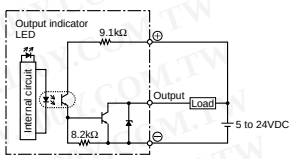
Two units with 32 point input/32 point output with ON pulse catch input function are available:
NPN type: FP2-XY64D7T
PNP type: FP2-XY64D7P

Internal circuit

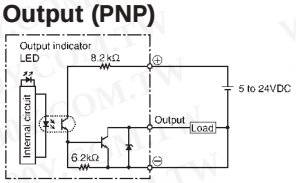
Input (+ and - switching)



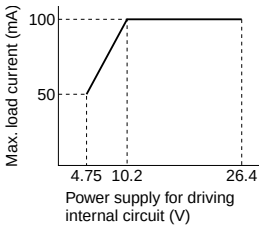
Output (NPN)

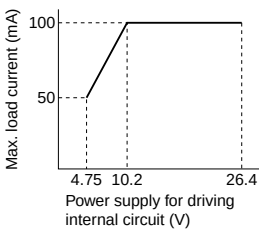


Output (PNP)

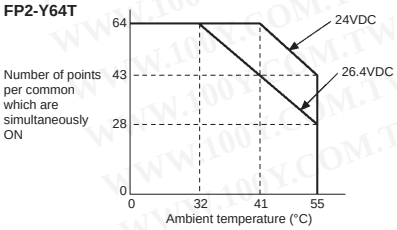


The load current will vary depending on the power supply for driving the internal circuit and the ambient temperature. Adjust the load current referring to the following range.

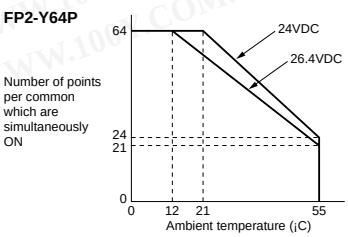




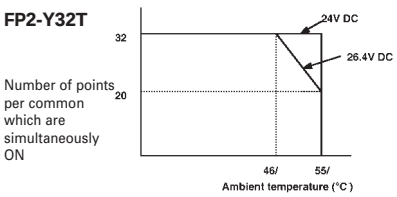
FP2-Y64T



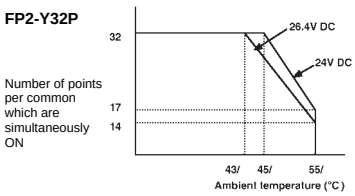
FP2-Y64P



FP2-Y32T



FP2-Y32P



FP2 Series

I/O Units (Connector Type)

Input specifications

Item		DC input type 32-point FP2-X32D2	DC input type 64-point FP2-X64D2	CPU unit with 64-point input FP2-C1D
Insulation method		Optical coupler		
Rated input voltage		24VDC		
Rated input current		Approx. 4.3mA (at 24VDC)		
Input impedance		Approx. 5.6kΩ		
Input voltage range		20.4 to 26.4VDC		
Min. ON voltage / Min. ON current		19.2V / 4mA		
Max. OFF voltage / Max. OFF current		5.0V / 1.5mA		
Response time	OFF → ON	0.2ms or less		
	ON → OFF	0.3ms or less		
Internal current consumption (at 5VDC)		80 mA or less	100mA or less	530mA or less
Input points per 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)
Connection method		One 40-pin connector	Two 40-pin connectors	Two 40-pin connectors
Weight		100g	120g	220g

Output specifications

Item		32-point transistor output type		64-point transistor output type	
		NPN open collector FP2-Y32T	PNP open collector FP2-Y32P	NPN open collector FP2-Y64T	PNP open collector FP2-Y64P
Insulation method		Optical coupler			
Rated load voltage		5 to 24VDC			
Load voltage range		4.75 to 26.5VDC			
Max. load current (*Note)		0.1A (at 12 to 24VDC) 50mA (at 5VDC)			
Maximum surge current		0.3A			
OFF state leakage current		1μA or less			
ON state maximum voltage drop		1V or less (at 6 to 26.4VDC) 0.5V or less (at 6V or less)	1.5V or less (at 6 to 26.4VDC) 0.5V or less (at 6V or less)	1V or less (at 6 to 26.4VDC) 0.5V or less (at 6V or less)	1.5V or less (at 6 to 26.4VDC) 0.5V or less (at 6V or less)
Response time	OFF → ON	0.1ms or less			
	ON → OFF	0.3ms or less			
Internal current consumption (at 5VDC)		130mA or less		210mA or less	
Power supply for driving internal circuit	Voltage	4.75 to 26.4VDC			
	Current	120mA or less (at 24VDC)	130mA or less (at 24VDC)	250mA or less (at 24VDC)	270mA or less (at 24VDC)
Surge absorber		Zener diode			
Fuse ratings		none			
Output points per common		32 points/common			
Operating indicator		32-dot LED display (Lights when ON)		32-dot LED display (Lights or switches when ON)	
Connection method		One 40-pin connector		Two 40-pin connector	
Weight		100g		120g	

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 Series

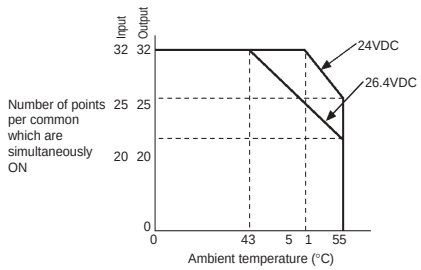
I/O Mixed Specifications

	Item		32-point DC input/32-point transistor output (NPN) type FP2-XY64D2T	32-point DC input/32-point transistor output (PNP) type FP2-XY64D2P	32-point DC input with ON pulse catch input/32-point transistor output (NPN) type FP2-XY64D7T	32-point DC input with ON pulse catch input/32-point transistor output (PNP) type FP2-XY64D7P
Input specifications	Insulation method		optical coupler		optical coupler	
	Rated input voltage		24VDC		24VDC	
	Rated input current		approx. 4.3mA (at 24VDC)		approx. 4.3mA (at 24VDC)	
	Input impedance		approx 5.6kΩ		approx 5.6kΩ	
	Input voltage range		20.4 to 26.4VDC		20.4 to 26.4VDC	
	Min. ON voltage/Min. ON current		19.2V/4mA		19.2V/4mA	
	Max. OFF voltage/Max. OFF current		5.0V/1.5mA		5.0V/1.5mA	
	Response time	OFF => ON	0.2ms or less		0.2ms or less (for X0 to X1F)	
		ON => OFF	0.3ms or less		0.3ms or less (for X0 to X1B), 1.0 to 5.0ms (for X1C to X1F)	
	Input points per common		32 points/common. Either the positive or negative of the input power supply can be connected to common terminal.			
Output specifications	Insulation method		optical coupler		optical coupler	
	Rated load voltage		5 to 24VDC		5 to 24VDC	
	Load voltage range		4.75 to 26.4VDC		4.75 to 26.4VDC	
	Maximum load current		0.1A (at 12 to 24VDC), 50mA (at 5VDC)		0.1 A (at 12 to 24VDC), 50mA (at 5VDC)	
	Maximum surge current		0.3A		0.3A	
	OFF state leakage current		1μA or less		1μA or less	
	ON state maximum voltage drop		1V or less (at 6 to 26.4VDC), 0.5V or less (at 6VDC or less)	1.5V or less (at 6 to 26.4VDC), 0.5V or less (at 6VDC or less)	1V or less (at 6 to 26.4VDC), 0.5V or less (at 6VDC or less)	1.5V or less (at 6 to 26.4VDC), 0.5V or less (at 6 VDC or less)
	Response time	OFF => ON	0.1ms or less		0.1ms or less	
		ON => OFF	0.3ms or less		0.3ms or less	
	Power supply for driving internal circuit	Voltage	4.75 to 26.4VDC		4.75 to 26.4VDC	
		Current	120mA or less (at 24VDC)	130mA or less (at 24VDC)	120mA or less (at 24VDC)	130mA or less (at 24VDC)
	Surge absorber		zener diode		zener diode	
	Fuse ratings		none		none	
	Output points per common		32 points/common		32 points/common	
Common specifications	Internal current consumption (at 5VDC)		150mA or less		150mA or less	
	Operating indicator		32-dot LED display (lit when ON, switching)		32-dot LED display (lit when ON, switching)	
	Connection method		two 40-pin connectors		two 40-pin connectors	
	Weight		approx. 120g		approx. 120g	

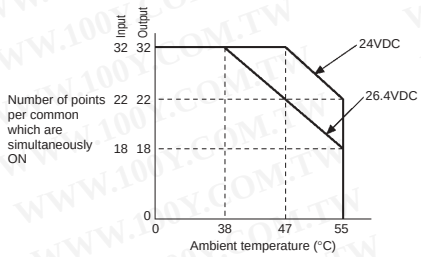
Notes:

- Keep the number of input and output points per common which are simultaneously ON within the following range as determined by the input voltage and ambient temperature.

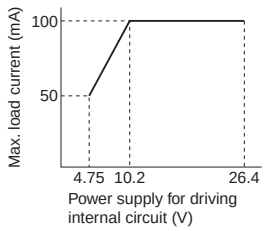
For FP2-XY64D2T and FP2-XY64D7T



For FP2-XY64D2P and FP2-XY64D7P



- The load current will vary depending on the power supply for driving the internal circuit. Adjust the load current referring to the following range.



- With a periodical interrupt function (1ms), it is possible to read an ON pulse input signal with a minimum pulse width of 0.4ms. Refer to page 16 regarding the ON pulse catch input.

FP2 Series

Positioning Units

2-axis
trans. output
FP2-PP21

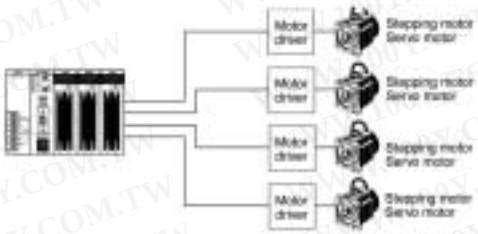
2-axis
line driver output
FP2-PP22

4-axis
trans. output
FP2-PP41

4-axis
line driver output
FP2-PP42

Configuration

Maximum control of 4 axes with one unit



*Compatible with pulse train input type drives.

Features

- Maximum 4Mpps command gives high-speed, high-precision positioning.
- 0.005ms high-speed drive reduces tact-time.
  (Start-up time is the time from reception of the CPU unit start-up command to release of the pulse output by the positioning unit.)
- 4 axes per unit means versatility and saves space.
- 'S (sigh-shaped)' acceleration/deceleration function yields smooth starting and stopping.
- Feedback pulse count function makes output pulse counting possible for encoders, etc.
- The pulse input function allows users to generate pulses manually and is used to adjust machines, for example.

Performance specifications

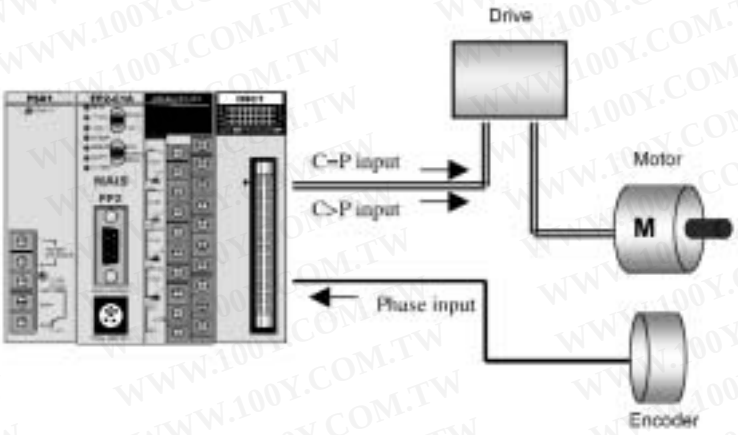
Order number		FP2-PP21	FP2-PP41	FP2-PP22	FP2-PP42
Output type		Transistor		Line driver	
Number of axes controlled		2 axes, independent	4 axes, independent	2 axes, independent	4 axes, independent
Position command	Command units	Pulse unit (The programme specifies whether Increment or Absolute is used.)			
	Max. pulse count	Signed 32 bits (-2,147,483,648 to -2,147,483,647 pulses)			
Speed command	Command range	1pps to 500kpps (can set in 1pps)		1pps to 4Mpps (can set in 1pps)	
Acceleration/ deceleration command	Acceleration/ deceleration	Linear acceleration/deceleration, S acceleration/deceleration (this takes the form of an 'S')			
	'S' Acceleration/ deceleration	can select from Sin curve, Secondary curve, Cycloid curve and Third curve			
	Acceleration/ deceleration time	0 to 32,767ms (can set in 1ms)			
Home return	Home return speed	Speed setting possible (changes return speed and search speed)			
	Input terminals	Home input, near home input, over limit input (+), Over limit input (-)			
	Output terminals	Deviation counter clear output signal			
Operation mode		E point control (Linear and S accelerations/decelerations selecting possible, P point control (Linear and S accelerations/decelerations selecting possible, Home return function (Home search) JOG operation function (*Note 1), JOG positioning function, Pulser input function (*Note 3), Transfer multiplication ratio (x1, x2, x5, x10, x50, x100, x500, x1000 selecting possible Real-time frequency change function, Infinity ouput function			
Startup time		0.02 ms or 0.005ms possible. (*Note 2)			
Output interface	Output mode	1 pulse output (pulse/sign), 2 pulse output (CW/CCW)			
Feedback counter	Countable range	Signed 32-bit (-2,147,483,648 to +2,147,483,647 pulse)			
	Input mode	2-phase input, direction distinction input, individual input (multiple transfer available for each)			
Other functions		The flag to compare the elapsed value is built in. (The timing signal outputs at the optional position during an operation.)			

Notes: *1 When linear acceleration/deceleration operation is selected, the target speed can be changed during operation.
*2 The startup time can be changed by the control code setting in the shared memory. The factory setting (default setting) is 0.02ms.
*3 Pulser input operation and feedback counter use the same pulse input terminal, so they cannot function simultaneously.
*4 To be supplied to the unit inside through the motherboard bus from the power supply unit.
*5 The power is supplied from the external to the unit connector.

FP2 Series

High-Speed Counter Unit

High-Speed Counter
FP2-HSCT (NPN type)
FP2-HSCP (PNP type)



The FP2 high-speed counter is an intelligent, four channel unit suited to a wide range of general and specific counting and measuring tasks.

Features

- **Space saving four-channel type**
- **High-speed counting up to 200kcps**
  Sensitivity of pulse can be selected according to the performance of the peripheral devices.
- **Phase input mode for motion control using encoders**
  The high-speed counter unit has a phase input mode capable of counting 2-phase pulses using a rotary encoder. Motor speed and servo motor positioning control can easily be performed. In addition to the phase mode, individual and direction modes can be selected.
- **Control output for motor control**
  The high-speed counter unit has a comparative output (C>P) and matching output (C=P). These functions can be used as speed acceleration / deceleration or stop signals when controlling a motor.
- **Realtime control possible by using interrupt programmes**
  Activates an interrupt programme when specified conditions are satisfied, and executes processing at high speed regardless of scanning time. 8 interrupt programmes are available with a single unit.

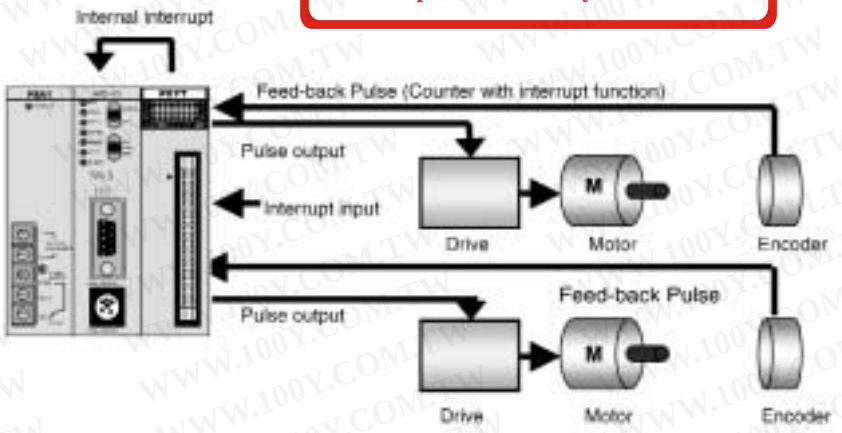
Performance specifications

Item		Description
Unit's current consumption		450mA or less
I/O occupation	Number of I/O points	32 inputs 32 outputs
Counter	Outside terminal	16 inputs 16 outputs
	Number of channel	4 CH
	Counting range	-2147483648 to +2147483647 (using 32bit including sign bit)
	Preset range	-2147483648 to +2147483647 (using 32bit including sign bit
	Maximum counting speed	200kHz
	Input mode	Phase input mode Individual input mode Orientation input mode
	Agreement output	Max. 8 points
	Special function	Multiple (1,2,4)
Interrupt input	Number of input points	8 points

FP2 Series

Pulse I/O Unit

Pulse I/O unit
FP2-PXYT (NPN type)
FP2-PXYP (PNP type)



Features

- **Space saving four-channel type**
- **High-speed counting up to 200kcps**
  Sensitivity of pulse can be selected according to the performance of the peripheral devices.
- **Phase input mode for motion control using encoders**
  The high-speed counter unit has a phase input mode capable of counting 2-phase pulses using a rotary encoder. Motor speed and servo motor positioning control can easily be performed. In addition to the phase mode, individual and direction modes can be selected.
- **Control output for motor control**
  The I/O unit has a comparative output (C>P) and matching output (C=P). These functions can be used as speed acceleration/deceleration or stop signals when controlling a motor.
- **Realtime control possible by using interrupt programmes**
  Activates an interrupt programme when specified conditions are satisfied, and executes processing at high speed regardless of scanning time. 8 interrupt programmes are available with a single unit.
- **The FP2 Pulse I/O unit can be used as a general input unit**
  The pulse output unit can also be used as a general input unit when it is not being used for another operation.
- **Easy positioning control**
  The internal counter and pulse oscillator function together with a pulse-string driver to facilitate positioning control of stepping and servo motors.

Performance specifications

Item		Description
Unit's current consumption		500mA or less
I/O occupation	Number of I/O points	32 inputs 32 outputs
	Outside terminal	16 inputs 16 outputs
Counter	Number of channel	4 CH
	Counting range	-2147483648 to +2147483647 (using 32bits, including sign bit)
	Preset range	-2147483648 to +2147483647 (using 32bits, including sign bit)
	Maximum counting speed	200kHz
	Input mode	Phase input mode Individual input mode Orientation input mode
	Agreement output	Max. 8 points
	Special function	Multiple (1,2,4)
Interrupt input	Number of input points	8 points
PWM output	Number of output points	4 points
	Output current	0.8A
	Duty	1-99%
	Frequency	1Hz to 30kHz
Pulse output	Number of output points	4 points
	Frequency	100kHz
	Output mode	Individual output mode Orientation output mode

- **PWM output function**
  The unit comes equipped with 4 channels for PWM output (Pulse Width Modulation output). The PWM frequency value is available from 1Hz to 30kHz.

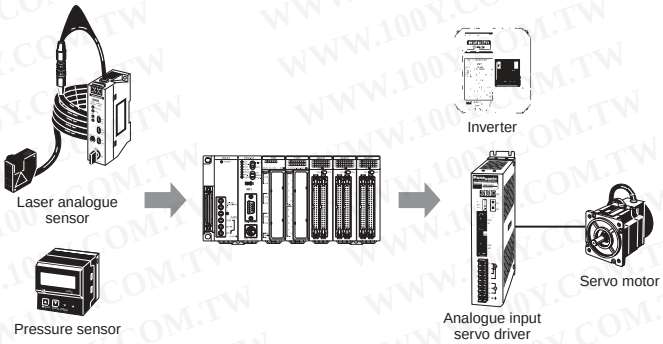
FP2 Series

Analogue I/O Units

Analogue input unit
FP2-AD8

Analogue output unit
FP2-DA4

CPU unit with analogue I/O
FP2-C1A



Features

Analogue control easily achieved.

Our line-up of analogue input/output units includes a CPU unit with analogue I/O, equipped with an analogue port containing four inputs and one output, for easy analogue control, as well as an analogue input unit that has an 8-point analogue port and an analogue output unit with a 4-point analogue output port. On all of these units, individual range settings can be specified for each channel, and analogue input can be directly coupled to a thermocouple and a resistance thermometer element (R.T.D.), for outstanding analogue control with the PLC.

- **Individual range settings supported for different channels**
  The range settings for each unit, such as voltage and current, can be specified either for all of the channels at once using DIP switches, or individually for separate channels, using shared memory settings.
- **16-bit input resolution**
  The CPU unit with analogue I/O and the analogue input unit feature 16-bit input resolution. A/D conversion of high resolution enables smooth analogue control with a high level of precision.
- **Direct thermocouple and resistance thermometer element (R.T.D.) connections**
  Both the CPU unit with analogue I/O and the analogue input unit support direct connection to S, J, K, T, and R thermocouples, as well as to Pt100 and Pt1000 resistance thermometer elements (R.T.D.).
- **PID operation instruction provided**
  With the FP2, the PID operation instruction can be executed using programs, as a time series processing instruction.
  Using this instruction in combination with the analogue input unit and analogue output unit enables easy process control, such as temperature control and pressure control, with the PLC.

Analogue input specifications

Item		FP2-AD8	FP2-C1A
Number of input points		8 channels	4 channels
Input range (resolution)	Voltage	±10V (1/65536)	
		1 to 5V (1/13107)	
		±100mV (1/65536)	
	Current	±20mA (1/32768)	
		4 to 20mA (1/13107)	
	Thermocouple	S: 0 to +1500°C (0.1°C)	
		J: –200 to +750°C (0.1°C)	
		K: –200 to +1000°C (0.1°C)	
		T: –200 to +350°C (0.1°C)	
		R: 0 to +1500°C (0.1°C)	
	R.T.D.	Pt100: –100 to +500°C (0.1°C)	
		Pt1000: –100 to +100°C (0.1°C)	
Conversion speed	Voltage input	500µs/channel (±100mV: 650µs/channel)	
	Current input		
	Thermocouple input	90ms/channel	
	R.T.D. input		
Overall accuracy		Max. ±1.0% F.S. (0 to 55°C) (*Note)	
Input impedance	Voltage input	Min. 1MΩ	
	Current input	250Ω	
	Thermocouple input	Min. 1MΩ	

FP2 Series

Analogue I/O Units

Analogue input specifications

Item		FP2-AD8	FP2-C1A
Absolute maximum input	±10V range	±15V	
	1 to 5V range		
	±100mV range	±150mA	
	±20mA range	±30mA	
	4 to 20mA range		
	Thermocouple S range	–50 to +1,700°C	
	Thermocouple J range	–210 to +1,200°C	
	Thermocouple K range	–270 to +1,370°C	
	Thermocouple T range	–270 to +400°C	
	Thermocouple R range	–50 to +1,760°C	
	Pt 100 range	–150 to +600°C	
	Pt 1000 range	–150 to +250°C	
Insulation method		• Between analogue input terminal and FP2 internal circuits: Optical coupler insulation • Between analogue input channels: No insulation	• Between analogue input terminal and FP2 internal circuits: Optical coupler insulation • Between analogue input channels: No insulation • Between analogue input terminal and analogue output terminal: DC/DC converter insulation
Digital output	Averaging	3 to 64 times/each channel	
	Offset setting	K–2,047 to K+2,047/each channel	
Broken wire sensing		Only thermocouple range or R.T.D. range/each channel	
Input range change method		All channels: By dip switch setting	
		Each channel: By shared memory setting	
Conversion channel setting		Each channel: By shared memory setting	
Permission resistance of input wire	R.T.D. input	Under 30Ω (each side)	
Input conversion data setup time (when power is turned on)		After FP2 system power has been turned on: • Voltage input range (all channels together): 430ms • Current input range (all channels together): 430ms • Thermocouple input range (all channels together): 1,330ms • Resistance thermometer device (R.T.D.) input range (all channels together): 6490ms	After FP2 system power has been turned on: • Voltage input range (all channels together): 460ms • Current input range (all channels together): 460ms • Thermocouple input range (all channels together): 910ms • Resistance thermometer device (R.T.D.) input range (all channels together): 3,350ms

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

Analogue output specifications

Item		FP2-DA4	FP2-C1A
Number of output points		4 channels	1 channel
Output range (digital input)	Voltage	±10V (K–2048 to K+2047)	
	Current	0 to 20mA (K0 to K4095)	
Resolution		1/4096	
Conversion speed		500µs/channel	
Overall accuracy		Max. ±1.0% F.S. (0 to 55°C)	
Output impedance		Voltage output: Max. 0.5Ω	
Maximum output current		5mA	10mA
Allowable output load resistance		Current output: Max. 300Ω	
Insulation method		• Between analogue output terminal and FP2 internal circuits: Optical coupler insulation • Between analogue output channels: No insulation	• Between analogue output terminal and FP2 internal circuits: Optical coupler insulation • Between analogue output terminal and analogue input terminal: DC/DC converter insulation
Analogue output (at PROG. mode)		Hold/Non-hold setting by shared memory setting	

FP2 Series

PROFIBUS Units

Features

PROFIBUS unit
(FMS/DP-Master)
FP2-FMS/DP-M

PROFIBUS unit
(DP-Master)
FP2-DP-M

- NAIS PROFIBUS - the vendor independent industrial network for FP2 programmable controllers - for use in manufacturing, process and building automation.
  NAiS PROFIBUS FMS for higher-level automation and
  NAiS PROFIBUS DP for the control of distributed field devices.
- FP2 programmable controllers support up to two PROFIBUS units.
- PROFIBUS FMS and DP communications can be used simultaneously.
- High-speed data transmission up to 12Mbaud.
- Modern, easy-to-use NAiS PROFIBUS configuration software tools for efficient design, parametrization and programming.
- NAiS PROFIBUS complies to EN 50 170 standard.

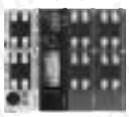
System configuration

- **NAiS PROFIBUS FMS**
- Fast and reliable general-purpose communication protocol – in particular for the transfer of large amounts of data.
- For powerful and flexible data exchange – ideal in extensive, higher-level multi-master networks.
- Industry proven NAiS Control FPWIN Pro function blocks save time with configuring and programming.
- Integral diagnostics simplify debugging and system maintenance.

- **NAiS PROFIBUS DP**
- For easy and cost-effective networking between FP2 programmable controllers and distributed devices, from simple I/Os (e.g. sensors, actuators, operating panels) to FP0 and FP∑ programmable controllers (decentralized intelligence).
- High-speed transmission of I/O signals – especially suited to time critical applications.
- Industry proven function blocks save time with configuring and programming.
- Integral diagnostics simplify debugging and system maintenance.

FP2 DP or FMS Master

FP0 DP Slave unit (Note*)



FP∑ (Sigma) DP Slave unit

FP0 DP Slave Remote I/O (Note*)

FP0 DP Slave Remote I/O

***) Note:**
The FP0DPS2 combines DP-Slave and DP-Slave Remote I/O in one unit. A DIP Switch allows the user to select between the two modes.

FP2 Series

PROFIBUS Specifications

General

	FP2-FMS/DP-M	FP2-DP-M
Available PROFIBUS protocols and functions	PROFIBUS FMS and DP (Master) (can be used at the same time)	PROFIBUS DP (Master)
Number of PROFIBUS unit per one CPU unit	Max. 2 units	

Transmission specifications

	FP2-FMS/DP-M		FP2-DP-M
Using PROFIBUS protocol	FMS	DP (Master)	DP (Master)
Communication method	Token passing	Polling method	Polling method
Transmission speed (Baud rate)	9.6kbps to 12Mbps		
Transmission distance	based on PROFIBUS standard EN 50 170, e.g. PROFIBUS copper cable: 1,200m (9.6kbps, no repeater), PROFIBUS copper cable: 4,800m (9.6kbps, 3 repeaters), PROFIBUS copper cable: 100m (12Mbps, no repeater), PROFIBUS copper cable: 400m (12Mbps, 3 repeaters), Optical fibre cable (plastic): 60m (1.5Mbps per segment), Optical fibre cable (glass): 2,850m (1.5Mbps per segment), Optical fibre cable (glass, special type): 15,000m (1.5Mbps per segment)		
Number of stations (nodes) / open connections	125 stations with 64 open connections	125 slave stations	125 slave stations
PROFIBUS interface	RS485 (SUB-D 9-pin socket)		
Communication path	PROFIBUS cable (according to EN 50 170)		

Performance specifications

		FP2-FMS/DP-M		FP2-DP-M
Using PROFIBUS protocol		FMS	DP (Master)	DP (Master)
Controllable PROFIBUS data types per one unit [1]		1,024 input objects 1,024 output objects	256 input process data 256 output process data	256 input process data 256 output process data
Used memory areas	Link registers	1,024 words 1,024 words	256 words 256 words	256 words 256 words
	Setting method	using NAiS FPWIN Pro and NAIS PROFIBUS Tool		
Movement status and control / error alert	Area of use	Special internal relays, special data registers		
	Read / Write method	using NAiS FPWIN Pro PROFIBUS function blocks		
Data transfer capacity		238 bytes		

Note:
1) default setting

FP2 Series

Multi-Wire Link Unit

Multi-wire link unit
FP2-MW

Features

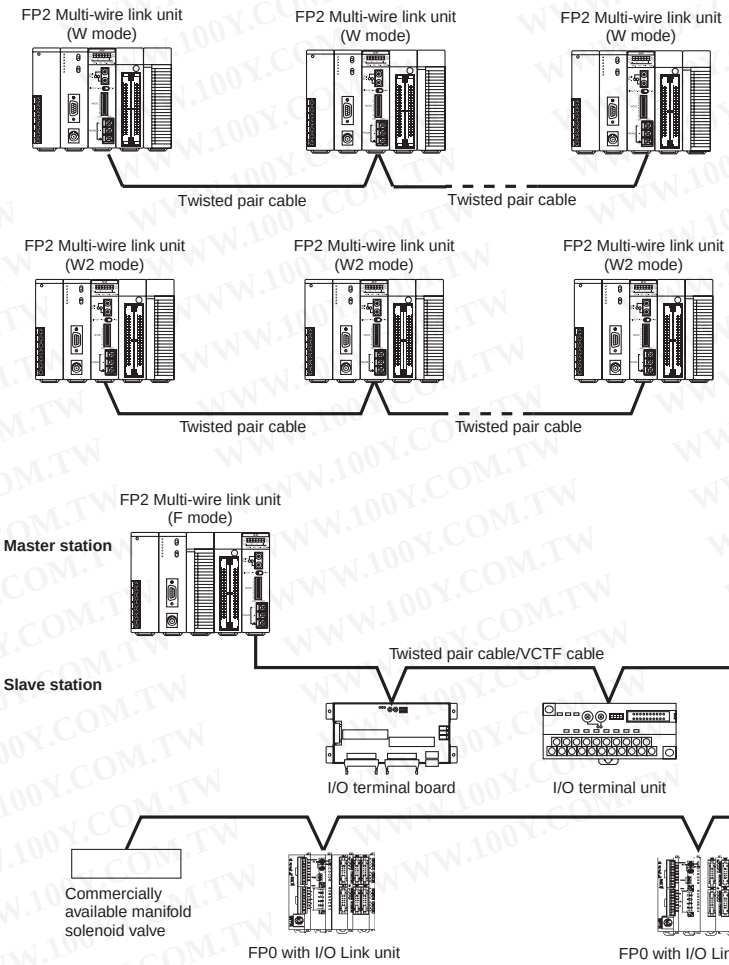
- 3 network modes (MEWNET-W, W2, F) can be selected in one unit.
- Economical link between compact-size PLCs with twisted-pair cable.
- Up to 2,048 I/O points (4,086 with FP2SH) can be controlled in MEWNET-F.
- High-capacity and long distance data transmission can be achieved through MEWNET-W2.

System configuration

• MEWNET-W mode
A system can be configured economically between programmable controllers, using twisted pair cables.
Link communication can be carried out between various programmable controllers, using link relays and link registers.
Communication is possible with conventional FP series devices capable of using the MEWNET-W.

• MEWNET-W2 mode
High-capacity of data can now be transmitted over long distances.
Link communication can be carried out between various FP2 units, using link relays and link registers.
Communication limited to only FP2 units is possible.
Using the MEWNET-W mode increases the capacity of data that can be handled.
Using the MEWNET-W mode extends the transmission distance (when set to 250kbps).

• MEWNET-F mode
Dual-core cables reduce the amount of wiring in the remote I/O system.
Remote I/O control is possible, using the FP2 as the master station.
Communication with conventional slave stations is possible, using the FP2 as the master station.



FP2 Series

Multi-Wire Link Unit

Transmission specifications

Item	W mode	W2 mode	F mode
Communication method	Token bus method		Polling method
Transmission method	Baseband transmission method		
Transmission speed (Baud rate)	500kbps	500kbps/250kbps	500kbps
Transmission distance	Total length: max. 800m	Total length: max. 1,200m (at 250kbps) 800m (at 500kbps)	Total length: max. 700m
Number of slave stations	Max. 32 stations		One master unit and max. 32 slave stations
Error check method	CRC (Cyclic Redundancy Check) method		
Synchronized method	Start-stop synchronous system		
Interface	Conforming to RS485		
Communication path	Twisted pair cable		Twisted pair cable, VCTF cable
RAS function	Hardware self-diagnostic function		

Performance specifications

W and W2 Modes

Item			Specification	
			W mode	W2 mode
Communication functions			PC link, Computer link, Data transfer, Remote programming, Hierarchical link	
Functions/ number of stations		PC link	Max. 16 stations	Max. 32 stations
		Other functions	Max. 32 stations	
PC link	Area of use	Link relays	Fixed at WL	Set by selecting among WL, WR, LD, DT and FL.
		Link registers	Fixed at LD	
	Setting method		Setting using system register	Setting using F145 (SEND)/P145 (PSEND) instruction.
	Capacity	Link relays	Max. 1,024 points	Max. 4,096 points
		Link registers	Max. 128 words	Max. 4,096 words
Movement status/ error alert	Area of use		Special internal relays, Special data registers	Special internal relays, Special data registers, Detailed information is output to WL, WR, LD, DT, or FL, depending on the setting.
	Setting method		—	Specified using F145 (SEND)/P145 (PSEND) instruction.
Data transfer capacity			Max. 16 words	Max. 1,020 words

F Mode

Item	Specification
Controllable points per one CPU unit	Max. 2,048 points
Controllable points per one unit	Max. 2,048 points
Controllable slots per one CPU unit	Max. 128 slots
Controllable slots per one unit	Max. 64 slots
Controllable master units per one CPU unit	Max. 4 units

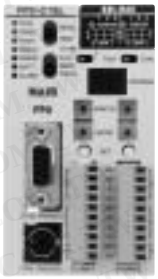
FP2 Series

S-LINK Units

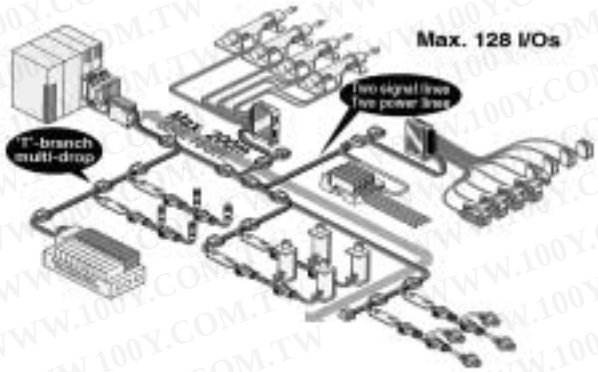
Overview

Matsushita S-LINK – the remote I/O network for significant time- and wire saving.

S-LINK unit
(1 Master interface)
FP2-SL2

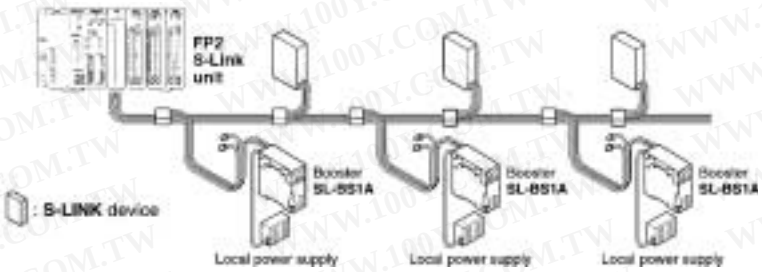


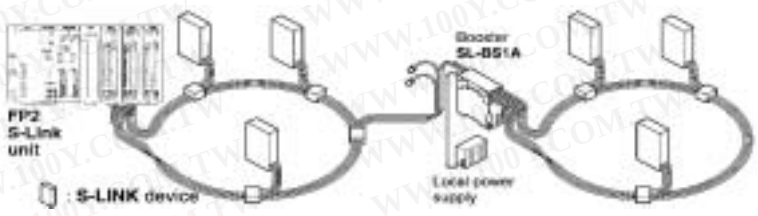
CPU unit with S-LINK
(2 Master interfaces)
FP2-C1SL

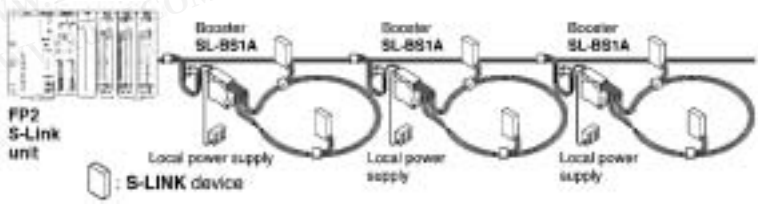


Features and configurations

- Different topologies can be arranged
  - busses with "T"-branches for line taps
  - redundant loops for additional safety
  - combinations of the two.
- A wide range of I/O modules allow manifold customer-oriented network layouts.
- S-LINK controls up to 2,048 remote I/Os per FP2 system.
- One cable for I/O signals and power supply – no separate power-lines are needed (4-core cable)
- S-LINK uses the standard I/O address areas, i.e. easy and time-saving configuring, programming and commissioning.
- Address setting by DIP switches on each remote I/O unit.
- Each S-LINK unit is equipped with a big LCD status display for quick service and maintenance in the field (readable from a distance). Powerful diagnostic functions reduce maintanance requirements additionally.
- A S-LINK handy monitor simplifies wiring, testing and commissioning.







FP2 Series

S-LINK Units / ET-LAN Unit

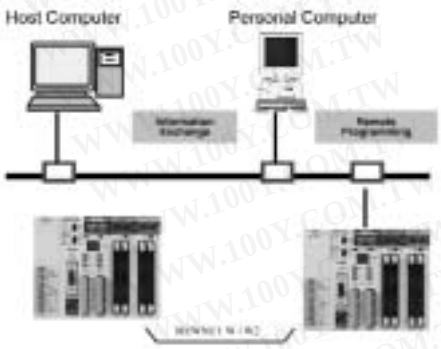
Specifications

Unit type	FP2-SL2 (S-Link unit)	FP2-C1SL (CPU)
Number of S-LINK interfaces	1	2
Input / output points	max. 128 E/A	Max. 2 x 128 E/A
	The number of I/O can be selected via the rotary switch (for each channel) Input: 0/32/64/128 per unit Output: 0/32/64/128 per unit (16 input and 16 output points are also possible) total: 2,048 I/O per FP2 system	
Rated voltage	+24VDC +/- 10% / allowable ripple max. +/- 10%	
Current consumption [1]	S-LINK Controller: 24VDC, max. 1.6A	
	I/O-module: 24VDC, max. 5A (fuse 5A)	
Transmission protocol	S-LINK protocol	
Transmission speed	28.5kbps	
Transmission distance [2]	128 I/O signals can be transmitted over a pair of wires up to a distance to 200m max. (400m when a booster is used)	
FAN-out [2]	320	
Connection method	'T'-branch multi-drop wiring or multi-drop wiring (+24V / 0V / D-G line [function provided to protect against short-circuiting between D-G line])	
Interface with FP2 CPU [3]	Common memory system Loading possible through F150 and P150; writing possible through F151 and P151	

Notes:
1) For detailed information on current consumption, refer to "Determining the Power Supply Capacitance" in the S-LINK design manual.
2) For information on the booster and FAN-out, refer to the S-LINK design manual.
3) The number of input and output points is automatically reflected in input X and output Y.

The connection unit between FP2 and the bus system Industrial Ethernet

Ethernet-LAN unit
FP2-ET1



Performance specifications

Item		Description
Unit's current consumption		670mA or less
Communication interface (only 1 port can be used at a time)		10 BASE5 10 BASE-T 100 BASE-TX
Communication protocol		TCP/UPD/IP
Functions	MEWTOCOL communication	Computer Link: Max. 2k bytes Data transfer: Max. 1,020 words
	Transparent communication	Max. 6k words
	Number of connections	Max. 8 connections
	Remote programming	Max. 3 connections
Installation limitation		FP2: Max. 3 units FP2SH: Max. 5 units

ET-LAN Unit Features

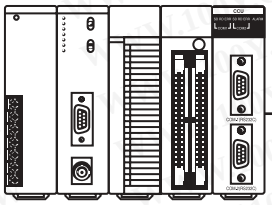
- The FP2 ET-LAN module enables data exchange between different types of PLCs with a vendor independent protocol and a short processing time.
- TCP/IP establishes logical point-to-point communication between two devices and provides the basics for exchanging information among all areas of production.
- You can connect 8 ethernet connections with each other at a transmission speed of up to 100Mbits/sec.
- Configuring the ET-LAN module is easy because no external programme is needed to initialize/configure parameters for the TCP/IP connection. Settings are entered in the PLC programme and transferred to the modules.
- The ET-LAN module can also be used as a gateway between several physical networks.
- Three communication interface types are supported:
  - 10BASE5 (Ethernet using Yellow cable)
  - 10BASE-T (Ethernet using twisted pair cable)
  - 100BASE-TX (Ethernet using twisted pair cable)
- Send and receive e-mail.

FP2 Series

Computer Communication Unit

Configuration

Computer Communication Unit
FP2-CCU



The host computer
(Commercial personal computer)

Operation display panel
(HMI)

Features

- **Connectable with operation display panel (HMI)**
- **Economical peer-to-peer communication with a personal computer is possible.**
  This unit can be directly connected with a personal computer via RS232C to collect and write data without building up a large-scale network.
- **No communication programme is needed on the PLC. (Computer link function)**
  The PLC automatically returns responses using the Matsushita FP Series' MEWTCOOL communication procedure so that there's no need to prepare a communication programme at the side of the PLC.
- **Data transmission from the PLC is also possible (Data transfer function).**
  Since requests by the PLC for sending and receiving data are possible, they communicate only when necessary, e.g. to send an alarm. This reduces the burden on the personal computer.
- **Connection with modem**
  It is possible to receive data over public telephone lines from another PLC by connecting a modem with your PLC (receiving only).

Performance specifications

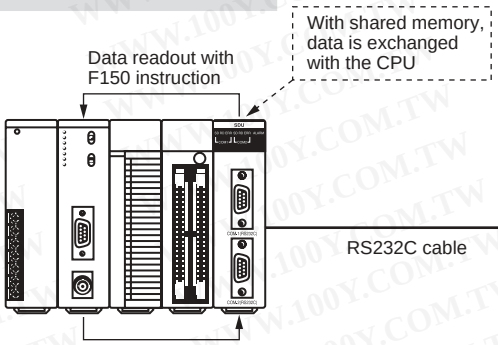
Item		Description
Interface		Two RS232C ports
Transmission speed (Baud rate)		19,200/9,600/4,800bps, selectable using dip switch
Communication method		Half duplex
Communications		Start-stop transmission
Transmission format		ASCII
Transmission data framing	Stop bit	1-bit
	Parity	Valid (odd)
	Character 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 format	Message	Header(%) to terminator (CR)
	Maximum message length	Max. 118 characters/frame (including "%" and "CR")
Data Transfer format	Message	Header(%) to terminator (CR)
	Maximum message length	Max. 240 characters/frame (including "%" and "CR")

FP2 Series

Serial Data Unit

Configuration

Serial Data Unit
FP2-SDU



Features

- **Data input/output is executed by sequence command**
  Reading can be performed simply by using applied command (F150), and writing by using applied command (F151). 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 programme.
- **Free combination of I/O devices**
  It is possible to use it in three ways: input only, output only, and input and output
- **500 bytes of data can be transmitted and received at a time**
- **No limitation on the number of units used**
  The number of serial data units used is limited to the number of free slots only.

Performance specifications

Item		Description
Interface		Two RS232C ports
Transmission speed (Baud rate)		19,200/9,600/4,800bps, selectable using dip switch (*Note)
Communication method		Half duplex
Communications		Start-stop transmission
Transmission format		ASCII
Transmission data framing	Stop bit	1-bit (*Note)
	Parity	Valid (odd) (*Note)
	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 terminal codes)
Interface with FP2 CPU unit		Shared memory method (data read out and write using F150/F151 instruction)
I/O allocation		X: 16 points/Y: 16 points

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

FP2 Series

Power Supply Units

100V 2.5A type
FP2-PSA1

200V 2.5A type
FP2-PSA2

100V-240V 5A type
FP2-PSA3

24VDC 5A type
FP2-PSD2

- 4 types available depending on the rated voltage and output capacity.
- High capacity type for supplying several modules and a 24VDC type for the UPS (un-interruptible power supply) are available.

DIN rail power supply

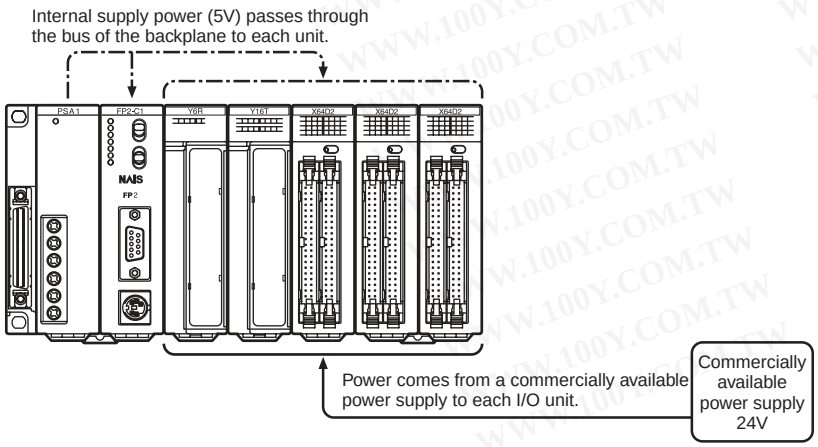
100-240VAC 2.1A type 24VDC output
FP-PS24-050E

Specifications

Order number		FP2-PSA1	FP2-PSA2	FP2-PSA3	FP2-PSD2
Input	Rated voltage	100 to 120VAC	200 to 240VAC	100 to 240VAC	24VDC
	Current consumption	0.4A or less (at 100VAC)	0.2A or less (at 200VAC)	0.7A or less (at 100VAC) 0.4A or less (at 200VAC)	2.5A or less
	Surge current	40A or less (at 55°C)		30A or less (at 25°C)	10A or less
	Rated frequency	50Hz/60Hz		–	
	Operating voltage range	85 to 132VAC	170 to 264VAC	85 to 264VAC	15.6 to 31.2VDC *)
Output	Output capacity at 5V	max. 2.5A		max. 5A	
Alarm contact capacity		30VDC 1A			
Alarm contact operation		When the ALARM LED of CPU unit is lit			
Alarm contact type		1c contact			
Leakage current		between input and ground terminals, 0.75mA or less			
Breakdown voltage		1500VAC for 1 minutes (between input and ground terminals)			500V for 1 minute
Insulation resistance		100MΩ 500VDC (between input and ground terminals)			
Guaranteed lifetime		20,000 hours at 55°C			
Overcurrent protection function		built-in overcurrent protection			

*) start up voltage range
20.4 to 31.2VDC needed

Limitations on current consumption



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

Combining units and selecting a backplane
The current consumed by each unit is shown on page 7. Give consideration to the combination of units so that the rated capacity of 5VDC and 24VDC power supplies should not be exceeded.

Internal and external supply power

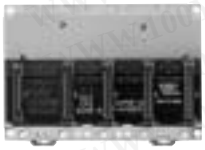
- **Internal supply power (5VDC)**
  The 5VDC power used for driving the internal circuit of each unit is supplied by the power supply unit via the internal bus of the backplane.

- **External supply power (24VDC)**
  The 24VDC power supply used to supply the input of each unit and to drive the output units' output circuit is supplied by an external source. For the 24V power supply, use the NAiS FP Power Supply (FPPS24050E) or another commercially available power supply source.

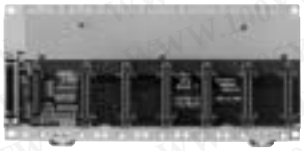
FP2 Series

Backplanes, Expansion Cable and Dummy Unit

Backplanes

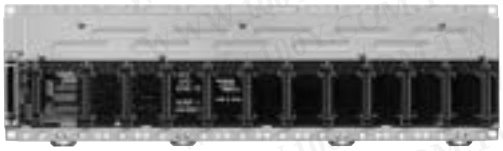


5-module type
(for CPU backplane not expandable)
FP2-BP05

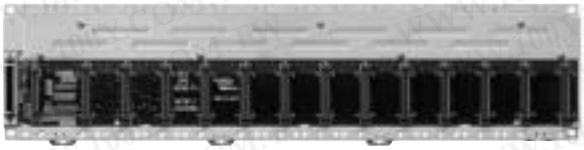


7-module type
(for CPU and expansion backplane)
FP2-BP07

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



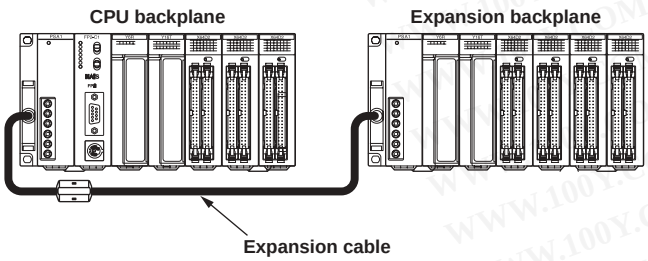
12-module type
(for CPU and expansion backplane)
FP2-BP12



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

Expansion of Backplane

Expansion is simply connecting a new backplane with a special expansion cable.
All backplanes except for the 5-module type can be used for expansion.



Notes:
- A 5-module type backplane cannot be expanded.
- A 5-module type backplane cannot be added on for expansion.
- Only one backplane can be added on for expansion.
- A power supply unit is also necessary on an expansion backplane.
- Do not install a CPU unit on an expansion backplane.
- There is no need to make the number of modules on the expansion backplane equal to the number of modules on the CPU backplane.

Expansion cable

FP2-EC
(60cm)
Cable connecting backplane on CPU side with backplane on expansion side

Dummy unit

FP2-DM

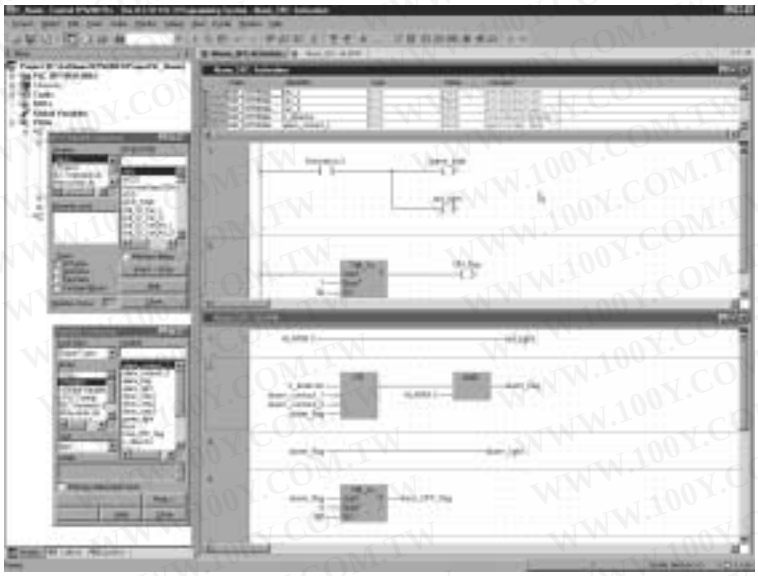
Cover unit for empty slots

Programming Software

Control FPWIN Pro

Familiar programming under Windows environment

NAiS Control FPWIN Pro is the Matsushita programming software according to the international standard IEC 61131-3 (for Windows 95/98/ME, NT/2000 or XP). NAiS Control FPWIN Pro works with the FP2 as well as any FP Series programmable controller. Also, since the tool port is an RS232C, connection to a PC is easy – it only requires a single cable. No converter or adapter is required.

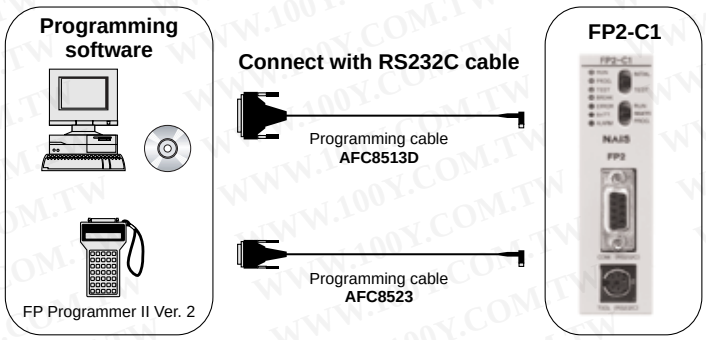


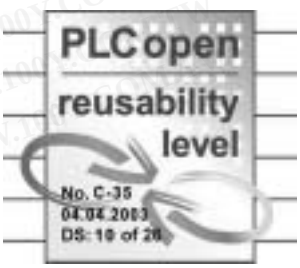
NAiS Control FPWIN Pro – *Programming*

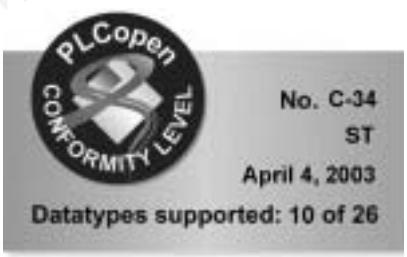
Features

The most important highlights at a glance:

- Reuse of ready made functions and function blocks saves time for programming and debugging
- 5 Programming Languages (Instruction List, Ladder Diagram, Function Block Diagram, Sequential Function Chart, Structured Text)
- 4 Standard Libraries (IEC-Standard Library, Matsushita Library, NC Tool Library, Pulsed Library)
- Well-structured through Programme Organisation Units, task- and project-management
- Fewer errors through defined data types and encapsulation
- Online Monitoring and Diagnostics
- Modem Communication for remote-programming, -service, and -diagnostics
- Password protection with different levels
- IEC 61131-3 protects your investments for the future
- One software tool for all FP Series PLCs







Programming Software

Control FPWIN GR

Features

FP Series programming software for Windows.

- To facilitate on-site operation, a mouse is not required for input, search, write, monitor and timer edit operations. Everything can be accomplished with a keyboard alone.
- Standard Windows operations, such as copy and paste, are included.

Usage environment

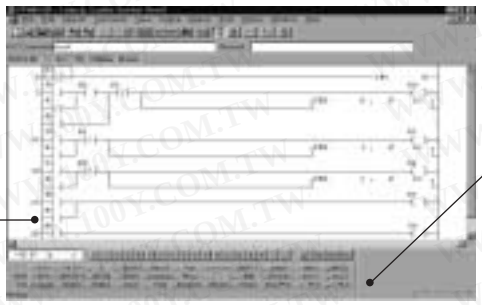
OS	Windows 95/98/ME/NT (Ver. 4.0 or later) /2000 and XP
Required hard disk capacity	At least 40MB
Recommended CPU	Pentium 100MHz or higher
Recommended installed memory	64MB or more
Recommended screen resolution	800 x 600 or higher
Recommended display colors	High Colour (16-bit or higher)

Applicable PLC types

***All products on the market as of June 2000 are supported**

All FP Series types are supported: FP0, FP-e, FPΣ (Sigma), FP1, FP2, FP2SH, FP3, FP10SH, FP-M

Menu



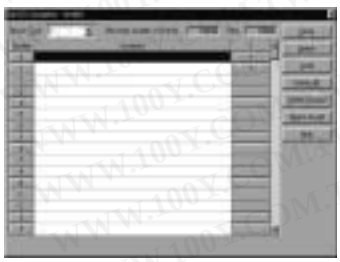
Tool bar
Access often-used functions using icons.

Function bar
Provides information regarding command input and confirmation, on-line/off-line selection and PLC mode selection.

Function instruction list

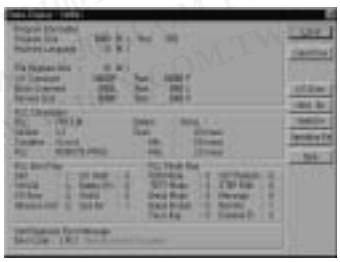
Classified by type, function commands can be selected from the displayed list. (Simple help included)

I/O comment edit function



Successive I/O comments can be input for each device type. Data from Excel and other applications can be copied and pasted via the clipboard.

Status display



Displays information concerning PLC usage environment and settings, and detailed information when an error occurs.

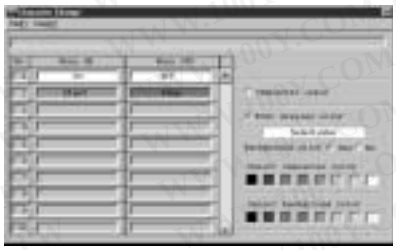
PCWAY

Operation data compilation software that is an add-on for Microsoft Excel.

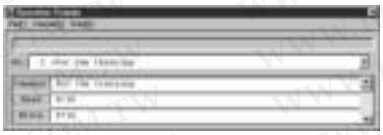
Features:

- Simple registration in cells
- Easy-to-use display (changes to text and colours can be easily displayed)
- Displayed data can be downloaded to a PLC .
- Log data can be automatically stored in text format.
- Processing timing can be freely specified (weekly timer can also be used).
- Modem communication supported (data can be compiled at remote location using telephone circuits).
- Information can be obtained by voice if a problem occurs.
- User-registered macros can be booted automatically, and operations such as voucher printing can be done automatically.

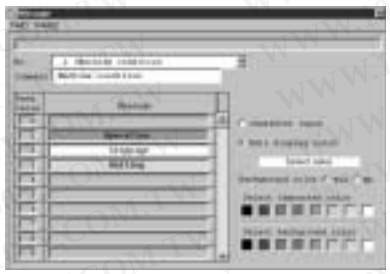
Cell setting window:
All you have to do is enter settings for the necessary items.



Registering changes to text:
Displayed text and colours can be changed by turning contact relays on or off.



Registering operation formulas:
Operations are executed when the register is displayed.



Registering file masters:
The formats of files for accumulation are registered.

Specifications:

OS	Windows 95/98/ME/NT (Ver. 4.0 or later) Windows 2000/XP
Software	Excel Ver. 7.0, Excel 97 (Ver. 8.0) Excel 2000, Excel Version 2002
Communication method	RS232C, MEWNET-P, MEWNET-H, modem supported (MEWNET-P and MEWNET-H are supported only when using Windows 95)
Applicable PLCs	FP Series PLCs

Note: For more details please see data sheet 'PCWAY'.

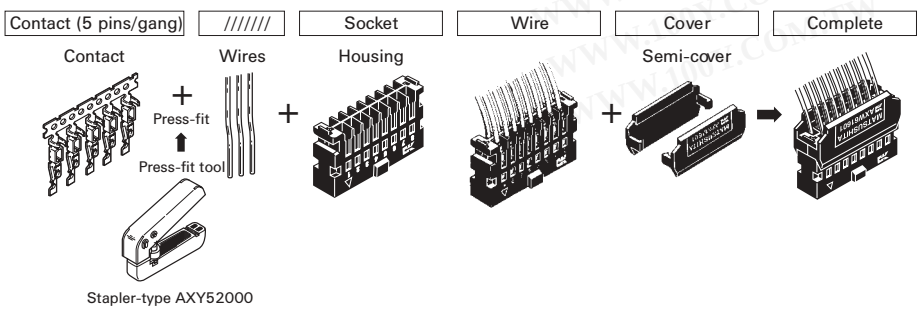
I/O cable for connector type (with a connector at one end)

I/O cable for connector type

- **Loose wiring cable, 40 leads with a connector at one end.**
  Easy connection to a controler using ready-made cables.

Cable with connector at one end	1m	AYT58403LW5C01
	3m	AYT58406LW5C01

Assembly of connector for wire-pressed terminal cable



Connector terminals, relay terminals, cables with connectors, connectors

Input/output units (connector types) can be wired in the four ways shown below. Select the type of wiring which is most applicable, based on the installation conditions. A loose-cable connector set is provided with the unit itself.

FP2 output unit (FP2-Y64T) example

Product name	Descriptions
Connector terminal  CT-2	• **Easy to connect to a controller.** Using purpose-specific cables, you can easily connect the relay terminal to a NAIS programmable controller. An M3 press-fit terminal can also be used for connection with an input/output device. • **Best suited for input signal cabling and transistor output cabling.**
Relay terminal  RT-2	• **Easy to connect to a controller.** Using purpose-specific cables, you can easily connect the relay terminal to a NAIS programmable controller. An M3 press-fit terminal can also be used for connection with an output device. • **Ready to control very small loads up to 2 A.** The terminal has a NAIS PA relay with Au clad twin contact. This design is effective in controlling very small loads, too. • **Quick to change the relays.** Thanks to simple relay change design, the relay terminal is easy to maintain. A key specified to detach the relay comes with the terminal.
Cables with connector  Cable with loose press-fit terminals  Flat cable with connector	• **Best suited for cabling to relay terminal block.** One end of the cable has a connector for a PLC unit, and the other end a set of loose press-fit terminals. • **Flat cables with a connector at one end are also available.**
Connectors  Press-fit socket for wire-pressed terminal cable (with half cover in place)  Socket for flat cable, Type MIL	• **No need to peel off the sheath of wire-pressed terminal cable.** Using a specific tool, a sheathed cable can be press-fit to the connector without hassle. • **Pull-out pin for easy reconnection.** Suppose that you have wrongly connected the wire-pressed terminal cable. The accompanying pull-out pins are intended to disconnect the cable easily. • **Flat cable connectors for economical cabling.** The flat cables may be used for collective input/output cabling.

Item			Description			
Type of unit (*Note 1)			64-point type input unit (FP2-X64D2)	64-point type output unit (FP2-Y64T, FP2-Y64P)	I/O Mixed unit (FP2-XY64D2T, FP2-XY64D7T, FP2-XY64D2P, FP2-XY64D7P)	CPU with 64-point input (FP2-C1D)
Number of connector pins			40 pins			
CT-2 connector terminal	DIN rail mounting type		AYC1140			
	Direct mouting type		AYC2140			
	Connector terminal cable	1m	AYT51403			
		2m	AYT51405			
RT-2 relay terminal (*Note 2)	DIN rail mounting type		—	AY232502		—
	Direct mouting type		—	AY232522		—
	Connector terminal cable	1m	—	AY15633		—
		2m	—	AY15635		—
Cables with connector	Cable with loose press-fit terminals	1m	AYT58403			
		2m	AYT58405			
	Flat cable with a connector on one end	1m	AFB8541			
		2m	AFB8542			
	Connector only		AFP2802 (two 40-pin connectors)			
Connector for wire-pressed terminal cable	Housing		Supplied with the unit (two 40-pin connectors) Maintenance part order number: AFP2801			
	Contact (for AWG22 and AWG24)					
	Semi-cover					
	Pressure connector tool		AXY52000			

Notes:
(*1): Two connectors for wire-pressed terminal cable (40 pins) are supplied with the unit.
(*2): The RT-2 relay terminal cannot be used with PNP collector output type output units (FP2-Y32P, FP2-Y64P, FP2-XY64D2P and FP2-XY64D7P).

FP2 Series

Product Types

CPU unit

Product name	Description	Part number
FP2 CPU unit	Standard type CPU unit	FP2-C1
	CPU unit with 64-point input	FP2-C1D
	CPU unit with analogue I/O	FP2-C1A
	CPU unit with S-LINK interfaces	FP2-C1SL
FP2SH CPU unit	Standard type CPU unit, 60k steps	FP2-C2
	CPU unit, 60k steps, with IC card interface	FP2-C2P
	CPU unit, 120k steps, with IC card interface	FP2-C3P

Optional memory

Product name	Description	Part number
Expansion memory unit	Comment input and calendar	FP2-EM1
	Expansion RAM, comment input and calendar	FP2-EM2
	ROM socket, expansion RAM, comment input and calendar	FP2-EM3
	ROM socket and expansion RAM	FP2-EM6
	ROM socket	FP2-EM7
ROM	FROM	FP2-EM4
	EPROM	FP2-EM5
IC memory card	2MB SRAM type for FP2SH CPUs	AIC 52000
	2MB FROM type for FP2SH CPUs	AIC 50020

Backplane / expansion cable / dummy unit

Product name	Description	Part number
Backplane	5-module type (for master)	FP2-BP05
	7-module type (for master and expansion)	FP2-BP07
	9-module type (for master and expansion)	FP2-BP09
	12-module type (for master and expansion)	FP2-BP12
	14-module type (for master and expansion)	FP2-BP14
Expansion cable	60cm	FP2-EC
Dummy unit	Cover unit for empty modules	FP2-DM

Power supply unit

Product name	Description	Part number
Power supply unit	100VAC 2.5A type	FP2-PSA1
	200VAC 2.5A type	FP2-PSA2
	100 to 240VAC 5A type	FP2-PSA3
	24VDC 5A type	FP2-PSD2
DIN rail power supply	100 to 240VAC 2.1A type; 24VDC output	FP-PS24-050E

I/O unit

Product name	Type (Number of I/O point)	Style	Specification	Part number
Input unit	16-point DC input	Terminal type	12 to 24VDC, sink/source input	FP2-X16D2
	32-point DC input	Connector type	24VDC, sink/source input	FP2-X32D2
	64-point DC input	Connector type	24VDC, sink/source input	FP2-X64D2
Output unit	16-point, transistor output (NPN)	Terminal type	5 to 24VDC, 0.5A	FP2-Y16T
	32-point transistor output (NPN)	Connector type	5 to 24VDC, 0.1A	FP2-Y32T
	64-point, transistor output (NPN)	Connector type	5 to 24VDC, 0.1A	FP2-Y64T
	16-point, transistor output (PNP)	Terminal type	5 to 24VDC, 0.5A	FP2-Y16P
	32-point transistor output (PNP)	Connector type	5 to 24VDC, 0.1A	FP2-Y32P
	64-point, transistor output (PNP)	Connector type	5 to 24VDC, 0.1A	FP2-Y64P
	6-point, relay output	Terminal type	5A 250VAC, 5A 30VDC without relay socket	FP2-Y6R
	16-point, relay output	Terminal type	2A 250VAC, 2A 30VDC without relay socket	FP2-Y16R
I/O mixed unit	32 input points/32 output points (NPN)	Connector type	Input: 24VDC, Output: 0.1A (at 12 to 24VDC)	FP2-XY64D2T
	32 input points/32 output points (PNP)	Connector type	Input: 24VDC, Output: 0.1A (at 12 to 24VDC)	FP2-XY64D2P
	32 input points/32 output points (NPN) with ON pulse catch input	Connector type	Input: 24VDC, Output: 0.1A (at 12 to 24VDC)	FP2-XY64D7T
	32 input points/32 output points (PNP) with ON pulse catch input	Connector type	Input: 24VDC, Output: 0.1A (at 12 to 24VDC)	FP2-XY64D7P

FP2 Series

Product Types

Intelligent unit

Product name	Description	Part number
FP2 Positioning unit	2-axis type, transistor output	FP2-PP21
	2-axis type, line driver output	FP2-PP22
	4-axis type, transistor output	FP2-PP41
	4-axis type, line driver output	FP2-PP42
FP2 High Speed Counter (NPN)	Counter: 4 channels max. speed 200kHz, counting range 32bit; 8 interrupt inputs	FP2-HSCT
FP2 High Speed Counter (PNP)		FP2-HSCP
FP2 Pulse I/O unit (NPN)	Counter: 4 channels, max. speed 200kHz, counting range 32bit; 8 interrupt inputs; PWM output, 1Hz to 30Hz; 4 pulse outputs, max. 100kHz	FP2-PXYT
FP2 Pulse I/O unit (PNP)		FP2-PXYP
FP2 Analogue input unit	8 channels, Input range ±10V (1/65536), ±20mA (1/32768), Conversion speed: 500µs/channel	FP2-AD8
FP2 Analogue output unit	4 channels, Output range: ±10V (K-2048 to K+2047), 0 to 20mA (K0 to K4095), Conversion speed: 500µs/channel, Resolution: 1/4096	FP2-DA4
FP2 PROFIBUS unit (FMS/DP-Master)	PROFIBUS FMS and DP (Master) functionality can be used in one unit (according to EN50170, Volume 2).	FP2-FMS/DP-M
FP2 PROFIBUS unit (DP-Master)	PROFIBUS DP (Master) functionality can be used (according to EN50170, Volume 2).	FP2-DP-M
FP2 Ethernet unit	Communication protocol: TCP/UDP/IP Communication interface types: 10BASE5, 10BASE-T, 100BASE-TX	FP2-ET1
FP2 Multi-wire link unit	3 network modes "MEWNET-W, -W2, -F" can be selected in one unit. Economical link between PLC with twisted-pair cab Up to 2,048 I/O points can be controlled in MEWNET-F mode	FP2-MW
FP2 S-LINK unit	Remote I/O network for significant time and wire saving. Up to 2,048 I/O points can be controlled.	FP2-SL2
FP2 Computer communication unit	The unit can communicate with a computer in 1:1 communication. RS232C × 2 channels, the unit can also be connected with operation display panel (HMI).	FP2-CCU
FP2 Serial data unit	Serial input/output data can be performed by sequence instruction. RS232C x 2 channels	FP2-SDU

Programming tool

Product name	Description	Part number
NAiS Control FPWIN Pro (Ver. 5)	IEC 61131-3 programming software including German manual, full version for all FP Series PLCs	FPWIN PRO F DE5
	IEC 61131-3 programming software including English manual, full version for all FP Series PLCs	FPWIN PRO F EN5
	IEC 61131-3 programming software including French manual, full version for all FP Series PLCs	FPWIN PRO F FR5
NAiS Control FPWIN GR	FPWIN GR Ver. 2 programming software including English manual	FPWIN GR F EN2
Programming Cable	3m, PC to TOOL Port	AFC8513
PCWAY	Add-on software for Excel + printer port dongle	AFW10011
	Add-on software for Excel + USB port dongle	AFW10031
Ethernet Configurator	Ethernet Configurator Software for ET-LAN unit	AFPS32510
PROFIBUS Configurator	PROFIBUS Configurator Software Tool DP-Configurator + Manual	AFP86910
	PROFIBUS Configurator Software Tool FMS-Configurator + Manual	AFP86911
FP Programmer	Hand-held programmer for FP Series	AFP1114V2
	3m, FP Programmer to TOOL Port	AFC8523

Other accessories

Product name	Description	Part number
FP2 backup battery	Lithium battery CR2450 or equivalent	AFC8801
FP2SH backup battery	Lithium battery BR2/3A with special connector	AFP8801
Screw terminal	5 pcs in set, for FP2-C1A, -X16D2, -Y16T, -Y16P, -Y6R, -Y16R, -AD8, -DA4	AFP2800
Connector set	FP2 connector set, loose wiring pressure, 2 pieces	AFP2801
	FP2 flat cable connector set	AFP2802