Fe Fuji Electric

Innovating Energy Technology

MICREX-SX series
SPH

USER'S MANUAL

Hardware

Preface

This User's Manual explains the system configuration of SPH, the specifications and operation of the modules. Read this manual carefully to ensure correct operation. When using modules or peripheral devices, be sure to read the corresponding user's manuals listed below.

<Relative manuals for the SX-Programmer Expert (D300win)>

Title	Manual No.	Contents
User's Manual Instruction, MICREX-SX series	FEH200	Explains the memory, language and system definitions of the MICREX-SX series.
User's Manual Hardware, MICREX-SX series SPH	FEH201	Explains the system configuration, the specifications and operations of modules in the MICREX-SX series.
User's Manual D300win <Reference>, MICREX-SX series	FEH254	Explains the menu and icon of D300winV2 and all of the operations of D300winV2.
User's Manual D300win <Reference>, MICREX-SX series	FEH257	Explains the menu and icon of D300winV3 and all of the operations of D300winV3.
User's Manual D300win LD/FBD Editor Operations, MICREX-SX series	FEH257-1	Explains the operating instruction of the LD/FBD editor which is added to D300winV3 as new function.
User's Manual SPH2000 /3000 Built-in Ethernet Communication Edition, MICREX-SX series	FEH193	Explains the Ethernet communication function of the SPH2000 /3000 Ethernet built-in CPU.

<Relative manuals for the SX-Programmer Standard (Standard Loader)>

Title	Manual No.	Contents
User's Manual Instruction, MICREX-SX series	FEH588	Explains the memory, language and system definitions of the MICREX-SX series.
User's Manual Hardware, MICREX-SX series SPH	FEH201	Explains the system configuration, the specifications and operations of modules in the MICREX-SX series.
User's Manual SX-Programmer Standard <Reference>, MICREX-SX series	FEH590	Explains the menu and icon of the SX-Programmer Standard and all of the operations of the SX-Programmer Standard.
User's Manual SPH2000 /3000 Built-in Ethernet Communication Edition, MICREX-SX series	FEH193	Explains the Ethernet communication function of the SPH2000 /3000 Ethernet built-in CPU.

* This manual is structured to be applicable to both D300win and Standard Loader.

In addition to the above manuals, the following Fuji Electric Systems Co., Ltd. site offers various manuals and technical documents associated with MICREX-SX.

URL   http://www.fujielectric.com/

Notes

1. This manual may not be reproduced in whole or part in any form without prior written approval by the manufacturer.
2. The contents of this manual (including specifications) are subject to change without prior notice.
3. If you find any ambiguous or incorrect descriptions in this manual, please write them down (along with the manual No. shown on the cover) and contact FUJI.

Safety Precautions

Be sure to read the "Safety Precautions" thoroughly before using the module.
Here, the safety precaution items are classified into "Warning" and "Caution."

⚠ **Warning** : Incorrect handling of the device may result in death or serious injury.

⚠ **Caution** : Incorrect handling of the device may result in minor injury or physical damage.

Even some items indicated by "Caution" may also result in a serious accident.

Both safety instruction categories provide important information. Be sure to strictly observe these instructions.

⚠ **Warning**
◊ Never touch any part of charged circuits as terminals and exposed metal portion while the power is turned ON. It may result in an electric shock to theoperator.   ◊ Turn OFF the power before mounting, dismounting, wiring, maintaining or checking, otherwise, electric shock, erratic operation or troubles might occur.   ◊ Place the emergency stop circuit, interlock circuit or the like for safety outside the PLC. A failure of PLC might break or cause problems to the machine.   ◊ Do not connect in reverse polarity, charge (except rechargeable ones), disassemble, heat, throw in fire or short-circuit the batteries, otherwise, they might burst or take fire.   ◊ If batteries have any deformation, spilled fluids, or other abnormality, do not use them. The use of such batteries might cause explosion or firing.   ◊ Do not open the FG terminal with the LG-FG short circuited. (It must be grounded, otherwise it might cause electric shock.)

Safety Precautions

⚠ **Caution**

◊ Do not use one found damaged or deformed when unpacked, otherwise, failure or erratic operation might be caused.
◊ Do not shock the product by dropping or tipping it over, otherwise, it might be damaged or troubled.
◊ Follow the directions of the operating instructions when mounting the product. If mounting is improper, the product might drop or develop problems or erratic operations.
◊ Use the rated voltage and current mentioned in the operating instructions and manual. Use beyond the rated values might cause fire, erratic operation or failure.
◊ Operate (keep) in the environment specified in the operating instructions and manual. High temperature, high humidity, condensation, dust, corrosive gases, oil, organic solvents, excessive vibration or shock might cause electric shock, fire, erratic operation or failure.
◊ Select a wire size to suit the applied voltage and carrying current. Tighten the wire terminals to the specified torque. Inappropriate wiring or tightening might cause fire, malfunction, failure, or might cause the product to drop from its mounting.
◊ Contaminants, wiring chips, iron powder or other foreign matter must not enter the device when installing it, otherwise, erratic operation or failure might occur.
◊ Remove the dust-cover seals of modules after wiring, otherwise, fire, accidents, failure or fault might occur.
◊ Connect the ground terminal to the ground, otherwise, an erratic operation might occur.
◊ Periodically make sure the terminal screws and mounting screws are securely tightened.
  Operation at a loosened status might cause fire or erratic operation.
◊ Put the furnished connector covers on unused connectors, otherwise, failure or erratic operation might occur.
◊ Install the furnished terminal cover on the terminal block, otherwise, electric shock or fire might occur.
◊ Sufficiently make sure of safety before program change, forced output, starting, stopping or anything else during a run. The wrong operation might break or cause machine problems.
◊ Engage the loader connector in a correct orientation, otherwise, an erratic operation might occur.
◊ Before touching the PLC, discharge any static electricity that may have been collected on your body. To discharge it, touch a grounded metallic object. Static electricity might cause erratic operation or failure of the module.
◊ Be sure to install the electrical wiring correctly and securely, observing the operating instructions and manual. Wrong or loose wiring might cause fire, accidents, or failure.
◊ When disengaging the plug from the outlet, do not pull the cord, otherwiase, break of cable might cause fire or failure.
◊ Do not attempt to change system configurations (such as installing or removing I/O modules) while the power is ON, otherwise, failure or erratic operation might occur.
◊ Do not attemp to repair the module by yourself contact your Fuji Electric agent. When replacing the batteries, correctly and securely connect the battery connectors, otherwise, fire, accidents or failure might occure.
◊ Clean this product after power-off using a towel that is moistened with lukewarm water and then wrung tightly. Do not use thinner or other organic solvents, as the module surface might become deformed or discolored.
◊ Do not remodel or disassemble the product, otherwise, a failure might occur.
◊ Follow the regulations of industrial wastes when the device is to be discarded.
◊ The modules covered in these operating instructions have not been designed or manufactured for use in equipment or systems which, in the event of failure, can lead to loss of human life.
◊ If you intend to use the modules covered in these operating instructions for special applications, such as for nuclear energy control, aerospace, medical, or transportation, please consult your Fuji Electric agent.
◊ Be sure to provide protective measures when using the module covered in these operating instructions in equipment which, in the event of failure, may lead to loss of human life or other grave results.
◊ External power supply (such as 24V DC power supply) which is connected to DC I/O should be strongly isolated from AC power supply.
◊ Do not use this equipment in a residential environment. If using, electromagnetic interference might be caused to other equipment.

Revisions

Printed on	*Manual No.	Revision contents
Sep. 1998	FEH201	First edition
Jun. 1999	FEH201a	Input filter time changed in specifications. Derating changed in specifications. Standard CPU specifications added.
Jun. 2000	FEH201b	New product specifications added.
Jul. 2001	FEH201c	New product specifications added. (CPU117K, Single slot power supply, I/O terminals etc.)
Mar. 2004	FEH201d	New product specifications added.
Jul. 2004	FEH201e	Operation of the high-performance CPU with key switches was added to Appendix 1. Specifications for using the SX-Programmer Standard were added.
Sep. 2005	FEH201f	Specifications when SX-Programmer Standard is used are added. New product specifications added (SPH2000 48K).
Jan. 2006	FEH201g	New product specifications added (SPH2000 256K).
Dec. 2006	FEH201h	New product specifications added. (SPH300EX, Baseboard, Handy monitor, Analog I/O module, Communication module etc.)
Oct. 2007	FEH201i	New product specifications added. (SPH2000 256K redundancy adapted products, Multiuse communication module)
May. 2010	FEH201j	New product specifications added. (SPH3000,NP1Y08R-00) Notes for NP1S-81 A, NP1S-91 A are added.

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Section 1 General

<The rule of type codes>

NP ☐ ☐ ☐☐☐☐-☐

└─── Specification code for the module

Symbol	Module type
1	Module, unit
2	Stand alone
3	Interface boad
4	Software package
8	Auxiliary

Symbol	Module type
A	Analog module
B	Base board
C	Cable
F	Function module
H	Programming tool
L	Communication module
P	CPU module
PS	CPU board
S	Power supply module
N	Software package, expansion FB
V	Auxiliary
W	Input / Output module
X	Input module
Y	Output module

MICREX-SX common codes

1-2-1 Hardware

Component	Type	Specification	Accessory	
			Name	No. of units
SPH3000	NP1PU-048E	· Basic instruction excecution speed: 9ns · Program memory: 48K steps · Max No. of I/O points: 8192 points	Instruction manual Data backup battery SX bus terminating plug CPU mode selection key switch Screwdriver * "R","D","E" and "H" attached at the end of type code means "user ROM adapted" CPU module. * Any CPU module with "E" at the end of its type is equipped with the Ethernet interface function.	1 1 set 2 1 1
	NP1PU-256E	· Basic instruction excecution speed: 9ns · Program memory:256K steps · Max No. of I/O points: 8192 points		
SPH2000	NP1PM-48R/ NP1PM-48E	· Basic instruction excecution speed: 30ns · Program memory: 48K steps · Max No. of I/O points: 8192 points		
	NP1PM-256E/ NP1PM-256H	· Basic instruction excecution speed: 30ns · Program memory:256K steps · Max No. of I/O points: 8192 points		
SPH300	NP1PS-32/ NP1PS-32R	· Basic instruction execution speed: 20ns · Program memory: 32K steps · Max. No. of I/O points: 8192 points		
	NP1PS-74/ NP1PS-74R	· Basic instruction execution speed: 20ns · Program memory: 74K steps · Max. No. of I/O points: 8192 points		
	NP1PS-117/ NP1PS-117R	· Basic instruction execution speed: 20ns · Program memory: 117K steps · Max. No. of I/O points: 8192 points		
	NP1PS-245R	· Basic instruction excecution speed: 20ns · Program memory: 250K steps · Max No. of I/O points: 8192 points		
SPH300EX	NP1PS-74D	· Basic instruction excecution speed: 20ns · Program memory: 74K steps x 2 · Max No. of I/O points: 8192 points x 2		
SPH200	NP1PH-16	· Basic instruction excecution speed: 70ns · Program memory: 16K steps · Max . No. of I/O points: 8192		
	NP1PH-08	· Basic instruction excecution speed: 70ns · Program memory: 8K steps · Max . No. of I/O points: 8192		
Base board	NP1BS-03	No. of slots: 3 No. of processor buses: 2	Instruction manual Base board mounting bracket * "S" attached at the end of type code means a base board equipped with SX bus station number setting switch. * Base boards with "D" at the end of Type are live insertion and disconnection base boards with the SX bus station No. setup switch.	1 1
	NP1BS-06	No. of slots: 6 No. of processor buses: 4		
	NP1BS-08 NP1BS-08S NP1BS-08D	No. of slots: 8 No. of processor buses: 3		
	NP1BS-11 NP1BS-11S NP1BS-11D	No. of slots: 11 No. of processor buses: 3		
	NP1BS-13 NP1BS-13S	No. of slots: 13 No. of processor buses: 3		
	NP1BP-13 NP1BP-13S	No. of slots: 13 No. of processor buses: 10		
	NP1BS-13D	No. of slots: 13 No. of processor buses: 3		
	NP1BP-13D	No. of slots: 13 No. of processor buses: 10		
Power supply module	NP1S-22	100 to 200V AC power supply Output: 35W (2-slot type)	Instruction manual Cable for ALM contact Voltage selection jumper plate LG-FG jumper plate (Note)	1 1 set 1 1
	NP1S-42	24V DC power supply output 35W (2-slot type)	Instruction manual Cable for ALM contact LG-FG jumper plate (Note)	1 1 set 1
	NP1S-91	100V AC power supply output 15W (1-slot type)	Instruction manual	1
	NP1S-81	200V AC power supply output 15W (1-slot type)	Instruction manual	1
SX bus expansion cable	NP1C-P3	Cable length: 300mm	Instruction manual * Also available are the lengths of cable that do not meet the figures at left, in 1 m steps (maximum 25 m).	1
	NP1C-P6	Cable length: 600mm		
	NP1C-P8	Cable length: 800mm		
	NP1C-02	Cable length: 2,000mm		
	NP1C-05	Cable length: 5,000mm		
	NP1C-10	Cable length: 10,000mm		
	NP1C-15	Cable length: 15,000mm		
	NP1C-25	Cable length: 25,000mm		

Note: LG-FG jumper plate is provided mounting on the module.

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Component		Type	Specification	Accessory	
				Name	No. of units
Auxiliary	SX bus terminating plug	NP8B-BP	For SX bus terminating (1 piece) (CPU module accessories)	-	-
	SX bus T-branch unit	NP8B-TB	For SX bus T-branch	Instruction manual SX bus terminating plug	1 1
	Simulative-input switch	NP8X-SW	16 points	Power supply connecting cable Power supply disconnecting cable	1 1
	Data backup battery	NP8P-BT	Lithium primary battery (CPU module accessories)	Effective period indication seal	1 set
	Primary battery for large-capacity memory backup	NP8P-BT1	Lithium primary battery	Effective period indication seal	1 set
	Mass battery unit	NP8P-BTS	Battery box for large-capacity memory backup (NP8P-BT1+Storage box)	Instruction manual Battery for large-capacity data backup Effective period indication seal	1 1 1 set
	CPU mode selection key switch	NP8P-KY	For CPU mode selection (CPU module accessories)	-	-
	T-link connector, JPCN-1 connector	FTC120T	Note: No terminating resistor is supplied.	Assembly drawing	1
	P/PE-link connector	FTC120P	Note: No terminating resistor is supplied.	Assembly drawing	1
	I/O connector	NP8V-CN	Soldered socket type, connector cover (Fujitsu Co.,Ltd.)	-	1 set
	T-link / OPCN-1 terminating resistor	FRT120A100	100Ω /1W (1 piece)	-	-
	P/PE terminating resistor	FRT220A75	75Ω /1W (1 piece)	-	-
	DIN rail mounting stud	NP8B-ST	For DIN rail (in pairs)	-	-
	User ROM card	NP8PMF-16	User ROM card 16K steps Dedicated to standard CPU	-	-
		NP8PCF-256	Compact flash card 256MB For User ROM card adapted SPH300/2000	-	-
		NP8PSD-002	SD card 2GB For SPH3000	-	-
	Handy monitor	NW0H-S3ES	PLC data memory monitor/test (For both Expert and Standard types)	Instruction manual Loader cable (Type: NP4H-CB1)	1 1

	Digital input module	NP1X1606-W	24V DC, 16 points, 7mA,
			1 to 100ms variable, Screw terminal type
				Instruction manual
				Terminal cover
				Terminal name blank sheet
				    (Note1)
				    (Note2)
					1
					1
					1

		NP1X3206-W	24V DC, 32 points, 4mA, 1 to 100ms variable, Connector type		
		NP1X6406-W	24V DC, 64 points, 4mA, 1 to 100ms variable, Connector type		
		NP1X3202-W	5 to 12V DC, 32 points, 3mA (5V), 9mA (12V), 1 to 100ms variable, Connector type		
		NP1X0810	100 to 200V AC, 8 points, 10mA, 10ms, Screw terminal type		
		NP1X1610	100 to 120V AC, 16 points, 10mA, 10ms, Screw terminal type		
		NP1X0811	200 to 240V AC, 8 points, 10mA, 10ms, Screw terminal type		
		NP1X3206-A	24V DC, 32 points, 4mA High-speed input (with pulse catch function) Port 1 to 8 : 20μs (no filters) Port 9 to 32: 100μs (no filters) 0.1 to 100ms variable		
		NP1X1607-W	48V DC, 16 points, 5mA 1 to 100ms variable, Screw terminal type		

	Digital output module	NP1Y08T0902	Tr sink, 12 to 24V DC, 8 points, 2.4A/point,
			4A/common, Screw terminal type
				Instruction manual
				Terminal cover
				Terminal name blank sheet
				    (Note1)
				    (Note2)
					1
					1
					1

		NP1Y16T09P6	Tr sink, 12 to 24V DC, 16 points, 0.6A/point, 4A/common, Screw terminal type		
		NP1Y32T09P1	Tr sink, 12 to 24V DC, 32 points, 0.12A/point, 3.2A/common, Connector type		
		NP1Y32T09P1-A	Tr sink, 12 to 24V DC, 32 points, 0.12A/point, 3.2A/common, Connector type, Pulse train output function		

Note: 1) Terminal cover and Terminal name blank sheet are provided in the screw terminal type module.
      2) External connector is not provided in the connector type module. For the applicable connector, refer to "4-4-3 Wiring."

(Continued from preceding page)

Component	Type	Specification	Accessory	
			Name	**No. of units**
Digital output module	NP1Y64T09P1	Tr sink, 12 to 24V DC, 64 points, 0.12A/point, 3.2A/common, Connector type	Instruction manual	1
	NP1Y08U0902	Tr source, 12 to 24V DC, 8 points, 2.4A/point, 4A/common, Screw terminal type	Terminal cover Terminal name blank sheet (Note1) (Note2)	1 1
	NP1Y16U09P6	Tr source, 12 to 24V DC, 16 points, 0.6A/point, 4A/common, Screw terminal type		
	NP1Y32U09P1	Tr source, 12 to 24V DC, 32 points, 0.12A/point, 3.2A/common, Connector type		
	NP1Y64U09P1	Tr source, 12 to 24V DC, 64 points, 0.12A/point, 3.2A/common, Connector type		
	NP1Y06S	Triac, 100 to 240V AC, 6 points, 2.2A/point, 4A/common, Screw terminal type		
	NP1Y08S	Triac, 100 to 240V AC, 8 points, 2.2A/point, All points individual, Screw terminal type		
	NP1Y08R-00	Ry, 110V DC, 240V AC, 8 points(all independent output), 30V DC/264V AC, 2.2A/point, Screw terminal type		
	NP1Y08R-04	Ry, 110V DC, 240V AC, 8 points, 30V DC / 264V AC, 2.2A/point, 4A/common, Screw terminal type		
	NP1Y16R-08	Ry, 110V DC, 240V AC, 16 points, 30V DC / 264V AC, 2.2A/point, 8A/common, Screw terminal type		
	NP1Y16T10P2	Tr sink, 48V DC, 16 points, 0.2A/point, 1.6A/common, Connector type		
Digital Input / Output module	NP1W1606T	DI: Source type, 24V DC, 8 points, DO: Tr sink, 12 to 24V DC, 8 points, Screw terminal type	Instruction manual	1
	NP1W1606U	DI: Sink type, 24V DC, 8 points, DO: Tr source, 12 to 24V DC, 8 points, Screw terminal type	Terminal cover Terminal name blank sheet (Note1) (Note2)	1 1
	NP1W3206T	DI: Source type, 24V DC, 16 points, DO: Tr sink, 12 to 24V DC, 16 points, Connector type		
	NP1W3206U	DI: Sink type, 24V DC, 16 points, DO: Tr source, 12 to 24V DC, 16 points, Connector type		
	NP1W6406T	DI: 24V DC, 32 points, DO: Tr sink, 12 to 24V DC, 32 points, Connector type		
	NP1W6406U	DI: 24V DC, 32 points, DO: Tr source, 12 to 24V DC, 32 points, Connector type		
Analog input module	NP1AXH8VG-MR	Between channels inslated, Multi-range, Voltage input: 8 channels, Resolution: 16 bits	Instruction manual	1
	NP1AXH8IG-MR	Between channels inslated, Multi-range, Current input: 8 channels, Resolution: 16 bits	Terminal cover Terminal name blank sheet	1 1
	NP1AXH8V-MR	Multi-range, high speed type, Voltage input: 8 channels, Resolution: 14 bits		
	NP1AXH8I-MR	Multi-range, high speed type, Current input: 8 channels, Resolution: 14 bits		
	NP1AXH4-MR	Multi-range, high speed type, Input: 4 channels, Resolution: 14 bits		
	NP1AX04-MR	Multi-range, standard type, Input: 4 channels, Resolution: 10 bits		
	NP1AX08V-MR	Multi-range, standard type, Voltage input: 8 channels, Resolution: 10 bits	Instruction manual	1
	NP1AX08I-MR	Multi-range, standard type, Current input: 8 channels, Resolution: 10 bits	Terminal cover Terminal name blank sheet	1 1
	NP1AXH6G-PT	High-acuuracy platinum resistance thermometer element, Input: 6 channels	Instruction manual Terminal cover	1 1
	NP1AXH4-PT	Platinum resistance thermometer element, Input: 4 channels		
	NP1AXH8G-TC	High-acuuracy thermocouple, Input: 8 channels		
	NP1AXH4-TC	Thermocouple, Input: 4 channels		
Analog output module	NP1AYH4VG-MR	Between channels inslated, multi-range, Voltage output: 4 channels, Resolution: 15 bits	Instruction manual	1
	NP1AYH4IG-MR	Between channels inslated, multi-range, Current output: 4 channels, Resolution: 15 bits	Terminal cover Terminal name blank sheet	1 1
	NP1AYH8V-MR	Multi-range, high speed type, Voltage output: 8 channels, Resolution: 14 bits		
	NP1AYH8I-MR	Multi-range, high speed type, Current output: 8 channels, Resolution: 14 bits		
	NP1AYH4V-MR	Multi-range, high speed type, Voltage output: 4 channels, Resolution: 14 bits		
	NP1AYH4I-MR	Multi-range, high speed type, Current output: 4 channels, Resolution: 14 bits		
	NP1AYH2-MR	Multi-range, high speed type, Output: 2 channels, Resolution: 14 bits		
	NP1AY02-MR	Multi-range, standard type, Output: 2 channels, Resolution: 10 bits		

Note: 1) Terminal cover and Terminal name blank sheet are provided in the screw terminal type module.
2) External connector is not provided in the connector type module. For the applicable connector, refer to "4-4-3 Wiring."

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Component		Type	Specification	Accessory	
				Name	**No. of units**
Analog Input / Output module		NP1AWH6-MR	Multi-range, high speed type, Output: 2 channels, Resolution: 14 bits Multi-range, high speed type, Input: 4 channels, Resolution: 14 bits	Instruction manual Terminal cover Terminal name blank sheet	1 1 1
Function / Positioning module	High-speed counter module	NP1F-HC2	2 channels 500kHz, 2-phase signal (90° phase difference), Pulse + directional signal, forward pulse + reverse pulse	Instruction manual (Note1)	1
		NP1F-HC2MR	2 channels 200kHz, Open Corrector Input Signal, (5V/12V/24V DC)		
		NP1F-HC2MR1	2 channels 50kHz, Open Corrector Input Signal, (5V/12V/24V DC)		
		NP1F-HC8	2 channels 50kHz, 2-phase signal (90° phase difference), Pulse + directional signal, forward pulse + reverse pulse		
	Analog multiple positioning control module	NP1F-MA2	Positioning control multiple module (2 axes, Analog command), Output ±10V Feedback pulse: 500kHz		1
	Pulse train multiple positioning control module	NP1F-MP2	Positioning control multiple module (2 axes, Pulse train command), Return pulse: 500kHz Output: 250kHz (forward pulse + reverse pulse)		1
	Pulse train output positioning control module	NP1F-HP2	Pulse train command, 2 channels 250kHz Forward pulse + reverse pulse		1
	MC module	NP1F-MC8P1	8-axis motion control module, Linear interpolation for up to 4 axes, 2-axis arc interpolation	Instruction manual SX bus terminating plug	1 1
	Memory card interface module	NP1F-MM1	General-purpose PC memory card (RAM card (5V)): 1 channel	Instruction manual Card cover Mounting studs	1 1 1
	Dummy module	NP1F-DMY	–	Instruction manual	1
	Multiuse communication module	NP1F-MU1	RS-232C: 1 channel, RS-485: 1 channel	Instruction manual	1
Signal converter		NP2F-LEV	Converts signal level, From open collector (Tr) signal to RS-485 or vice versa	Instruction manual Output connector Input connector	1 1set 1set
Communication module	General purpose communication module	NP1L-RS1	RS-232C: 1 channel, RS-485: 1 channel	Instruction manual	1
		NP1L-RS2	RS-232C: 1 channel		
		NP1L-RS3	RS-232C: 2 channels		
		NP1L-RS4	RS-485 : 1 channel		
		NP1L-RS5	RS-485 : 2 channels		
	P-link module	NP1L-PL1	P-link: 1 channel	Instruction manual P/PE-link connector	1 1set
	PE-link module	NP1L-PE1	PE-link: 1 channel	Instruction manual P/PE-link connector	1 1set
	LE-net module	NP1L-LE1	LE-net: 1 channel	Instruction manual Connector for LE-net Terminating register	1 1 1
	LE-net loop module	NP1L-LL1	LE-net loop: 1 channel	Instruction manual	1
	LE-net loop 2 module	NP1L-LL2	LE-net loop 2: 1 channel		
	FL-net (OPCN-2) module (Note2)	NP1L-FL3	FL-net Ver. 2.0: 1 channel (10BASE-T or 100BASE-TX)	Instruction manual	1
	T-link master module	NP1L-TL1	T-link master: 1 channel	Instruction manual, T-link connector	1 1set
	T-link slave module	NP1L-TS1	T-link slave: 1 channel No. of link I/O points: 1word/1word, 2words/2words, 4words/4words, 8words/8words, 32words/32words		
	T-link interface module	NP1L-RT1	Interface module to expansion T-link	Instruction manual T-link connector SX bus terminating plug	1 1set 2
	OPCN-1 master module	NP1L-JP1	OPCN-1 master: 1 channel	Instruction manual OPCN-1 connector	1 1set
	OPCN-1 slave module	NP1L-JS1	OPCN-1 slave: 1 channel No. of link I/O points: Input: 0 to 64words/Outputput: 0 to 64words		
	OPCN-1 interface module	NP1L-RJ1	Interface module to expansion OPCN-1	Instruction manual OPCN-1 connector SX bus terminating plug	1 1set 2

Note: 1) External connector is not provided in the connector type module. For the applicable connector, refer to "4-4-3 Wiring."
    2) FL-net (OPCN-2) is abbreviated to FL-net.

(Continued from preceding page)

Component		Type	Specification	Accessory	
				Name	**No. of units**
Communication module / Unit	DeviceNet master module	NP1L-DN1	DeviceNet master: 1 channel	Instruction manual Connector	1 1
	DeviceNet slave module	NP1L-DS1	DeviceNet slave: 1 channel No. of I/O link points: Input: 64 words/Output: 64 words	Instruction manual Connector	1 1
	DeviceNet interface module	NP1L-RD1	Interface module to expansion DeviceNet	Instruction manual Connector SX bus terminating plug	1 1 2
	PROFIBUS-DP master module	NP1L-PD1	PROFIBUS-DP master: 1 channel	Instruction manual	1
	PROFIBUS-DP slave module	NP1L-PS1	PROFIBUS-DP slave: 1 channel	Instruction manual	1
	Ethernet interface module	NP1L-ET1	Ethernet: 1 channel (10BASE-T/100BASE-TX)	Instruction manual	1
		NP1L-ET2	Ethernet: 1 channel 10BASE5		
	ADS-net module	NP1L-AD1	ADS-net: 1 channel Self-directed distributed protocol (R3.0)	Instruction manual Power supply cable for 10BASE5	1 1set
	WEB module	NP1L-WE1	10BASE-T/100BASE-TX: 1 channel WEB server function, E-mail send function, Loader command gate way function	Instruction manual	1
	LonWorks network adaptive module	NP1L-LW1	LonWorks interface: 1 channel (78kbps)		
	AS-Interface master module	NP1L-AS1	AS-Interface master (V2.0 adaptation): 1 channel	Instruction manual Screw connector	1 1
		NP1L-AS2	AS-Interface master (V2.1 adaptation): 1 channel		
	S-LINK master module	NP1L-SL1	S-LINK master: 1 channel		
	SX bus optical converter	NP2L-OE1	Distance between optical converter Max: 800m (25° C)	Instruction manual SX bus terminating plug	1 1
	SX bus optical link module	NP1L-OL1			
	ONLINE adapter	FOA-ALFA2	ONLINE adapter	Instruction manual	1
	SX bus electrical repeater	NP2L-RP1	SX bus 25m electrical repeater unit	Instruction manual	1
	Remote terminal master/slave module	NP1L-RM1	Remote terminal 1 system	Instruction manual	1
Support tool cable		NP4H-CB2 (Note)	Personal computer cable for loader: 2m	-	-
		NW0H-CNV	Converter for the programming support tool for AT compatible personal computer	Instruction manual	1
I/O terminals	OPCN-1 interface I/O terminals	NR1JX-1606DT	24V DC input (Non-polarity), 16 points	Instruction manual	1
		NR1JY-08R07DT	RY, 110V DC, 240V AC, 8 points output		
		NR1JY-16T05DT	Tr sink, 24V DC, 16 points, 0.5A/point, 4A/common		
		NR1JW-16T65DT	24V DC, 8 points source input, Tr sink, 24V DC, 8 points output		
	DeviceNet interface I/O terminals	NR1DX-1606DT	24V DC input (Non-polarity), 16 points	Instruction manual	1
		NR1DY-08R07DT	RY, 110V DC, 240V AC, 8 points output		
		NR1DY-16T05DT	Tr sink, 24V DC, 16 points, 0.5A/point, 4A/common		
		NR1DW-16T65DT	24V DC, 8 points source input, Tr sink, 24V DC, 8 points output		
		NR2DX-3206DT	24V DC input (Non-polarity), 32 points		
		NR2DY-16R07DT	RY, 30V DC, 240V AC, 16 points		
		NR2DY-32T05DT	Tr sink, 24V DC, 32 points, 3A/16 points		
		NR2DW-32T65DT	24V DC input (Non-polarity), 16 points source input, Tr sink, 24V DC, 16 points output		
	SX bus interface I/O terminals	NR1SX-1606DT	24V DC input (Non-polarity), 16 points	Instruction manual	1
		NR1SY-08R07DT	RY, 110V DC, 240V AC, 8 points output		
		NR1SY-16T05DT	Tr sink, 24V DC, 16 points, 0.5A/point, 4A/common		
		NR1SW-16T65DT	24V DC, 8 points source input, Tr sink, 24V DC, 8 points output		
		NR1SF-HP4DT	Pulse train output, Pulse train command, 250kHz 4 axes	Instruction manual Common extension bar	1

Note: A converter (type: NW0H-CNV) is required additionally.

(Continued from preceding page)

Component		Type	Specification	Accessory	
				Name	**No. of units**
I/O terminals	T-link interface I/O terminals	NR1TX-1606DT	24V DC input (Non-polarity), 16 points	Instruction manual	1
		NR1TY-08R07DT	Ry, 110V DC, 240V AC, 8 points output		
		NR1TY-16T05DT	Tr sink, 24V DC, 16 points, 0.5A/point, 4A/common		
		NR1TW-16T65DT	24V DC, 8 points source input, Tr sink, 24V DC, 8 points output		
	LonWorks network adaptive I/O terminals	NR1LX-1606DT	24V DC input (Non-polarity), 16 points	Instruction manual Neuron ID seal	1 1
		NR1LY-08R07DT	Ry, 110V DC, 240V AC, 8 points output		
		NR1LW-11R80DT	24V DC, 9 points source input (4 points are pulse input), Ry, 110V DC, 240V AC, 2 points output		
		NR1LW-11R67DT	24V DC, 9 points source input (2 points are pulse input), Ry, 110V DC, 240V AC, 2 points output		
	Common extension bar	NR1XV-CB1	16 points input/output units(two wires system, three wires system)	-	-

1-2-2 Software

Component	Type	Specification	Accessory	
			Name	**No. of units**
Positioning control FB package	NP4N-PTPFV2 for D300winV2	One axis positioning control FB, Simplified one axis positioning control FB, High functional one axis positioning control FB, The support utilities	User's manual Fax. sheet for user registration	1 (Note) 1
	NP4N-PTPFV3 for D300winV3			
Electric cam FB package	NP4N-CAMFV2 for D300winV2	Variable cam FB, Moving cutter FB		
	NP4N-CAMFV3 for D300winV3			
Fault diagnosis FB package	NP4N-TRBFV2 for D300winV2	Fault diagnosis FB, The support utilities		
	NP4N-TRBFV3 for D300winV3			
General purpose communication package for Factory Automation machine	NP4N-COMFV2 for D300winV2	Temperature controller interface FB, ID interface FB, Barcode interface FB, SECS protocol interface FB, The installation tool etc.		
	NP4N-COMFV3 for D300winV3			
PID FB package	NP4N-PIDFV2 for D300winV2	PID operation FB, ON/OFF control FB, Program setting FB etc. The support utilities		
	NP4N-PIDFV3 for D300winV3			
Expansion FB package	NP4N-FSETV2 for D300winV2	Positioning control FB package, Electric cam FB package, Fault diagnosis FB package, General purpose communication package for Factory Automation machine, PID FB package		
	NP4N-FSETV3 for D300winV3			
SC matrix	NP4H-SESV2	Programming support tool to create matrix-type program stepping on Excel97 (for D300winV2)		
Programming support tool based on IEC 61131-3	NP4H-SEDBV2 for D300winV2	D300winV2, based on IEC Standard expansion FB		
SX-Programmer Expert	NP4H-SEDBV3 for D300winV3	D300winV3, based on IEC Standard expansion FB		
SX-Programmer Standard	NP4H-SWN	SX-Programmer Standard, based on IEC Standard expansion FB		
SX Communication middle ware	NP4N-MDLW	Communication Library based on OPC		
Definition tool for LonWorks network based module	NP4N-LNDF	Definition tool for LonWorks network based module (NP1L-LW1)		
Initialize loader software for ONLINE adapter	FOA-LOADER2-CD	Initialize loader software for ONLINE adapter		
Station master monitoring software for ONLINE adapter	FOA-CENTER2-CD	Station master monitoring software for ONLINE adapter		

Note: The user's manual is included as PDF data in the CD supplied with the product.

1-2-3 Boards build in personal computer

Component	Type	Specification	Accessory	
			Name	**No. of units**
CPU boad	NP3PS-SX1SAS	• ISA-bus-based high performance CPU boad • Program memory: 32 Ksteps	User's manual Driver CD Data backup battery SX bus terminating plug CPU mode selecting key switch	1 (Note) 1 1 1 1
	NP3PS-SX1PCS74	• PCI-bus-based high performance CPU boad • Program memory: 74 Ksteps		
	NP3PS-SX1PCS32	• PCI-bus-based high performance CPU boad • Program memory: 32 Ksteps		
FL-net boad	NP3L-FL3PCS	• PCI-bus-based FL-net boad (FL-net Ver. 2.0)	User's manual Driver CD	1 (Note) 1
SX bus slave boad	NP3L-SX1SASS	• ISA-bus-based SX bus slave boad	User's manual Driver CD	1 1

Note: The user's manual is included as PDF data in the CD supplied with the product.

Section 2 System Configuration

Section 2 System Configuration
## 2-1 Overview of System Configuration

2-1-1 CIM (Computer Integrated Manufacturing) model

MICREX-SX SPH series is located from level 1 (the device control) to level 3 (the cell control) in the CIM Model which consists of 6 levels.

Level 6
Management control

Company host computer

WAN   WAN:Wide Area Network

Level 5
Factory control

Factory host computer

Control computer

Main LAN

Level 4
Area control

FA computer

FA personal computer

Cell network

Level 3
Cell control

FA personal computer

SPH

PLC network   P/PE-link, FL-net (OPCN-2) etc.,

Level 2
Station control

SPH

MICREX-F series

NC:Numerical Controller

Lower rank PLC network   T-link, OPCN-1, DeviceNet, PROFIBUS-DP etc.,

Level 1
Device control

SPH

POD

Sensor

Solenoid valve

Inverter, Servomotor

2-1-2 Outline of SPH system configuration

System is configured by installing a Power supply module, CPU module, Input / Output module, Positioning control module, Function module and Communication module to the Base board.
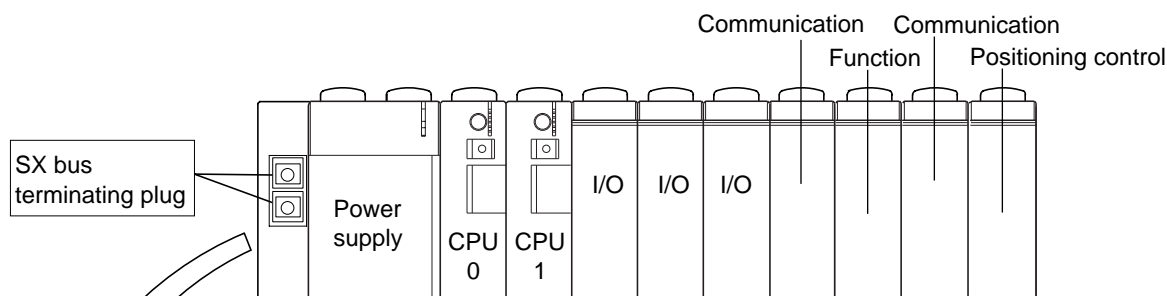
There is a signal bus named SX bus in the base board. All modules on the base board are connected to the SX bus. An SX bus station number is allocated to each module which is connected to the SX bus (except the power supply module). Furthermore there is another signal bus named the processor bus in the base board. The processor bus is used for high speed communications such as CPU to CPU or CPU to processor link module.

<Illustration of System Configuration>

* One SPH system (One configuration) includes all modules connected to the SX bus and remote I/O master.
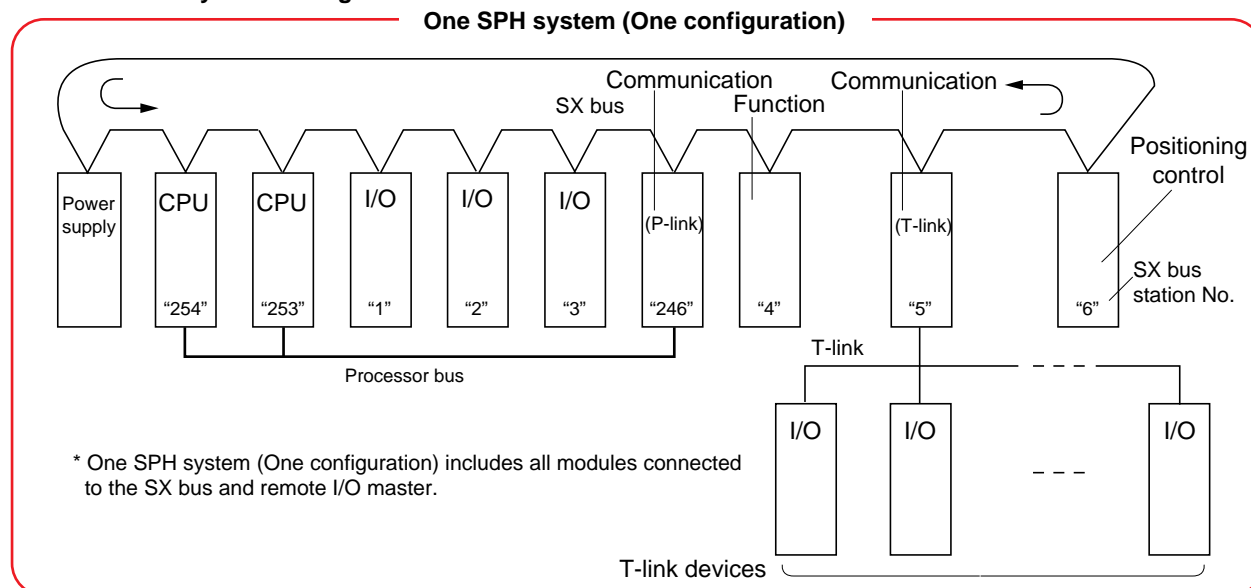
SX bus:
SX bus is the high speed data bus for MICREX-SX series network. Transfer rate: 25 Mbps, Total length: 25m, Number of stations: Max. 254. SX bus is composed of loop network as shown above. Therefore SX bus terminating plugs are needed at both ends of the SX bus, both ends are on the base board.

Processor bus:
Processor bus is the high speed data bus which is connected to CPU modules and P/PE-link modules on the same base board. Transfer rate: 25 Mbps, number of data buses: 8. Even in the same configuration, the processor bus is not connected to the CPU module or the P/PE-link module which is on another base board. This is used for the data communication which is transferred from CPU to CPU or vice versa and from CPU to P/PE-link or vice versa.

Key-point

- SX bus station numbers (station 1 to 254) need to be assigned to all modules except power supply modules. The station number of the CPU module or the P/PE-link module begins from the last number (station 254), and the station number of other modules begins from the first number (station 1).

<CPU No. and SX bus No.>

SX bus station number of a CPU module and processor-link modules are specified by the CPU number.
CPU No.0 to No.7 are for CPU modules, and CPU No.8 and No.9 are for processor-link modules.

CPU No.	SX bus station No.
0	254
1	253
2	252
3	251
4	250
5	249
6	248
7	247

For CPU module

CPU No.	SX bus station No.
8	246
9	245
A	244
B	243
C	242
D	241
E	240
F	239

For Processor-link module

Reserved (Note)

Note: The number of processor link modules connected can be increased in accordance with the CPU version and loader version.

2-1-3 No. of connectable modules

1) No. of modules to connect to the SX bus

Max. 248 (Except power supply modules, SX bus T-branch units, base boards)

2) No. of modules to connect in 1 configuration(Including Remote I/O)

MAX. 254 (Except power supply modules, SX bus Tbranch units, base boards)

3) No. of connectable modules in 1 configuration

Module type	No. of connectable modules
Power supply module	No limitation
CPU module	Max. 8
Processor-link module	Total 2 (P-link modules, PE-link modules and FL-net modules) (Note)
POD for SX bus connection	Max. 8
Class A module	Max. 8 (Remote I/O master module, slave module)
Class B module	Processor-link module, POD for SX bus connection
Class C module	Max. 238 including Class A and Class B. (Except P-link modules and PE-link modules)

Note: The number of connectable processor link modules can be extended depending on the CPU version and loader version.

<Module Class>

Class A	Class B	
· T-link master module (NP1L-TL1) · OPCN-1 master module (NP1L-JP1) · DevicNet master module (NP1L-DN1) · PROFIBUS-DP master module (NP1L-PD1) · T-link slave module (NP1L-TS1) · OPCN-1 slave module (NP1L-JS1) · PROFIBUS-DP slave module (NP1L-PS1) · DeviceNet slave module (NP1L-DS1)	· P-link module (NP1L-PL1) · PE-link module (NP1L-PE1) · FL-net module (NP1L-FL1, NP1L-FL2, NP1L-FL3) · General purpose communication module (NP1L-RS1/RS2/RS3/RS4/RS5) · PC card interface module (NP1F-PC2) (Note) · Memory card interface module · POD for SX bus connection	· Ethernet interface module (NP1L-ET1/ET2) (Note) · ADS-net module (NP1L-AD1) · LonWorks network-based module (NP1L-LW1) · WEB module (NP1L-WE1) (Note) · LE-net module (NP1L-LE1) · LE-net loop module (NP1L-LL1) · LE-net loop2 module (NP1L-LL2)

Note: Maximum 4 units in total of PC card interface module, Ethernet interface module and Web module can be used for one SPH system.

The number of words input to or output from the I/O master module in multi-CPU system configuration

When a multi-CPU system is configured by expanding T-link master module or OPCN-1 master module of MICREX-SX Series or expanding the I/O of PROFIBUS-DP master module (with the hardware version of V20**), the number of input/output words must meet the following calculation conditions:

Note: If your configuration does not meet this requirement, there might be the I/O area whose data is not updated. Even in such case, no error is detected.

> 2043 words > Number of CPUs x (the number of input/output words of I/O master + 8)
> + (the number of SX bus directly connected modules other than CPU modules x 1.5)
> + (the total number of words of the I/O modules directly connected to SX bus)

<Example of remote I/O expanded system>

Number of SX bus directly connected modules other than CPU modules: 5

Total number of words of the I/O modules directly connected to SX bus: 8

Remote I/O

Remote I/O

Remote I/O

Number of input/output words of I/O master: 400
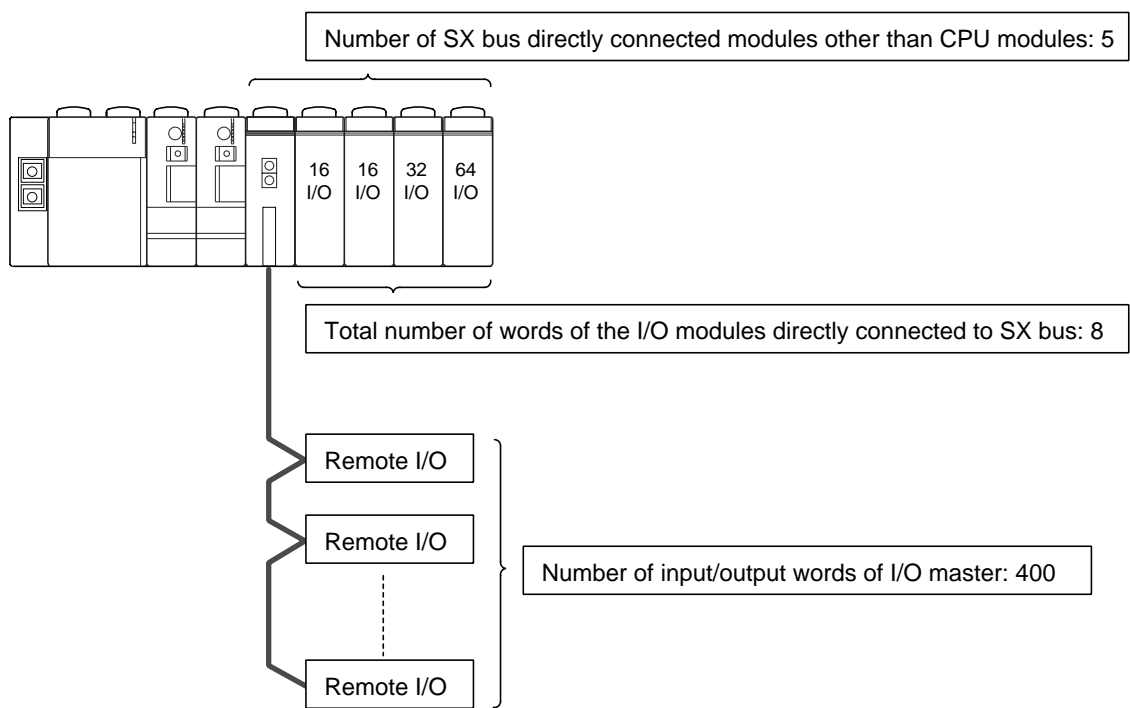
When the system configuration shown above is applied to the calculation formula,

> 2043 > 2 x (400 + 8) + 5 x 1.5 + 8
> 2043 > 831.5

Therefore, there is no problem with this configuration, the number of input/output words of I/O master of which is 400 words.
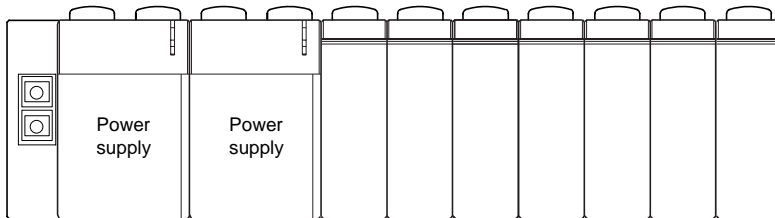
2-1-4 Module mounting on the base board
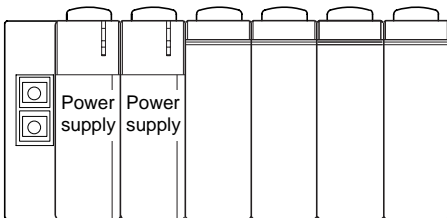
(1) Power supply module
Power supply module can be mounted up to 3 modules from the left side on the base board.
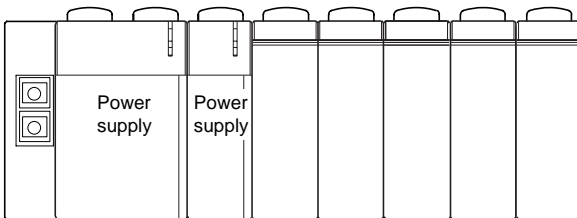
<Example>
• Example mounting two power supply modules (in the case of 2 slots size)

• Example mounting two power supply modules (in the case of single slot size)

• Example mounting two power supply modules (in the case of 2 slots size and single slot size)


> Key-point
>
> · Power supply modules with different power supply specifications can be used together. (AC and DC types can also be used together.)
> · Power supply modules can be used with any base boards. (Base boards have 3 to 13 slots.)

<Remarks: Parallel connection of Power supply modules>
When two (or three) power supply modules are mounted on one base board, it is called a parallel connection. Even when one power supply module has a fault in parallel connection, other power supply modules supply power if the power is adequate to the load. Therefore the CPU module can not detect any fault in power supply module. To inform the CPU module of the fault, the ALM contact should be wired to a digital input module. The ALM contact is a NC contact.For details, refer to "4-4 Wiring."
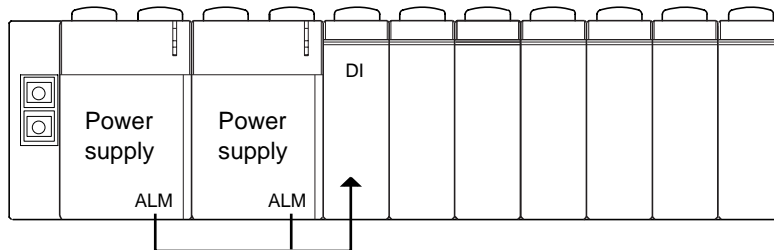
Precautions for single-slot size power supply modules
a) The single-slot size power module has no ALM contact (NC contact) output to report faults in the power supply module.
b) When a fault occurs in a single-slot size power supply module, the green indicator will turn off.

Key-point

· The left end of the base board is dedicated for the power supply module. Other modules such as CPU or I/O are not
  mounted. (do not operate even if mounted)
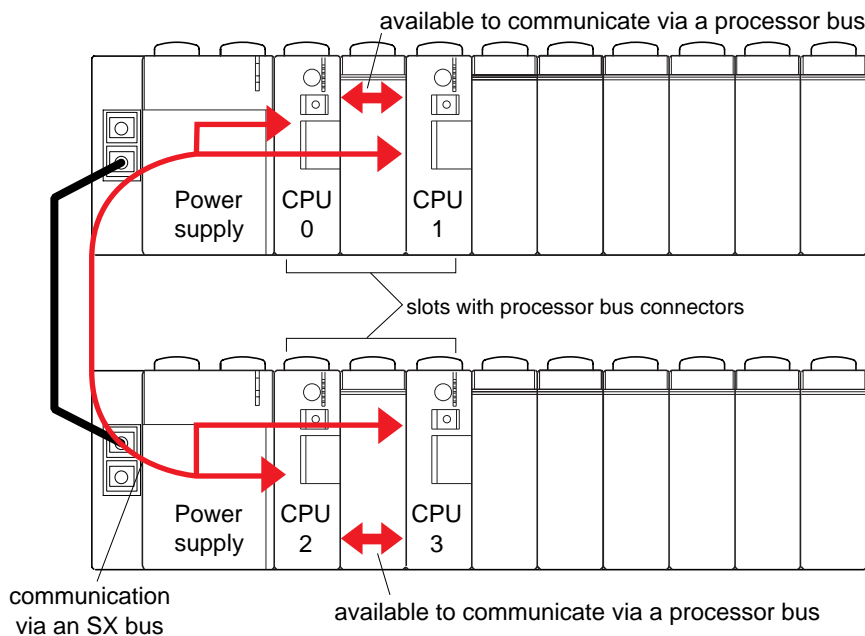· Added power supply to be used parallel can be mounted any slot of the base board.

(2) CPU module

A maximum of eight CPU modules can be mounted to one SPH system
(one configuration) which is connected to an SX bus.

> Key-point
>
> · Multi-CPU system can be constructed in SPH. Two or more CPU modules are mounted in one system, and each CPU
>   module controls each function (for high-performance CPU and SPH2000 only). For details, refer to "2-2-6 Multi-CPU
>   system."
> · The CPU module can not be mounted on the slot which has no processor bus connectors.

• Two or more CPU modules on two base boards.

available to communicate via a processor bus

slots with processor bus connectors

communication
via an SX bus

available to communicate via a processor bus

· In above example where CPU modules are mounted on the same processor bus, high speed communication is
  available via a processor bus in CPU0 to CPU1, CPU2 to CPU3.
· The SX bus is used to communicate to the CPU on another base board. The processor bus is not used. For
  example, CPU0 to CPU2, CPU0 to CPU3, CPU1 to CPU2, CPU1 to CPU3.

<Reference>

When you use a total of 3 or more units of the CPU module, P/PE-link module and/or FL-net module on a single
baseboard, please use a baseboard (NP1BP-13) which has processor bus connectors for 10 slots. But there are no
processor bus connectors in the 13th slot, and the CPU module can not be connected there.

NP1BP-13

the 13th slot

available to communicate via a processor bus　　　communication via an SX bus
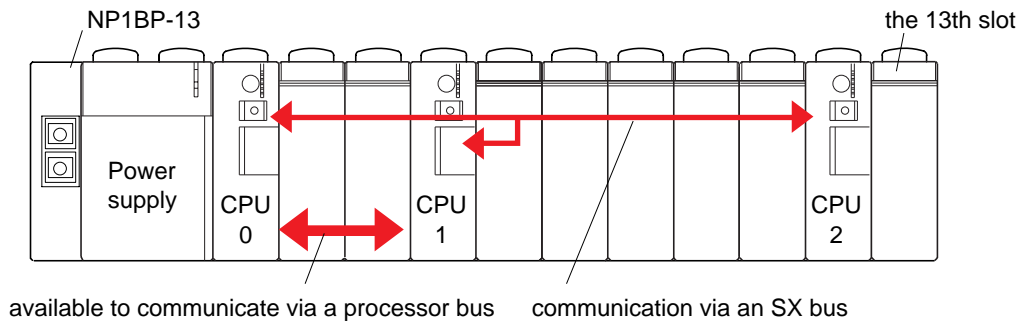
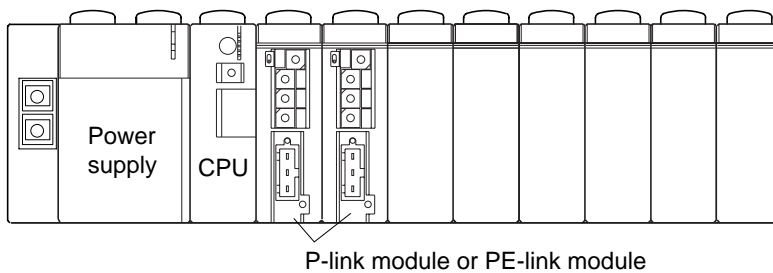**(3) P-link module / PE-link module / FL-net module**
A total of two modules (P-link modules, PE-link modules,
FL-net modules) can be mounted to one SPH system (one configuration) which is connected to an SX bus.
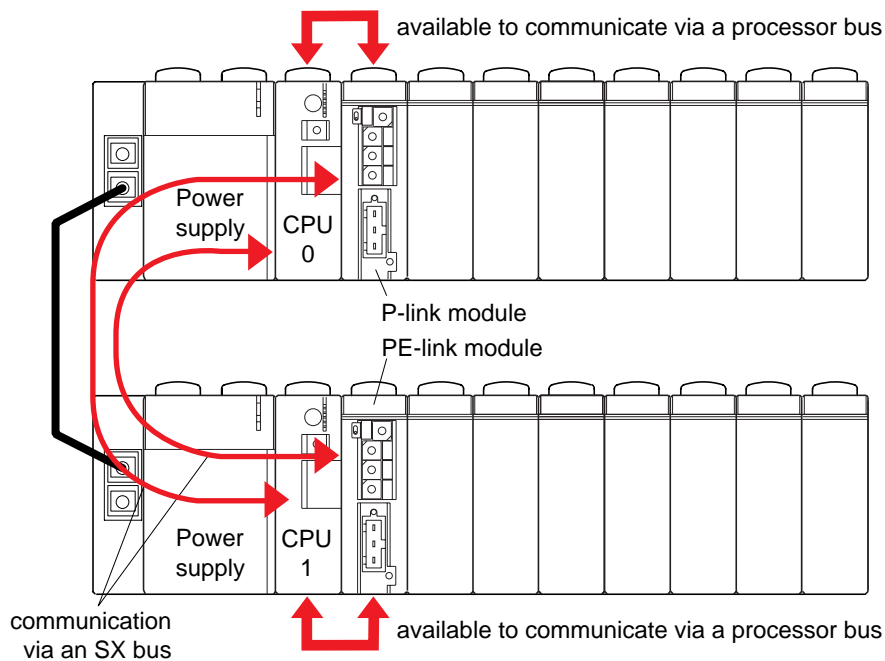
Key-point

· When you access the internal memory of P/PE-link or FL-net via the processor bus, be sure to connect the P/PE-link module or FL-net module to a slot that has a processor bus connector.

<Example of two modules (P-link / PE-link)>

· On one base board

P-link module or PE-link module

· Two modules on two base boards

available to communicate via a processor bus

P-link module
PE-link module

communication via an SX bus

available to communicate via a processor bus

· In above example where modules are mounted on the same processor bus, high speed communication is available via a processor bus in CPU0 to the P-link module, and CPU1 to the PE-link module.
· Even when modules are mounted on slots which have processor bus connectors, the SX bus is used to communicate from CPU0 to the PE-link module, and CPU1 to the P-link module. The processor bus is not used.

(3)-1 Installing maximum number of interprocessor link modules
· Up to 8 interprocessor link modules can be installed in the SPH system (1 configuration).
  · NP1L-PL1/NP1L-PE1/NP1L-FL1/NP1L-FL2/NP1L-FL3/NP1L-LE1/NP1L-LL1/NP1L-LL2
· When connecting two or more interprocessor link modules, check the version of the CPU module and loader.

| CPU module version		Loader version (V2)	Loader version (V3)
NP1PS-32	: V24 63 or later	V2.2.6.0	V3.1.4.0
NP1PS-32R	: V26 63 or later	V2.2.6.0	V3.1.4.0
NP1PS-74	: V23 63 or later	V2.2.6.0	V3.1.4.0
NP1PS-74R	: V26 63 or later	V2.2.6.0	V3.1.4.0
NP1PS-117	: V26 63 or later	V2.2.6.0	V3.1.4.0
NP1PS-117R	: V26 63 or later	V2.2.6.0	V3.1.4.0
NP1PS-245R	: V20 64 or later	–	V3.2.1.0
NP1PM-48R	: V20 01 or later	–	V3.3.0.0
NP1PM-48E	: V20 01 or later	–	V3.3.0.0
NP1PM-256E	: V21 02 or later	–	V3.3.0.0
NP1PM-256H	: All version	–	V3.4.0.0
NP1PU-048E	: All version	–	V3.5.0.0
NP1PU-256E	: All version	–	V3.5.0.0
NP3PS-SX1SAS	: V23 63 or later	V2.2.6.0	V3.1.4.0
NP3PS-SX1PCS32	: V22 63 or later	V2.2.6.0	V3.1.4.0
NP3PS-SX1PCS74	: V22 63 or later	V2.2.6.0	V3.1.4.0

(4) Input / Output modules and others
Digital Input / Output modules, Analog Input / Output modules and other modules can be mounted to any slots except power supply module mounting slots.

2-1 Overview of System Configuration

Module mounting

(5) Number of modules limited by output current of power supply.
Power consumption of mounted modules should be considered. In the following example the power supply module does not have enough output current.
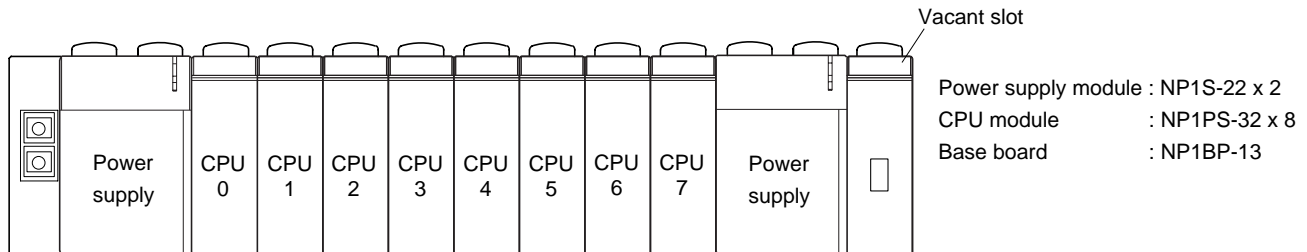
**1) The case of eight CPU modules in the 13-slot base board**
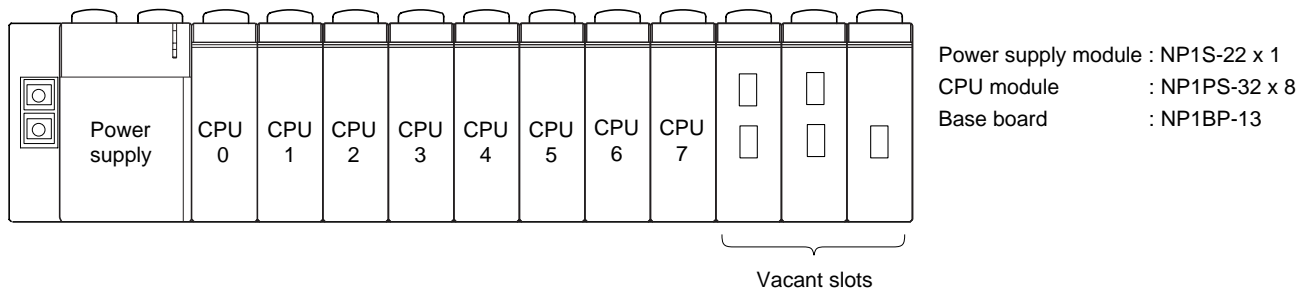
Power supply module : NP1S-22 x 1
CPU module　　　　 : NP1PS-32 x 8
Base board　　　　　: NP1BP-13

Vacant slots

In the above configuration the output current exceeds the current (24V DC, 1.46A) of the power supply module.

　　200mA x 8 + 70mA x 1 = 1670 mA

<Countermeasure>
Power supply module should be added in vacant slots.

Vacant slot

Power supply module : NP1S-22 x 2
CPU module　　　　 : NP1PS-32 x 8
Base board　　　　　: NP1BP-13

2) The case of one CPU module and 10 Ry 16-point output modules in the 13-slot base board
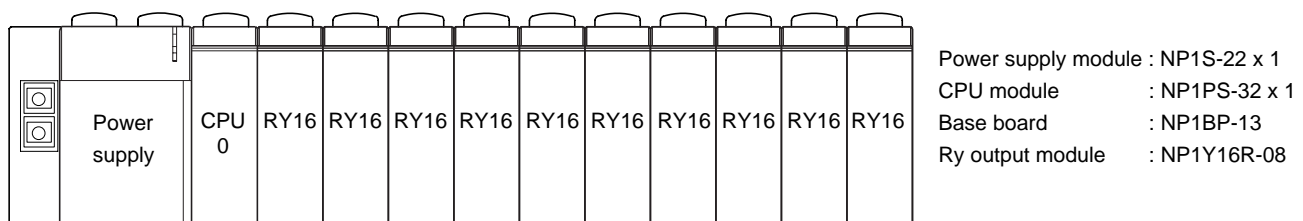
Power supply module : NP1S-22 x 1
CPU module　　　　 : NP1PS-32 x 1
Base board　　　　　: NP1BP-13
Ry output module　　 : NP1Y16R-08

In the above configuration the output current exceeds the current (24V DC, 1.46A) of the power supply module when all the of Ry output points are set ON.

　　200mA + 70mA + 176mA x 10 = 2030mA

<Countermeasure>
Ry output modules should be reduced by four modules.

　　200mA + 70mA + 176mA x 6 = 1326mA

\<Module consumption power table\>
The following table shows the consumption power of the modules/units that are supplied power from the power module.

Component	Type	Consumption power
CPU module	NP1PS-32	24V DC 200mA or less
	NP1PS-74	24V DC 200mA or less
	NP1PS-117	24V DC 200mA or less
	NP1PS-32R	24V DC 200mA or less
	NP1PS-74R	24V DC 200mA or less
	NP1PS-117R	24V DC 200mA or less
	NP1PS-245R	24V DC 200mA or less
	NP1PS-74D	24V DC 200mA or less
	NP1PM-48R	24V DC 200mA or less
	NP1PM-48E	24V DC 200mA or less
	NP1PM-256E	24V DC 200mA or less
	NP1PM-256H	24V DC 200mA or less
	NP1PU-048E	24V DC 200mA or less
	NP1PU-256E	24V DC 200mA or less
	NP1PH-08	24V DC 85mA or less
	NP1PH-16	24V DC 85mA or less
Base board	NP1BP-13	24V DC 70mA or less
	NP1BS-03	24V DC 35mA or less
	NP1BS-06	24V DC 45mA or less
	NP1BS-08	24V DC 50mA or less
	NP1BS-11	24V DC 60mA or less
	NP1BS-13	24V DC 70mA or less
	NP1BP-13S	24V DC 80mA or less
	NP1BS-08D	24V DC 70mA or less
	NP1BS-08S	24V DC 60mA or less
	NP1BS-11S	24V DC 70mA or less
	NP1BS-11D	24V DC 80mA or less
	NP1BS-13S	24V DC 80mA or less
	NP1BS-13D	24V DC 80mA or less
	NP1BP-13D	24V DC 80mA or less
SX bus optical link module	NP1L-OL1	24V DC 54mA or less
T-link master module	NP1L-TL1	24V DC 140mA or less
T-link interface module	NP1L-RT1	24V DC 140mA or less
T-link slave module	NP1L-TS1	24V DC 140mA or less
OPCN-1 master module	NP1L-JP1	24V DC 130mA or less
OPCN-1 interface module	NP1L-RJ1	24V DC 130mA or less
OPCN-1 slave module	NP1L-JS1	24V DC 130mA or less
DeviceNet master module	NP1L-DN1	24V DC 90mA or less
DeviceNet interface module	NP1L-RD1	24V DC 90mA or less
DeviceNet slave module	NP1L-DS1	24V DC 90mA or less
LONWORKS interface module	NP1L-LW1	24V DC 140mA or less
AS-i master module	NP1L-AS1	24V DC 100mA or less
	NP1L-AS2	24V DC 100mA or less
S-LINK master module	NP1L-SL1	24V DC 80mA or less
P-link master module	NP1L-PL1	24V DC 160mA or less
PE-link master module	NP1L-PE1	24V DC 160mA or less
FL-net module	NP1L-FL3	24V DC 160mA or less

Component	Type	Consumption power
PROFIBUS-DP master module	NP1L-PD1	24V DC 200mA or less
PROFIBUS-DP slave module	NP1L-PS1	24V DC 150mA or less
ADS-net module	NP1L-AD1	24V DC 140mA or less
WEB module	NP1L-WE1	24V DC 120mA or less
ETHERNET module	NP1L-ET1	24V DC 150mA or less
	NP1L-ET2	24V DC 150mA or less
ONLINE adapter	FOA-ALFA2	24V DC 60mA or less
General purpose communication module	NP1L-RS1	24V DC 110mA or less
	NP1L-RS2	24V DC 90mA or less
	NP1L-RS5	24V DC 110mA or less
	NP1L-RS4	24V DC 80mA or less
	NP1L-R33	24V DC 110mA or less
LE-net module	NP1L-LE1	24V DC 70mA or less
LE-net loop module	NP1L-LL1	24V DC 80mA or less
	NP1L-LL2	24V DC 80mA or less
SX-bus electrical repeater	NP2L-RP1	24V DC 70mA or less
Digital input module	NP1X1607-W	24V DC 35mA or less (when all points are turned on)
	NP1X1606-W	24V DC 35mA or less (when all points are turned on)
	NP1X3206-W	24V DC 50mA or less (when all points are turned on)
	NP1X3202-W	24V DC 50mA or less (when all points are turned on)
	NP1X3206-A	24V DC 50mA or less (when all points are turned on)
	NP1X6406-W	24V DC 85mA or less (when all points are turned on)
	NP1X0810	24V DC 35mA or less (when all points are turned on)
	NP1X1610	24V DC 40mA or less (when all points are turned on)
	NP1X0811	24V DC 35mA or less (when all points are turned on)
Digital output module	NP1Y16T10P2	24V DC 42mA or less (when all points are turned on)
	NP1Y06S	24V DC 60mA or less (when all points are turned on)
	NP1Y08R-00	24V DC 100mA or less (when all points are turned on)
	NP1Y08R-04	24V DC 80mA or less (when all points are turned on)
	NP1Y08T0902	24V DC 20mA or less (when all points are turned on)
	NP1Y08U0902	24V DC 20mA or less (when all points are turned on)
	NP1Y08S	24V DC 80mA or less (when all points tare turned on)
	NP1Y16R-08	24V DC 176mA or less (when all points are turned on)
	NP1Y16T09P6	24V DC 42mA or less (when all points are turned on)
	NP1Y16U09P6	24V DC 43mA or less (when all points are turned on)
	NP1Y32T09P1-A	24V DC 50mA or less (when all points are turned on)
	NP1Y32T09P1	24V DC 45mA or less (when all points are turned on)
	NP1Y32U09P1	24V DC 45mA or less (when all points are turned on)
	NP1Y64T09P1	24V DC 90mA or less (when all points are turned on)
	NP1Y64U09P1	24V DC 90mA or less (when all points are turned on)
Digital Input / Output module	NP1W1606T	24V DC 35mA or less (when all points are turned on)
	NP1W1606U	24V DC 35mA or less (when all points are turned on)
	NP1W3206T	24V DC 50mA or less (when all points are turned on)
	NP1W3206U	24V DC 50mA or less (when all points are turned on)
	NP1W6406T	24V DC 90mA or less (when all points are turned on)
	NP1W6406U	24V DC 90mA or less (when all points are turned on)
Analog input module	NP1AXH4-MR	24V DC 120mA or less
	NP1AXH8V-MR	24V DC 200mA or less
	NP1AXH8I-MR	24V DC 200mA or less

Component	Type	Consumption power
Analog platinum resistance thermometer element module	NP1AXH6G-PT	24V DC 150mA or less
	NP1AXH4-PT	24V DC 150mA or less
Analog thermocouple module	NP1AXH8G-TC	24V DC 150mA or less
	NP1AXH4-TC	24V DC 150mA or less
Analog output module	NP1AYH2-MR	24V DC 120mA or less
	NP1AYH4VG-MR	24V DC 200mA or less
	NP1AYH4IG-MR	24V DC 250mA or les
	NP1AYH4V-MR	24V DC 200mA or less
	NP1AYH4I-MR	24V DC 200mA or les
	NP1AYH8V-MR	24V DC 240mA or less
	NP1AYH8I-MR	24V DC 300mA or less
Analog input module	NP1AX04-MR	24V DC 120mA or less
Analog output module	NP1AY08-MR	24V DC 120mA or less
	NP1AY02-MR	24V DC 120mA or less
Analog input module	NP1AX08VG-MR	24V DC 150mA or less
	NP1AX08IG-MR	24V DC 150mA or less
	NP1AX08V-MR	24V DC 120mA or less
	NP1AX08I-MR	24V DC 120mA or less
Analog input / output module	NP1AWH6-MR	24V DC 200mA or less
High-speed counter module	NP1F-HC2MR	24V DC 85mA or less
	NP1F-HC2MR1	24V DC 85mA or less
	NP1F-HC2	24V DC 85mA or less
	NP1F-HC8	24V DC 100mA or less
Pulse train output positioning control module	NP1F-HP2	24V DC 95mA or less
Pulse train multiple positioning control module	NP1F-MP2	24V DC 95mA or less
Analog multiple positioning control module	NP1F-MA2	24V DC 150mA or less
MC module	NP1F-MC8P1	24V DC 150mA or less
Dummy module	NP1F-DMY	24V DC 26mA or less
PC card interface module	NP1F-PC2	24V DC 120mA or less
Memory card interface module	NP1F-MM1	24V DC 90mA or less
Handy monitor	NW0H-S3ES	24V DC 60mA or less
RS-232C / RS-422 signal converter	NW0H-CNV	24V DC 15mA or less
Multiuse communication module	NP1F-MU1	24V DC 80mA or less

2-1-5 Connecting loader

(1) Connection to loader connector of CPU module

NW0H-CNV

Dedicated cable (NP4H-CB2: 2m)

* To connect a RS-232C
   connector of personal computer
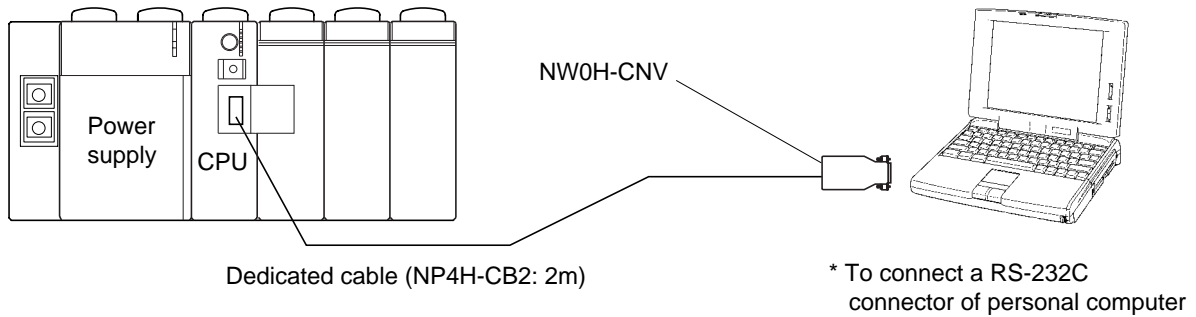
### (2) Connection via general purpose communication module

D300win can be accessed to CPU module by connecting a general purpose communication port of general purpose communication module (NP1L-RS1/2/3/4/5) mounted on base board.

SX bus
expansion cable

connected via an SX bus

NP1L-RS1
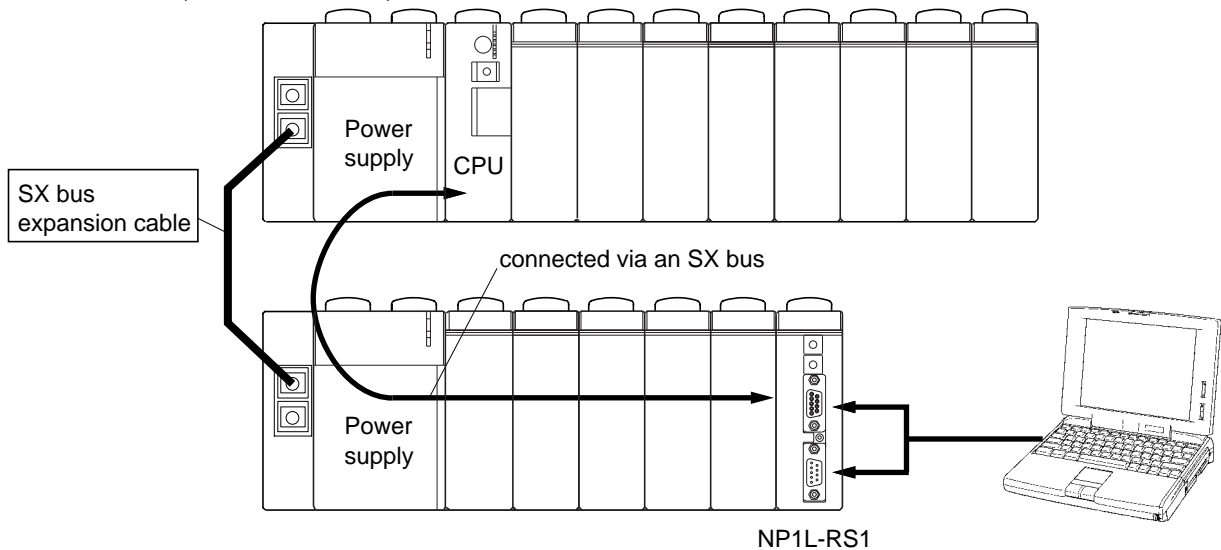
For details of connecting loader via a general purpose communication module, refer to "General purpose communication module User's Manual FEH225."

(3) Remote connection by Ethernet interface module
Remote operation (remote programming, remote monitoring) can be used by connecting a modem card or Ethernet card to the Ethernet interface module on the base board.

Ethernet

Power
supply

Ethernet interface module
Type: NP1L-ET1/ET2
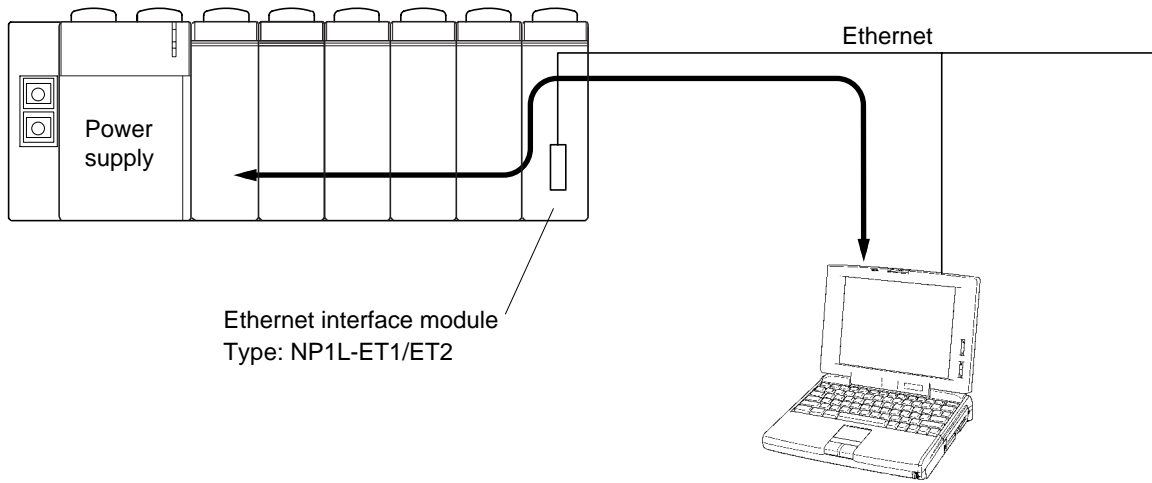
* Personal computer connected to Ethernet

For details of loader connection by PC card interface module, refer to "PC card interface module User's Manual FEH226" and "D300winV2 Reference User's Manual FEH254 / D300winV3 Reference User's Manual FEH257."

*Ethernet is a registered trademark of Xerox Corp., U.S.A.

(4) Connection via internet
D300win can be connected to CPU module via internet by connecting WEB module (NP1L-WE1).
D300win

WEB module
Type: NP1L-WE1

Internet/
Intranet

MICREX-SX SPH series
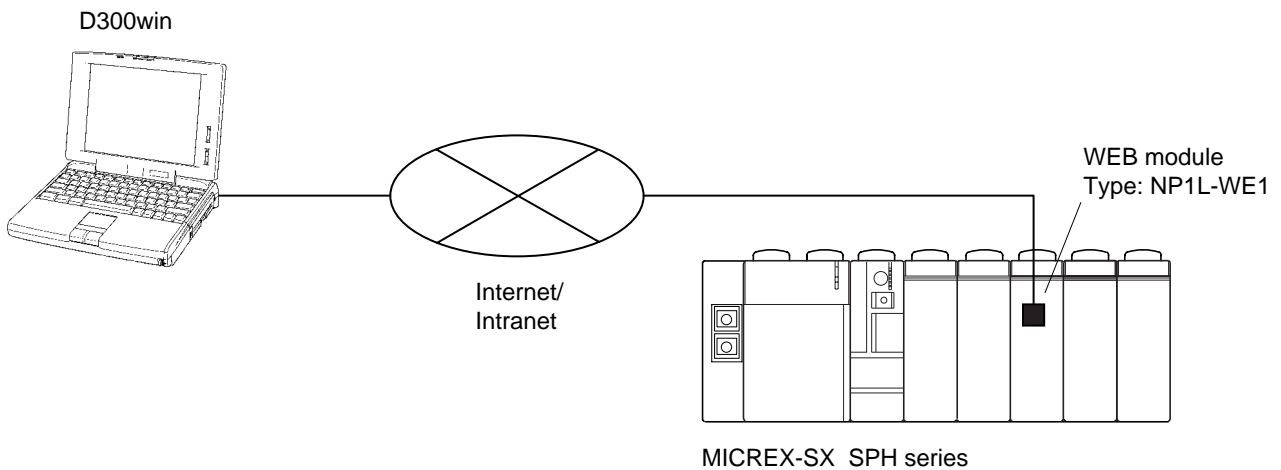
 * For a detailed explanation of connection settings, refer to "WEB Module User's Manual FEH258".

(5) Connection to USB connector of CPU module
Loader can be connected to CPU module (*1) provided with USB interface by using commercially-available USB cable.

USB cable
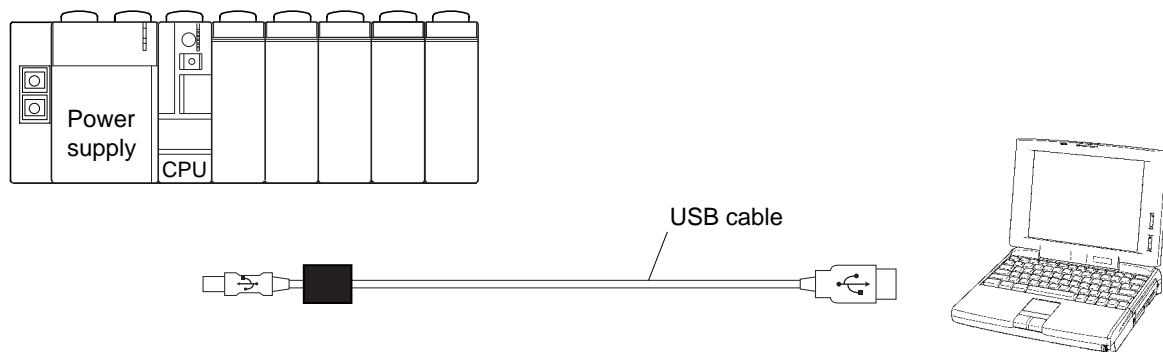
* 1 **List of CPU Modules with USB Interface**

Type of CPU	USB connector type of CPU module side
NP1PS-32R NP1PS-74R NP1PS-117R NP1PS-245R	B type
NP1PM-48R NP1PM-48E NP1PM-256E NP1PM-256H	mini-B type

Various systems can be constructed for user's applications in SPH system.

System name	Outline
Independent system	An independent system consists of one CPU module, power supply modules, I/O modules, and Function modules on one base board.
SX bus expansion system	Two or more base boards are connected by SX bus expansion cables. a maximum of 254 modules not including power supply modules can be connected.
SX bus T-branch expansion system	A branch unit can make a branch of an SX bus.
SX bus optical expansion system	By using the SX bus optical converter and SX bus optical link module, you can set up SX bus as an optical transmission line and construct a distributed or expanded system.
T-link distributed expansion system	This system is configured by connecting the CPU part to the distributed I/O modules via the T-link. This is a serial transmission system for the exclusive use of FUJI.
Multi-CPU system	This system has two or more CPU modules which control devices separately.
Redundant CPU system	For the purpose of high reliability, the backup CPU module is reserved for the operating CPU module.
P/PE-link system	Fuji's original network system for data communication among multiple SX series configurations or CPUs with a P/PE-link.
FL-net link system	Open the FA network system for data communication among SX series configurations or other makers' PLCs that support FL-net.
Ethernet communication system	This system is used to communicate with a personal computer positioned the CIM upper level or with Programmable Controllers made by other manufacturers from FUJI.
AS-i system	This system is configured by mounting an AS-i master module on the base board. AS-i system is an open architecture system which saves wiring.
OPCN-1 system	By mounting the AS-i master module on a baseboard, you can construct the OPCN-1 system as an open remote I/O network.
DeviceNet system	By mounting the DeviceNet master module on a baseboard, you can construct the DeviceNet system as an open remote I/O network.
SPH300EX system	The CPU in this system has two built-in SPH300-series NP1PS-74R modules.

2-2-1 Independent system

This system is a basic system which consists of one CPU module, power supply modules and I/O modules on one base board.

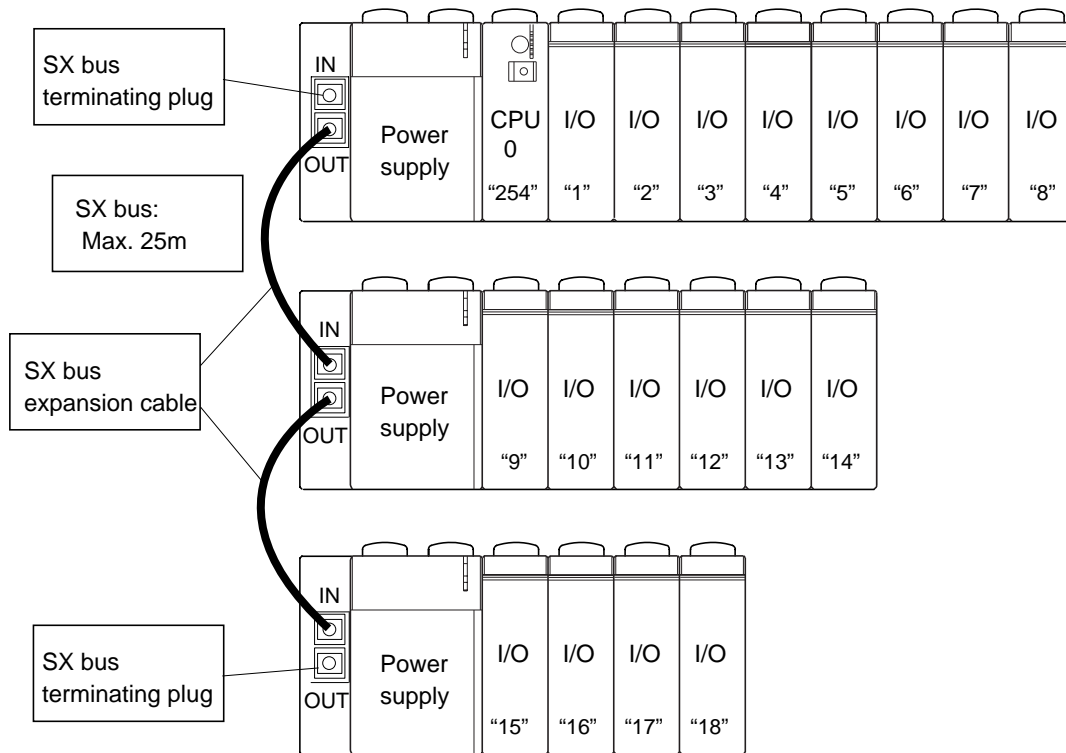### (1) Example of system configuration
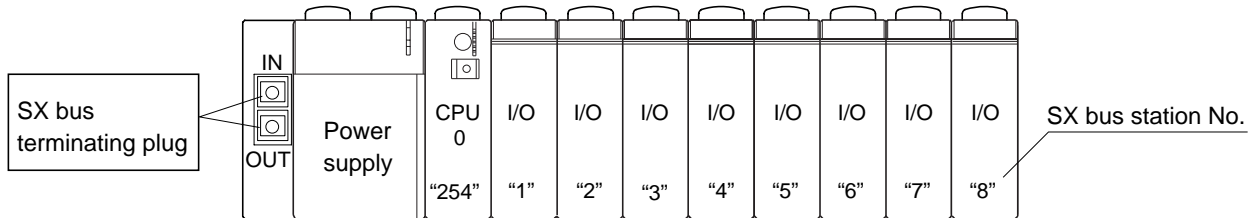
Note: Even for one base board system, SX bus terminating plugs are needed at both ends of an SX bus.

(2) SX bus station No. assignment

The SX bus station numbers are usually assigned by the system configuration definitions in order of 1, 2, 3... from the right side of the CPU0. (An arbitrary number from 1 to 238 can be assigned.) However, the number of the CPU module (CPU0) is "station 254," and is not related to the slot position.

2-2-2 SX bus expansion system
Two or more base boards are connected by SX bus expansion cables.

(1) Example of system configuration

Note: Be sure to connect the cable from OUT to IN. An OUT to OUT connection or IN to IN connection will make it impossible to communicate.

(2) SX bus station No. assignment
The SX bus station numbers are usually assigned by the system configuration definitions in order of 1, 2, 3... from the right side of the CPU0. (An arbitrary number from 1 to 238 can be assigned.) However, the number of the CPU module (CPU0) is "station 254," and is not related to the slot position.

> Key-point
>
> · Power supply module must be mounted at the left end of the base board, and at least one module except power supply module must be mounted.
> · Number of connectable base boards is a maximum of 25. Though 26 or more base boards can be used, the reliability of the SX bus communication is greatly reduced. Be sure to use less than 25.
> · In principle the bases (power supplies) of the SPH system should be turned on at the same time. However, if several bases (power supplies) are required to be OFF for certain reasons of application program, the number of bases should be a maximum of three in series for the SPH system. (Servo amplifier, I/O terminal, and POD directly connected to the SX bus are also included.)

(3) Precautions for connecting baseboards and units to the SX bus

The baseboards and units that are connected to the SX bus are classified into two groups: those which are supplied power for SX bus transmission from their own power supply and those which are supplied such power from other unit.

Unit that has its own power supply for SX bus transmission	Unit that is supplied external power for SX bus transmission
• Baseboard (when the power switch is turned ON) • SX bus optical converter (when external 24V power supply is connected) (Note 2)	• I/O terminal • SX bus optical converter (when external 24V power supply is not connected) • UG20 series (POD) • UG30 series (POD) • PCI bus adapted high-performance CPU board (to be built in personal computer) • ISA bus adapted high-performance CPU board (to be built in personal computer) • ISA bus adapted SX bus slave board (to be built in personal computer) • AC servo FALDIC-*a* (alpha) series • Baseboard (when the power switch is turned OFF), equivalent to 3 units of the above

Note: 1) SX bus T branch unit belongs to neither of the above.
      2) The capacity of the unit that supplies 24V DC needs to be considered. 25mA is necessary for each of the units that are supplied power from externally.

When units are used that are supplied power for SX bus transmission from other unit, there is a restriction on the number of such units: maximum 10 units connected in series for each of IN and OUT connectors of the power supply unit.
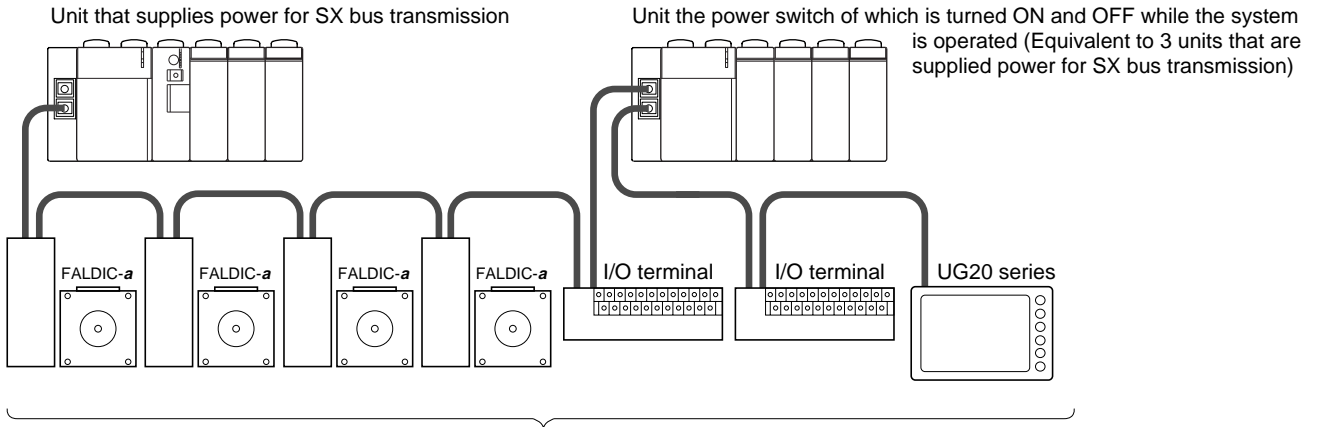
1) Example 1 of system configuration
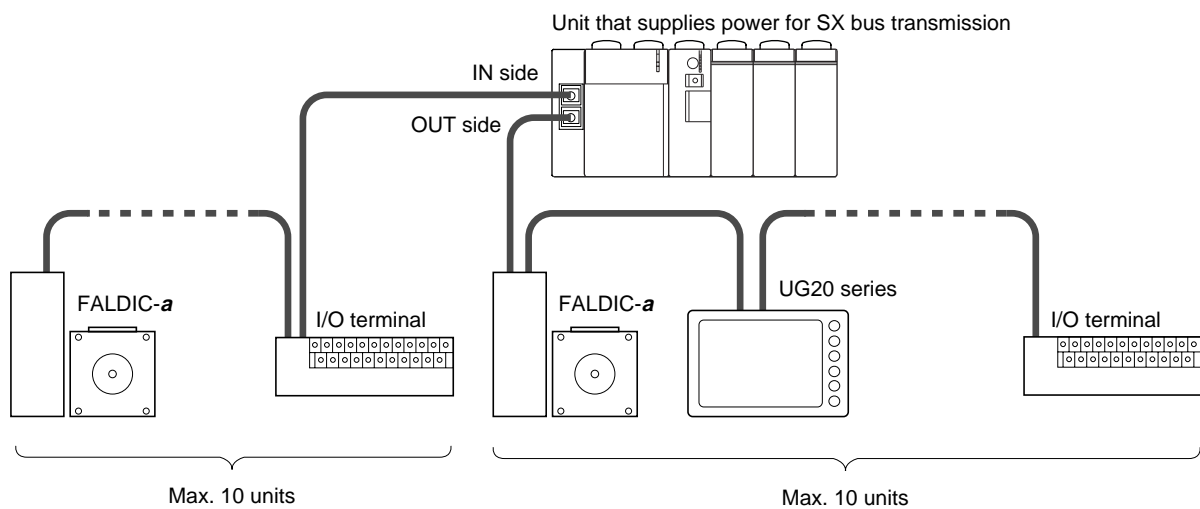
2) Example 2 of system configuration
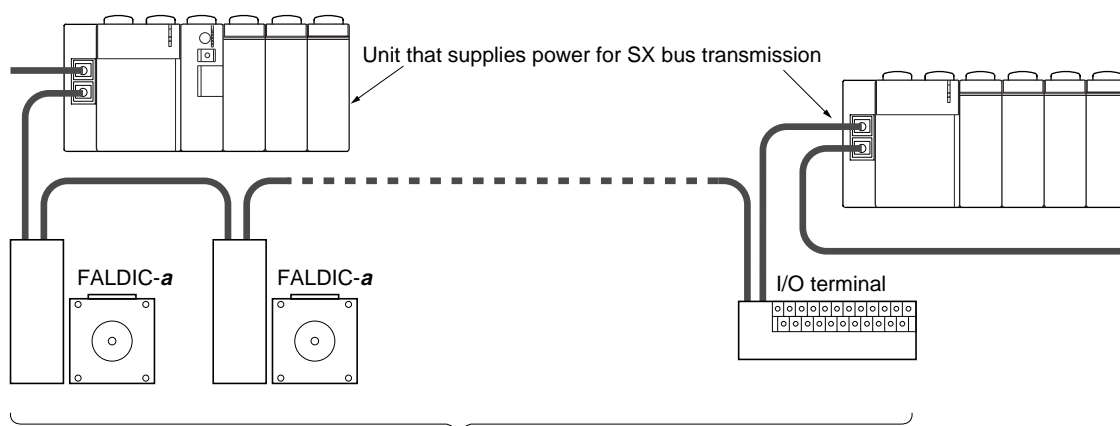
Max. 20 units * Maximum 20 units can be connected in series because each of the two power supply units supplies power for 10 units.

3) Example 3 of system configuration (configuration for fail-soft operation)

For fail-soft operation system, the baseboard changes from "the unit that supplies power for SX bus transmission" to "an equivalent to 3 units that are supplied power for SX bus transmission" when its power switch is turned OFF.

Unit that supplies power for SX bus transmission

Unit the power switch of which is turned ON and OFF while the system is operated (Equivalent to 3 units that are supplied power for SX bus transmission)

| FALDIC-*a* | FALDIC-*a* | FALDIC-*a* | FALDIC-*a* | I/O terminal | I/O terminal | UG20 series |

Max. 8 units * For the above system, maximum 8 units because one baseboard whose power switch is turned OFF is included

2-2-3 SX bus T-branch expansion system
An SX bus T-branch unit (NP8B-TB) can be used to make an SX bus branch.

(1) Example of system configuration
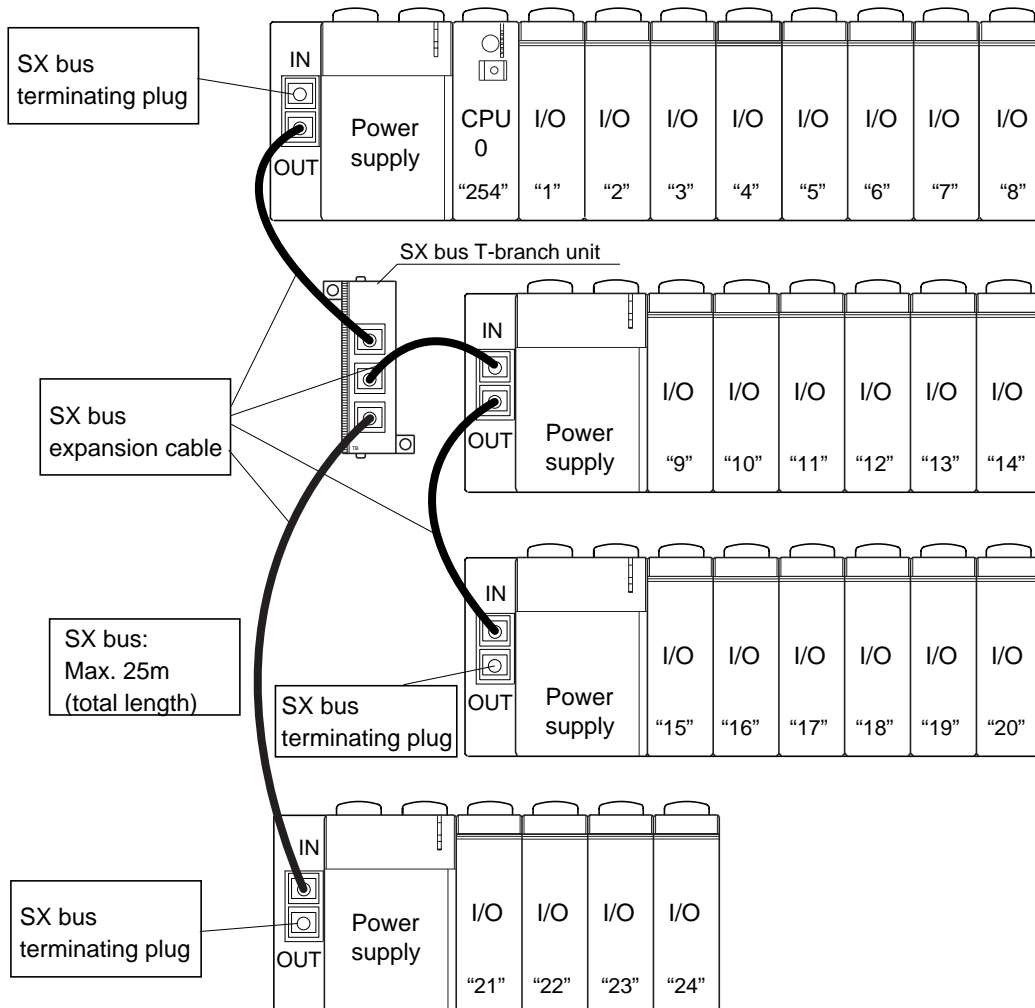
(2) SX bus station No. assignment
The SX bus station numbers are usually assigned by the system configuration definitions in order of 1, 2, 3... from the right side of the CPU0. (An arbitrary number from 1 to 238 can be assigned.) The station numbers using T-branch units are assigned as shown above.
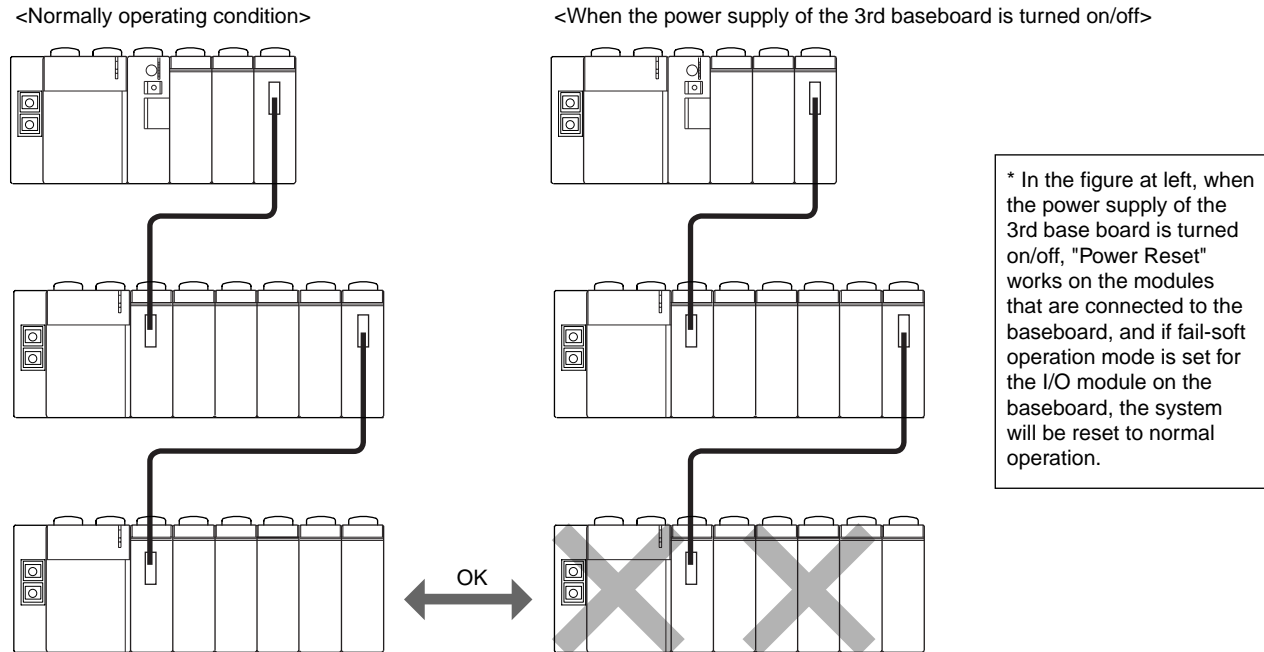
Key-point

· Number of connectable SX bus T-branch units is a maximum of 25 including base boards. Though 26 or more SX bus T-branch units can be used, the reliability of SX bus communication is greatly reduced. Be sure to use less than 25.
· In principle, the bases (power supplies) of the SPH system should be turned on at the same time. However, if several bases (power supplies) are required to be OFF for certain reasons of application program, the number of bases should be a maximum of three in series for the SPH system. (Servo amplifier, I/O terminal, and POD directly connected to the SX bus are also included.)

2-2-4 SX bus optical expansion system

By using the SX bus optical link module (NP1L-OL1) and SX bus optical converter (NP2L-OE1) to set up the SX bus as an optical transmission line, you can construct a long-distance distributed system on SX bus.

(1) Example of system configuration
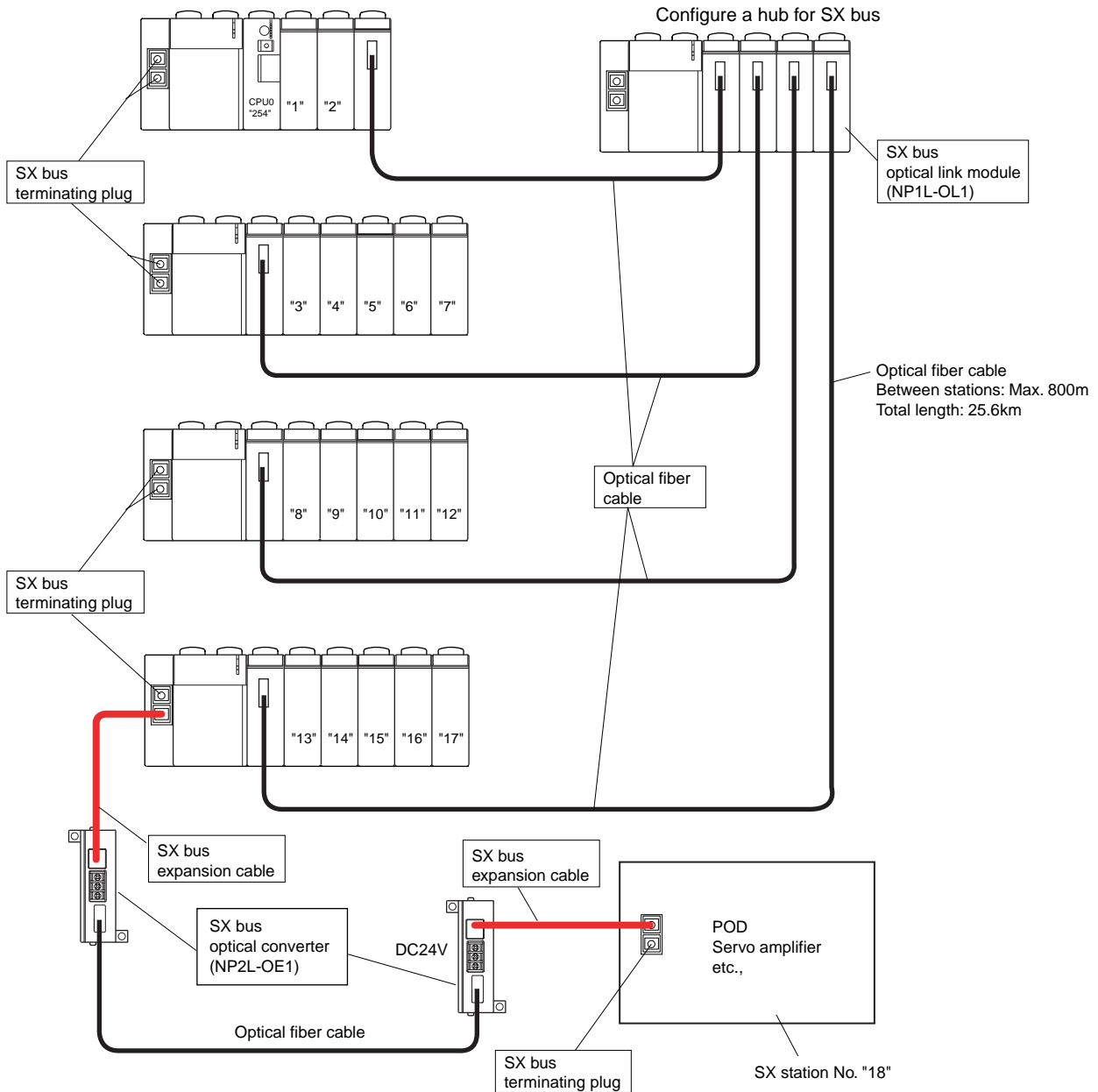
(2) SX bus station No. assignment

The SX bus station numbers are usually assigned by the system configuration definitions in order of 1, 2, 3... from the right side of the CPU0. (An arbitrary number from 1 to 238 can be assigned.) The station numbers using T-branch units are assigned as shown above.

Key-point

· Maximum number of connectable the SX bus link modules and the SX bus optical converters per the SPH system is 64.
· Maximum transmission distance of optical fiber (PCF) is 800 m (25°C) between stations. Maximum extended length of a system is 25.6 km.
· For specifications and handling of the SX bus optical link module and the SX bus optical converter, refer to "3-8 Communication module specifications".

(3) Turning on/off part of the power supplies of the SX bus optical expansion system

For partially turning on/off the power supply of MICREX-SX, you must enable a fail-soft operation mode in advance. It must be noted here that if power is turned on/off partly for a system that uses SX bus optical link devices, the system may not be reset normally, depending on the system configuration, even when a fail-soft operation mode is enabled.

1) Example in which fail-soft operation is performed normally

<Normally operating condition>   <When the power supply of the 3rd baseboard is turned on/off>

OK

> * In the figure at left, when the power supply of the 3rd base board is turned on/off, "Power Reset" works on the modules that are connected to the baseboard, and if fail-soft operation mode is set for the I/O module on the baseboard, the system will be reset to normal operation.

2) Example in which fail-soft operation is not normally performed

<Normally operating condition>   <When the power supply of the 2nd baseboard is turned on/off>

NG

← Disconnected from CPU to fall into Heavy Error condition.
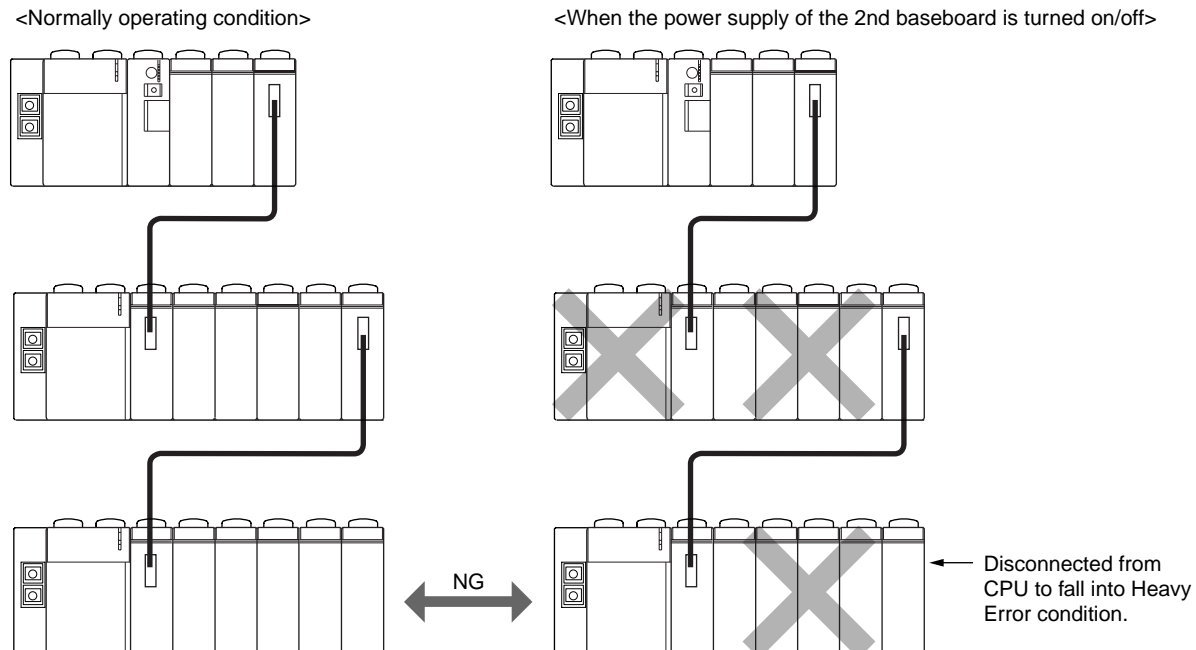
> * In the above figure, if the power supply of the 2nd baseboard is turned off, the modules fall into Heavy Error conditions because they are disconnected from the CPU. Therefore, the system cannot restart even when the power supply of the 2nd baseboard is turned on again.
> To cancel the Heavy Error condition, you need to reset the power supply of the 3rd baseboard together with that of the 2nd baseboard or reset the power supply of the baseboard on which the CPU module is mounted, after the power supply of the 2nd baseboard is turned on.

Note: For a detailed explanation of fail-soft operation, refer to "Section 3 System Configuration" in the Commands Volume. For a detailed explanation of fail-soft operation using SX bus optical link devices, please ask Fuji Electric.

(4) Restrictions on redundant systems
For redundant systems, CPU modules cannot be arranged or distributed via optical link.
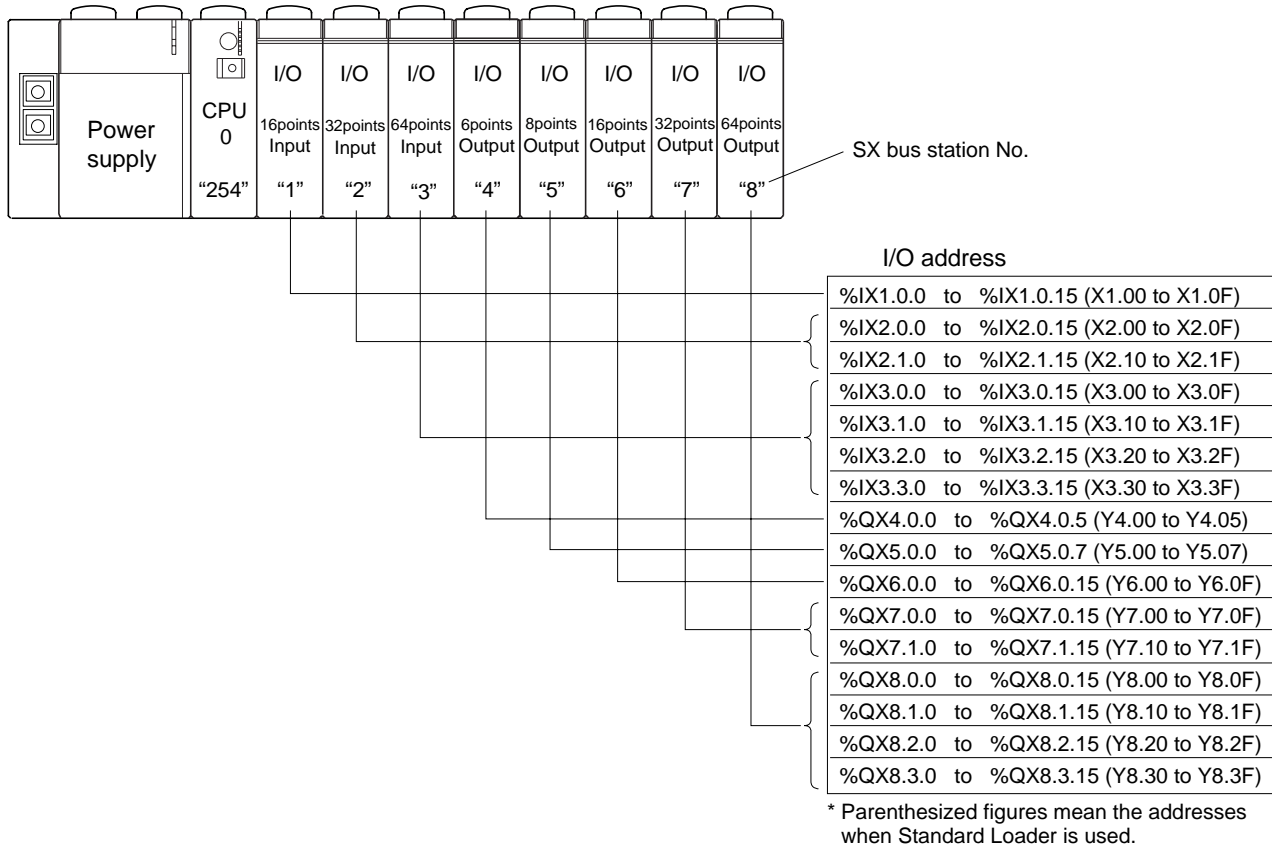
\<Reason\>
If the optical fiber cable is broken, the optical link device (SX bus optical converter and SX bus optical link module) bypasses the SX bus signal within it. Consider a system in which the operating CPU and standby CPU are connected by optical fiber cable. If the optical fiber cable is broken, two SX bus loops are generated, because the SX bus signal is bypassed in the optical link device. In this case, an individual CPU recognizes another CPU as being disconnected, and each CPU works as an "operating CPU" in each SX bus loop. In this condition, when the broken optical fiber cable is restored but the system is not reset, there will be two operating CPUs on one SX bus loop. Therefore, system operation cannot be guaranteed.

Note: For a detailed explanation of a redundant system, refer to "2-2-8 Multi-CPU system".

2-2-5 I/O address assignment

I/O address assignment is shown below.

<Example of system configuration>

I/O address

%IX1.0.0 to %IX1.0.15 (X1.00 to X1.0F)	
%IX2.0.0 to %IX2.0.15 (X2.00 to X2.0F)	
%IX2.1.0 to %IX2.1.15 (X2.10 to X2.1F)	
%IX3.0.0 to %IX3.0.15 (X3.00 to X3.0F)	
%IX3.1.0 to %IX3.1.15 (X3.10 to X3.1F)	
%IX3.2.0 to %IX3.2.15 (X3.20 to X3.2F)	
%IX3.3.0 to %IX3.3.15 (X3.30 to X3.3F)	
%QX4.0.0 to %QX4.0.5 (Y4.00 to Y4.05)	
%QX5.0.0 to %QX5.0.7 (Y5.00 to Y5.07)	
%QX6.0.0 to %QX6.0.15 (Y6.00 to Y6.0F)	
%QX7.0.0 to %QX7.0.15 (Y7.00 to Y7.0F)	
%QX7.1.0 to %QX7.1.15 (Y7.10 to Y7.1F)	
%QX8.0.0 to %QX8.0.15 (Y8.00 to Y8.0F)	
%QX8.1.0 to %QX8.1.15 (Y8.10 to Y8.1F)	
%QX8.2.0 to %QX8.2.15 (Y8.20 to Y8.2F)	
%QX8.3.0 to %QX8.3.15 (Y8.30 to Y8.3F)	

* Parenthesized figures mean the addresses when Standard Loader is used.

<Addressing modes>

<For D300win>

Prefix	SX bus station No.	Period →	Word No.	Period →	Bit address (0 to 15)

%IX(bit), %IW(word), %ID(double-word)
%QX(bit), %QW(word), %QD(double-word)

<For Standard Loader>

Prefix	SX bus station No.	Period →	Word No. + Bit address (0 to F)

%IX(bit), %IW(word), %ID(double-word)
%QX(bit), %QW(word), %QD(double-word)

2-2-6 T-link distributed expansion system

T-link system is configured by mounting a T-link master module (NP1L-TL1) on the SX bus (on the base board). One T-link master module has 32 slave stations and a maximum 100m of transmission line.

(1) Example of system configuration

For detailed specifications and operations of the T-link system, refer to "MICREX-SX series T-link master module User's Manual FEH204."

· On the base board (slave station) on which the T-link interface module is mounted, mountable modules are digital I/O modules and analog I/O modules except high-speed input modules, high-speed output modules, and analog modules (NP1AX08□-MR)
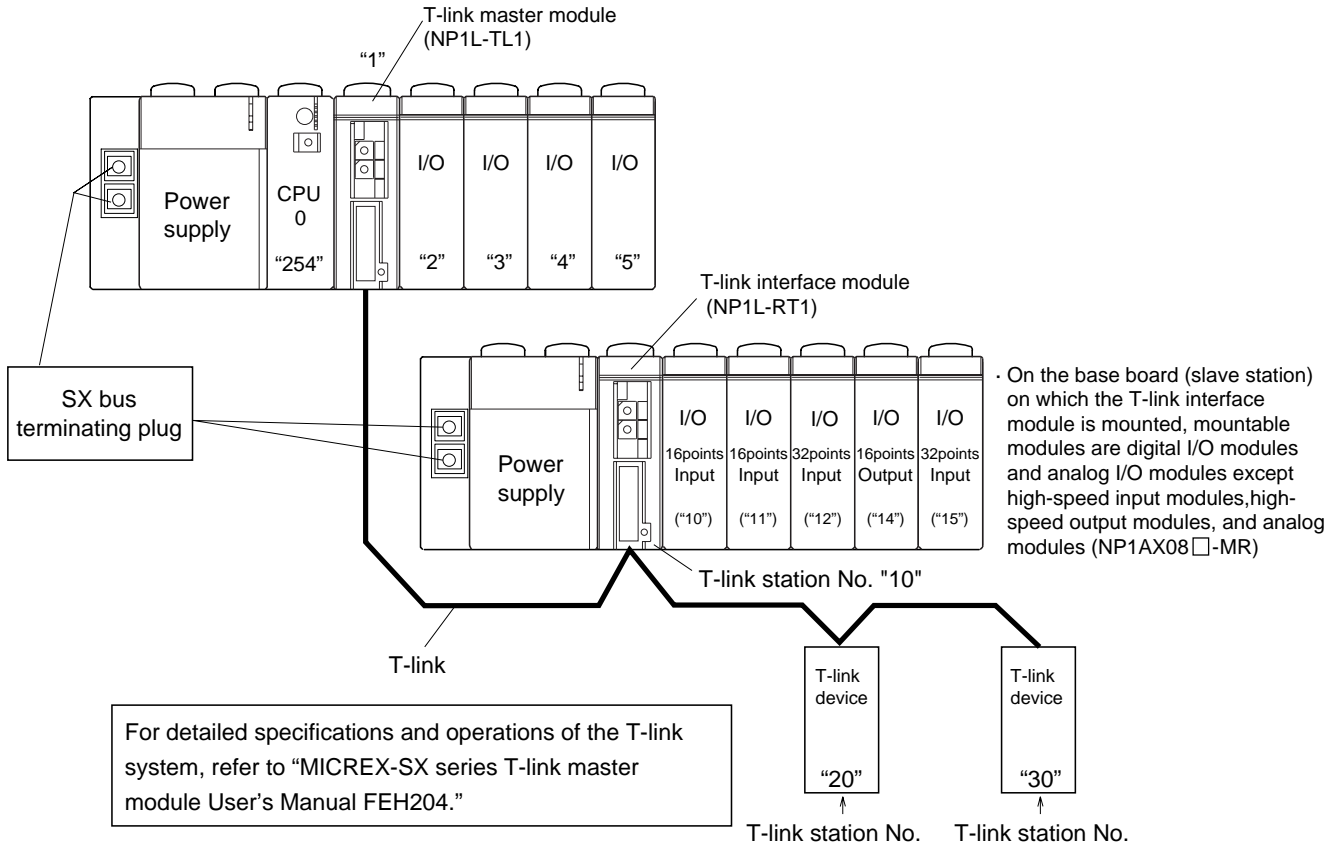
(2) I/O address assignment on the T-link

I/O address on the T-link is assigned to the I/O area of SPH same as I/O on the SX bus.

<Addressing modes>

<For D300win>

<For Standard Loader>
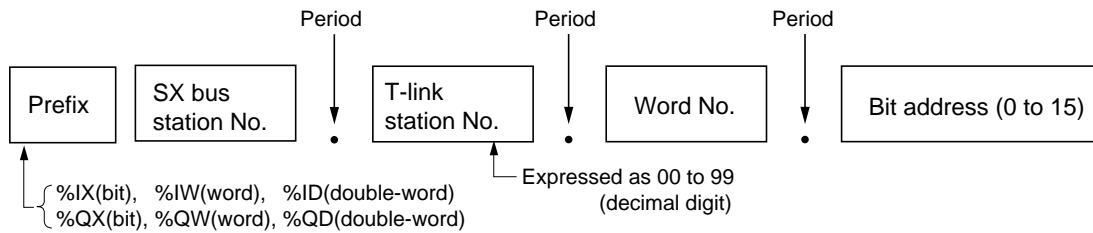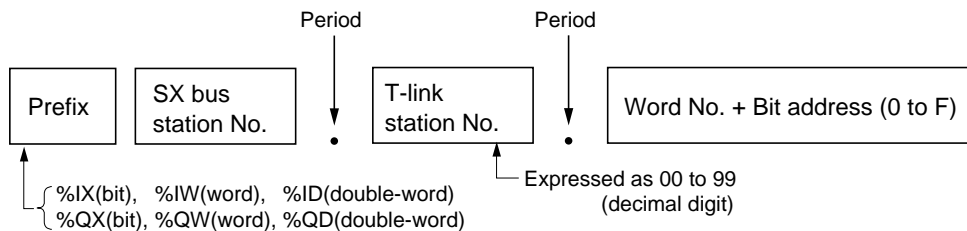
2-2-7 Multi-CPU system (SPH300 and SPH2000 only)

In MICREX-SX series, a multi-CPU system can be configured by connecting multiple CPUs to the processor bus and by mounting multiple CPUs on the SX bus.

The number of CPUs is a maximum of eight in a multi-CPU system.

(1) Example of system configuration

In the system below, CPU0 controls I/O (1), (2), (3) and Positioning control (1), and CPU1 controls Positioning control (2), General communication and I/O (4).
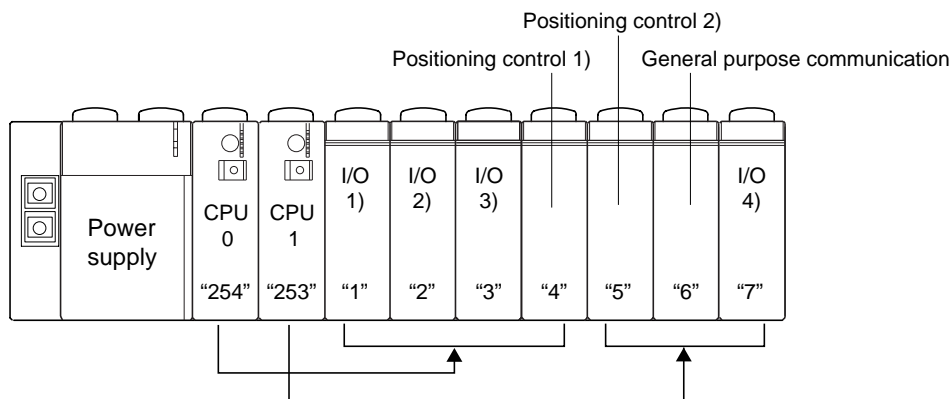
(2) CPU No. selection

CPU number is selected from No.0 by the key switch on the front of the CPU module.

(3) SX bus station No. assignment

The SX bus station numbers of the I/O modules are usually assigned by the system configuration definitions in order of 1, 2, 3... from the right side of the CPU0. However, SX bus station numbers of the CPU modules are assigned by CPU number selection key switch as follows:

<The relationship between CPU No. and SX bus station No.>

The SX bus station number is decided by the selected CPU number. No.0 to No.7 are for CPU module,and No.8 and No.9 are for P/PE-link.

CPU No.	SX bus station No.		CPU No.	SX bus station No.	
0	254		8	246	For Processor-link module
1	253		9	245	
2	252		A	244	
3	251	For CPU module	B	243	
4	250		C	242	Reserved
5	249		D	241	
6	248		E	240	
7	247		F	239	

Key-point

· CPU0 (CPU module selected No. 0) is necessary for both a Single-CPU system and Multi-CPU system.

· CPU No. selection is necessary for a CPU module, a P/PE-link module and a waiting CPU module of a Duplex-CPU system.

· In multi-CPU system, system configuration definitions must be same for all CPUs.

2-2-8 Redundant CPU system (SPH300 and NP1PM-256H only)

A control system in which devices are used doubly for the purpose of improving safety and reliability is said to be "redundant". With the MICREX-SX Series, power module and CPU module can be set up as "redundant". This section describes CPU module redundancy. For the MICREX-SX Series, there are two modes of CPU redundancy: 1:1 redundancy and N:1 redundancy. (NP1PM-256H is not available for N:1 redundancy.)

(1) 1:1 redundancy

This method achieves CPU redundancy by installing one unit of a standby CPU for one unit of an operating CPU. Each CPU0-CPU1, CPU2-CPU3, CPU4-CPU5 and CPU6-CPU7 makes up a pair of an operating CPU and standby CPU. Application programs use the same pairing.

<Sample configuration of 1:1 redundant CPU pair>

Operating CPU
· Execution of application
· I/O control
· Monitoring and control of whole system
· Outputting equivalent data to standby CPU (see note)

Standby CPU
· I/O data input
· Monitoring of operating CPU
· Inputting equivalent data from operating CPU (see note)

Note: Cold standby system does not take over equivalent data.

CPU 0

CPU 1

SX bus
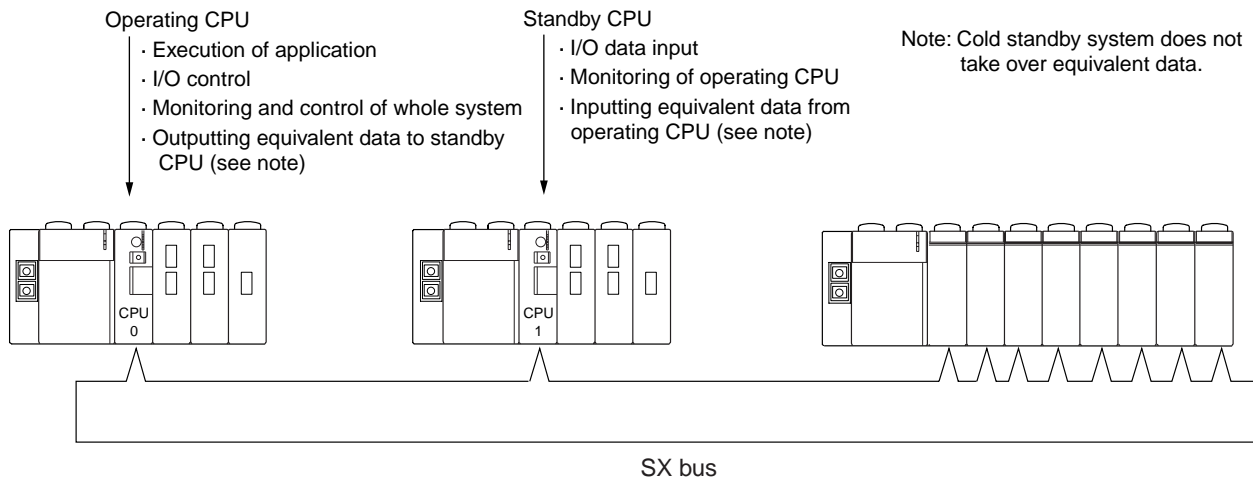
1) System operation

When the power supply for the system is turned on, the system starts operation, in which the CPU module that is given an even CPU number becomes the operating CPU while the CPU module that is given an odd CPU number is the standby CPU. (For the configuration as shown above, CPU0 becomes the operating CPU while CPU1 is the standby CPU.)
If the operating CPU stops due to an error occurring, the standby CPU starts operation.
There are two types of 1:1 redundancy: a "warm standby" in which the standby CPU takes over the data of the operating CPU when starting, and "cold standby" in which the standby CPU does not take over the data of the operating CPU when starting. The data that is taken over by the standby CPU in a warm standby system is referred to as "equivalent data", the range of which is specified by system definition.

2) Replacing a failed CPU

With the above system configuration, no module other than the power module is mounted on the baseboard on which the individual CPU is mounted, so it is possible to replace CPU0 while CPU1 is operating due to an error occurring on CPU0. The replacement procedure is: (1) Turn off the CPUO power supply, (2) Replace the CPU0, and (3) Turn on the CPUO power supply. The restored CPU0 becomes the standby CPU.
If the operating CPU and standby CPU of a redundant system are both abnormal, turn their power supplies off once and then on again.

> **Key-point**
>
> · The same application program needs to be installed in both the operating CPU and standby CPU.
> · For both the warm standby and cold standby systems, I/O data is taken over by the standby CPU when it starts operating.
> · "Operating" and "standby" modes can be changed over from the loader.
> · For redundant systems, use two-slot size power supply modules. Do not use single-slot size power supply modules.

(2) N:1 redundancy (SPH300 only)
This method achieves CPU redundancy when you install one standby CPU for multiple (2 to 7) operating CPUs. A maximum of two n:1 redundant groups can be defined for one configuration. The CPU that is assigned the highest CPU number in a registered group becomes the standby CPU.

<Sample configuration of a 2:1 redundant group>

Operating CPU
· Execution of application
· I/O control
· Monitoring and control of whole system

Standby CPU
· Monitoring of operating CPU/whole system

Memory card if

CPU 0

CPU 1

CPU 2

SX Bus
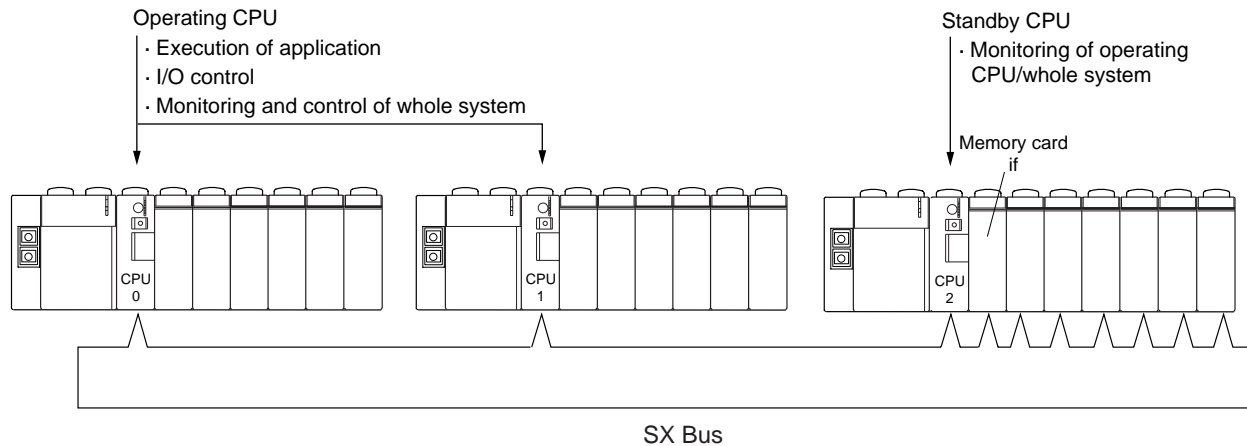
1) System operation
When the power supply of the system is turned on, the system starts operation, and the CPU module that is assigned the highest CPU number in the N:1 redundant group becomes the standby CPU. (For the configuration as shown above, the CPU0 and CPU1 become the operating CPUs while the CPU2 is the standby CPU.)
If an error occurs on either the CPU0 or CPU1 to make it inoperable, the standby CPU downloads the programs for the failed CPU from the memory card interface module to start operation. Only "cold standby" is available for N:1 redundant systems. No data of an operating CPU can be taken over by a standby CPU.

2) Replacing a failed CPU
With the above system configuration, no module other than the power module is mounted on the baseboard on which the individual CPU is mounted, so it is possible to replace the failed CPU1, while the CPU2 is operating, due to an error occurring on CPU1. Replacement procedure: (1) Turn off the power supply for the CPU1, (2) Replace the CPU1, and (3) Turn on the power supply for the CPU1. However, the restored CPU is in standby mode awaiting a mode change-over command issued from the loader or for the power supply for the whole system being reset. Therefore, the system is not "N:1 redundant" immediately after the failed CPU is restored.

> **Key-point**
>
> · Application programs for N units (for the number of operating CPUs) need to be installed in the memory card interface module.
> · Only cold standby is available for N:1 redundant systems. Internal data or I/O data cannot be taken over by the standby CPU when it starts operating.
> · "Operating" and "standby" modes can be changed over from the loader. After replacement of the failed CPU, you need to change the mode of the operating CPU.
> · With an N:1 redundant system, program read/write operation with the switch provided on the front of the memory card interface module is disabled. Do not use the memory card interface module that stores application programs for the N:1 redundant system as the file memory for reading/loading file data from/to the CPU application program. To read/load files, be sure to prepare another memory card interface. Sharing the memory card interface module may result in access conflict, making the mode change-over between "operating" and "standby" impossible for CPUs of a redundant system.
> · For redundant systems, use two-slot size power supply modules. Do not use single-slot size power supply modules.

2-2-9 P/PE-link system

P/PE-link system is high speed network system which transfers data between different configurations of MICREX-SX series. (Transfer rate: 5 Mbps)

The configuration is connected to the P/PE-link by mounting a P/PE -link module on the SX bus (on the base board).

(1) Example of system configuration
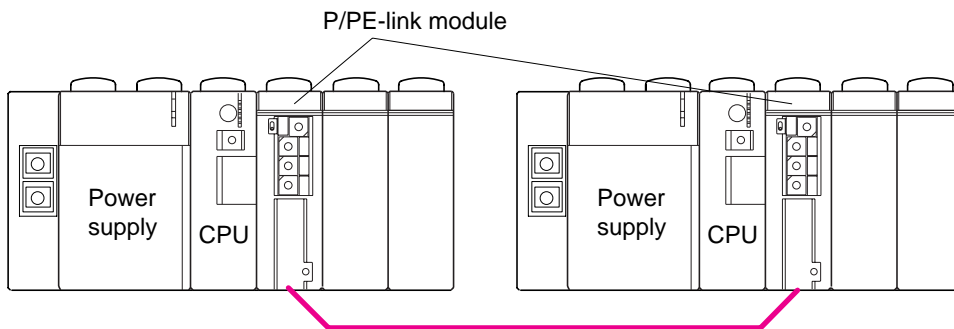
P/PE-link module

P-link (Total length: Max. 250m, No. of connectable stations: Max. 16)
PE-link (Total length: Max. 500m, No. of connectable stations: Max. 64)

(2) SX bus station No. assignment

CPU number of the P/PE-link module is selected by the key switch on the front of the module like as CPU module.

<The relation between CPU No. and SX bus station No.>

No. 0 to No. 7 are for the CPU module, and No. 8 and No. 9 are for the processor link (FL-net, P-link, PE-link).

CPU No.	SX bus station No.	
0	254	
1	253	
2	252	
3	251	For CPU
4	250	module
5	249	
6	248	
7	247	

CPU No.	SX bus station No.	
8	246	For Processor-link
9	245	module
A	244	
B	243	
C	242	
D	241	Reserved
E	240	(Note)
F	239	

Note: The number of processor link modules connected can be increased in accordance with the CPU version and loader version.

For detailed specifications and operations of P/PE-link system, refer to "MICREX-SX series P/PE-link module User's Manual FEH203."

2-2-10 FL-net (OPCN-2) system

FL-net is the open network system that connects various FA controllers and personal computers, such as programmable controllers (PLCs) and arithmetic units (CNCs) from different manufacturers to control or monitor the system.

(1) Example of basic system configuration

* FL-net
No. of connectable nodes: 100 units/segment
(256 units when repeater is used)
Transmission rate: 10 Mbps/100 Mbps
(when NP1L-FL3 is used)
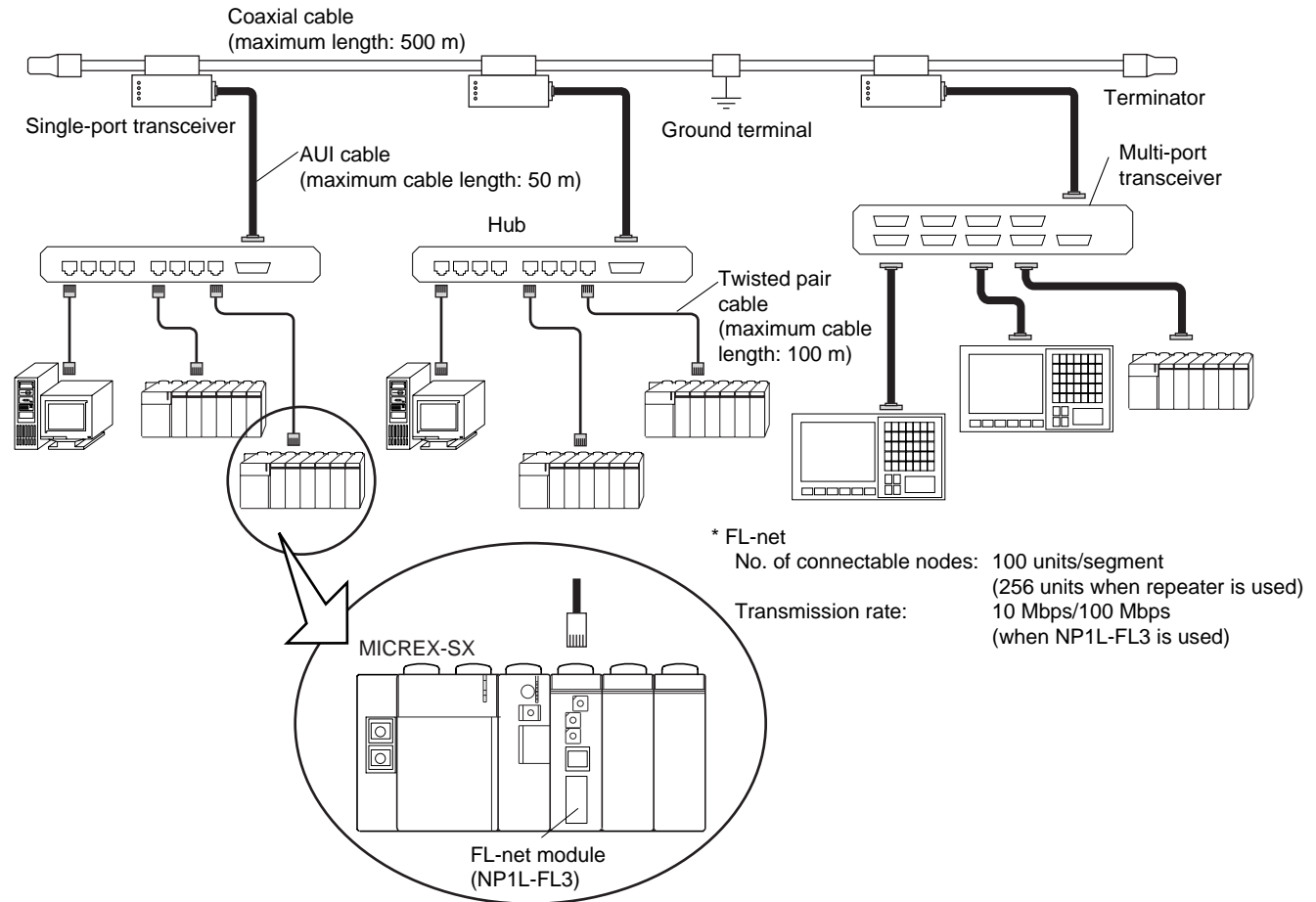
(2) SX bus station No. assignment

As with the CPU module, the CPU number of an FL-net module is assigned by the switch on the module front panel. According to the assigned number, an SX bus station number is assigned as follows:

<The relationship between CPU No. and SX bus station No.>
No. 0 to No. 7 are for the CPU module, and No. 8 and No. 9 are for the processor link (FL-net, P-link, PE-link).

CPU No.	SX bus station No.		CPU No.	SX bus station No.	
0	254		8	246	For Processor-link module
1	253		9	245	
2	252		A	244	
3	251	For CPU module	B	243	
4	250		C	242	
5	249		D	241	Reserved (Note)
6	248		E	240	
7	247		F	239	

Note: The number of processor link modules connected can be increased in accordance with the CPU version and loader version.

For detailed specifications or for using the method of the FL-net system, refer to "User's Manual FL-net modules, MICREX-SX series" (FEH234).

2-2-11 OPCN-1 system

OPCN-1 system is configured as a master station by mounting OPCN-1 master module on the SX bus (on the base board).
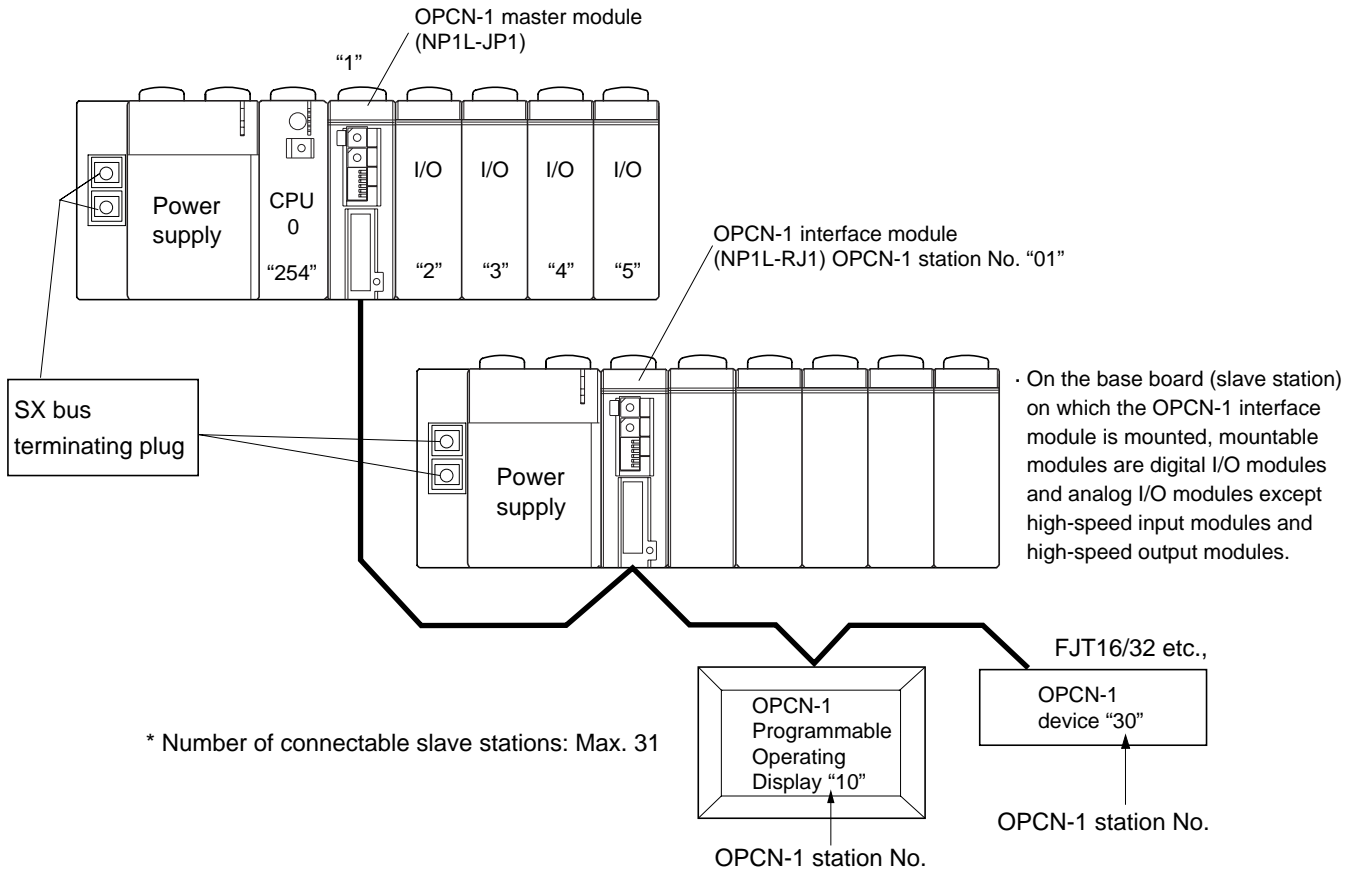
(1) Example of system configuration

OPCN-1 master module (NP1L-JP1) "1"

Power supply

CPU 0 "254"

I/O "2"　I/O "3"　I/O "4"　I/O "5"

OPCN-1 interface module (NP1L-RJ1) OPCN-1 station No. "01"

SX bus terminating plug

Power supply

· On the base board (slave station) on which the OPCN-1 interface module is mounted, mountable modules are digital I/O modules and analog I/O modules except high-speed input modules and high-speed output modules.

* Number of connectable slave stations: Max. 31

OPCN-1 Programmable Operating Display "10"

FJT16/32 etc.,

OPCN-1 device "30"

OPCN-1 station No.

OPCN-1 station No.

(2) SX bus station No. assignment

The SX bus station numbers are usually assigned by the system configuration definitions in order of 1, 2, 3... from the right side of the CPU0. However, SX bus station number is not assigned to JPCN-1 slave station.

For detailed specifications and operations of OPCN-1 system, refer to "MICREX-SX series SPH OPCN-1 master module User's Manual FEH238."

2-2-12 DeviceNet system

(1) Example of system configuration
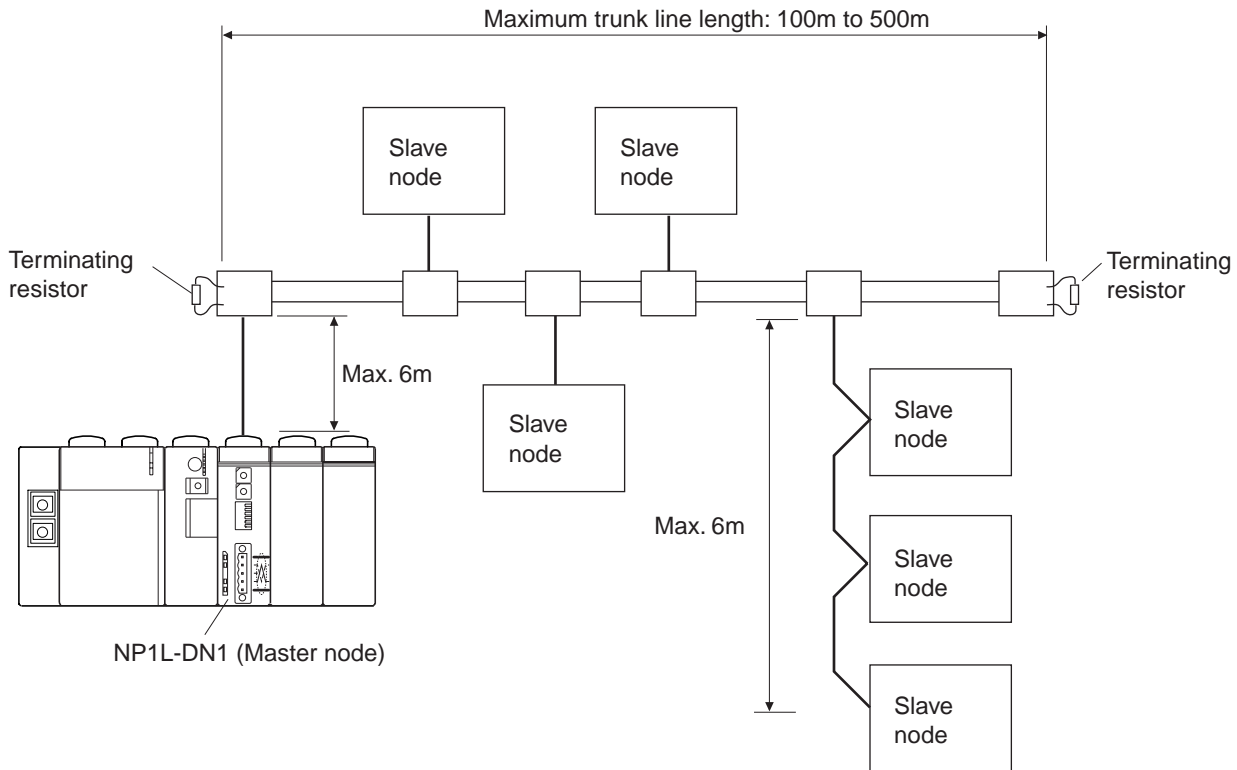
Note: The maximum length of a trunkline depends on the transmission rate and the type of cable to be used. (500m: 125 kbps, 250m: 250kbps, 100m: 500kbps)

(2) SX bus station No. assignment
For the bus SX station number, in general, the system configuration definitions assigns "1", "2", "3"... from the node on the right of the CPU0 in order. However, no SX bus station No. is assigned to the slave nodes of DeviceNet.

For detailed specifications and operations of DeviceNet system, refer to "MICREX-SX series SPH DeviceNet master module User's Manual FEH232."

2-2-13 SPH300EX system

(1) Example of single CPU configuration

| Devices connected to the Basic SX-bus. |
| SX-bus terminating plug |

<Connectable Devices>
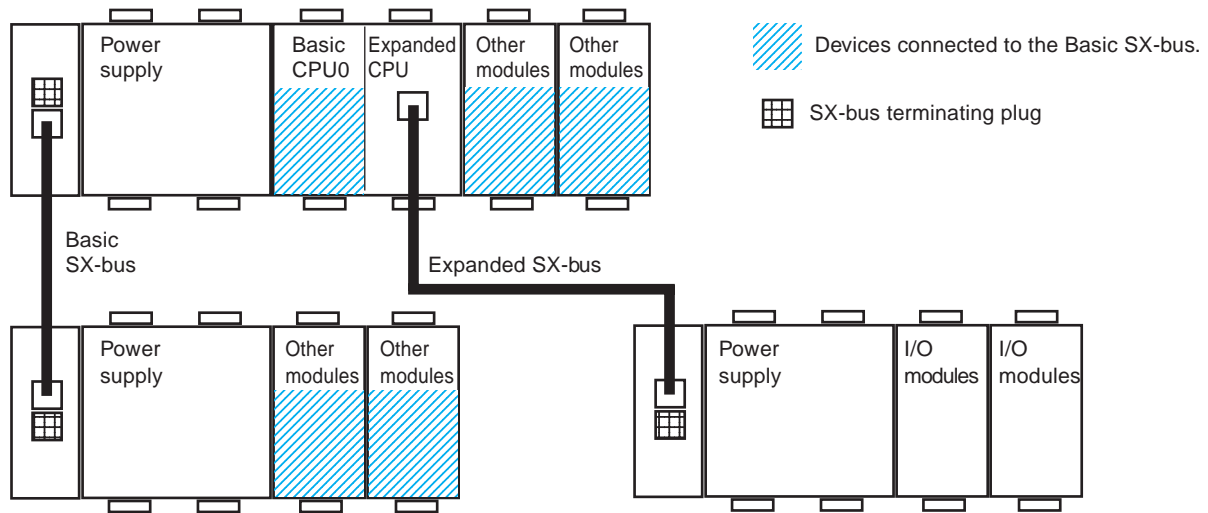
A variety of I/O modules, communication modules, and PODs supporting the SX-bus can be connected to the Basic SX-bus as shown in the illustration. This function has the same specifications as the SPH300.

I/O (digital I/O and analog I/O) modules, servos, and inverters, which transmit data in the same way I/O modules do, are connected to the Expanded SX-bus. No PODs or communication modules can be connected.

(2) SX bus station No. assignment

The system configuration definition assigns the SX bus station numbers in numerical order (1, 2, 3...) from the node on the right of the CPU0.

> For detailed specifications and operations of the SPH300EX, refer to "MICREX-SX series SPH300EX Module User's Manual FEH192."

Section 3 Specifications

Item		Specification	
Physical environmental conditions	Operating ambient temperature	0 to 55° C (Surrounding Air Temperature)	IEC 61131-2
	Storage temperature	-25 to +70° C	
	Relative humidity	20 to 95%RH no condensation (Transport condition: 5 to 95%RH no condensation)	
	Pollution degree	2 (Note1)	
	Corrosion immunity	Free from corrosive gases. Not stained with organic solvents.	
	Operating altitude	2000m or less above sea level (Transport condition: 70kPa or more)	
Mechanical service conditions	Vibration	Half amplitude: 0.15mm, Constant acceleration: 19.6 m/s^2, Two hours for each of three mutually perpendicular axes, total six hours. (Note 2) (Note 3)	
	Shock	Acceleration peak: 147 m/s^2 Three times for each of three mutually perpendicular axes. (Note 2)	
Electrical service conditions	Noise immunity	1.5kV, rise time 1 ns, pulse width 1 μs (noise simulator)	JEM TR177
	Electrostatic discharge	Contact discharge: ± 4kV Aerial discharge: ± 8kV	IEC 61000-4-2
	Radiated, radioe-frequency, electromagnetic field	80 to 1000MHz (10V/m) 1.4 to 2.0 GHz (3V/m) 2.0 to 2.7 GHz (1V/m)	IEC 61000-4-3
	EFT/B (Electrical fast transient/burst)	Equipment power, I/0 power, AC I/O (unshielded): ± 2kV Data communication, digital and analog I/O s' (except AC unshielded I/O): ± 1kV	IEC 61000-4-4
	Lightning impulse surge	AC equipment power: ± 2kV common mode, ± 1kV differential mode DC equipment power: ± 0.5kV common mode, ± 0.5kV differential mode	IEC 61000-4-5
	Conducted radio frequency	150kHz to 80MHz. 10V	IEC 61000-4-6
	Power frequency magnetic field	50Hz, 30A/m	IEC 61000-4-8
Construction		Panel-mounted type(open equipment)	-
Cooling		Air cooling	-
Dielectric property		Dielectric strength and Insulation resistance are described in each module's specifications.	-
Internal current consumption		Described in each module's (unit's) specifications.	-
Mass		Described in each module's (unit's) specifications.	-
Dimensions		Described in 3-11	-

Note: 1) Pollution degree 2: This pollution does not conduct usually, but under certain circumstances temporary conductivity occurs due to condensation.
   2) The unit is fixed by screws to the control panel. When the unit is mounted to the DIN rail, care must be taken that vibrations or shocks will not occur.
   3) In an environment where repetitive or continuous vibration occurs, be sure to take vibration-proofing measures.

3-2 Power Supply Module Specifications

3-2-1 Power supply specifications

Item	Specification			
Type(Note5)	NP1S-22(NP1S-22 A)	NP1S-42	NP1S-91(NP1S-91A)	NP1S-81(NP1S-81A)
Rated input voltage (tolerance)	100 to 120/200 to 240V AC (85 to 132V AC) (170 to 264V AC)	24V DC (19.2 to 30V DC)	100 to 120V AC (85 to 132V AC)	200 to 240V AC (170 to 264V AC)
Rated frequency	50/60Hz	-	50/60Hz	
Frequency (tolerance)	47 to 63Hz	-	47 to 63Hz	
Dropout tolerance (Note 2)	1 cycle or less (Note 1)	10ms or less (When rated voltage, and rated load)	1 cycle or less (Note 1)	
AC waveform distortion factor	5% or less	-	5% or less	
Ripple factor tolerance	-	Three-phase full-wave rectification can be used. 5% or less	-	
Leakage current	0.25mA or less			
Inrush current	22.5A$_{0-P}$ or less (Ambient temperature =25° C not repeated) 1ms or less	150A$_{0-P}$ or less 2ms or less	22.5A$_{0-P}$ or less (Ambient temperature=25° C not repeated) 1ms or less	
Power consumption (Note 3)	110VA or less	45W or less	40VA or less	50VA or less
Rated output voltage (tolerance) (Note 4)	24V DC (22.8 to 26.4V DC)			
Output current	0 to 1.46A		0 to 0.625A	
Isolation method	Transducer			
Dielectric strength	2300V AC, 1minute between power input terminals and ground	510V AC, 1 minute between power input terminals and ground	1400V AC, 1 minute between power input terminals and ground	2300V AC, 1 minute between power input terminals and ground
Insulation resistance	10MΩ or more (500V DC megger)			
Occupied slots	2		1	
Alarm output	Provided :Relay NC contact output Object: Monitoring of output voltage Output specification: 24V DC, 0.3A or less (AC power supply are not used)		Not provided	
Mass	Approx. 360g	Approx. 360g	Approx. 180g	

Note 1) This is a value from rated voltage to 0V and for all phases.
Note 2) The value when the interval between momentary power failures is 1 second or longer
Note 3) The value under maximum load when rated voltage is input
Note 4) Maximum 3 units of NP1S-22, NP1S-42, NP1S-91 or NP1S-81 can be mounted in parallel on one base board.
Note 5) These name are shown on product.
    Ordering code is NP1S-22/NP1S-42/NP1S-91/NP1S-81(without suffix A)

3-2-2 Names and functions

(1) NP1S-22/NP1S-42

2) Terminal block (6 poles)
Note: Unremovable

1) Status indication LED

Nameplate

Version No.

3) ALM output connector
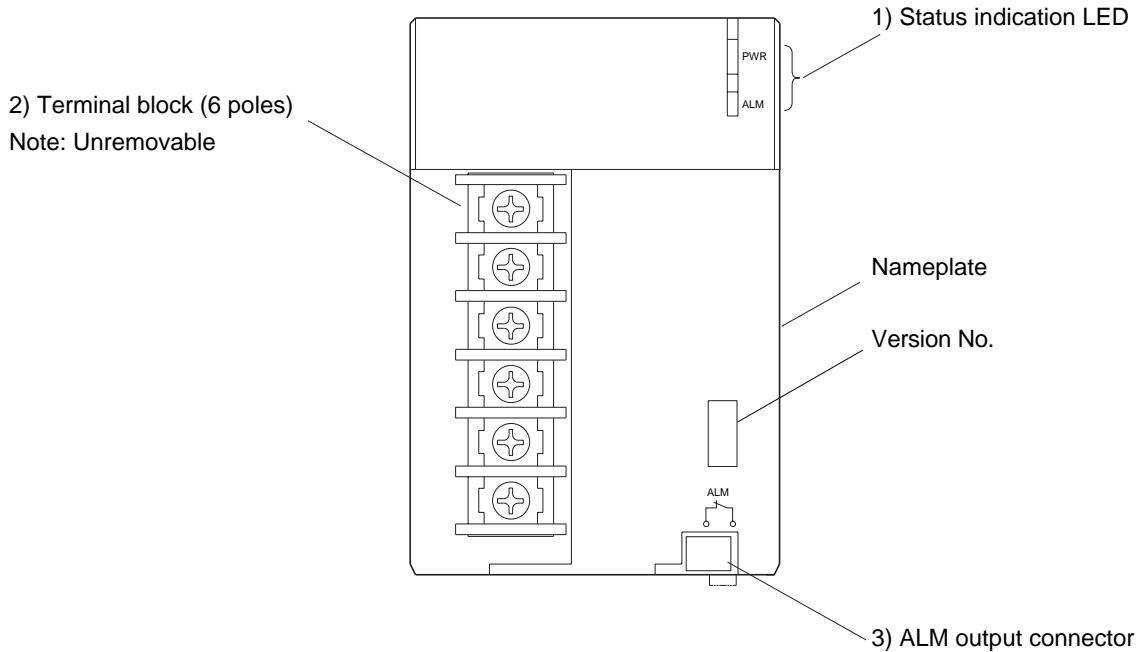
Note: Terminal cover is removed in this figure to explain functions.

1) Status indication LED

Symbol	Color	Description
PWR	Green	Turns on when the output voltage is within the rated range. Turns off when out of the range.
ALM	Red	Turns on when the output voltage is within the rated voltage.

2) Terminal block (6 poles)
This is a terminal block (M4) with 6 poles. Signals are as follows.
(Tightening torque: 1.2N·m, Applicable wire size: 2mm^2)

<NP1S-22 (AC power supply)>

100 to 200V AC $\left(\begin{array}{l}\text{85 to 132V AC}\\\text{170 to 264V AC}\end{array}\right)$

LG

FG

Jumper plate for 100/200V $\left(\begin{array}{l}\text{Short: 100V AC}\\\text{Open: 200V AC}\end{array}\right)$

<NP1S-42 (DC power supply)>

+ 24V DC
- (19.2 to 30V DC)

LG

FG

NC

NC
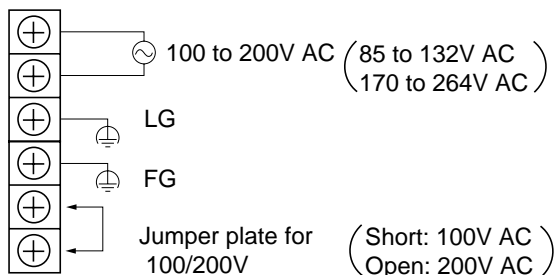
3) ALM output connector
The ALM contact is an NC contact. While the power supply module is normal (output voltage is 22.8 to 26.4V), the ALM contact is OFF. If the power supply module is not normal, the ALM contact is ON. The rated voltage is 24V DC, the rated current is 0.3A.
The connector with cable (length: 600 mm) is supplied with the product.

3-2 Power Supply Module Specifications

(2) NP1S-91/NP1S-81

1) Status indication LED

2) Terminal block (3 poles)

Nameplate

Version No.
(Indicated on the
back side of the cover)

Terminal cover

⚠ **WARNING**

⚡ Hazardous
Voltage.

Note: In the left side figure, the terminal cover is removed only for explanation purpose.
The right side figure shows the terminal cover mounted condition.

1) Status indication LED

Symbol	Color	Description
PWR	Green	Turns on when the output voltage is within the rated range.

2) Terminal block (3 poles)

This is a terminal block (M4) with 3 poles. Signals are as follows.
(Tightening torque: 1.0N·m, Applicable wire size: 2mm^2)

<NP1S-91>

100V AC

FG

<NP1S-81>

AC200V

FG
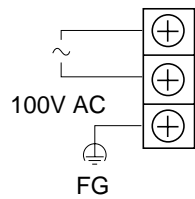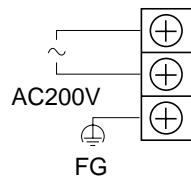
3-3-1 Specifications

(1) SPH300

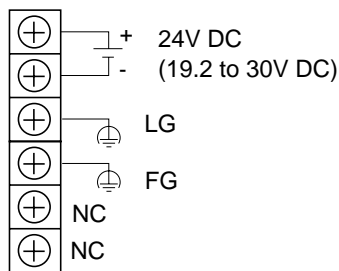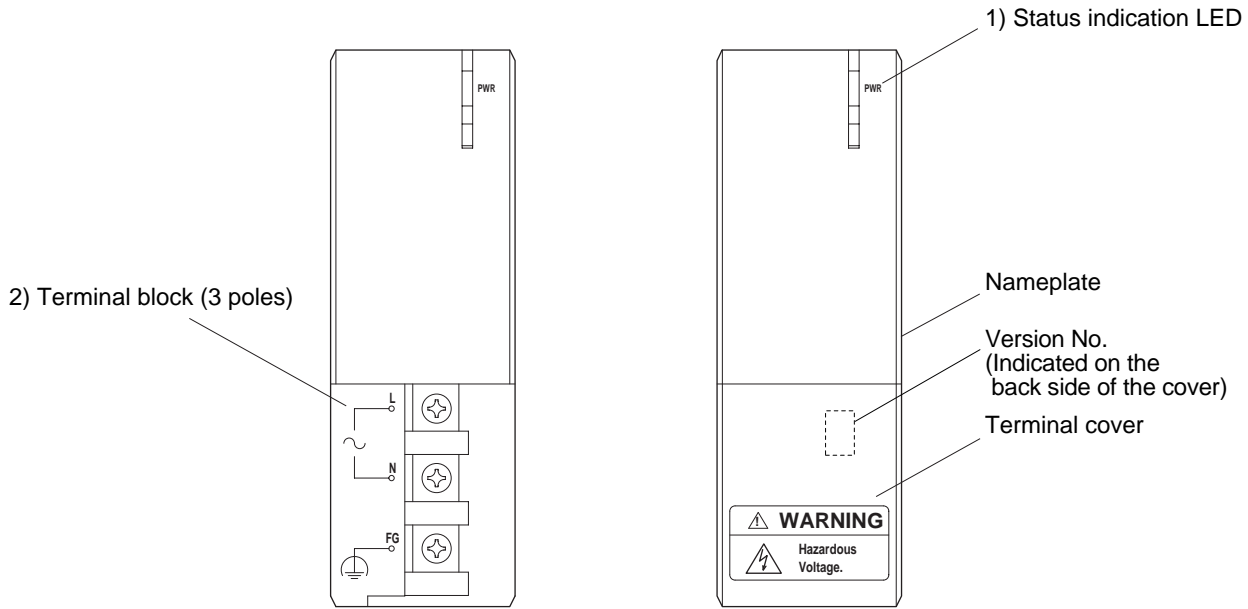| Item	Specification		
Type	NP1PS-32/NP1PS-32R	NP1PS-74/NP1PS-74R	NP1PS-117/NP1PS-117R
Control system	Stored program, Cyclic scanning system (default task), periodic task, event task		
Input / Output connection method	Direct input / output (SX bus), remote input / output (OPCN-1, DeviceNet etc.)		
I/O control system	Via SX bus: Synchronous refresh with Takt Via device level network: Refer to the manual for the corresponding network module.		
CPU	32-bit OS processor, 32-bit execution processor		
Memory types	Program memory, data memory, temporary memory		
Programming language	<When used the D300win> IL language (Instruction List) ST language (Structured Text) LD language (Ladder Diagram) FBD language (Function Block Diagram) SFC elements (Sequential Function Chart)	<When used the Standard Loader> Origin LD language (Ladder Diagram)	
Program memory capacity	32768 steps	75776 steps	119808 steps
Memory — I/O memory	512 words (Max. 8192 points) Up to 4096 words at I/O extension (65535 points) Note 1)		
Memory — General memory	8192 words	32768 words	131072 words
Memory — Retain memory	4096 words	16384 words	32768 words
Memory — User FB instance memory	4096 words	16384 words	32768 words
Memory — Memory for System FB	16384 words	65536 words	65536 words
Memory — Memory for System FB — Timer	512 points	2048 points	2048 points
Memory — Memory for System FB — Integrating timer	128 points	512 points	512 points
Memory — Memory for System FB — Counter	256 points	1024 points	1024 points
Memory — Memory for System FB — Edge detection	1024 points	4096 points	4096 points
Memory — Memory for System FB — Others	8192 words	32768 words	32768 words
Memory — System memory	512 words		
No. of tasks	Default tasks (Cyclic scanning): 1 Periodic tasks: 4 Event tasks : 4 (Total of 4 tasks when Periodic task is used)		
No. of programs	Max. 256 (Max. 128 for one task)		
Diagnosis function	Self diagnosis (memory checking, ROM sum checking, CPU basic calculation checking), system configuration monitoring, module fault monitoring		
Secret preserving function	By password (set with the support tool)		
Calendar	Available up to 12/31/2069 23:59:59 Precision: ± 27s/month (at 25° C, when active) In multi-CPU system the function of correcting the clock setting is provided		
Backup of application program	Flash ROM built in CPU module Backup area: Application program, system definition, ZIP file		
User ROM function (NP1S-32R/74R/117R only)	Application programs, system definitions, zipped files and compressed projects can be stored in user ROM cards.		
Backup of data memory — Backup area	Retain memory, retain attributed memory (e.g. current value of counter), calendar IC memory, RAS area		
Backup of data memory — Battery	Lithium primary battery, Replacement time: 5 minutes or less (at 25° C)		
Backup of data memory — Backup time	5 years (at 25° C)	When NP8P-BT is used: Approx. 1.3 years (at 25° C) When NP8P-BTS is used: Approx. 3.5 years (at 25° C)	
Occupied slot	1		
Internal current consumption	24V DC 200mA or less	24V DC 200mA or less	24V DC 200mA or less
Mass	Approx. 200g	Approx. 200g	Approx. 220g (when User ROM card mounted on)

Note: 1) NP1PS-32/32R is not applied. The maximum memory capacity of NP1PS-74/74R is 1856 words. The maximum memory capacity of NP1PS-117/117R is 4096 words.

(2) SPH300 (NP1PS-245R)

Item			Specification
Type			NP1PS-245R
Control system			Stored program, Cyclic scanning system (default task), periodic task, event task
Input / Output connection method			Direct input / output (SX bus), remote input / output (OPCN-1, DeviceNet etc.)
I/O control system			Via SX bus: Synchronous refresh with Takt Via device level network: Refer to the manual for the corresponding network module.
CPU			32-bit OS processor, 32-bit execution processor
Memory types			Program memory, data memory, temporary memory
Programming language			<When used the D300win> IL language (Instruction List) ST language (Structured Text) LD language (Ladder Diagram) FBD language (Function Block Diagram) SFC elements (Sequential Function Chart) <When used the Standard Loader> Origin LD language (Ladder Diagram)
Program memory capacity			250880 steps
Memory Note 1)	I/O memory		512 words (Max. 8192 points) Up to 4096 words at I/O extension (65535 points)
	General memory		262144 words
	Retain memory		130048 words
	User FB instance memory		66560 words
	Memory for System FB		65536 words
		Timer	2048 points
		Integrating timer	512 points
		Counter	1024 points
		Edge detection	4096 points
		Others	32768 words
	System memory		512 words
No. of tasks			Default tasks (Cyclic scanning): 1 Periodic tasks: 4 Event tasks : 4 (Total of 4 tasks when Periodic task is used)
No. of programs			Max. 256 (Max. 128 for one task)
Diagnosis function			Self diagnosis (memory checking, ROM sum checking, CPU basic calculation checking), system configuration monitoring, module fault monitoring
Secret preserving function			By password (set with the support tool)
Calendar			Available up to 12/31/2069 23:59:59 Precision: ± 27s/month (at 25° C, when active) In multi-CPU system the function of correcting the clock setting is provided
Backup of application program			Flash ROM built in CPU module Backup area: Application program, system definition, ZIP file
User ROM function (NP1PS-245R)			Application programs, system definitions, zipped files and compressed projects can be stored in user ROM cards.
Backup of data memory	Backup area		Retain memory, retain attributed memory (e.g. current value of counter), calendar IC memory, RAS area
	Battery		Lithium primary battery, Replacement time: 5 minutes or less (at 25° C)
	Backup time		When NP8P-BT is used: Approx. 0.7 years (at 25° C) When NP8P-BTS is used: Approx. 2 years (at 25° C)
Occupied slot			1
Internal current consumption			24V DC 200mA or less
Mass			Approx. 220g (when User ROM card mounted on)

(3) SPH200 (NP1PH-16/08)

Item	Specification	
Type	NP1PH-16	NP1PH-08
Control system	Stored program, Cyclic scanning system (default task), periodic task, event task	
Input / Output connection method	Direct input / output (SX bus), remote input / output (T-link, OPCN-1, DeviceNet etc.)	
I/O control system	Via SX bus: Synchronous refresh with Takt Via device level network: Refer to the manual for the corresponding network module.	
CPU	16-bit OS processor, 16-bit execution processor	
Memory types	Program memory, data memory, temporary	
Programming language	<When used the D300win> IL language (Instruction List) ST language (Structured Text) LD language (Ladder Diagram) FBD language (Function Block Diagram) SFC elements (Sequential Function Chart)	<When used the Standard Loader> Origin LD language (Ladder Diagram)
Program memory capacity	16384 steps	8192 steps
Data memory — I/O memory	512 words (Max. 8192 points) (fixed)	
Data memory — Memory for System FB	8192 words (default) Timer : 256 points (default) Integrating timer : 64 points (default) Counter : 128 points (default) Edge detection : 512 points (default) Others : 4096 words	4096 words (default) Timer : 128 points (default) Integrating timer : 32 points (default) Counter : 64 points (default) Edge detection : 250 points (default) Others : 2048 words
Data memory — General memory	8192 words (default)	4096 words (default)
Data memory — Retain memory	4096 words (default)	2048 words (default)
Data memory — User FB memory	4096 words (default)	2048 words (default)
Data memory — System memory	512 words (fixed)	
Data memory — Initial value setting area	7168 words (default)	3072 words (default)
No. of tasks	Default tasks (Cyclic scanning): 1 Periodic tasks : 4 Event tasks : 4 (Total of 4 tasks when Periodic task is used)	
No. of programs	Max. 64	
Diagnosis function	Self diagnosis (memory checking, ROM sum checking, CPU basic calculation checking), system configuration monitoring, module fault monitoring	
Secret preserving function	By password (set with the support tool)	
Calendar	Available up to 12/31/2069 23:59:59 Precision: ± 27s/month (at 25° C)	
Backup of memory	Battery in CPU module Backup area: Application program, system definition, ZIP file, retain memory, retain attributed memory (e.g. current value of counter), calendar IC memory, RAS area Battery: Lithium primary battery Backup time: 5 years (at 25° C) Replacement time: 5 minutes or less (at 25° C)	
Occupied slot	1	
Internal current consumption	24V DC 85mA or less	
Mass	Approx. 170g	

(4) SPH2000 (NP1PM-48R/48E/256E/256H)

Item	Specification	
Type	NP1PM-48R/48E	NP1PM-256E/256H
Control system	Stored program, Cyclic scanning system (default task), periodic task, event task	
Input / Output connection method	Direct input / output (SX bus), remote input / output (OPCN-1, DeviceNet etc.)	
I/O control system	Via SX bus: Synchronous refresh with Takt Via device level network: Refer to the manual for the corresponding network module.	
CPU	32-bit RISC processor	
Memory types	Program memory, data memory, temporary memory	
Programming language	<When used the D300win> IL language (Instruction List) Diagram) ST language (Structured Text) LD language (Ladder Diagram) FBD language (Function Block Diagram) SFC elements (Sequential Function Chart)	<When used the Standard Loader> Origin LD language (Ladder
Program memory capacity	49152 steps	262144 steps
Memory / I/O memory	512 words (Max. 8192 points)	
Memory / General memory	65536 words	1703936 words
Memory / Retain memory	8192 words	262144 words
Memory / User FB instance memory	8192 words	65536 words
Memory / Memory for System FB	16384 words	65536 words
Memory / Memory for System FB / Timer	512 points	2048 points
Memory / Memory for System FB / Integrating timer	128 points	512 points
Memory / Memory for System FB / Counter	256 points	1024 points
Memory / Memory for System FB / Edge detection	1024 points	4096 points
Memory / Memory for System FB / Others	8192 words	32768 words
Memory / System memory	512 words	
No. of tasks	Default tasks (Cyclic scanning): 1 　　　　　　*The default task has the constant scan function. Periodic tasks: 4 Event tasks : 4 (Total of 4 tasks when Periodic task is used)	
No. of programs	Max. 256 (Max. 128 for one task)	
Diagnosis function	Self diagnosis (memory checking, ROM sum checking, system configuration monitoring, module fault monitoring)	
Secret preserving function	By password (set with the support tool)	
Calendar	Available up to 12/31/2069 23:59:59 Precision: ± 27s/month (at 25° C, when active) In multi-CPU system the function of correcting the clock setting is provided	
Backup of application program	Flash ROM built in CPU module Backup area: Application program, system definition, ZIP file	
User ROM function	Application programs, system definitions, zipped files and compressed projects can be stored in user ROM cards.	
Backup of data memory / Backup area	Retain memory, retain attributed memory (e.g. current value of counter), calendar IC memory, RAS area	
Backup of data memory / Battery	Lithium primary battery, Replacement time: 5 minutes or less (at 25° C)	
Backup of data memory / Backup time	5 years (at 25° C)	
Occupied slot	1	
Internal current consumption	24V DC 200mA or less	
Mass	Approx. 220g (when User ROM card mounted on)	

Note: Ethernet connector of NP1PM-256H is used as a bus for data equalization in a redundant system configuration.
　　　Thus, Ethernet communication cannot be executed with NP1PM-256H.
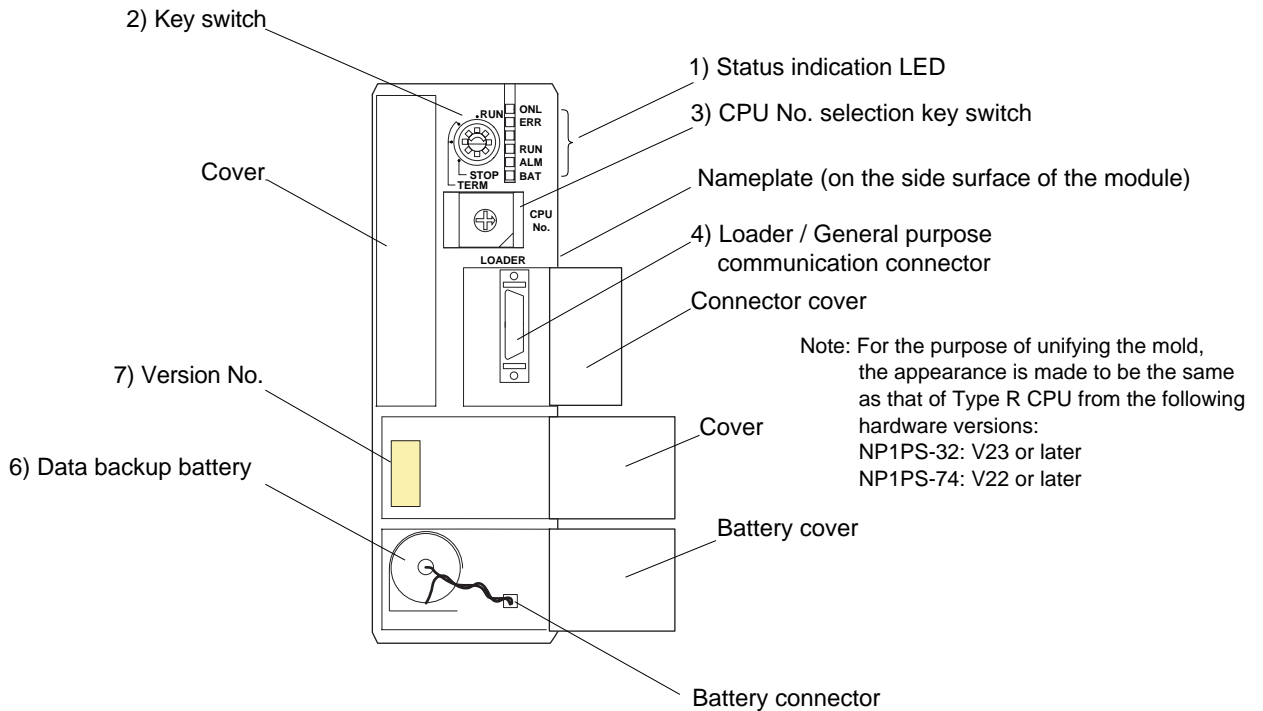
(5) SPH3000 (NP1PU-048E/256E)

Item	Specification	
Type	NP1PU-048E	NP1PU-256E
Control system	Stored program, Cyclic scanning system (default task), periodic task, event task	
Input / Output connection method	Direct input / output (SX bus), remote input / output (OPCN-1, DeviceNet etc.)	
I/O control system	Via SX bus: Synchronous refresh with Takt Via device level network: Refer to the manual for the corresponding network module.	
CPU	32-bit RISC processor	
Memory types	Program memory, data memory, temporary memory	
Programming language	<When used the D300win> IL language (Instruction List) ST language (Structured Text) LD language (Ladder Diagram) FBD language (Function Block Diagram) SFC elements (Sequential Function Chart)	
Program memory capacity	49152 steps	262144 steps
Memory / I/O memory	512 words (Max. 8192 points)	
General memory	98304 words (default value)	1703936 words (default value)
Retain memory	40960 words (default value)	237568 words (default value)
User FB instance memory	40960 words (default value)	73728 words (default value)
Memory for System FB	81920 words (default value)	81920 words (default value)
Memory for System FB / Timer	2560 points	2560 points
Integrating timer	640 points	640 points
Counter	1280 points	1280 points
Edge detection	5120 points	5120 points
Others	40960 words	40960 words
System memory	512 words	
No. of tasks	Default tasks (Cyclic scanning): 1 *The default task has the constant scan function. Periodic tasks: 4 Event tasks : 4 (Total of 4 tasks when Periodic task is used)	
No. of programs	Max. 256 (Max. 128 for one task)	
Diagnosis function	Self diagnosis (memory checking, ROM sum checking, system configuration monitoring, module fault monitoring)	
Secret preserving function	By password (set with the support tool)	
Calendar	Available up to 12/31/2069 23:59:59 Precision: ± 27s/month (at 25° C, when active) In multi-CPU system the function of correcting the clock setting is provided	
Backup of application program	Flash ROM built in CPU module Backup area: Application program, system definition, ZIP file	
User ROM function	Application programs, system definitions, zipped files and compressed projects can be stored in user ROM cards.	
Backup of data memory / Backup area	Retain memory, retain attributed memory (e.g. current value of counter), calendar IC memory, RAS area	
Battery	Lithium primary battery, Replacement time: 5 minutes or less (at 25° C)	
Backup time	5 years (at 25° C)	
Occupied slot	1	
Internal current consumption	24V DC 200mA or less	
Mass	Approx. 220g (when User ROM card mounted on)	

(6) SPH300EX (NP1PS-74D)
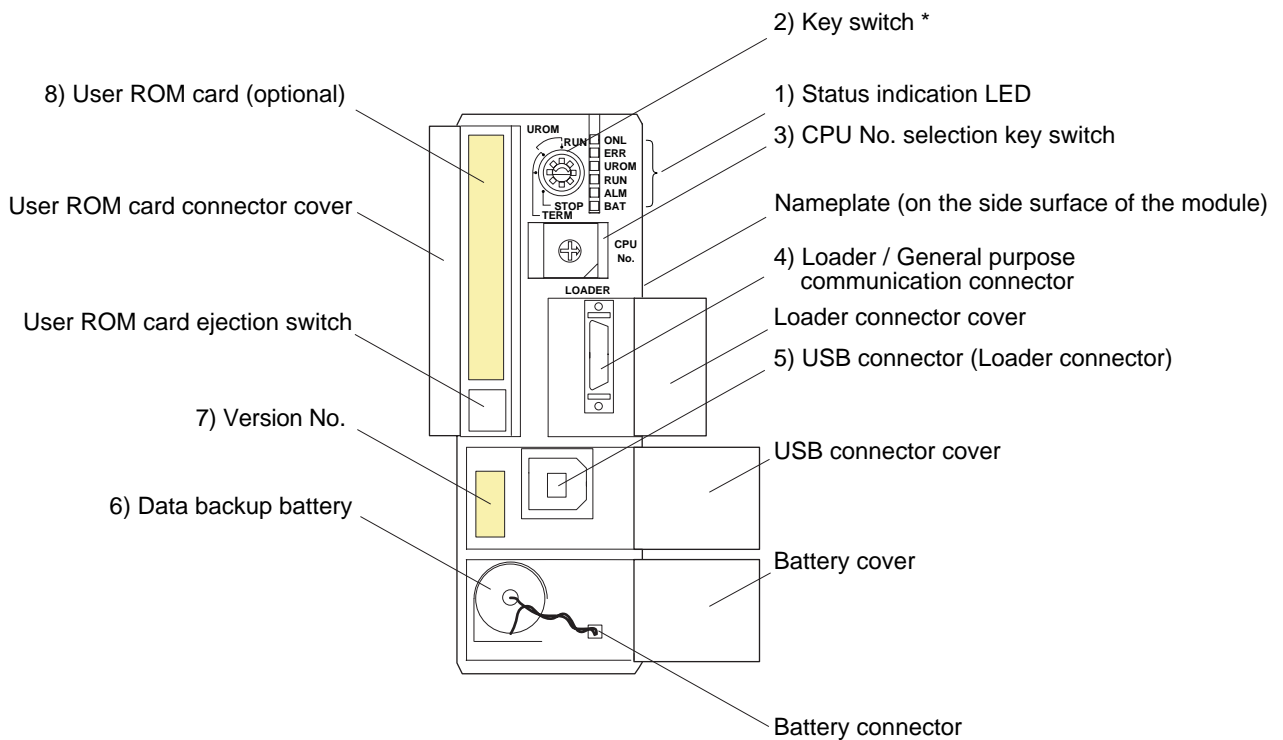
Item			Specification
Type			NP1PS-74D
Control system			Stored program, Cyclic scanning system (default task), periodic task, event task
Input / Output connection method			Direct input / output (SX bus), remote input / output (OPCN-1, DeviceNet etc.)
I/O control system			Via SX bus: Synchronous refresh with Takt Via device level network: Refer to the manual for the corresponding network module.
CPU			32-bit OS processor, 32-bit execution processor
Memory types			Program memory, data memory, temporary memory
Programming language			<When used the D300win> IL language (Instruction List) ST language (Structured Text) LD language (Ladder Diagram) FBD language (Function Block Diagram) SFC elements (Sequential Function Chart) <When used the Standard Loader> Origin LD language (Ladder Diagram)
Program memory capacity			75776 steps x 2
Memory	I/O memory		512 words (Max. 8192 points) Up to 1856 words at I/O extension (29696 points)
	General memory		32768 words x 2
	Retain memory		16384 words x 2
	User FB instance memory		16384 words x 2
	Memory for System FB		65536 words x 2
		Timer	2048 points x 2
		Integrating timer	512 points x 2
		Counter	1024 points x 2
		Edge detection	4096 points x 2
		Others	32768 words x 2
	System memory		512 words x 2
No. of tasks			Default tasks (Cyclic scanning): 1 Periodic tasks: 4 Event tasks : 4 (Total of 4 tasks when Periodic task is used)
No. of programs			Max. 256 (Max. 128 for one task)
Diagnosis function			Self diagnosis (memory checking, ROM sum checking, CPU basic calculation checking), system configuration monitoring, module fault monitoring
Secret preserving function			By password (set with the support tool)
Calendar			Available up to 12/31/2069 23:59:59 Precision: ± 27s/month (at 25° C, when active) In multi-CPU system the function of correcting the clock setting is provided
Backup of application program			Flash ROM built in CPU module Backup area: Application program, system definition, ZIP file
User ROM function (NP1S-32R/74R/117R only)			Application programs, system definitions, zipped files and compressed projects can be stored in user ROM cards.
Backup of data memory	Backup area		Retain memory, retain attributed memory (e.g. current value of counter), calendar IC memory, RAS area
	Battery		Lithium primary battery, Replacement time: 5 minutes or less (at 25° C)
	Backup time		When NP8P-BT is used: Approx. 0.65 years (at 25° C) When NP8P-BTS is used: Approx. 1.75 years (at 25° C)
Occupied slot			2
Internal current consumption			24V DC 200mA or less
Mass			Approx. 410g

3-3-2 Names and functions

(1) SPH300 NP1PS-32/NP1PS-74/NP1PS-117

2) Key switch

1) Status indication LED

3) CPU No. selection key switch

Cover

Nameplate (on the side surface of the module)

4) Loader / General purpose communication connector

Connector cover

Note: For the purpose of unifying the mold, the appearance is made to be the same as that of Type R CPU from the following hardware versions:
NP1PS-32: V23 or later
NP1PS-74: V22 or later

7) Version No.

Cover

6) Data backup battery

Battery cover

Battery connector

(2) SPH300 (User ROM card adapted CPU) NP1PS-32R/74R/117R/245R

2) Key switch *

8) User ROM card (optional)

1) Status indication LED

3) CPU No. selection key switch

User ROM card connector cover

Nameplate (on the side surface of the module)

4) Loader / General purpose communication connector

Loader connector cover

User ROM card ejection switch

5) USB connector (Loader connector)

7) Version No.

USB connector cover

6) Data backup battery

Battery cover

Battery connector

* For more information about the operation of the CPU with key switches, refer to "Appendix 1 Operation of the high-performance CPU with key switches", in addition to the explanation on the following pages.

(3) SPH2000 NP1PM-48R, NP1PM-48E/256E/256H (with Ethernet interface)
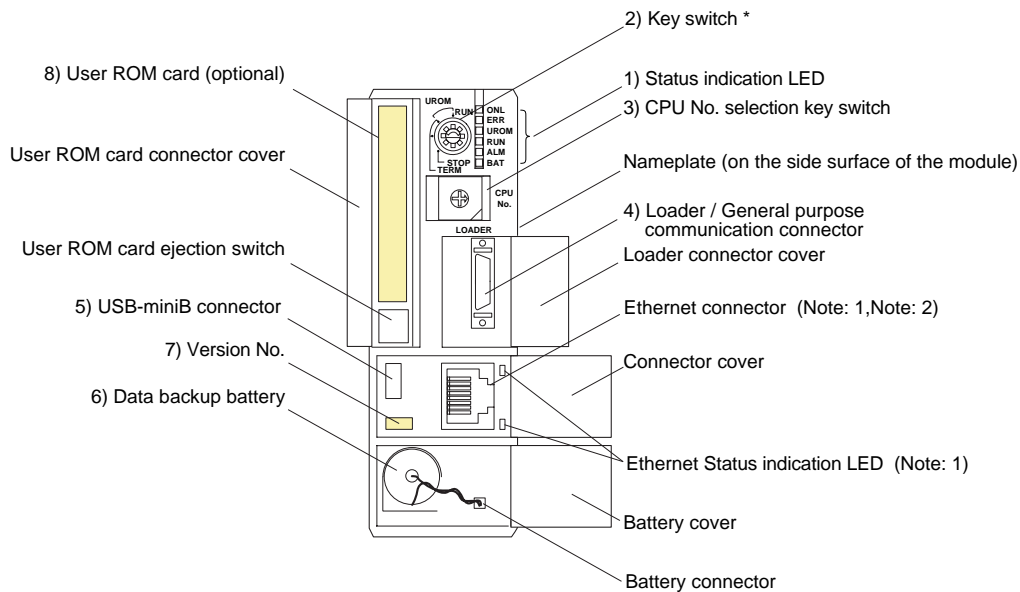
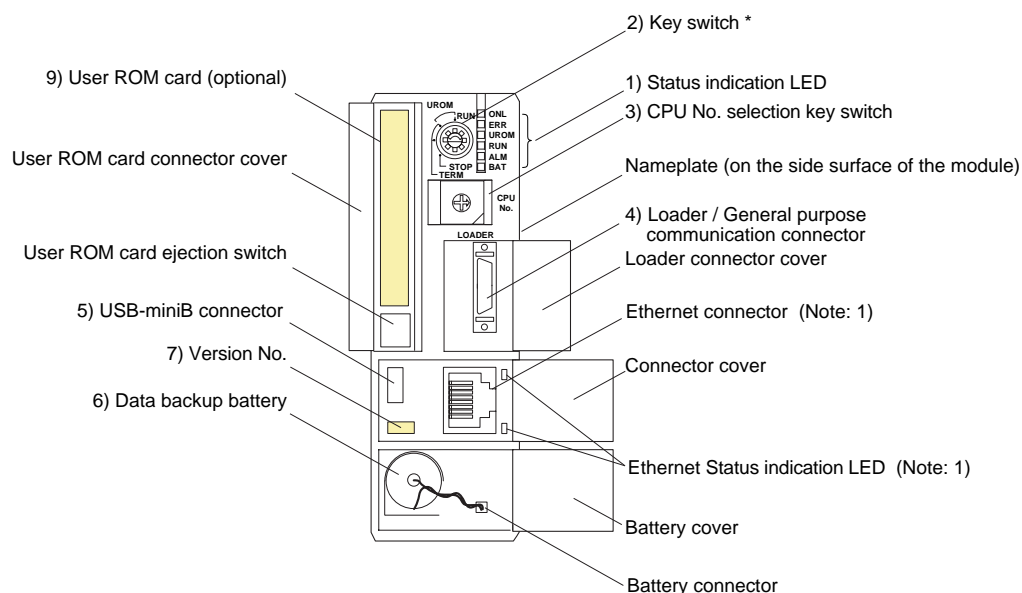Note: 1) The Ethernet communication function is supported only in NP1PM-48E/256E.
        For details on specifications and handling, see "SPH2000/3000 Ethernet Communication Edition (FEH193)."

Ethernet status indication LED

LED position	Ethernet status
Upper side	LINK status. Lights on when LAN cable is connected to external device (such as HUB).
Lower side	TX/RX status. Blinks when communication.

2) Ethernet connector of NP1PM-256H is used as part of a bus for inputting/outputting equivalent data in a redundant system configuration. Thus, the connector cannot be used for Ethernet communication. For details of SPH2000 redundant system configurations, refer to "SPH2000 Redundant Function Edition (FEH184)".
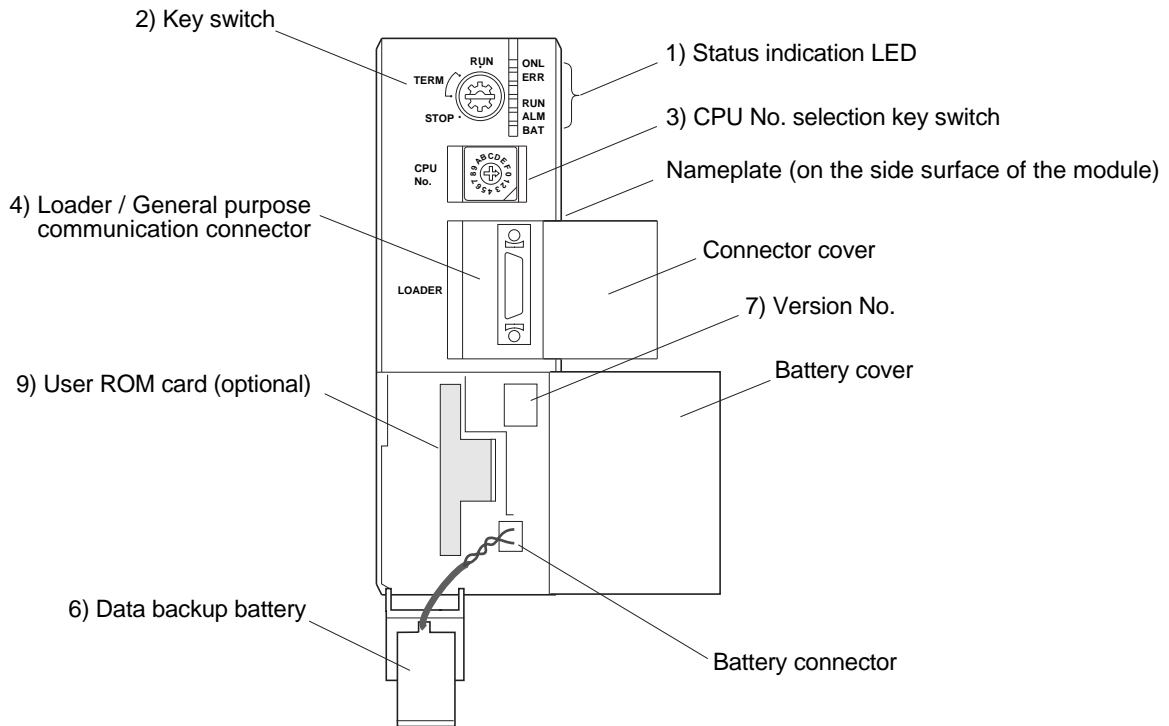
(4) SPH3000 NP1PU-048E/256E

Note: 1) For details on specifications and handling, see "SPH2000/3000 Ethernet Communication Edition (FEH193)."
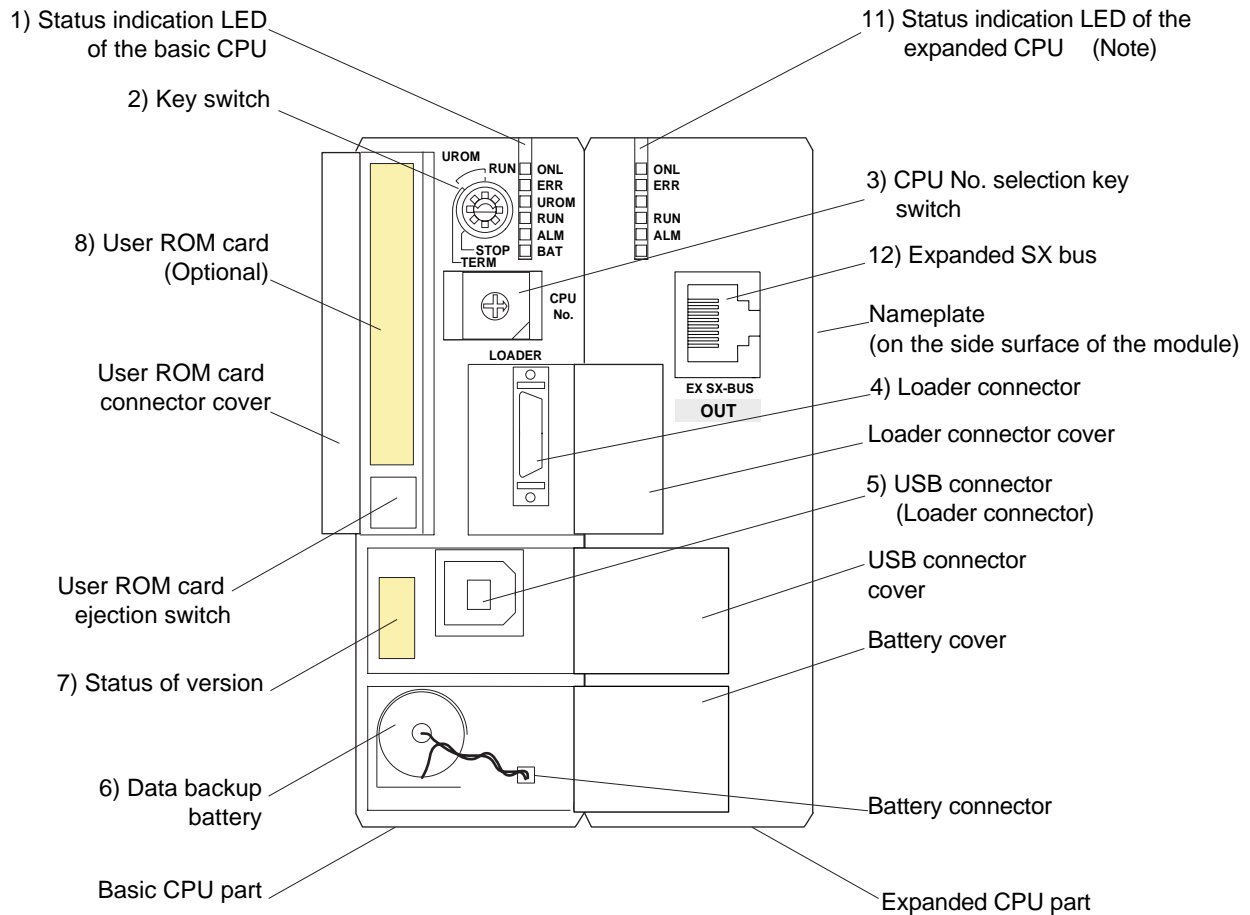
Ethernet status indication LED

LED position	Ethernet status
Upper side	LINK status. Lights on when LAN cable is connected to external device (such as HUB).
Lower side	TX/RX status. Blinks when communication.

(5) SPH200   NP1PH-16/NP1PH-08

2) Key switch

1) Status indication LED

3) CPU No. selection key switch

Nameplate (on the side surface of the module)

4) Loader / General purpose communication connector

Connector cover

7) Version No.

Battery cover

9) User ROM card (optional)

6) Data backup battery

Battery connector

(6) SPH300EX   NP1PS-74D

1) Status indication LED of the basic CPU

11) Status indication LED of the expanded CPU   (Note)

2) Key switch

3) CPU No. selection key switch

8) User ROM card (Optional)

12) Expanded SX bus

Nameplate (on the side surface of the module)

User ROM card connector cover

4) Loader connector

Loader connector cover

5) USB connector (Loader connector)

USB connector cover

User ROM card ejection switch

Battery cover

7) Status of version

6) Data backup battery

Battery connector

Basic CPU part

Expanded CPU part

* For specification and operation of the SPH300EX, refer to the "User's Manual SPH300EX" (FEH192).

1) Status indication LED

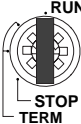| Symbol	Color	Description
ONL ERR	Green Red	Status of own CPU module <Lights on pattern> *see sub-table below*
UROM	Green	Lights on continuously when the CPU recognizes a user ROM card. Lights on continuously when a user ROM card (compact flash card) is correctly installed in the CPU module and the key switch is set to UROM. (User ROM card adapted high-performance CPU, SPH 2000/3000 only)
RUN ALM	Green Red	Status of system (Note) <Lights on pattern> *see sub-table below*
BAT	Orange	Turned on when data backup battery dropped or disconnected.

ONL/ERR <Lights on pattern>:

ONL	ERR	Status of own CPU module
OFF	OFF	Power OFF, system resetting or initializing
Blinks	-	SX bus standing on
ON	OFF	Normally running (initial diagnosis completed)
ON	ON	Nonfatal fault, at a running
OFF	ON	Fatal fault at a stop

RUN/ALM <Lights on pattern>:

RUN	ALM	Status of system
OFF	OFF	Power OFF or application program at a stop
ON	OFF	Normally running
ON	ON	Nonfatal fault, at a running
OFF	ON	Fatal fault, at a stop
Blinks	-	While the CPU is accessing the user ROM

Note: The system includes the own CPU.

2) Key switch
How the CPU operates when individual key switch is set at various positions is described below.

<Other than user ROM card adapted high-performance CPU,SPH2000/3000>

Position of key	Operation of CPU
RUN	• When this switch is changed over from STOP or TERM to RUN, the CPU module starts operation. • If this switch is at the RUN position when powered on, the CPU starts running. * Monitoring and reading from loader are possible. (Data can be read or written.)
TERM	• The previous condition is kept. When this switch is changed over from STOP to TERM, the CPU module continues to be stopped. When this switch is changed over from RUN to TERM, the CPU module continues to run. If the system is powered on when this switch is at the TERM position, the CPU operates according to the setting of [Running specification at power on] on the [CPU running definition] tab window. • TERM = Run (default) ⇒ Operation is started. • TERM = Last State, ⇒ When the power was turned off in running condition last time, operation is started. When the power was turned off in stop condition last time, operation is not started. • TERM = Stop ⇒ Operation is not started. * Monitoring, reading and writing from loader are possible.
STOP	• When this switch is changed over from RUN or TERM to STOP, the CPU module stops. • If this switch is at the STOP position when powered on, the CPU stops. Operation is not started. * Monitoring and reading from loader are possible. (Data can be read or written.)

<User ROM card adapted high-performance CPU,SPH 2000/3000>
   * For more information about the operation of CPU, refer to
      "Appendix 1 Operation of the user ROM card adapted CPU with Key Switches".

3) CPU No. selection key switch

This switch is used to select the CPU number. Be sure to select "0" for a one-CPU system. CPU number is selected in order from "0" for the multi-CPU system.
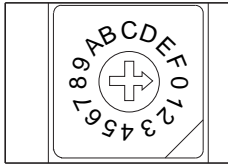
Note: Do not change during operation, otherwise, system stop might be caused.

4) Loader / General purpose communication connector

Used to connect a program loader.

[Note:]

It is possible to connect FUJI UG Series Programmable Operation Display to the program loader connector.

Be sure to use dedicated cable.

UG Series
Programmable
Operation Display
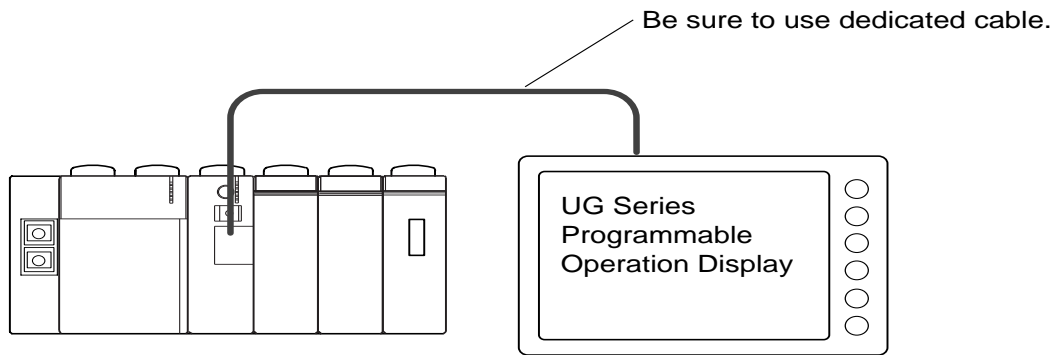
5) USB / USB-miniB connector (program loader connector)

Used to connect a program loader. Use commercially available USB cable.

Note: USB (Universal Serial Bus) is a standard for external peripheral devices for personal computer. When you use a USB cable, be careful of the following matters, taking into consideration the noise immunity of the personal computer to be connected.
• USB cable should be separated from power line as far as possible.

6) Data backup battery

The battery backs up the retain memory, the calendar data and so on in the CPU module. Backup time: 5 years (at 25°C).

7) Version No.

Version No. of the CPU module is described.

SPH300/SPH200/SPH300EX   **SPH2000/3000**

Hardware version   Software version

20   20   01

50   Hardware version

Farmware version
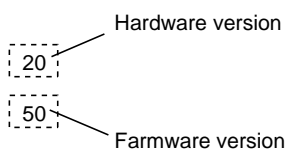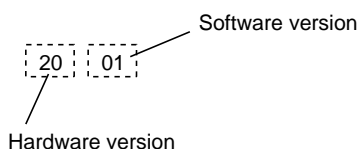
8) User ROM card (compact flash card)

Application programs, system definitions, zipped files and compressed projects can be saved in user ROM cards. (User ROM card is optional)

For more information about the specification and handling of user ROM card, refer to 3-3-3 (Specification of user ROM card (compact flash card)).

9) User ROM card (SD card)

Application programs, system definitions, zipped files and compressed projects can be saved in user ROM cards. (User ROM card is optional)

For more information about the specification and handling of user ROM card, refer to 3-3-4 (Specification of user ROM card (SD card)).

10) User ROM card NP8PMF-16 (optional)

This card is used to store application program, system definition and ZIP file of a standard CPU module into the flash ROM. Mounting this card enables battery-less operation of standard CPU.

Knob

Connector   Write-protect switch

WRITE PROTECT — Write protected

WRITE ENABLE — Write enabled
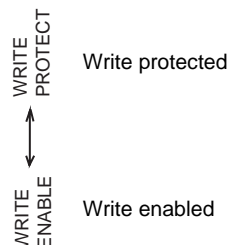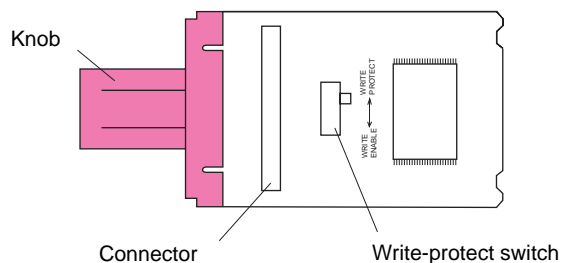
Note: Set to "Protected" when program, system definition and ZIP file are not rewritten.

<Mounting the user ROM card>

1) Shut down the system power supply.

* When remove the card, use the reverse procedure.

2) Open the battery cover.

4) Insert the user ROM card from the position of the following figure of the CPU module to the backside.

Note: Be sure to use the knob.

User ROM card

Knob

3) Turn down the battery folder.

User ROM card

Knob

5) Push the knob of the user ROM card to the right firmly.

7) Close the battery cover.

6) Close the battery folder with pushing the battery leads not to be jammed.

11) Status indication LED of the expanded CPU

Symbol	Color	Description
ONL ERR	Green Red	Status of expanded CPU module <Lights on pattern> _see sub-table below_
RUN ALM	Green Red	Status of system 　　　　　　(Note) <Lights on pattern> _see sub-table below_

Sub-table for ONL / ERR:

ONL	ERR	Status of own CPU module
OFF	OFF	Power OFF, system resetting or initializing
Blinks	-	SX bus standing on
ON	OFF	Normally running (initial diagnosis completed)
ON	ON	Nonfatal fault, at a running
OFF	ON	Fatal fault at a stop

Sub-table for RUN / ALM:

RUN	ALM	Status of system
OFF	OFF	Power OFF or application program at a stop
ON	OFF	Normally running
ON	ON	Nonfatal fault, at a running
OFF	ON	Fatal fault, at a stop

Note: The system includes the basic and expanded CPU.

11) SX bus expansion

This bus is specifically for applications that require high-speed I/O response. The devices that can be connected to the bus are limited to I/O modules that are compatible with the SX bus and servos and inverters conforming to these I/O modules.

3-3-3 Specification of user ROM card (compact flash card)

(1) Appearance and specification

<Specification of user ROM card>
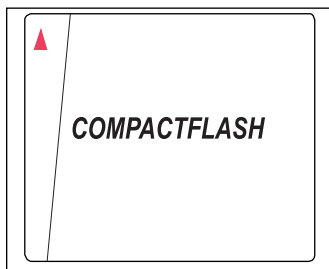
Type (maker)	NP8PCF-256
Standard	Compact flash ATA card, Type I CFA 3.0
Specification of card	Industrial grade Operating temperature: -25 to 85 Number of re-write:more than 100 thousands
Memory capacity	256MB

Note: 1 When you install a user ROM card in the loader and directly access it, use commercially available compact flash adapter for PCMCIA card slot or commercially available compact flash reader/writer.

Note: 2 Format the user ROM card in "FAT."
In case of SPH2000, "FAT" or "FAT32".

(2) User ROM card mounting procedure

* For removal, do in the reverse order.

1) Shut down the system power supply or set the key switch to a position other than UROM. (The UROM LED turned off.)
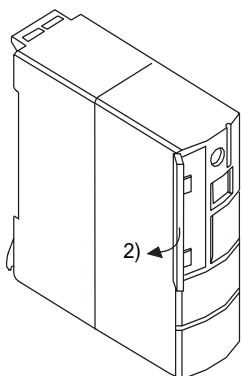
2) Open the user ROM card connector cover.
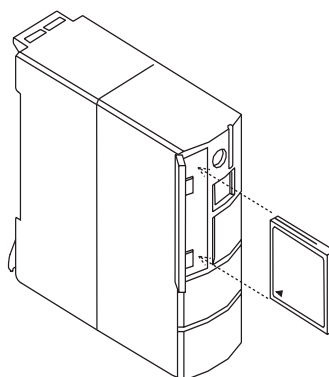
3) Insert a user ROM card in the slot of the CPU module, according to the above figure.

User ROM card ejection switch
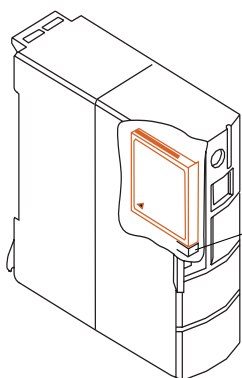
4) When a user ROM card is inserted, the user ROM card eject button is protruded.
(Press this button to take the card out.)
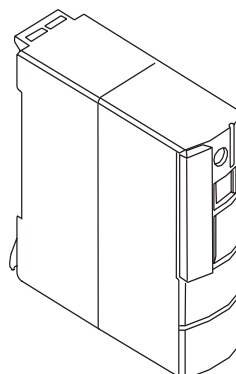
5) Close the user ROM card connector cover.

6) Turn the system power supply ON and set the key switch to UROM, and the CPU module will recognize the user ROM card.

(3) Operation of the CPU when it recognizes a user ROM card

State of user ROM card	When CPU stops	When CPU is running	When CPU starts to run from stop condition
1) Initialized, no run project	Clears the flash memory in the CPU in which run project is stored.	Outputs nonfatal fault signal and sets mismatch flag ON. (Note 1)	Clears the internal flash memory of the CPU in which run project is stored.
2) Run project normal (the content of CPU internal flash memory does not match that of the user ROM card) (Note 5)	Updates the CPU internal flash memory (by copying the content of the user ROM card.	Outputs nonfatal fault signal and sets mismatch flag ON.	Updates the CPU internal flash memory (by copying the content of the user ROM card.
3) Run project error (user ROM card not initialized, file destroyed, etc.) (Note 2, Note 6)	CPU comes in fatal fault condition.	Outputs fatal fault signal and sets mismatch flag ON.	CPU comes in fatal fault condition.

Notes:1) Mismatch flag is %MX10.4.12. Nonfatal fault does not occur when no run project exists in the CPU, either.
2) The CPU detects physical error when it can recognize the user ROM card but can read no sector data. When the CPU cannot recognize the user ROM card, it operates the same as no card being set.
3) To initialize the user ROM card, insert the card in the CPU module and execute "Resource initialization," or execute "Initialize" in the memory card menu of loader.
4) Execution of "Resource initialization" with a user ROM card mounted in the CPU module cannot initialize the user ROM card in DOS format. When DOS format is destroyed, execute offline initialization.
5) When the power switch of the CPU module is turned on, it may take approximately 3 minutes to copy the content of the user ROM card in the internal flash memory of the CPU. Multi-CPU system recognizes this condition as the copying CPU being disconnected by other CPU. In such case, turn the system on again after the RUN LED of the copying CPU stops blinking.
6) Be sure to initialize (FAT format) the user ROM card before you use it.

(4) Timing to transfer data from user ROM card to CPU internal flash memory
When transferring data (application program, system definition, ZIP file) from the user ROM card installed in the CPU module to the CPU internal flash memory under the following conditions, the content of the user ROM card is compared with that of the CPU internal flash memory and the data is transferred if the comparison results in mismatch.
- When the power switch of the CPU module is turned ON with the key switch set at UROM
- When resetting is performed from loader with the key switch set at UROM
- When the key switch is changed over to UROM from a position other than UROM while the CPU stops.

(5) Downloading from the user ROM card mounted in the CPU module
To download data from loader to the user ROM card mounted in the CPU module, set the key switch to UROM_TERM (the UROM LED lights up) and execute the downloading from loader to the CPU. Then, the data is downloaded to the internal flash memory of the CPU as well as to the user ROM card at a time.

Notes: 1) When unformatted or write protected user ROM card is mounted in the CPU module, no data is downloaded to the flash memory or the user ROM card.
Notes: 2) It is possible to insert the user ROM card in the personal computer in which Loader is installed and to download the data.
For the operating method, refer to the "User's Manual Loader <Reference>."

3-3 CPU module Specifications

(6) How to initialize the user ROM card

1) Offline initialization

Insert the user ROM card in the compact flash card adapter or compact flash card reader/writer to make the personal computer recognize the card.

For initialization, "Memory card utility" in the "Extras" menu of loader is used. The utility executes both DOS formatting and initialization (creation of directories and files).

Note: Perform the DOS formatting in "FAT."
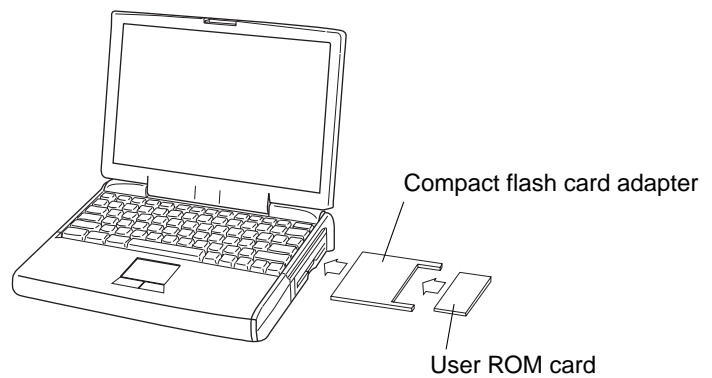
Compact flash card adapter

User ROM card

2) Initialization by mounting a user ROM card in the CPU module

When you initialize a user ROM card that is mounted in the CPU module, be careful that only DOS formatted cards can be initialized (to create directories and files).

Insert a user ROM card in the CPU module and execute "Resource initialization" from loader when the CPU recognizes the user ROM card.
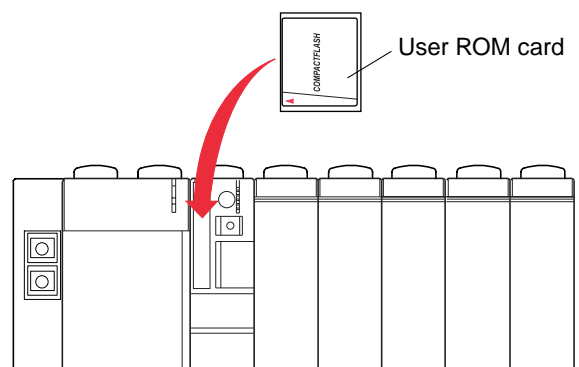
User ROM card

3-3-4 Specification of user ROM card (SD card)

(1) Appearance and specification
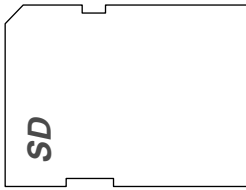
SDHC logo is trademark

<Specification of user ROM card>

Item		Contents
PLC card slot specification	Standard	SD Physical layer Specification Version 2.00
	Supported memory card	SD memory card, SDHC memory card
	Specification	Power supply: 3.3V ± 0.3V,Max 100mA
ROM card specification	Type	NP8PSD-002
	Standard	SD card spec V1.1
	Card specification	Industrial grade Operating Temperature:-40 to 85
	Memory capacity	2GB

Note: 1 When you install a user ROM card in the loader and directly access it, use commercially available SD card adapter for PCMCIA card slot or commercially available SD catd reader/writer.

Note: 2 Format the user ROM card in "FAT" or "FAT32".

Note: 3 Number of re-write of user ROM.
    Number of re-write varies depends on writing data size.
    Below table shows Fuji user ROM card (Type:NP8PSD-002) as reference.

Write data size	Number of re-write	Note
1MB	2 millions	Max writing data size by application program is 1MB
20MB	100 thousands	Download project size may exceed 1MB depends on program

Note: 4 We recommend to use Fuji user ROM card.
    If you use market sale SD card, check operation by yourself. In this case, do not use mini SD/ micro SD with SD adapter.
    Make sure to use SD card.

(2) User ROM card mounting procedure

* For removal, do in the reverse order.

1) Shut down the system power supply or set the key switch to a position other than UROM. (The UROM LED turned off.)

2) Open the user ROM card connector cover.

3) Insert a user ROM card until it is completely seated in its connector.
(When remove card, press the card into the slot to release. Card partially ejected, remove the card.)

4) Close the user ROM card connector cover.

5) Turn the system power supply ON and set the key switch to UROM, and the CPU module will recognize the user ROM card.

(3) Operation of the CPU when it recognizes a user ROM card

State of user ROM card	When CPU stops	When CPU is running	When CPU starts to run from stop condition
1) Initialized, no run project	Clears the flash memory in the CPU in which run project is stored.	Outputs nonfatal fault signal and sets mismatch flag ON. (Note 1)	Clears the internal flash memory of the CPU in which run project is stored.
2) Run project normal (the content of CPU internal flash memory does not match that of the user ROM card) (Note 5)	Updates the CPU internal flash memory (by copying the content of the user ROM card.	Outputs nonfatal fault signal and sets mismatch flag ON.	Updates the CPU internal flash memory (by copying the content of the user ROM card.
3) Run project error (user ROM card not initialized, file destroyed, etc.) (Note 2, Note 6)	CPU comes in fatal fault condition.	Outputs fatal fault signal and sets mismatch flag ON.	CPU comes in fatal fault condition.

Notes:1) Mismatch flag is %MX10.4.12. Nonfatal fault does not occur when no run project exists in the CPU, either.
   2) The CPU detects physical error when it can recognize the user ROM card but can read no sector data.
      When the CPU cannot recognize the user ROM card, it operates the same as no card being set.
   3) To initialize the user ROM card, insert the card in the CPU module and execute "Resource initialization," or execute "Initialize" in the memory card menu of loader.
   4) Execution of "Resource initialization" with a user ROM card mounted in the CPU module cannot initialize the user ROM card in DOS format. When DOS format is destroyed, execute offline initialization (Format card by "FAT" or "FAT32").
   5) When the power switch of the CPU module is turned on, it may take approximately 3 minutes to copy the content of the user ROM card in the internal flash memory of the CPU. Multi-CPU system recognizes this condition as the copying CPU being disconnected by other CPU. In such case, turn the system on again after the RUN LED of the copying CPU stops blinking.
   6) Be sure to initialize ("FAT" or "FAT32" format) the user ROM card before you use it.

(4) Timing to transfer data from user ROM card to CPU internal flash memory
When transferring data (application program, system definition, ZIP file) from the user ROM card installed in the CPU module to the CPU internal flash memory under the following conditions, the content of the user ROM card is compared with that of the CPU internal flash memory and the data is transferred if the comparison results in mismatch.
   • When the power switch of the CPU module is turned ON with the key switch set at UROM
   • When resetting is performed from loader with the key switch set at UROM
   • When the key switch is changed over to UROM from a position other than UROM while the CPU stops.

(5) Downloading from the user ROM card mounted in the CPU module
To download data from loader to the user ROM card mounted in the CPU module, set the key switch to UROM_TERM (the UROM LED lights up) and execute the downloading from loader to the CPU. Then, the data is downloaded to the internal flash memory of the CPU as well as to the user ROM card at a time.

Notes: 1) When unformatted or write protected user ROM card is mounted in the CPU module, no data is downloaded to the flash memory or the user ROM card.
Notes: 2) It is possible to insert the user ROM card in the personal computer in which Loader is installed and to download the data.
   For the operating method, refer to the "User's Manual Loader <Reference>."

(6) How to initialize the user ROM card

1) Offline initialization
Insert the user ROM card in the SD card adapter or
SD card reader/writer to make the personal computer
recognize the card.
For initialization, "Memory card utility" in the "Extras"
menu of loader is used. The utility executes both DOS
formatting and initialization (creation of directories and
files).
Note: Perform the formatting in "FAT" or "FAT32".
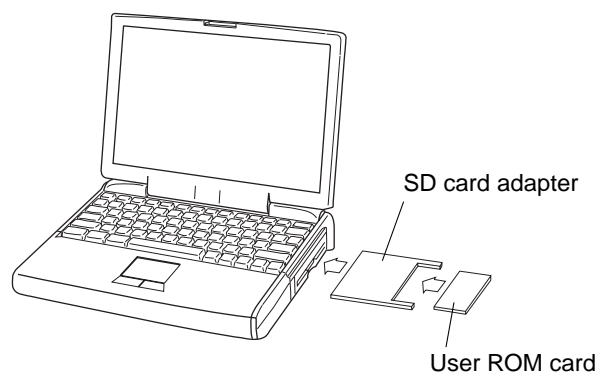
SD card adapter

User ROM card

**2) Initialization by mounting a user ROM card in
    the CPU module**
When you initialize a user ROM card that is mounted
in the CPU module, be careful that only DOS formatted cards
can be initialized (to create directories and files).
Insert a user ROM card in the CPU module and execute
"Resource initialization" from loader when the CPU
recognizes the user ROM card.

User ROM card

3-4 Base Board Specifications
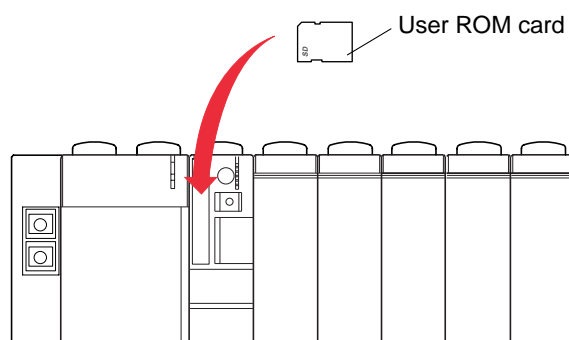
3-4-1 Specifications

Type	Specification			
	No. of slots	No. of processor buses	Internal power consumption 24V DC	Mass
NP1BS-03	3 slots	2 slots	35 mA or less	Approx. 250g
NP1BS-06	6 slots	4 slots	45 mA or less	Approx. 420g
NP1BS-08	8 slots	3 slots	50 mA or less	Approx. 540g
NP1BS-08S	8 slots	3 slots	60 mA or less	Approx. 550g
NP1BS-08D	8 slots	3 slots	70 mA or less	Approx. 550g
NP1BS-11	11 slots	3 slots	60 mA or less	Approx. 720g
NP1BS-11S	11 slots	3 slots	70 mA or less	Approx. 730g
NP1BS-11D	11 slots	3 slots	80 mA or less	Approx. 730g
NP1BS-13	13 slots	3 slots	70 mA or less	Approx. 840g
NP1BS-13S	13 slots	3 slots	80 mA or less	Approx. 850g
NP1BS-13D	13 slots	3 slots	80 mA or less	Approx. 850g
NP1BP-13	13 slots	10 slots	70 mA or less	Approx. 840g
NP1BP-13S	13 slots	10 slots	80 mA or less	Approx. 850g
NP1BP-13D	13 slots	10 slots	80 mA or less	Approx. 850g

Note: For dimensions, refer to "3-11 Dimensions."

<Processor bus connectable slots>

NP1BS-03
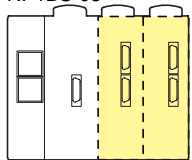
NP1BS-06
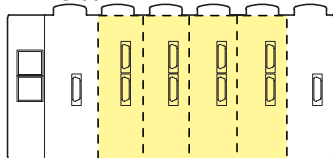
NP1BS-08/NP1BS-08S/NP1BS-08D
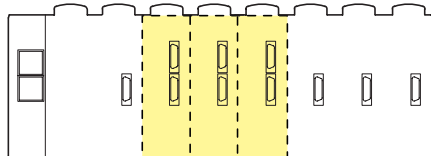
NP1BS-11/NP1BS-11S/NP1BS-11D
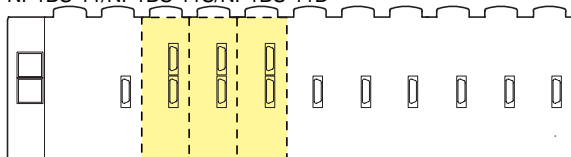
NP1BS-13/NP1BS-13S/NP1BS-13D
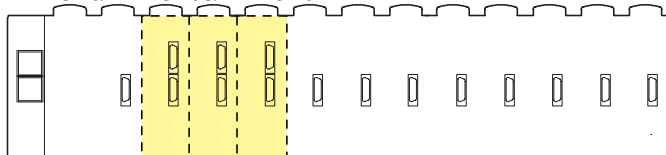
NP1BP-13/NP1BP-13S/NP1BP-13D (Processor bus expanded type)
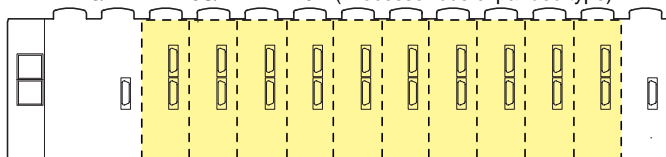
 Indicates a slot with a processor bus connector.

Key-point

· One power supply module and at least one module other than a power supply module should be mounted on the base board.
· The power supply module should be mounted on the left end of the base board.
· Number of connectable base boards is a maximum of 25 including SX bus T-branch units (NP8B-TB) bus T-branch units (NP8B-TB).
· In the system which two or more base boards are connected by the SX bus expansion cable, if several bases (power supplies) are required to be OFF, the number of bases should be a maximum of three in series. (Though four or more bases in series can be turned OFF to operate, the reliability of SX bus communication is greatly reduced.) For more information, refer to 2-2-2 (3) (Precautions for connecting baseboards and units to the SX bus).

3-4-2 Names and functions

SX bus station No. selection switch
(NP1BP-□□S, NP1BS-□□S, NP1BP-13D, NP1BS-13D only)

Expansion SX bus connector (IN)

Coupler lock

Processor bus connectors

Note: When connecting the SX bus
extension cable, be sure to
connect the cable that comes
from OUT terminal to the IN
terminal. (Connect the orange
connector of the cable to
OUT; the white connector to
IN.)

Expansion SX bus connector (OUT)

Direct-mount hole

SX bus connector

Direct-mount hole

(Side)   (Front)

Base board mounting studs (optional)
Type: NP8B-ST (2 pieces / 1 set)

Base board mounting bracket

(Front)   (Side)

<About the setting of SX bus station No.>
The set value for the SX bus station number on this baseboard is the SX bus station number for the module that is inserted in the leftmost slot but the power supply module on the baseboard. The station numbers for the remaining slots are automatically determined by adding one in order. For empty slots, SX bus station numbers are reserved.

<Example of setting>

"1E" → 30

High-order   Low-order

SX bus

	30	31	32	33	(34)	35	36	37	(38)	(39)	(40)
Power supply	I/O	I/O	I/O	I/O	Empty	I/O	I/O	I/O	Empty	Empty	Empty
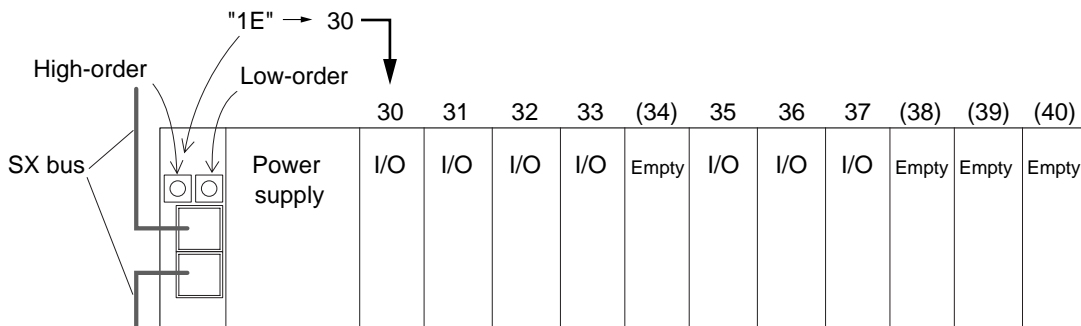
*   SX station number is set by hexadecimal number. In the above figure, the numbers
    beginning from "30" are assigned for SX station numbers because
    1E (hexadecimal) = 30 (decimal).

3-5 I/O Specifications

3-5-1 Sink and source

(1) Sink-type input
A sink-type input is where the signal current flows into a signal terminal of a input module.
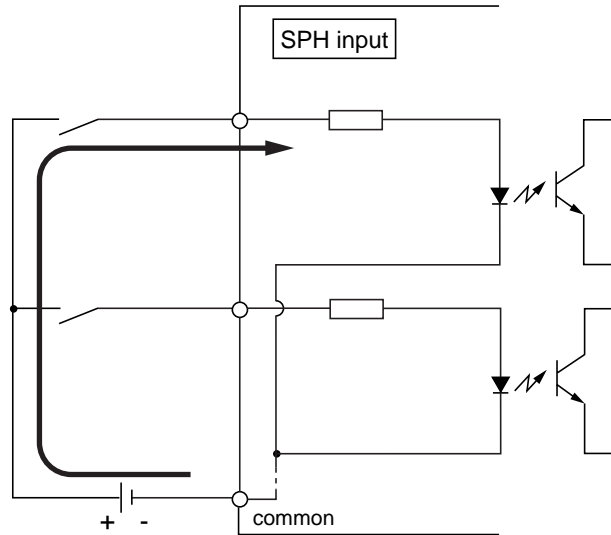
(2) Source-type input
A source-type input is where the signal current flows from a signal terminal of a input module.
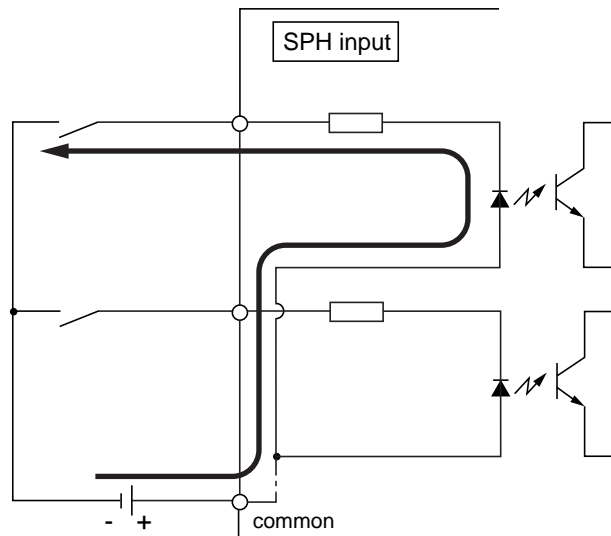
(3) Sink-type output
A sink-type output is where the signal current flows into a signal terminal of a output module.
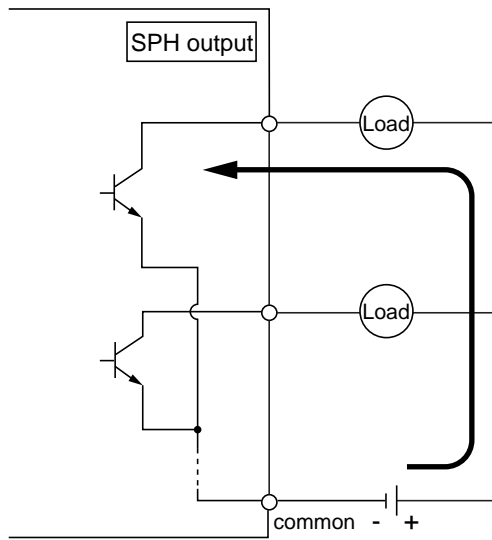
(4) Source-type output
A source-type output is where the signal current flows from a signal terminal of a output module.
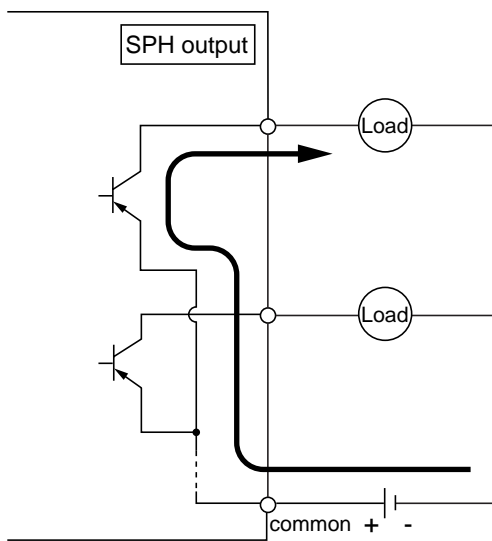
3-5-2 Life curve of relays

(1) Life curve of relays

The life expectancy of contacts depends on the voltage, current and the type of load connected. As the life expectancy of a relay output is severe for much times of on/off operation, use of a triac output is recommended. Determine the electrical life of contacts and replacement period of modules by taking the following graphs into account.

<Test conditions>

On/off frequency: 1800 times/hour
On load factor: 40%, Time constant L/R= 15ms (inductive load)

[Electrical life curve for relay output element]
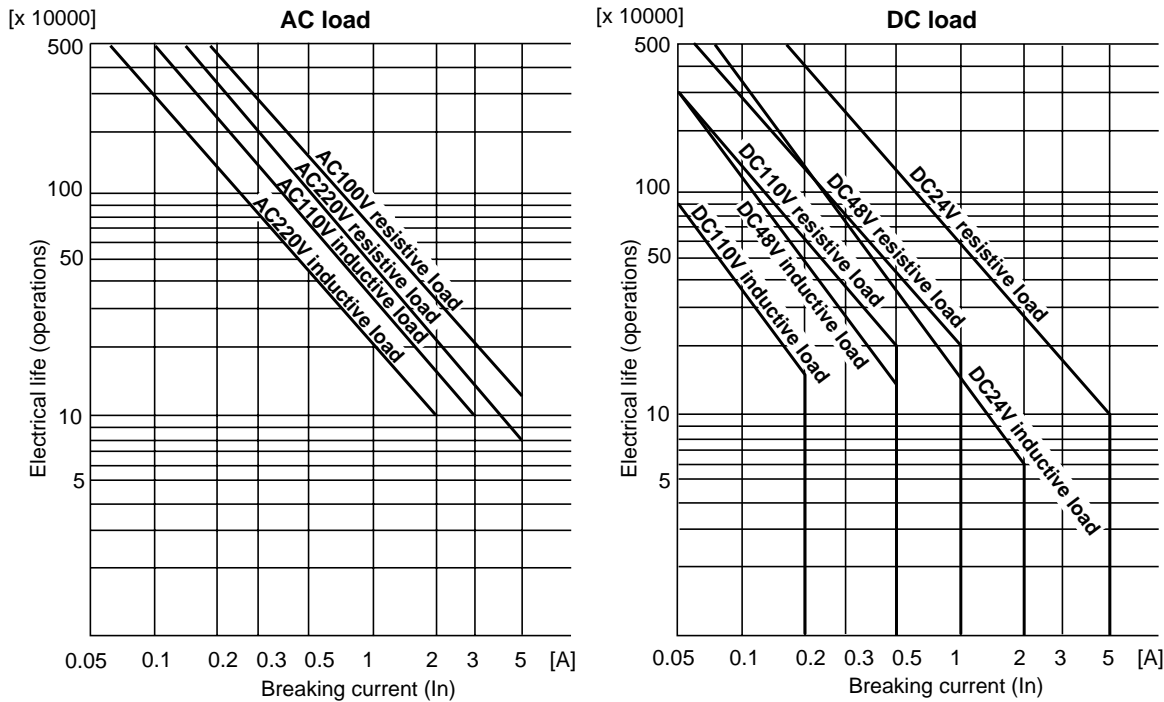
(2) Load types and inrush current

The load types and inrush current characteristics have remarkable effects on relay contacts. In particular, inrush current can cause contact welding, and must be taken into account together with the rated current.

- **Motors, electromagnetic contactors, and solenoid value**
  With these loads, the value of inrush current is 3 to 10 times that of the rated current.
  In addition, when inrush current lasts for a long time, such as under a motor load, breaking of inrush current may cause contact welding.
- **Compact self-ballasted fluorescent lamp load**
  The compact self-ballasted fluorescent lamp load allows rush current flow that is about 100 times the steady current, which may contact melting. Therefore, it is recommended that you perform the confirmation test with a real load.
- **Lamp loads**
  With lamp loads, the value of inrush current is 5 to 15 times that of the rated current. Because the inrush current may cause contact welding, in particular when a lamp with a large current capacity is to be turned on and off, it is recommended that confirmation test be performed using the actual load.
  The figure as shown below are examples of the relationship between current waveform and time for each load.
  (Ip: Inrush current, Io: Rated current)

[Relationship between current waveform and time for each load]
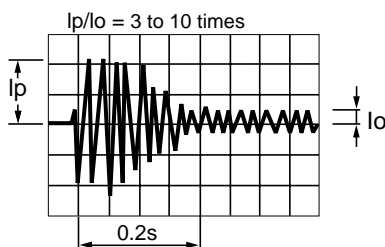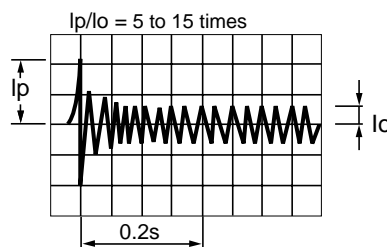
(3) Protection of contacts

When an inductive load such as motors, clutches, and solenoids is turned off, counter electromotive forces of several hundreds to thousands volts are generated, which may greatly shorten the electrical life of contacts. This is because the energy $1/2Li^2$ accumulated in the coil (L: inductance of coil) is consumed by discharge between contacts when an inductive load is turned off. Therefore, to absorb the counter electromotive force, use of a contact protection circuit is recommended. The following shows some examples of contact protection circuits; in each case AC or DC voltage must be used appropriately.

Note that using a contact protection circuit may slightly extend the recovery time.

Contact protection circuit

Example circuit	Judgment	Notes on use
Load (capacitor)	No good	(1) The contact tends to be welded when the contact is closed. (2) With AC voltage, leakage voltage may occur at the load.
Load (capacitor in series)	No good	(1) The contact tends to be welded when the contact is closed.
Load R — c, r	Good	(1) C= 0.1 to 1μF, r nearly equals R (2) With AC voltage: · Not applicable if the load impedance (R) is larger than the impedance of c or r · Applicable if the load impedance (R) is sufficiently small compared with the impedance of c or r
Load R — c r	Good	(1) C= 0.1 to 1μF, r nearly equals R (2) AC and DC voltage applicable
Load Diode	Good	(1) DC voltage only (2) AC voltage not applicable
Load Varister	Good	(1) AC and DC voltage are applicable

(4) Contact transfer

Contact transfer refers to a phenomena in which one side of contact melts or evaporates and is transferred to the other side because of on/off operation of the DC load. As the number of on/off times increases, the protruded portion on one contact grows and the embossed portion on other contact becomes correspondingly large. Eventually the two contacts are locked as if contact melting occurred. This phenomena may occur within the ratings of relay contacts. In particular, when a relay is used to turn on and off a capacitive load, this phenomena may occur. In this case, use a resistor to suppress inrush current.
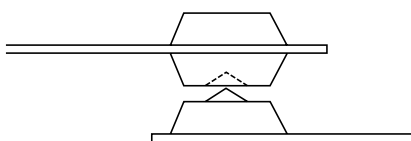
(5) Notes on relay output

When used in silicon gas atmosphere, contact failure of the relay contact may occur. To prevent this, avoid using silicon rubber, silicon oil, etc. which evaporate silicon gas or change relay output to transistor output, etc.
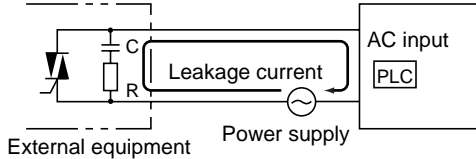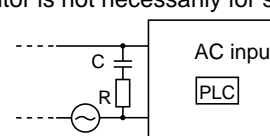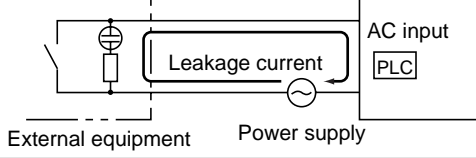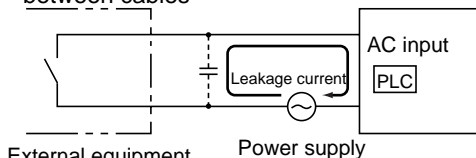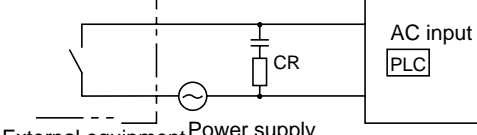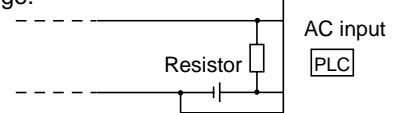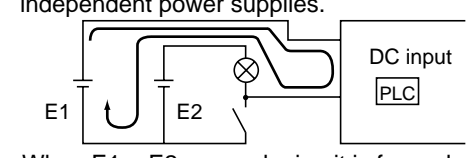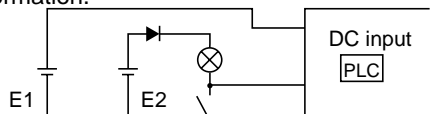
+---+
| Tips for Preventing I/O Malfunctions |
| |
| # ONE-POINT ADVICE |
+---+

Example of malfunction of I/O circuit and its countermeasure

When digital I/O is used, malfunction of the I/O circuit may occur. For example, even if an external input device (such as a sensor) is turned off, the PLC input remains turned on; or even if the PLC output is turned off, an external output device (such as a lamp) remains turned on.

The following table shows the causes and countermeasures for each case of malfunction, which should be taken into account in designing hardware.

(1) Input circuit malfunctions

Status	Cause	Countermeasures
—Case 1— The input signal does not go off.	· Leakage current from external equipment (driven by a proximity switch) 	· Connect an appropriate resistor and capacitor so that the voltage between terminals of the input module is lower than the recovery voltage value. (A capacitor is not necessarily for some circuit.)
—Case 2— The input signal does no go off. (The neon lamp remains on in some cases.)	· Leakage current from external equipment (driven by a limit switch with a neon lamp) 	· The CR value is determined by the leakage current value. Recommended value C: 0.1 to 0.47μF R: 47 to 120Ω (1/2W) · Alternatively, a display circuit is installed separately as an independent circuit.
—Case 3— The input signal does not go off.	· Leakage current due to stray capacitance between cables 	· Same as case 1. · The power supply is installed outside the external equipment as shown below.
—Case 4— The input signal does no go off.	· Leakage current from external equipment (driven by a switch with an LED indicator) 	· Connect an appropriate resistor so that the voltage between the input module terminal and the common line is lower than the OFF voltage.
—Case 5— The input signal does not go off.	· Sneak-circuit formed by the use of two independent power supplies. · When E1 > E2, a sneak-circuit is formed.	· Use only one power supply. · Connect a diode to prevent sneak-circuit formation.

Tips for Preventing I/O Malfunctions

ONE-POINT ADVICE

* Continued from preceding page
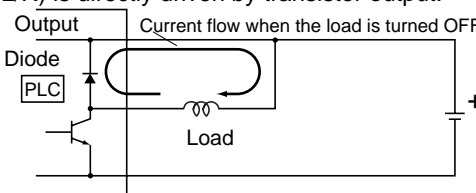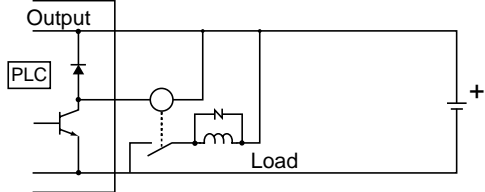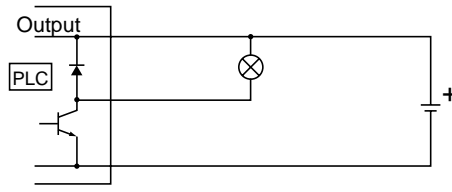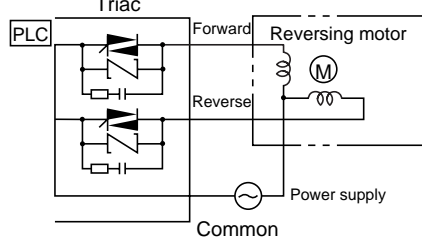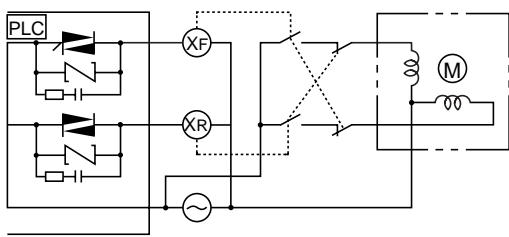
(2) Output circuit malfunctions

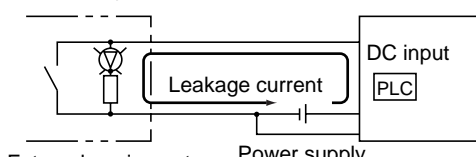| Status	Cause	Countermeasures
—Case 1— When the output circuit is turned off, excessive voltage is applied to the load.	· Half-wave rectification is made inside the load, as is the case with solenoids. · When the polarity of the power supply is as in (1) below, capacitor C is charged. When it is changed as in (2), the sum of the voltage charged and the power voltage is applied to both sides of diode D1. In this case the maximum voltage value is about $2\sqrt{2}$ E. Note: With this usage, the output element has no problem but the diode (D1) built into the load is deteriorated, which may cause burn or other failures. Output PLC ... D1 (1) ... Load (2)	· Connect a resistor with several ten to hundred kΩ in parallel with the load. Resistor / PLC / C R / Load
—Case 2— The load does not go off.	· Leakage current due to the surge absorbing circuit being connected in parallel with the output element. Output PLC / C R / Load / Leakage current	· Connect a resister of several ten kΩ or CR with the same impedance in parallel with the load. Note: When the wiring distance between the output module and load is long, there may be leakage current due to stray capacitance between leads. R / Load C R / Load
—Case 3— When the load is a CR timer, timer operates incorrectly.	Same as case 2.	· Drive the CR timer by means of a relay. · Use a timer of other than the CR type. Note: Follow the note in case 1, because some timers perform half-wave rectification. T / Timer / Output / PLC / Relay
—Case 4— The load does not go off.	· Loop-back circuit formed by the use of two power supply units Output PLC / Load / E2 / E1 · When E1 > E2, a sneak-circuit is formed. · When E1 is off and E2 is on, a sneak-circuit is also formed.	· Use only one power supply. · Connect a diode to prevent sneak-circuit formation. Note: When a relay is used as a load, connect a diode for absorbing counter electromotive force in parallel with the load, as shown by the dotted lines below. PLC / Load / E1 / E2

ONE-POINT ADVICE

* Continued from preceding page

Status	Cause	Countermeasures
—Case 5— The off response time of the load is excessively long.	· Transient current when the load turned OFF. When a solenoid or other large current inductive load (with a large time constant L/R) is directly driven by transistor output. · When transistor output is off, current flows through the diode and therefore the off response time may be delayed by 1 second or more.	· As shown below, connect a control relay or magnetic contactor having a short time constant to drive the load. · Use the output module not having a free wheeling diode, and provide a countermeasure for the surge of the load.
—Case 6— The output transistor is destroyed. (Transistor output)	· Inrush current of an incandescent lamp · When an incandescent lamp lights up, inrush current more than 10 times rated current may flow.	· To suppress inrush current, allow preheating current that is 1/5 to 1/3 times the rated current of the incandescent lamp to flow. Sink-type transistor output Source-type transistor output
—Case 7— The output triac is destroyed. (SSR output)	· Excessive voltage is applied to the output element. · When the output of the forwarding coil side is on, voltage is induced in the reversing coil, and excessive voltage (induced voltage + power voltage) is applied to the output of the reversing coil side that is off. · Voltage almost two times the power supply voltage may be applied. · The surge absorber may burn out before the triac is damaged.	· Provide a relay or a magnetic contactor to drive the load. · External interlock circuit is required.

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                                              Tips for Preventing I/O Malfunctions

      ONE-POINT ADVICE
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* Continued from preceding page

(3) Example of calculating bleeder resistance

The following is example of calculating bleeder resistance, which is provided as a countermeasure
for input malfunction due to leakage current of the LED circuit.

1) Example malfunction
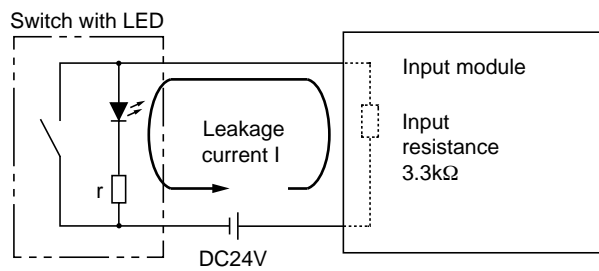
When r = 2.6kΩ, leakage current I is as follows:

$$I = \frac{24}{(2.6 + 3.3) \times 10^3} \fallingdotseq 4.1 \times 10^{-3} \, (A) \, (= 4.1mA)$$

In this case, the voltage given by the following expression is applied between input terminals of theinput module.

$$4.1 \times 10^{-3} \times 3.3 \times 10^3 \fallingdotseq 14 \, (V)$$

Because the voltage exceeds the OFF voltage of the input module (5.0V), if a switch with LED is turned off, the input
module remain on.

2) Countermeasure
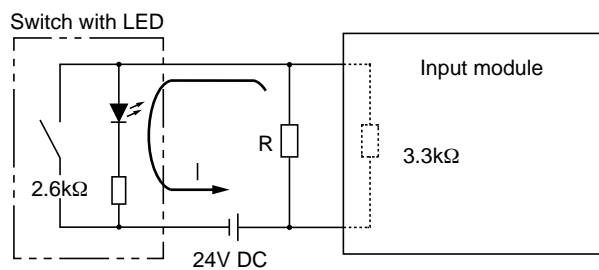
Insert a bleeder resistor (R) between the input terminals of input module so that the voltage applied between them is
reduced to 5.0V or less.

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┌──────────────────────────────────────────────────────┐
│                                    Tips for Preventing I/O Malfunctions │
│                                                        │
│     ONE-POINT ADVICE                                   │
│                                                        │
└──────────────────────────────────────────────────────┘
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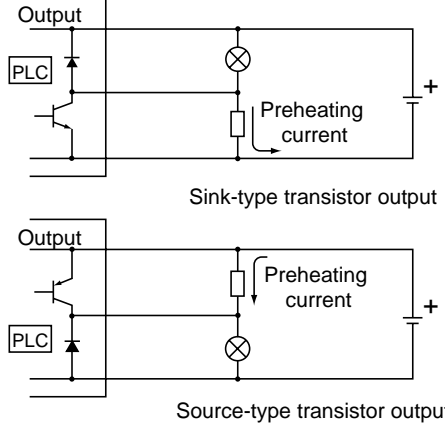
* Continued from preceding page

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3) Example calculation

· When the voltage applied to the bleeder resistor is 5.0V, the current given
  by the following expression flows.

$$I = \frac{24 - 5.0}{2.6 \times 10^3} = 7.3 \times 10^{-3} \, (A) \; (\, = 7.3mA)$$

· R can be obtained from the following expression,
  by taking into account the input resistance and the bleeder resistance.

$$\frac{5.0}{R} > 7.3 \times 10^{-3} - \frac{5.0}{3.3 \times 10^3} \quad \Rightarrow \quad R < 860 (\Omega)$$

· When R= 820 (Ω), the capacity (P) of the bleeder resistor can be obtained
  from the following expression. (When a switch with LED is turned on,
  24V DC is applied to the bleeder resistor.)

$$P = \frac{24^2}{820} \fallingdotseq 0.702 \, (W)$$

Assuming a margin that is normally 3 to 4 times the
above value, the capacity of the resistor is
determined to be 3W.

> Conclusion: Connect a bleeder resistor with 820Ω/3W.

MEMO

3-5-3 Digital input

(1) Input 24V DC 16 points (NP1X1606-W)

Item		Specification
Type		NP1X1606-W
No. of input points		16 points (8 points common x 2 circuits)
Input signal condition	Rated voltage	24V DC (24V AC can also be input)
	Rated voltage (tolerance)	30V DC
	Ripple percentage	5% or less
Characteristics of input circuit	Input type	Source, sink common
	Input current	7mA (24V DC)
	Input impedance	3.3kΩ
	Operating voltage — OFF to ON	15 to 30V
	Operating voltage — ON to OFF	0 to 5V
	Input delay time — OFF to ON	0.7ms (hard filter time) + (soft filter time) Whole soft filter time is variable by parameter setting.
	Input delay time — ON to OFF	(OFF to ON) to (ON to OFF) 1 to 1ms, 3 to 3ms (default), 3 to 10ms, 10 to 10ms, 30 to 30ms, 100 to 100ms
	Input type	DC type 1
Wire connections	External wire connections	Detachable screw terminal (M3) 20 poles
	Applicable wire size	AWG #22 to 18 (Note)
Input indication		LED indicator lights up when input is ON. (Logic side) ONL: normal (Green LED), ERR: abnormal (Red LED)
Isolation method		Photocoupler
Dielectric strength		1500V AC 1 minute (between input terminals and frame ground)
Insulation resistance		10MΩ or more with 500V DC megger (between input terminals and frame ground)
Derating condition		Simultaneous ON rate: Max. 100% (at 26.4V DC/55° C) Simultaneous ON rate: Max. 75% (at 30V DC/55° C)
External power supply		For signal: 24V DC
Internal current consumption		24V DC, 35mA or less (when all points are turned ON)
Occupied word		Directly connected to the SX bus: 2 words On the remote I/O link: 1 word
Mass		Approx. 150g

Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."

<Names>

Status indication LED

Detachable terminal block (M3) 20 poles

Nameplate

ONL 0 1 2 3 4 5 6 7
ERR 8 9 10 11 12 13 14 15

<External wiring>

Signal name

Terminal No.

Note: 1) Common terminals C0 and C1 are electrically separated and isolated from each other.
2) NC indicates a terminal not connected to an internal circuit. Do not use NC terminals as repeating terminals.

<Circuit configuration>

Internal circuit

0,8

7,15

C0,C1

24V DC

(2) Input 24V DC 32 points (NP1X3206-W)

Item		Specification
Type		NP1X3206-W
No. of input points		32 points (32 points common x 1 circuit)
Input signal condition	Rated voltage	24V DC
	Rated voltage (tolerance)	30V DC
	Ripple percentage	5% or less
Characteristics of input circuit	Input type	Source, sink common
	Input current	4mA (24V DC)
	Input impedance	5.6kΩ
	Operating voltage OFF to ON	15 to 30V
	Operating voltage ON to OFF	0 to 5V
	Input delay time OFF to ON	0.7ms (hard filter time) + (soft filter time) Whole soft filter time is variable by parameter setting.
	Input delay time ON to OFF	(OFF to ON) to (ON to OFF) 1 to 1ms, 3 to 3ms (default), 3 to 10ms, 10 to 10ms, 30 to 30ms, 100 to 100ms
	Input type	DC type1
Wire connections	External wire connections	40-pin connector (FCN-365P040-AU) x 1 piece
	Applicable wire size	AWG #23 or less (at soldered connector) (Note)
Input indication		For selected points by the switch, LED indicator lights up when input is ON. (Logic side) ONL: normal (Green LED), ERR: abnormal (Red LED)
Isolation method		Photocoupler
Dielectric strength		1500V AC 1 minute (between input terminals and frame ground)
Insulation resistance		10MΩ or more with 500V DC megger (between input terminals and frame ground)
Derating condition		Simultaneous ON rate: Max. 100% (at 26.4V DC/55° C) Simultaneous ON rate: Max. 75% (at 30V DC/55° C)
External power supply		For signal: 24V DC
Internal current consumption		24V DC, 50mA or less (when all points are turned ON)
Occupied words		2 words
Mass		Approx. 130g

Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."

<Names>

Status indication LED

LED indication selection switch

Mode	Lighting bits
0 ⦾ 1	0.0 to 0.15
0 ⊙ 1	1.0 to 1.15

Connector 40 poles

Nameplate

<External wiring>

Signal name

Connector pin No.

0.0	B20	A20	1.0
0.1	B19	A19	1.1
0.2	B18	A18	1.2
0.3	B17	A17	1.3
0.4	B16	A16	1.4
0.5	B15	A15	1.5
0.6	B14	A14	1.6
0.7	B13	A13	1.7
0.8	B12	A12	1.8
0.9	B11	A11	1.9
0.10	B10	A10	1.10
0.11	B9	A9	1.11
0.12	B8	A8	1.12
0.13	B7	A7	1.13
0.14	B6	A6	1.14
0.15	B5	A5	1.15
NC	B4	A4	NC
NC	B3	A3	NC
C0	B2	A2	NC
C0	B1	A1	NC

Note: NC indicates a terminal not connected to an internal circuit. Do not use NC terminals as repeating terminals.

<Circuit configuration>

Internal circuit

24V DC

(3) Input 24V DC 64 points (NP1X6406-W)

Item		Specification
Type		NP1X6406-W
No. of input points		64 points (32 points common x 2 circuits)
Input signal condition	Rated voltage	24V DC
	Rated voltage (tolerance)	30V DC
	Ripple percentage	5% or less
Characteristics of input circuit	Input type	Source, sink common
	Input current	4mA (24V DC)
	Input impedance	5.6kΩ
	Operating voltage — OFF to ON	15 to 30V
	Operating voltage — ON to OFF	0 to 5V
	Input delay time — OFF to ON	0.7ms (hard filter time) + (soft filter time) Whole soft filter time is variable by parameter setting.
	Input delay time — ON to OFF	(OFF to ON) to (ON to OFF) 1 to 1ms, 3 to 3ms (default), 3 to 10ms, 10 to 10ms, 30 to 30ms, 100 to 100ms
	Input type	DC type1
Wire connections	External wire connections	40-pin connector (FCN-365P040-AU) x 2 pieces
	Applicable wire size	AWG #23 or less (at soldered connector) (Note)
Input indication		For selected points by the switch, LED indicator lights up when input is ON. (Logic side) ONL: normal (Green LED), ERR: abnormal (Red LED)
Isolation method		Photocoupler
Dielectric strength		1500V AC 1 minute (between input terminals and frame ground)
Insulation resistance		10MΩ or more with 500V DC megger (between input terminals and frame ground)
Derating condition		Simultaneous ON rate: Max. 60% (at 26.4V DC/55° C) Simultaneous ON rate: Max. 45% (at 30V DC/55° C)
External power supply		For signal: 24V DC
Internal current consumption		24V DC, 85mA or less (when all points are turned ON)
Occupied words		4 words
Mass		Approx. 180g

Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."

\<Names\>

Status indication LED

LED indication selection switch

Mode	Lighting bits
⊙ ⊙	0.0 to 0.15
⊙ ⊙	1.0 to 1.15
⊙ ⊙	2.0 to 2.15
⊙ ⊙	3.0 to 3.15

Connector 40 poles

Nameplate

Connector 40 poles

```
ONL  0 1 2 3 4 5 6 7
ERR  8 9 10 11 12 13 14 15

     0 ── 1
     2 ── 3

0/1    2/3
```

\<External wiring\>

Signal name
Connector pin No.

0.0	1B20	1A20	1.0
0.1	1B19	1A19	1.1
0.2	1B18	1A18	1.2
0.3	1B17	1A17	1.3
0.4	1B16	1A16	1.4
0.5	1B15	1A15	1.5
0.6	1B14	1A14	1.6
0.7	1B13	1A13	1.7
0.8	1B12	1A12	1.8
0.9	1B11	1A11	1.9
0.10	1B10	1A10	1.10
0.11	1B9	1A9	1.11
0.12	1B8	1A8	1.12
0.13	1B7	1A7	1.13
0.14	1B6	1A6	1.14
0.15	1B5	1A5	1.15
NC	1B4	1A4	NC
NC	1B3	1A3	NC
C0	1B2	1A2	NC
C0	1B1	1A1	NC

Signal name
Connector pin No.

2.0	2B20	2A20	3.0
2.1	2B19	2A19	3.1
2.2	2B18	2A18	3.2
2.3	2B17	2A17	3.3
2.4	2B16	2A16	3.4
2.5	2B15	2A15	3.5
2.6	2B14	2A14	3.6
2.7	2B13	2A13	3.7
2.8	2B12	2A12	3.8
2.9	2B11	2A11	3.9
2.10	2B10	2A10	3.10
2.11	2B9	2A9	3.11
2.12	2B8	2A8	3.12
2.13	2B7	2A7	3.13
2.14	2B6	2A6	3.14
2.15	2B5	2A5	3.15
NC	2B4	2A4	NC
NC	2B3	2A3	NC
C1	2B2	2A2	NC
C1	2B1	2A1	NC

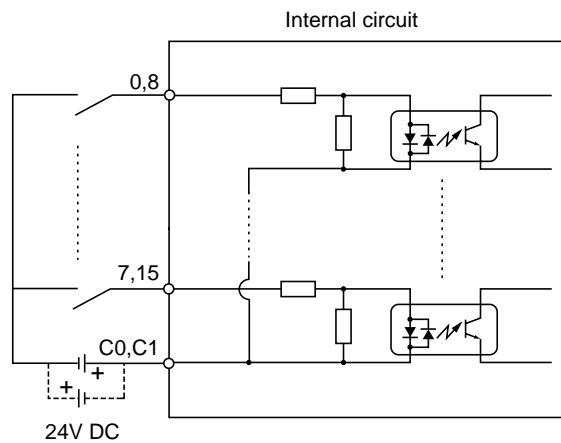Connector diagram labels: 1B20, 1A20, 2B20, 2A20 (top); 1B1, 1A1, 2B1, 2A1 (bottom)

Note:1) Common terminals C0 and C1 are electrically separated and isolated from each other.
2) NC indicates a terminal not connected to an internal circuit.
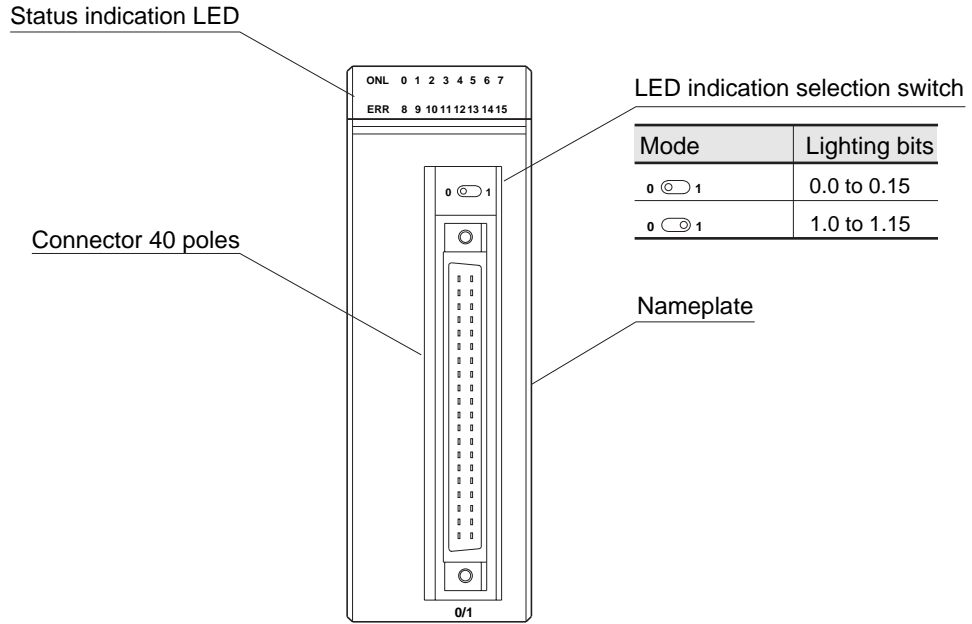Do not use NC terminals as repeating terminals.
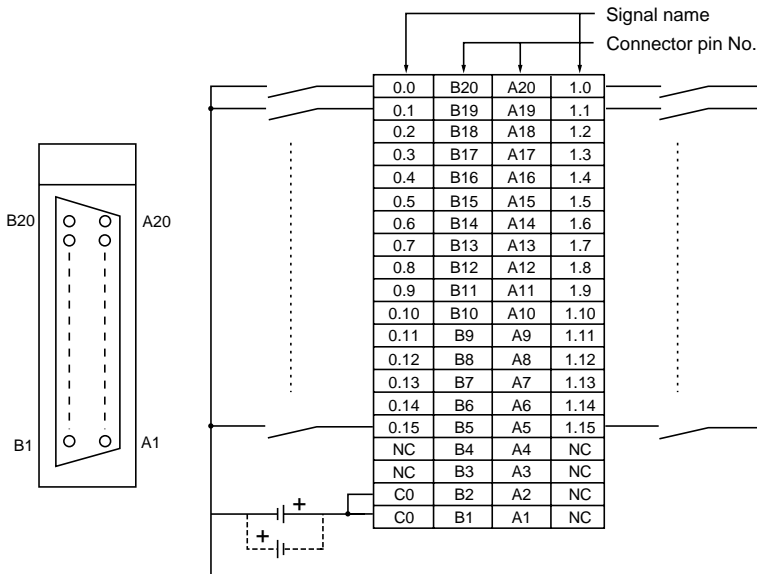
\<Circuit configuration\>

Internal circuit

0.0,2.0

1.15,3.15

C0,C1

24V DC

(4) Input 5 to 12V DC 32 points (NP1X3202-W)

Item			Specification
Type			NP1X3202-W
No. of input points			32 points (32 points common x 1 circuit)
Input signal condition	Rated voltage		5 to 12V DC
	Rated voltage (tolerance)		13.2V DC
	Ripple percentage		5% or less
Characteristics of input circuit	Input type		Source, sink common
	Input current		3mA (5V DC), 9mA (12V DC)
	Input impedance		1.2kΩ
	Operating voltage	OFF to ON	3.5 to 13.2V
		ON to OFF	0 to 1V
	Input delay time	OFF to ON	0.7ms (hard filter time) + (soft filter time) Whole soft filter time is variable by parameter setting.
		ON to OFF	(OFF to ON) to (ON to OFF) 1 to 1ms, 3 to 3ms (default), 3 to 10ms, 10 to 10ms, 30 to 30ms, 100 to 100ms
	Input type		DC type1
Wire connections	External wire connections		40-pin connector (FCN-365P040-AU) x 1 piece
	Applicable wire size		AWG #23 or less (at soldered connector) (Note)
Input indication			For selected points by the switch, LED indicator lights up when input is ON. (Logic side) ONL: normal (Green LED), ERR: abnormal (Red LED)
Isolation method			Photocoupler
Dielectric strength			1500V AC 1 minute (between input terminals and frame ground)
Insulation resistance			10MΩ or more with 500V DC megger (between input terminals and frame ground)
Derating condition			Simultaneous ON rate: Max. 100% (at 13.2V DC/55° C) Simultaneous ON rate: Max. 75% (at 15V DC/55° C)
External power supply			For signal: 5 to 12V DC
Internal current consumption			24V DC, 50mA or less (when all points are turned ON)
Occupied words			2 words
Mass			Approx. 130g

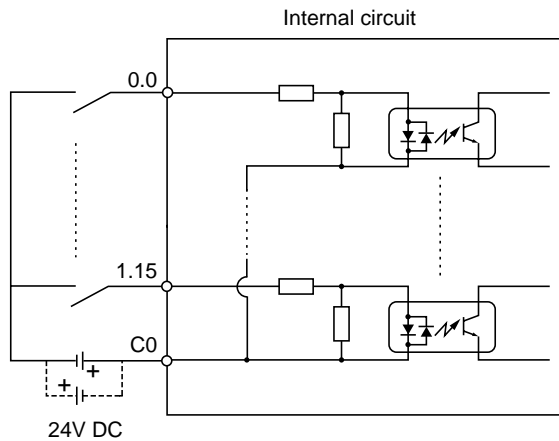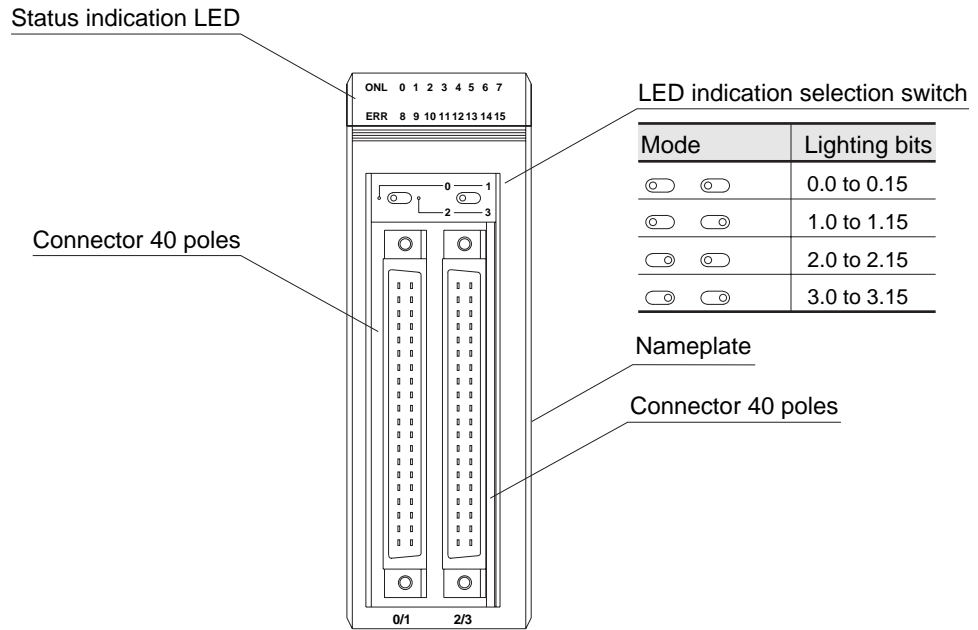Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."

<Names>

Status indication LED

LED indication selection switch

Mode	Lighting bits
0 ◎ 1	0.0 to 0.15
0 ◯ 1	1.0 to 1.15

Connector 40 poles

Nameplate

```
ONL  0 1 2 3 4 5 6 7
ERR  8 9 10 11 12 13 14 15

0 ◎ 1

0/1
```

<External wiring>

Signal name

Connector pin No.

0.0	B20	A20	1.0
0.1	B19	A19	1.1
0.2	B18	A18	1.2
0.3	B17	A17	1.3
0.4	B16	A16	1.4
0.5	B15	A15	1.5
0.6	B14	A14	1.6
0.7	B13	A13	1.7
0.8	B12	A12	1.8
0.9	B11	A11	1.9
0.10	B10	A10	1.10
0.11	B9	A9	1.11
0.12	B8	A8	1.12
0.13	B7	A7	1.13
0.14	B6	A6	1.14
0.15	B5	A5	1.15
NC	B4	A4	NC
NC	B3	A3	NC
C0	B2	A2	NC
C0	B1	A1	NC

B20   A20

B1   A1

Note: NC indicates a terminal not
connected to an internal
circuit. Do not use NC
terminals as repeating
terminals.

<Circuit configuration>

Internal circuit

0.0

1.15

C0

5 to 12V DC

3-5 I/O Specifications

(5) Input 48V DC 16 points (NP1X1607-W)

Item		Specification
Type		NP1X1607-W
No. of input points		16 points (8 points common x 2 circuits)
Input signal condition	Rated voltage	48V DC
	Rated voltage (tolerance)	60V DC
	Ripple percentage	5% or less
Characteristics of input circuit	Input type	Source, sink common
	Input current	5mA
	Input impedance	10kΩ
	Operating voltage — OFF to ON	34 to 60V
	Operating voltage — ON to OFF	0 to 10V
	Input delay time — OFF to ON	0.7ms (hard filter time) + (soft filter time) Whole soft filter time is variable by parameter setting.
	Input delay time — ON to OFF	(OFF to ON) to (ON to OFF) 1 to 1ms, 3 to 3ms (default), 3 to 10ms, 10 to 10ms, 30 to 30ms, 100 to 100ms
	Input type	DC type 1
Wire connections	External wire connections	Detachable screw terminal (M3) 20 poles
	Applicable wire size	AWG #22 to 18 (Note)
Input indication		LED indicator lights up when input is ON. (Logic side) ONL: normal (Green LED), ERR: abnormal (Red LED)
Isolation method		Photocoupler
Dielectric strength		1500V AC 1 minute (between input terminals and frame ground)
Insulation resistance		10MΩ or more with 500V DC megger (between input terminals and frame ground)
Derating condition		Simultaneous ON rate: Max. 100% (at 48V DC/55° C) Simultaneous ON rate: Max. 90% (at 52.8V DC/55° C) Simultaneous ON rate: Max. 60% (at 60V DC/55° C)
External power supply		For signal: 48V DC
Internal current consumption		24V DC, 35mA or less (when all points are turned ON)
Occupied word		Directly connected to the SX bus: 2 words On the remote I/O link: 1 word
Mass		Approx. 150g

Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."

<Names>

Status indication LED

ONL 0 1 2 3 4 5 6 7
ERR 8 9 10 11 12 13 14 15

Detachable terminal block
(M3) 20 poles

Nameplate

0
1
2
3
4
5
6
7
C0
8
9
10
11
12
13
14
15
C1
NC
NC

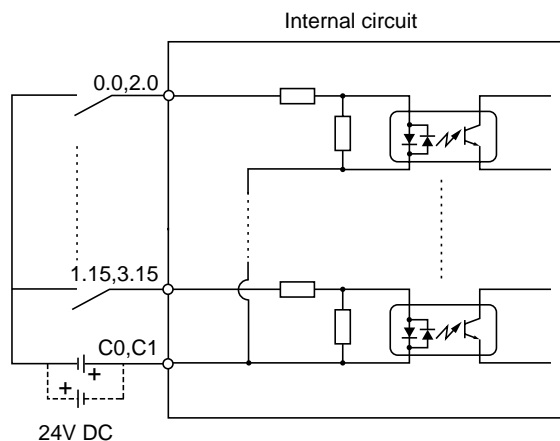**<External wiring>**

Signal name

Terminal No.

Note:1) Common terminals C0 and C1 are
electrically separated and isolated from
each other.
2) NC indicates a terminal not connected to
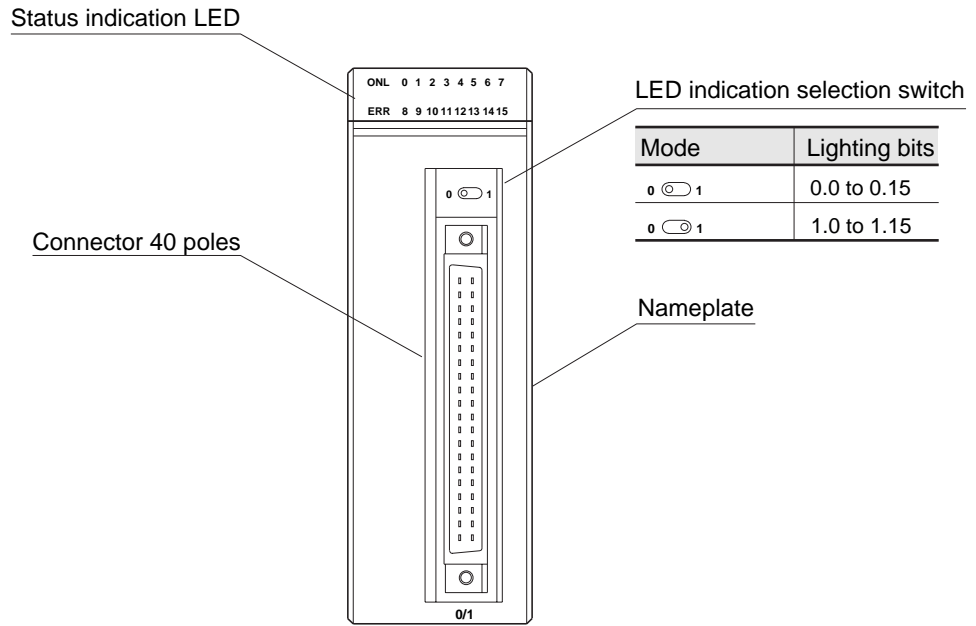an internal circuit. Do not use NC
terminals as repeating terminals.

<Circuit configuration>

Internal circuit

0,8

7,15

C0,C1

48V DC

3-45

(6) Input 100V AC 8 points (NP1X0810)

Item			Specification
Type			NP1X0810
No. of input points			8 points (8 points common x 1 circuit)
Input signal condition	Input type		AC Input
	Rated voltage		100 to 120V AC
	Rated voltage (tolerance)		132V AC
	Ripple percentage		5% or less
	Rated frequency		50/60Hz
	Rated frequency (tolerance)		47 to 63Hz
	Inrush current		Max. 150mA
Characteristics of input circuit	Input current		10mA
	Input impedance		10kΩ (50Hz), 9kΩ (60Hz)
	Operating voltage	OFF to ON	80 to 132V
		ON to OFF	0 to 20V
	Input delay time	OFF to ON	Approx. 10ms
		ON to OFF	Approx. 10ms
	Input type		AC type1
Wire connections	External wire connections		Detachable screw terminal (M3) 10 poles
	Applicable wire size		AWG #22 to 18 (Note)
Input indication			LED indicator lights up when input is ON. (Logic side) ONL: normal (Green LED), ERR: abnormal (Red LED)
Isolation method			Photocoupler
Dielectric strength			1500V AC 1 minute (between input terminals and frame ground)
Insulation resistance			10MΩ or more with 500V DC megger (between input terminals and frame ground)
Derating condition			None
External power supply			For signal: 100 to 120V AC
Internal current consumption			24V DC, 35mA or less (when all points are turned ON)
Occupied word			Directly connected to the SX bus: 2 words On the remote I/O link: 1 word
Mass			Approx. 130g

Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."

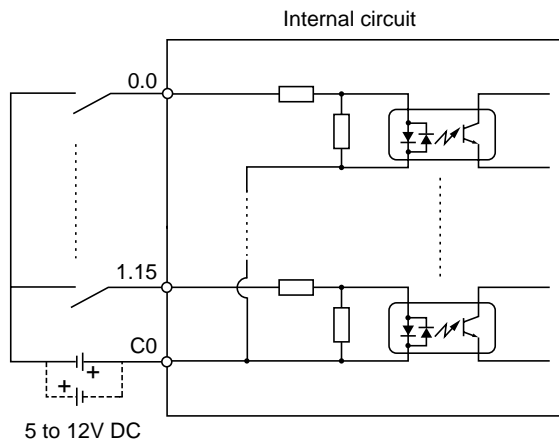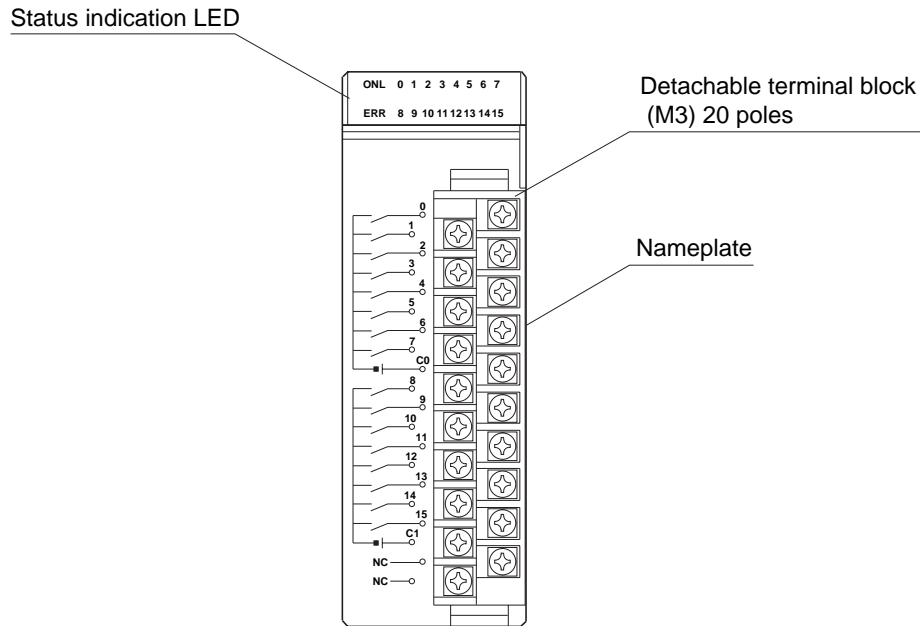**\<Names\>**

Status indication LED

Detachable terminal block
(M3) 10 poles

Nameplate

ONL 0 1 2 3 4 5 6 7

ERR

0
1
2
3
4
5
6
7
C0
NC

\<External wiring\>

Signal name

0	1
1	2
2	3
3	4
4	5
5	6
6	7
7	8
C0	9
NC	10

Terminal No.

Note:1) NC indicates a terminal not connected
to an internal circuit. Do not use NC
terminals as repeating terminals.

\<Circuit configuration\>

Internal circuit

0

7

C0

(7) Input 100V AC 16 points (NP1X1610)

Item			Specification
Type			NP1X1610
No. of input points			16 points (16 points common x 1 circuit), 2 common terminals
Input signal condition	Input type		AC Input
	Rated voltage		100 to 120V AC
	Rated voltage (tolerance)		132V AC
	Ripple percentage		5% or less
	Rated frequency		50/60Hz
	Rated frequency (tolerance)		47 to 63Hz
	Inrush current		Max. 150mA
Characteristics of input circuit	Input current		10mA/point (100 to 120V AC)
	Input impedance		10kΩ (50Hz), 9kΩ (60Hz)
	Operating voltage	OFF to ON	80 to 132V
		ON to OFF	0 to 20V
	Input delay time	OFF to ON	Approx. 10ms
		ON to OFF	Approx. 10ms
	Input type		AC type1
Wire connections	External wire connections		Detachable screw terminal (M3) 20 poles
	Applicable wire size		AWG #22 to 18 (Note)
Input indication			LED indicator lights up when input is ON. (Logic side) ONL: normal (Green LED), ERR: abnormal (Red LED)
Isolation method			Photocoupler
Dielectric strength			1500V AC 1 minute (between input terminals and frame ground)
Insulation resistance			10MΩ or more with 500V DC megger (between input terminals and frame ground)
Derating condition			Simultaneous ON rate: Max. 80% (at 100V AC/55° C) Simultaneous ON rate: Max. 60% (at 132V AC/55° C)
External power supply			For signal: 100 to 120V AC
Internal current consumption			24V DC, 40mA or less (when all points are turned ON)
Occupied word			Directly connected to the SX bus: 2 words On the remote I/O link: 1 word
Mass			Approx. 170g

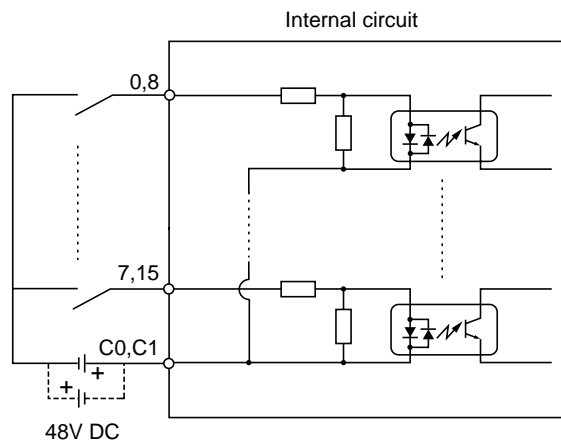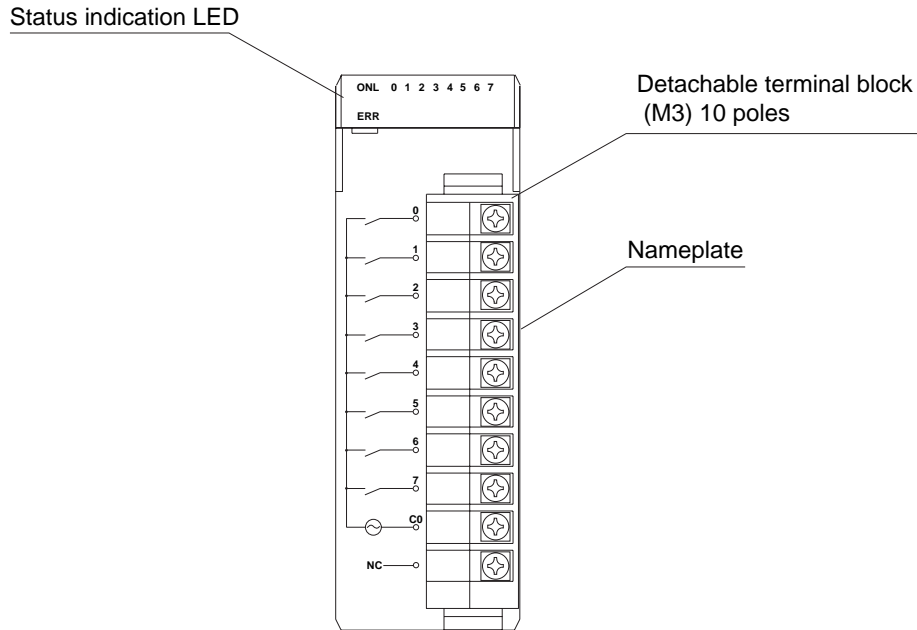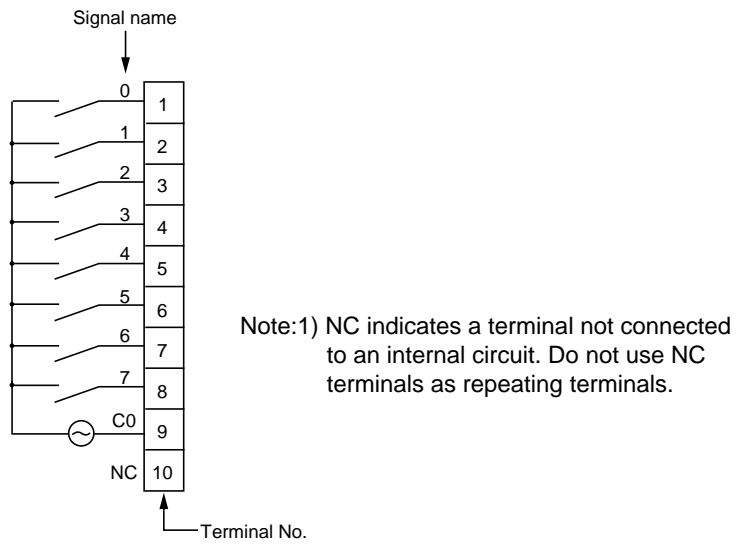Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."

<Names>

Status indication LED

Detachable terminal block (M3) 20 poles

Nameplate

| ONL | 0 1 2 3 4 5 6 7 |
| ERR | 8 9 10 11 12 13 14 15 |

0
1
2
3
4
5
6
7
C0
8
9
10
11
12
13
14
15
C0
NC
NC

<External wiring>

Signal name
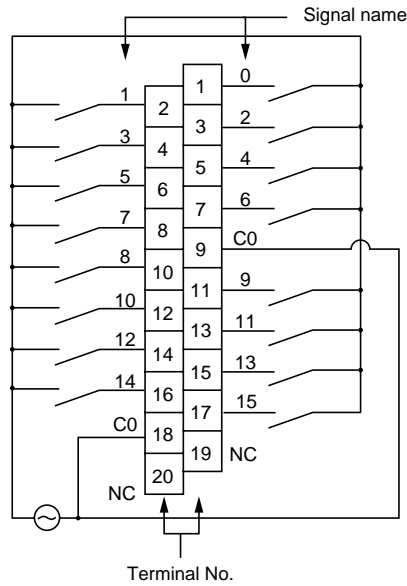
Note:1) Common terminals 9 and 18 are connected internal.
2) NC indicates a terminal not connected to an internal circuit. Do not use NC terminals as repeating terminals.

Terminal No.

<Circuit configuration>

Internal circuit

0

C0

8

C0
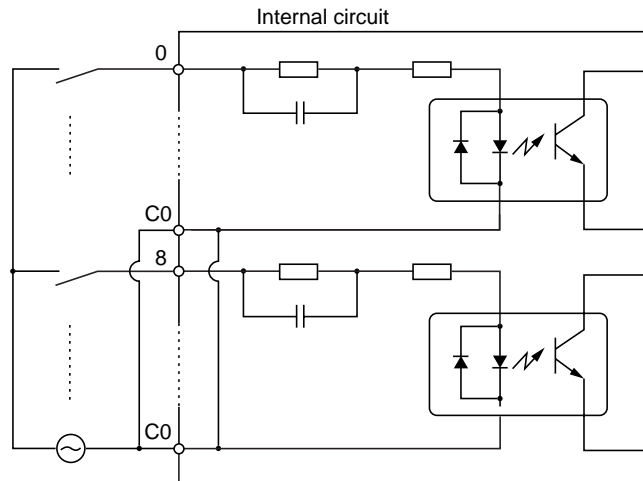
(8) Input 200V AC 8 points (NP1X0811)

Item			Specification
Type			NP1X0811
No. of input points			8 points (8 points common x 1 circuit)
Input signal condition	Input type		AC Input
	Rated voltage		200 to 240V AC
	Rated voltage (tolerance)		264V AC
	Ripple percentage		5% or less
	Rated frequency		50/60Hz
	Rated frequency (tolerance)		47 to 63Hz
	Inrush current		Max. 300mA
Characteristics of input circuit	Input current		10mA/point (200 to 240V AC)
	Input impedance		22kΩ (50Hz), 18kΩ (60Hz)
	Operating voltage	OFF to ON	160 to 264V
		ON to OFF	0 to 40V
	Input delay time	OFF to ON	Approx. 10ms
		ON to OFF	Approx. 10ms
	Input type		AC type1
Wire connections	External wire connections		Detachable screw terminal (M3) 10 poles
	Applicable wire size		AWG #22 to 18 (Note)
Input indication			LED indicator lights up when input is ON. (Logic side) ONL: normal (Green LED), ERR: abnormal (Red LED)
Isolation method			Photocoupler
Dielectric strength			2830V AC 1 minute (between input terminals and frame ground)
Insulation resistance			10MΩ or more with 500V DC megger (between input terminals and frame ground)
Derating condition			Simultaneous ON rate: Max 80% (at 200V AC/55° C) Simultaneous ON rate: Max 50% (at 264V AC/55° C)
External power supply			For signal: 200 to 240V AC
Internal current consumption			24V DC, 35mA or less (when all points are turned ON)
Occupied word			Directly connected to the SX bus: 2 words On the remote I/O link: 1 word
Mass			Approx. 130g

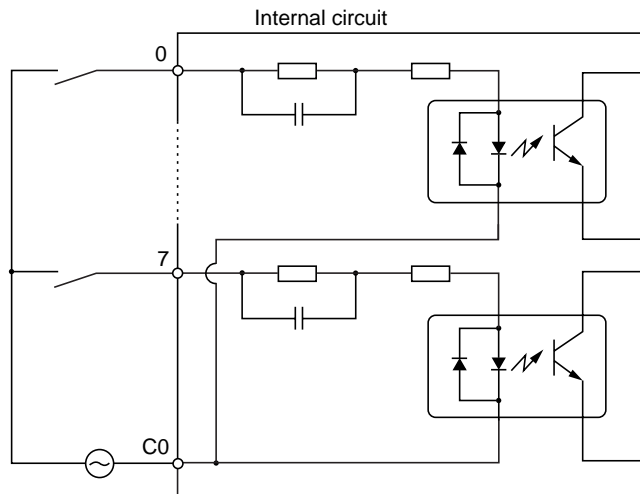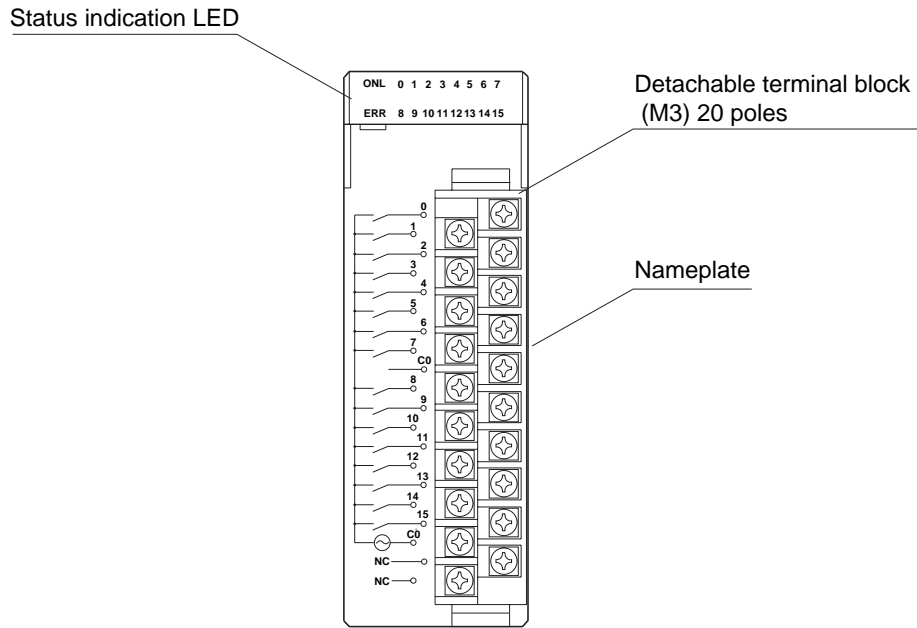Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."

<Names>

Status indication LED

Detachable terminal block
(M3) 10 poles

Nameplate

ONL 0 1 2 3 4 5 6 7

ERR

<External wiring>

Signal name

Note:1) NC indicates a terminal not connected
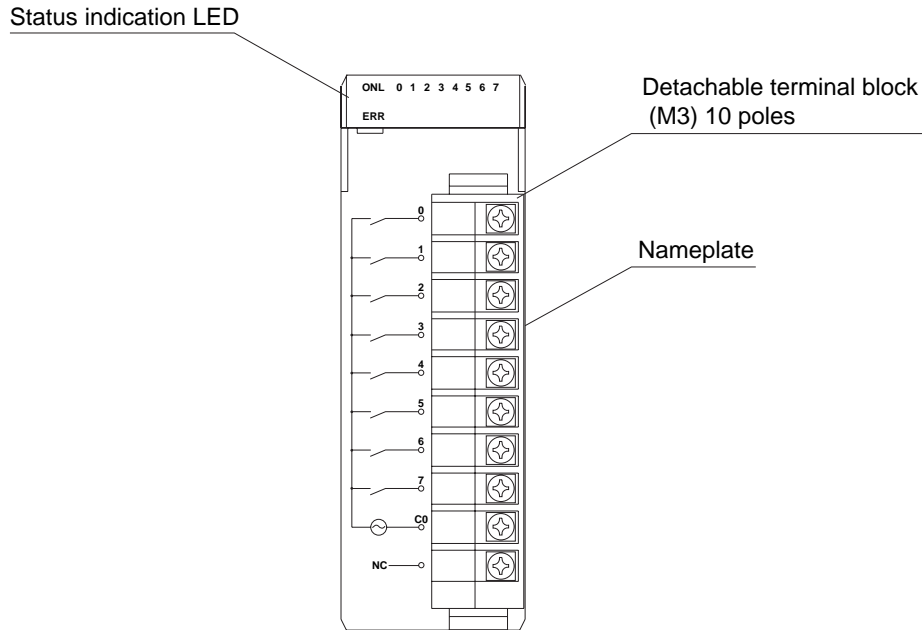to an internal circuit. Do not use NC
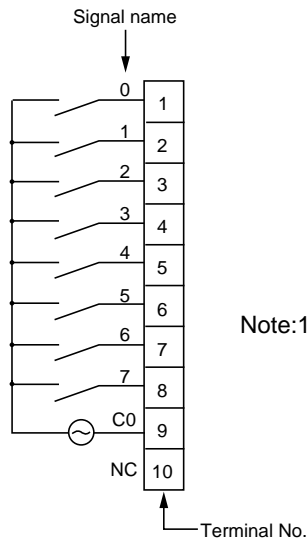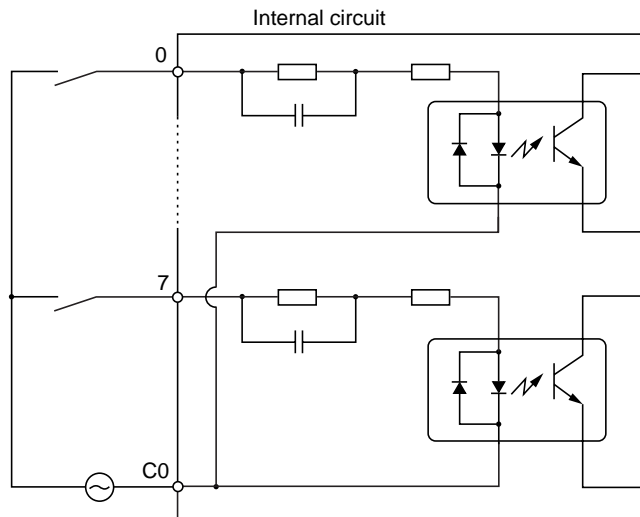terminals as repeating terminals.

Terminal No.

<Circuit configuration>

Internal circuit

3-51

(9) High-speed input 24V DC 32 points (NP1X3206-A)

Item			Specification
Type			NP1X3206-A
No. of input points			32 points (32 points common x 1 circuit)
Input signal condition	Rated voltage		24V DC
	Rated voltage (tolerance)		30V DC
	Ripple percentage		5% or less
Characteristics of input circuit	Input type		Source
	Input current		4mA (24V DC)
	Input impedance		5.6kΩ
	Operating voltage	OFF to ON	15 to 30V
		ON to OFF	0 to 5V
	Input delay time	OFF to ON	0.7ms (hard filter time) + (soft filter tim (Note 1) Whole soft filter time is variable by parameter setting. (OFF to ON) to (ON to OFF)
		ON to OFF	1 to 1ms, 3 to 3ms (default), 3 to 10ms, 10 to 10ms, 30 to 30ms, 100 to 100ms
	Input type		DC type1
Wire connections	External wire connections		40-pin connector (FCN-365P040-AU) x 1 piece
	Applicable wire size		AWG #23 or less (at soldered connecto (Note 2)
Input indication			For selected points by the switch, LED indicator lights up when input is ON. (Logic side) ONL: normal (Green LED), ERR: abnormal (Red LED)
Isolation method			Photocoupler
Dielectric strength			1500V AC 1 minute (between input terminals and frame ground)
Insulation resistance			10MΩ or more with 500V DC megger (between input terminals and frame ground)
Derating condition			Simultaneous ON rate: Max. 100% (at 26.4V DC/55° C) Simultaneous ON rate: Max. 75% (at 30V DC/55° C)
External power supply			For signal: 24V DC
Internal current consumption			24V DC, 50mA or less (when all points are turned ON)
Occupied words			14 words (Input: 9 words, Output: 5 words)
Mass			Approx. 130g

Note: 1) Hard filter time depends on used port. Time is 20μs for port 1 to 8, 100μs for port 9 to 32.
   2) Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."
      And when the counter function is used, no software filter time can be set.

   * For more information about this module, refer to the "User's Manual Digital High-speed Input Module" (FEH211).

<Names>

Status indication LED

LED indication selection switch

Mode	Lighting bits
0 ◉ 1	1.0 to 1.15
0 ◯ 1	2.0 to 2.15

Connector 40 poles

Nameplate

ONL 0 1 2 3 4 5 6 7
ERR 8 9 10 11 12 13 14 15

0/1

<External wiring>

Signal name
Connector pin No.

Port 9 (1.8)	B20	A20	Port 21 (2.4)
Port 10 (1.9)	B19	A19	Port 22 (2.5)
Port 11 (1.10)	B18	A18	Port 23 (2.6)
Port 12 (1.11)	B17	A17	Port 24 (2.7)
Port 13 (1.12)	B16	A16	Port 25 (2.8)
Port 14 (1.13)	B15	A15	Port 26 (2.9)
Port 15 (1.14)	B14	A14	Port 27 (2.10)
Port 16 (1.15)	B13	A13	Port 28 (2.11)
Port 17 (2.0)	B12	A12	Port 29 (2.12)
Port 18 (2.1)	B11	A11	Port 30 (2.13)
Port 19 (2.2)	B10	A10	Port 31(2.14)
Port 20 (2.3)	B9	A9	Port 32(2.15)
C0	B8	A8	C0
C0	B7	A7	C0
Port 1 (1.0)	B6	A6	Port 5 (1.4)
C0	B5	A5	C0
Port 2 (1.1)	B4	A4	Port 6 (1.5)
Port 3 (1.2)	B3	A3	Port 7 (1.6)
C0	B2	A2	C0
Port 4 (1.3)	B1	A1	Port 8 (1.7)

B20 ___ A20

B1 ___ A1

Note:1) Common pins C0s are connected internal.
   2) ( ) of signal name indicates an offset address and a bit position.
   3) For detail specifications and operations, refer to the manual (FEH211).

3-5-4 Digital output

(1) Transistor (sink type) output 8 points (NP1Y08T0902)

Item		Specification
Type		NP1Y08T0902
No. of output points		8 points (8 points common x 1 circuit) No. of common terminals P and M is four respectively.
Output power supply condition	Rated voltage	12 to 24V DC
	Tolerance	10.2 to 30V DC
Characteristics of output circuit	Output type	Sink type
	Max. load current	2.4A/point, 8A/common
	Voltage drop	2V or less (at 2.4A load)
	Response time	OFF to ON	1 ms or less
		ON to OFF	1 ms or less
	Leakage current in OFF state	Max. 0.1mA
	Output element	Transistor
	Surge current strength	9A 10ms
Output protection method	Built-in fuse	125V, 15A 2 fuses, not changeable
	Surge absorption circuit	Varistor
	Others	None
On/off times		Max. 1800 times/hour (inductive load), No limit (resistor load)
Wire connections	External wire connections	Detachable screw terminal (M3) 20 poles
	Applicable wire size	AWG #22 to 18 (Note)
Output indication		LED indicator lights up when output is ON (Logic side), ONL: normal (Green LED), ERR: abnormal and the fuse blown out (Red LED)
Isolation method		Photocoupler
Dielectric strength		1500V AC/minute (between output terminals and frame ground)
Insulation resistance		10MΩ or more with 500V DC megger (between output terminals and ground)
Derating condition		Simultaneous ON rate: Max. 100% (at 26.4V DC/55° C) Simultaneous ON rate: Max. 85% (at 30V DC/55° C)
External power supply		12 to 24V DC, 20mA (for transistor drive)
Internal current consumption		24V DC, 20mA or less (when all points are turned ON)
Occupied word		Directly connected to the SX bus: 2 words On the remote I/O link: 1 word
Mass		Approx. 150g

Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."

<Names>

Status indication LED
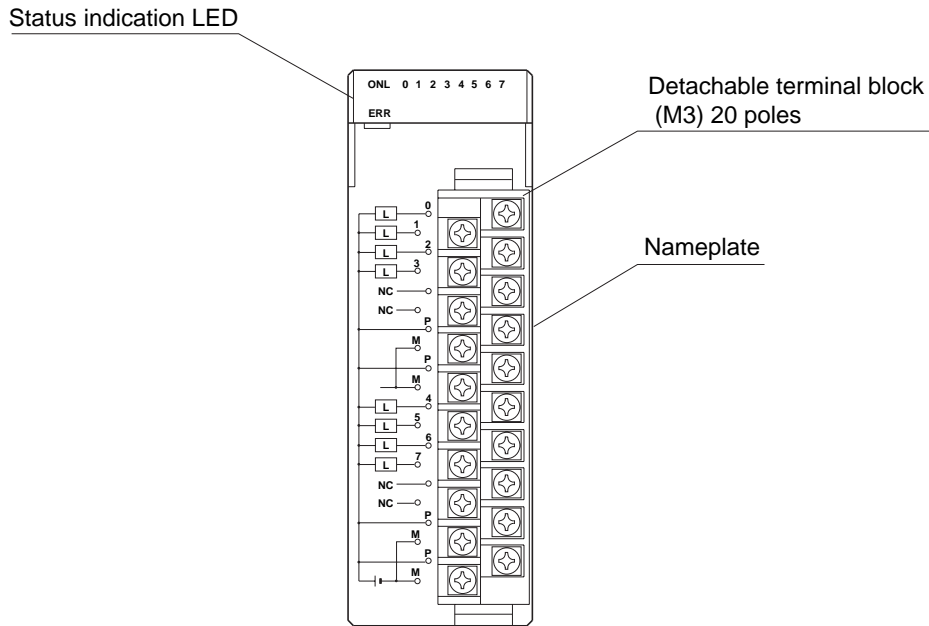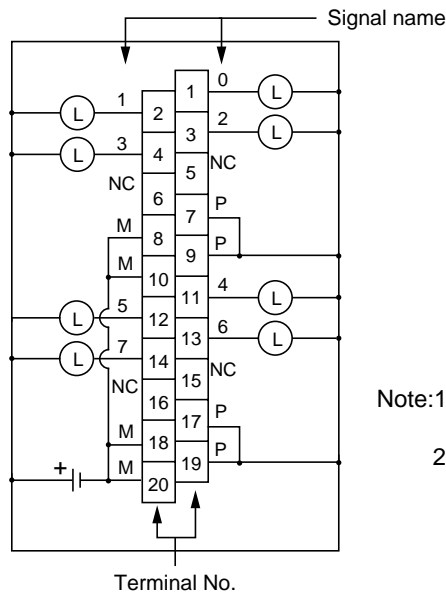
ONL 0 1 2 3 4 5 6 7

ERR

Detachable terminal block
(M3) 20 poles

Nameplate
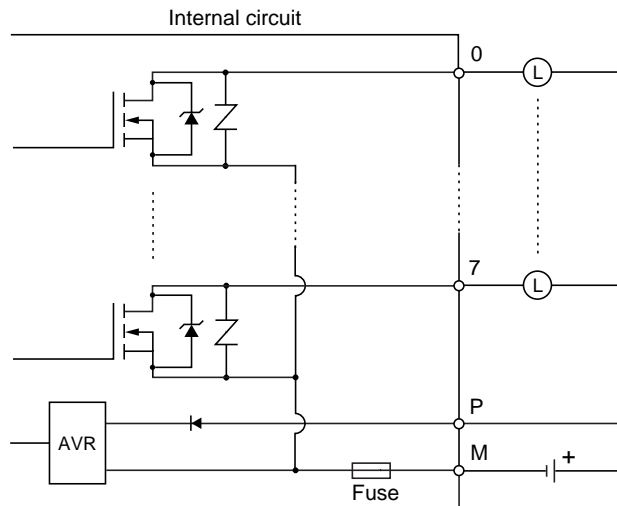
<External wiring>

Signal name

Note:1) Common terminals (P: 7, 9, 17, 19,
       M: 8, 10, 18, 20) are connected internal.
     2) NC indicates a terminal not connected
        to an internal circuit. Do not use NC
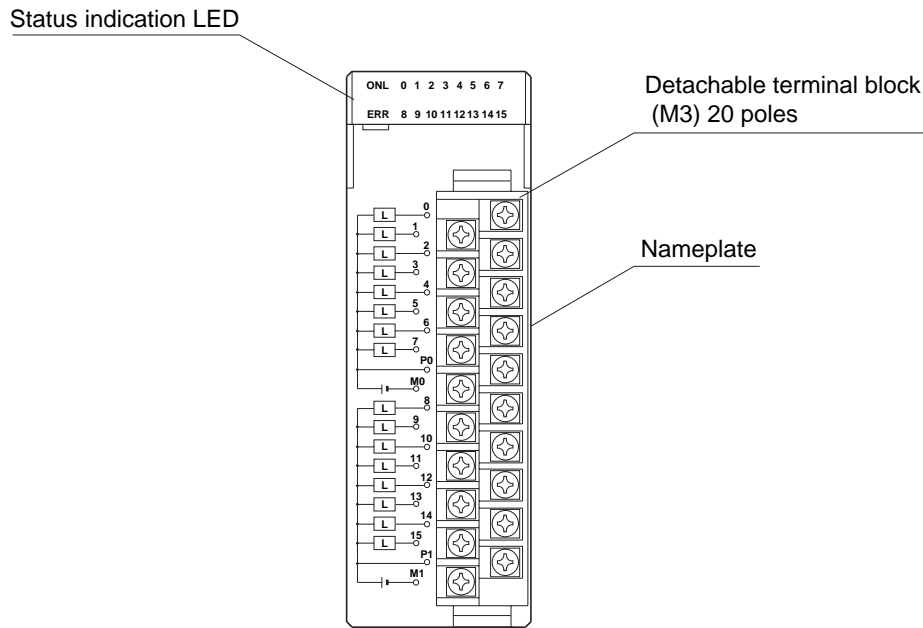   terminals as repeating terminals.

Terminal No.

<Circuit configuration>

Internal circuit

AVR

Fuse

(2) Transistor (sink type) output 16 points (NP1Y16T09P6)
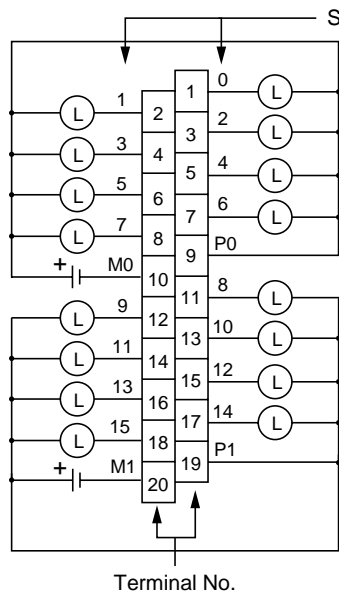
Item			Specification
Type			NP1Y16T09P6
No. of output points			16 points (8 points common x 2 circuits)
Output power supply condition	Rated voltage		12 to 24V DC
	Tolerance		10.2 to 30V DC
Characteristics of output circuit	Output type		Sink type
	Max. load current		0.6A/point, 4A/common
	Voltage drop		1.5V or less (at 0.6A load)
	Response time	OFF to ON	1 ms or less
		ON to OFF	1 ms or less
	Leakage current in OFF state		Max. 0.1mA
	Output element		Transistor
	Surge current strength		2A 10ms
Output protection method	Built-in fuse		125V, 7A 2 fuses, not changeable
	Surge absorption circuit		Varistor
	Others		None
On/off times			Max. 1800 times/hour (inductive load), No limit (resistor load)
Wire connections	External wire connections		Detachable screw terminal (M3) 20 poles
	Applicable wire size		AWG #22 - 18 (Note)
Output indication			LED indicator lights up when output is ON (Logic side), ONL: normal (Green LED), ERR: abnormal and the fuse blown out (Red LED)
Isolation method			Photocoupler
Dielectric strength			1500V AC/minute (between output terminals and frame ground)
Insulation resistance			10MΩ or more with 500V DC megger (between output terminals and ground)
Derating condition			Simultaneous ON rate: Max. 100% (at 26.4V DC/55° C) Simultaneous ON rate: Max. 85% (at 30V DC/55° C)
External power supply			12 to 24V DC, 30mA (for transistor drive)
Internal current consumption			24V DC, 42mA or less (when all points are turned ON)
Occupied word			Directly connected to the SX bus: 2 words On the remote I/O link: 1 word
Mass			Approx. 160g

Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."

\<Names\>

Status indication LED

ONL 0 1 2 3 4 5 6 7
ERR 8 9 10 11 12 13 14 15

Detachable terminal block (M3) 20 poles

Nameplate

\<External wiring\>

Signal name

Note: Common terminals P0 and P1 are electrically separated and isolated from each other.
And common terminals M0 and M1 are electrically separated and isolated from each other.

Terminal No.

\<Circuit configuration\>

Internal circuit

0,8

7,15

P0,P1

M0,M1

AVR

Fuse

(3) Transistor (sink type) output 16 points (NP1Y16T10P2)

Item			Specification
Type			NP1Y16T10P2
No. of output points			16 points (8 points common x 2 circuits)
Output power supply condition	Rated voltage		48V DC
	Tolerance		38 to 60V DC
Characteristics of output circuit	Output type		Sink type
	Max. load current		0.2A/point, 1.6A/common
	Voltage drop		1.5V or less (at 0.2A load)
	Response time	OFF to ON	1 ms or less
		ON to OFF	1 ms or less
	Leakage current in OFF state		Max. 0.1mA
	Output element		Transistor
	Surge current strength		1A 10ms
Output protection method	Built-in fuse		125V, 2.5A, not changeable
	Surge absorption circuit		Varistor
	Others		None
On/off times			Max. 3600 times/hour (inductive load), No limit (resistor load)
Wire connections	External wire connections		Detachable screw terminal (M3) 20 poles
	Applicable wire size		AWG #22 - 18 (Note)
Output indication			LED indicator lights up when output is ON (Logic side), ONL: normal (Green LED), ERR: abnormal and the fuse blown out (Red LED)
Isolation method			Photocoupler
Dielectric strength			1500V AC/minute (between output terminals and frame ground)
Insulation resistance			10MΩ or more with 500V DC megger (between output terminals and ground)
Derating condition			Simultaneous ON rate: Max. 100% (at 48V DC/55° C) Simultaneous ON rate: Max. 90% (at 60V DC/55° C)
External power supply			48V DC, 30mA (for transistor drive)
Internal current consumption			24V DC, 42mA or less (when all points are turned ON)
Occupied word			Directly connected to the SX bus: 2 words On the remote I/O link: 1 word
Mass			Approx. 160g

Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."

<Names>

Status indication LED

Detachable terminal block (M3) 20 poles

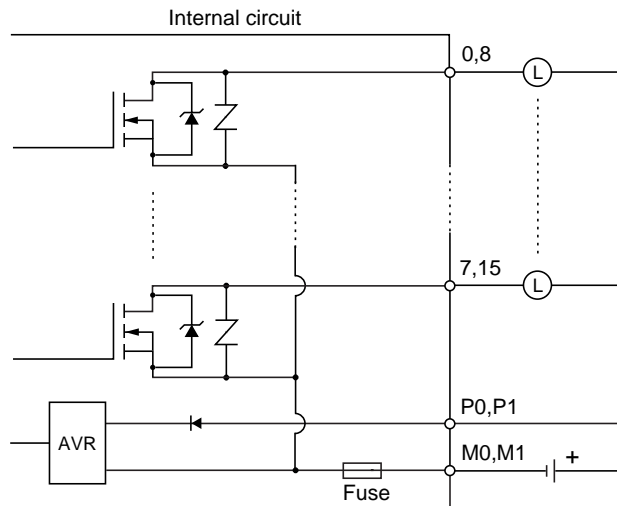Nameplate

<External wiring>

Signal name

Note: Common terminals P0 and P1 are electrically separated and isolated from each other.
And common terminals M0 and M1 are electrically separated and isolated from each other.
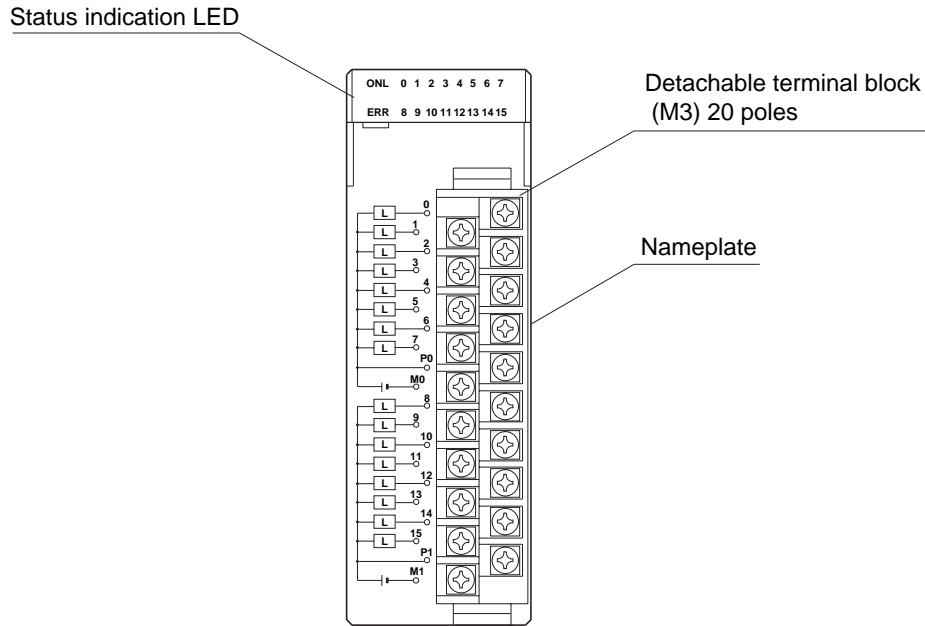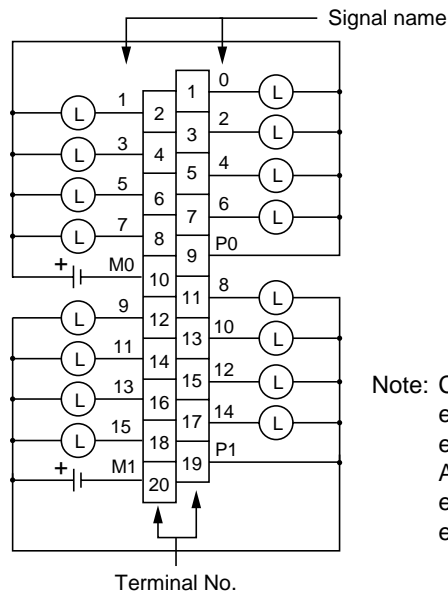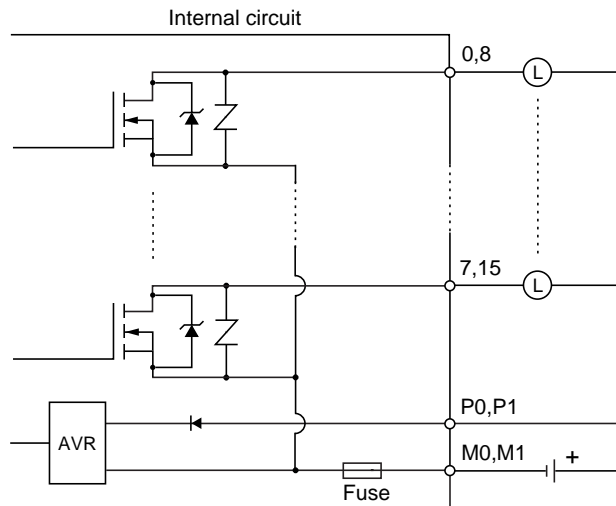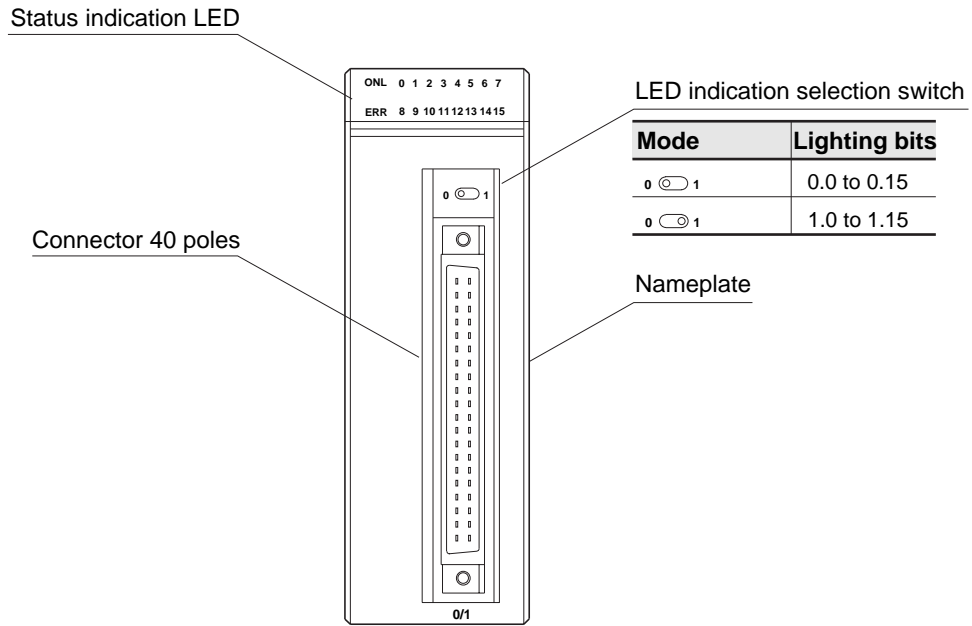
Terminal No.

<Circuit configuration>

Internal circuit

0,8

7,15

P0,P1

AVR

M0,M1

Fuse

(4) Transistor (sink type) output 32 points (NP1Y32T09P1)
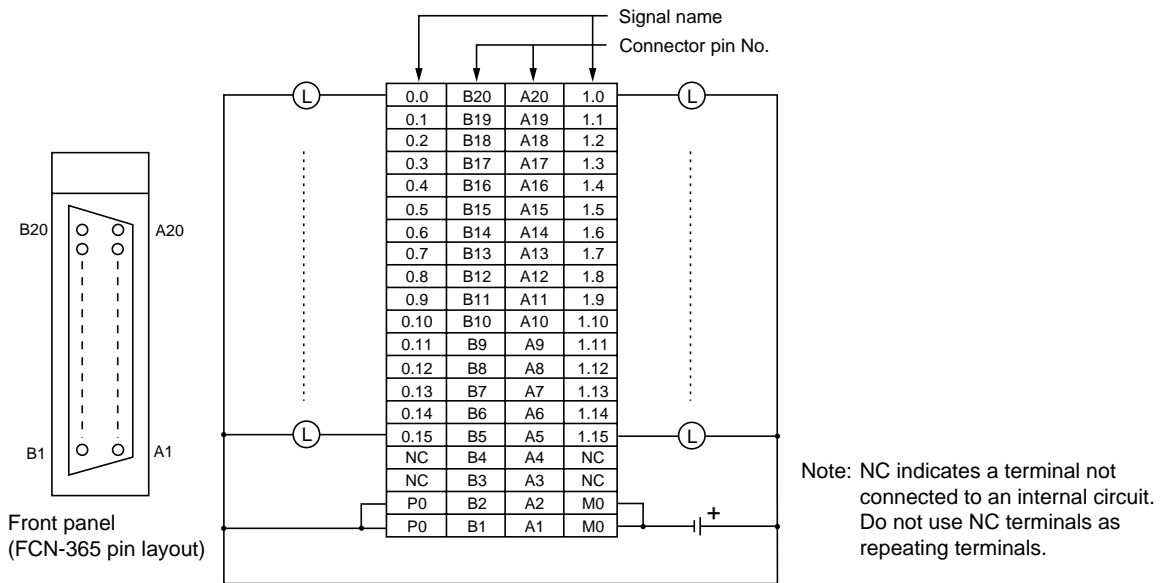
Item			Specification
Type			NP1Y32T09P1
No. of output points			32 points (32 points common x 1 circuit)
Output power supply condition	Rated voltage		12 to 24V DC
	Tolerance		10.2 to 30V DC
Characteristics of output circuit	Output type		Sink type
	Max. load current		0.12A/point (30V DC), 3.2A/common
	Voltage drop		1.5V or less (at 0.12A load)
	Response time	OFF to ON	1ms or less
		ON to OFF	1ms or less
	Leakage current in OFF state		Max. 0.1mA
	Output element		Transistor
	Surge current strength		0.3A 10ms
Output protection method	Built-in fuse		125V, 5A, not changeable
	Surge absorption circuit		Zener diode
	Others		None
On/off times			Max. 3600 times/hour (inductive load), No limit (resistor load)
Wire connections	External wire connections		40-pin connector (FCN-365P040-AU) x 1 piece
	Applicable wire size		AWG #23 or less (at soldered connector) (Note)
Output indication			For selected points by the switch, LED indicator lights up when output is ON (Logic side), ONL: normal (Green LED), ERR: abnormal and the fuse blown out (Red LED)
Isolation method			Photocoupler
Dielectric strength			1500V AC/minute (between output terminals and frame ground)
Insulation resistance			10MΩ or more with 500V DC megger (between output terminals and ground)
Derating condition			Simultaneous ON rate: Max. 80% (at 24V DC/55° C) Simultaneous ON rate: Max. 75% (at 26.4V DC/55° C) Simultaneous ON rate: Max. 65% (at 30V DC/55° C)
External power supply			12 to 24V DC, 52mA (for transistor drive)
Internal current consumption			24V DC, 45mA or less (when all points are turned ON)
Occupied words			2 words
Mass			Approx. 130g

Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."

<Names>

Status indication LED

ONL 0 1 2 3 4 5 6 7
ERR 8 9 10 11 12 13 14 15

Connector 40 poles

LED indication selection switch

Mode	Lighting bits
0 ◎ 1	0.0 to 0.15
0 ◯ 1	1.0 to 1.15

Nameplate

0/1

<External wiring>

Signal name
Connector pin No.

Front panel
(FCN-365 pin layout)

0.0	B20	A20	1.0
0.1	B19	A19	1.1
0.2	B18	A18	1.2
0.3	B17	A17	1.3
0.4	B16	A16	1.4
0.5	B15	A15	1.5
0.6	B14	A14	1.6
0.7	B13	A13	1.7
0.8	B12	A12	1.8
0.9	B11	A11	1.9
0.10	B10	A10	1.10
0.11	B9	A9	1.11
0.12	B8	A8	1.12
0.13	B7	A7	1.13
0.14	B6	A6	1.14
0.15	B5	A5	1.15
NC	B4	A4	NC
NC	B3	A3	NC
P0	B2	A2	M0
P0	B1	A1	M0

Note: NC indicates a terminal not connected to an internal circuit. Do not use NC terminals as repeating terminals.

<Circuit configuration>

Internal circuit

P0

AVR

0.0

1.15

M0

Fuse

3-61

(5) Transistor (sink type) output 32 points with pulse output function (NP1Y32T09P1-A)

Item			Specification
Type			NP1Y32T09P1-A
No. of output points			32 points (32 points common x 1 circuit)
Output power supply condition	Rated voltage		12 to 24V DC
	Tolerance		10.2 to 30V DC
Characteristics of output circuit	Output type		Sink type
	Max. load current		0.12A/point, 3.2A/common
	Voltage drop		1.5V or less (at 0.12A load)
	Response time	OFF to ON	Part 1 to 8: 20μs or less (at over 20mA) : 25μs (at 10 to 20mA)
		ON to OFF	Part 9 to 32: 1μs or less
	Leakage current in OFF state		Max. 0.1mA
	Output element		Transistor
	Surge current strength		0.3A 10ms
Output protection method	Built-in fuse		125V, 5A, not changeable
	Surge absorption circuit		Zener diode
	Others		None
On/off times			Max. 3600 times/hour (inductive load), No limit (resistor load)
Wire connections	External wire connections		40-pin connector (FCN-365P040-AU) x 1 piece
	Applicable wire size		AWG #23 or less (at soldered connector) (Note)
Output indication			For selected points by the switch, LED indicator lights up when output is ON (Logic side), ONL: normal (Green LED), ERR: abnormal and the fuse blown out (Red LED)
Isolation method			Photocoupler
Dielectric strength			1500V AC/minute (between output terminals and frame ground)
Insulation resistance			10MΩ or more with 500V DC megger (between output terminals and ground)
Derating condition			Simultaneous ON rate: Max. 80% (at 24V DC/55° C) Simultaneous ON rate: Max. 75% (at 26.4V DC/55° C) Simultaneous ON rate: Max. 65% (at 30V DC/55° C)
External power supply			12 to 24V DC, 40mA (for transistor drive)
Internal current consumption			24V DC, 50mA or less (when all points are turned ON)
Occupied words			14 words (Input: 6 words, Output: 8 words)
Mass			Approx. 200g

Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."
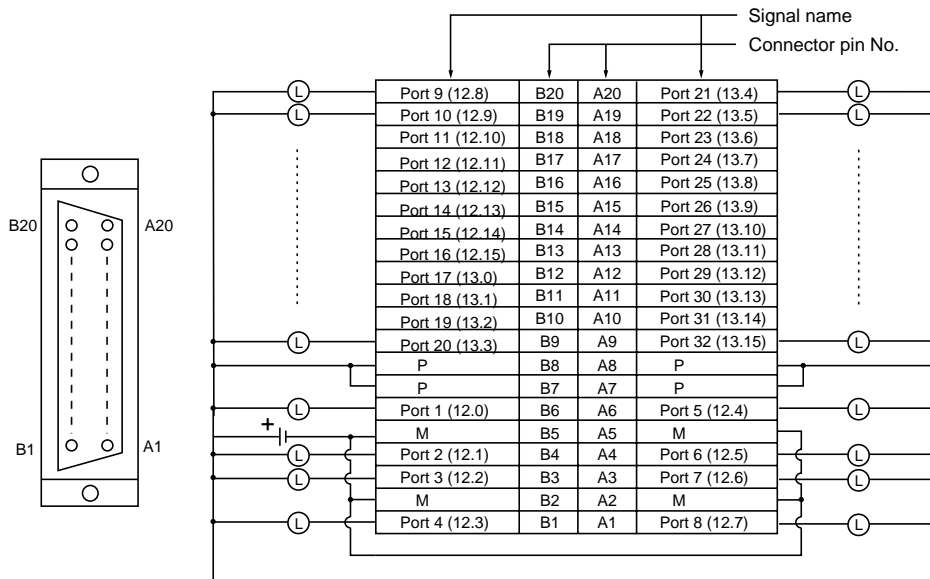   * For more information about this module, refer to the "User's Manual Digital High-speed Output Module" (FEH212).
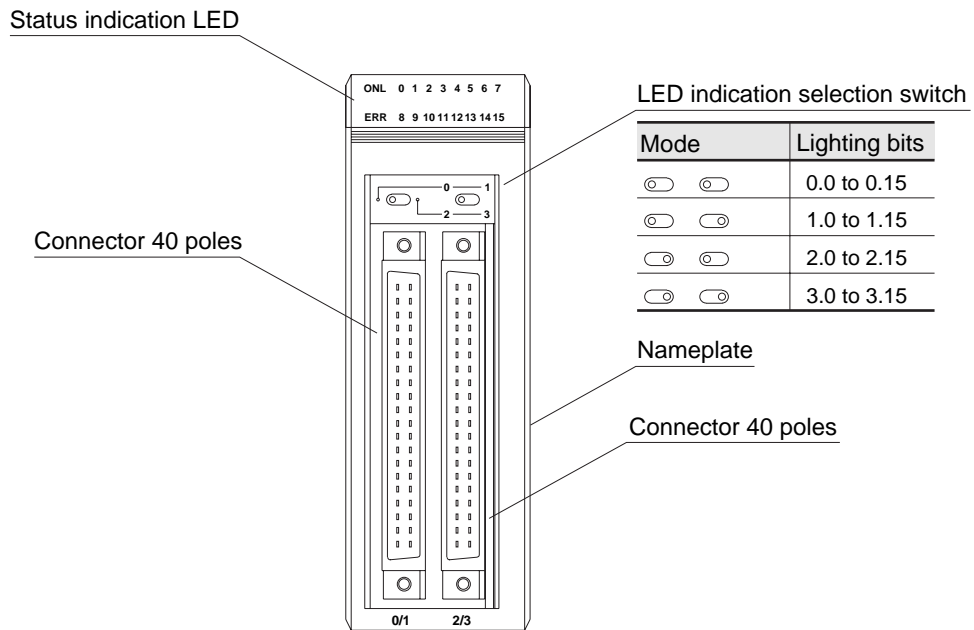
<Names>

Status indication LED

Connector 40 poles

LED indication selection switch

Mode	Lighting bits
0 ◉ 1	12.0 to 12.15
0 ◯ 1	13.0 to 13.15

Nameplate

ONL 0 1 2 3 4 5 6 7
ERR 8 9 10 11 12 13 14 15

<External wiring>

Signal name
Connector pin No.

Port 9 (12.8)	B20	A20	Port 21 (13.4)
Port 10 (12.9)	B19	A19	Port 22 (13.5)
Port 11 (12.10)	B18	A18	Port 23 (13.6)
Port 12 (12.11)	B17	A17	Port 24 (13.7)
Port 13 (12.12)	B16	A16	Port 25 (13.8)
Port 14 (12.13)	B15	A15	Port 26 (13.9)
Port 15 (12.14)	B14	A14	Port 27 (13.10)
Port 16 (12.15)	B13	A13	Port 28 (13.11)
Port 17 (13.0)	B12	A12	Port 29 (13.12)
Port 18 (13.1)	B11	A11	Port 30 (13.13)
Port 19 (13.2)	B10	A10	Port 31 (13.14)
Port 20 (13.3)	B9	A9	Port 32 (13.15)
P	B8	A8	P
P	B7	A7	P
Port 1 (12.0)	B6	A6	Port 5 (12.4)
M	B5	A5	M
Port 2 (12.1)	B4	A4	Port 6 (12.5)
Port 3 (12.2)	B3	A3	Port 7 (12.6)
M	B2	A2	M
Port 4 (12.3)	B1	A1	Port 8 (12.7)

B20   A20

B1   A1

Note: 1) ( ) of signal name indicates an offset address and a bit position.
2) Port 1 to 8 are used for dual-purpose of a pulse train output.
3) For detail specifications and operations, refer to the manual (FEH212).

3-63

(6) Transistor (sink type) output 64 points (NP1Y64T09P1)

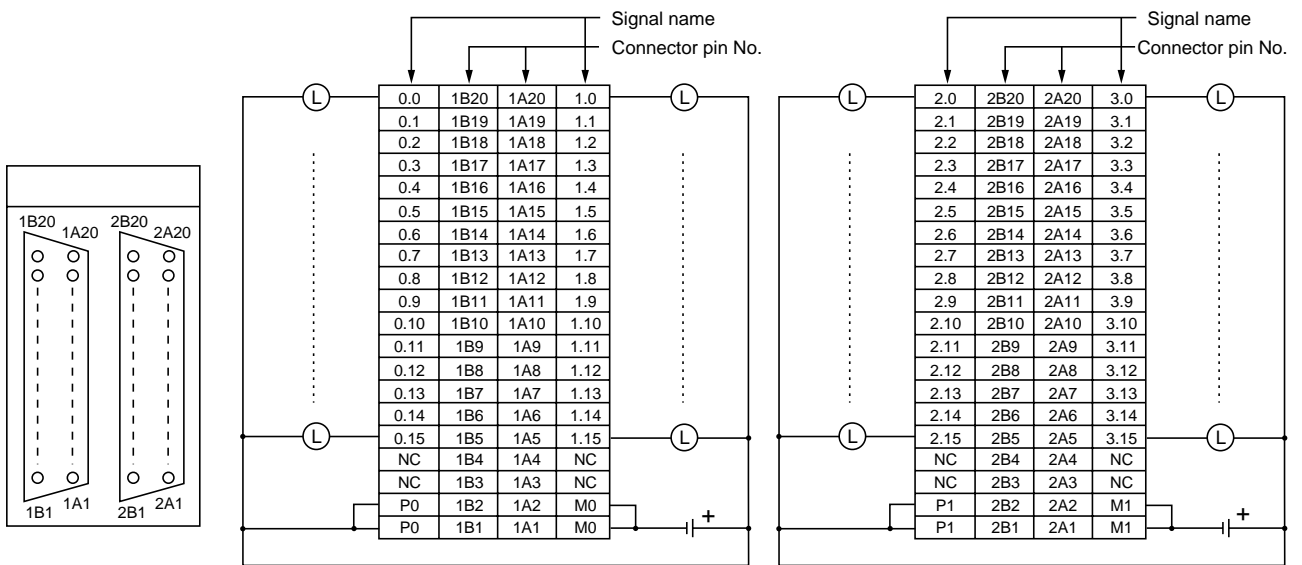| Item			Specification
Type			NP1Y64T09P1
No. of output points			64 points (32 points common x 2 circuits)
Output power supply condition	Rated voltage		12 to 24V DC
	Tolerance		10.2 to 30V DC
Characteristics of output circuit	Output type		Sink type
	Max. load current		0.12A/point, 3.2A/common
	Voltage drop		1.5V or less (at 0.12A load)
	Response time	OFF to ON	1 ms or less
		ON to OFF	1 ms or less
	Leakage current in OFF state		Max. 0.1mA
	Output element		Transistor
	Surge current strength		0.3A 10ms
Output protection method	Built-in fuse		125V, 5A 2 fuses, not changeable
	Surge absorption circuit		Zener diode
	Others		None
On/off times			Max. 3600 times/hour (inductive load), No limit (resistor load)
Wire connections	External wire connections		40-pin connector (FCN-365P040-AU) x 2 pieces
	Applicable wire size		AWG #23 or less (at soldered connector) (Note)
Output indication			For selected points by the switch, LED indicator lights up when output is ON (Logic side), ONL: normal (Green LED), ERR: abnormal and the fuse blown out (Red LED)
Isolation method			Photocoupler
Dielectric strength			1500V AC/minute (between output terminals and frame ground)
Insulation resistance			10MΩ or more with 500V DC megger (between output terminals and ground)
Derating condition			Simultaneous ON rate: Max. 90% (at 24V DC/55° C) Simultaneous ON rate: Max. 85% (at 26.4V DC/55° C) Simultaneous ON rate: Max. 85% (at 30V DC/55° C)
External power supply			12 to 24V DC, 80mA (for transistor drive)
Internal current consumption			24V DC, 90mA or less (when all points are turned ON)
Occupied words			4 words
Mass			Approx. 180g

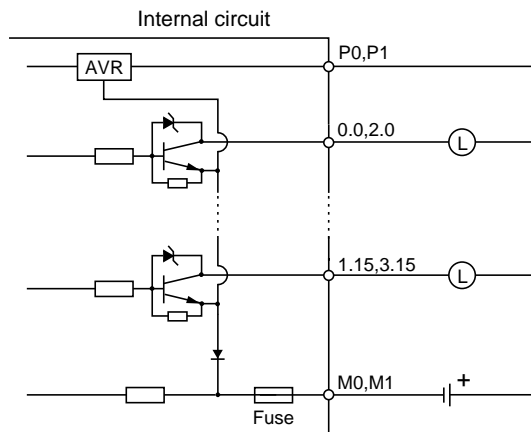Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."

\<Names\>

Status indication LED

Connector 40 poles

```
ONL  0 1 2 3 4 5 6 7
ERR  8 9 10 11 12 13 14 15
```

LED indication selection switch

Mode	Lighting bits
⊙ ⊙	0.0 to 0.15
⊙ ⊙	1.0 to 1.15
⊙ ⊙	2.0 to 2.15
⊙ ⊙	3.0 to 3.15

Nameplate

Connector 40 poles

0/1   2/3

\<External wiring\>

Signal name
Connector pin No.

0.0	1B20	1A20	1.0
0.1	1B19	1A19	1.1
0.2	1B18	1A18	1.2
0.3	1B17	1A17	1.3
0.4	1B16	1A16	1.4
0.5	1B15	1A15	1.5
0.6	1B14	1A14	1.6
0.7	1B13	1A13	1.7
0.8	1B12	1A12	1.8
0.9	1B11	1A11	1.9
0.10	1B10	1A10	1.10
0.11	1B9	1A9	1.11
0.12	1B8	1A8	1.12
0.13	1B7	1A7	1.13
0.14	1B6	1A6	1.14
0.15	1B5	1A5	1.15
NC	1B4	1A4	NC
NC	1B3	1A3	NC
P0	1B2	1A2	M0
P0	1B1	1A1	M0

Signal name
Connector pin No.

2.0	2B20	2A20	3.0
2.1	2B19	2A19	3.1
2.2	2B18	2A18	3.2
2.3	2B17	2A17	3.3
2.4	2B16	2A16	3.4
2.5	2B15	2A15	3.5
2.6	2B14	2A14	3.6
2.7	2B13	2A13	3.7
2.8	2B12	2A12	3.8
2.9	2B11	2A11	3.9
2.10	2B10	2A10	3.10
2.11	2B9	2A9	3.11
2.12	2B8	2A8	3.12
2.13	2B7	2A7	3.13
2.14	2B6	2A6	3.14
2.15	2B5	2A5	3.15
NC	2B4	2A4	NC
NC	2B3	2A3	NC
P1	2B2	2A2	M1
P1	2B1	2A1	M1

1B20 1A20   2B20 2A20

1B1 1A1   2B1 2A1

Note:1) Common terminals P0 and P1 are electrically separated and isolated from each other.
And common terminals M0 and M1 are electrically separated and isolated from each other.
2) NC indicates a terminal not connected to an internal circuit. Do not use NC terminals as repeating terminals.

\<Circuit configuration\>

Internal circuit

AVR

P0,P1

0.0,2.0

1.15,3.15

M0,M1

Fuse

(7) Transistor (source type) output 8 points (NP1Y08U0902)
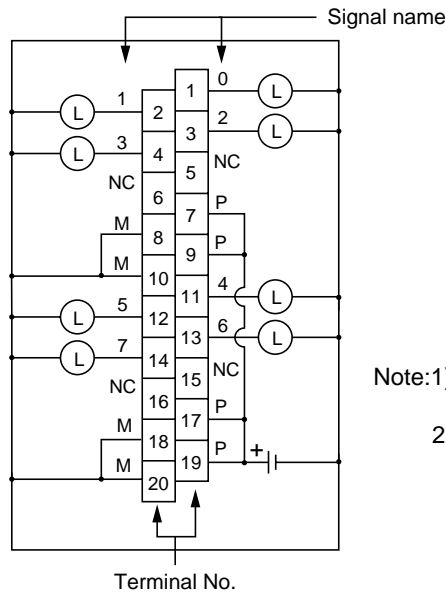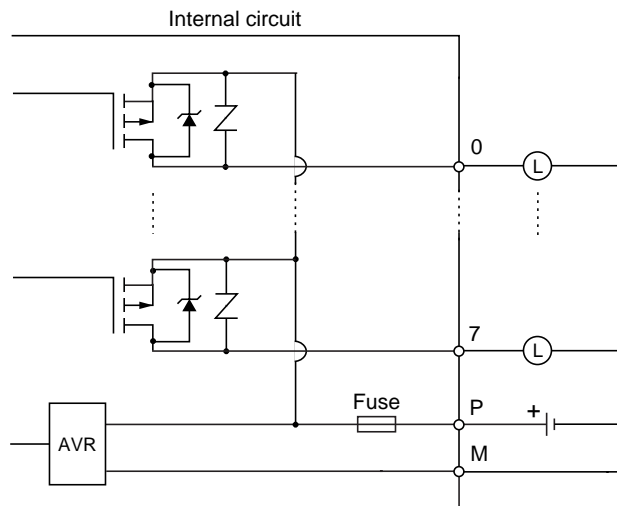
Item		Specification
Type		NP1Y08U0902
No. of output points		8 points (8 points common x 1 circuit) No. of common terminals P and M is four respectively.
Output power supply condition	Rated voltage	12 to 24V DC
	Tolerance	10.2 to 30V DC
Characteristics of output circuit	Output type	Source type
	Max. load current	2.4A/point, 8A/common
	Voltage drop	2V or less (at 2.4A load)
	Response time — OFF to ON	1ms or less
	Response time — ON to OFF	1ms or less
	Leakage current in OFF state	Max. 0.1mA
	Output element	Transistor
	Surge current strength	6A 10ms
Output protection method	Built-in fuse	125V, 15A 2 fuses, not changeable
	Surge absorption circuit	Varistor
	Others	None
On/off times		Max. 1800 times/hour (inductive load), No limit (resistor load)
Wire connections	External wire connections	Detachable screw terminal (M3) 20 poles
	Applicable wire size	AWG #22 to 18 (Note)
Output indication		LED indicator lights up when output is ON (Logic side), ONL: normal (Green LED), ERR: abnormal and the fuse blown out (Red LED)
Isolation method		Photocoupler
Dielectric strength		1500V AC/minute (between output terminals and frame ground)
Insulation resistance		10MΩ or more with 500V DC megger (between output terminals and ground)
Derating condition		Simultaneous ON rate: Max. 100% (at 26.4V DC/55° C) Simultaneous ON rate: Max. 85% (at 30V DC/55° C)
External power supply		12 to 24V DC, 33mA (for transistor drive)
Internal current consumption		24V DC, 20mA or less (when all points are turned ON)
Occupied word		Directly connected to the SX bus: 2 words On the remote I/O link: 1 word
Mass		Approx. 150g

Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."

\<Names\>

Status indication LED

Detachable terminal block
(M3) 20 poles

Nameplate

\<External wiring\>

Signal name

Terminal No.

Note:1) Common terminals (P: 7, 9, 17, 19,
M: 8, 10, 18, 20) are connected internal.
2) NC indicates a terminal not connected
to an internal circuit. Do not use NC
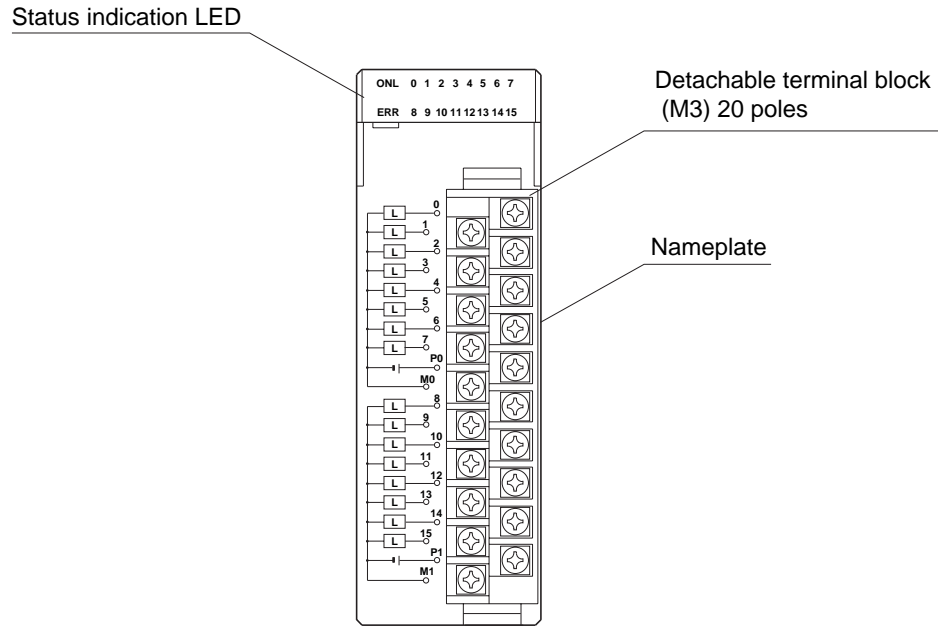terminals as repeating terminals.

\<Circuit configuration\>

Internal circuit

Fuse

AVR

(8) Transistor (source type) output 16 points (NP1Y16U09P6)

Item			Specification
Type			NP1Y16U09P6
No. of output points			16 points (8 points common x 2 circuits)
Output power supply condition	Rated voltage		12 to 24V DC
	Tolerance		10.2 to 30V DC
Characteristics of output circuit	Output type		Source type
	Max. load current		0.6A/point, 4A/common
	Voltage drop		1.5V or less (at 0.6A load)
	Response time	OFF to ON	1 ms or less
		ON to OFF	1 ms or less
	Leakage current in OFF state		Max. 0.1mA
	Output element		Transistor
	Surge current strength		3A 10ms
Output protection method	Built-in fuse		125V, 7A 2 fuses, not changeable
	Surge absorption circuit		Varistor
	Others		None
On/off times			Max. 1800 times/hour (inductive load), No limit (resistor load)
Wire connections	External wire connections		Detachable screw terminal (M3) 20 poles
	Applicable wire size		AWG #22 - 18 (Note)
Output indication			LED indicator lights up when output is ON (Logic side), ONL: normal (Green LED), ERR: abnormal and the fuse blown out (Red LED)
Isolation method			Photocoupler
Dielectric strength			1500V AC 1 minute (between output terminals and frame ground)
Insulation resistance			10MΩ or more with 500V DC megger (between output terminals and ground)
Derating condition			Simultaneous ON rate: Max. 100% (at 24V DC/55° C) Simultaneous ON rate: Max. 90% (at 26.4V DC/55° C) Simultaneous ON rate: Max. 75% (at 30V DC/55° C)
External power supply			12 to 24V DC, 30mA (for transistor drive)
Internal current consumption			24V DC, 43mA or less (when all points are turned ON)
Occupied word			Directly connected to the SX bus: 2 words On the remote I/O link: 1 word
Mass			Approx. 160g

Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."

<Names>

Status indication LED

ONL 0 1 2 3 4 5 6 7
ERR 8 9 10 11 12 13 14 15

Detachable terminal block (M3) 20 poles

Nameplate

0
1
2
3
4
5
6
7
P0
M0
8
9
10
11
12
13
14
15
P1
M1

<External wiring>

Signal name

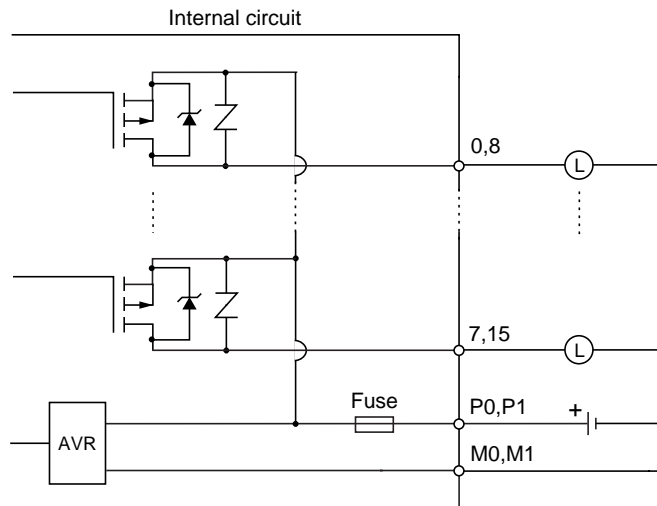| 1 | 1 | 0 |
2	2	
3	3	
4	4	

Terminal No.

Note:1) Common terminals P0 and P1 are electrically separated and isolated from each other.
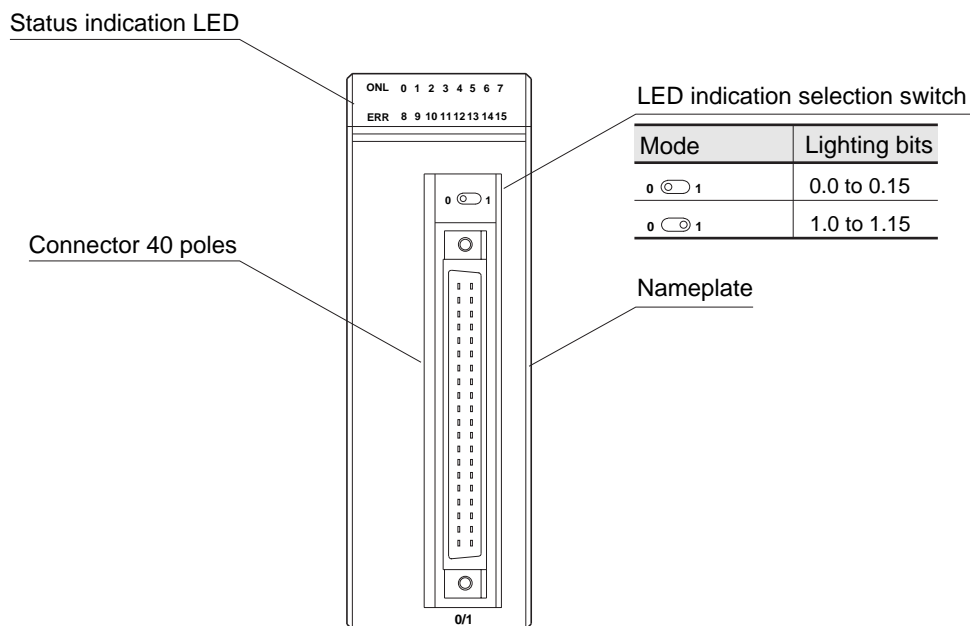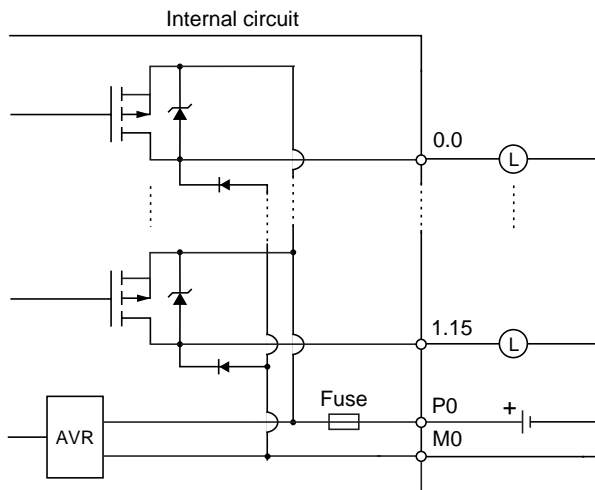And common terminals M0 and M1 are electrically separated and isolated from each other.

<Circuit configuration>

Internal circuit

0,8

7,15

Fuse

P0,P1 +

M0,M1

AVR

3-69

(9) Transistor (source type) output 32 points (NP1Y32U09P1)

Item			Specification
Type			NP1Y32U09P1
No. of output points			32 points (32 points common x 1 circuit)
Output power supply condition	Rated voltage		12 to 24V DC
	Tolerance		10.2 to 30V DC
Characteristics of output circuit	Output type		Source type
	Max. load current		0.12A/point, 3.2A/common
	Voltage drop		1.5V or less (at 0.12A load)
	Response time	OFF to ON	1 ms or less
		ON to OFF	1 ms or less
	Leakage current in OFF state		Max. 0.1mA
	Output element		Transistor
	Surge current strength		0.8A 10ms
Output protection method	Built-in fuse		125V, 2.5A 2 fuses, not changeable
	Surge absorption circuit		Zener diode
	Others		None
On/off times			Max. 3600 times/hour (inductive load), No limit (resistor load)
Wire connections	External wire connections		40-pin connector (FCN-365P040-AU) x 1 piece
	Applicable wire size		AWG #23 or less (at soldered connector) (Note)
Output indication			For selected points by the switch, LED indicator lights up when output is ON (Logic side), ONL: normal (Green LED), ERR: abnormal and the fuse blown out (Red LED)
Isolation method			Photocoupler
Dielectric strength			1500V AC/minute (between output terminals and frame ground)
Insulation resistance			10MΩ or more with 500V DC megger (between output terminals and ground)
Derating condition			Simultaneous ON rate: Max. 70% (at 24V DC/55° C) Simultaneous ON rate: Max. 65% (at 26.4V DC/55° C) Simultaneous ON rate: Max. 55% (at 30V DC/55° C)
External power supply			12 to 24V DC, 40mA (for transistor drive)
Internal current consumption			24V DC, 45mA or less (when all points are turned ON)
Occupied words			2 words
Mass			Approx. 140g

Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."
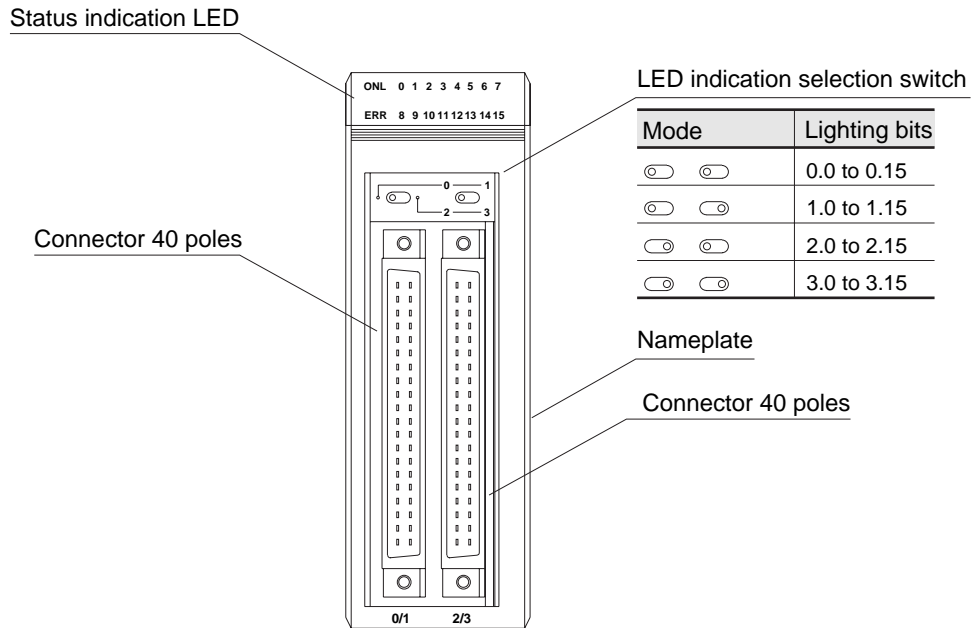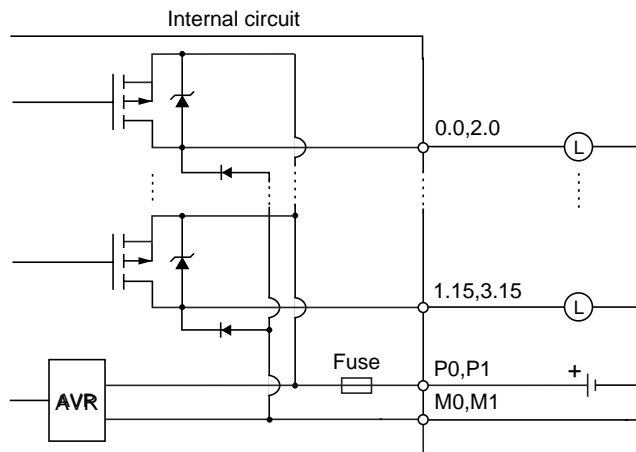
<Names>

Status indication LED

Connector 40 poles

LED indication selection switch

Mode	Lighting bits
0 ◉ 1	0.0 to 0.15
0 ◯ 1	1.0 to 1.15

Nameplate

ONL 0 1 2 3 4 5 6 7	
ERR 8 9 10 11 12 13 14 15	

0 ◉ 1

0/1

<External wiring>

Signal name

Connector pin No.

0.0	B20	A20	1.0
0.1	B19	A19	1.1
0.2	B18	A18	1.2
0.3	B17	A17	1.3
0.4	B16	A16	1.4
0.5	B15	A15	1.5
0.6	B14	A14	1.6
0.7	B13	A13	1.7
0.8	B12	A12	1.8
0.9	B11	A11	1.9
0.10	B10	A10	1.10
0.11	B9	A9	1.11
0.12	B8	A8	1.12
0.13	B7	A7	1.13
0.14	B6	A6	1.14
0.15	B5	A5	1.15
NC	B4	A4	NC
NC	B3	A3	NC
P0	B2	A2	M0
P0	B1	A1	M0

Front panel
(FCN-365 pin layout)

B20 ○ ○ A20

B1 ○ ○ A1

Note: NC indicates a terminal not connected to an internal circuit. Do not use NC terminals as repeating terminals.

<Circuit configuration>

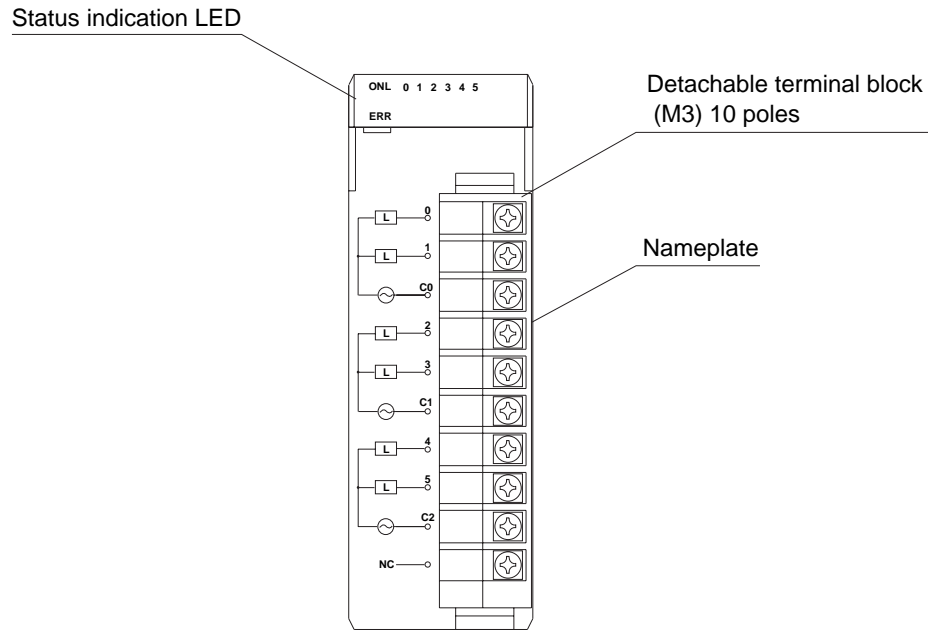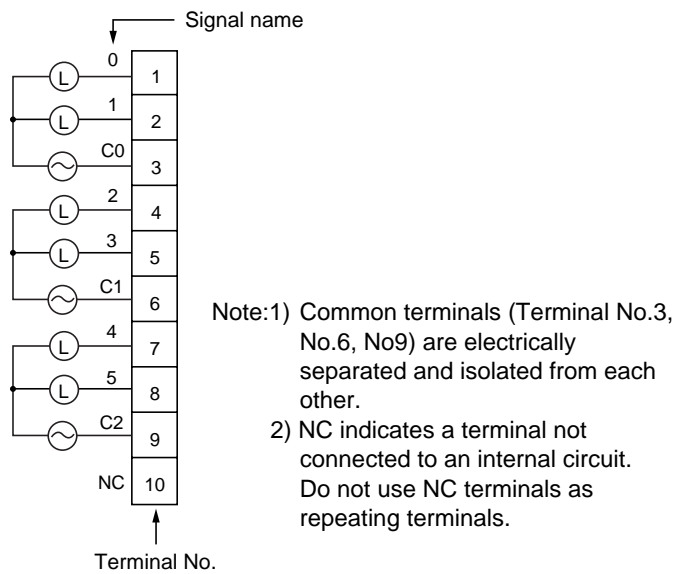Internal circuit

0.0

1.15

Fuse

P0

M0

AVR

(10) Transistor (source type) output 64 points (NP1Y64U09P1)

Item		Specification
Type		NP1Y64U09P1
No. of output points		64 points (32 points common x 2 circuits)
Output power supply condition	Rated voltage	12 to 24V DC
	Tolerance	10.2 to 30V DC
Characteristics of output circuit	Output type	Source type
	Max. load current	0.12A/point, 3.2A/common
	Voltage drop	1.5V or less (at 0.12A load)
	Response time OFF to ON	1 ms or less
	Response time ON to OFF	1 ms or less
	Leakage current in OFF state	Max. 0.1mA
	Output element	Transistor
	Surge current strength	0.8A 10ms
Output protection method	Built-in fuse	125V, 2.5A 2 fuses, not changeable
	Surge absorption circuit	Zener diode
	Others	None
On/off times		Max. 3600 times/hour (inductive load), No limit (resistor load)
Wire connections	External wire connections	40-pin connector (FCN-365P040-AU) x 2 pieces
	Applicable wire size	AWG #23 or less (at soldered connector) (Note)
Output indication		For selected points by the switch, LED indicator lights up when output is ON (Logic side), ONL: normal (Green LED), ERR: abnormal and the fuse blown out (Red LED)
Isolation method		Photocoupler
Dielectric strength		1500V AC/minute (between output terminals and frame ground)
Insulation resistance		10MΩ or more with 500V DC megger (between output terminals and ground)
Derating condition		Simultaneous ON rate: Max. 90% (at 24V DC/55° C) Simultaneous ON rate: Max. 85% (at 26.4V DC/55° C) Simultaneous ON rate: Max. 85% (at 30V DC/55° C)
External power supply		12 to 24V DC, 80mA (for transistor drive)
Internal current consumption		24V DC, 90mA or less (when all points are turned ON)
Occupied words		4 words
Mass		Approx. 180g

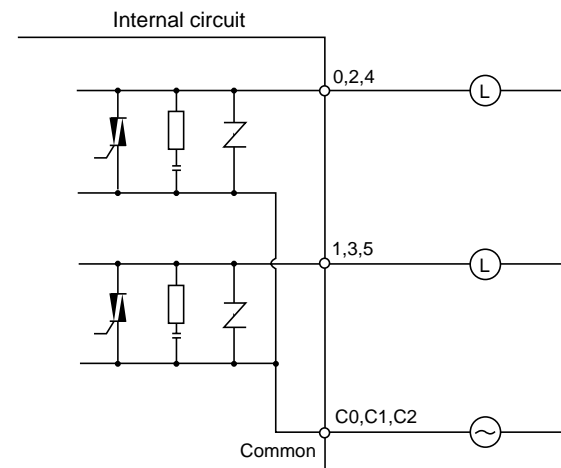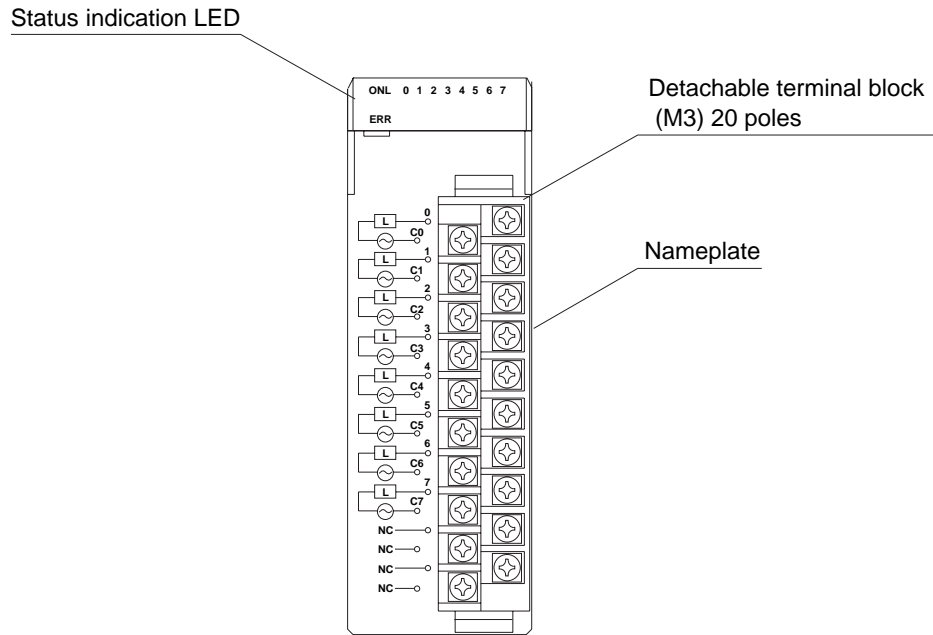Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."

\<Names\>

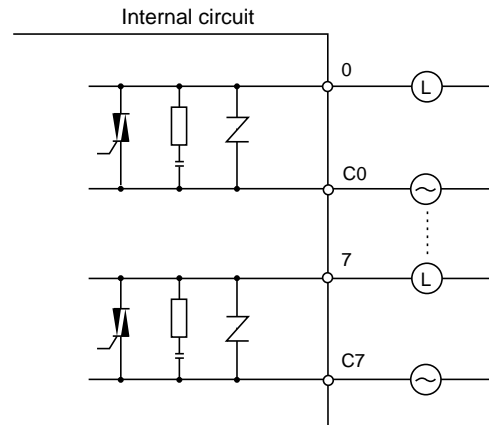Status indication LED

Connector 40 poles

LED indication selection switch

Mode		Lighting bits
⊙	⊙	0.0 to 0.15
⊙	⊙	1.0 to 1.15
⊙	⊙	2.0 to 2.15
⊙	⊙	3.0 to 3.15

Nameplate

Connector 40 poles

\<External wiring\>

Signal name

Connector pin No.

0.0	1B20	1A20	1.0
0.1	1B19	1A19	1.1
0.2	1B18	1A18	1.2
0.3	1B17	1A17	1.3
0.4	1B16	1A16	1.4
0.5	1B15	1A15	1.5
0.6	1B14	1A14	1.6
0.7	1B13	1A13	1.7
0.8	1B12	1A12	1.8
0.9	1B11	1A11	1.9
0.10	1B10	1A10	1.10
0.11	1B9	1A9	1.11
0.12	1B8	1A8	1.12
0.13	1B7	1A7	1.13
0.14	1B6	1A6	1.14
0.15	1B5	1A5	1.15
NC	1B4	1A4	NC
NC	1B3	1A3	NC
P0	1B2	1A2	M0
P0	1B1	1A1	M0

2.0	2B20	2A20	3.0
2.1	2B19	2A19	3.1
2.2	2B18	2A18	3.2
2.3	2B17	2A17	3.3
2.4	2B16	2A16	3.4
2.5	2B15	2A15	3.5
2.6	2B14	2A14	3.6
2.7	2B13	2A13	3.7
2.8	2B12	2A12	3.8
2.9	2B11	2A11	3.9
2.10	2B10	2A10	3.10
2.11	2B9	2A9	3.11
2.12	2B8	2A8	3.12
2.13	2B7	2A7	3.13
2.14	2B6	2A6	3.14
2.15	2B5	2A5	3.15
NC	2B4	2A4	NC
NC	2B3	2A3	NC
P1	2B2	2A2	M1
P1	2B1	2A1	M1

Note:1) Common terminals P0 and P1 are electrically separated and isolated from each other.
And common terminals M0 and M1 are electrically separated and isolated from each other.
2) NC indicates a terminal not connected to an internal circuit. Do not use NC terminals as repeating terminals.

\<Circuit configuration\>

Internal circuit

0.0,2.0

1.15,3.15

Fuse   P0,P1

AVR   M0,M1

(11) SSR output 6 points (NP1Y06S)

Item			Specification
Type			NP1Y06S
No. of output points			6 points (2 points common x 3 circuits)
Output power supply condition	Rated voltage		100 to 240V AC
	Tolerance		85 TO 264V AC
	Rated frequency		50/60Hz
	Rated frequency (tolerance)		47 to 63Hz
Characteristics of output circuit	Output type		AC output
	Max. load current		2.2A/point, 4.4A/common
	Voltage drop		2V or less (at 2.2A load)
	Response time	OFF to ON	10ms or less
		ON to OFF	10ms or less
	Leakage current in OFF state		Max. 0.1mA (at 200V AC 60Hz)
	Min. make/break current		10mA/100V AC
	Output element		Triac
	Surge current strength		20A 1 cycle
Output protection method	Surge absorption circuit		CR absorber and Varistor
	Others		None
On/off times			Max. 1800 times/hour
Wire connections	External wire connections		Detachable screw terminal (M3) 10 poles
	Applicable wire size		AWG #22 to 18 (Note)
Output indication			LED indicator lights up when output is ON (Logic side), ONL: normal (Green LED), ERR: abnormal (Red LED)
Isolation method			Photocoupler
Dielectric strength			2830V AC/minute (between output terminals and frame ground)
Insulation resistance			10MΩ or more with 500V DC megger (between output terminals and ground)
Derating condition			Simultaneous ON rate: Max. 33% (at 132V AC/55° C) Simultaneous ON rate: Max. 16% (at 264V AC/55° C)
External power supply			For signal: 100 to 240V AC
Internal current consumption			24V DC, 60mA or less (when all points are turned ON)
Occupied word			Directly connected to the SX bus: 2 words On the remote I/O link: 1 word
Mass			Approx. 190g

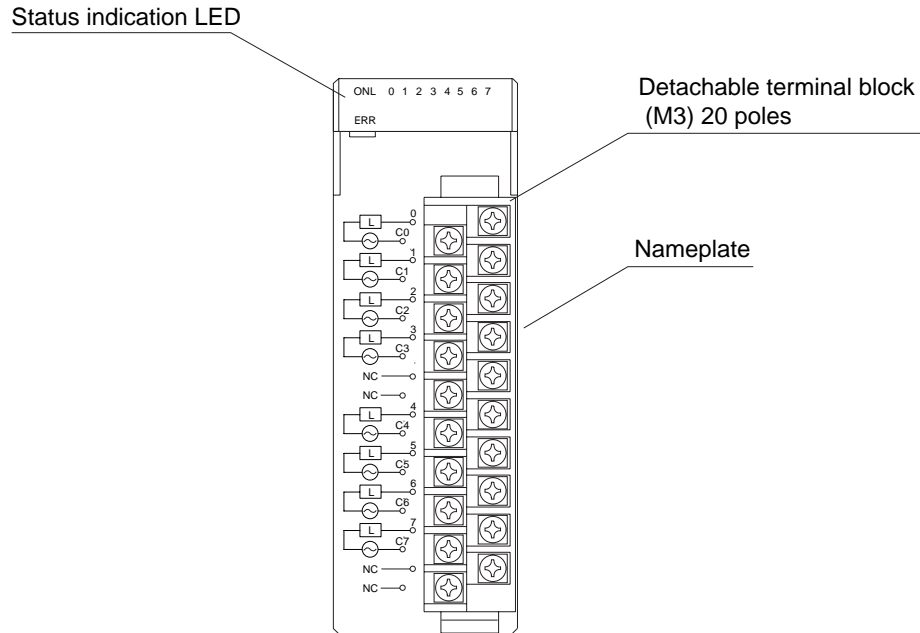Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."

<Names>

Status indication LED

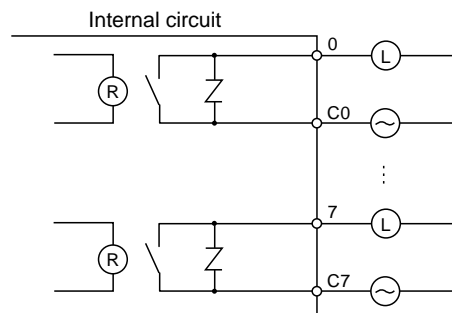ONL 0 1 2 3 4 5

ERR

Detachable terminal block (M3) 10 poles

Nameplate

0
1
C0
2
3
C1
4
5
C2
NC

<External wiring>

Signal name

0	1
1	2
C0	3
2	4
3	5
C1	6
4	7
5	8
C2	9
NC	10

Terminal No.

Note:1) Common terminals (Terminal No.3, No.6, No9) are electrically separated and isolated from each other.

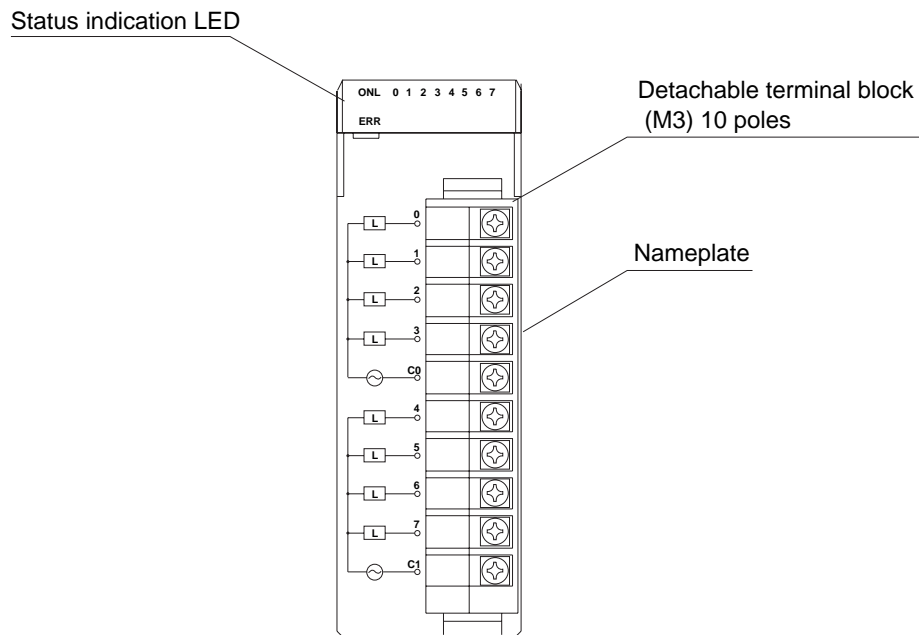2) NC indicates a terminal not connected to an internal circuit. Do not use NC terminals as repeating terminals.

<Circuit configuration>

Internal circuit

0,2,4   L

1,3,5   L

C0,C1,C2

Common

(12) SSR output 8 points (NP1Y08S)

Item		Specification
Type		NP1Y08S
No. of output points		8 points (all points are independent)
Output power supply condition	Rated voltage	100 to 240V AC
	Tolerance	85 TO 264V AC
	Rated frequency	50/60Hz
	Rated frequency (tolerance)	47 to 63Hz
Characteristics of output circuit	Output type	AC output
	Max. load current	2.2A/point
	Voltage drop	2V or less (at 2.2A load)
	Response time OFF to ON	10ms or less
	Response time ON to OFF	10ms or less
	Leakage current in OFF state	Max. 0.1mA (at 200V AC 60Hz)
	Min. make/break current	10mA/100V AC
	Output element	Triac
	Surge current strength	20A 1 cycle
Output protection method	Surge absorption circuit	CR absorber and Varistor
	Others	None
On/off times		Max. 1800 times/hour
Wire connections	External wire connections	Detachable screw terminal (M3) 20 poles
	Applicable wire size	AWG #22 to 18 (Note)
Output indication		LED indicator lights up when output is ON (Logic side), ONL: normal (Green LED), ERR: abnormal (Red LED)
Isolation method		Photocoupler
Dielectric strength		1500V AC/minute (between output terminals and frame ground)
Insulation resistance		10MΩ or more with 500V DC megger (between output terminals and ground)
Derating condition		Simultaneous ON rate: Max. 25% (at 132V AC/55° C) Simultaneous ON rate: Max. 12% (at 264V AC/55° C)
External power supply		For signal: 100 to 240V AC
Internal current consumption		24V DC, 80mA or less (when all points are turned ON)
Occupied word		Directly connected to the SX bus: 2 words On the remote I/O link: 1 word
Mass		Approx. 200g

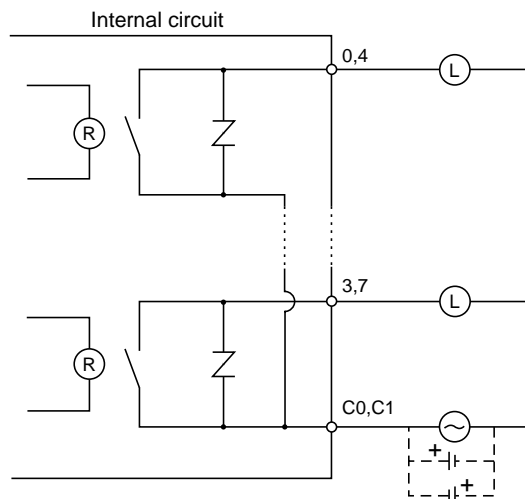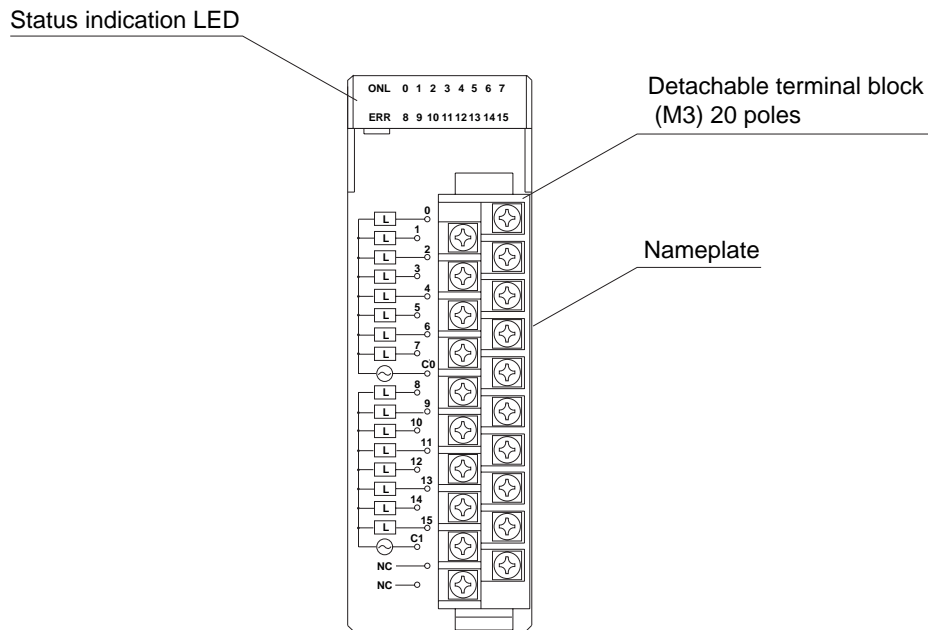Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."

\<Names\>

Status indication LED

Detachable terminal block
(M3) 20 poles

Nameplate

ONL 0 1 2 3 4 5 6 7
ERR

0
L
C0
1
L
C1
2
L
C2
3
L
C3
4
L
C4
5
L
C5
6
L
C6
7
L
C7
NC
NC
NC
NC

\<External wiring\>

Signal name

L   0
C0
     1   2
L
C1
     2   4
L
C2
     3   6
L
C3
     4   8
L
C4
     5   10
L
C5
     6   12
L
C6
     7   14
L
C7
     16
          17 NC
NC   18
          19 NC
NC   20

1
3
5
7
9
11
13
15

Terminal No.

Note: NC indicates a terminal not
connected to an internal circuit.
Do not use NC terminals as
repeating terminals.

\<Circuit configuration\>

Internal circuit

0   L

C0   ∼

7   L

C7   ∼

3-77

(13) Relay output 8 points (NP1Y08R-00)

Item		Specification
Type		NP1Y08R-00
No. of output points		8 points (all independent output)
Output power supply condition	Rated voltage	240V AC, 110V DC
	Tolerance	264V AC or less, 140V DC or less
	Rated frequency	50/60Hz
	Rated frequency (tolerance)	47 to 63 Hz
Characteristics of output circuit	Max. load current	30V DC/264V AC: 2.2A/point 110V DC: 0.2A/point
	Min. make/break current	5V DC, 1mA
	Response time OFF to ON	10 ms or less
	Response time ON to OFF	10 ms or less
	Leakage current in OFF state	Max. 0.1mA (at 200V AC 60Hz)
Output protection method	Built-in fuse	None
	Output element	Relay (AC, DC)
	Surge absorption circuit	Varistor
	Others	None
On/off times		Max. 1800 times/hour
Wire connections	External wire connections	Detachable screw terminal (M3) 20 poles
	Applicable wire size	AWG #22 to 18 (Note)
Output indication		LED indicator lights up when output is ON (Logic side), ONL: normal (Green LED), ERR: abnormal (Red LED)
Isolation method		Relay
Dielectric strength		1500V AC/minute (between output terminals and frame ground)
Insulation resistance		10MΩ or more with 500V DC megger (between output terminals and ground)
Derating condition		None
External power supply		For signal: 240V AC, 110V DC
Internal current consumption		24V DC, 100mA or less (when all points are turned ON)
Occupied word		Directly connected to the SX bus: 2 words On the remote I/O link: 1 word
Mass		Approx. 170g

Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."
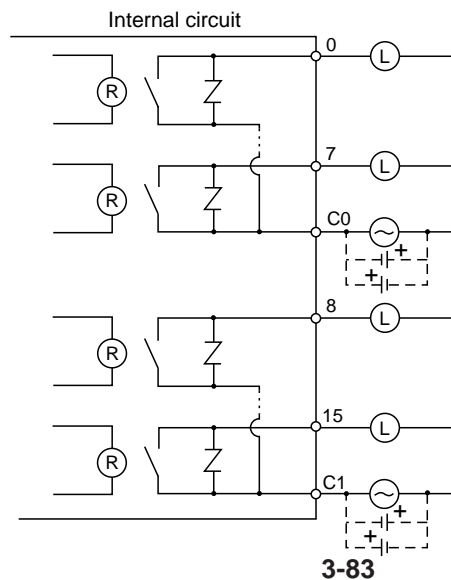
\<Names\>

Status indication LED

Detachable terminal block
(M3) 20 poles

Nameplate

\<External wiring\>

Signal name

Note: NC Indicates a terminal not
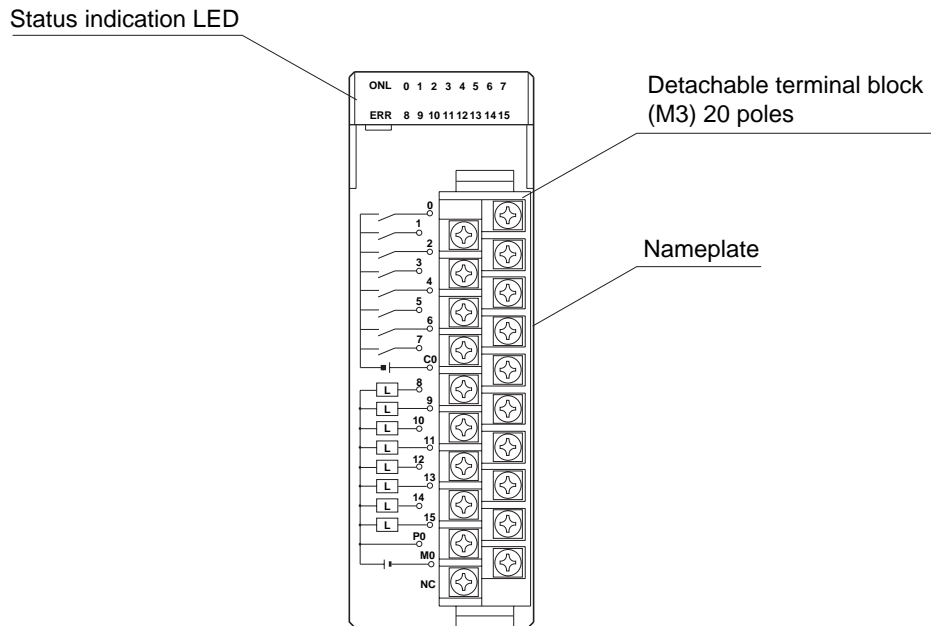connected to an internal circuit. Do not use
NC terminals as repeating terminals.

Terminal No.

\<Circuit configuration\>

Internal circuit

(14) Relay output 8 points (NP1Y08R-04)

Item			Specification
Type			NP1Y08R-04
No. of output points			8 points (4 points/common x 2 circuits)
Output power supply condition	Rated voltage		240V AC, 110V DC
	Tolerance		264V AC or less, 140V DC or less
	Rated frequency		50/60Hz
	Rated frequency (tolerance)		47 to 63Hz
Characteristics of output circuit	Max. load current		30V DC/264V AC: 2.2A/point, 4A/common 110V DC: 0.2A/point, 0.8A/common
	Min. make/break current		5V DC, 1mA
	Response time	OFF to ON	10 ms or less
		ON to OFF	10 ms or less
	Leakage current in OFF state		Max. 0.1mA (at 200V AC 60Hz)
Output protection method	Built-in fuse		None
	Output element		Relay (AC, DC)
	Surge absorption circuit		Varistor
	Others		None
On/off times			Max. 1800 times/hour
Wire connections	External wire connections		Detachable screw terminal (M3) 10 poles
	Applicable wire size		AWG #22 to 18 (Note)
Output indication			LED indicator lights up when output is ON (Logic side), ONL: normal (Green LED), ERR: abnormal (Red LED)
Isolation method			Relay
Dielectric strength			1500V AC/minute (between output terminals and frame ground)
Insulation resistance			10MΩ or more with 500V DC megger (between output terminals and ground)
Derating condition			None
External power supply			For signal: 240V AC, 110V DC
Internal current consumption			24V DC, 80mA or less (when all points are turned ON)
Occupied word			Directly connected to the SX bus: 2 words On the remote I/O link: 1 word
Mass			Approx. 150g

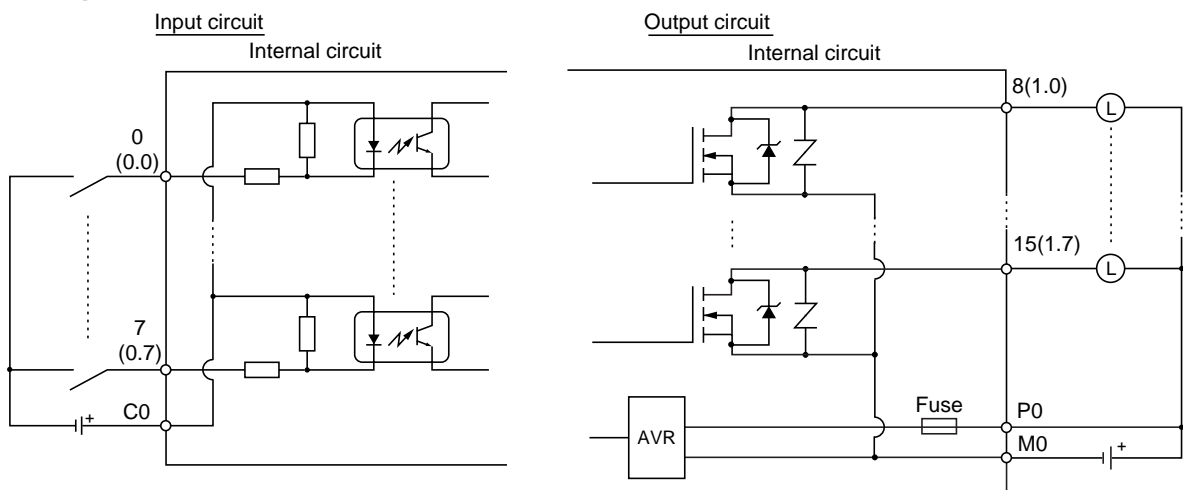Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."

<Names>

Status indication LED

Detachable terminal block
(M3) 10 poles

Nameplate

<External wiring>

Signal name

Terminal No.

Note: Common terminals C0 and C1 are
electrically separated and isolated
from each other.

<Circuit configuration>

Internal circuit

(15) Relay output 16 points (NP1Y16R-08)

Item			Specification
Type			NP1Y16R-08
No. of output points			16 points (8 points/common x 2 circuits)
Output power supply condition	Rated voltage		240V AC, 110V DC
	Tolerance		264V AC or less, 140V DC or less
	Rated frequency		50/60Hz
	Rated frequency (tolerance)		47 to 63Hz
Characteristics of output circuit	Output type		Relay output
	Max. load current		30V DC/264V AC: 2.2A/point, 8A/common 110V DC: 0.2A/point, 1.6A/common
	Min. make/break current		5V DC, 1mA
	Response time	OFF to ON	10ms or less
		ON to OFF	10ms or less
	Leakage current in OFF state		Max. 0.1mA (at 200V AC 60Hz)
Output protection method	Built-in fuse		None
	Output element		Relay (AC, DC)
	Surge absorption circuit		Varistor
	Others		None
On/off times			Max. 1800 times/hour
Wire connections	External wire connections		Detachable screw terminal (M3) 20 poles
	Applicable wire size		AWG #22 to 18 (Note)
Output indication			LED indicator lights up when output is ON (Logic side), ONL: normal (Green LED), ERR: abnormal (Red LED)
Isolation method			Relay
Dielectric strength			1500V AC/minute (between output terminals and frame ground)
Insulation resistance			10MΩ or more with 500V DC megger (between output terminals and ground)
Derating condition			None
External power supply			For signal: 240V AC, 10V DC
Internal current consumption			24V DC, 176mA or less (when all points are turned ON)
Occupied word			Directly connected to the SX bus: 2 words On the remote I/O link: 1 word
Mass			Approx. 190g

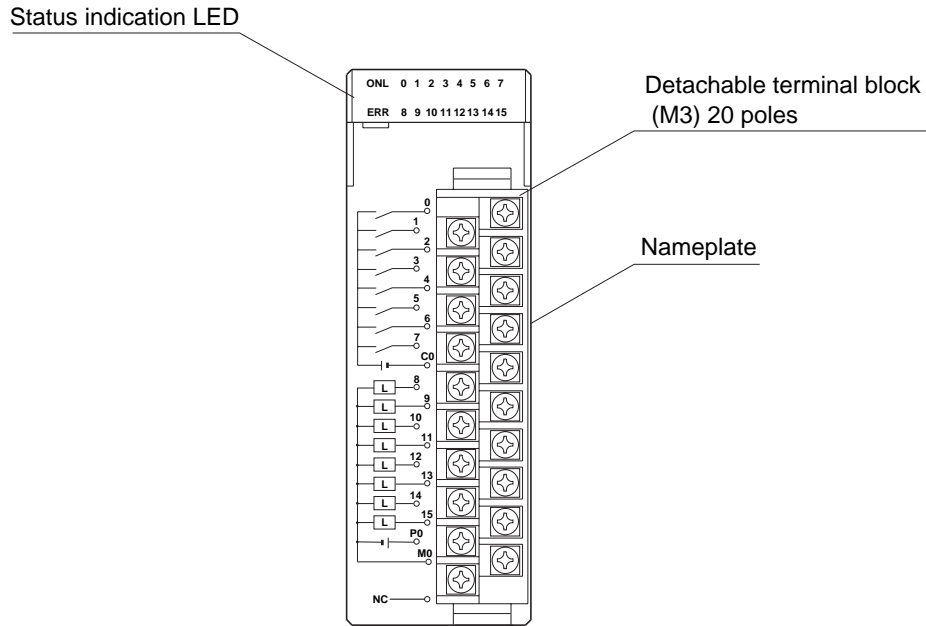Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."

<Names>

Status indication LED

ONL 0 1 2 3 4 5 6 7
ERR 8 9 10 11 12 13 14 15

Detachable terminal block (M3) 20 poles

Nameplate

0 1 2 3 4 5 6 7 C0 8 9 10 11 12 13 14 15 C1 NC NC

<External wiring>

Signal name

Terminal No.

Note:1) Common terminals C0 and C1 are electrically separated and isolated from each other.
   2) NC indicates a terminal not connected to an internal circuit. Do not use NC terminals as repeating terminals.

<Circuit configuration>
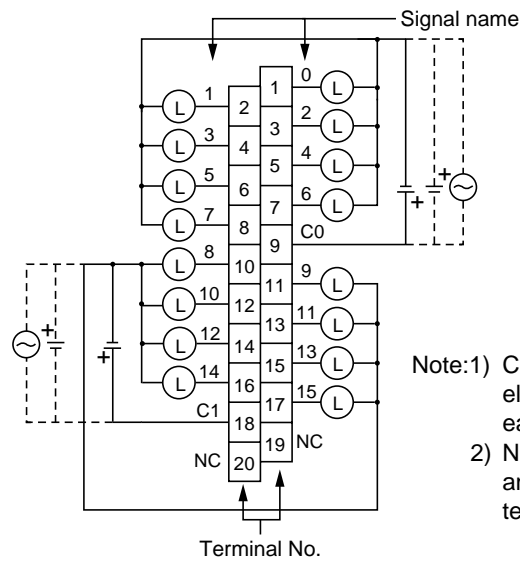
Internal circuit

3-5-5 Digital input / output

(1) Transistor (source type) input 24V DC 8 points / Transistor (sink type) output 8 points (NP1W1606T)

Item			Specification
Type			NP1W1606T
No. of input points			8 points (8 points common x 1 circuit)
Input signal condition	Rated voltage		24V DC
	Rated voltage (tolerance)		30V DC
	Ripple percentage		5% or less
Characteristics of input circuit	Input type		Source type
	Input current		7mA (24V DC)
	Input impedance		3.3kΩ
	Operating voltage	OFF to ON	15 to 30V
		ON to OFF	0 to 5V
	Input delay time	OFF to ON	0.7ms (hard filter time) + (soft filter time) Whole soft filter time is variable by parameter setting.
		ON to OFF	(OFF to ON) to (ON to OFF) 1 to 1ms, 3 to 3ms (default), 3 to 10ms, 10 to 10ms, 30 to 30ms, 100 to 100ms
	Input type		DC type1
No. of output points			8 points (8 points common x 1 circuit)
Output power supply condition	Rated voltage		12 to 24V DC
	Tolerance		10.2 to 30V DC
Characteristics of output circuit	Output type		Sink type
	Max. load current		0.6A/point, 4A/common
	Voltage drop		1.5V or less
	Response time	OFF to ON	1 ms or less
		ON to OFF	1 ms or less
	Leakage current in OFF state		Max. 0.1mA
	Output element		Transistor
	Surge current strength		2A 10ms
Output protection method	Built-in fuse		125V, 7A, not changeable
	Surge absorption circuit		Varistor
	Others		None
On/off times			Max. 1800 times/hour (inductive load), No limit (resistor load)
Wire connections	External wire connections		Detachable screw terminal (M3) 20 poles
	Applicable wire size		AWG #22 to 18 (Note)
Input/output indication			LED indicator lights up when input is ON. (Logic side) ONL: normal (Green LED), ERR: abnormal and the fuse blown out (Red LED)
Isolation method			Photocoupler
Dielectric strength			1500V AC 1 minute (between I/O terminals and frame ground)
Insulation resistance			10MΩ or more with 500V DC megger (between I/O terminals and frame ground)
Derating condition			Simultaneous ON rate: Max. 100% (at 26.4V DC/55° C) Simultaneous ON rate: Max. 75% (at 30V DC/55° C)
External power supply			For input signal: 24V DC, For transistor drive: 12 to 24V DC, 20mA
Internal current consumption			24V DC, 35mA or less (when all points are turned ON)
Occupied words			2 words
Mass			Approx. 150g

Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."
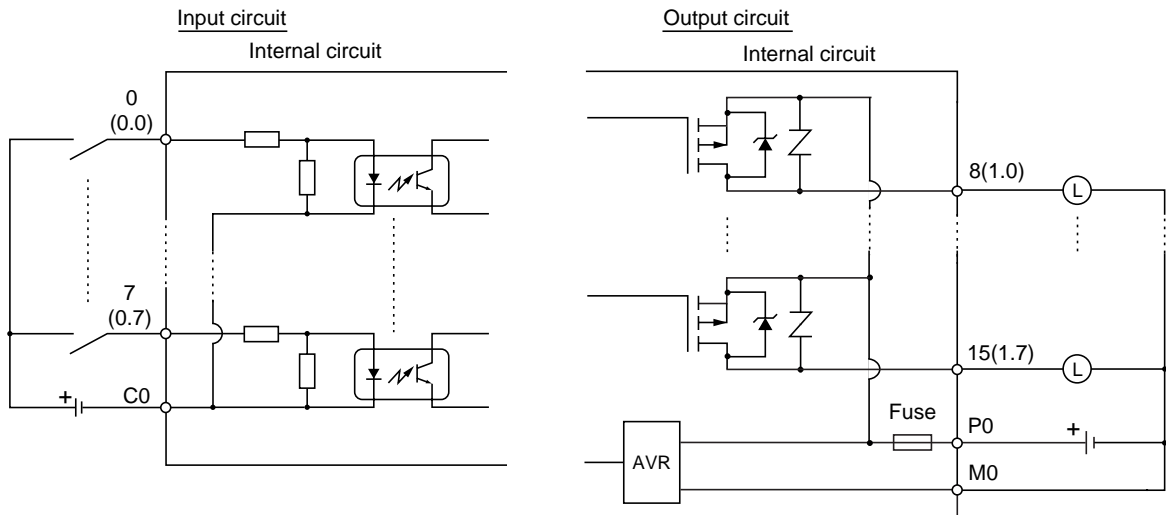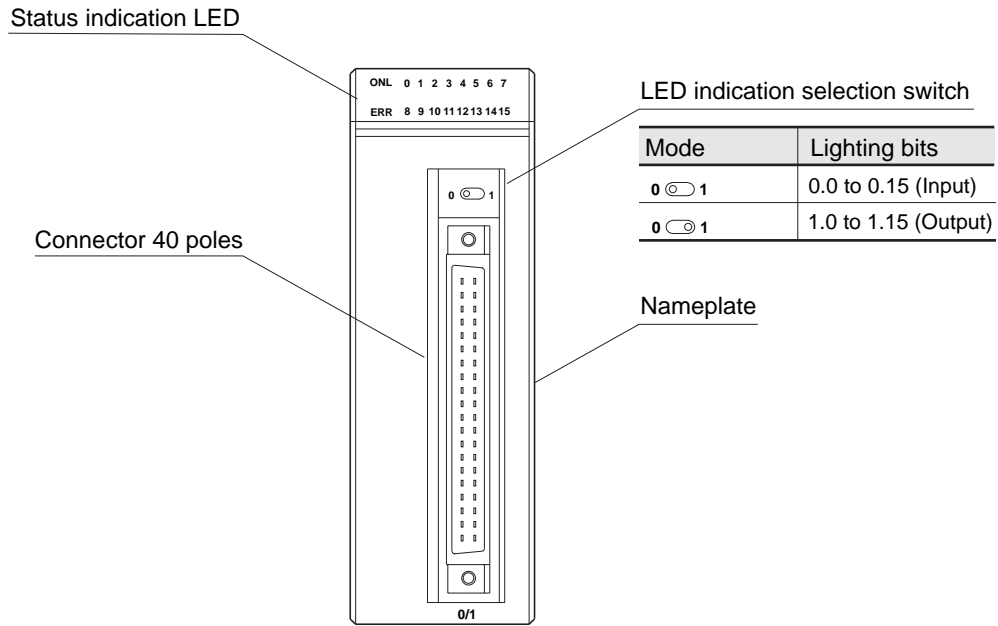
\<Names\>

Status indication LED

Detachable terminal block
(M3) 20 poles

Nameplate

```
ONL  0 1 2 3 4 5 6 7
ERR  8 9 10 11 12 13 14 15
```

\<External wiring\>

Signal name

Note: NC indicates a terminal not
connected to an internal
circuit. Do not use NC
terminals as repeating
terminals.

Terminal No.

\<Circuit configuration\>

Input circuit

Internal circuit

0
(0.0)

7
(0.7)

C0

Output circuit

Internal circuit

8(1.0)

15(1.7)

Fuse

AVR

P0

M0

3-85

3-5 I/O Specifications

(2) Transistor (sink type) input 24V DC 8 points / Transistor (source type) output 8 points (NP1W1606U)

Item			Specification
Type			NP1W1606U
No. of input points			8 points (8 points common x 1 circuit)
Input signal condition	Rated voltage		24V DC
	Rated voltage (tolerance)		30V DC
	Ripple percentage		5% or less
Characteristics of input circuit	Input type		Sink type
	Input current		7mA (24V DC)
	Input impedance		3.3kΩ
	Operating voltage	OFF to ON	15 to 30V
		ON to OFF	0 to 5V
	Input delay time	OFF to ON	0.7ms (hard filter time) + (soft filter time) Whole soft filter time is variable by parameter setting. (OFF to ON) to (ON to OFF)
		ON to OFF	1 to 1ms, 3 to 3ms (default), 3 to 10ms, 10 to 10ms, 30 to 30ms, 100 to 100ms
	Input type		DC type1
No. of output points			8 points (8 points common x 1 circuit)
Output power supply condition	Rated voltage		12 to 24V DC
	Tolerance		10.2 to 30V DC
Characteristics of output circuit	Output type		Source type
	Max. load current		0.6A/point, 4A/common
	Voltage drop		1V or less
	Response time	OFF to ON	1 ms or less
		ON to OFF	1 ms or less
	Leakage current in OFF state		Max. 0.1mA
	Output element		Transistor
	Surge current strength		3A 10ms
On/off times			Max. 1800 times/hour (inductive load), No limit (resistor load)
Output protection method	Built-in fuse		125V, 7A, not changeable
	Surge absorption circuit		Varistor
	Others		None
Wire connections	External wire connections		Detachable screw terminal (M3) 20 poles
	Applicable wire size		AWG #22 to 18 (Note)
Input indication			LED indicator lights up when input is ON. (Logic side) ONL: normal (Green LED), ERR: abnormal and the fuse blown out (Red LED)
Isolation method			Photocoupler
Dielectric strength			1500V AC 1 minute (between I/O terminals and frame ground)
Insulation resistance			10MΩ or more with 500V DC megger (between I/O terminals and frame ground)
Derating condition			Simultaneous ON rate: Max.100% (at 24V DC/55° C) Simultaneous ON rate: Max. 90% (at 26.4V DC/55° C) Simultaneous ON rate: Max. 75% (at 30V DC/55° C)
External power supply			For input signal: 24V DC, For transistor drive: 12 to 24V DC, 20mA
Internal current consumption			24V DC, 35mA or less (when all points are turned ON)
Occupied words			2 words
Mass			Approx. 150g

Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."
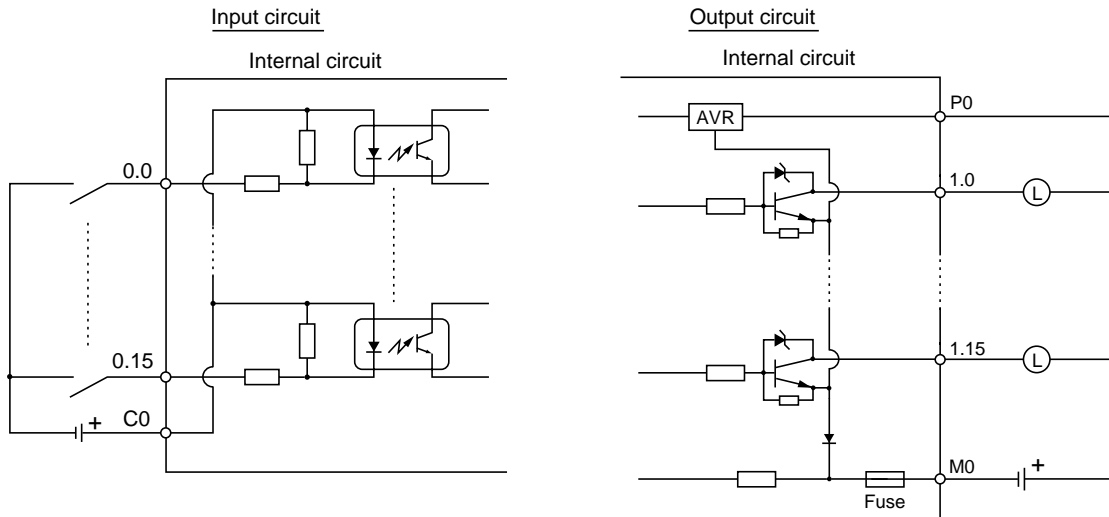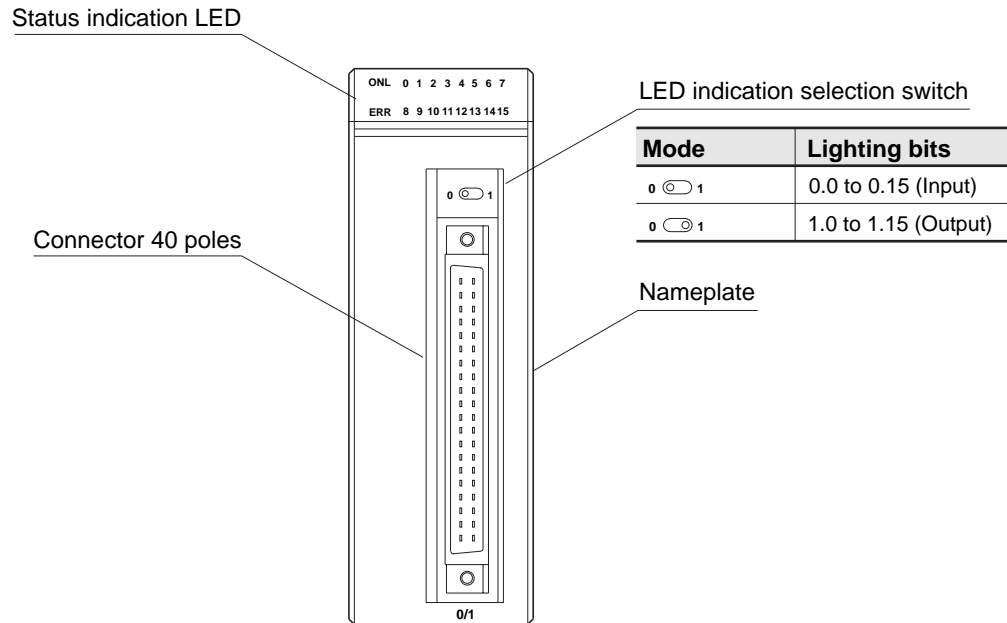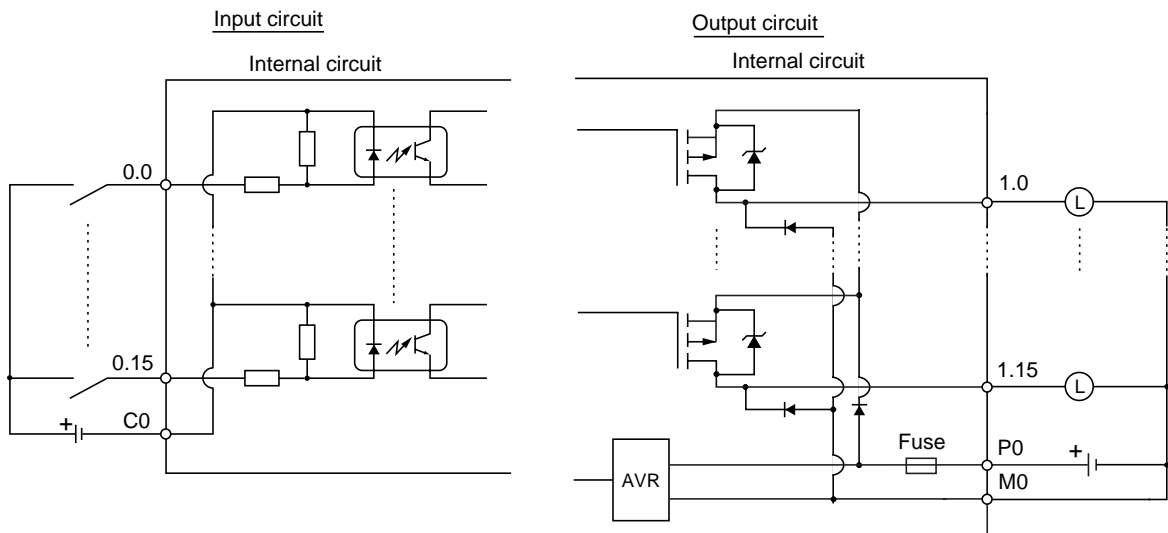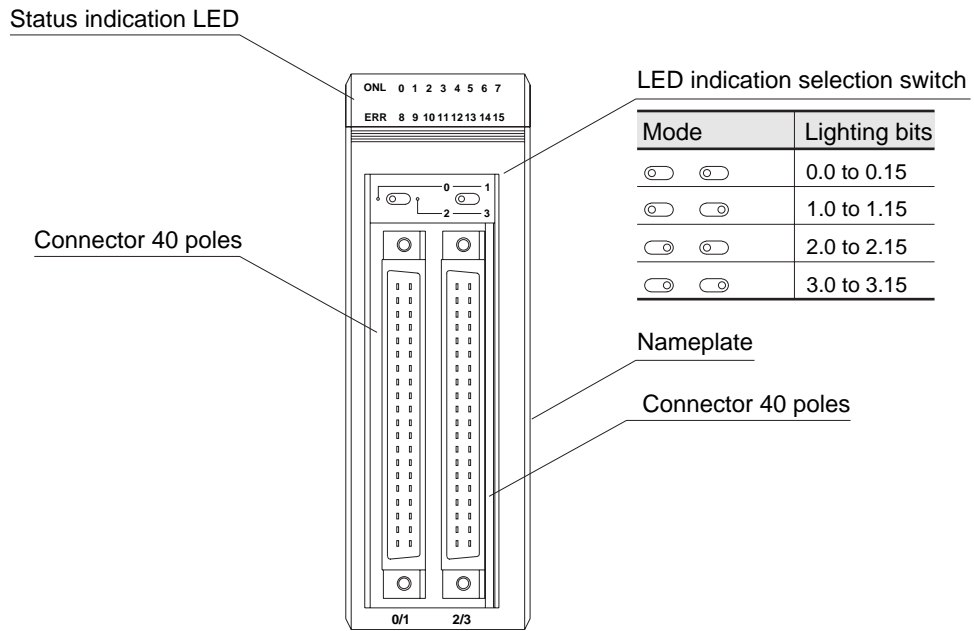
\<Names\>

Status indication LED

ONL 0 1 2 3 4 5 6 7
ERR 8 9 10 11 12 13 14 15

Detachable terminal block
(M3) 20 poles

Nameplate

0
1
2
3
4
5
6
7
C0
8
9
10
11
12
13
14
15
P0
M0

NC

\<External wiring\>

Signal name

1	1	0
	2	
3	3	2
	4	
5	5	4
	6	
7	7	6
	8	C0 +
L 8	9	
L 10	10	9 L
L 12	11	11 L
L 14	12	13 L
	13	
	14	
	15	15 L
	16	
+ P0	17	M0
	18	
NC	20	19

Terminal No.

Note: NC indicates a terminal not
connected to an internal
circuit. Do not use NC
terminals as repeating
terminals.

\<Circuit configuration\>

Input circuit

Internal circuit

0
(0.0)

7
(0.7)

+ C0

Output circuit

Internal circuit

8(1.0)   L

15(1.7)   L

Fuse

AVR

P0   +

M0

(3) Transistor (source type) input 24V DC 16 points / Transistor (sink type) output 16 points (NP1W3206T)

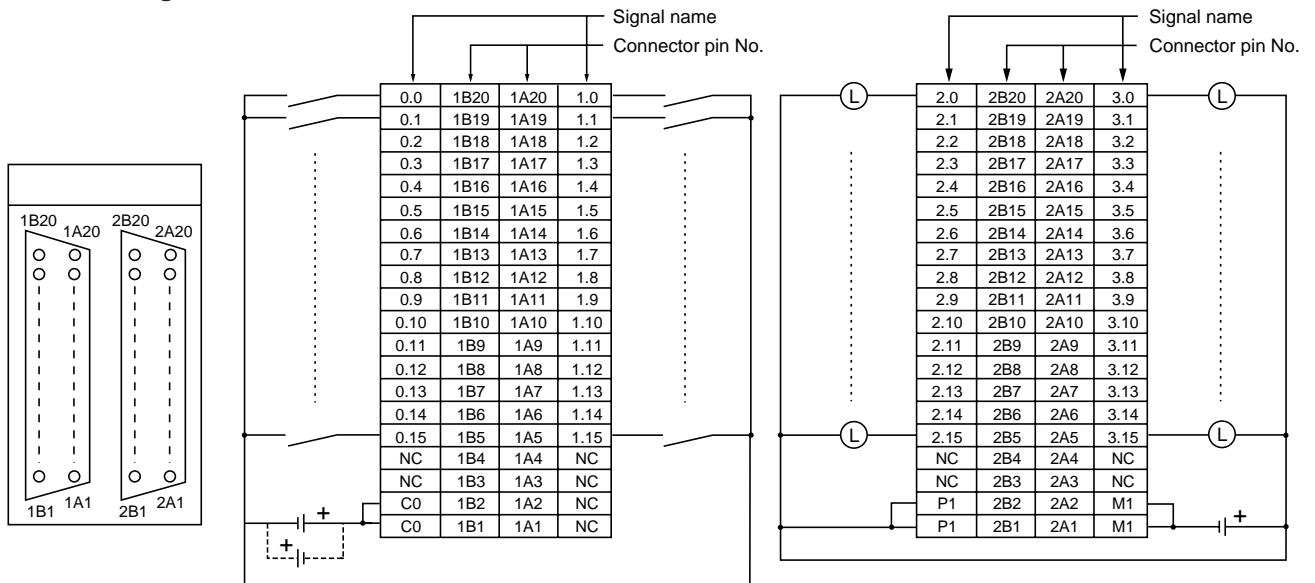| Item		Specification
Type		NP1W3206T
No. of input points		16 points (16 points common x 1 circuit)
Input signal condition	Rated voltage	24V DC
	Rated voltage (tolerance)	30V DC
	Ripple percentage	5% or less
Characteristics of input circuit	Input type	Source type
	Input current	4mA (24V DC)
	Input impedance	5.6kΩ
	Operating voltage	OFF to ON	15 to 30V
		ON to OFF	0 to 5V
	Input delay time	OFF to ON	0.7ms (hard filter time) + (soft filter time) Whole soft filter time is variable by parameter setting. (OFF to ON) to (ON to OFF)
		ON to OFF	1 to 1ms, 3 to 3ms (default), 3 to 10ms, 10 to 10ms, 30 to 30ms, 100 to 100ms
	Input type	DC type1
No. of output points		16 points (16 points common x 1 circuit)
Output power supply condition	Rated voltage	12 to 24V DC
	Tolerance	10.2 to 30V DC
Characteristics of output circuit	Output type	Sink type
	Max. load current	0.12A/point, 1.6A/common
	Voltage drop	1.5V or less (at 2.4V load)
	Response time	OFF to ON	1 ms or less
		ON to OFF	1 ms or less
	Leakage current in OFF state	Max. 0.1mA
	Output element	Transistor
	Surge current strength	0.3A 10ms
Output protection method	Built-in fuse	125V, 2.5A, not changeable
	Surge absorption circuit	Zener diode
	Others	None
On/off times		Max. 3600 times/hour (inductive load), No limit (resistor load)
Wire connections	External wire connections	40-pin connector (FCN-365P040-AU) x 1 piece
	Applicable wire size	AWG #23 or less (at soldered connector) (Note)
Input indication		LED indicator lights up when input is ON. (Logic side) ONL: normal (Green LED), ERR: abnormal and the fuse blown out (Red LED)
Isolation method		Photocoupler
Dielectric strength		1500V AC 1 minute (between I/O terminals and frame ground)
Insulation resistance		10MΩ or more with 500V DC megger (between I/O terminals and frame ground)
Derating condition		Simultaneous ON rate: Max. 100% (at 26.4V DC/55° C) Simultaneous ON rate: Max. 75% (at 30V DC/55° C)
External power supply		For input signal: 24V DC, For transistor drive: 12 to 24V DC, 20mA
Internal current consumption		24V DC, 50mA or less (when all points are turned ON)
Occupied words		2 words
Mass		Approx. 140g

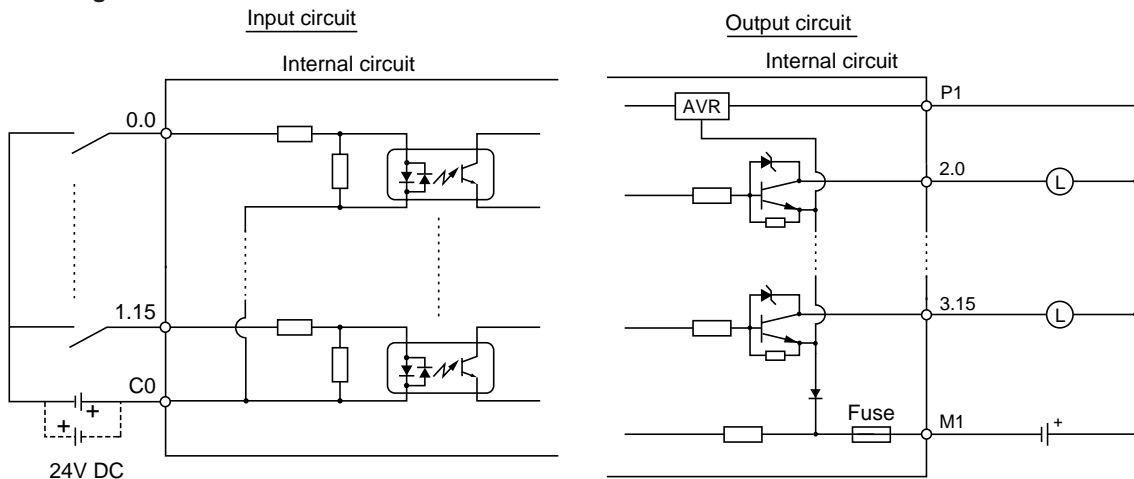Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."

\<Names\>

Status indication LED

LED indication selection switch

Mode	Lighting bits
0 ◎ 1	0.0 to 0.15 (Input)
0 ◯ 1	1.0 to 1.15 (Output)

Connector 40 poles

Nameplate

| ONL | 0 1 2 3 4 5 6 7 |
| ERR | 8 9 10 11 12 13 14 15 |

0 ◎ 1

0/1

\<External wiring\>

Signal name

Connector pin No.

0.0	B20	A20	1.0
0.1	B19	A19	1.1
0.2	B18	A18	1.2
0.3	B17	A17	1.3
0.4	B16	A16	1.4
0.5	B15	A15	1.5
0.6	B14	A14	1.6
0.7	B13	A13	1.7
0.8	B12	A12	1.8
0.9	B11	A11	1.9
0.10	B10	A10	1.10
0.11	B9	A9	1.11
0.12	B8	A8	1.12
0.13	B7	A7	1.13
0.14	B6	A6	1.14
0.15	B5	A5	1.15
NC	B4	A4	NC
NC	B3	A3	NC
NC	B2	A2	P0
C0	B1	A1	M0

B20 — A20

B1 — A1

Note: NC indicates a terminal not connected to an internal circuit. Do not use NC terminals as repeating terminals.
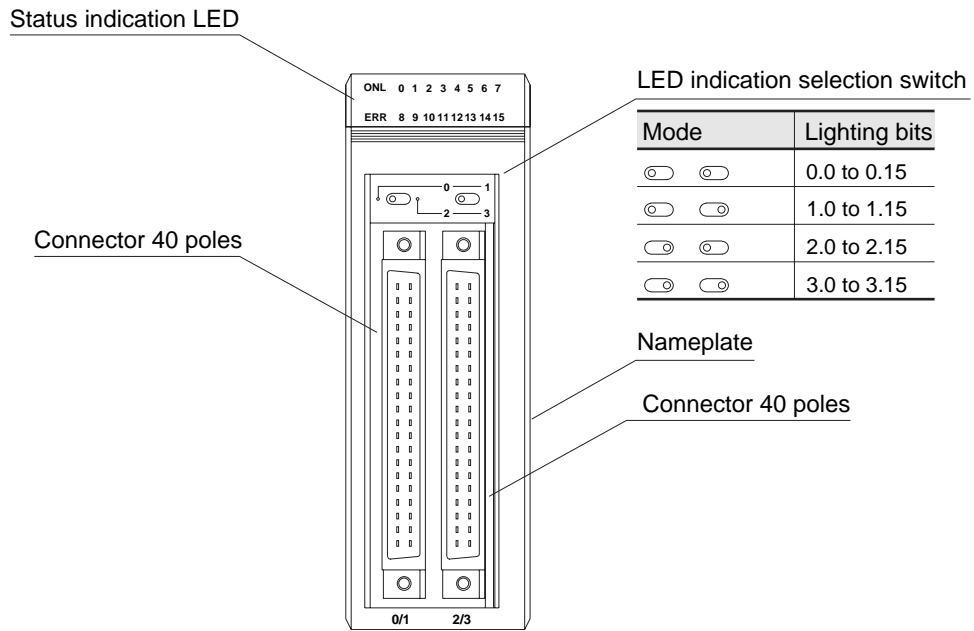
\<Circuit configuration\>

Input circuit

Internal circuit

0.0

0.15

C0

Output circuit

Internal circuit

AVR

P0

1.0

1.15

M0

Fuse

(4) Transistor (sink type) input 24V DC 16 points / Transistor (source type) output 16 points (NP1W3206U)

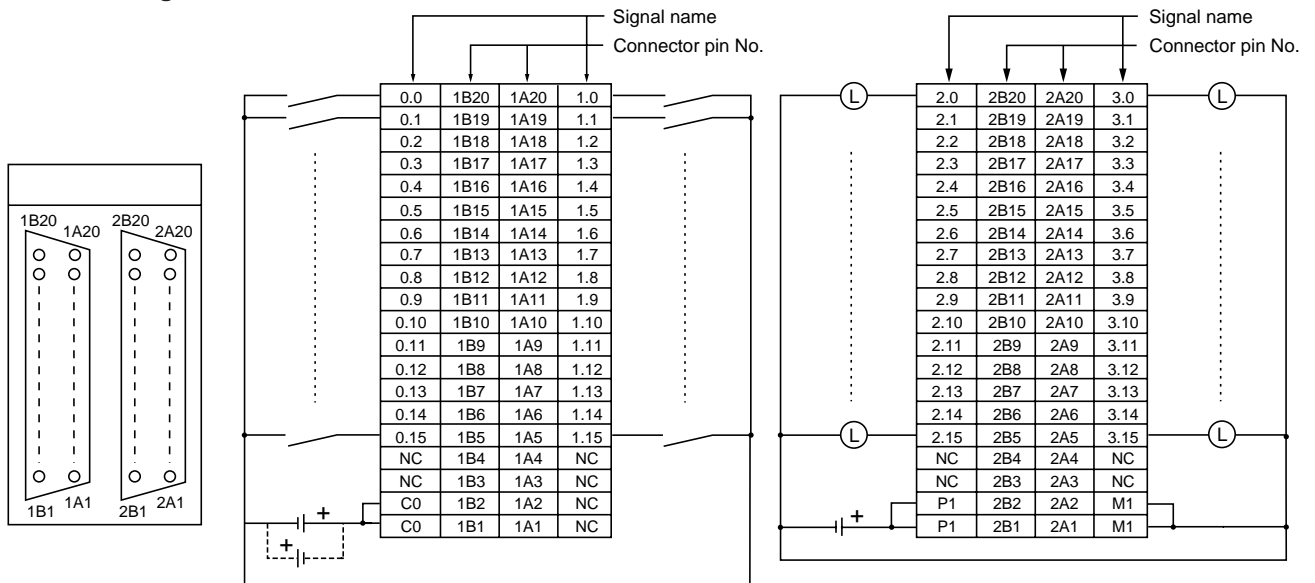| Item			Specification
Type			NP1W3206U
No. of input points			16 points (16 points common x 1 circuit)
Input signal condition	Rated voltage		24V DC
	Rated voltage (tolerance)		30V DC
	Ripple percentage		5% or less
Characteristics of input circuit	Input type		Sink type
	Input current		4mA (24V DC)
	Input impedance		5.6kΩ
	Operating voltage	OFF to ON	15 to 30V
		ON to OFF	0 to 5V
	Input delay time	OFF to ON	0.7ms (hard filter time) + (soft filter time) Whole soft filter time is variable by parameter setting. (OFF to ON) to (ON to OFF)
		ON to OFF	1 to 1ms, 3 to 3ms (default), 3 to 10ms, 10 to 10ms, 30 to 30ms, 100 to 100ms
	Input type		DC type1
No. of output points			16 points (16 points common x 1 circuit)
Output power supply condition	Rated voltage		12 to 24V DC
	Tolerance		10.2 to 30V DC
Characteristics of output circuit	Output type		Source type
	Max. load current		0.12A/point, 1.6A/common
	Voltage drop		1.5V or less
	Response time	OFF to ON	1 ms or less
		ON to OFF	1 ms or less
	Leakage current in OFF state		Max. 0.1mA
	Output element		Transistor
	Surge current strength		0.8A 10ms
On/off times			Max. 3600 times/hour (inductive load), No limit (resistor load)
Output protection method	Built-in fuse		125V, 2.5A, not changeable
	Surge absorption circuit		Zener diode
	Others		None
Wire connections	External wire connections		40-pin connector (FCN-365P040-AU) x 1 piece
	Applicable wire size		AWG #23 or less (at soldered connector) (Note)
Input indication			For selected points by the switch, LED indicator lights up when input is ON. (Logic side) ONL: normal (Green LED), ERR: abnormal and the fuse blown out (Red LED)
Isolation method			Photocoupler
Dielectric strength			1500V AC 1 minute (between I/O terminals and frame ground)
Insulation resistance			10MΩ or more with 500V DC megger (between I/O terminals and frame ground)
Derating condition			Simultaneous ON rate: Max. 100% (at 26.4V DC/55° C) Simultaneous ON rate: Max. 75% (at 30V DC/55° C)
External power supply			For input signal: 24V DC, For transistor drive: 12 to 24V DC, 20mA
Internal current consumption			24V DC, 50mA or less (when all points are turned ON)
Occupied words			2 words
Mass			Approx. 140g

Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."
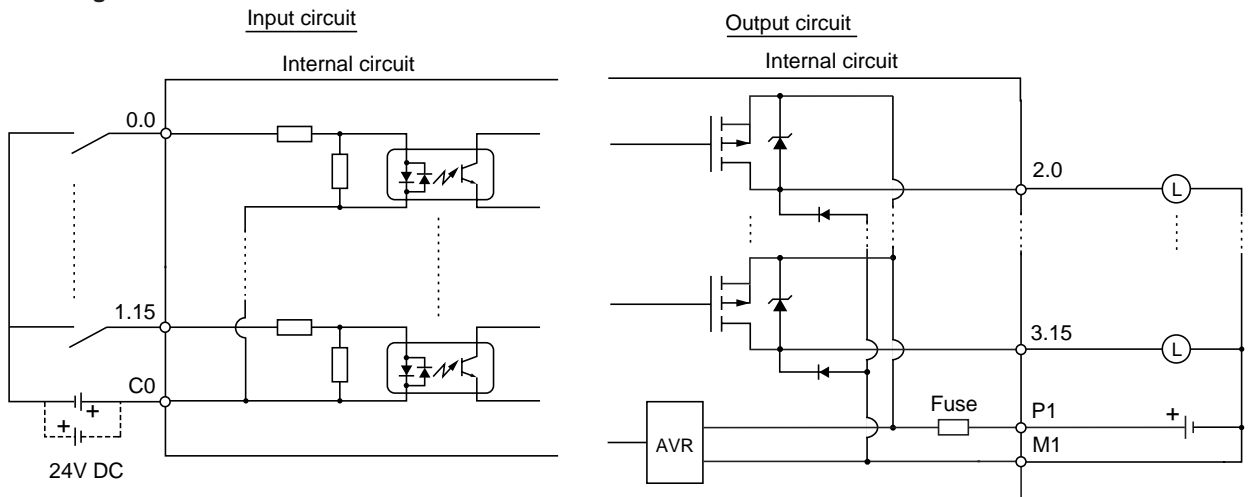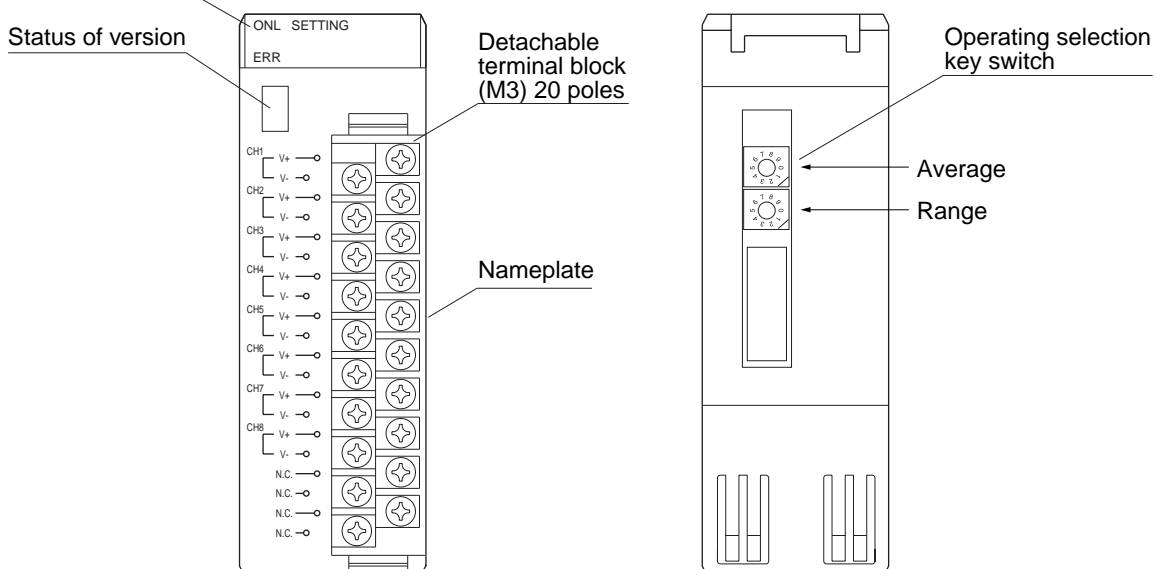
<Names>

Status indication LED

Connector 40 poles

LED indication selection switch

Mode	Lighting bits
0 ⊙ 1	0.0 to 0.15 (Input)
0 ⊙ 1	1.0 to 1.15 (Output)

Nameplate

<External wiring>

Signal name
Connector pin No.

0.0	B20	A20	1.0
0.1	B19	A19	1.1
0.2	B18	A18	1.2
0.3	B17	A17	1.3
0.4	B16	A16	1.4
0.5	B15	A15	1.5
0.6	B14	A14	1.6
0.7	B13	A13	1.7
0.8	B12	A12	1.8
0.9	B11	A11	1.9
0.10	B10	A10	1.10
0.11	B9	A9	1.11
0.12	B8	A8	1.12
0.13	B7	A7	1.13
0.14	B6	A6	1.14
0.15	B5	A5	1.15
NC	B4	A4	NC
NC	B3	A3	NC
NC	B2	A2	P0
C0	B1	A1	M0

B20 ○ ○ A20

B1 ○ ○ A1

Note: NC indicates a terminal not connected to an internal circuit. Do not use NC terminals as repeating terminals.

<Circuit configuration>

Input circuit

Internal circuit

0.0

0.15

C0

Output circuit

Internal circuit

1.0

1.15

Fuse

AVR

P0

M0

(5) Input 24V DC 32 points / Transistor (sink type) output 32 points (NP1W6406T)

Item		Specification
Type		NP1W6406T
No. of input points		32 points (32 points common x 1 circuit)
Input signal condition	Rated voltage	24V DC
	Rated voltage (tolerance)	30V DC
	Ripple percentage	5% or less
Characteristics of input circuit	Input type	Source, sink common
	Input current	4mA (24V DC)
	Input impedance	5.6kΩ
	Operating voltage — OFF to ON	15 to 30V
	Operating voltage — ON to OFF	0 to 5V
	Input delay time — OFF to ON	0.7ms (hard filter time) + (soft filter time) Whole soft filter time is variable by parameter setting. (OFF to ON) to (ON to OFF)
	Input delay time — ON to OFF	1 to 1ms, 3 to 3ms (default), 3 to 10ms, 10 to 10ms, 30 to 30ms, 100 to 100ms
	Input type	DC type1
No. of output points		32 points (32 points common x 1 circuit)
Output power supply condition	Rated voltage	12 to 24V DC
	Tolerance	10.2 to 30V DC
Characteristics of output circuit	Output type	Sink type
	Max. load current	0.12A/point, 3.2A/common
	Voltage drop	1.5V or less (at 0.12A load)
	Response time — OFF to ON	1 ms or less
	Response time — ON to OFF	1 ms or less
	Leakage current in OFF state	Max. 0.1mA
	Output element	Transistor
	Surge current strength	0.3A 10ms
Output protection method	Built-in fuse	125V, 5A, not changeable
	Surge absorption circuit	Zener diode
	Others	None
On/off times		Max. 3600 times/hour (inductive load), No limit (resistor load)
Wire connections	External wire connections	40-pin connector (FCN-365P040-AU) x 1 piece
	Applicable wire size	AWG #23 or less (at soldered connector) (Note)
Input indication		LED indicator lights up when input is ON. (Logic side) ONL: normal (Green LED), ERR: abnormal and the fuse blown out (Red LED)
Isolation method		Photocoupler
Dielectric strength		1500V AC 1 minute (between I/O terminals and frame ground)
Insulation resistance		10MΩ or more with 500V DC megger (between I/O terminals and frame ground)
Derating condition		Simultaneous ON rate: Max. 90% (at 24V DC/55° C) Simultaneous ON rate: Max. 80% (at 26.4V DC/55° C) Simultaneous ON rate: Max. 65% (at 30V DC/55° C)
External power supply		For input signal: 24V DC, For transistor drive: 12 to 24V DC, 52mA
Internal current consumption		24V DC, 90mA or less (when all points are turned ON)
Occupied words		4 words
Mass		Approx. 180g

Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."

\<Names>

Status indication LED

| ONL | 0 1 2 3 4 5 6 7 |
| ERR | 8 9 10 11 12 13 14 15 |

LED indication selection switch

Mode	Lighting bits
⊙ ⊙	0.0 to 0.15
⊙ ⊂	1.0 to 1.15
⊂ ⊙	2.0 to 2.15
⊂ ⊂	3.0 to 3.15

Connector 40 poles

Nameplate

Connector 40 poles

0/1   2/3

\<External wiring>

Signal name
Connector pin No.

| | 1B20 1A20 | | 2B20 2A20 | |

0.0	1B20	1A20	1.0
0.1	1B19	1A19	1.1
0.2	1B18	1A18	1.2
0.3	1B17	1A17	1.3
0.4	1B16	1A16	1.4
0.5	1B15	1A15	1.5
0.6	1B14	1A14	1.6
0.7	1B13	1A13	1.7
0.8	1B12	1A12	1.8
0.9	1B11	1A11	1.9
0.10	1B10	1A10	1.10
0.11	1B9	1A9	1.11
0.12	1B8	1A8	1.12
0.13	1B7	1A7	1.13
0.14	1B6	1A6	1.14
0.15	1B5	1A5	1.15
NC	1B4	1A4	NC
NC	1B3	1A3	NC
C0	1B2	1A2	NC
C0	1B1	1A1	NC

Signal name
Connector pin No.

2.0	2B20	2A20	3.0
2.1	2B19	2A19	3.1
2.2	2B18	2A18	3.2
2.3	2B17	2A17	3.3
2.4	2B16	2A16	3.4
2.5	2B15	2A15	3.5
2.6	2B14	2A14	3.6
2.7	2B13	2A13	3.7
2.8	2B12	2A12	3.8
2.9	2B11	2A11	3.9
2.10	2B10	2A10	3.10
2.11	2B9	2A9	3.11
2.12	2B8	2A8	3.12
2.13	2B7	2A7	3.13
2.14	2B6	2A6	3.14
2.15	2B5	2A5	3.15
NC	2B4	2A4	NC
NC	2B3	2A3	NC
P1	2B2	2A2	M1
P1	2B1	2A1	M1

1B20 1A20   2B20 2A20
1B1 1A1   2B1 2A1

Note:1) Common terminals (C0), P1 and M1 are electrically separated and isolated from each other.
2) NC indicates a terminal not connected to an internal circuit. Do not use NC terminals as repeating terminals.

\<Circuit configuration>

Input circuit
Internal circuit

0.0

1.15

C0

24V DC

Output circuit
Internal circuit

AVR   P1

2.0

3.15

Fuse   M1

3-5 I/O Specifications

(6) Input 24V DC 32 points / Transistor (source type) output 32 points (NP1W6406U)

Item			Specification
Type			NP1W6406U
No. of input points			32 points (32 points common x 1 circuit)
Input signal condition	Rated voltage		24V DC
	Rated voltage (tolerance)		30V DC
	Ripple percentage		5% or less
Characteristics of input circuit	Input type		Source, sink common
	Input current		4mA (24V DC)
	Input impedance		5.6kΩ
	Operating voltage	OFF to ON	15 to 30V
		ON to OFF	0 to 5V
	Input delay time	OFF to ON	0.7ms (hard filter time) + (soft filter time) Whole soft filter time is variable by parameter setting. (OFF to ON) to (ON to OFF)
		ON to OFF	1 to 1ms, 3 to 3ms (default), 3 to 10ms, 10 to 10ms, 30 to 30ms, 100 to 100ms
	Input type		DC type1
No. of output points			32 points (32 points common x 1 circuit)
Output power supply condition	Rated voltage		12 to 24V DC
	Tolerance		10.2 to 30V DC
Characteristics of output circuit	Output type		Source type
	Max. load current		0.12A/point, 3.2A/common
	Voltage drop		1.5V or less (at 0.12A load)
	Response time	OFF to ON	1 ms or less
		ON to OFF	1 ms or less
	Leakage current in OFF state		Max. 0.1mA
	Output element		Transistor
	Surge current strength		0.3A 10ms
Output protection method	Built-in fuse		125V, 5A, not changeable
	Surge absorption circuit		Zener diode
	Others		None
On/off times			Max. 3600 times/hour (inductive load), No limit (resistor load)
Wire connections	External wire connections		40-pin connector (FCN-365P040-AU) x 1 piece
	Applicable wire size		AWG #23 or less (at soldered connector) (Note)
Input indication			LED indicator lights up when input is ON. (Logic side) ONL: normal (Green LED), ERR: abnormal and the fuse blown out (Red LED)
Isolation method			Photocoupler
Dielectric strength			1500V AC 1 minute (between I/O terminals and frame ground)
Insulation resistance			10MΩ or more with 500V DC megger (between I/O terminals and frame ground)
Derating condition			Simultaneous ON rate: Max. 90% (at 24V DC/55° C) Simultaneous ON rate: Max. 80% (at 26.4V DC/55° C) Simultaneous ON rate: Max. 65% (at 30V DC/55° C)
External power supply			For input signal: 24V DC, For transistor drive: 12 to 24V DC, 40mA
Internal current consumption			24V DC, 90mA or less (when all points are turned ON)
Occupied words			4 words
Mass			Approx. 180g

Note: Applicable wire size depends on a crimp terminal. For details, refer to "4-4-3 Wiring."

\<Names\>

Status indication LED

Connector 40 poles

LED indication selection switch

Mode	Lighting bits
⊙ ⊙	0.0 to 0.15
⊙ ⊂⊃	1.0 to 1.15
⊂⊃ ⊙	2.0 to 2.15
⊂⊃ ⊂⊃	3.0 to 3.15

Nameplate

Connector 40 poles

```
ONL  0 1 2 3 4 5 6 7
ERR  8 9 10 11 12 13 14 15

      0   1
      2   3

  0/1     2/3
```

\<External wiring\>

Signal name
Connector pin No.

```
1B20  1A20      2B20  2A20

1B1   1A1       2B1   2A1
```

0.0	1B20	1A20	1.0
0.1	1B19	1A19	1.1
0.2	1B18	1A18	1.2
0.3	1B17	1A17	1.3
0.4	1B16	1A16	1.4
0.5	1B15	1A15	1.5
0.6	1B14	1A14	1.6
0.7	1B13	1A13	1.7
0.8	1B12	1A12	1.8
0.9	1B11	1A11	1.9
0.10	1B10	1A10	1.10
0.11	1B9	1A9	1.11
0.12	1B8	1A8	1.12
0.13	1B7	1A7	1.13
0.14	1B6	1A6	1.14
0.15	1B5	1A5	1.15
NC	1B4	1A4	NC
NC	1B3	1A3	NC
C0	1B2	1A2	NC
C0	1B1	1A1	NC

Signal name
Connector pin No.

2.0	2B20	2A20	3.0
2.1	2B19	2A19	3.1
2.2	2B18	2A18	3.2
2.3	2B17	2A17	3.3
2.4	2B16	2A16	3.4
2.5	2B15	2A15	3.5
2.6	2B14	2A14	3.6
2.7	2B13	2A13	3.7
2.8	2B12	2A12	3.8
2.9	2B11	2A11	3.9
2.10	2B10	2A10	3.10
2.11	2B9	2A9	3.11
2.12	2B8	2A8	3.12
2.13	2B7	2A7	3.13
2.14	2B6	2A6	3.14
2.15	2B5	2A5	3.15
NC	2B4	2A4	NC
NC	2B3	2A3	NC
P1	2B2	2A2	M1
P1	2B1	2A1	M1

Note:1) Common terminals (C0), P1 and M1 are electrically separated and isolated from each other.
2) NC indicates a terminal not connected to an internal circuit. Do not use NC terminals as repeating terminals.

\<Circuit configuration\>

Input circuit

Internal circuit

0.0

1.15

C0

24V DC

Output circuit

Internal circuit

2.0

3.15

Fuse

AVR   P1

M1

3-5-6 Analog I/O specifications

(1) Between channels insulated analog voltage input 8ch (NP1AXH8VG-MR)

Item	Specification	
Type	NP1AXH8VG-MR	
No. of input channels	8 channels	
Input impedance	1MΩ	
Input tolerance	Voltage input: ±15V	
Conversion characteristics	Analog input range (V)	Digital output value
	-10 to 10, 1 to 5, 0 to 5, 0 to 10	-32000 to 32000 or 0 to 32000
Resolution	16 bits	
Reference accuracy (For full scale)	± 0.05% or less (at 18 to 28° C)	
Digital output format	INT type (integer)	
Sampling time	40ms or less/8 channels	
Input filtering time	Approx. 200μs or less (hard filter: primary delay time constant)	
Input delay time	40ms or less + Takt time (ms)	
Wire connections — External wire connections	Detachable screw terminal block (M3) 20 poles	
Wire connections — Applicable wire size	AWG#22-18 (Shielding twist pair wire (the wick line is a stranded wire.))	
Status indication	ONL: normal (Green LED), ERR: abnormal (Red LED), SETTING: light or blink on Gain/Offset setting (Green LED)	
Isolation method	Between external terminal and internal logic: Photocoupler/transducer Between channels: Transducer	
Dielectric strength	1000V AC 1 minute	
Insulation resistance	10MΩ or more with 500V DC megger (between I/O terminals and frame ground, between analog channels)	
Internal current consumption	24V DC 150mA or less (when all channels are used)	
Occupied words	12 words (Input: 8 words, Output: 4 words)	
Mass	Approx. 280g	

* For more information about this module, refer to the "User's Manual Between Channels Insulated Multi-range Analog Module" (FEH189).

<Names>

(2) Between channels insulated analog current input 8ch (NP1AXH8IG-MR)

Item	Specification
Type	NP1AXH8IG-MR
No. of input channels	8 channels
Input impedance	250Ω
Input tolerance	±30mA
Conversion characteristics	<table><tr><td>Analog input range (mA)</td><td>Digital output value</td></tr><tr><td>0 to 20, 4 to 20, -20 to 20</td><td>-32000 to 32000 or 0 to 32000</td></tr></table>
Resolution	16 bits
Reference accuracy (For full scale)	± 0.05% or less (at 18 to 28° C)
Digital output format	INT type (integer)
Sampling time	40ms or less/8 channels
Input filtering time	200μs or less (hard filter: primary delay time constant)
Input delay time	40ms or less + Takt time (ms)
Wire connections — External wire connections	Detachable screw terminal block (M3) 20 poles
Wire connections — Applicable wire size	AWG#22-18 (Shielding twist pair wire (the wick line is a stranded wire.))
Status indication	ONL: normal (Green LED), ERR: abnormal (Red LED), SETTING: light or blink on Gain/Offset setting (Green LED)
Isolation method	Between external terminal and internal logic: Photocoupler/transducer Between channels: Transducer
Dielectric strength	1000V AC 1 minute
Insulation resistance	10MΩ or more with 500V DC megger (between I/O terminals and frame ground, between analog channels)
Internal current consumption	24V DC 150mA or less (when all channels are used)
Occupied words	12 words (Input: 8 words, Output: 4 words)
Mass	Approx. 280g

* For more information about this module, refer to the "User's Manual Between Channels Insulated Multi-range Analog Module" (FEH189).

<Names>

Status indication LED

Status of version

ONL SETTING

ERR

CH1 I+
     I-
CH2 I+
     I-
CH3 I+
     I-
CH4 I+
     I-
CH5 I+
     I-
CH6 I+
     I-
CH7 I+
     I-
CH8 I+
     I-
     N.C.
     N.C.
     N.C.
     N.C.

Detachable terminal block (M3) 20 poles

Nameplate

Operating selection key switch
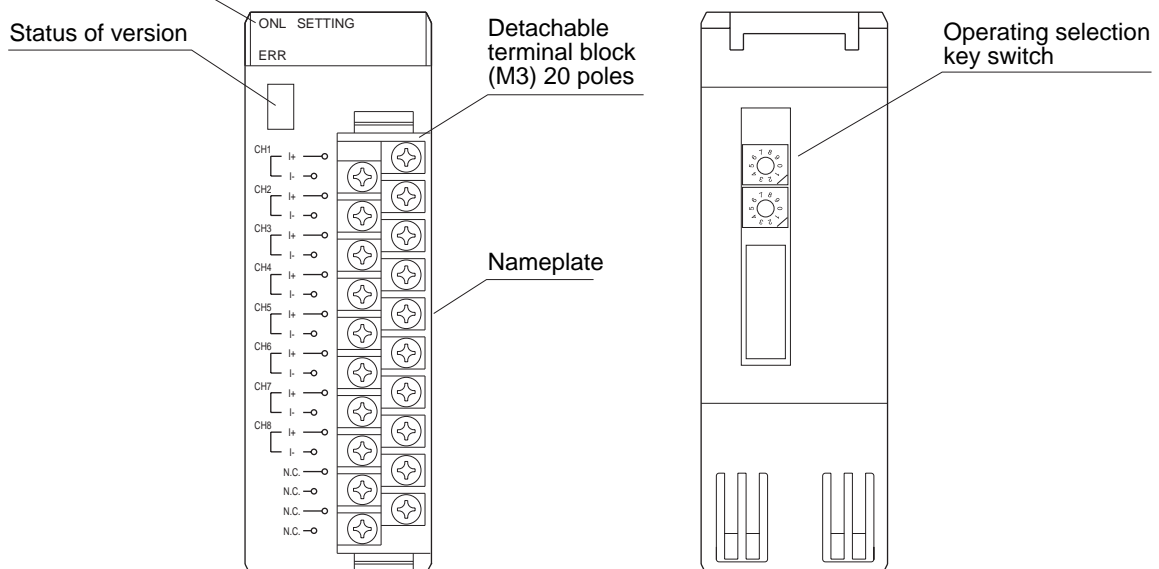
(3) High-speed analog voltage input 8ch (NP1AXH8V-MR)

Item		Specification	
Type		NP1AXH8V-MR	
No. of input channels		8 channels	
Input impedance		1MΩ	
Input tolerance		Voltage input: ±15V	
Conversion characteristics		Analog input range (V)	Digital output value
		-10 to 10, 1 to 5, 0 to 5, 0 to 10	-8000 to 8000 or 0 to 16000
Resolution		14 bits (1.25mV)	
Overall accuracy (For full scale)		± 0.1% or less (at 18 to 28° C), ±0.2% or less (0 to 55° C) When 1 to 5V range: ±0.3% (0 to 55° C)	
Digital output format		INT type (integer)	
Sampling time		0.27ms x (The number of convert channels + 1)	
Input filtering time		Approx. 100μs or less (hard filter: primary delay time constant)	
Input delay time		2.5ms or less /8 points + Takt time (ms)	
Wire connections	External wire connections	Detachable screw terminal block (M3) 20 poles	
	Applicable wire size	AWG#22-18 (Shielding twist pair wire (the wick line is a stranded wire.))	
Status indication		ONL: normal (Green LED), ERR: abnormal (Red LED), SETTING: light or blink on Gain/Offset setting (Green LED)	
Isolation method		Photocoupler, not isolated between channels	
Dielectric strength		500V AC 1 minute (between I/O terminals and frame ground) (Short cut current: 5mA)	
Insulation resistance		10MΩ or more with 500V DC megger (between I/O terminals and frame ground)	
Internal current consumption		24V DC 200mA or less (when all channels are used)	
Occupied words		12 words (Input: 8 words, Output: 4 words)	
Mass		Approx. 240g	

* For more information about this module, refer to the "User's Manual 8ch Multi Range Analog I/O Module" (FEH206).

\<Names\>

Status indication LED
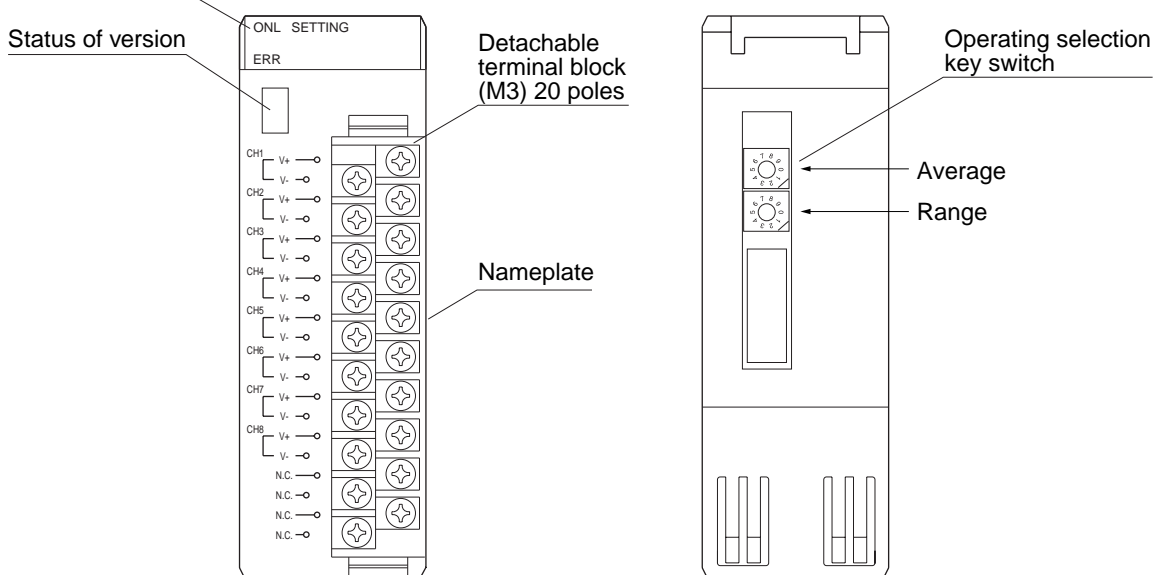
(4) High-speed analog current input 8ch (NP1AXH8I-MR)

Item	Specification	
Type	NP1AXH8I-MR	
No. of input channels	8 channels	
Input impedance	250Ω	
Input tolerance	±30mA	
Conversion characteristics	Analog input range (mA)	Digital output value
	0 to 20, 4 to 20, -20 to 20	-8000 to 8000 or 0 to 16000
Resolution	14 bits (2.5μA)	
Overall accuracy (For full scale)	± 0.1% or less (at 18 to 28° C), ±0.4% or less (0 to 55° C)	
Digital output format	INT type (integer)	
Sampling time	0.27ms x (The number of convert channels + 1)	
Input filtering time	100μs or less (hard filter: primary delay time constant)	
Input delay time	2.5ms or less /8 points + Takt time (ms)	
Wire connections — External wire connections	Detachable screw terminal block (M3) 20 poles	
Wire connections — Applicable wire size	AWG#22-18 (Shielding twist pair wire (the wick line is a stranded wire.))	
Status indication	ONL: normal (Green LED), ERR: abnormal (Red LED), SETTING: light or blink on Gain/Offset setting (Green LED)	
Isolation method	Photocoupler, not isolated between channels	
Dielectric strength	500V AC 1 minute (between I/O terminals and frame ground) (Short cut current: 5mA)	
Insulation resistance	10MΩ or more with 500V DC megger (between I/O terminals and frame ground)	
Internal current consumption	24V DC 200mA or less (when all channels are used)	
Occupied words	12 words (Input: 8 words, Output: 4 words)	
Mass	Approx. 240g	

* For more information about this module, refer to the "User's Manual 8ch Multi Range Analog I/O Module" (FEH206).

<Names>

(5) High-speed analog input (NP1AXH4-MR)

Item	Specification		
Type	NP1AXH4-MR		
No. of input channels	4 channels		
Input impedance	Voltage input: 1MΩ , Current input: 250Ω		
Input tolerance	Voltage input: ±15V, Current input: ± 30mA		
Conversion characteristics	Input	Analog input range	Digital output value
	Voltage (V)	-10 to 10, -5 to 5, 1 to 5, 0 to 5, 0 to 10	-8000 to 8000 or 0 to 16000
	Current (mA)	0 to 20, 4 to 20, -20 to 20	
Resolution	14 bits		
Overall accuracy (For full scale)	± 0.1% or less (at 25° C), ±1.0% or less (0 to 55° C)		
Digital output format	INT type (integer)		
Sampling time	1 ms/4 channels		
Input filtering time	47μs		
Input delay time	1 ms + Takt time		
Wire connections	External wire connections	Detachable screw terminal block (M3) 20 poles	
	Applicable wire size	AWG#22-18 (Shielding twist pair wire (the wick line is a stranded wire.))	
Status indication	ONL: normal (Green LED), ERR: abnormal (Red LED), SETTING: light or blink on setting (Green LED)		
Isolation method	Photocoupler, not isolated between channels		
Dielectric strength	500V AC 1 minute (between I/O terminals and frame ground)		
Insulation resistance	10MΩ or more with 500V DC megger (between I/O terminals and frame ground)		
Internal current consumption	24V DC 120mA or less (when all channels are used)		
Occupied words	10 words (Input: 8 words, Output: 2 words)		
Mass	Approx. 200g		

* For more information about this module, refer to the "User's Manual Multi Range Analog I/O Module" (FEH207).
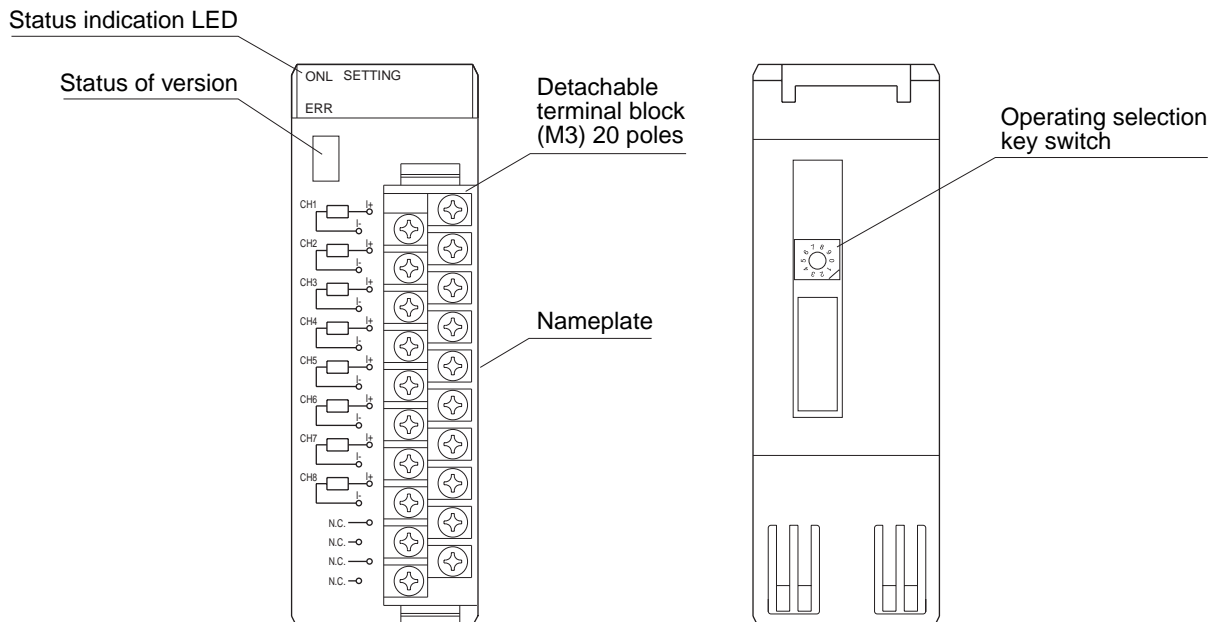
<Names>

(6) Standard analog input (NP1AX04-MR)

Item	Specification
Type	NP1AX04-MR
No. of input channels	4 channels
Input impedance	Voltage input: 1MΩ , Current input: 250Ω
Input tolerance	Voltage input: ±15V, Current input: ± 30mA
Conversion characteristics	<table><tr><td>Input</td><td>Analog input range</td><td>Digital output value</td></tr><tr><td>Voltage (V)</td><td>-10 to 10, -5 to 5, 1 to 5, 0 to 5, 0 to 10</td><td rowspan="2">-500 to 500 or 0 to 1000</td></tr><tr><td>Current (mA)</td><td>0 to 20, 4 to 20, -20 to 20</td></tr></table>
Resolution	10 bits
Overall accuracy (For full scale)	± 0.5% or less (at 25° C), ±1.0% or less (0 to 55° C)
Digital output format	INT type (integer)
Sampling time	4ms/4 channels
Input filtering time	47μs
Input delay time	4ms + Takt time
Wire connections — External wire connections	Detachable screw terminal block (M3) 20 poles
Wire connections — Applicable wire size	AWG#22-18 (Shielding twist pair wire (the wick line is a stranded wire.))
Status indication	ONL: normal (Green LED), ERR: abnormal (Red LED), SETTING: light or blink on setting (Green LED)
Isolation method	Photocoupler, not isolated between channels
Dielectric strength	500V AC 1 minute (between I/O terminals and frame ground)
Insulation resistance	10MΩ or more with 500V DC megger (between I/O terminals and frame ground)
Internal current consumption	24V DC 120mA or less (when all channels are used)
Occupied words	10 words (Input: 8 words, Output: 2 words)
Mass	Approx. 200g

* For more information about this module, refer to the "User's Manual Multi Range Analog I/O Module" (FEH207).
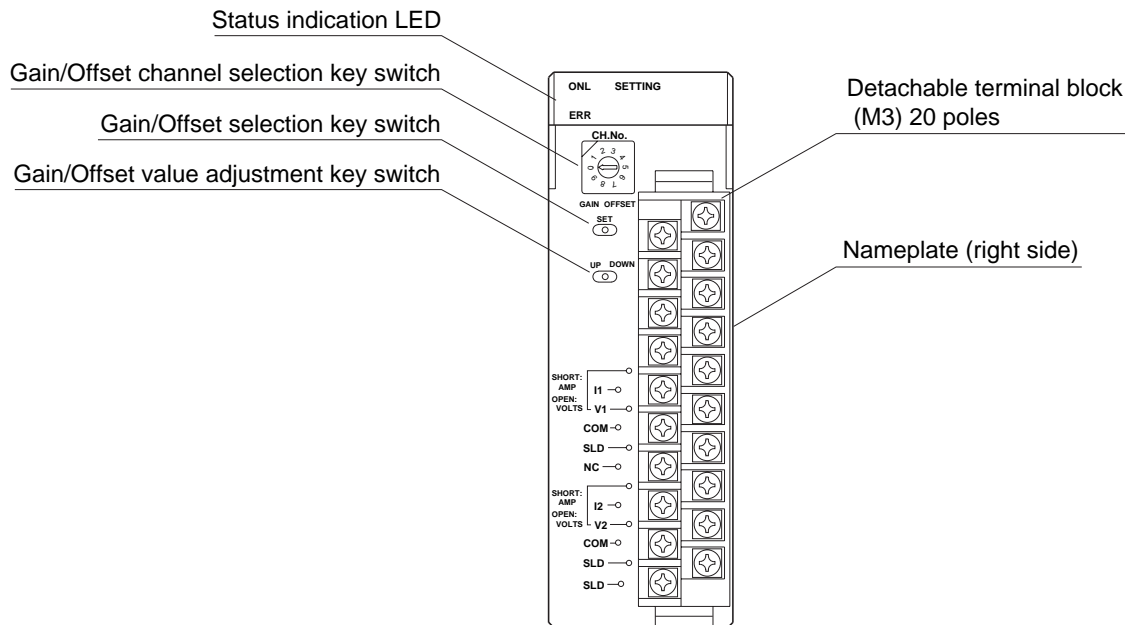
<Names>

(7) Standard analog input (Voltage input (NP1AX08V-MR), Current input (NP1AX08I-MR))

Item	Specification		
Type	NP1AX08V-MR (Voltage input), NP1AX08I-MR (Current input)		
No. of input channels	8 channels		
Input impedance	Voltage input: 1MΩ , Current input: 250Ω		
Input tolerance	Voltage input: ±15V, Current input: ± 30mA		
Conversion characteristics	Input	Analog input range	Digital output value
	Voltage (V)	-10 to 10, -5 to 5, 1 to 5, 0 to 5, 0 to 10	-500 to 500 or 0 to 1000
	Current (mA)	0 to 20, 4 to 20, -20 to 20	
Resolution	10 bits		
Overall accuracy (For full scale)	± 0.5% or less (at 25° C), ±1.0% or less (0 to 55° C)		
Digital output format	INT type (integer)		
Sampling time	1ms + 0.5ms x (The number of convert channels + 1)		
Input filtering time	47μs (Hardware filter: Primary delay time constant)		
Input delay time	5ms or less + Takt time (ms)		
Wire connections	External wire connections	Detachable screw terminal block (M3) 20 poles	
	Applicable wire size	AWG#22-18 (Shielding twist pair wire (the wick line is a stranded wire.))	
Status indication	ONL: normal (Green LED), ERR: abnormal (Red LED), SETTING: light or blink on setting (Green LED)		
Isolation method	Photocoupler, not isolated between channels		
Dielectric strength	500V AC 1 minute (between I/O terminals and frame ground)		
Insulation resistance	10MΩ or more with 500V DC megger (between I/O terminals and frame ground)		
Internal current consumption	24V DC 120mA or less (when all channels are used)		
Occupied words	18 words (Input: 16 words, Output: 2 words)		
Mass	Approx. 200g		

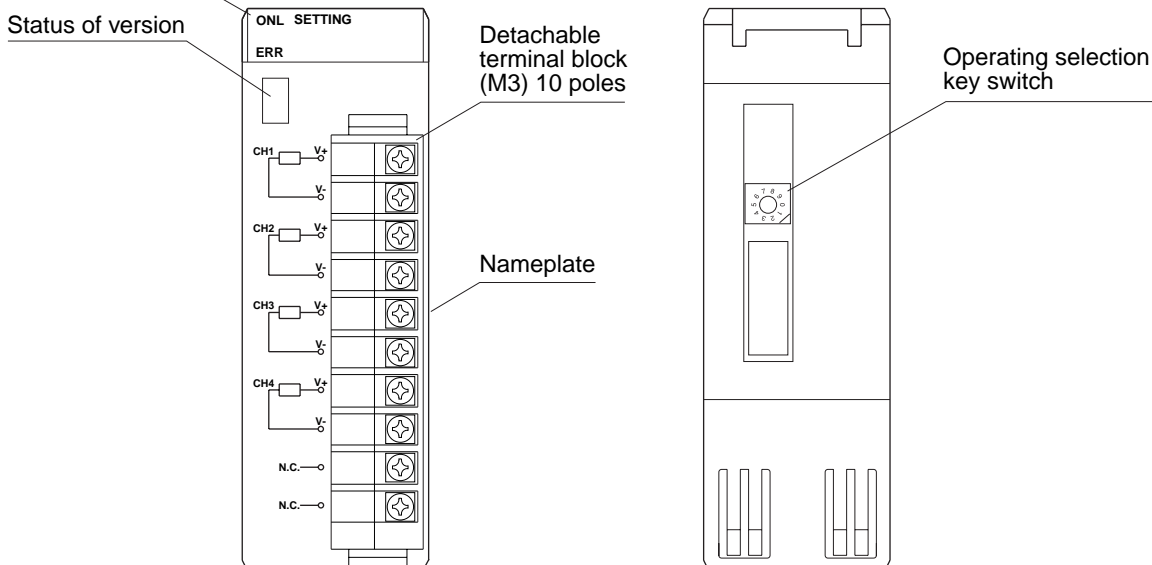* For more information about this module, refer to the "User's Manual Multi Range Analog I/O Module" (FEH216).

<Names>

(8) Between channels insulated analog voltage output 4ch (NP1AYH4VG-MR)

Item		Specification
Type		NP1AYH4VG-MR
No. of output channels		4 channels
External load resistance		When 0 to 5V, 1 to 5V: 500Ω or more When 0 to 10V, -10 to 10V: 1 kΩ or more
Conversion characteristics		<table><tr><td>Digital input value</td><td>Analog output range (V)</td></tr><tr><td>-16000 to 16000 or 0 to 16000</td><td>-10 to 10, 1 to 5, 0 to 5, 0 to 10</td></tr></table>
Resolution		15 bits
Reference accuracy (For full scale)		± 0.1% or less (at 18 to 28° C)
Digital input format		INT type (integer)
Output delay time		0.6ms or less + Takt time (ms)
Wire connections	External wire connections	Detachable screw terminal block (M3) 10 poles
	Applicable wire size	AWG#22-18 (Shielding twist pair wire (the wick line is a stranded wire.))
Status indication		ONL: normal (Green LED), ERR: abnormal (Red LED), SETTING: light or blink on Gain/Offset setting (Green LED)
Isolation method		Between external terminal and internal logic: Photocoupler/transducer Between channels: Transducer
Dielectric strength		1000V AC 1 minute
Internal current consumption		24V DC 200mA or less (when all channels are used)
Occupied words		8 words (Input: 4 words, Output: 4 words)
Mass		Approx. 300g

* For more information about this module, refer to the "User's Manual Between Channels Insulated Multi-range Analog Module" (FEH189).

<Names>

(9) Between channels insulated analog current output 4ch (NP1AYH4IG-MR)

Item	Specification	
Type	NP1AYH4IG-MR	
No. of output channels	4 channels	
External load resistance	600Ω or less	
Conversion characteristics	Digital input value	Analog output range (mA)
	0 to 16000	0 to 20, 4 to 20
Resolution	15 bits	
Reference accuracy (For full scale)	± 0.1% or less (at 18 to 28° C)	
Digital input format	INT type (integer)	
Output delay time	0.6ms or less + Takt time (ms)	
Wire connections — External wire connections	Detachable screw terminal block (M3) 10 poles	
Wire connections — Applicable wire size	AWG#22-18 (Shielding twist pair wire (the wick line is a stranded wire.))	
Status indication	ONL: normal (Green LED), ERR: abnormal (Red LED), SETTING: light or blink on Gain/Offset setting (Green LED)	
Isolation method	Between external terminal and internal logic: Photocoupler/transducer Between channels: Transducer	
Dielectric strength	1000V AC 1 minute	
Insulation resistance	10MΩ or more with 500V DC megger (between I/O terminals and frame ground, between analog channels)	
Internal current consumption	24V DC 200mA or less (when all channels are used)	
Occupied words	8 words (Input: 4 words, Output: 4 words)	
Mass	Approx. 300g	

* For more information about this module, refer to the "User's Manual Between Channels Insulated Multi-range Analog Module" (FEH189).

<Names>

(10) High-speed analog voltage output 8ch (NP1AYH8V-MR)

Item	Specification
Type	NP1AYH8V-MR
No. of output channels	8 channels
External load resistance	When 0 to 5V, 1 to 5V: 500Ω or more When 0 to 10V, -10 to 10V: 1 kΩ or more
Conversion characteristics	<table><tr><td>Digital input value</td><td>Analog output range (V)</td></tr><tr><td>-8000 to 8000 or 0 to 16000</td><td>-10 to 10, 1 to 5, 0 to 5, 0 to 10</td></tr></table>
Resolution	14 bits (1.25mV)
Overall accuracy (For full scale)	± 0.1% or less (at 18 to 28° C), ±0.2% or less (0 to 55° C) When 1 to 5V range: ±0.3% (0 to 55° C)
Digital input format	INT type (integer)
Output delay time	2.0ms or less /8 points + Takt time
Wire connections — External wire connections	Detachable screw terminal block (M3) 20 poles
Wire connections — Applicable wire size	AWG#22-18 (Shielding twist pair wire (the wick line is a stranded wire.))
Status indication	ONL: normal (Green LED), ERR: abnormal (Red LED), SETTING: light or blink on Gain/Offset setting (Green LED)
Isolation method	Photocoupler, not isolated between channels
Dielectric strength	500V AC 1 minute (between I/O terminals and frame ground) (Short cut current: 5mA)
Insulation resistance	10MΩ or more with 500V DC megger (between I/O terminals and frame ground)
Internal current consumption	24V DC 240mA or less (when all channels are used)
Occupied words	12 words (Input: 4 words, Output: 8 words)
Mass	Approx. 240g

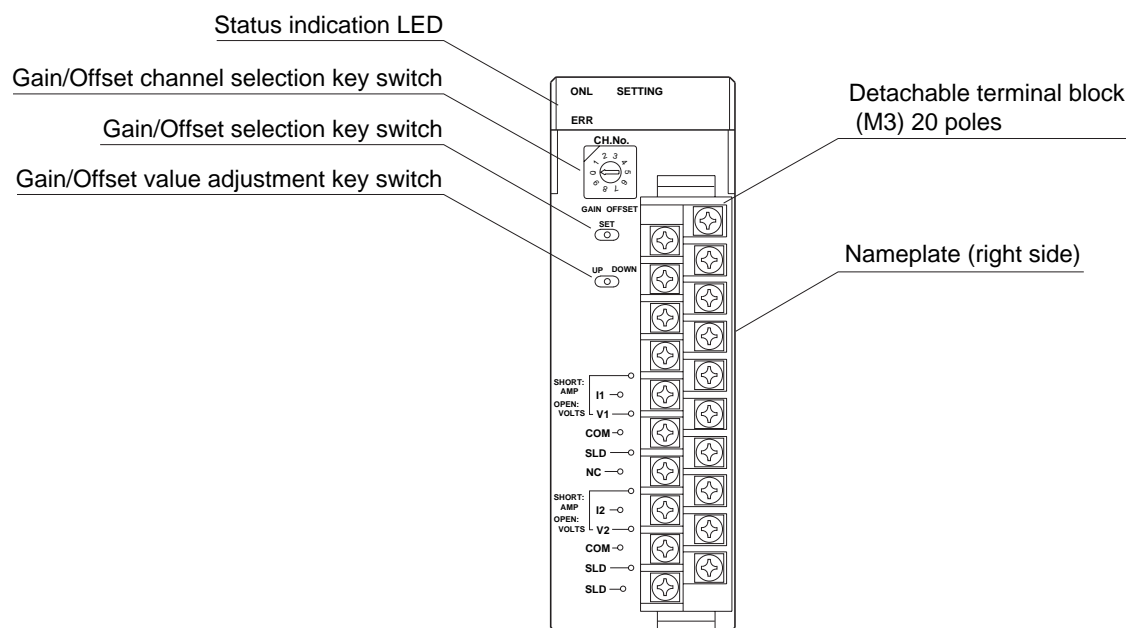* For more information about this module, refer to the "User's Manual 8ch Multi Range Analog I/O Module" (FEH206).

<Names>

(11) High-speed analog current output 8ch (NP1AYH8I-MR)

Item		Specification
Type		NP1AYH8I-MR
No. of output channels		8 channels
External load resistance		600Ω or less
Conversion characteristics		Digital input value / Analog output range (mA)
		0 to 16000 / 0 to 20, 4 to 20
Resolution		14 bits (2.5μA)
Overall accuracy (For full scale)		± 0.1% or less (at 18 to 28° C), ±0.4% or less (0 to 55° C)
Digital input format		INT type (integer)
Output delay time		2.0ms or less /8 points + Takt time
Wire connections	External wire connections	Detachable screw terminal block (M3) 20 poles
	Applicable wire size	AWG#22-18 (Shielding twist pair wire (the wick line is a stranded wire.))
Status indication		ONL: normal (Green LED), ERR: abnormal (Red LED), SETTING: light or blink on Gain/Offset setting (Green LED)
Isolation method		Photocoupler, not isolated between channels
Dielectric strength		500V AC 1 minute (between I/O terminals and frame ground) (Short cut current: 5mA)
Insulation resistance		10MΩ or more with 500V DC megger (between I/O terminals and frame ground)
Internal current consumption		24V DC 300mA or less (when all channels are used)
Occupied words		12 words (Input: 4 words, Output: 8 words)
Mass		Approx. 240g

* For more information about this module, refer to the "User's Manual 8ch Multi Range Analog I/O Module" (FEH206).

<Names>

(12) High-speed analog output (NP1AYH2-MR)

Item	Specification
Type	NP1AYH2-MR
No. of output channels	2 channels
External load resistance	Voltage output: 1 kΩ or more, Current output: 600Ω or less
Conversion characteristics	<table><tr><td>Output</td><td>Digital input value</td><td>Analog output range</td></tr><tr><td>Voltage (V)</td><td rowspan="2">-8000 to 8000 or 0 to 16000</td><td>-10 to 10, -5 to 5, 1 to 5, 0 to 5, 0 to 10</td></tr><tr><td>Current (mA)</td><td>0 to 20, 4 to 20</td></tr></table>
Resolution	14 bits
Overall accuracy (For full scale)	± 0.1% or less (at 25° C), ±1.0% or less (0 to 55° C)
Digital input format	INT type (integer)
Output delay time	1 ms + Takt time
Wire connections — External wire connections	Detachable screw terminal block (M3) 20 poles
Wire connections — Applicable wire size	AWG#22-18 (Shielding twist pair wire (the wick line is a stranded wire.))
Status indication	ONL: normal (Green LED), ERR: abnormal (Red LED), SETTING: light or blink on setting (Green LED)
Isolation method	Photocoupler, not isolated between channels
Dielectric strength	500V AC 1 minute (between I/O terminals and frame ground)
Insulation resistance	10MΩ or more with 500V DC megger (between I/O terminals and frame ground)
Internal current consumption	24V DC 120mA or less (when all channels are used)
Occupied words	6 words (Input: 2 words, Output: 4 words)
Mass	Approx. 200g

* For more information about this module, refer to the "User's Manual Multi Range Analog I/O Module" (FEH207).

<Names>

- Status indication LED
- Gain/Offset channel selection key switch
- Gain/Offset selection key switch
- Gain/Offset value adjustment key switch
- Detachable terminal block (M3) 20 poles
- Nameplate (right side)

(13) High-speed analog voltage output 4ch (NP1AYH4V-MR)

Item		Specification
Type		NP1AYH4V-MR
No. of output channels		4 channels
External load resistance		When 0 to 5V, 1 to 5V: 500Ω or more When 0 to 10V, -10 to 10V: 1 kΩ or more
Conversion characteristics		<table><tr><td>Digital input value</td><td>Analog output range (V)</td></tr><tr><td>-8000 to 8000 or 0 to 16000</td><td>-10 to 10, 1 to 5, 0 to 5, 0 to 10</td></tr></table>
Resolution		14 bits
Overall accuracy (For full scale)		± 0.1% or less (at 18 to 28° C), ±0.2% or less (0 to 55° C) When 1 to 5V range: ±0.3% (0 to 55° C)
Digital input format		INT type (integer)
Output delay time		2.0ms or less /8 points + Takt time
Wire connections	External wire connections	Detachable screw terminal block (M3) 10 poles
	Applicable wire size	AWG#22-18 (Shielding twist pair wire (the wick line is a stranded wire.))
Status indication		ONL: normal (Green LED), ERR: abnormal (Red LED), SETTING: light or blink on Gain/Offset setting (Green LED)
Isolation method		Photocoupler, not isolated between channels
Dielectric strength		500V AC 1 minute (between I/O terminals and frame ground) (Short cut current: 5mA)
Insulation resistance		10MΩ or more with 500V DC megger (between I/O terminals and frame ground)
Internal current consumption		24V DC 200mA or less (when all channels are used)
Occupied words		8 words (Input: 4 words, Output: 4 words)
Mass		Approx. 240g

* For more information about this module, refer to the "User's Manual 8ch Multi Range Analog I/O Module" (FEH206).

\<Names\>

(14) High-speed analog current output 4ch (NP1AYH4I-MR)

Item		Specification
Type		NP1AYH4I-MR
No. of output channels		4 channels
External load resistance		600Ω or less
Conversion characteristics		<table><tr><td>Digital input value</td><td>Analog output range (mA)</td></tr><tr><td>0 to 16000</td><td>0 to 20, 4 to 20</td></tr></table>
Resolution		14 bits (2.5μA)
Overall accuracy (For full scale)		± 0.1% or less (at 18 to 28° C), ±0.4% or less (0 to 55° C)
Digital input format		INT type (integer)
Output delay time		2.0ms or less /8 points + Takt time
Wire connections	External wire connections	Detachable screw terminal block (M3) 10 poles
	Applicable wire size	AWG#22-18 (Shielding twist pair wire (the wick line is a stranded wire.))
Status indication		ONL: normal (Green LED), ERR: abnormal (Red LED), SETTING: light or blink on Gain/Offset setting (Green LED)
Isolation method		Photocoupler, not isolated between channels
Dielectric strength		500V AC 1 minute (between I/O terminals and frame ground) (Short cut current: 5mA)
Insulation resistance		10MΩ or more with 500V DC megger (between I/O terminals and frame ground)
Internal current consumption		24V DC 200mA or less (when all channels are used)
Occupied words		8 words (Input: 4 words, Output: 4 words)
Mass		Approx. 240g

* For more information about this module, refer to the "User's Manual 8ch Multi Range Analog I/O Module" (FEH206).

<Names>

(15) Standard analog output (NP1AY02-MR)

Item	Specification
Type	NP1AY02-MR
No. of output channels	2 channels
External load resistance	Voltage output: 1 kΩ or more, Current output: 600Ω or less
Conversion characteristics	<table><tr><td>Output</td><td>Digital input value</td><td>Analog output range</td></tr><tr><td>Voltage (V)</td><td>-500 to 500 or</td><td>-10 to 10, -5 to 5, 1 to 5, 0 to 5, 0 to 10</td></tr><tr><td>Current (mA)</td><td>0 to 1000</td><td>0 to 20, 4 to 20</td></tr></table>
Resolution	10 bits
Overall accuracy (For full scale)	± 0.5% or less (at 25° C), ±1.0% or less (0 to 55° C)
Digital input format	INT type (integer)
Output delay time	2ms + Takt time
Wire connections — External wire connections	Detachable screw terminal block (M3) 20 poles
Wire connections — Applicable wire size	AWG#22-18 (Shielding twist pair wire (the wick line is a stranded wire.))
Status indication	ONL: normal (Green LED), ERR: abnormal (Red LED), SETTING: light or blink on setting (Green LED)
Isolation method	Photocoupler, not isolated between channels
Dielectric strength	500V AC 1 minute (between I/O terminals and frame ground)
Insulation resistance	10MΩ or more with 500V DC megger (between I/O terminals and frame ground)
Internal current consumption	24V DC 120mA or less (when all channels are used)
Occupied words	6 words (Input: 2 words, Output: 4 words)
Mass	Approx. 200g

* For more information about this module, refer to the "User's Manual Multi Range Analog I/O Module" (FEH207).

<Names>

Status indication LED

Gain/Offset channel selection key switch

Gain/Offset selection key switch

Gain/Offset value adjustment key switch

Detachable terminal block (M3) 20 poles

Nameplate (right side)

(16) 6 Channel high-accuracy resistance thermometer element input (NP1AXH6G-PT)

Item		Specifications
Type		NP1AXH6G-PT
No. of input channels		6 channels
Applicable resistance thermometer element		Platinum resistance thermometer element (Pt100, JPt100)
Reference accuracy (For full scale)		More than large of ± 0.05% or ± 0.07° C (Ambient temperature: 18 to 28° C)
Resistance of input wiring		20Ω or less
Sampling interval		80ms/6 channels
Input filtering time		Hardware (time constant) : 30ms Digital filter time:1 to 100s (It is possible to set every 1 second)
Wire connections	External wire connections	Detachable screw terminal block (M3) 20 poles
	Applicable wire size	AWG#22-18 (Shielding twist pair wire (the wick line is a stranded wire.))
Status indication		ONL: normal (Green LED), ERR: abnormal (Red LED)
Isolation method		Between external terminal and internal logic: Photocoupler/transducer Between channels: Transducer
Dielectric strength		1000V AC 1 minute (between external I/O terminals and frame ground)
Insulation resistance		10MΩ or more with 500V DC megger
Internal current consumption		24V DC 150mA or less
Occupied words		12 words (Input: 8 words, Output: 4 words)
Mass		Approx. 300g

* For more information about this module, refer to the "User's Manual Resistance Thermometer Element Input Module" (FEH208).

<Names>

Status indication LED

Status of version

Detachable terminal block

Nameplate

Resistance thermometer element type selection switch

ONL

ERR

x10 x1
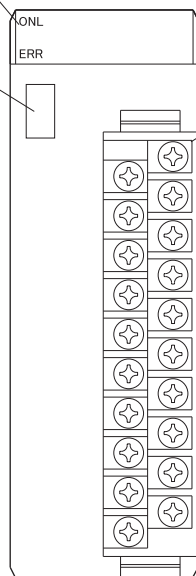
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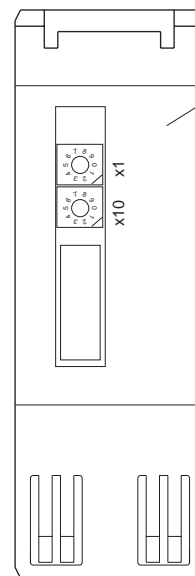
Rear

(17) Resistance thermometer element input (NP1AXH4-PT)

Item		Specifications
Type		NP1AXH4-PT
No. of input channels		4 channels
Applicable resistance thermometer element		Platinum resistance thermometer element (Pt100, JPt100)
Accuracy (To the full scale)		±0.3, ±1Digit (Ambient temperature: 18 to 28° C) ±0.7, ±1Digit (Ambient temperature: 0 to 55° C)
Resistance of input wiring		10Ω or less
Sampling interval		500ms/4channels
Input filtering time		Hardware (time constant) : 50ms Digital filter time:1 to 100s (It is possible to set every 1 second)
Wire connections	External wire connections	Detachable screw terminal block (M3) 20 poles
	Applicable wire size	AWG#22-18 (Shielding twist pair wire (the wick line is a stranded wire.))
Status indication		ONL: normal (Green LED), ERR: abnormal (Red LED)
Isolation method		Photocoupler
Dielectric strength		500V AC 1 minute (between I/O terminals and frame ground)
Insulation resistance		10MΩ or more with 500V DC megger
Internal current consumption		24V DC 150mA or less
Occupied words		16 words (Input: 8 words, Output: 8 words)
Mass		Approx. 240g

* For more information about this module, refer to the "User's Manual Resistance Thermometer Element Input Module" (FEH208).

<Names>

Front   Rear

(18) 8 Channel high-accuracy Thermocouple input (NP1AXH8G-TC)

Item		Specifications
Type		NP1AXH8G-TC
No. of input channels		8 channels
Applicable resistance Thermo-couple element		JIS Standard: R, K, J, S, B, E, T, N ASTN Standard: W5Re, W26Re, PL II DIN Standard: U, L
Reference junction compensation accuracy		±1° C (Ambient temperature: 118 to 28° C)
Reference accuracy (To the full scale)		± 0.05% or less (at 18 to 28° C)
Resistance of input wiring (per 1 wire)		100Ω or less
Sampling interval		80ms/8 channels
Input filtering time		Hardware (time constant) : 30ms Digital filtering time:1 to 100s (It is possible to set every 1 second)
Wire connections	External wire connections	Detachable screw terminal block (M3) 20 poles
	Applicable wire size	AWG#22-18 (Shielding compensation wire (the wick line is a stranded wire.))
Status indication		ONL: normal (Green LED), ERR: abnormal (Red LED)
Isolation method		Between external terminal and internal logic: Photocoupler/transducer Between channels: Transducer
Dielectric strength		1000V AC 1 minute (between external I/O terminals and frame ground)
Insulation resistance		10MΩ or more with 500V DC megger
Internal current consumption		24V DC 150mA or less
Occupied words		12 words (Input: 8 words, Output: 4 words)
Mass		Approx. 300g

* For more information about this module, refer to the "User's Manual Thermo-couple Input Module" (FEH209).

<Names>

Front

Rear side

Note:
Do not remove the cold junction compensator.
Do not change to other sensor as doing so may result in incorrect measurement.

(19) Thermocouple input (NP1AXH4-TC)

Item		Specifications
Type		NP1AXH4-TC
No. of input channels		4 channels
Applicable resistance Thermo-couple element		JIS Standard: R, K, J, S, B, E, T, N ASTN Standard: W5Re, W26Re, PL II DIN Standard: U, L
Reference junction compensation accuracy		±1° C (Ambient temperature: 118 to 28° C)
Accuracy (To the full scale)		±0.3% (Ambient temperature: 18 to 28° C) ±0.7% (Ambient temperature: 0 to 55° C)
Resistance of input wiring (per 1 wire)		10Ω or less
Sampling interval		500ms/4channels
Input filtering time		Hardware (time constant) : 50ms Digital filtering time:1 to 100s (It is possible to set every 1 second)
Wire connections	External wire connections	Detachable screw terminal block (M3) 20 poles
	Applicable wire size	AWG#22-18 (Shielding compensation wire (the wick line is a stranded wire.))
Status indication		ONL: normal (Green LED), ERR: abnormal (Red LED)
Isolation method		Photocoupler, Between channel: Transformer
Dielectric strength		500V AC 1 minute (between I/O terminals and frame ground)
Insulation resistance		10MΩ or more with 500V DC megger
Internal current consumption		24V DC 150mA or less
Occupied words		16 words (Input: 8 words, Output: 8 words)
Mass		Approx. 240g

* For more information about this module, refer to the "User's Manual Thermo-couple Input Module" (FEH209).

<Names>

Status indication LED

Status of version

ONL
ERR

Detachable terminal block

Thermo-couple type selection swich

Note:
Do not remove the cold junction compensator.
Do not change to other sensor as doing so may result in incorrect measurement.

+1
N.C.
-1
SLD
+2
N.C.
-2
SLD
N.C.
N.C.
+3
N.C.
-3
SLD
+4
N.C.
-4
SLD

Nameplate

NP1 AXH4   -TC

Front

Rear side

(20) High Speed Multi-Range Analog 6 channels I/O Mixed Module (NP1AWH6-MR)

Item		Specification	
Type		NP1AWH6-MR	
Analog input	No. of input points	4	
	Analog input range	0 to 5V, 1 to 5V, 0 to 10V, -10 to 10V	0 to 20mA, 4 to 20mA, -20 to 20mA
	Input impedance	1MΩ	250Ω
	Input tolerance	± 15V	± 30mA
	Max. resolution	0.625mV	2.5μA
	Digital conversion value (INT type)	0 to 16000, -8000 to 8000	
	Sampling interval	0.25 ms x (Conversion permission channels)	
	Input filtering times	47μs or less (hardware filtering times: primary delay time constant)	
Analog output	No. of output points	2	
	Analog output range	0 to 5V, 1 to 5V, 0 to 10V, -10 to 10V	0 to 20mA, 4 to 20mA
	External load resistance	2kΩ or more	500Ω or less
	Max. resolution	0.625mV	2.5μA
	Digital conversion value (INT type)	0 to 16000, -8000 to 8000	
	Output response times	0.5 ms or less + takt time (ms)	
	Load short-circuit protection	Provided (voltage output) (See note 1.)	
Measurement accuracy		Ambient temperature 18 to 28 ° C: ± 0.1% (of full scale) Ambient temperature 0 to 55 ° C: ± 0.2% (of full scale) (See note 2.)	
External cable connections		Detachable screw terminal (M3) 10 poles	
Applicable cable		Be sure to use shielded twisted pair cable.	
Processing of unused channel		Input: To basically be short-circuited (between V+ and COM) Output: To basically be opened.	
Number of occupied slots		1 slot	
Number of occupied words		Input: 4 words, Output: 4 words (fixed)	
Internal current consumption		24V DC 200mA or less	
Mass		Approx. 240g	

Note 1: Short-circuit protection for arbitrary one channel. The occurrence of short-circuit on multiple channels in an environment where ambient temperature is higher than 30˚C may have a bad influence on internal electric component of the module.

Note 2: For the range of 4 to 20 mA and 0 to 20 mA, ±0.3% (of full scale) when ambient temperature is 0 to 55˚C.

* For more detail specifications and operation about this module, refer to the "User's Manual High Speed Multi-Range Analog Module " (FEH206).

<Names>

Front

Rear side

3-6 Communication Specifications
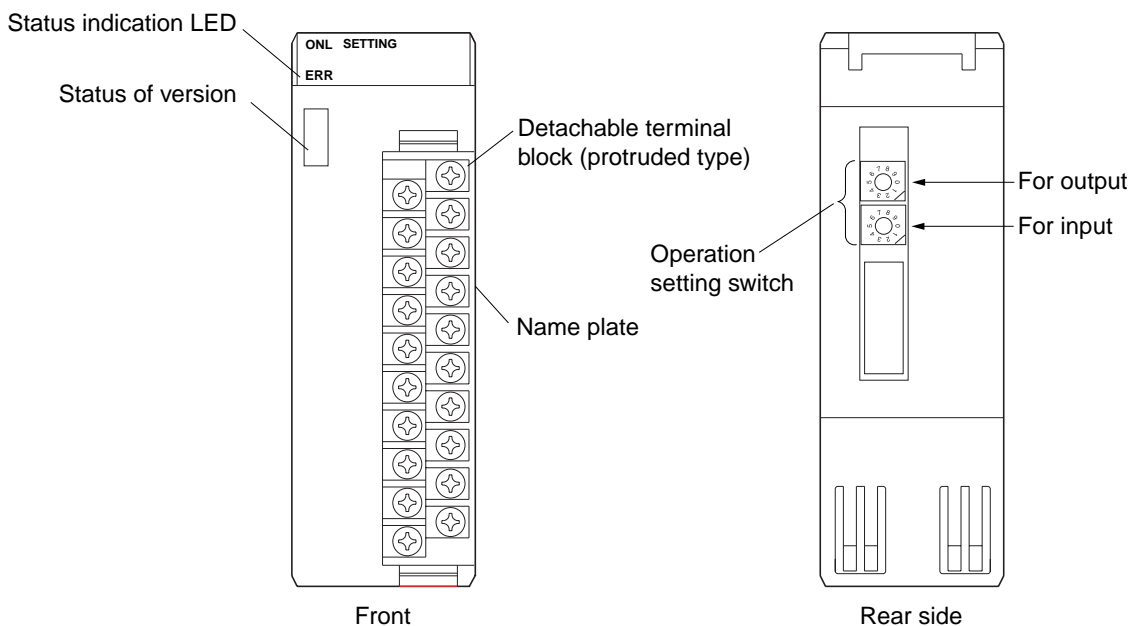
(1) General purpose communication module (NP1L-RS1)

Item	Specification	
Type	NP1L-RS1	
No. of SX bus connectable modules	Max. 16/configuration (Class B)	
Port	RS-232C 1 channel	RS-485 1 channel
Communication method	Full-duplex or half-duplex communication (selected by the software)	
Synchronization method	Start-stop synchronous transmission	
Transmission speed	1200/2400/4800/9600/19200/38400/57600 bps (Max. 57600bps or less in total of 2 channels)	
Transmission distance	15m or less	1km or less (transmission speed: 19.2kbps or less)
No. of connectable modules	1 : 1 (One external device)	1 : 31 (Max.) (The station No. of this module is limited 0 to F)
Connection method	D-sub, 9-pin connector (female)	D-sub, 9-pin connector (male)
Transmission protocol	Depends on the application program (FB) in the CPU module. Non-procedural FB (Included in D300win), FA package (Optional)	
Isolation method	Photocoupler	
Dielectric strength	445V AC 1 minute (between I/O connector pins and frame ground)	
Insulation resistance	10MΩ or more with 500V DC megger (between I/O connector pins and frame ground)	
Occupied slot	1 slot	
Internal current consumption	24V DC, 110mA or less	
Mass	Approx. 170g	

* For more information about this module, refer to the "User's Manual General Purpose Communication Module" (FEH225).

<Names>
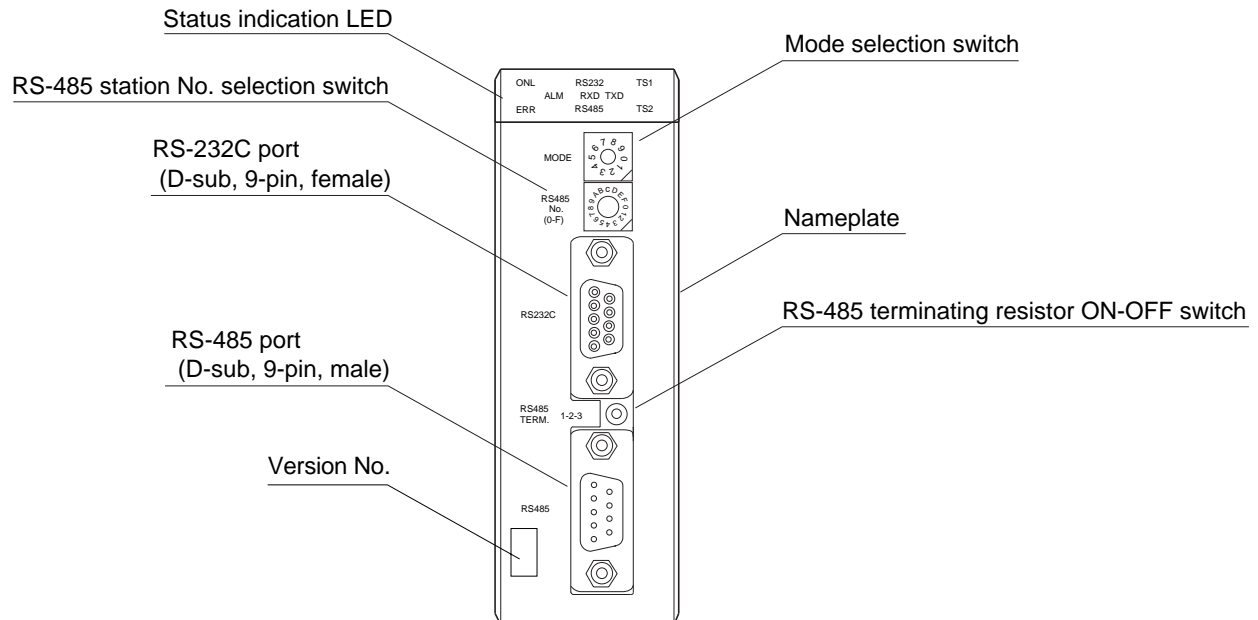
(2) General purpose communication module (NP1L-RS2)

Item	Specification
Type	NP1L-RS2
No. of SX bus connectable modules	Max. 16/configuration (Class B)
Port	RS-232C 1 channel
Communication method	Full-duplex or half-duplex communication (selected by the software)
Synchronization method	Start-stop synchronous transmission
Transmission speed	1200/2400/4800/9600/19200/38400/57600 bps
Transmission distance	15m or less
No. of connectable modules	1 : 1 (One external device)
Connection method	D-sub, 9-pin connector (female)
Transmission protocol	Depends on the application program (FB) in the CPU module. Non-procedural FB (Included in D300win), FA package (Optional)
Isolation method	Photocoupler
Dielectric strength	445V AC 1 minute (between I/O connector pins and frame ground)
Insulation resistance	10MΩ or more with 500V DC megger (between I/O connector pins and frame ground)
Occupied slot	1 slot
Internal current consumption	24V DC, 90mA or less
Mass	Approx. 160g

 * For more information about this module, refer to the "User's Manual General Purpose Communication Module" (FEH225).

\<Names\>

Status indication LED

Mode selection switch

RS-232C port
(D-sub, 9-pin, female)

Nameplate

Version No.

ONL   RS232   TS1
ALM   RXD TXD
ERR   TS2

MODE

RS232C
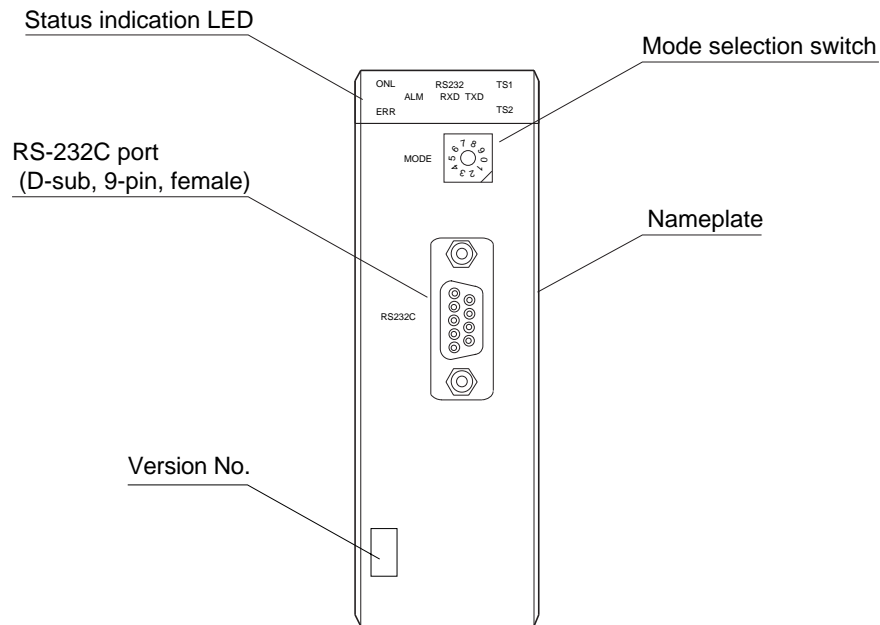
(3) General purpose communication module (NP1L-RS3)

Item	Specification
Type	NP1L-RS3
No. of SX bus connectable modules	Max. 16/configuration (Class B)
Port	RS-232C 2 channel
Communication method	Full-duplex or half-duplex communication (selected by the software)
Synchronization method	Start-stop synchronous transmission
Transmission speed	1200/2400/4800/9600/19200/38400/57600 bps
Transmission distance	15m or less
No. of connectable modules	1 : 1 (One external device)
Connection method	D-sub, 9-pin connector (female)
Transmission protocol	Depends on the application program (FB) in the CPU module. Non-procedural FB (Included in D300win), FA package (Optional)
Isolation method	Not isolated
Dielectric strength	445V AC 1 minute (between I/O connector pins and frame ground)
Insulation resistance	10MΩ or more with 500V DC megger (between I/O connector pins and frame ground)
Occupied slot	1 slot
Internal current consumption	24V DC, 110mA or less
Mass	Approx. 140g

 * For more information about this module, refer to the "User's Manual General Purpose Communication Module" (FEH225).

\<Names\>

(4) General purpose communication module (NP1L-RS4)

Item	Specification
Type	NP1L-RS4
No. of SX bus connectable modules	Max. 16/configuration (Class B)
Port	RS-485 1 channel
Communication method	Full-duplex or half-duplex communication (selected by the software)
Synchronization method	Start-stop synchronous transmission
Transmission speed	1200/2400/4800/9600/19200/38400/57600 bps
Transmission distance	1km or less (transmission speed: 19.2kbps or less)
No. of connectable modules	1 : 31 (Max.) (The station number of this module is limited 0 to F)
Connection method	D-sub, 9-pin connector (male)
Transmission protocol	Depends on the application program (FB) in the CPU module. Non-procedural FB (Included in D300win), FA package (Optional)
Isolation method	Photocoupler
Dielectric strength	445V AC 1 minute (between I/O connector pins and frame ground)
Insulation resistance	10MΩ or more with 500V DC megger (between I/O connector pins and frame ground)
Occupied slot	1 slot
Internal current consumption	24V DC, 80mA or less
Mass	Approx. 160g

* For more information about this module, refer to the "User's Manual General Purpose Communication Module" (FEH225).

<Names>

(5) General purpose communication module (NP1L-RS5)

Item	Specification
Type	NP1L-RS5
No. of SX bus connectable modules	Max. 16/configuration (Class B)
Port	RS-485 2 channels
Communication method	Full-duplex or half-duplex communication (selected by the software)
Synchronization method	Start-stop synchronous transmission
Transmission speed	1200/2400/4800/9600/19200/38400/57600 bps
Transmission distance	1km or less (transmission speed: 19.2kbps or less)
No. of connectable modules	1 : 31 (Max.) (The station number of this module is limited 0 to F)
Connection method	Detachable screw terminal block (M3) 20 poles
Transmission protocol	Depends on the application program (FB) in the CPU module. Non-procedural FB (Included in D300win), FA package (Optional)
Isolation method	Photocoupler
Dielectric strength	445V AC 1 minute (between I/O connector pins and frame ground)
Insulation resistance	10MΩ or more with 500V DC megger (between I/O connector pins and frame ground)
Occupied slot	1 slot
Internal current consumption	24V DC, 110mA or less
Mass	Approx. 190g

 * For more information about this module, refer to the "User's Manual General Purpose Communication Module" (FEH225).

<Names>
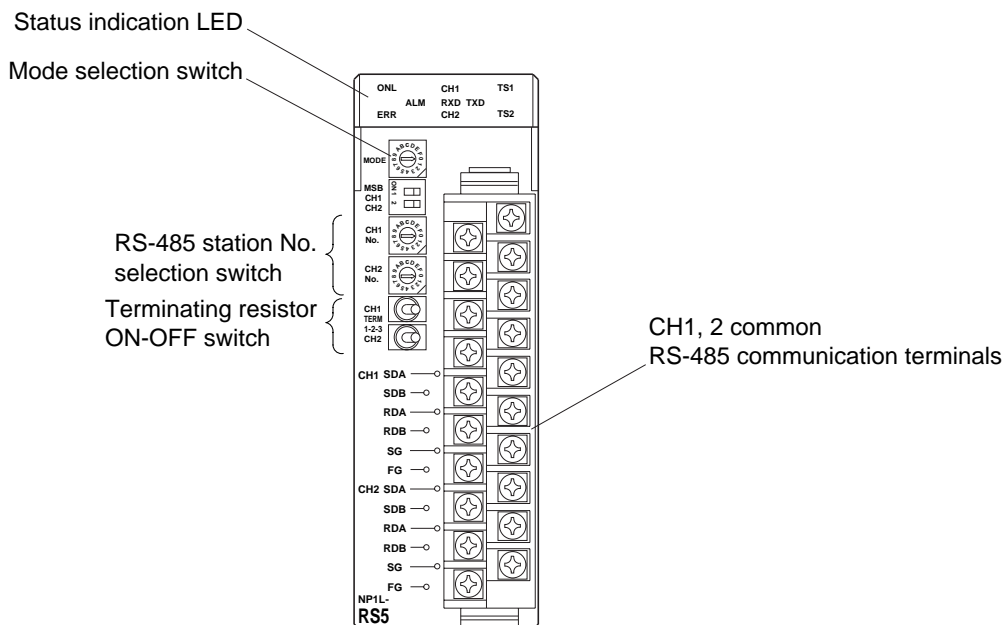
(6) P-link module (NP1L-PL1) / PE-link module (NP1L-PE1)

Item	Specification	
Type	NP1L-PL1	NP1L-PE1
No. of SX bus connectable modules	Max. 2/configuration　(Note)	
No. of P-link connectable modules	Max. 16/system	Max. 64/system
Connection method	Detachable dedicated connector (M3.5)	
Transmission line format	Bus configuration (multi-drop)	
Transmission line	Electrical transmission line: Coaxial cable　Total length: Max. 250m (P-link), Total length: Max. 500m (PE-link) Optical transmission line: SI/GI quartz cable 　　　　(Optical converter is needed for the optical transmission line)	
Transmission method	Half-duplex, serial transmission	
Data exchange method	N : N (token passing) method, memory refresh method	
Transmission speed	5Mbps	
Error check	FCS (frame check sequence), Number of data words check, Collision detection	
Data transfer	Broadcast communication, message transmission	
Isolation method	Pulse transform	
Dielectric strength	445V AC 1 minute (between connector pins and frame ground)	
Insulation resistance	10MΩ or more with 500V DC megger (between connector pins and frame ground)	
Occupied slot	1 slot	
Internal current consumption	24V DC, 160mA or less	
Mass	Approx. 235g (module), Approx. 40g (P/PE-link connector)	

Note: The total of P-link modules, PE-link modules, FL-net modules should add up to 2.

* For more information about this module, refer to the "User's Manual P/PE-Link Master Module" (FEH203).

<Names>
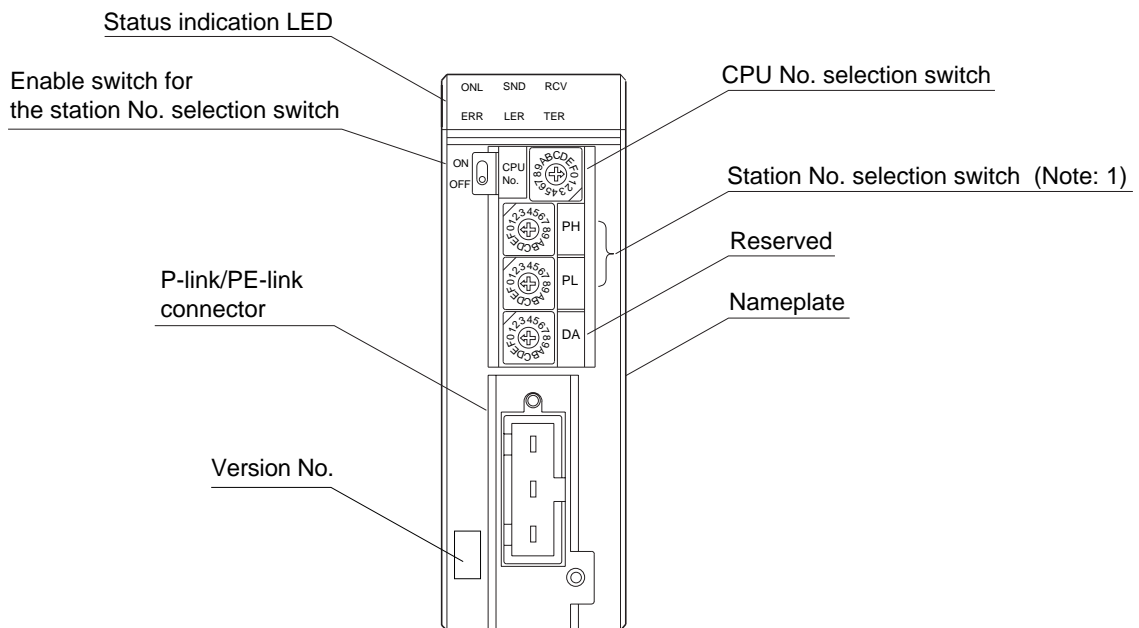
Note: 1) Only PL is used for the P-link module. (0 to F)

(7) FL-net module (NP1L-FL1 / NP1L-FL2)

Item	Specification
Type	NP1L-FL1 (based on FL-net Ver. 1), NP1L-FL2 (based on FL-net Ver. 2)
No. of SX bus connectable modules	Max. 2/configuration Note)
No. of FL-net connectable modules	100 node/segment (max. 256: at using a repeater)
Connection method	AUI connector (10BASE5) or UTP connector(10BASE-T)
Transmission line format	Bus configuration (Multi-drop)
Transmission method	Base band (Manchester coding)
Data exchange method	• Cyclic transmission system using common memory Data size: Max. 8704 words (512 words + 8192 words) • Message transmission method
Transmission speed	10Mbps
Error check	CRC (AUTODIN II)
Isolation method	Pulse transformer insulation
Dielectric strength	1500V AC 1 minute (between connector pins and frame ground)
Insulation resistance	10MΩ or more with 500V DC megger (between connector pins and frame ground)
Occupied slot	1 slot
Internal current consumption	24V DC, 105mA or less
External power supply	12V DC, 500mA or less (Necessary only to use 10BASE5)
Mass	Approx. 220g

Note: The total of P-link modules, PE-link modules, FL-net modules should add up to 2.

* For more information about this module, refer to the "User's Manual FL-net Module" (FEH234).

<Names>
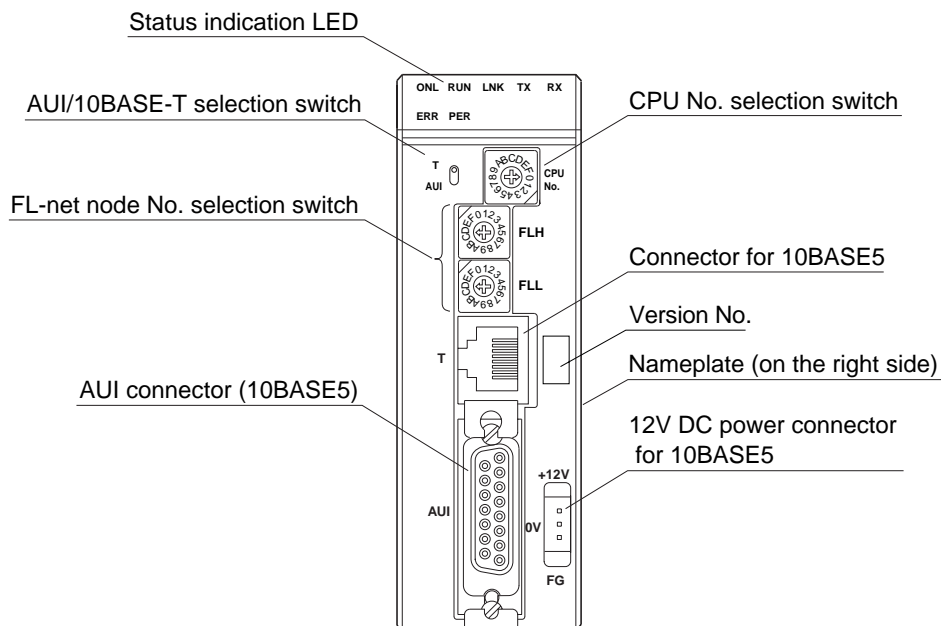
(8) FL-net module (NP1L-FL3)

Item	Specification
Type	NP1L-FL3 (based on FL-net Ver. 2)
No. of SX bus connectable modules	Max. 2/configuration Note)
No. of FL-net connectable modules	100 node/segment (max. 256: at using a repeater)
Connection method	UTP connector (10BASET), (100BASE-TX)
Transmission line format	Bus configuration (Multi-drop)
Transmission method	Base band (Manchester coding)
Data exchange method	• Cyclic transmission system using common memory Data size: Max. 8704 words (512 words + 8192 words) • Message transmission method
Transmission speed	10Mbps/100Mbps
Error check	CRC (AUTODIN II)
Isolation method	Pulse transformer insulation
Dielectric strength	1500V AC 1 minute (between connector pins and frame ground)
Insulation resistance	10MΩ or more with 500V DC megger (between connector pins and frame ground)
Occupied slot	1 slot
Internal current consumption	24V DC, 160mA or less
Mass	Approx. 220g

Note: The total of P-link modules, PE-link modules, FL-net modules should add up to 2.

* For more information about this module, refer to the "User's Manual FL-net Module" (FEH234).

<Names>

3-6 Communication Specifications

(9) T-link master module (NP1L-TL1)

This module is a remote I/O master module which constitutes one T-link system.

Item	Specification
Type	NP1L-TL1
No. of SX bus connectable modules	Max. 8/configuration (Class A) (Note)
No. of connectable T-link slaves	32/master module
Connection method	Detachable dedicated connector (M3.5)
Transmission line format	Bus configuration (multi-drop)
Transmission line	Electrical transmission line: Twisted pair cable Total length: Max. 1km Optical transmission line: SI/GI quartz cable, multicomponent cable (Optical connector FNC120/130 is needed for the optical transmission line)
Transmission method	Half-duplex, serial transmission
Data exchange method	1 : N (polling / selecting) method
Transmission speed	500kbps
Error check	FCS (frame check sequence)
No. of I/O points	Max. 2048 points (128 words)
Isolation method	Photocoupler
Dielectric strength	445V AC 1 minute (between connector pins and frame ground)
Insulation resistance	10MΩ or more with 500V DC megger (between connector pins and frame ground)
Occupied slot	1 slot
Internal current consumption	24V DC, 140mA or less
Mass	Approx. 200g (module), Approx. 40g (T-link connector)

Note: When other remote I/O master module or slave module are connected to SX bus, the number of connectable
remote I/O master modules and slave modules are 8 in total.

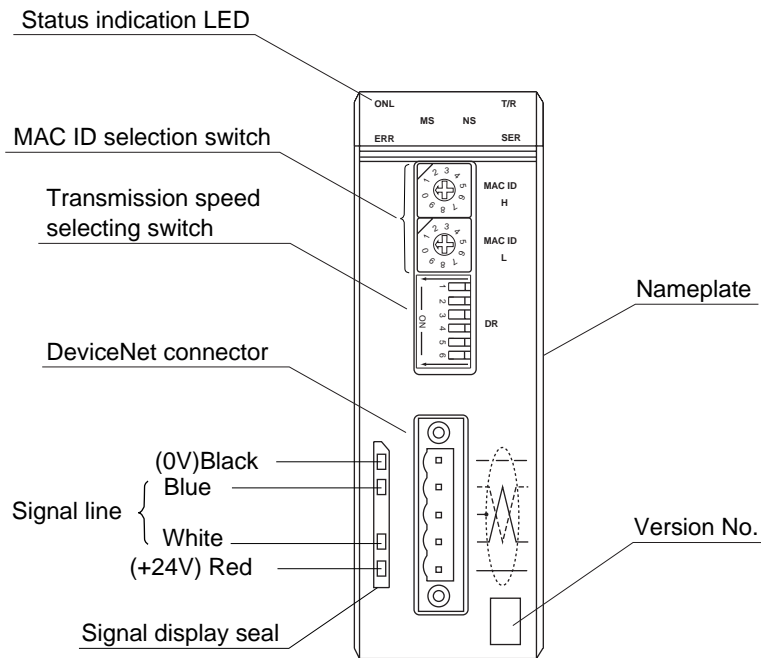* For more information about this module, refer to the "User's Manual T-Link Master Module / T-Link Interface Module /
T-Link slave Module" (FEH204).

<Names>

Status indication LED

ONL   T/R

ERR   TER   SER

T-link station No. selection switch (00)

x10

x1

Nameplate

T-link connector

Version No.

(10) T-link slave module (NP1L-TS1)

This is the communication module that is connected to a base board directly connected to SX bus to communicate I/O data between configurations of MICREX-SX series or with other PLC system having the T-link master function.

Item	Specification
Type	NP1L-TS1
No. of SX bus connectable modules	Max. 8/configuration (Class A) (Note)
Connection method	Detachable dedicated connector (M3.5)
Connectable type	MICREX-SX, MICREX-F, FLEX-PC
Communication function	I/O transmission (without message transmission function)
No. of link I/O points (input/output)	1 word/1 word, 2 words/2 words, 4 words/4 words, 8 words/8 words, 32 words/32 words
Isolation method	Photocoupler
Dielectric strength	445V AC 1 minute (between connector pins and frame ground)
Insulation resistance	10MΩ or more with 500V DC megger (between connector pins and frame ground)
Occupied slot	1 slot
Internal current consumption	24V DC, 140mA or less
Mass	Approx. 200g (module), Approx. 40g (T-link connector)

Note: When other remote I/O master module or slave module are connected to SX bus, the number of connectable remote I/O master modules and slave modules are 8 in total.

* For more information about this module, refer to the "User's Manual T-Link Master Module / T-Link Interface Module / T-Link slave Module" (FEH204).

<Names>

3-6 Communication Specifications

(11) T-link interface module (NP1L-RT1)

This interface module is used to construct SPH I/O modules via T-link.

Item	Specification
Type	NP1L-RT1
Connection method	Detachable dedicated connector (M3.5)
Usable base board	NP1BS-06 (6-slots type), NP1BS-08 (6-slots type), NP1BS-11 (11-slots type), NP1BS-13 (13-slots type), NP1BS-03 (3-slots type), NP1BS-08S (8-slots type), NP1BS-11S (11-slots type), NP1BP-13 (13-slots type), NP1BS-13S (13-slots type), NP1BP-13S (13-slots type)
Isolation method	Photocoupler
Dielectric strength	445V AC 1 minute (between connector pins and frame ground)
Insulation resistance	10MΩ or more with 500V DC megger (between connector pins and frame ground)
Occupied slot	1 slot
Internal current consumption	24V DC, 140mA or less
Mass	Approx. 200g (module), Approx. 40g (T-link connector)

 * For more information about this module, refer to the "User's Manual T-Link Master Module / T-Link Interface Module / T-Link slave Module" (FEH204).

<Names>

(12) OPCN-1 master module (NP1L-JP1)
This module is a remote I/O master module which constitutes one OPCN-1 system.

Item	Specification
Type	NP1L-JP1
No. of SX bus connectable modules	Max. 8/configuration (Class A) (Note)
No. of connectable T-link slaves	31/master module
Connection method	Detachable dedicated connector (M3.5)
Transmission line format	Bus configuration (multi-drop)
Transmission line	Electrical transmission line: Twisted pair cable, Total length depends on the baud rate.
Transmission method	Half-duplex, serial transmission, based on EIA RS-485
Transmission speed (Max. total length)	125kbps (1000m), 250kbps (800m), 500kbps (480m), 1Mbps (240m)
Encoding method	NRZI (Non Return to Zero Inverted)
Error check	FCS (frame check sequence CRC-16)
No. of I/O points	Max. 2032 points (127 words)
Isolation method	Photocoupler
Dielectric strength	445V AC 1 minute (between connector pins and frame ground)
Insulation resistance	10MΩ or more with 500V DC megger (between connector pins and frame ground)
Occupied slot	1 slot
Internal current consumption	24V DC, 130mA or less
Mass	Approx. 200g (module), Approx. 40g (JPCN-1 connector)

Note: When other remote I/O master module or slave module are connected to SX bus, the number of connectable remote I/O master modules and slave modules are 8 in total.

* For more information about this module, refer to the "User's Manual OPCN-1 Master Module / OPCN-1 Interface Module" (FEH238).

<Names>
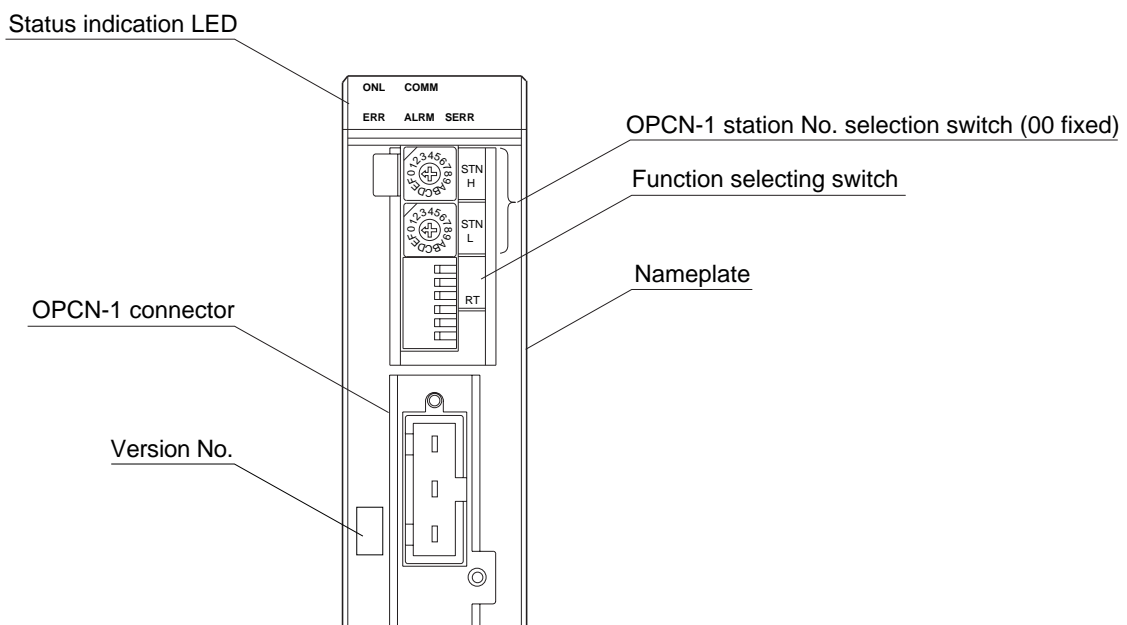
(13) OPCN-1 slave module (NP1L-JS1)

This is the communication module that is mounted on a base board directly connected to SX bus to communicate I/O data between configurations of MICREX-SX series or with other PLC system having the OPCN-1 master function.

Item	Specification
Type	NP1L-JS1
No. of SX bus connectable modules	Max. 8/configuration (Class A) (Note)
Connection method	Detachable dedicated connector (M3.5)
Connectable type	Programmable controller having the OPCN-1 master function.
Communication function	I/O transmission (without message transmission function)
No. of link I/O points	Input: 0 to 64 words, output: 0 to 64 words * The number of words occupied by I/O are 128 words (total of input/output).
Isolation method	Photocoupler
Dielectric strength	445V AC 1 minute (between connector pins and frame ground)
Insulation resistance	10MΩ or more with 500V DC megger (between connector pins and frame ground)
Occupied slot	1 slot
Internal current consumption	24V DC, 130mA or less
Mass	Approx. 200g (module), Approx. 40g (OPCN-1 connector)

Note: When other remote I/O master module or slave module are connected to SX bus, the number of connectable remote I/O master modules and slave modules are 8 in total.

* For more information about this module, refer to the "User's Manual OPCN-1 Master Module / OPCN-1 Interface Module" (FEH238).

<Names>

(14) OPCN-1 interface module (NP1L-RJ1)
This interface module is used to construct SPH I/O modules via OPCN-1.

Item	Specification
Type	NP1L-RJ1
Connection method	Detachable dedicated connector (M3.5)
Usable base board	NP1BS-06 (6-slots type), NP1BS-08 (6-slots type), NP1BS-11 (11-slots type), NP1BS-13 (13-slots type), NP1BS-03 (3-slots type), NP1BS-08S (8-slots type), NP1BS-11S (11-slots type), NP1BP-13 (13-slots type), NP1BS-13S (13-slots type), NP1BP-13S (13-slots type)
Isolation method	Photocoupler
Dielectric strength	445V AC 1 minute (between connector pins and frame ground)
Insulation resistance	10MΩ or more with 500V DC megger (between connector pins and frame ground)
Occupied slot	1 slot
Internal current consumption	24V DC, 130mA or less
Mass	Approx. 200g (module), Approx. 40g (OPCN-1 connector)

 * For more information about this module, refer to the "User's Manual OPCN-1 Master Module / OPCN-1 Interface Module" (FEH238).

<Names>
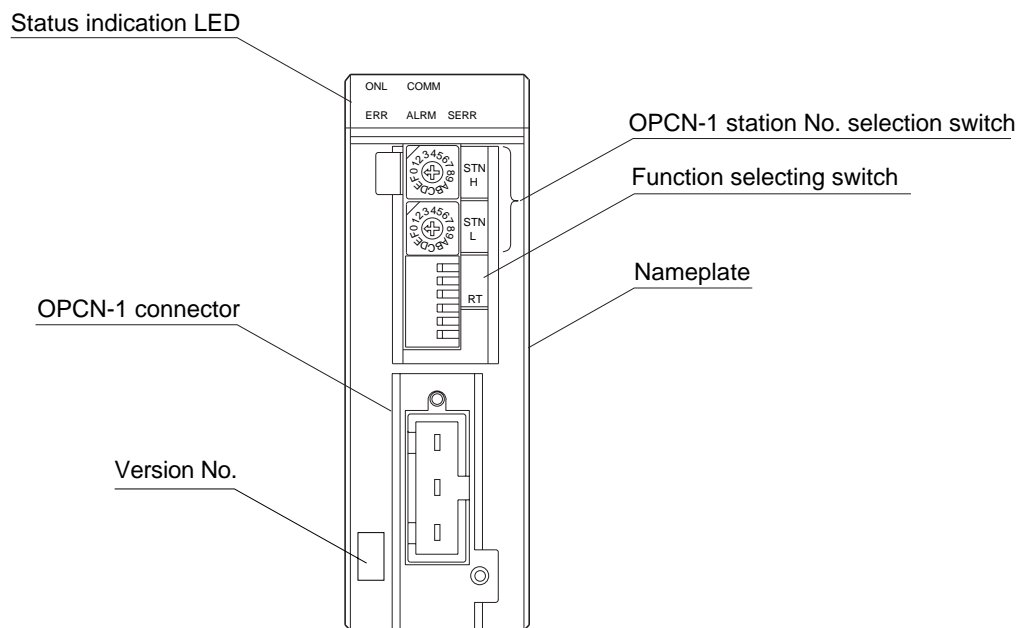
(15) DeviceNet master module (NP1L-DN1)

Item	Specification
Type	NP1L-DN1
No. of SX bus connectable modules	Max. 8/configuration (Class A) (Note)
No. of connectable slave node	Max. 63
Connection method	Screw connector (Open type)
Transmission line format	Bus configuration (Multi-drop)
Transmission line	Trunk line, Drop line
Transmission speed (Max. total legth)	125kbps (500m), 250kbps (250m), 500kbps(100m)
No. of I/O points	Max. 2032 points (127 words)
Isolation method	Photocoupler
Dielectric strength	445V AC 1 minute (between connector pins and frame ground)
Insuration resistance	10MΩ or more with 500V DC megger (between connector pins and frame)
Internal current consumption	24V DC, 90mA or less
Network current consumption	24V DC, 45mA or less
Mass	Approx. 170g

Note: When other remote I/O master module or slave module are connected to SX bus, the number of connectable remote I/O master modules and slave modules are 8 in total.

* For more information about this module, refer to the "User's Manual DeviceNet Master Module" (FEH232).

<Names>
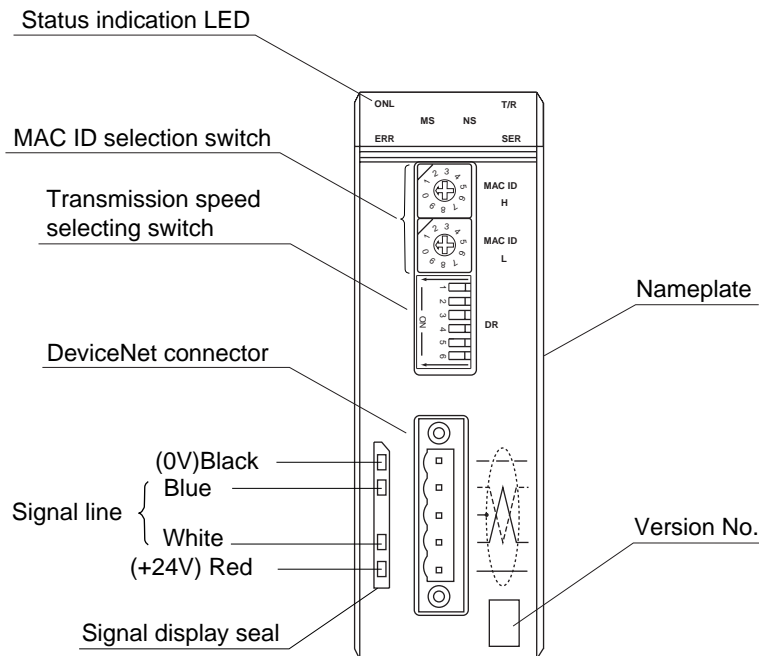
(16) DeviceNet slave module (NP1L-DS1)

Item	Specification
Type	NP1L-DS1
Connection method	Screw connector (Open type) (MSTB2.5/5-STF-5.08AU, Phoenix Co., LTD made from)
Usable base board	NP1BS-06 (6-slot type), NP1BS-08 (8-slot type), NP1BS-11 (11-slot type), NP1BS-13 (13-slot type)
Isolation method	Photocoupler
Dielectric strength	445V AC 1 minute (between connector pins and frame ground)
Insuration resistance	10MΩ or more with 500V DC megger (between connector pins and frame)
Occupied slot	1 slot
Internal current consumption	24V DC, 90mA or less
Network current consumption	24V DC, 45mA or less
Mass	Approx. 170g

<Names>

Status indication LED

MAC ID selection switch

Transmission speed selecting switch

Nameplate

DeviceNet connector

(0V)Black
Blue

Signal line
White
(+24V) Red

Version No.

Signal display seal

ONL   T/R
MS   NS
ERR   SER
MAC ID H
MAC ID L
ON   DR

(17) DeviceNet interface module (NP1L-RD1)

Item	Specification
Type	NP1L-RD1
Connection method	Screw connector (Open type) (MSTB2.5/5-STF-5.08AU, Phoenix Co., LTD made from)
Usable base board	NP1BS-06 (6-slots type), NP1BS-08 (6-slots type), NP1BS-11 (11-slots type), NP1BS-13 (13-slots type), NP1BS-03 (3-slots type), NP1BS-08S (8-slots type), NP1BS-11S (11-slots type), NP1BP-13 (13-slots type), NP1BS-13S (13-slots type), NP1BP-13S (13-slots type)
Isolation method	Photocoupler
Dielectric strength	445V AC 1 minute (between connector pins and frame ground)
Insuration resistance	10MΩ or more with 500V DC megger (between connector pins and frame)
Occupied slot	1 slot
Internal current consumption	24V DC, 90mA or less
Network current consumption	24V DC, 45mA or less
Mass	Approx. 170g

<Names>

(18) PROFIBUS-DP master module (NP1L-PD1)

This is the remote I/O master module that is connected to a base board directly connected to the SX bus to construct one PROFIBUS-DP system.

Item	Specifications
Type	NP1L-PD1
No. of SX bus connectable modules	Max. 8/configuration (Class A) (Note)
Communication function	PROFIBUS-DP master (DPM1) function
Number of connectable slave stations	Max. 32 (126 when repeater is used)
Station No. (station address) setting range	0 to 125
Transmission line format	Bus configuration (multi-drop)
Communication protocol	Conforming to EN50 170 and DIN 19245
Data interchange system	1: N (polling / selecting system)
Transmission rate	9.6k, 19.2k, 93.75k, 187.5k, 500k, 1.5M, 12M (bps) * Setting on by the configutaror
Transmission distance	Maximum transmission distance depends on transmission rate. 1200 m when 9.6, 19.2 or 93.75 kbps, 1000 m when 187.5 kbps, 400 m when 500 kbps, 200 m when 1.5 Mbps, and 100 m when 12 Mbps
Number of input / output points	Total 510 words for input and output Maximum words for input or output: 255
Isolation method	Photocoupler
Dielectric strength	500V AC 1 minute
Insulation resistance	10MΩ or more with 500V DC megger
Number of slots occupied	1
Internal current consumption	Max. 200mA, 24V DC
Mass	Approx. 250 g

Note: When other remote I/O master module or slave module are connected to SX bus, the number of connectable remote I/O master modules and slave modules are 8 in total.

* For more information about this module, refer to the "User's Manual PROFIBUS-DP Master Module" (FEH237).

<Names>
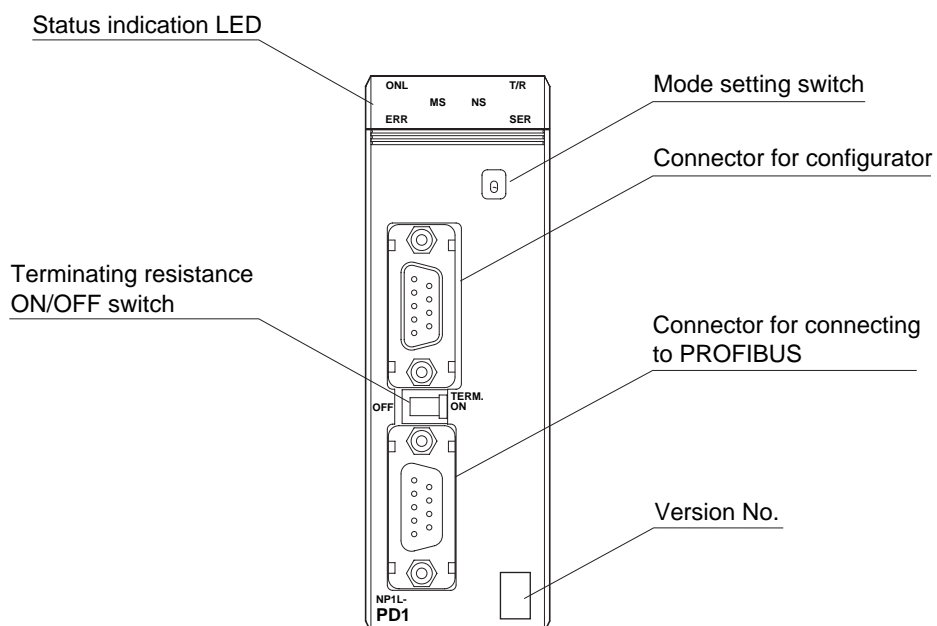
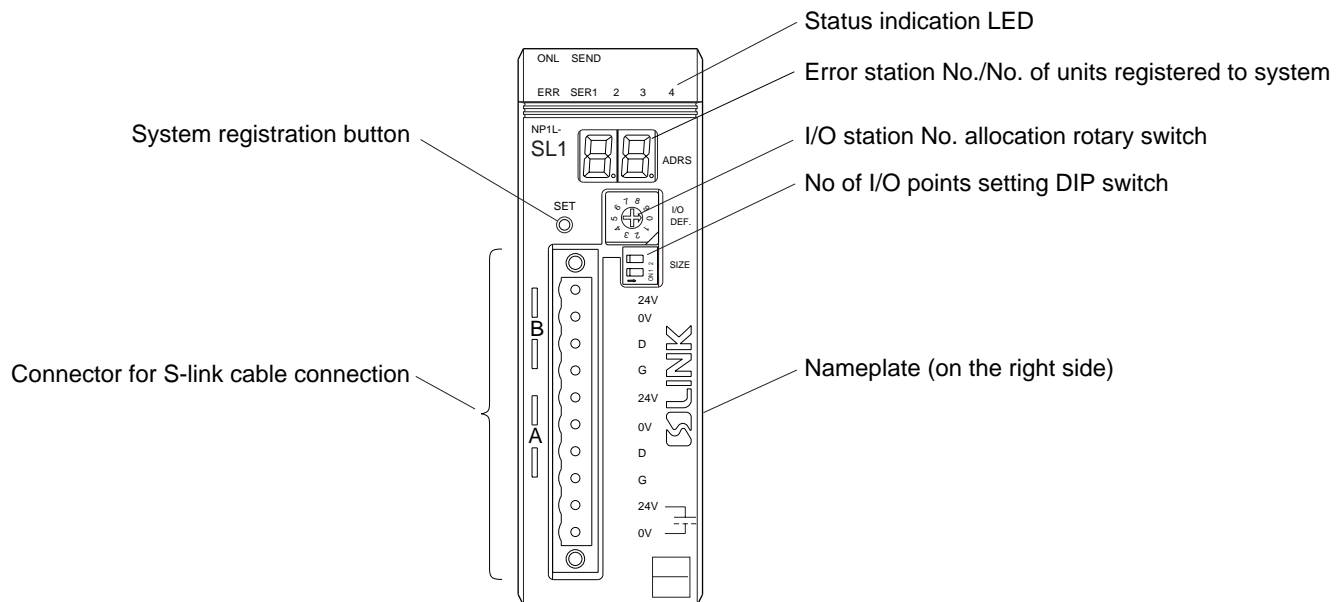**(19) PROFIBUS-DP slave module (NP1L-PS1)**

This is the communication module that is connected to a base board directly connected to the SX bus to communicate I/O data between configurations of MICREX-SX series or with other PLC system having the PROFIBUS-DP master function.

Item	Specifications
Type	NP1L-PS1
No. of SX bus connectable modules	Max. 8/configuration (Class A) (Note)
Communication function	PROFIBUS-DP slave function
GSD file	HMS_1003. GSD
Station No. (station address) setting range	0 to 99 (decimal)
Transmission line format	Bus configuration (multi-drop)
Communication protocol	Conforming to EN50 170 and DIN 19245
Data interchange system	1: N (polling / selecting) system
Transmission rate	9.6k, 19.2k, 93.75k, 187.5k, 500k, 1.5M, 3M, 6M, 12M (bps) * Setting on by the configutaror
Transmission distance	Maximum transmission distance depends on transmission rate. 1200m when 9.6, 19.2 or 93.75kbps, 1000m when 187.5kbps, 400m when 500kbps, 200m when 1.5Mbps, and 100m when 3, 6 and 12Mbps
Number of input / output points	The setting ranges are 128 words or less (total of the number of I/O words). * The ratio of the number of I/O words are free. However, set it within the following ranges. Input: 122 words. Output: 122 words. * Depends on parameter setting in system configuration definition (on the D300win loader)
Isolation method	Photocoupler
Dielectric strength	500V AC 1 minute
Insulation resistance	10MΩ or more with 500V DC megger
Number of slots occupied	1
Internal current consumption	Max. 150mA, 24V DC
Mass	Approx. 180g

Note: When other remote I/O master module or slave module are connected to SX bus, the number of connectable remote I/O master modules and slave modules are 8 in total.

* For more information about this module, refer to the "User's Manual PROFIBUS-DP Master Module" (FEH237).

<Names>
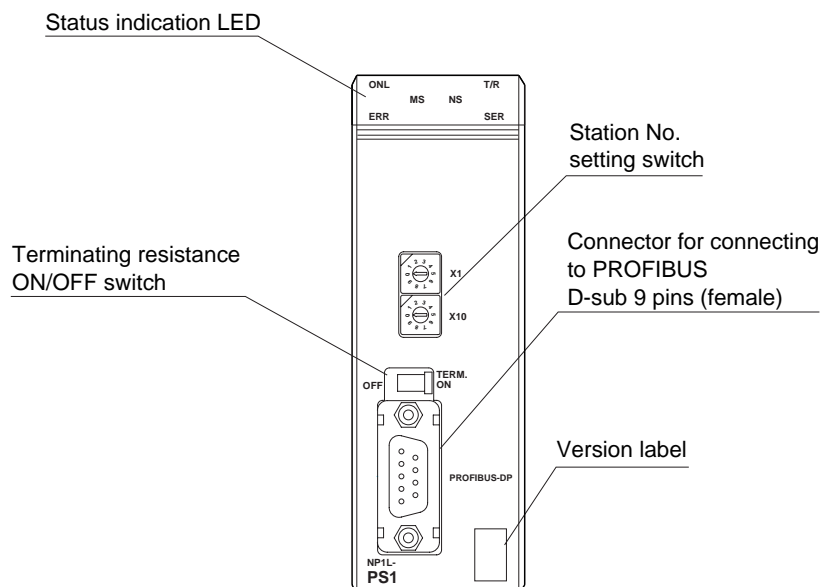
(20) Ethernet interface module (NP1L-ET1/NP1L-ET2)
This is the communication module that is connected to a base board directly connected to SX bus to communicate with other PLC system via Ethernet.

Item	Specifications		
Type	NP1L-ET1		NP1L-ET2
No. of SX bus connectable modules	Max. 4/configuration		
Communication function	General purpose communication mode, Fixed buffer communication mode, Loader command communication mode		
Interface	10BASE-T	100BASE-TX	10BASE5
Transmission speed	10Mbps	100Mbps	10Mbps
Media control	IEEE802.3	IEEE802.3u	IEEE802.3
Interface switching style	Auto-negotiation (Auto-switching)		–
Maximum segment length	100m		500m
Isolation method	Pulse transform		
Dielectric strength	500V AC 1 minute		
Insulation resistance	10MΩ or more with 500V DC megger		
Number of slots occupied	1 slot		
Internal current consumption 24V DC	150mA or less		
Mass	Approx. 140g		

 * For more information about this module, refer to the "User's Manual Ethernet Interface Module" (FEH259).

<Names>

3-6 Communication Specifications
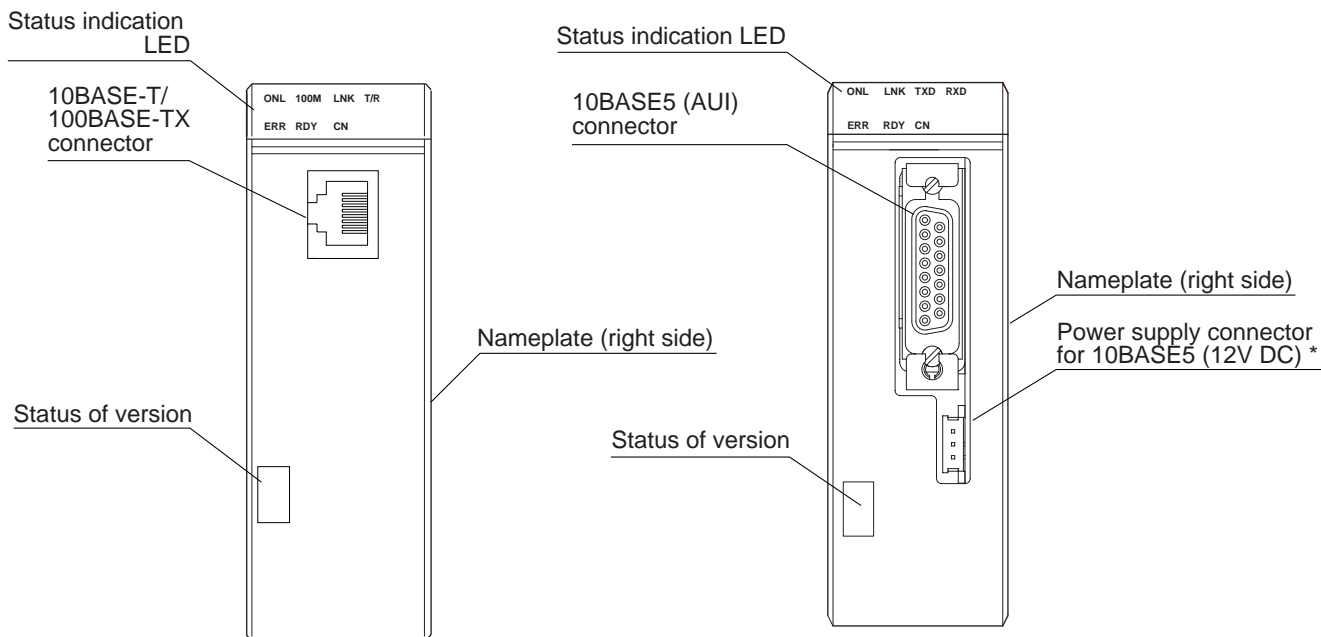
(21) ADS-net module (NP1L-AD1)

This is the communication module that is connected to a base board directly connected to SX bus to connect to an Ethernet based autonomous distributed network (ADS-net).

Item	Overview
Type	NP1L-AD1
No. of SX bus connectable modules	Max. 16/configuration (Class B)
Communication functions	• Multicast communication (function class: Base-1)　　　Note 1) • Survival signal transmission (function class: Base-2)　　Note 2) • Failure information transmission (function class: Opt-2-a)　Note 2)
Interface	10BASE-T or 10BASE5
Transmission rate	10Mbps
Maximum segment length	10BASE-T: 100m, 10BASE5: 500m (2500m max. when a repeater is used)
Maximum number of nodes	10BASE-T: 1 unit/segment, 10BASE5: 100 units/segment
Transmission protocol	UDP/IP, self-directed distributed protocol (R3.0)
Isolation method	Pulse transform
Dielectric strength	500V AC 1 minute
Insulation resistance	10MΩ or more with 500V DC megger
Number of slots occupied	1 slot
Internal current consumption	24V DC, 140mA or less
External power supply	12V DC, 500mA (when used to 10BASE5)
Mass	Approx. 220g

 * For more information about this module, refer to the "User's Manual ADS-net Module" (FEH248).

<Names>
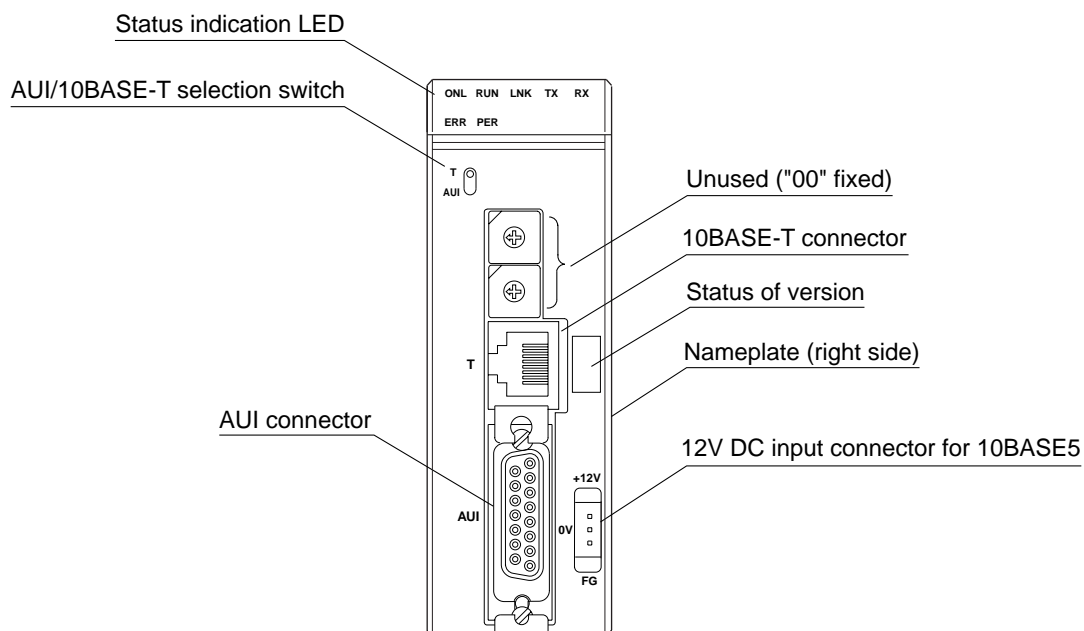
(22) WEB module (NP1L-WE1)

This is the communication module that can monitor SX data from the browser of personal computer or send mail from SX via Internet or Intranet.

Item	Specification
Type	NP1L-WE1
No. of SX bus connectable modules	Max. 4/configuration
Function	1) WEB server function
	• Setting of each function: Each function are setting on the browser display.
	• Basic setting of IP address etc., host information and FTP server etc..
	• Registration of monitoring data (SX I/O, setting of the data in the internal memory space, setting of the sampling period etc..)
	• Table data setting, trend data setting, E-mail setting etc..
	• Standard monitoring display: Table format output of controller data, trend graph indication of stored controller data, table format indication of event logging lists, and output operation of PLC can be on the table format indication display.
	2) User contents adaptation and download function: Support function for browser monitoring by user production contents.
	3) E-mail send function: Send to address by pre-setting event
	4) FTP send function: The preset periodically trend data and event log data are saved on to the external FTP sever by binary format file.
	5) Remote loader function: Remote operation of support tool of the SX (D300win software package) can be from personal computer to monitoring of sequence of PLC etc..
	6) Security function: The user and the setting operation can be limited by using the user's names and the pass words.
Isolation method	Pulse transform (The parts of the RS-232C are not Isolated)
Dielectric strength	500V AC 1 minute
Insulation resistance	10MΩ or more with 500V DC megger
Occupied slot	1 slot
Internal current consumption	24V DC, 120mA or less
Mass	Approx. 150g

* For more information about this module, refer to the "User's Manual WEB Module" (FEH258).

<Names>
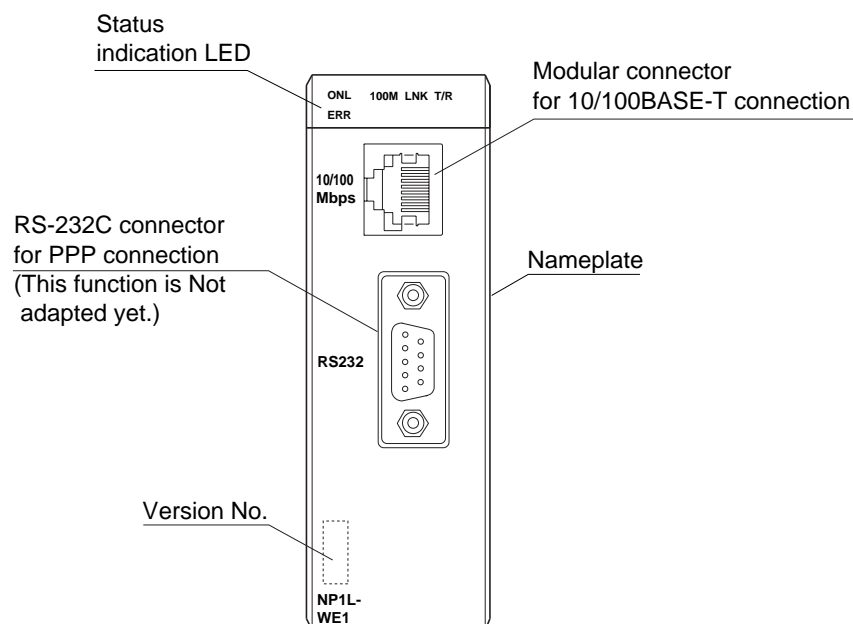
(23) LONWORKS network adaptive module (NP1L-LW1)

Item	Specification
Type	NP1L-LW1
Number of units connected	Up to 2 units for each configuration
Number of units connected to LONWORKS Network	Up to 64 units, Up to 32385 units can be added using a router.
Transmission line connection form	Free topology connection, bus connection
Transmission distance	Free topology connection: 500m, Bus connection: 2200m
Transmission rate	78kbps (This module does not support 1.25MHz.)
Transmission mode	LonTalk system (Predicted persistent CSMA system)
Maximum number of NV	300
Maximum number of CP	200
Number of words occupying I/O area	Input: Up to 64 words, Output: Up to 64 words (A total of 128 words fixed)
Isolation method	Photocoupler
Dielectric strength	500V AC 1 minute
Insulation resistance	10MΩ or more with 500V DC megger
Occupied slot	1 slot
Internal current consumption	24V DC 140mA or less
Mass	Approx. 195g (only a module), Approx. 5g (network connector)

 * For more information about this module, refer to the "User's Manual " (FEH229).

<Names>
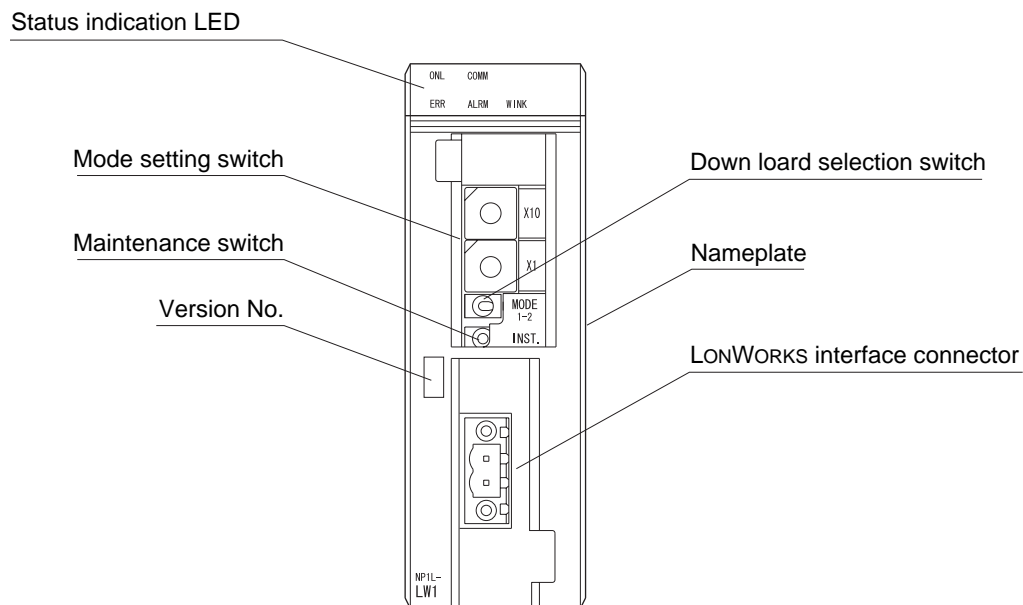
(24) AS-i master module (NP1L-AS1/NP1L-AS2)
This module is a master module which constitutes one AS-i system.

Item	Specification	
Type	NP1L-AS1	NP1L-AS2
No. of SX bus connectable modules	Max. 19/configuration	Max. 12/configuration
No. of connectable slaves	31/master module	62/master module
Total length	100m (Max. 300m: at using a repeater)	
Applicable cable	AS-i flat cable, standard cable	
Connection method	Screw terminal block (M3.5) 3 poles	
Refresh time	Max. 5ms	Max. 10ms
Error check	FCS (frame check sequence CRC-16)	
No. of I/O points	Total points: Max. 124	Total points: Max. 434
Isolation method	Photocoupler	
Dielectric strength	445V AC 1 minute (between connector pins and frame ground)	
Insulation resistance	10MΩ or more with 500V DC megger (between connector pins and frame ground)	
Occupied words	26 words/master module	42 words/master module
Occupied slot	1 slot	
Internal current consumption	24V DC, 100mA or less	
Mass	Approx. 180g	

 * For more information about this module, refer to the "User's Manual AS-Interface Master Module" (FEH231).

<Names>

Status indication LED

ONL AUP CM
ERR APF CER

7-segment indication LED

Selection switch LED

SET
DISPLAY

Nameplate (side)

AS-i+
AS-i-
AS-i+
AS-i-
LG

As-i connector
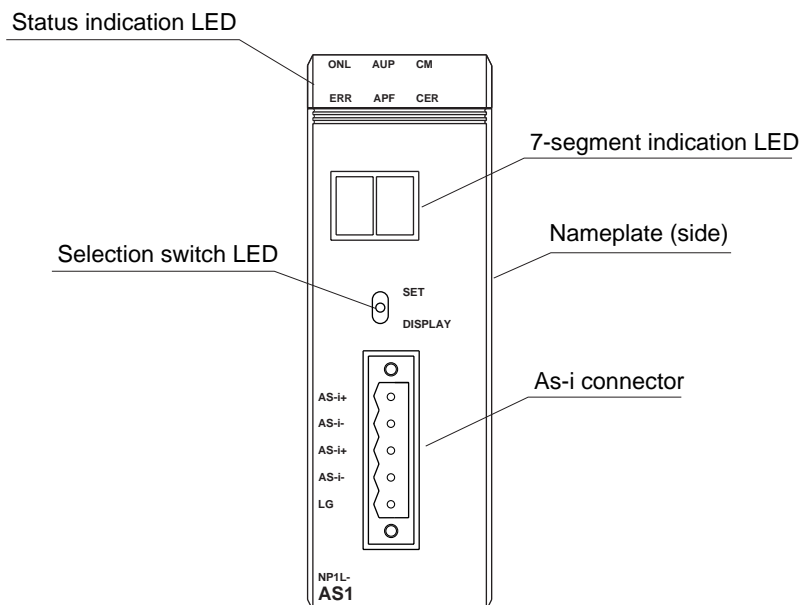
NP1L-
AS1

(25) S-LINK master module (NP1L-SL1)

This is the communication module that is connected to a base board directly connected to SX bus to construct one S-LINK system.

Item	Specification
Type	NP1L-SL1
No. of units connectable to SX bus	Max. 28 per configuration
Transmission procedure	S-LINK protocol
Transmission distance	Total length 200m (400m when booster is used)
No. of I/O points	Max. 128
Isolation characteristics	S-LINK master module is functionally insulated and therefore must not be subjected to withstand voltage test.
No. of occupied slots	1
Current consumption of module inside	24V DC, 80mA or less
Mass	Approx. 200g

* For more information about this module, refer to the "User's Manual S-LINK Master Module" (FEH230).

\<Names\>

Status indication LED

Error station No./No. of units registered to system

System registration button

I/O station No. allocation rotary switch

No of I/O points setting DIP switch

Connector for S-link cable connection

Nameplate (on the right side)

(26) SX bus optical-link module (NP1L-OL1) / SX bus optical converter (NP2L-OE1)

Item		Spcification	
Type		NP1L-OL1	NP2L-OE1
No. of connectable modules		Max. 64/configuration (Total of NP1L-OL1 and NP2L-OE1)	
Optical fiber	Type	PCF (Polymer Clad Fiber)	
	Core/Clad diameter	200μm/230μm	
	Min. bending radius	50mm Note 1)	
	Optical connector	Type: F07	
Transmission distance		Between stations Max. 800m (Total extention distance 25.6km) Note 2)	
Permissible attenuations of quantity of light		7dB or less Note 2)	
Occupied slot		1 slot	–
Internal current consumption		24V DC 54mA or less	24V DC 70mA or less
Power supply	Terminal form	–	3-pole type M3 (Tightening torque is 0.5 to 0.7N·m)
	Rated input voltage	–	24V DC (22.8 to 26.4V DC) Note 3)
	Cable size	–	AWG#16
	Inrush current	–	165mA or less when switching power 50Ao-p-70μs:24V DC (In case of switching power in not used)
Mass		Approx. 135g	Approx. 155g

Note 1: Depending on the type of optical fiber cable, the minimum bend radius may be different from this value, which is for CCV-HG-20/08 from Sumitomo Electric Industries, Ltd.

Note 2: The transmission distance of an optical fiber cable is determined by the cable attenuation. Attenuation increases when ambient temperature drops (when used in low temperatures), when the optical fiber cable suffers from bending stress, or when the end connectors are not polished, resulting in shortened transmission distance. This value is for the condition in which the cable is used at the specified working temperature (25°C), the cable does not suffer from bending stress, and both of the end connectors are polished. Note that attenuation also increases with deterioration from aging.

[Reference]
Attenuation calculation formula for CCV-HG-20/08 from Sumitomo Electric
Industries, Ltd., and the transmission distance at the specified ambient temperature

<Calculation formula for 100 m or shorter cables>
Attenuation [dB] = 1.4 dB + Low temperature loss + Loss due to unpolished connectors
"1.4 dB" is the cable transmission loss for 100 m or shorter cables.
For low-temperature loss, use a value in the "100 m cable" column of the following table.

<Calculation formula for 100 m or longer cables>
Attenuation [dB] = (8 - 6 x log (cable length)) x Cable length + Low - temperature loss + Loss due to unpolished connectors
Unit for cable length is "km".
* The loss due to unpolished connectors is 0.75 dB for each unpolished connector, namely 1.5 dB when neither of the two end connectors is polished.

<Low-temperature loss for CCV-HG-20/08>

Temperature [° C]	Loss[dB]	
	1km cable	100m cable
25	0	0
10	0.40	0.25
0	0.80	0.35
-5	1.05	0.6
-10	1.30	0.8
-15	1.55	1.03
-20	1.80	1.25

<Relation between ambient temperature and transmission distance of CCV-HG-20/08>

Ambient temperature[°C]	Both end connectors are polished	Neither end connector is polished
25	800m	500m
20	800m	500m
15	700m	500m
10	700m	500m
5	700m	500m
0	600m	400m
-5	600m	400m
-10	600m	400m
-15	500m	300m
-20	500m	300m

Note 3: To supply power from an external source, be sure to use a switching power supply with reinforced insulation and a capacity of 24 VDC, 1 A or more per unit. For the wiring method, refer to "4-4-5 Wiring of power supply for SX bus optical converter".

Note 4: Transmission delay time of optical link system
With an optical link system, a transmission delay occurs, which can be calculated by using the following formula. For system design, be sure to take the SX Bus contact time into consideration. Transmission delay time [μs]= (No. of optical devices) x 1μs + (Total length of optical cable (km)) x 4.97μs

<Names>

Type: NP1L-OL1   Type: NP2L-OE1

Screw size: M4
Tightning torque:1.8N•m
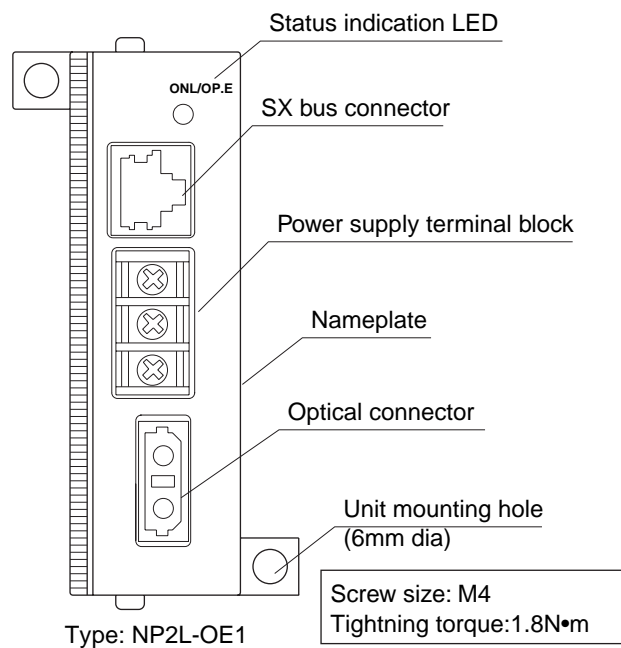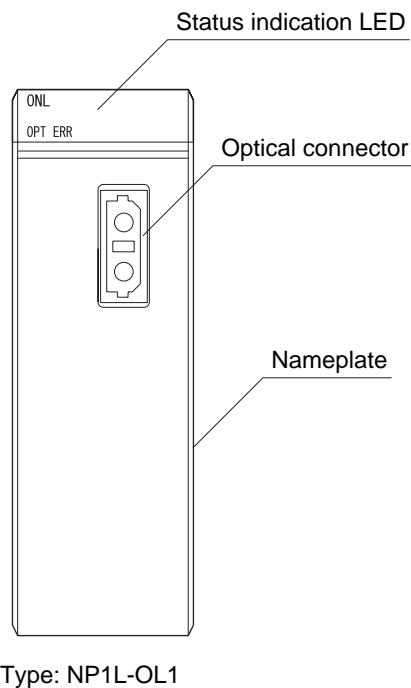
* The following are recommended
  Optical fiber: SUYMITOMO ELECTRIC INDUSTRIES, LTD CCV-HG-20/08 (Type: H-PCF)
  Optical connector: SUMITOMO ELECTRIC INSUSTRIES, LTD CF-2071
  Crimping tool: SUMITOMO ELECTRIC INDUSTRIES, LTD CAK-0057

(27) LE-net module (NP1L-LE1)

Item	Specification
Connection node quantity	Up to 64 units
Node number setting range	0 to 63
Connection distance/communication speed (Total extension)	800m/62.5kbps, 500m/125kbps, 250m/250kbps, 100m/500kbps, 40m/1Mbps
Connection method	Multi drop, bus
Communication method	Semi-duplex
Communication protocol	1) N:N broadcast communication 2) 1:1 single division message method
Remote support function	Loader network: up to 2 layers (3 hierarchical)
Transmission error check system	CRC16

Frame size (Amount of communication data)	1) Broadcast communication:
	  48 words at maximum per node (3 words x 16 stations)
	* Occupies 4 words for each station. Since the system uses one word,
	  the user can use 3 words for each station.
	2) Message communication:
	  49 words at maximum (when R_READ or R_WRITE is used)
	  61 words at maximum (when M_OPEN+M_RECEIVE or M_OPEN+M_SEND is used)

Number of communication ports which can be opened simultaneously	5 ports * Uses one port for each M_OPEN. Uses one M_OPEN for M_SEND or M_RECEIVE.
Communication cable	Shielded twist pair cable * T-link cable (T-KPEV-SB: Recommended to made by The Furukawa Electric Co., Ltd., Japan)
Isolation method	Not isolated
Occupied slot	1 slot
Internal current consumption	24V DC, 70mA or less
Mass	Body: Approx. 130g, Connector: Approx. 6g

 * For more information about this module, refer to the "User's Manual LE-net Module" (FEH198).

<Names>
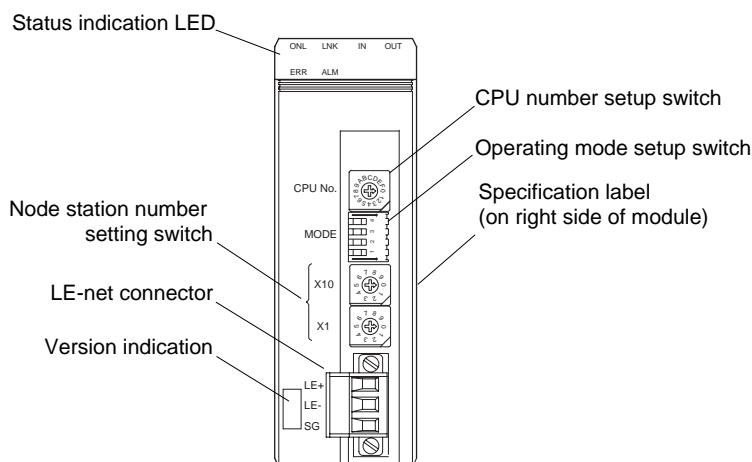
(28) LE-net loop/LE-net loop 2 module (NP1L-LL1/NP1L-LL2)

Item	Specification	
Type	NP1L-LL1	NP1L-LL2
Connection node quantity	Up to 64 units	
Node number setting range	0 to 63	
Connection distance	Total extension 500m, 100m between nodes	
Connection method	Single loop duplex wiring	
Communication method	Semi-duplex, double-system transmission and first-come first-received method	
Communication protocol	1) N: N broadcast communication 2) 1: 1 single division message method	
Remote support function	Loader network: up to 2 layers (3 hierarchical)	
Transmission error check system	CRC16	
Communication speed	Fixed to 5Mbps	
Frame size (Amount of communication data) Broadcast communication	4 words per one station (net valid data: 3 words) 48 words at maximum per node (3 words x 16 stations) * Occupies 4 words for each station. Since the system uses one word, the user can use 3 words for each station.	48 words per one station (net valid data: 48 words) 768 words at maximum per node (48 words x 16 stations)
Frame size (Amount of communication data) Message communication	1) 49 words at maximum (when R_READ or R_WRITE is used) 2) 61 words at maximum (when M_OPEN+M_RECEIVE or M_OPEN+M_SEND is used)	1) The module has no limitation on the amount of communication data. With the D300win loader, however, the maximum capacity is 4096 words because of the limitation on the derived data type. (when R_READ or R_WRITE is used) 2) 245 words at maximum (when M_OPEN+M_SEND is used)
Number of communication ports which can be opened simultaneously	5 ports * Uses one port for each M_OPEN. Uses one M_OPEN for M_SEND or M_RECEIVE.	
Communication cable	Shielded twist pair cross cable of Category 5	
Isolation method	Not isolated	
Occupied slot	1 slot	
Internal current consumption	24V DC, 80mA or less	
Mass	Approx. 140g	

* For more information about this module, refer to the "User's Manual LE-net Loop/LE-net Loop 2 Module" (FEH224).

<Names>
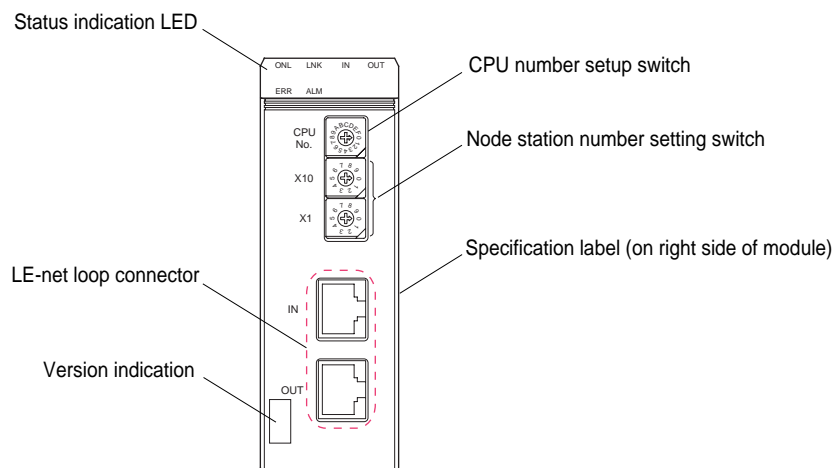
(29) SX bus electrical repeater (NP2L-RP1)

Item		Specification
Total length of SX bus		100m
Number of connectable device		Max. 3 / configuration
Number of branches		Max. 25 including base board
Internal current consumption		24V DC, 70mA or less
Power supply	Terminal type	3-poles M3 screw terminal (tightening torque: 0.5 to 0.7N•m)
	Rated input voltage	24V DC (Note 1)
	Applicable wire size	AWG#16 (1.25mm^2)
	Inrush current	165mA or less when switching power supply is used (Note 2)
Minimum radius of curvature of SX bus cable		50mm or more
Operating ambient temperature		0 to 55° C
Mass		Approx. 150g

Note 1: When a device (servo amplifier, inverter, etc.) that is connected to SX bus is used, 24V DC or higher input voltage (maximum 26.4V DC) must be applied.
When power supply is supplied from externally, the switching power supply with reinforced insulation (UL approved) that can supply 24V DC , 1A or more per unit shall be used.
Moreover, wire for this unit and the switching power supply to become 10m or less.

Note 2: The inrush current when 24V DC is directly applied is $50A_{0-P}$-70μ s (reference value). This value depends on the condition of power supply.

<Names>

Unit mounting hole (6mm dia.)

POWER

24V

NP2L-

Status indication LED

SX bus connector

Specification nameplate

Power supply terminal block
See Notes 1) and 2)

Unit mounting hole (6mm dia.)
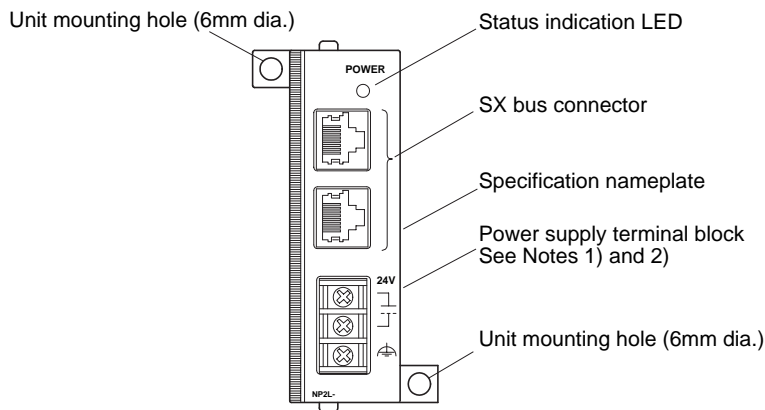
Note 1:
Mounting screw: M4
Tightening torque: 1.8N•m

(30) Remote terminal master/slave module (NP1L-RM1)
This is a remote I/O master module that, using one unit, can build one remote terminal system. It is also possible to set the DIP switch so that this module operates as a slave.

Item	Specification
No. of remote terminal link	1
No. of SX bus connectable modules	Max. 8/configuration (Categoly A) (Note)
No. of connectable remote terminals (No. of signals)	1: 1 mode: 1 slave module (1024 points) 1: N or N: N mode: RM21/22 series terminal 128 units (1024 points)
Cable type	CPEV, KPEV cable
Wire size/Total distance	ø 0.9/2.0km (at 128 remote stations) ø 1.2/3.5km (at 128 remote stations) 2mm^2/5km (at 64 remote stations)
Ouccupied slot	1 slot
Operating ambient temperature	0 to 55° C
Internal current consumption	24V DC, 140mA or less
Mass	Approx. 210g

Note: When other remote I/O master module or slave module are connected to SX bus, the number of connectable remote I/O master modules and slave modules are 8 in total.

* For more information about this module, refer to the "User's Manual Remote Terminal Master/Interface/Slave Module (FEH195).

<Names>
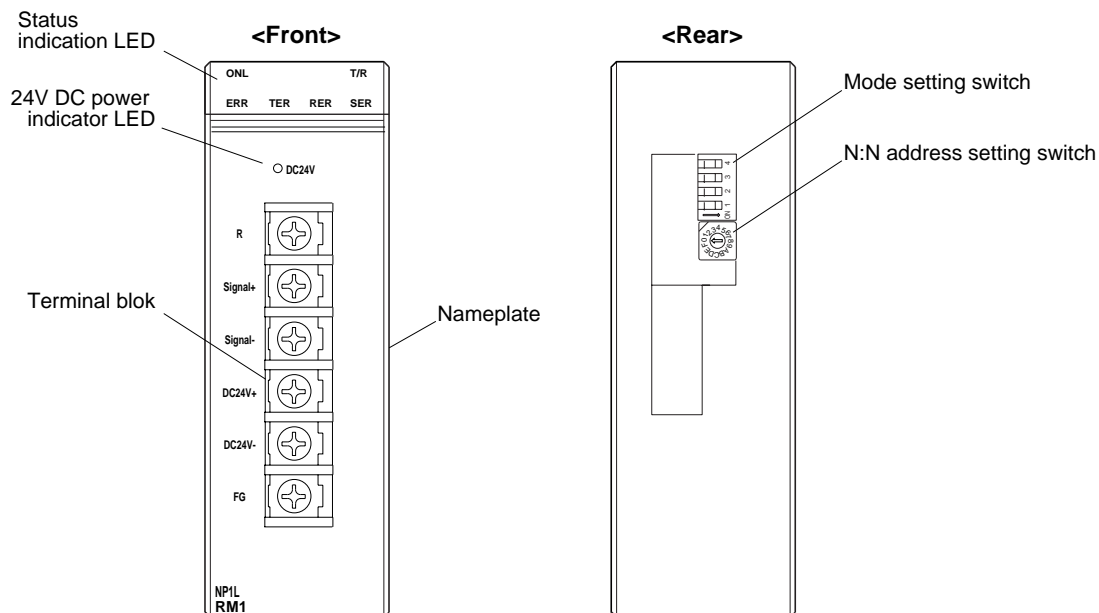
(1) High-speed counter module (NP1F-HC2/NP1F-HC2MR/NP1F-HC2MR1)

Item		Specification		
Type		NP1F-HC2	NP1F-HC2MR	NP1F-HC2MR1
Count input signal	Input phase	2-Phase signal (90° phase difference), forward/reverse signal, coded pulse etc., (Selected by the software)		
	Level	Open collector signal or differential signal, square wave (The differential signal is applied only to NP1F-HC2.)		
	Input voltage	5V DC	5V/12V/24V DC	
Counter0	Type	Ring counter function, reset function, gate function, comparison function, phase Z detection		
	No. of channels	2 channels (independent)		
	Counting speed	500kHz	200kHz	50kHz
	Counting range	-2,147,483,648 to 2,147,483,647 (DINT type)		
	Multiplication function	x4 (2-phase signal only)		
	Reset function	Soft command		
	Gate function	External input signal and soft command		
	Comparison function	Soft command		
	Phase Z detection	External input signal and soft command Selectable rising edge or falling edge for external input signal		
Comparison	No. of output points	1 point/channel		
	Comparison range	Same as the counting range		
	Comparison contents	(Counted value) ≥ (Compared value) to Output ON		
	Comparison output	Open collector output (sink type), 24V DC, Rated load: Max. 100mA		
Isolation method		Photocoupler		
Dielectric strength		1500V AC 1 minute (between I/O connector pins and frame ground)		
Insulation resistance		10MΩ or more with 500V DC megger (between I/O connector pins and frame ground)		
Occupied words		16 words		
Occupied slot		1 slot		
Internal current consumption		24V DC, 85mA or less		
External power supply		24V DC		
Mass		Approx. 140g		

 * For more information about this module, refer to the "User's Manual High-speed Counter Module" (FEH210).

<Names>

Status indication LED

ONL   CH1
        SET GAT EQL
ERR ALM   CH2

External I/O signal connector

(Note) An external connector is optional.
       For an applicable connector,
       refer to "4-4-3 Wiring".

Nameplate

Pin No. from the view of external connector pin layout

20
CH2

CH1

1
B/A
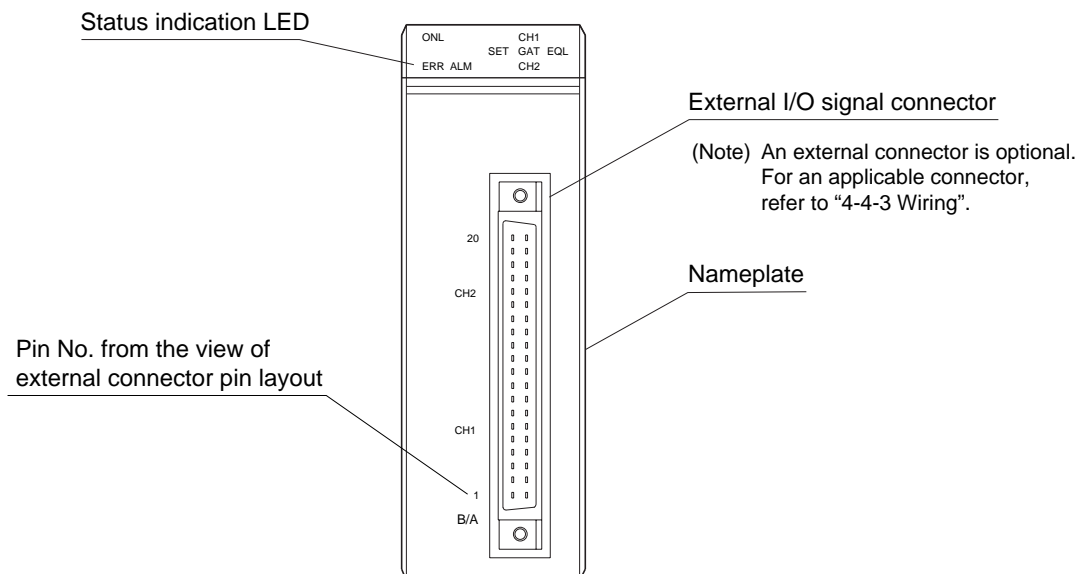
(2) Multi channel high-speed counter module (NP1F-HC8)

Item		Spcification
Type		NP1F-HC8
Count input signal	Input phase	2-phase signal (90° phase difference), forward/reverse signal, coded pulse etc., (Selected by the software)
	Level	Open collector signal or differential signal, square wave
	Input voltage	5V DC
Counter	Type	Ring counter function, reset function, gate function
	No. of cahnnels	8 channels (independent)
	Counting speed	50kHz
	Counting range	– 32768 to 32767(INT type)
	Multiplication function	x 4 (2-phase signal only)
	Reset function	Soft command
	Gate function	External input signal and soft command
Isolation method		Photocoupler
Dielectric strength		1500V AC 1 minute (between I/O connector pins and frame ground)
Insulation resistance		10MΩ or more with 500V DC megger (between I/O connector pins and frame ground)
Occupied words		12 words
Occupied slot		1 slot
Internal current consumption		24V DC, 100mA or less
External power supply		24V DC is supplied from an external power supply
Mass		Approx. 195g

 * For more information about this module, refer to the "User's Manual High-speed Counter Module" (FEH210).

<Names>

Status indication LED

ONL   CH0 CH1 CH2 CH3
ERR   CH4 CH5 CH6 CH7

External I/O signal connector

Note) An external connector is optional
For applicable connector,
refer to " 4-4-3 Wiring"

20

Nameplate

1
B/A
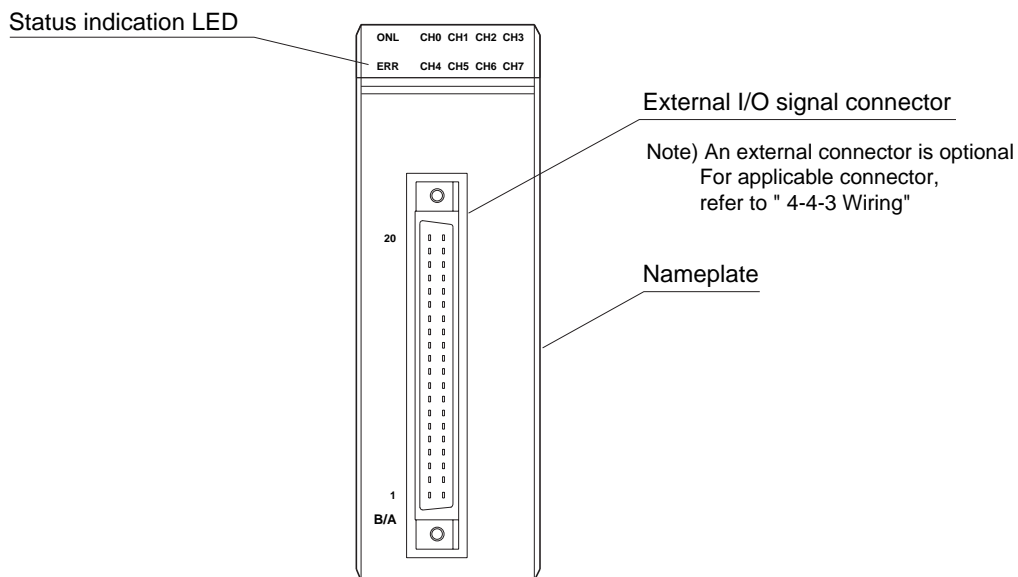
(3) Positioning control signal converter (NP2F-LEV)

Item		Specification
Type		NP2F-LEV
No. of control axes		4 axes (4 channels)
Input signal	Input frequency	Max. 1 MHz
	Input type	Open collector input
Output signal	Output frequency	Max. 1 MHz
	Output type	Differential signal
Isolation method		Not isolated (between input signal and output signal), External power supply is isolated
External power supply		24V DC, 40mA
Mass		Approx. 130g

<Names>

Unit mounting hole (6mm dia.)

Input signal connector

Status indication LED

Nameplate

Output signal connector

Unit mounting hole (6mm dia.)

PWR

OC

RS485
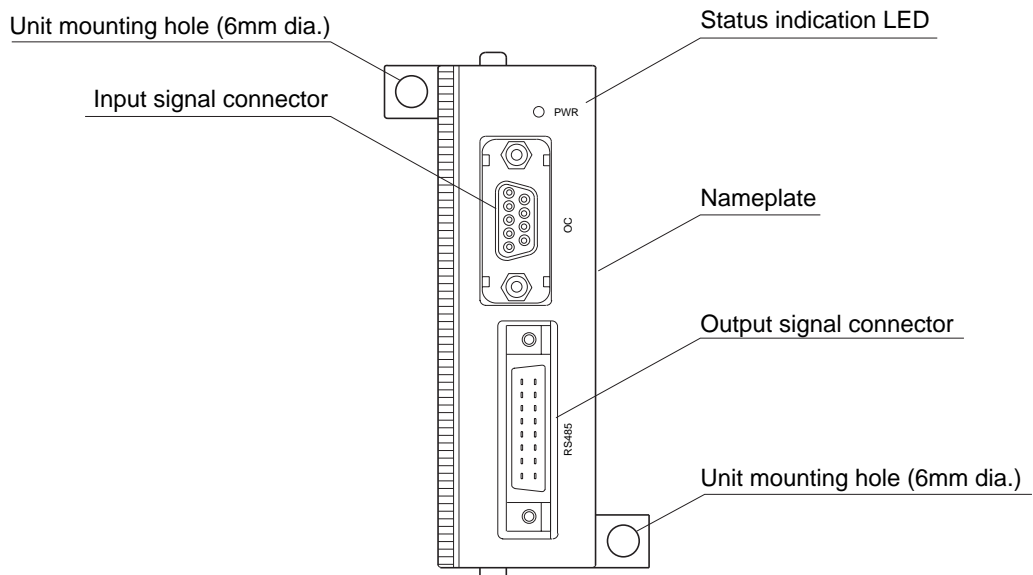
(4) Two-axis analog duplex command positioning control module (NP1F-MA2)

Item		Specification
Type		NP1F-MA2
No. of control axes		2 axes
Positioning control		Semi-closed loop
Acceleration/deceleration characteristics		Trapezoidal (at occurrence mode)
Position data		Max. $2^{32}-1$ pulse/command
Speed command	Command voltage	Analog speed command (0 to ±10.24V)
	Signal type	Analog voltage command
Feedback pulse	Input frequency	500kHz
	Input type	Open collector input or differential signal (90° phase difference, phase A, phase B and phase Z)
Manual pulse unit	Input frequency	500kHz
	Input type	Open collector input or differential signal (90° phase difference, phase A, phase B and forward pulse + reverse pulse)
Control functions		Pulse occurrence mode, positioning command mode, positioning control mode
Combination actuator		Servo system prepared analog speed command input
Isolation method		Not isolated (between amplifier interfaces and between manual pulse unit interfaces), Photocoupler (digital I/O) * External connectable devices should be isolated strongly.
Occupied words		Input: 14 words / Output: 8 words
Occupied slot		1 slot
Internal current consumption		24V DC, 150mA or less
Mass		Approx. 200g

* For more information about this module, refer to the "User's Manual Analog Duplex Command Positioning Control Module" (FEH213).

<Names>

Status indication LED

Gain adjustor

External I/O signal connector

(Note) An external connector is optional. For an applicable connector, refer to "4-4-3 Wiring."

Nameplate

Pin No. from the view of external connector pin layout
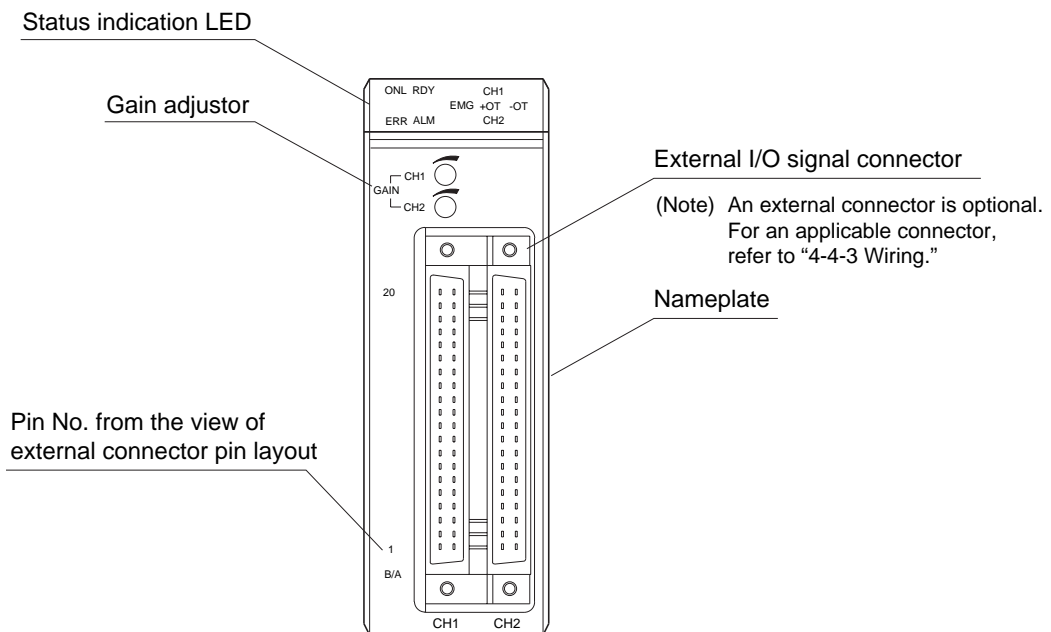
(5) Two-axis pulse train duplex positioning control module (NP1F-MP2)

Item		Specification
Type		NP1F-MP2
No. of control axes		2 axes
Positioning control		Open loop
Acceleration/deceleration characteristics		Trapezoidal (at pulse generation mode)
Position data		Max. $2^{32}-1$ pulse/command
Command pulse	Command frequency	250kHz
	Frequency resolution	16bit/20bit
	Output type	Open collector output (forward pulse + reverse pulse)
Feedback pulse	Input frequency	500kHz
	Input type	Open collector input or differential signal (90° phase difference, phase A, phase B and phase Z)
Manual pulse unit	Input frequency	500kHz
	Input type	Open collector input or differential signal (90° phase difference, phase A, phase B and forward pulse + reverse pulse)
Control functions		Pulse generation mode, positioning command mode
Combination actuator		Servo system prepared analog speed command input or stepping motor
Isolation method		Photocoupler
Dielectric strength		1500V AC 1 minute (between I/O connector pins and frame ground)
Insulation resistance		10MΩ or more with 500V DC megger (between I/O connector pins and frame ground)
Occupied words		Input: 14 words / Output: 8 words
Occupied slot		1 slot
Internal current consumption		24V DC, 95mA or less
External power supply		24V DC, 35mA
Mass		Approx. 200g

 * For more information about this module, refer to the "User's Manual Pulse Train Duplex Positioning Control Module" (FEH214).

<Names>

Status indication LED

External I/O signal connector

(Note) An external connector is optional. For an applicable connector, refer to "4-4-3 Wiring."

Nameplate

Pin No. from the view of external connector pin layout
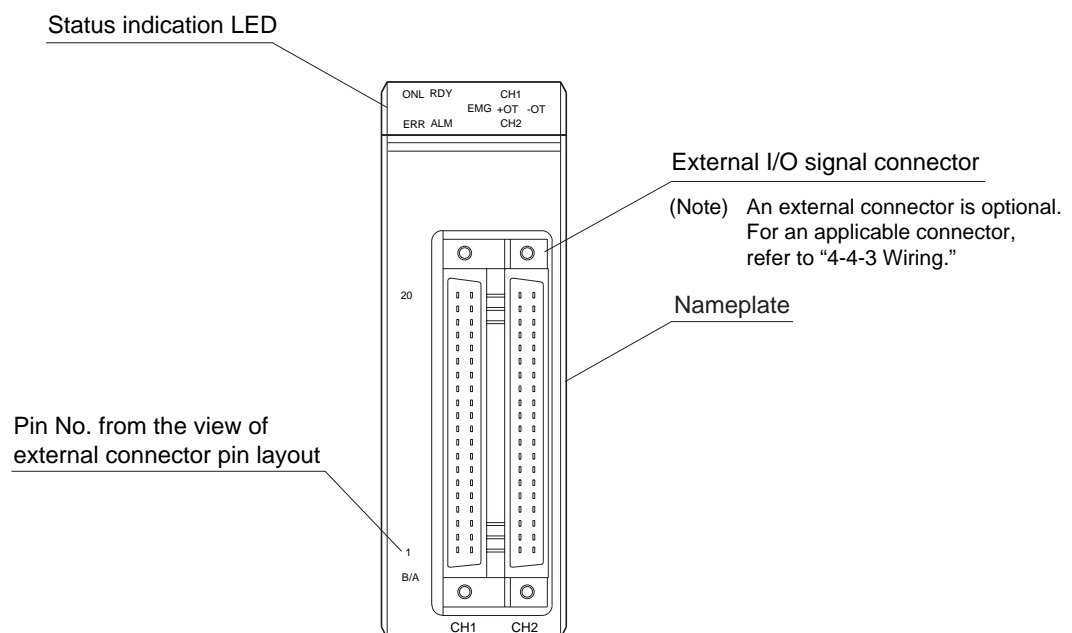
(6) Pulse train output positioning control module (NP1F-HP2)

Item		Specification
Type		NP1F-HP2
No. of control axes		2 axes
Positioning control		Open loop
Acceleration/deceleration characteristics		Trapezoidal (at pulse generation mode)
Position data		Max. $2^{32}-1$ pulse/command
Command pulse	Command frequency	250kHz
	Frequency resolution	16bit/20bit
	Output type	Open collector output (forward pulse + reverse pulse)
Control functions		Pulse generation mode
Combination actuator		Servo system prepared analog speed command input or stepping motor
Isolation method		Photocoupler
Dielectric strength		1500V AC 1 minute (between I/O connector pins and frame ground)
Insulation resistance		10MΩ or more with 500V DC megger (between I/O connector pins and frame ground)
Occupied words		Input: 8 words / Output: 8 words
Occupied slot		1 slot
Internal current consumption		24V DC, 95mA or less
External power supply		24V DC, 35mA
Mass		Approx. 180g

* For more information about this module, refer to the "User's Manual Pulse Train Output Positioning Control Module" (FEH215).

<Names>

Status indication LED

External I/O signal connector

(Note) An external connector is optional.
For an applicable connector,
refer to "4-4-3 Wiring."

Nameplate

Pin No. from the view of
external connector pin layout
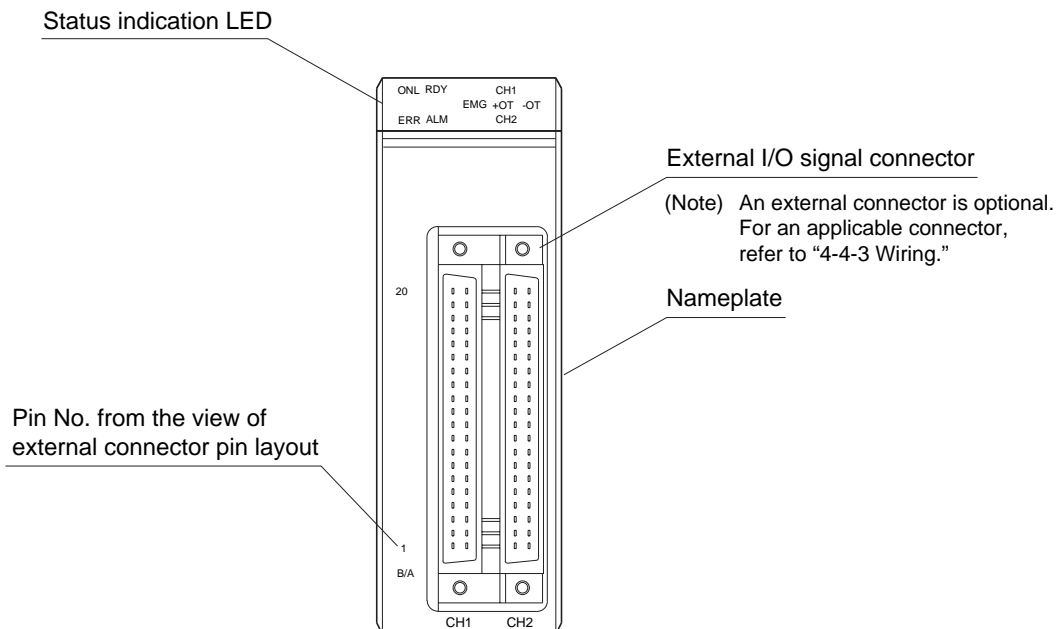
(1) Memory card interface module (NP1F-MM1)

Item	Specification
Type	NP1F-MM1
No. of SX bus connectable modules	Class B
Memory card interface	Based on JEIDA Ver. 4.1/PCMCIA Type I, II x 2 slots 5V
Card type	Memory card (SRAM card)
Function	Program reading/writing, data reading/writing
Isolation method	Not isolated
Occupied slot	1 slot
Internal current consumption	120mA or less
Mass	Approx. 200g

* For more information about this module, refer to the "User's Manual Memory Card Interface Module" (FEH227).

<Names>
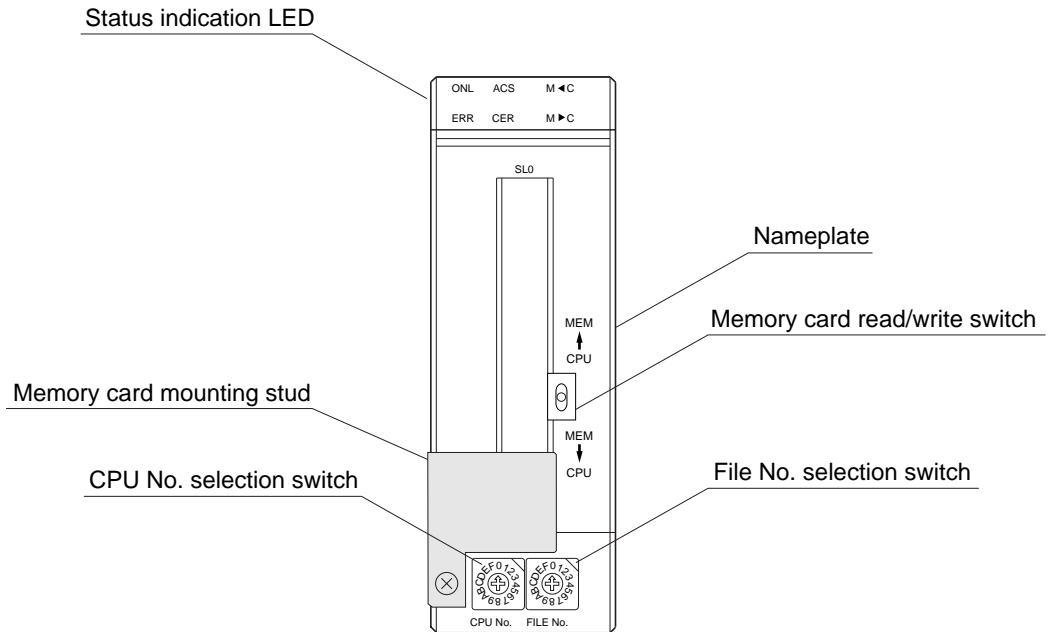
(2) Dummy module (NP1F-DMY)

The dummy module is mounted to replace a failed module in a running system to make it possible to restart the system. However, the dummy module cannot perform the functions of a failed module.

Item	Specification
Type	NP1F-DMY
Module substituted for (Note 1)	All modules expept power module and CPU module
Mounting place	On a baseboard directly connected to SX bus cannot be mounted on a T-link baseboard or other remote I/O module.
Related system memory	%MX10.42.14: "Dummy module existence" flag Turn on when the dummy module is mounted on the SX bus.
Data refresh specification	Input data: 0 fixed ("Forced ON/OFF" by D300win is available.) Output value reference input: 0 fixed ("Forced ON/OFF" by D300win is available.) Output data: Disabled
Operation specification for message communication	System message: Not sent to dummy module (Note 2) User message: Abnormal ternination if message communication with dummy module is attempted using message-related FB.
Processor bus access	When the dummy module is used to replace a module that uses a processor bus to communicate data with the CPU of a P-link module or the like, if the processor bus is accessed from the application program, then a "Processor bus access error" (for dummy module) occurs.
Applicable CPU version	Standard CPU: V33 or newer firmware version High-performance CPU: V38 or newer firmware version
Occupied slot	1 slot
Occupied words	0 word
Internal current consumption	24V DC 26mA or less
Mass	Approx. 120g

Note 1: The dummy module cannot perform the functions of a failed module.
Note 2: When modules are started after powering on the system, it is necessary for the CPU to transmit parameter data (input filtering time for input module, for example) to an individual module. This operation is referred to as "System Message."

<Names>
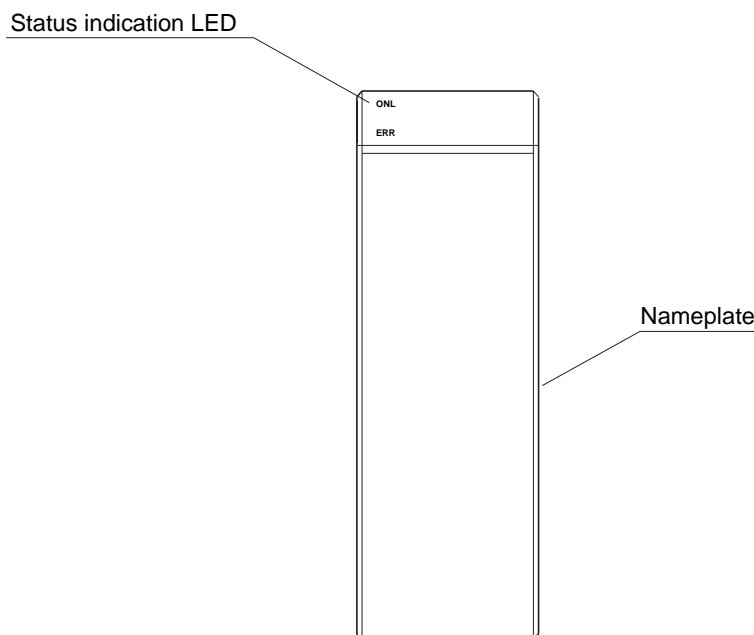
(3) Multiuse communication module (NP1F-MU1)
This is a general purpose communication module for accommodating high-speed responsibility and communication protocols between PLC applications and external devices which cannot be handled by other general purpose communication modules (Type: NP1L-RS □ Series).

Item	Specification	
Type	NP1F-MU1	
No. of SX bus connectable modules	Max. 238/1 configuration (Class C)	
Port	RS-232C 1 channel	RS-485 1 channel
Transmission method	half-duplex serial communication method	
Synchronization method	Start-stop synchronous transmission	
Transmission speed	300/600/1200/2400/4800/9600/19200/38400/57600/115200/ 230400/460800bps Note) 230400/460800bps are RS-485 only	
Transmission distance	15m or less	1km or less (transmission speed: 19200bps or less)
No. of connectable modules	1 : 1 (One external device)	1 : 31 (Max.)
Connection method	D-sub, 9-pins connector (male)	6 poles connector
Transmission protocol	An any transmission protocol by user maked program	
Isolation method	Not isolated	Photocoupler
Dielectric strength (RS-485 port)	445V AC 1 minute (between RS-485 connector and frame ground)	
Insulation resistance (RS-485 port)	10MΩ or more with 500V DC megger (between RS-485 connector and frame ground)	
Occupied slot	1 slot	
Internal current consumption	24V DC, 80mA or less	
Mass	Approx. 175g	

* For more information about this module, refer to the "User's Manual Multiuse Communication Module" (FEH196).

<Names>
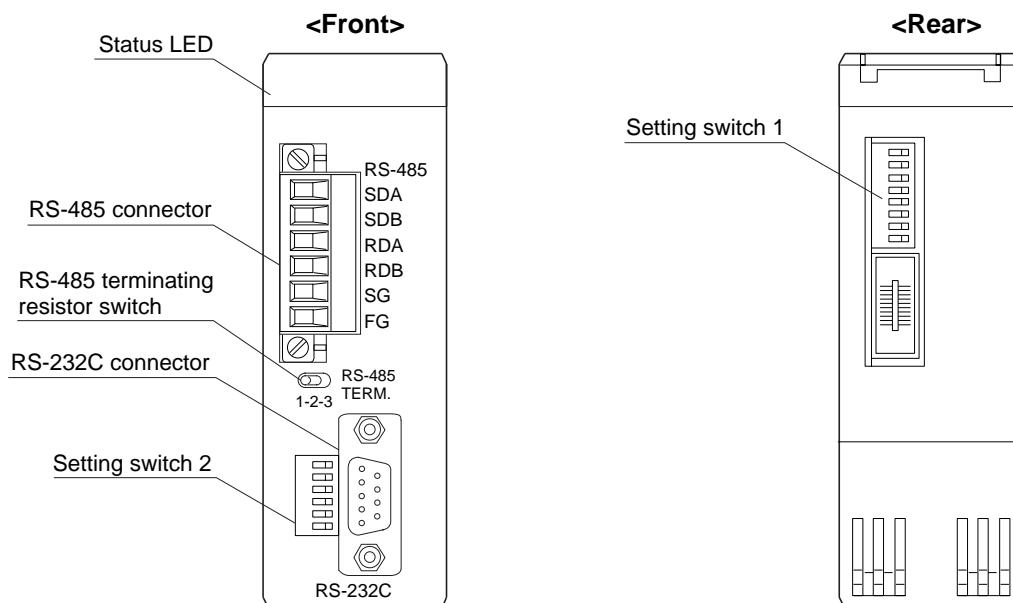
3-9 I/O Terminals

The I/O terminal is a compact remote I/O terminal that can adapt to device level open network OPCN-1, DeviceNet, LONWORKS, and Fuji Electric's original SX-bus and T-link networks by common frame size. The units are prepared, the 5 different types of interface of which have each 4 types of I/O that differ in specification.

3-9-1 Common specifications
The specifications that are common to the I/O terminals of individual communication interface are as follows:

(1) Power supply specification
The specifications shown below are common to all I/O terminals. For power consumption, refer to 3-9-3 (Individual specification).

Item	Specification
Rated input voltage	24V DC
Input voltage tolerance	21.6 to 26.4V DC * NR1LX-1606DT, NR1LY-08R07DT, NR1LW-11R80DT are 20.4 to 27.6V DC * NR2JAX-08VMRDT, NR2JAX-08IMRDT, NR2JAY-04VMRDT, NR2JAY-04IMRDT are 20.4 to 26.4V DC
Dropout tolerance	1ms or less
Rush current	5A 1ms or less, (When relay output: 25A or less) * NR1LX-1606DT, NR1LW-11R80DT, NR1LW-11R67DT are 3A 5ms or less NR1LY-08R07DT is 25A 5ms or less * NR2DX-3206DT, NR2DY-32T05DT, NR2DW-32T65DT, NR2DY-16R07DT are 7A 0.4ms or less * NR1SF-HP4DT are 10A or less
Dielectric strength	1500V AC/minute (between power supply input terminals and frame ground) * NR2JAX-08VMRDT, NR2JAX-08IMRDT, NR2JAY-04VMRDT, NR2JAY-04IMRDT are 500V AC One minute (between external terminals and ground)
Insulation resistance	10MΩ more with 500V DC megger (between power supply input terminals and frame ground)

<Connections>

Input/output terminals

Terminal block mounting screw (NC)

Terminal block mounting screw
(Common to input/output signal terminals)
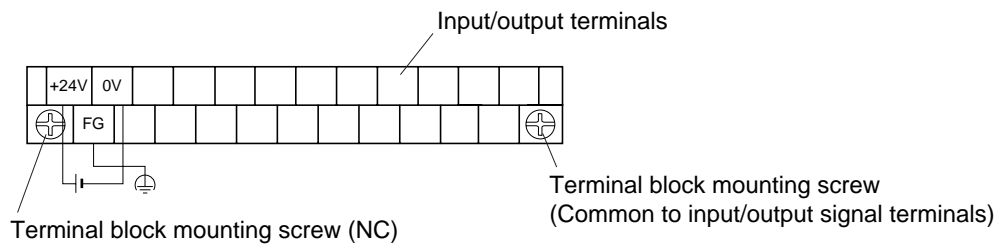
(2) Input/Output specification

1) 16 Points input

Item		Specification
Type		NR1SX-1606DT, NR1TX-1606DT, NR1JX-1606DT, NR1DX-1606DT
Rated voltage		24V DC
Input type		Source, sink common
Rated current		7mA (24V DC)
Input impedance		3.3kΩ
Operating voltage	OFF to ON	15 to 26.4V
	ON to OFF	0 to 5V
Input delay time	OFF to ON	3ms or less (5ms or less: NR1TX-1606DT only) (Note)
	ON to OFF	3ms or less (5ms or less: NR1TX-1606DT only) (Note)
Input type		DC Type 2
Isolation method		Photocoupler
Derating conditions		None

Note: For NR1SX-1606DT with SX bus interface, software filtering time for 16 points can be set as a batch by setting a parameter from D300win.
0.5 ms (hardware filtering time) + software filtering time
1 to 1ms, 3 to 3ms (default), 3 to 10ms, 10 to 10ms, 30 to 30ms, 100 to 100ms

<Connections>

* EXP is used when the common extension bar is mounted.

<Circuit configuration>
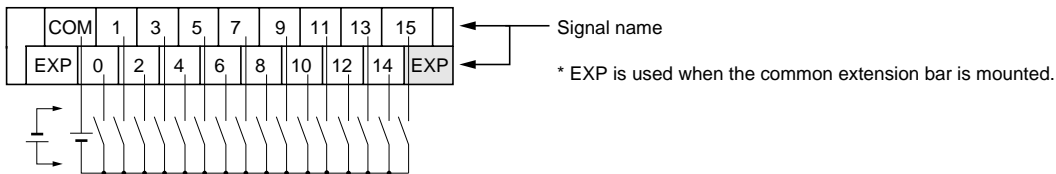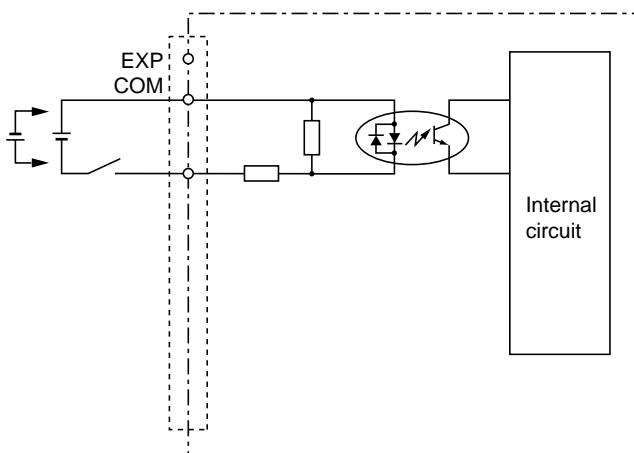
2) 32 Points input

Item		Specification
Type		NR2DX-3206DT
Rated voltage		24V DC
Input polarity		None
Rated current		5mA
Input impedance		4.7kΩ
Standard operation range	OFF to ON	15 to 26.4V
	ON to OFF	0 to 5V
Input delay time	OFF to ON	3ms or less
	ON to OFF	3ms or less
Input type		DC (EN61131 Type 2)
Isolation method		Photocoupler
Derating conditions		50%/common (26.4V), 60%/common (24V)
Mass		Approx. 300g
Power consumption		3W or less

<Connections>

NC	NC	0.1	0.3	0.5	0.7	0.9	0.11	0.13	0.15	1.0	1.2	1.4	1.6	1.8	1.10	1.12	1.14	COM 1

←— Signal name

NC	0.0	0.2	0.4	0.6	0.8	0.10	0.12	0.14	COM 0	1.1	1.3	1.5	1.7	1.9	1.11	1.13	1.15	NC

<Circuit configuration>

EXP
COM

Internal circuit
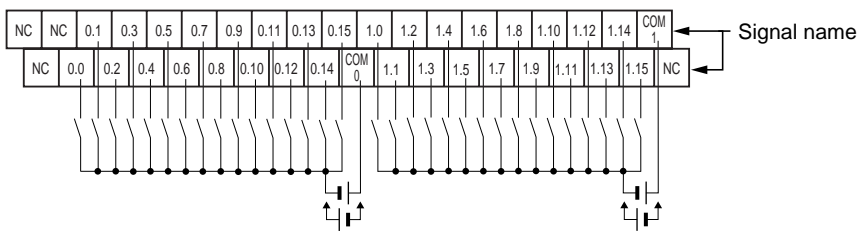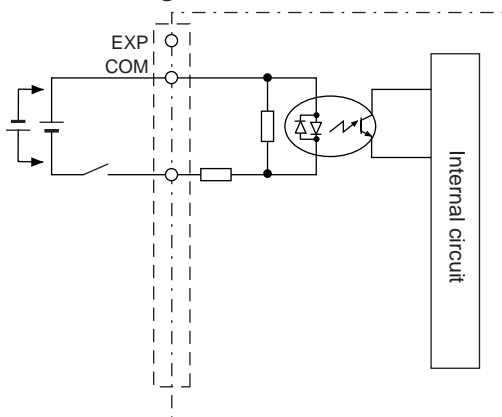
3) 8 Points relay output

Item		Specification
Type		NR1SY-08R07DT, NR1TY-08R07DT, NR1JY-08R07DT, NR1DY-08R07DT, NR1LY-08R07DT
Rated voltage		240V AC 50/60Hz, 110V DC
Max. load current		30V DC / 240V AC: 2A, 110V DC: 0.2A
Min. make/break current		5V DC /1mA
Response time	OFF to ON	10ms or less
	ON to OFF	10ms or less
Surge absorption circuit		None
Output protection		None
On/off time		Max. 1800 times/hour
Isolation method		Photocoupler + relay

Note: If supply voltage drops (allowable range: 21.6 to 26.4 V), the relay is set OFF even when communication is performed normally.
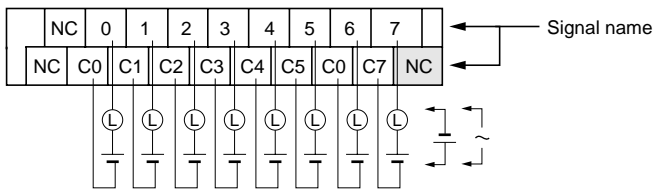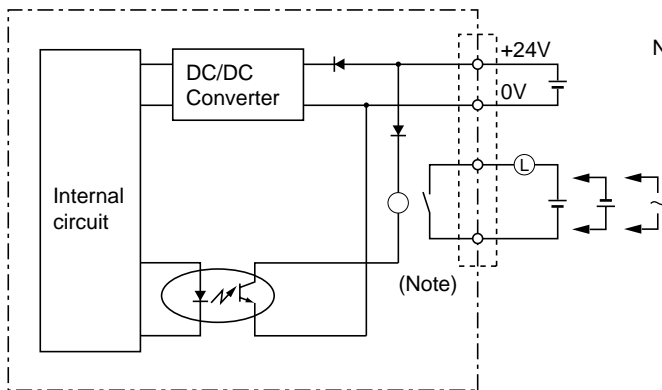
<Connections>

<Circuit configuration>

Note: Neither surge suppressing circuit nor output protective circuit is included in the output circuit. It is recommended to use the protective circuit as needed, referring to 3-5-2 (3) (Protection of contacts).

4) 16 Points output

Item		Specification
Type		NR2DY-16R07DT
Rated voltage		240V AC 50/60Hz, 30V DC
Max. load current		30V DC/250V AC: 2A, 5A/common
Min. load current		5V DC 1mA
Output delay time	OFF to ON	10ms or less
	ON to OFF	5ms or less
Surge protection		None
Output protection		None
On/off time		1800 times/hour
Isolation method		Relay
Delating condition		0 to 40° C: None, 40 to 55° C: 75%
Mass		Approx. 340g
Power consumption		4.5W or less

This unit uses Matsushita, PA relay (Part No. PA1a-5V). For detail specification, please refer Matsushita catalog.
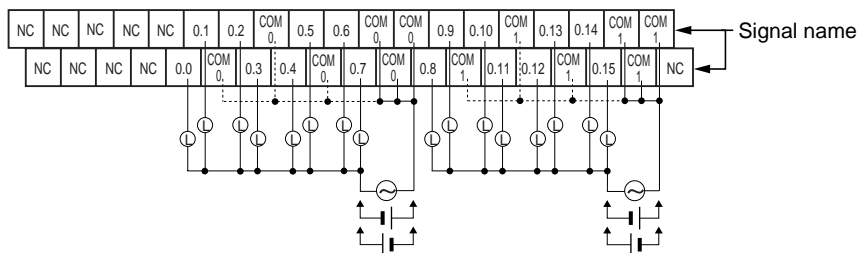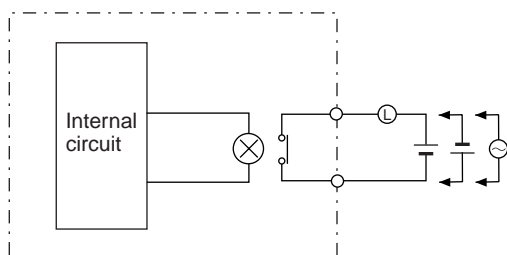
<Connections>

<Circuit configuration>

Note: Neither surge suppressing circuit nor output protective circuit is included in the output circuit. It is recommended to use the protective circuit as needed, referring to 3-5-2 (3) (Protection of contacts).

5) 16 Points transistor output

Item	Specification
Type	NR1SY-16T05DT, NR1TY-16T05DT, NR1JY-16T05DT, NR1DY-16T05DT
Output type	Sink output
Rated voltage	24V DC (19.2 to 30V DC)
Max. load current	0.6A (30V DC), 4.8A/Common
Output voltage drop	1.5V or less (at 0.5A)
Leakage current in OFF state	Max. 0.1mA
Response time — OFF to ON	1ms or less
Response time — ON to OFF	1ms or less
Surge current strength	2A, 10ms
Surge absorption circuit	Cramp diode
Other's output protection	None
On/off times	Max. 3600 times/hour (inductive load), No limit (resistor load)
Isolation method	Photocoupler
Derating condition	None

<Connections>

Signal name

Note: Do not reversely connect the output power line as doing so might short-circuit the powr line or damage internal element because no protective circuit against reverse connection is included.

<Circuit configuration>
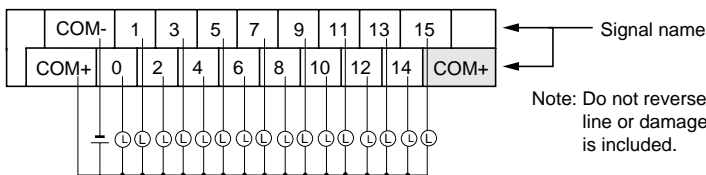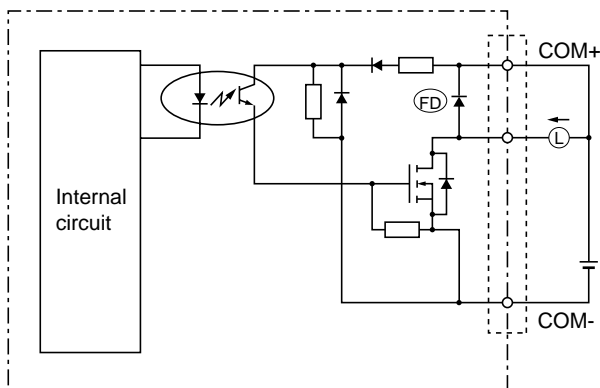
6) 32 Points transistor output

Item		Specification
Type		NR2DY-32T05DT
Output type		Sink output
Rated voltage		24V DC (19.2 to 26.4V DC)
Max. current		0.5A (26.4V DC), 3A/16 points (Note)
Voltage drop at "ON"		1.0V or less (at 0.5A)
Current leakage at "OFF"		Max. 0.1mA
Output delay time	OFF to ON	1ms or less
	ON to OFF	1ms or less
Allowable surge current		2A, 10ms
Surge protection		Zener diode
Output protection		None
On/off time		1800 times/hour
Isolation method		Photocoupler
Delating condition		None
Mass		Approx. 300g
Power consumption		2.5W or less

Note: 3A each for terminal 0.0 to 0.15 (16 points), 1.0 to 1.15 (16 points).

<Connections>

<Circuit configuration>

7) 8 Points input, 8 Points transistor output

Item		Specification
Type		NR1SW-16T65DT, NR1TW-16T65DT, NR1JW-16T65DT, NR1DW-16T65DT
Input/output type		Source input, sink output
Rated input voltage/current		24V DC/7mA
Input impedance		3.3kΩ
Operating voltage	OFF to ON	15 to 26.4V
	ON to OFF	0 to 5V
Input delay time	OFF to ON	3ms or less (5ms or less: NR1TW-16T65DT only) (Note)
(Note)	ON to OFF	3ms or less (5ms or less: NR1TW-16T65DT only) (Note)
Input type		DC type2
Rated output voltage		24V DC (19.2 to 30V DC)
Max. load current		0.6A (30V DC), 4.8A/common
Output voltage drop		1.5V or less (at 0.5A)
Leakage current in OFF state		Max. 0.1mA
Output delay time	OFF to ON	1ms or less
	ON to OFF	1ms or less
Surge current strength		2A, 10ms
Surge absorption circuit		Cramp diode
Other output protection		None
On/off times		Max. 3600 times/hour (inductive load), No limit (resistor load)
Isolation method		Photocoupler
Derating condition		None

Note: For NR1SX-1606DT with SX bus interface, software filtering time for 16 points can be set as a batch by setting a parameter from D300win.
0.5 ms (hardware filtering time) + software filtering time
1 to 1ms, 3 to 3ms (default), 3 to 10ms, 10 to 10ms, 30 to 30ms, 100 to 100ms

<Connections>

<Circuit configuration>
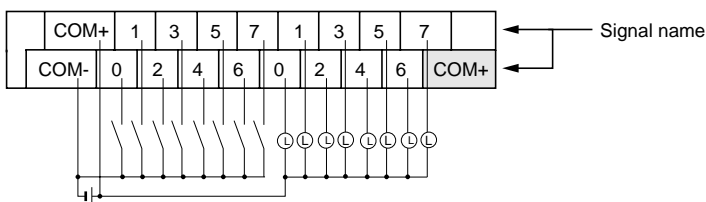
(Input circuit)
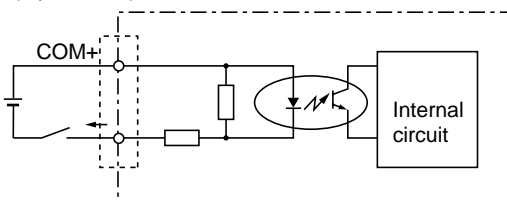
(Output circuit)
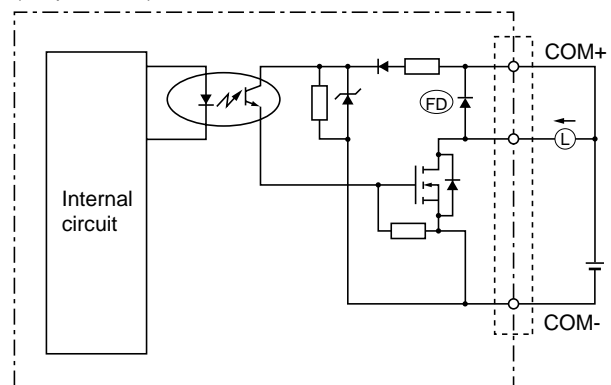
8) 16 Points input, 16 Points transistor output

Item		Specification
Type		NR2DW-32T65DT
Rated voltage		24V DC
Input polarity		Source
Rated current		5mA
Input impedance		4.7kΩ
Standard operation range	OFF to ON	15 to 26.4V
	ON to OFF	0 to 5V
Input delay time	OFF to ON	3ms or less
	ON to OFF	3ms or less
Input type		DC (EN61131 Type 2)
Isolation method		Photocoupler
Delating condition		None
Output type		Sink output
Rated voltage		24V DC (19.2 to 26.4V DC)
Max. current		0.5A (26.4V DC), 3A/16 points
Voltage drop at "ON"		1.0V or less (at 0.5A)
Current leakage at "OFF"		Max. 0.1mA
Output delay time	OFF to ON	1ms or less
	ON to OFF	1ms or less
Allowable surge current		2A, 10ms
Surge protection		Zener diode
Output protection		None
On/off time		1800 times/hour
Isolation method		Photocoupler
Delating condition		None
Mass		Approx. 300g
Power consumption		2.5W or less

Note: 3A each for terminal 0.0 to 0.15 (16 points), 1.0 to 1.15 (16 points).

<Connections>

<Circuit configuration>

(Input circuit)
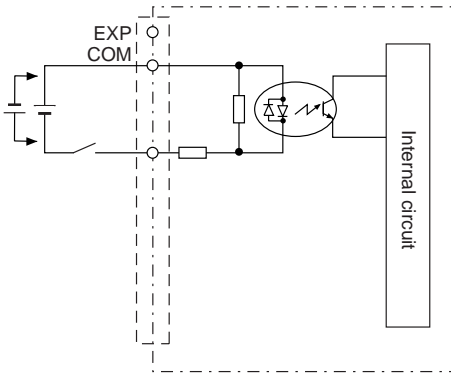
(Output circuit)
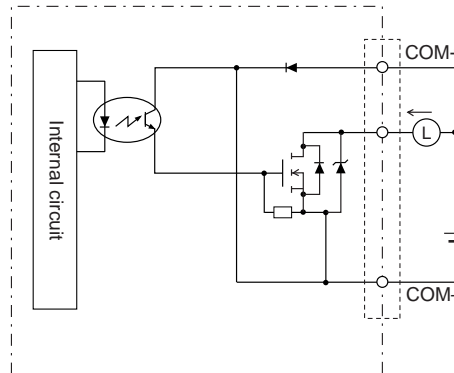
9) 16 Points input (including the 4 points pulse input)

Item		Specification
Type		NR1LW-1606DT
Rated voltage		24V DC
Input type		Source, sink common
Rated current		7mA (when 24V DC)
Input impedance		3.3kΩ
Operating voltage	OFF to ON	15 to 26.4V
	ON to OFF	0 to 5V
Input delay time	OFF to ON	10ms or less
	ON to OFF	10ms or less
Max. pulse input frequency		20Hz
Input type		DC type 2
Isolation method		Photocoupler
Derating condition		None

<Connections>
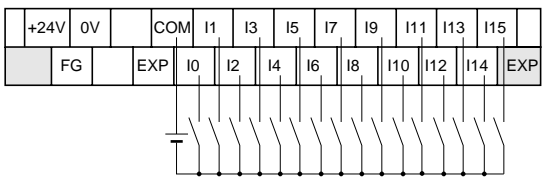
Signal name

* EXP is used to mount the common expansion bar.
* I0, I1, I2 and I3 are pulse input, but can be used as ordinary digital input

<Circuit configuration>
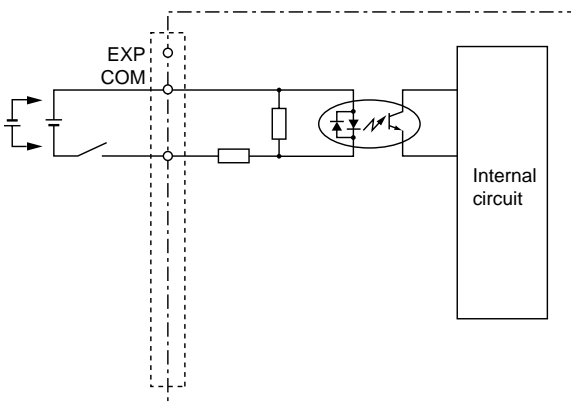
10) 9 Points input + 2 Points output

Item		Specification
Type		NR1LW-11R80DT, NR1LW-11R67DT
Input/output type		Souce input, relay output
Rated input voltage/current		24V DC/7mA
Input impedance		3.3kΩ
Operating voltage	OFF to ON	15 to 26.4V
	ON to OFF	0 to 5V
Input delay time	OFF to ON	10ms or less
	ON to OFF	10ms or less
Input type		DC type 2
Rated output voltage		When relay output: 240V AC 50/60Hz, 110V DC When voltage output: 24V DC, 50mA/point
Max. load current		30V DC/240V AC: 2A 110V DC: 0.2A
Min. load current		5V DC: 1mA
Output delay time	OFF to ON	10ms or less
	ON to OFF	10ms or less
Surge absorption circuit		None
Other output protection		None
On/off times		Max. 1800 times/hour
Isolation method		Input: Photocoupler, Output: Relay
Derating condition		None
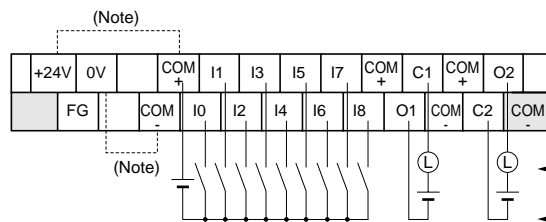
<Connections>

<When Ry output>

Signal name

Note: For NR1LW-11R67DT, +24V and COM(+) as well as 0V and COM(-) are connected internally.

* For NR1LW-11R80DT, I0, I1, I2 and I3 are pulse input.
* For NR1LW-11R67DT, I0 and I1 are pulse input.
  These pulse inputs can be used as ordinary digital inputs.

<When voltage output>
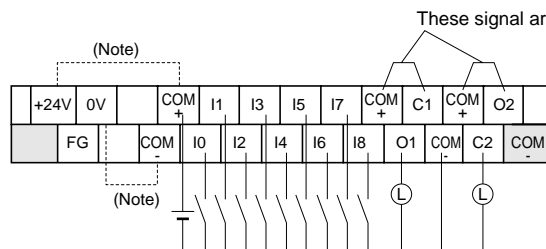
These signal are connected with them at the external.

Signal name

Note: For NR1LW-11R67DT, +24V and COM(+) as well as 0V and COM(-) are connected internally.

* For NR1LW-11R80DT, I0, I1, I2 and I3 are pulse input.
* For NR1LW-11R67DT, I0 and I1 are pulse input.
  These pulse inputs can be used as ordinary digital inputs.

<Circuit configuration>

<Input circuit>

A pulse input and usual input are as the same circuit.

<Output circuit when Ry output>

<Output circuit when voltage output>
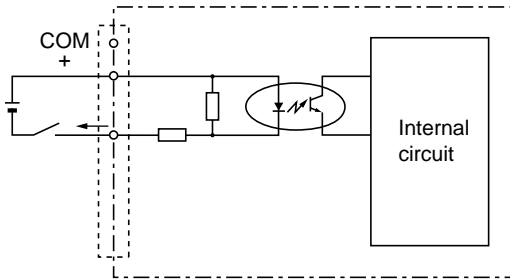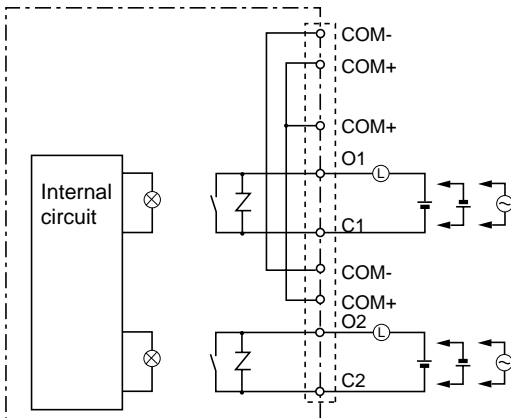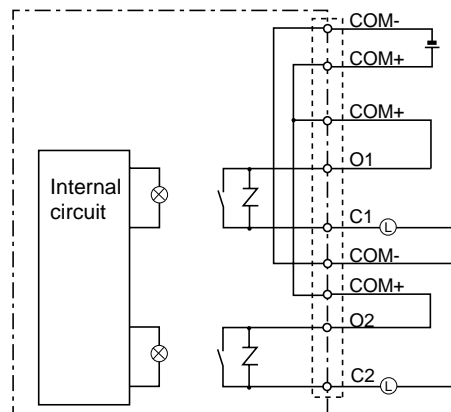
11) Analog voltage input unit

Item	Specification			
Type	NR2JAX-08VMRDT			
No. of input points	8 points			
Analog input range	0 to 5V	1 to 5V	0 to 10V	-10 to 10V
Input impedance	1MΩ			
Input tolerance	±15V			
Input type	Single end input			
Max. resolution	1.25mV	1.25mV	1.25mV	1.25mV
Digital convention value (INT type)	0 to 4000		0 to 8000	-8000 to 8000
Measurement accuracy (To the full scale)	±0.1% (Ambient temperature: 18 to 28° C) ±0.3% (Ambient temperature: 0 to 55° C)			
Sampling time	4ms/8 points			
Input filtering time	Approx. 100μs or less (hard filter: primary delay time constant)			
Input delay time	4ms or less / 8 points + Tact time (ms)			
External wire connections	External power supply, Analog signal: Detachable screw terminal block (M3) 38 poles OPCN-1 signal: Detachable screw terminal block (M3) 3 poles			
Applicable wire	Shielding twist pair wire			
Processing of unused terminal	Basically shorted			
No. of occupied words	8 words input			
Internal current consumption	24V DC 200mA or less			
Mass	Approx. 340g			

Note: For more information about this manual, refer to the "User's Manual OPCN-1 interface I/O terminal analog unit (FEH217)."

<Names>

12) Analog voltage input unit

Item	Specification		
Type	NR2JAX-08IMRDT		
No. of input points	8 points		
Analog input range	-20mA to 20mA	0 to 20mA	4 to 20mA
Input impedance	250Ω		
Input tolerance	±30mA		
Input type	Single end input		
Max. resolution	2.5µA	2.5µA	2.5µA
Digital convention value (INT type)	-8000 to 8000	0 to 8000	
Measurement accuracy (To the full scale)	±0.1% (Ambient temperature: 18 to 28° C) ±0.4% (Ambient temperature: 0 to 55° C)		
Sampling time	4ms / 8 points		
Input filtering time	Approx. 100µs or less (hard filter: primary delay time constant)		
Input delay time	4ms or less / 8 points + Tact time (ms)		
External wire connections	External power supply, Analog signal: Detachable screw terminal block (M3) 38 poles OPCN-1 signal: Detachable screw terminal block (M3) 3 poles		
Applicable wire	Shielding twist pair wire		
Processing of unused terminal	Basically shorted		
No. of occupied words	8 words input		
Internal current consumption	24V DC 200mA or less		
Mass	Approx. 340g		

Note: For more information about this manual, refer to the "User's Manual OPCN-1 interface I/O terminal analog unit (FEH217)."

<Names>

13) Analog voltage output unit

Item	Specification			
Type	NR2JAY-04VMRDT			
No. of input point	4 points			
Analog output range	0 to 5V	1 to 5V	0 to 10V	-10 to 10V
External load resistance	1kΩ or more	1kΩ or more	2kΩ or more	2kΩ or more
Max. resolution	1.25mV	1.25mV	1.25mV	1.25mV
Digital input value (INT type)	0 to 4000		0 to 8000	-8000 to 8000
Measurement accuracy (To the full scale)	±0.1% (Ambient temperature: 18 to 28° C) ±0.3% (Ambient temperature: 0 to 55° C)			
Output response tim	2ms or less / 4 points + Tact time (ms)			
Shorted protection	Protected			
External wire connections	External power supply, Analog signal: Detachable screw terminal block (M3) 38 poles OPCN-1 signal: Detachable screw terminal block (M3) 3 poles			
Applicable wir	Shielding twist pair wire			
Processing of unused terminal	Basically opened			
No. of occupied words	4 words output			
Internal current consumption	24V DC 230mA or less			
Mass	Approx. 340g			

Note: For more information about this manual, refer to the "User's Manual OPCN-1 interface I/O terminal analog unit (FEH217)."

<Names>
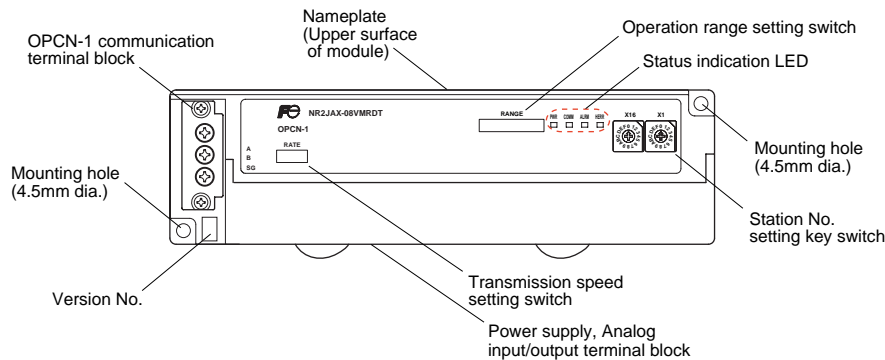
14) Analog voltage output unit

Item	Specification	
Type	NR2JAY-04IMRDT	
No. of input points	4 points	
Analog output range	0 to 20mA	4 to 20mA
External load resistance	500Ω or less	
Max. resolution	2.5µA	
Digital input value (INT type)	0 to 8000	
Measurement accuracy (To the full scale)	±0.2% (Ambient temperature: 18 to 28° C) ±0.4% (Ambient temperature: 0 to 55° C)	
Output response time	2ms or less / 4 points + Tact time (ms)	
External wire connections	External power supply, Analog signal: Detachable screw terminal block (M3) 38 poles OPCN-1 signal: Detachable screw terminal block (M3) 3 poles	
Applicable wire	Shielding twist pair wire	
Processing of unused terminal	Basically opened	
No. of occupied words	4 words output	
Internal current consumption	24V DC 260mA or less	
Mass	Approx. 350g	

Note: For more information about this manual, refer to the "User's Manual OPCN-1 interface I/O terminal analog unit (FEH217)."

<Names>
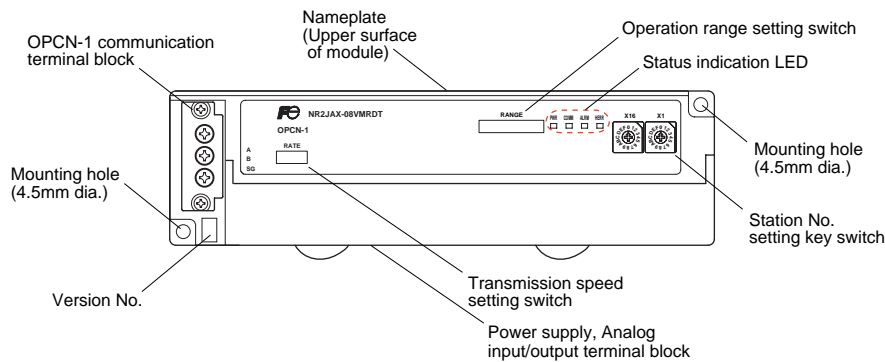
15) Four-axis pulse string output terminal for SX bus

Item		Specification
Type		NR1SF-HP4DT
Number of control axis		Four axis
Speed command	Command signal	Pulse train command
	Max. command frequency	250kHz
	Output type	Open collector, sink output
	Max. load current	24V DC, 50mA
	Isolation method	Photocoupler
	Form of signal	Clockwise pulse (CW) + counter-clockwise pulse (CCW)
Feedback pulse input		None
External pulse		None
Input signal	Points	8 points (2 points/ch), zero LSx4ch, timing signal/z-phasex4ch (max. 10kHz)
	Input type	Source input (no-voltage contact)
	Input type	DC Type 1
	Rated current	24V DC, 4mA
	Input impedance	5.6kΩ
	Isolation method	Photocoupler
	Common points	2 points (10 points; when common extension bar is used)
Occupied words		Total input/output: 40 words (input: 16 words/output: 24 words)
Internal current consumption		24V DC, 20mA (Power consumption: 3.5W or less)
External wire connections		Treminal block, M3 screw (screw fastening torque: 0.5 to 0.6N•m)
Gounding method		D-type grounding
Structure		IP20, built-in board type
Main unit mounting method		DIN rail, screw fastening (screw fastening torque: 1 to 1.5N•m)
Cooling method		Natural air cooling
Mass		Approx. 230g

Note: For more information about this manual, refer to the "User's Manual, Four-axis Pulse String Output Terminal for SX Bus (FEH239).

<Names>
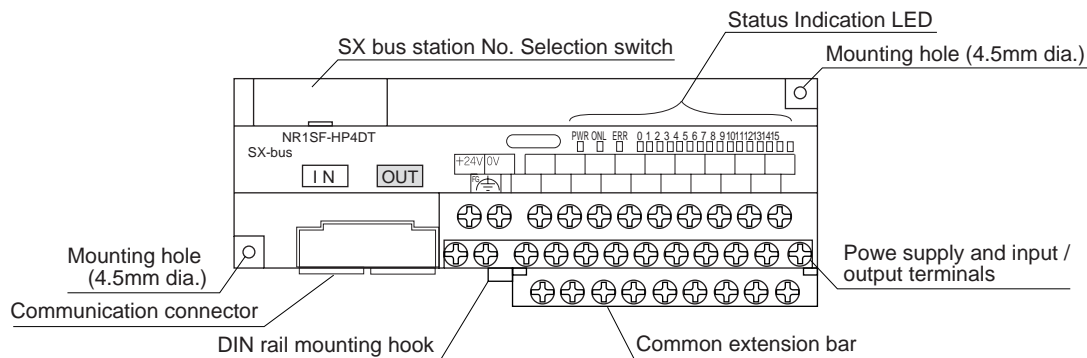
(3) Common extension bar
Used to extend the common terminals provided in the lower row of the main unit.
Type: **NR1XV-CB1**

The terminals are divided into two groups (shaded part ☐ and black part ■ in the figure below) for electrical connection.

To COM/EXP terminal of the main unit

To terminal block mounting screw (right side)
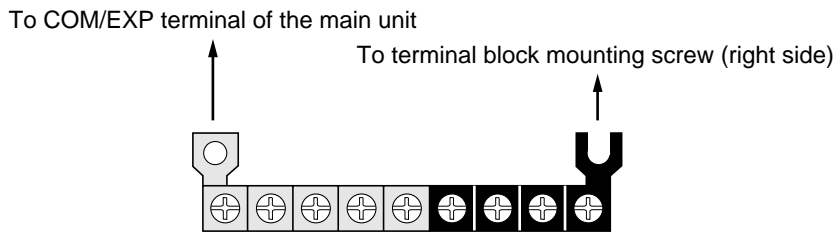
(4) Dimensions
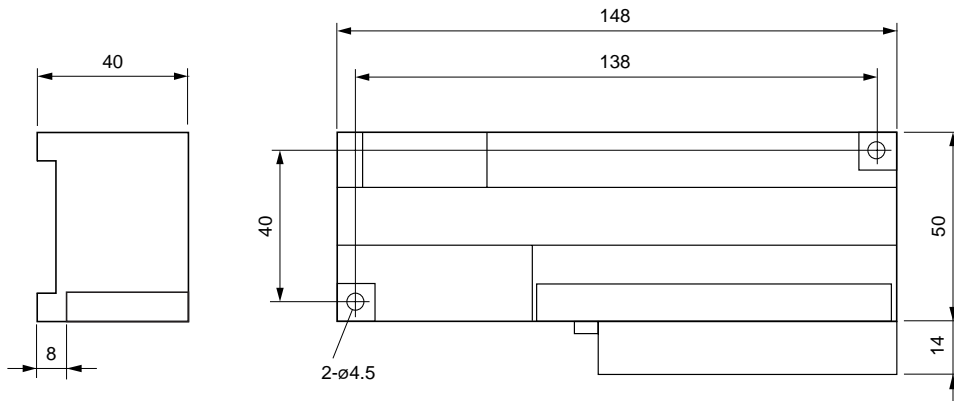
3-9-2 Communication interface specifications

(1) SX bus interface (NR1S ☐)

1) SX bus station No. selection switch

Mounting hole
(4.5mm dia)
(Tightening torque: 1 to 1.5N·m)

2) Status indication LED

3) Power supply and input/output terminal block
(Tightening torque: 0.5 to 0.6N·m)

IN   OUT

Terminal block mounting screw
(Common to signal terminals)
(Tightening torque: 0.5 to 0.6N·m)

SX bus connector

Mounting hole
(4.5mm dia)

4) Common extension bar (Optional)

Terminal block mounting screw (NC)

Note: For SX bus connection, be sure to connect the cable that comes from the OUT terminal of the other equipment to IN terminal of this unit; the cable from the OUT terminal of this unit, to the IN terminal of the other equipment.
When this unit becomes a termination of the SX bus transmission path, be sure to connect a loop-back plug.

1) SX bus station No. selection switch

This switch is used to set an address by a combination of ON/OFF status of the 8 slide switches (2^7 to 2^0).
Setting range: 1 to 238. (OFF=0, ON=1)

STATION No.

2^7 2^6 2^5 2^4 2^3 2^2 2^1 2^0

ON
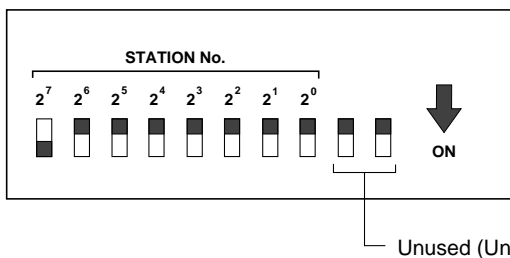
* If 0 is set for the station address, the station address setting by this switch is disabled, and instead the station address in the system definition is enabled.

Unused (Unused switches must be set OFF)

2) Status indication LED

The LED indicates the status of the I/O terminal or ON/OFF status of input/output terminal.

Symbol	Color	Description
PWR	Green	Lights on continuously when power is supplied normally.
ONL	Green	Lights on continuously when communication is performed normally via the SX bus. Blinks while the system is being initialized.
ALM	Red	Lights on when the SX bus is abnormal.
Input/output LED	Green	Lights on continuously when input or output is turned ON.

3) Power supply and input/output terminal block

For terminal layout and input/output specifications, refer to 3-9-1 (Common specification).

4) Common extension bar

Refer to 3-9-1 (3) (Common extension bar).

(2) T-link interface (NR1T ☐)
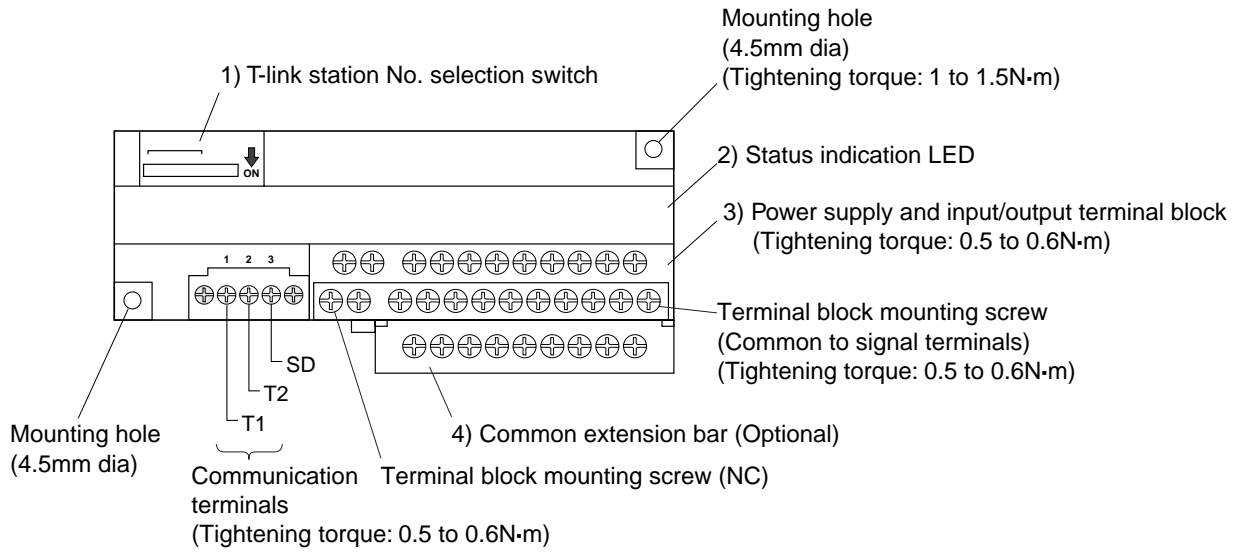
1) T-link station No. selection switch

Mounting hole
(4.5mm dia)
(Tightening torque: 1 to 1.5N·m)

2) Status indication LED

3) Power supply and input/output terminal block
(Tightening torque: 0.5 to 0.6N·m)

Terminal block mounting screw
(Common to signal terminals)
(Tightening torque: 0.5 to 0.6N·m)

SD

T2

T1

Mounting hole
(4.5mm dia)

4) Common extension bar (Optional)

Communication terminals
(Tightening torque: 0.5 to 0.6N·m)

Terminal block mounting screw (NC)

1) T-link station No. selection switch
This switch is used to set an address by a combination of ON/OFF status of the 8 slide switches.
Setting range: 00 to 99. (OFF=0, ON=1)
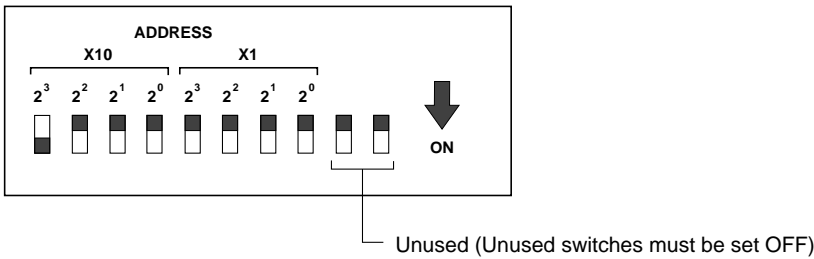
ADDRESS

X10   X1

2^3 2^2 2^1 2^0 2^3 2^2 2^1 2^0

ON

Unused (Unused switches must be set OFF)

2) Status indication LED
The LED indicates the status of the I/O terminal or ON/OFF status of input/output terminal.

Symbol	Color	Description
PWR	Green	Lights on continuously when power is supplied normally.
ALM	Red	Lights on continuously when no communication line is connected or in case of communication error.
Input/output LED	Green	Lights on continuously when input or output is turned ON.

3) Power supply and input/output terminal block
For terminal layout and input/output specifications, refer to 3-9-1 (Common specification).

4) Common extension bar
Refer to 3-9-1 (3) (Common extension bar).

(3) OPCN-1 interface (NR1J☐)

1) Selection switch

Mounting hole
(4.5mm dia)
(Tightening torque: 1 to 1.5N·m)

2) Status indication LED

3) Power supply and input/output terminal block
(Tightening torque: 0.5 to 0.6N·m)

Terminal block mounting screw
(Common to signal terminals)
(Tightening torque: 0.5 to 0.6N·m)

SG

B

A

Mounting hole
(4.5mm dia)

Communication
terminals
(Tightening torque: 0.5 to 0.6N·m)

4) Common extension bar (Optional)

Terminal block mounting screw (NC)

1) Selection switch

Node address selection

Communicating
speed selection

Unused

Unused

Sure thing ON

<Node address selection>
This switch is used to set an address by a combination of ON/OFF status of the 7 slide switches (2^6 to 2^0).
Setting range: 01 to 7F. (OFF=0, ON=1)

<Communicating speed selection>

Communicating speed	2^1	2^0
1Mbps	ON	ON
500kbps	ON	OFF
250kbps	OFF	ON
125kbps	OFF	OFF

2) Status indication LED
The LED indicates the status of the I/O terminal or ON/OFF status of input/output terminal.

Symbol	Color	Description
PWR	Green	Lights on continuously when power is supplied normally.
COMM	Green	Lights on continuously when data is communicated normally.
ALM	Red	Lights on continuously in case of communication error or when address is set to "00."
Input/output LED	Green	Lights on continuously when input or output is turned ON.

3) Power supply and input/output terminal block
For terminal layout and input/output specifications, refer to 3-9-1 (Common specification).

4) Common extension bar
Refer to 3-9-1 (3) (Common extension bar).

(4) DeviceNet interface (NR1D □)

1) Selection switch

Mounting hole(4.5mm dia)
(Tightening torque: 1 to 1.5N·m)

2) Status indication LED

3) Power supply and input/output terminal block
(Tightening torque: 0.5 to 0.6N·m)

Mounting hole
(4.5mm dia)

Terminal block mounting screw
(Common to signal terminals)
(Tightening torque: 0.5 to 0.6N·m)

24V +DC (Red)
CAN_H (White)
Shielding wire (Drain)
CAN_L (Blue)
0V (Blue)

4) Common extension bar (Optional)

Terminal block mounting screw (NC)

Communication terminals
(Tightening torque: 0.5 to 0.6N·m)

1) Selection switch

NOED ADDRESS   DR   HOLD or NC

2^5 2^4 2^3 2^2 2^1 2^0 2^1 2^0 OFF   ON

Node address selection

HOLD selection

Unused (Unused switches must be set OFF)

Communicating speed selection

* Adapted DevideNet standard:
  Volume 1, resource 2.0
  Volume 2, resource 2.0
  Test version A-14
* Adapted I/O message is only for polling.
* Network power consumption is 50 mA.

<Node address selection>
This switch is used to set an address by a combination of ON/OFF status of the 6 slide switches (2^5 to 2^0).
Setting range: 0 to 63. (OFF=0, ON=1)

<Communicating speed selection>

Communicating speed	2^1	2^0
500kbps	ON	OFF
250kbps	OFF	ON
125kbps	OFF	OFF
Don't selection	ON	ON

<HOLD selection>
When this switch is set ON, output is held in case of transmission error. For 16-input point unit, be sure to turn this switch OFF.

2) Status indication LED
The LED indicates the status of the I/O terminal or ON/OFF status of input/output terminal.

Symbol	Color	Description
MS	Green	Lights on continuously when the unit is in normal condition, and blinks if setting is incomplete.
	Red	Lights on continuously in case of error, and blinks in case of nonfatal fault.
NS	Green	Lights on continuously when the connection of communication line is completed, and blinks when no communication line is connected.
	Red	Lights on continuously in case of communication error (fatal fault), and blinks in case of communication error (nonfatal fault).
Input/output LED	Green	Lights on continuously when input or output is turned ON.

3) Power supply and input/output terminal block
For terminal layout and input/output specifications, refer to 3-9-1 (Common specification).

4) Common extension bar
Refer to 3-9-1 (3) (Common extension bar).

(5) DeviceNet interface (NR2D☐)
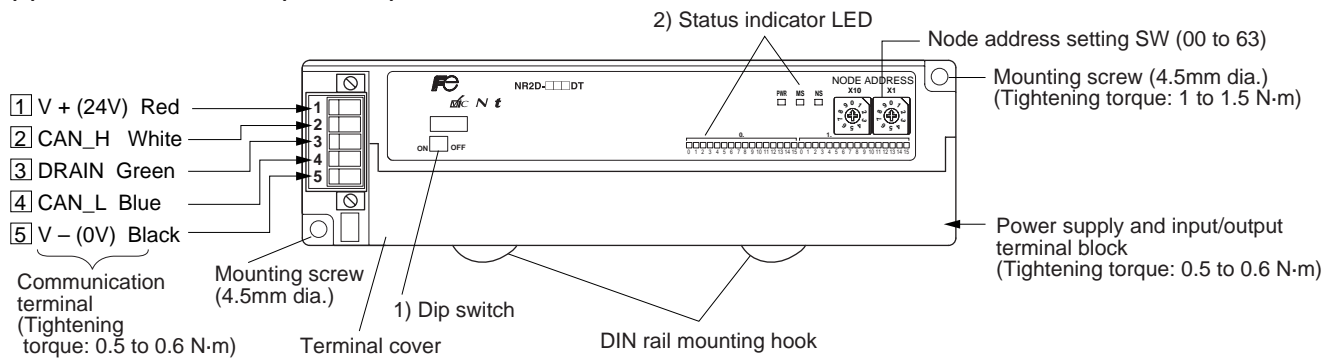
1) Dip switch
Not used. Always set to "OFF".
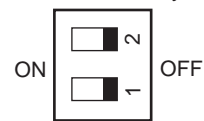
2) Status indicator LED

Name	Status	Color	Condition
PWR	ON	Green	There is power from communication line
	OFF	–	There is no power
MS	ON	Green	Normal condition
	Flicker		Non-setting condition
	ON	Red	Fatal trouble
	Flicker		Non-fatal trouble
	OFF	–	Power supply is off
NS	ON	Green	Communication OK
	Flicker		Not connected
	ON	Red	Fatal communication error
	Flicker		Non-fatal communication error
	OFF	–	Power supply is off
0.0 to 1.15	ON	Green	Input / Output is ON

* Applicable DeviceNet standard
  Volume 1 Resource 2.0
  Volume 2 Resource 2.0
  Test version A-17
* This unit supports following I/O message.
 Polling, Bit strobe, Change of state, Cyclic
* Output holds when communication error occur.
* Automatically adjusted to master.

(6) LONWORKS interface (NR1L ☐)

Service switch   Neuron ID

Mounting hole
(4.5mm dia.)
(Tightening torque: 1 to 1.5N·m)

2) Status indication LED

3) Power supply and input/output terminal block
(Tightening torque: 0.5 to 0.6N·m)

Terminal block mounting screw (NC)
(Tightening torque: 0.5 to 0.6N·m)

4) Common extension bar (Optional)

Terminal block mounting screw (NC)

Mounting hole
(4.5mm dia.)

1) Communication
terminals
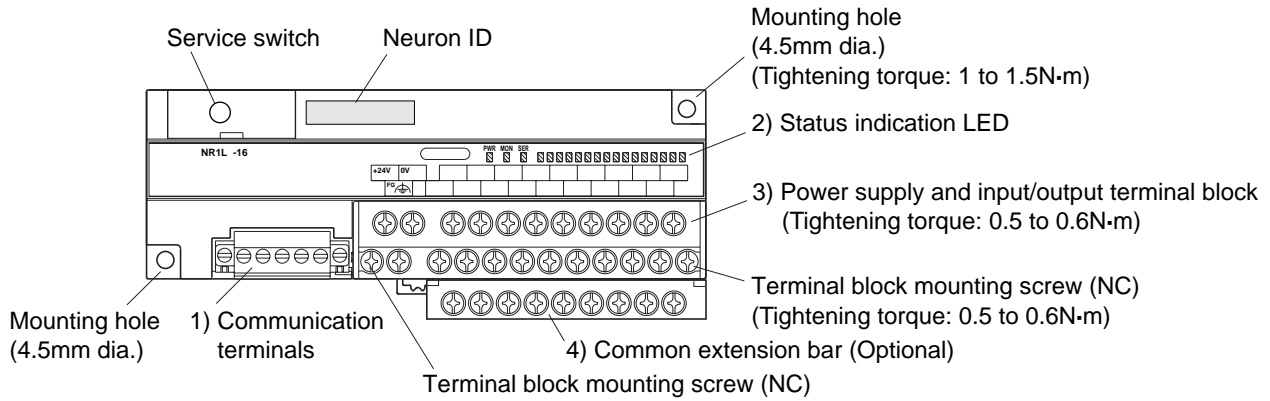
1) Communication terminals

These are detachable terminal block for connecting to the LON WORKS.
(Manufacturer: Phoenix contact Co., Ltd.   Type; MVSTBR2.5/5-STF-5.08AU)
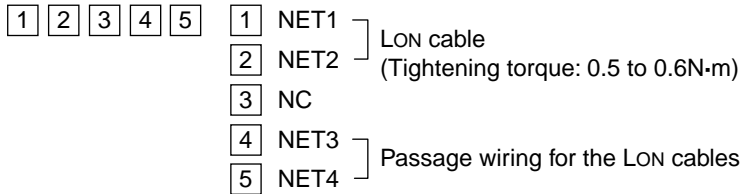
| 1 | 2 | 3 | 4 | 5 |

1	NET1	⎤ LON cable
2	NET2	⎦ (Tightening torque: 0.5 to 0.6N·m)
3	NC	
4	NET3	⎤ Passage wiring for the LON cables
5	NET4	⎦

2) Status indication LED

The LED indicates the status of the I/O terminal or ON/OFF status of input/output terminal.

Names	Color	Descriptions
PWR	Green	Lights on continuously when power is supplied normally.
MON	Red	Lights on: Program stop (Incorrect rewriting program. Off-line) Flicker (The cycle of 1 second (5 times blinks)): When the wink message is received.
SER	Yellow	Lights on: • No application program • Service request switch depressed Flicker (The cycle of 2 second): Network information unconstitutional. Flicker (The cycle of 1 second): The abnormal writes in a software (Watchdog time error) Lights off (In the case of continuation putting out light): Program stop (Incorrect rewriting program. Off-line) Lights off (The cycle of 11 second (1 second lighting, 10 second putting out light): LON node OK
0-15	Green	Lights on continuously when input or output is turned ON.

3) Power supply and input/output terminal block

For terminal layout and input/output specifications, refer to 3-9-1 (Common specification).

4) Common extension bar

Refer to 3-9-1 (3) (Common extension bar).

3-9 I/O Terminals

<The Configuration of objects for LONWORKS interface products>

LONWORKS interface product has 4 objects, i.e. node object, DI object, DO object and PI object, as shown below.

(1) NR1LX-1606DT
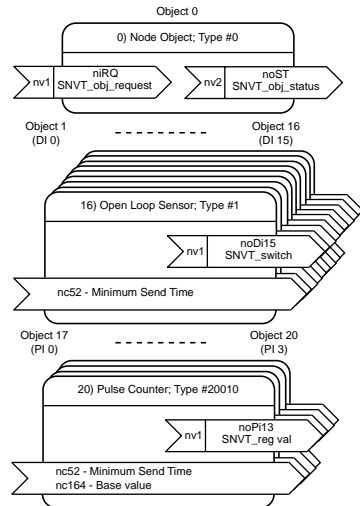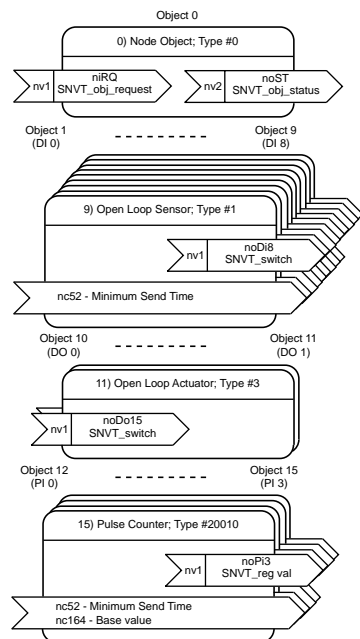
(2) NR1LY-08R07DT

(3) NR1LW-11R80DT
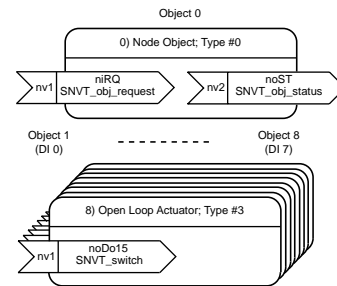
(4) NR1LW-11R67DT
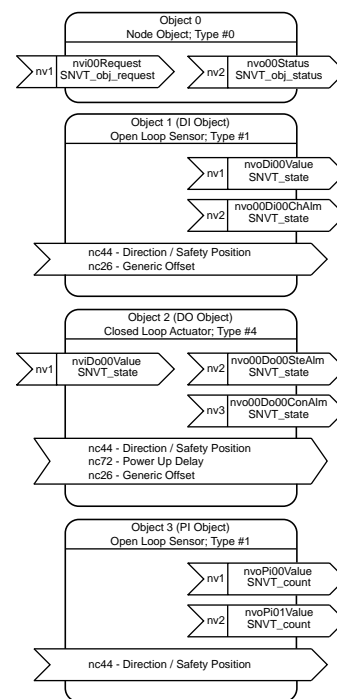
* LON and LONWORKS are both registered trademarks of
  U.S. based Echelon Corporation.

3-9-3 Individual specification

The table below shows the mass and power consumption of I/O terminal unit.

Type of interface	Type No.	Consumption energy	Mass
SX bus	NR1SX-1606DT	0.9W or less	Approx. 240g
	NR1SY-08R07DT	3.0W or less	Approx. 250g
	NR1SY-16T05DT	0.9W or less	Approx. 240g
	NR1SW-16T65DT	0.9W or less	Approx. 240g
T-link	NR1TX-1606DT	1.4W or less	Approx. 240g
	NR1TY-08R07DT	3.0W or less	Approx. 250g
	NR1TY-16T05DT	1.4W or less	Approx. 240g
	NR1TW-16T65DT	1.4W or less	Approx. 240g
OPCN-1	NR1JX-1606DT	1.0W or less	Approx. 240g
	NR1JY-08R07DT	3.0W or less	Approx. 250g
	NR1JY-16T05DT	1.0W or less	Approx. 240g
	NR1JW-16T65DT	1.0W or less	Approx. 240g
DeviceNet	NR1DX-1606DT	0.7W or less	Approx. 240g
	NR1DY-08R07DT	3.0W or less	Approx. 250g
	NR1DY-16T05DT	0.7W or less	Approx. 240g
	NR1DW-16T65DT	0.7W or less	Approx. 240g
LONWORKS	NR1LX-1606DT	1.6W or less	Approx. 260g
	NR1LY-08R07DT	3.0W or less	Approx. 260g
	NR1LW-11R80DT	1.6W or less	Approx. 260g
	NR1LW-11R67DT	1.6W or less	Approx. 260g

(1) Data backup battery (NP8P-BT/NP8P-BTS (Mass battery unit))

Item	Specification	
	NP8P-BT	**NP8P-BTS (Mass battery unit)**
CPU that can be installed	All versions of all CPUs	NP1PS-74: hardware version V22 or later NP1PS-74R: hardware version V25 or later NP1PS-117: hardware version V25 or later NP1PS-117R: hardware version V20 or later NP1PS-245R: all versions NP1PS-74D: all versions
Battery voltage/capacity	3.6V/1000mAh	3.6V/2700mAh
Backup time (at 25° C) (Note 1)	NP1PS-32/32R: 5 years NP1PS-74/74R/117/117R: approx. 1.3 years NP1PS-245R: approx. 0.7 year NP1PM-48R: 5 years NP1PH-08/16: 5 years NP1PS-74D: 0.65 years	NP1PS-74/74R/117/117R: approx. 3.5 years NP1PS-245R: approx. 2 years NP1PS-74D: approx. 1.75 years
Battery guaranteed term (Note 2)	5 years (Years/Month is indicated on the battery)	
Battery for exchang	NP8P-BT	NP8P-BT1
Mass	Approx. 10g	Approx. 50g (Contain a built-in battery)

Note: 1) The warranty period is for the battery, It is 5 years at 25°C regardless of whether the battery is used or not. Memory backup time depends on the device and ambient temperature.
2) The battery backup time is reduced by about half for every 10°C increase in ambient temperature.

<Names>

Note) When NP8P-BT is used, attach the battery replacement period seal to the battery cover of the CPU module.
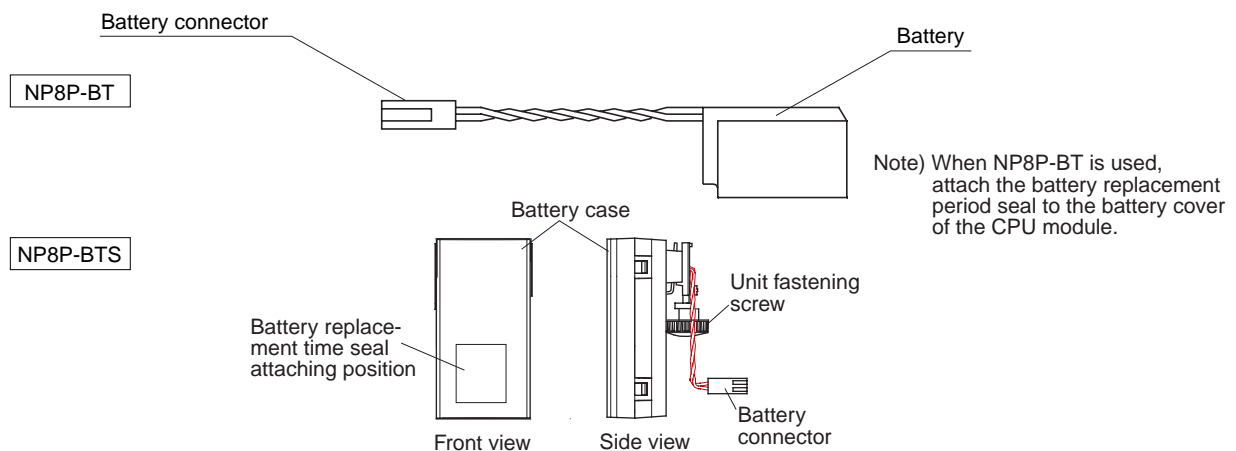
(2) SX bus expansion cable (NP1C - □□)

Type	Cable length (L)
NP1C-P3	300mm
NP1C-P6	600mm
NP1C-P8	800mm
NP1C-02	2,000mm
NP1C-05	5,000mm
NP1C-10	10,000mm
NP1C-15	15,000mm
NP1C-25	25,000mm

OUT side (orange)   IN side (white)
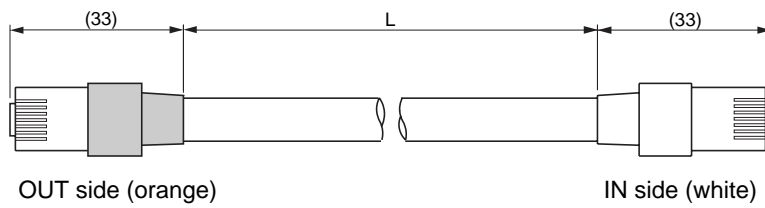
(3) SX bus terminating plug (NP8B-BP)
This plug is used to terminate the SX bus.
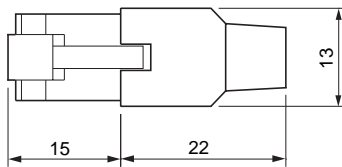
(4) SX bus T-branch unit (NP8B-TB)

This unit is used to branch the SX bus like the letter T.

Item	Specification
Type	NP8B-TB
Total length of SX bus	25m
No. of connectable units (branches)	Max. 25 including base boards
Mass	Approx. 160g

Note: For the SX bus T-branch expansion system, refer to "2-2-3 SX bus T-branch expansion system."

<Names>

Unit mounting hole (6mm dia.)

SX bus connector

Nameplate

IN

OUT1

OUT2

Unit mounting hole (6mm dia.)

Applicable screw : M4
Tightening torque: 1.8N·m
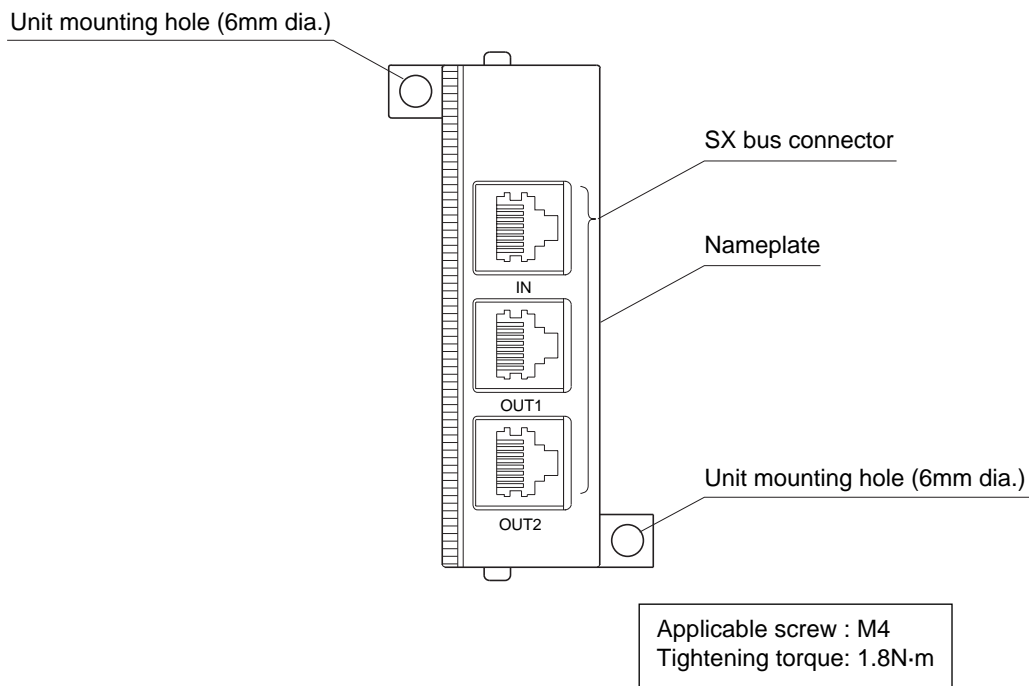
(5) T-link cable specifications

Cables that meet the following specifications should be used for the T-link cables.

Maker	Cable type		Maximum length T-link	Remarks
The Furukawa Electric Co., Ltd., Japan	KPEV-SB	$0.75mm^2$ x 1 pair	700m	Twisted pair cable
	T-KPEV-SB	$1.25mm^2$ x 1 pair	1000m	

Note: The maximum length values in the above table are confirmed by Fuji.

(6) P/PE-link specifications

Cable materials that meet the following specifications must be used for the P/PE-link cable. If other types of cables (including KIV cable or twisted pair cable) are used, the transmission line may malfunction and system faults may occur.

Item		Specification
Name / Type		Coaxial cable / 5C-2V (Conforming to JIS C 3501)
Internal conductor	Material	Annealed copper wire for electrical use JIS C 3102
	Diameter	0.8mm
Insulation	Material	Polyethylene
	Diameter	4.9mm
Shielding		Flexible copper wire braid
Sheath	Material	Non-migration PVC (black)
	Finished diameter	7.4mm
Unit weight		Approx. 74kg/km
Electrical characteristics	Conductor resistance	35.9Ω/km
	Insulation resistance	1000MΩkm
	Dielectric strength	1000V AC, 1 minute

(7) Simulative-input switch (NP8X-SW)

This switch is exclusively used for a digital input module (NP1X1606-W).
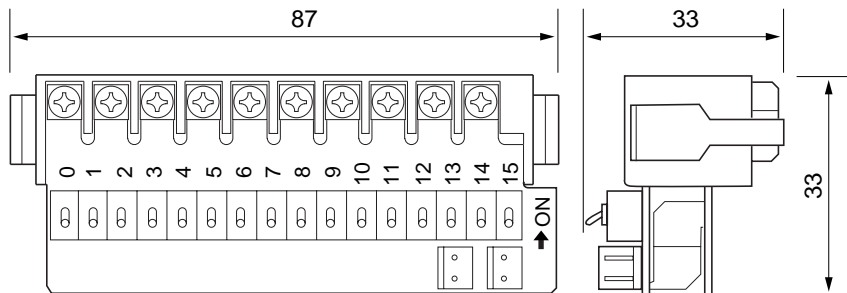
Note: This switch is only used to debug. Do not use this with mounting on the control panel.

(8) Personal computer cable for loader (NP4H-CB2 (cable), NW0H-CNV (converter))
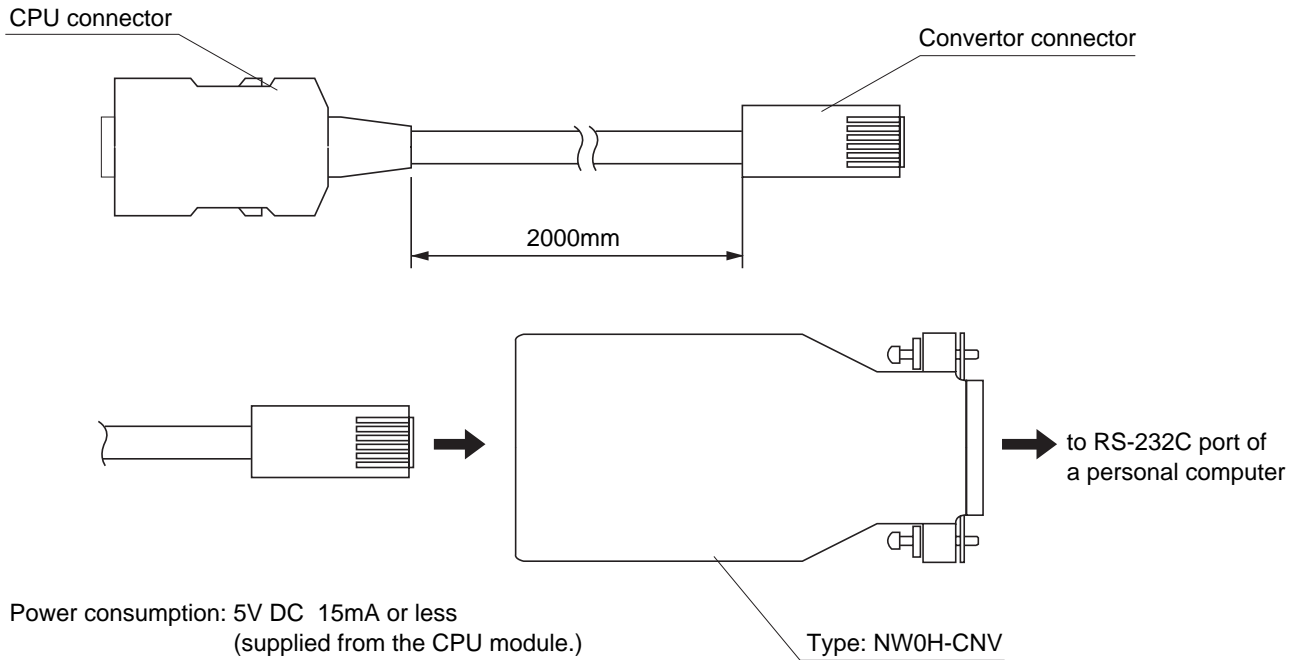
CPU connector

Convertor connector

2000mm

to RS-232C port of
a personal computer

Power consumption: 5V DC 15mA or less
(supplied from the CPU module.)

Type: NW0H-CNV

(9) User ROM card NP8PMF-16 (optional)
This card is used to store application program, system definition and ZIP file of a standard CPU module into the flash
ROM. Mounting this card enables battery-less
operation of standard CPU.

Knob

Connector   Write-protect switch

WRITE
PROTECT   Write protected

WRITE
ENABLE   Write enabled
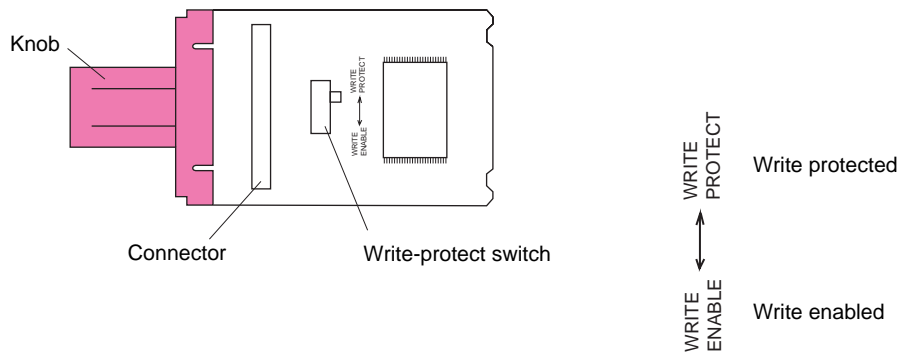
Note: Before using this card, discharge the static electricity of the human body. And furthermore, grip the knob and do
not touch directly electric parts on the printed circuit board except the write-protect switch.

(10) Handy monitor (NW0H-S3ES)
The Handy monitor connects to the MICREX-SX series SPH and SPB (SX-mode) and to the board controller to monitor and test PLC data memory, and has the following functions.

Item	Description
Monitoring function (See Note 1)	Used for on/off monitoring of bit data.
	Used for the word and double-word monitoring of internal memories (I, Q, M/X, Y, M, L, and SM).
Test function (See Note 1)	Used to turn (overwrite) bit data on/off and forcibly turn I/O on/off.
	Used to make word and double-word settings for internal memories (I, Q, M/X, Y, M, L, and SM).
Fault message display	Connects to PLCs that have a fatal or nonfatal fault, in order to display messages describing the fault.
Auxiliary functions	Used to start or stop a PLC.
	Used to make calendar settings.
	Used to turn buzzers on/off.
	Inverter connection function (See Note 2) (Used to display/set function code data, monitor operation, and display alarm information.)

Note 1: Device addresses are compatible with both the SX-Programmer Expert (D300win) and SX-Programmer Standard. Set the appropriate loader type for use.
Note 2: The inverter connection function is used for inverters connected to the RS-485 interface of the board controller.

<Names>

Note) Be sure don't remove this cover.

Modular connector for loader connector

Wall mounting hook

LCD (16 characters x 2 lines)

Contrast volume for LCD

Operation keyboard
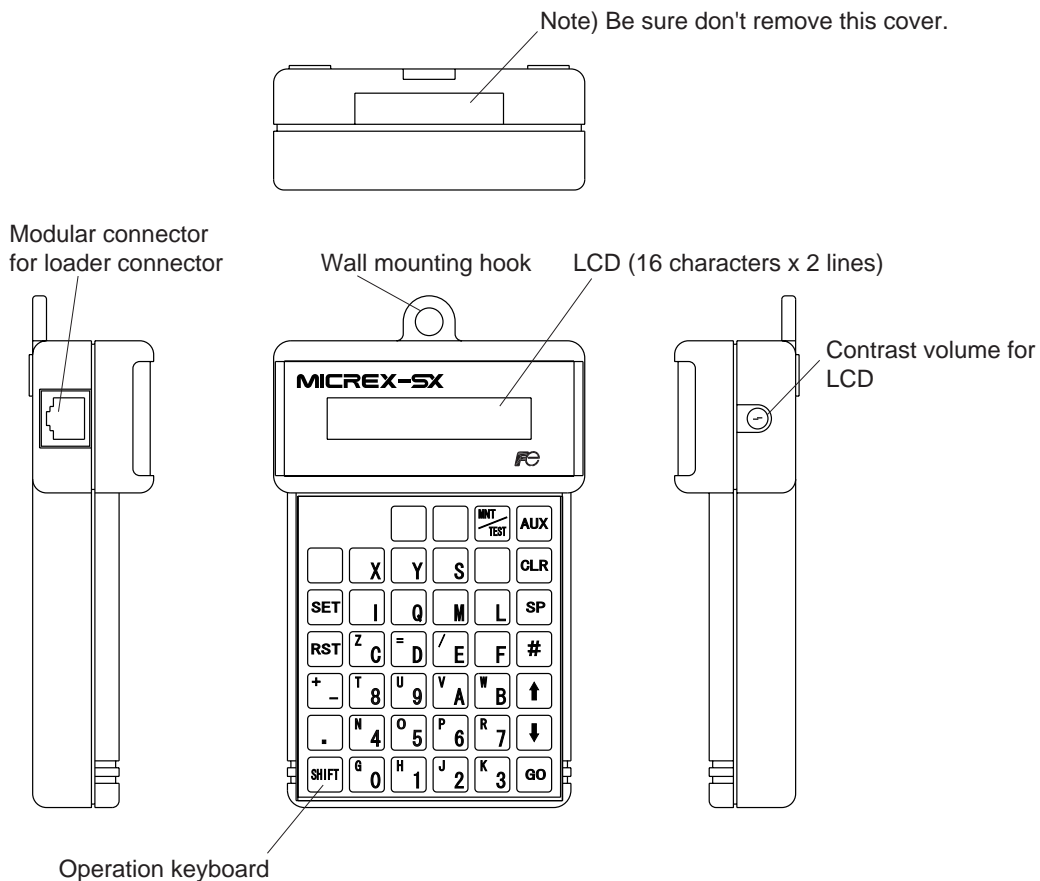
3-11 Dimensions

Dimensions (mm) of SPH modules are shown below.

(1) Power supply module

1) NP1S-22/NP1S-42
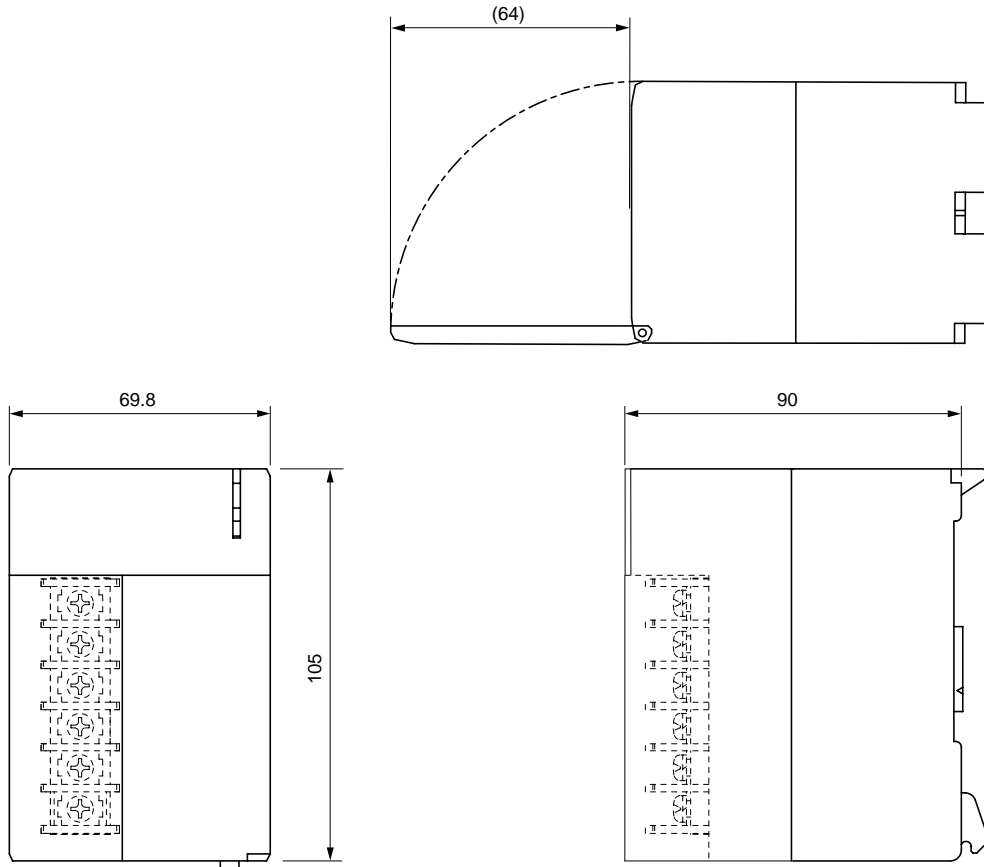
2) NP1S-91/NP1S-81
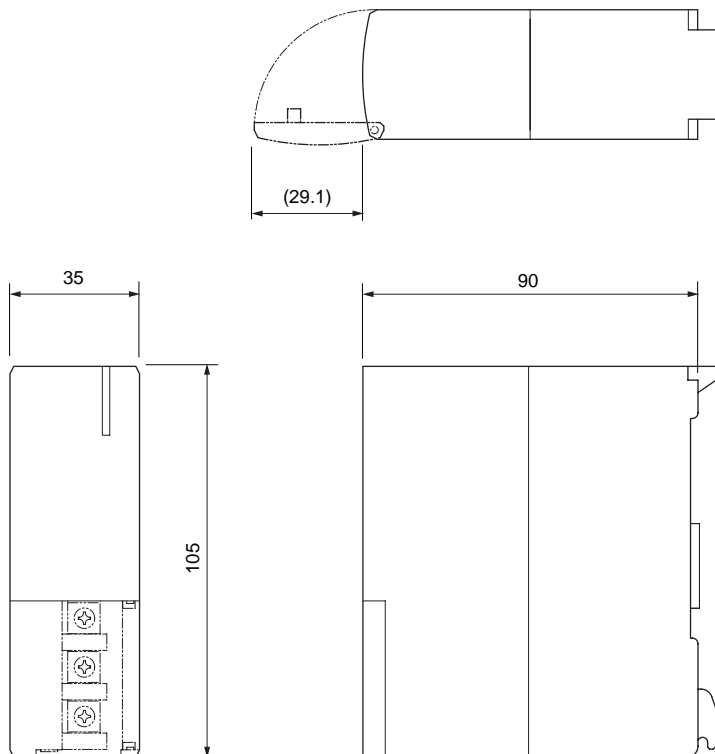
(2) CPU module

1) Standard CPU   NP1PH-16, NP1PH-08
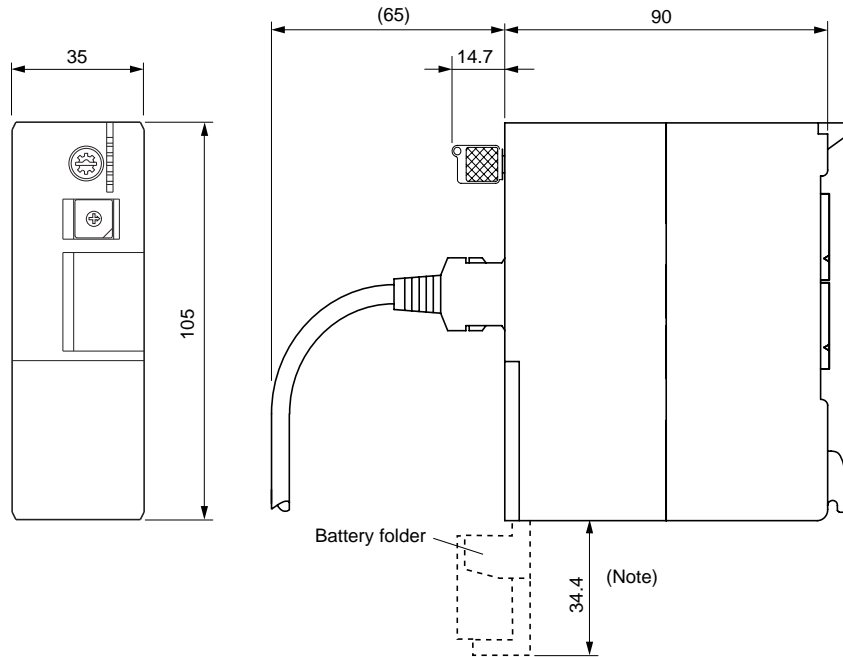
Note: For the standard CPU, open the battery folder at an angle of 180° when user ROM card is removed.

2) High-Performance CPU/SPH2000/SPH3000
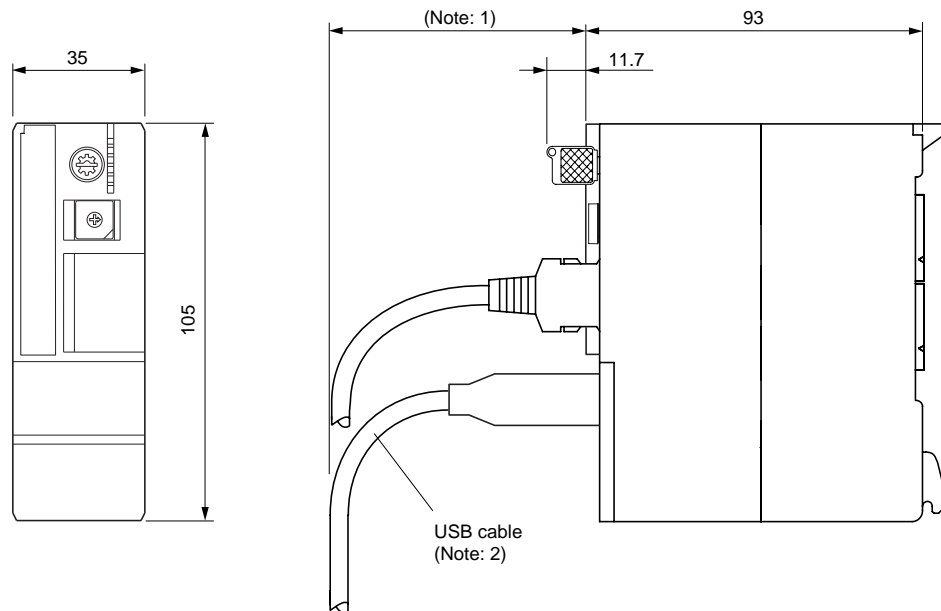
Note: 1 For bend radius, check the specification for the loader cable you use.
Note: 2 When USB cable is used to connect the loader, only Type R high-performance CPU and SPH2000/3000 can be used.

3-11 Dimensions

(3) Base board

1) NP1BP-13/NP1BS-13/NP1BP-13S/NP1BS-13S/NP1BP-13D/NP1BS-13D
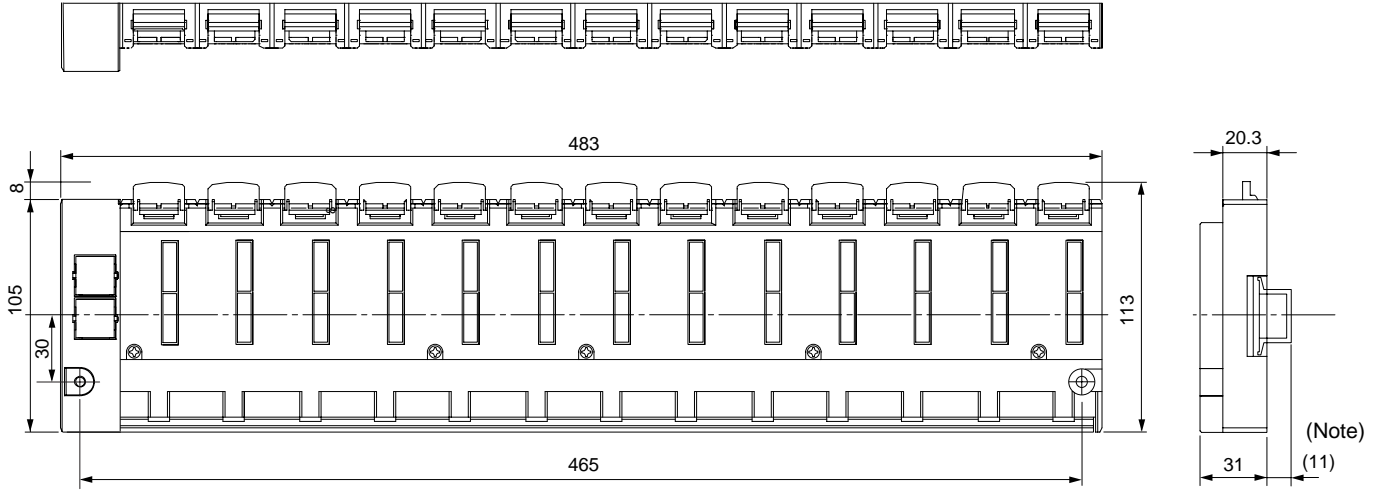
2) NP1BS-11/NP1BS-11S/NP1BS-11D
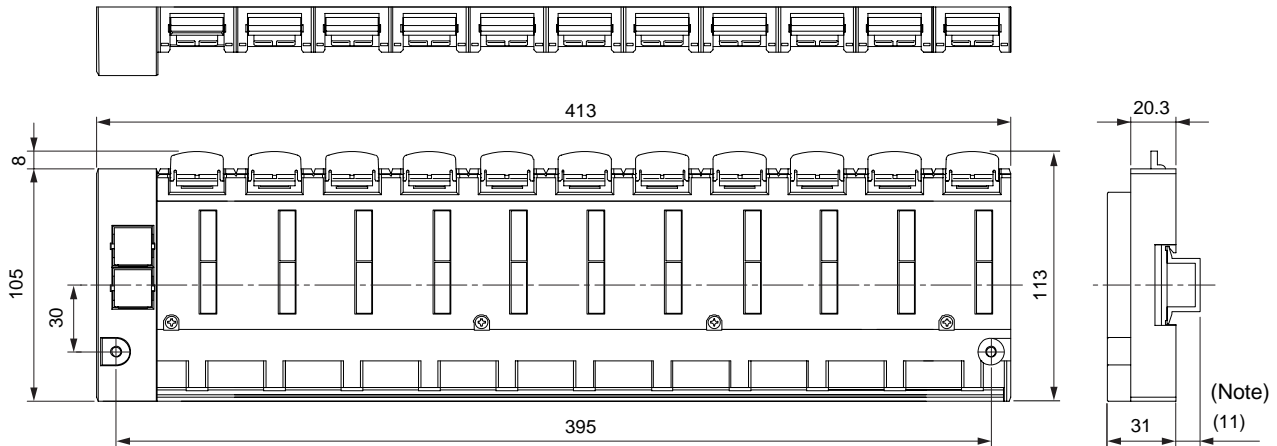
3) NP1BS-08/NP1BS-08S/NP1BS-08D
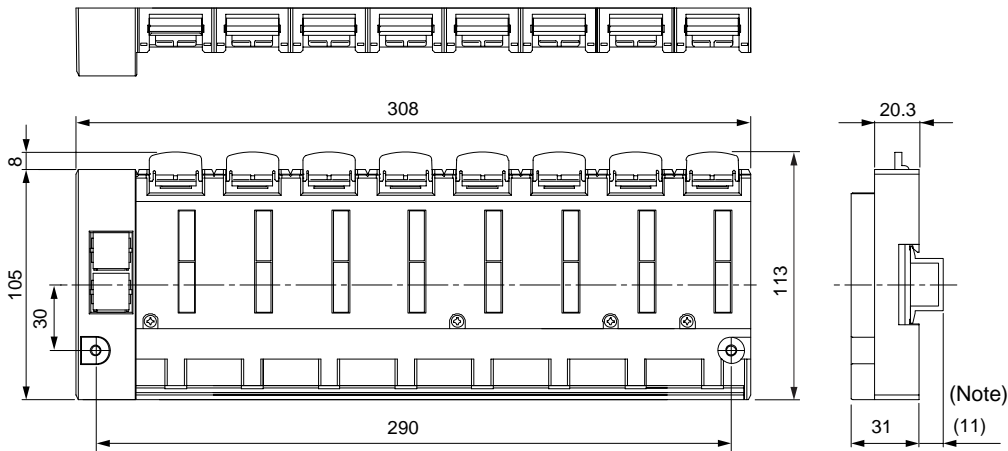
Note: ( ) means to use the rail (TH35-15AL) made by FUJI.

4) NP1BS-06

238

8

105

30

113

220

20.3

31 (11)

(Note)

5) NP1BS-03

133

8

105

30

113

115

20.3

31 (11)
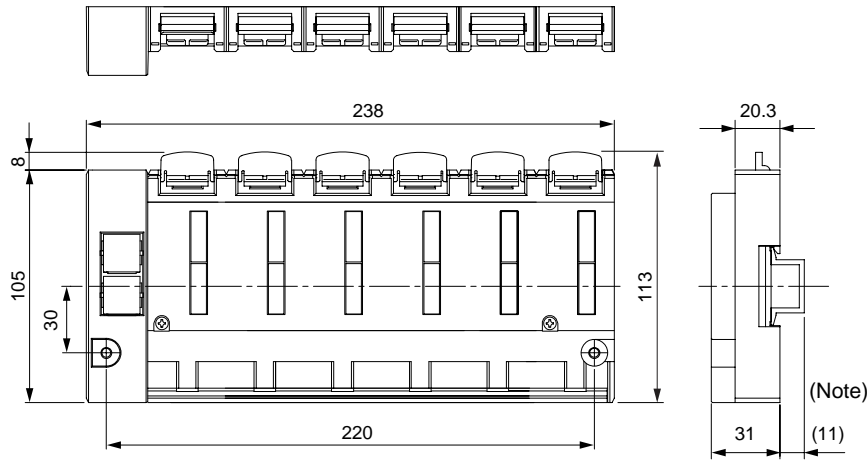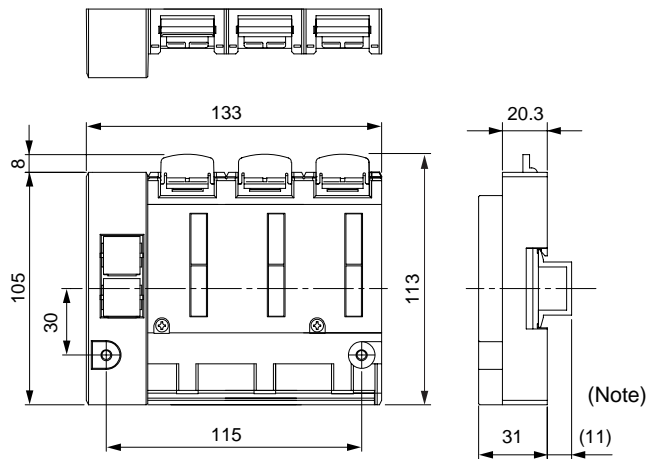
(Note)

Note: ( ) means to use the rail (TH35-15AL) made by FUJI.

(4) Base board mounting bracket (accessories for base board)

Type	L(mm)
For NP1BP-13/NP1BS-13	476.5
For NP1BS-11	406.5
For NP1BS-08	301.5
For NP1BS-06	231.5
For NP1BS-03	126.5

5.8

5.8

12.8

(28.5)

6mm dia., two holes

L

(4)

(5) Base board mounting stud   NP8B-ST

26

42

12 5

17

3-11 Dimensions
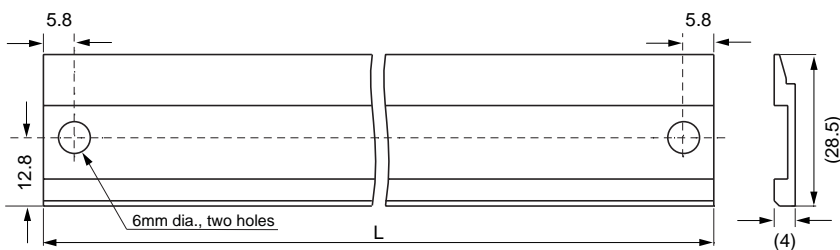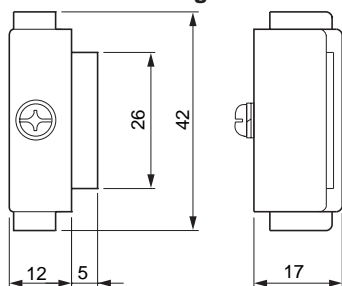
(6) I/O module
1) 6-point/8-point module

35 90 105
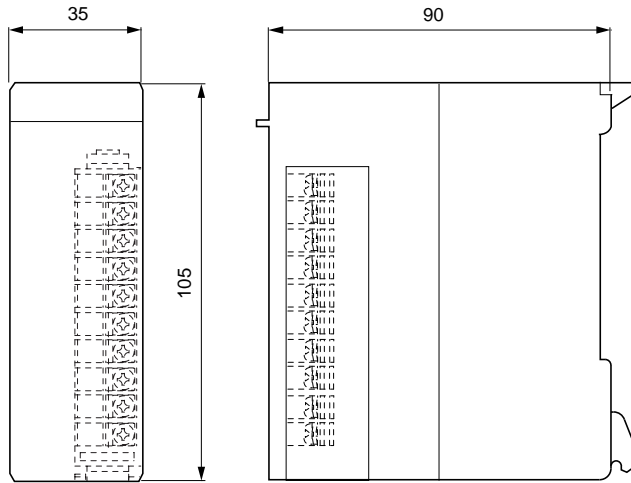
2) 16-point module / Analog input module / Analog output module

35 90 105

3) 32-point module

35 105 (75) (45.2) 90

0 1

4) 64-point module

35   (75)   (45.2)   90   105
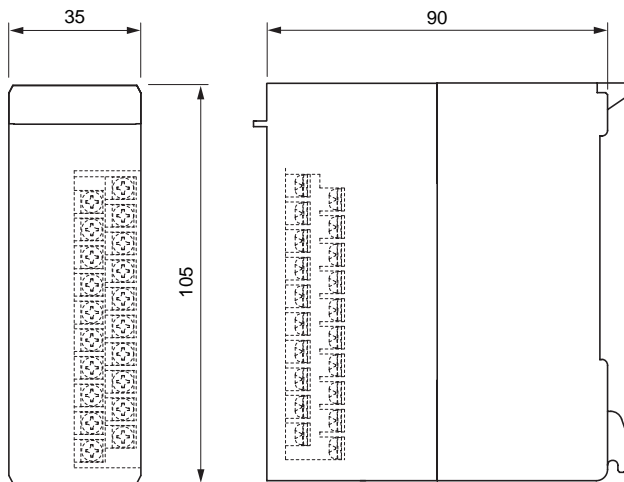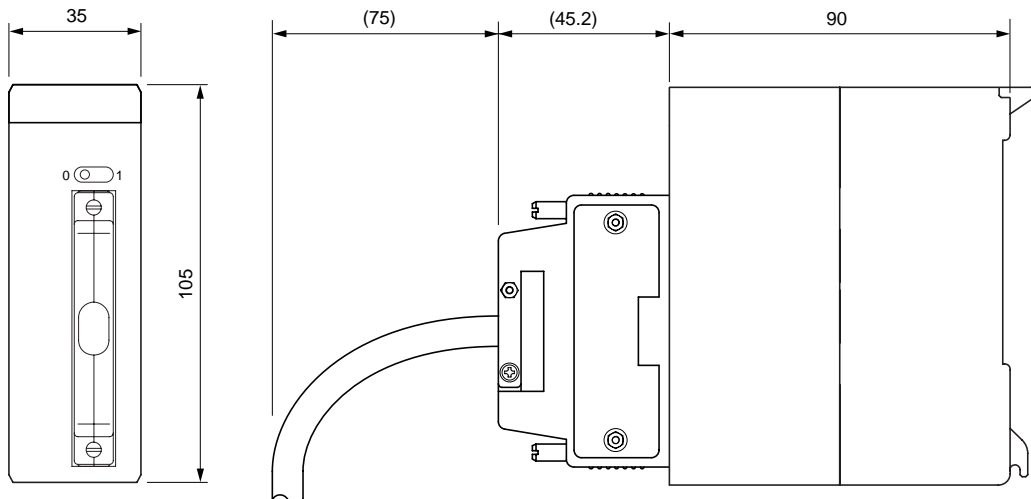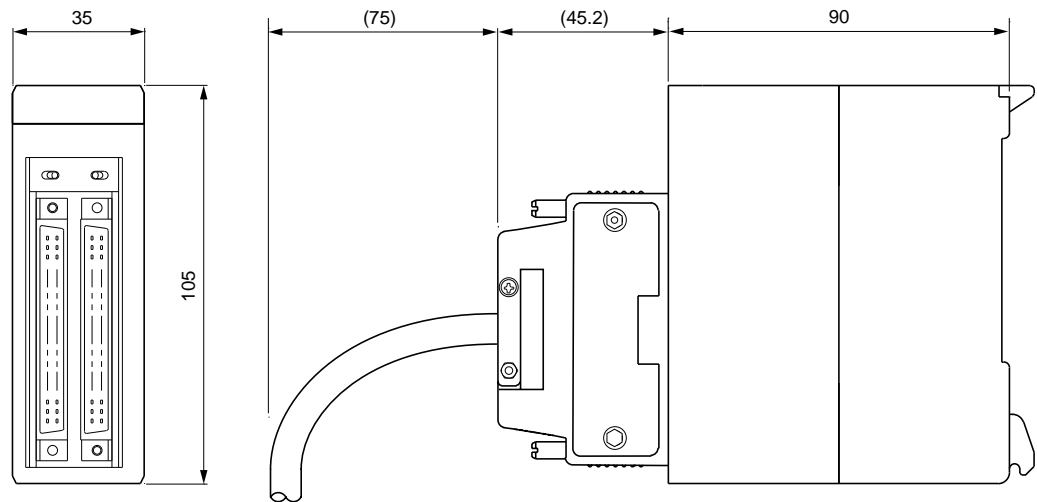
5) Module with protruding terminal block
(Resistance thermometer element input module NP1AXH4-PT, Thermocouple input module NP1AXH4-TC,
High speed analog 8ch input module, 8ch/4ch output module NP1AXH8 □ -MR, NP1AYH8 □ -MR,
NP1AYH4 □ -MR)

35   111   90   105
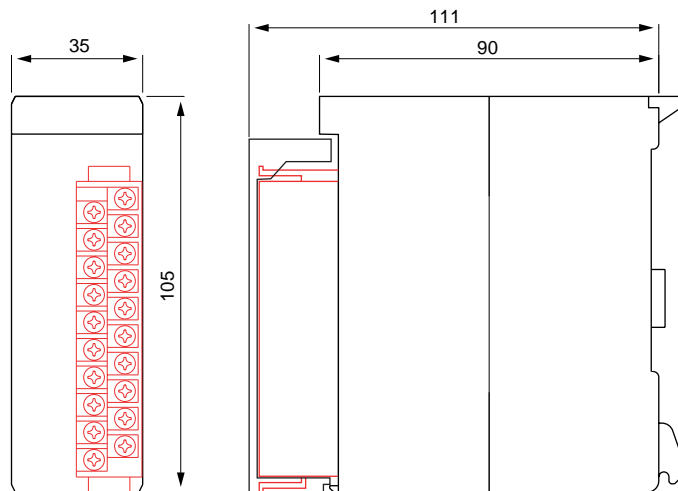
3-11 Dimensions

(7) Communication module
  * For the outside dimensions that are not shown in this manual, refer to the manual for the corresponding module.

1) General purpose communication module NP1L-RS1/2/3/4
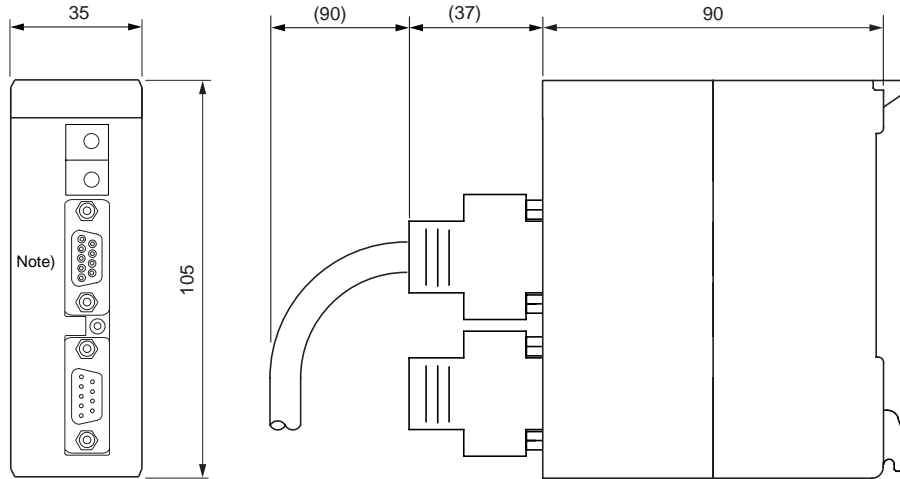
35   (90)   (37)   90   105

Note)

Note: This differs by type, whether or not connectors and switches exist, but outside dimensions are the same for all
    types.

2) T-link master module NP1L-TL1/T-link slave module NP1L-TS1/T-link interface module NP1L-RT1
  P-link module NP1L-PL1/PE-link module NP1L-PE1
   OPCN-1 master module NP1L-JP1/OPCN-1 slave module NP1L-JS1/OPCN-1 interface module NP1L-RJ1
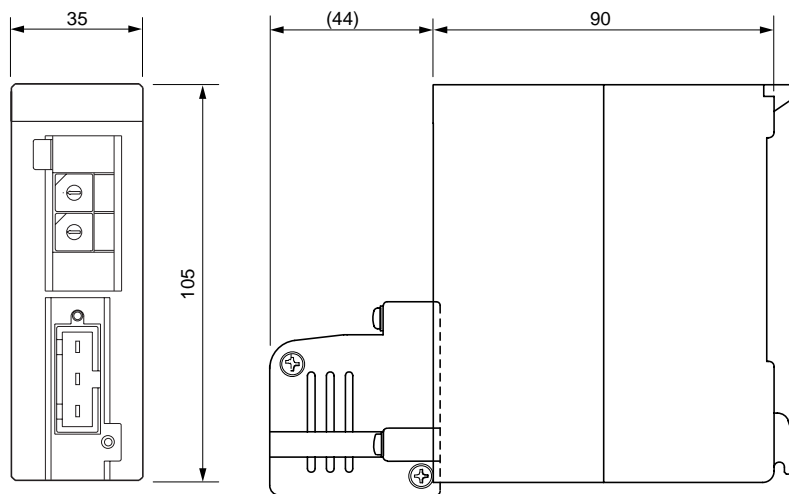
35   (44)   90   105

Note: This differs by type, whether or not connectors and switches exist, but outside dimensions are the same for all
    types.

3) AS-i master module NP1L-AS1/NP1L-AS2

35   (19)   90   105

ONL AUP CM
ERR APF CER

SET
DISPLAY

AS-i+
AS-i-
AS-i+
AS-i-
LG

NP1L-
AS1

3-194
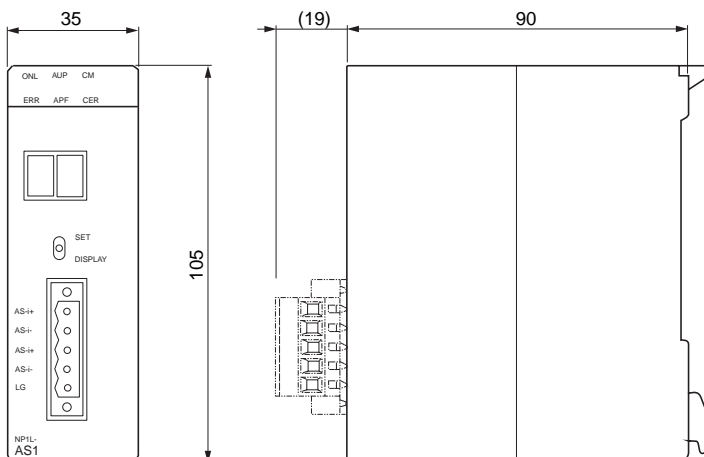
4) FL-net module NP1L-FL1/FL2/FL3

35 Note) 90

105

UTP

Note)

AUI
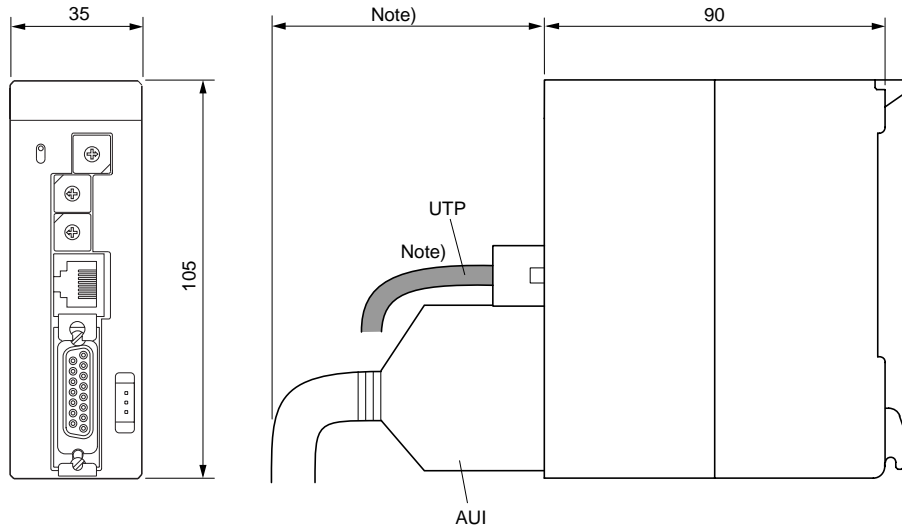
Note: For AUI and UTP cables, you need to take connector dimensions and cable bend into consideration. (For bend radius, check the specification for the cable you use.)

5) DeviceNet master module NP1L-DN1 / DeviceNet interface module NP1L-RD1
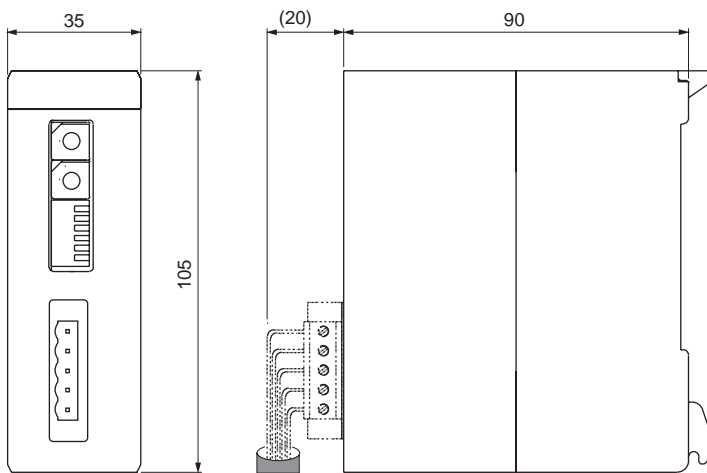
35 (20) 90

105

6) SX bus optical link module NP1L-OL1

35 (min. 83) 90

105

63.5

16.5

Radius of curvature 50mm or more

3-11 Dimensions

7) SX bus optical converter   NP2L-OE1

ø6 M4 screw Fixation

10
29.8
85
95
40
48.3

(min. 83)
95

Radius of curvature 50mm or more

8) SX bus electrical repeater   NP2L-RP1

10
29.8
POWER
85
95
24V
NP2L-
40
ø6 M4 screw Fixation

(min.75)
95
10

Note: For bend radius, check the specification for the loader cable you use.
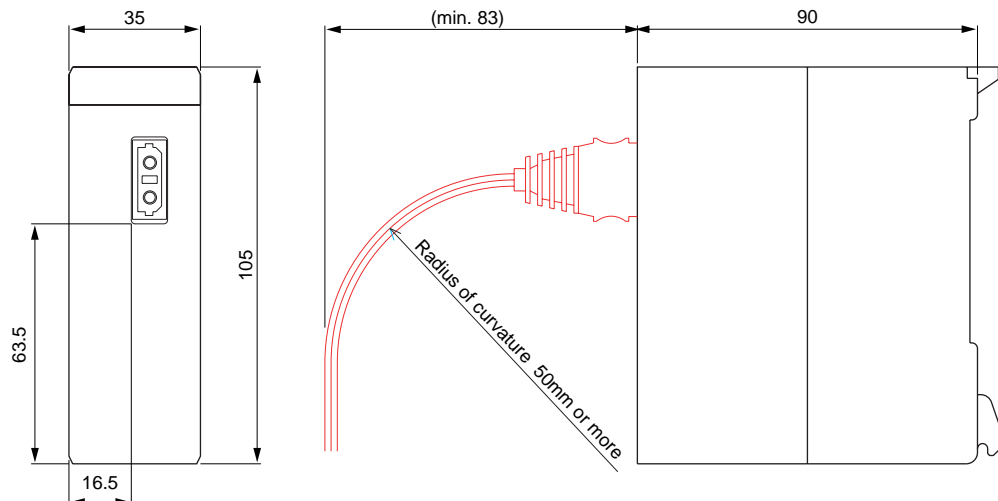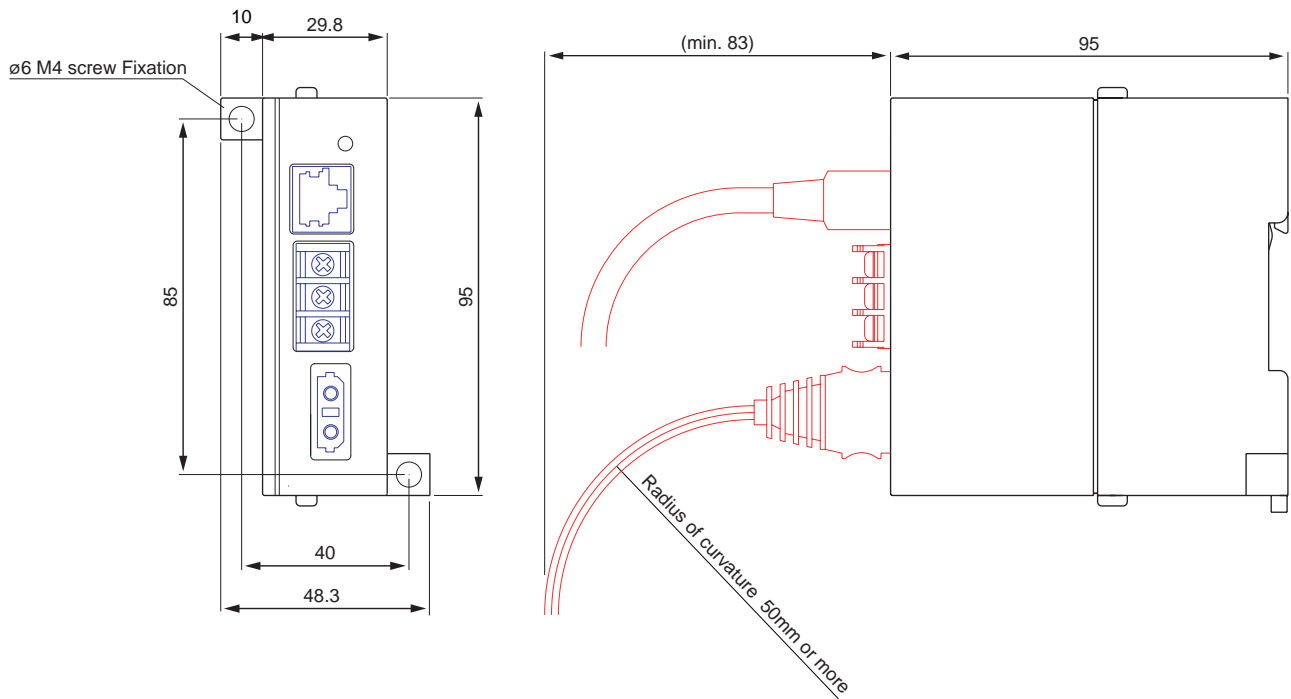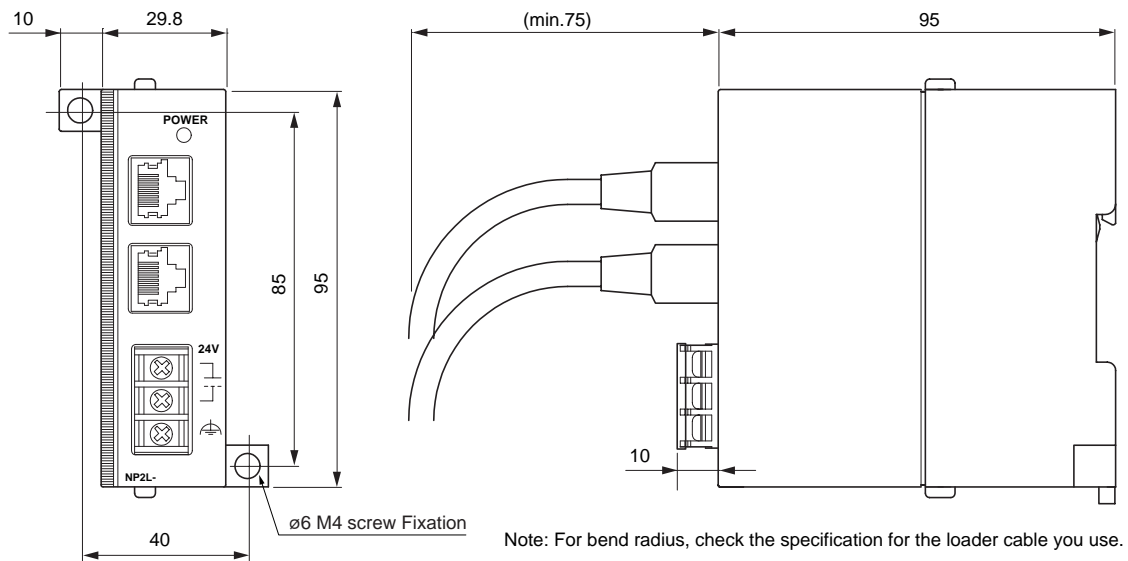
(8) Positioning control module / Unit
 * For the outside dimensions that are not shown in this manual, refer to the manual for the corresponding module.

1) High-speed counter modle NP1F-HC2 / Multi channel high-speed counter module NP1F-HC8
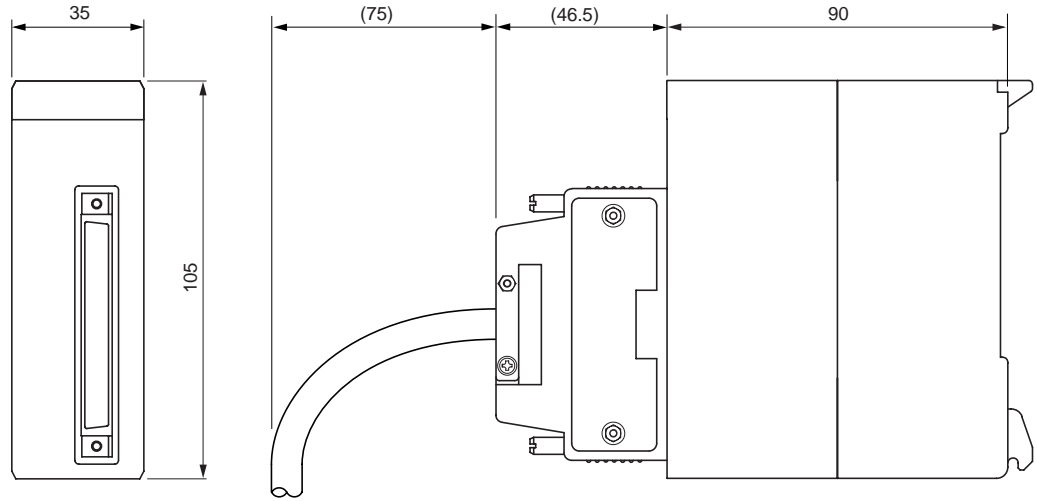
2) Signal converter NP2F-LEV
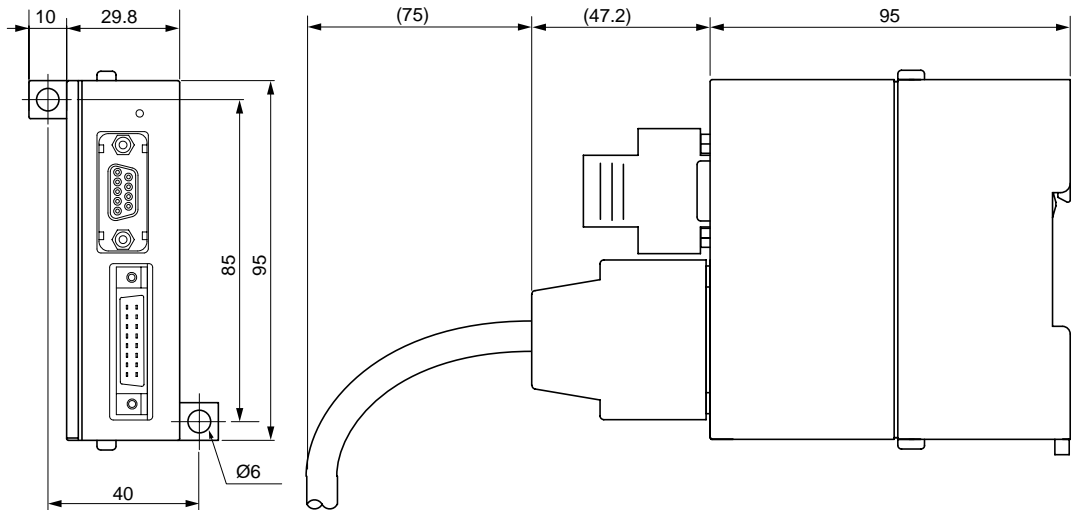
3) Positioning control module NP1F-MA2/NP1F-MP2/NP1F-HP2
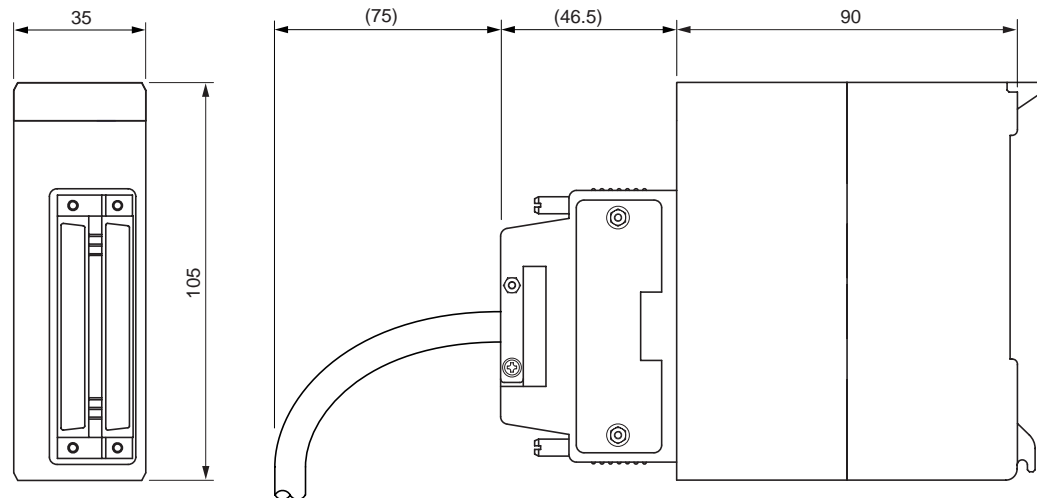
3-11 Dimensions

(9) Function module / Unit

 * For the outside dimensions that are not shown in this manual, refer to the manual for the corresponding module.

1) Memory card interface module NP1F-MM1
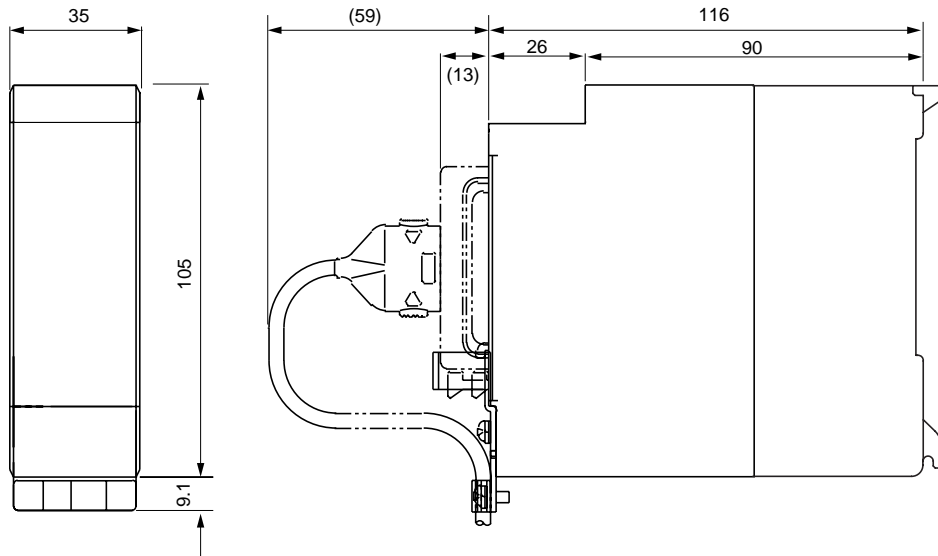
2) Dummy module NP1F-DMY
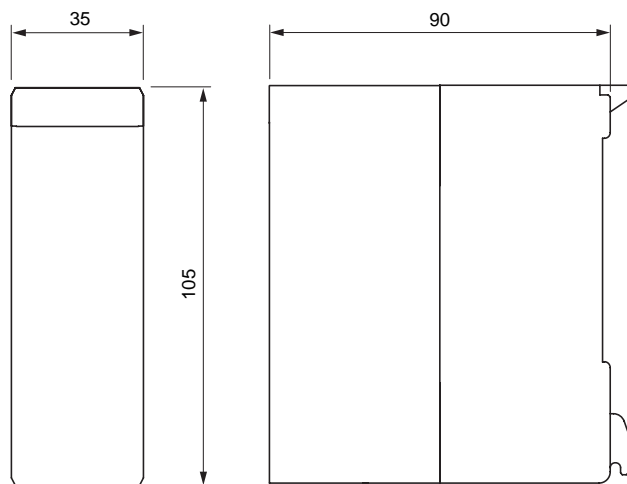
3) SX bus T-branch unit NP8B-TB
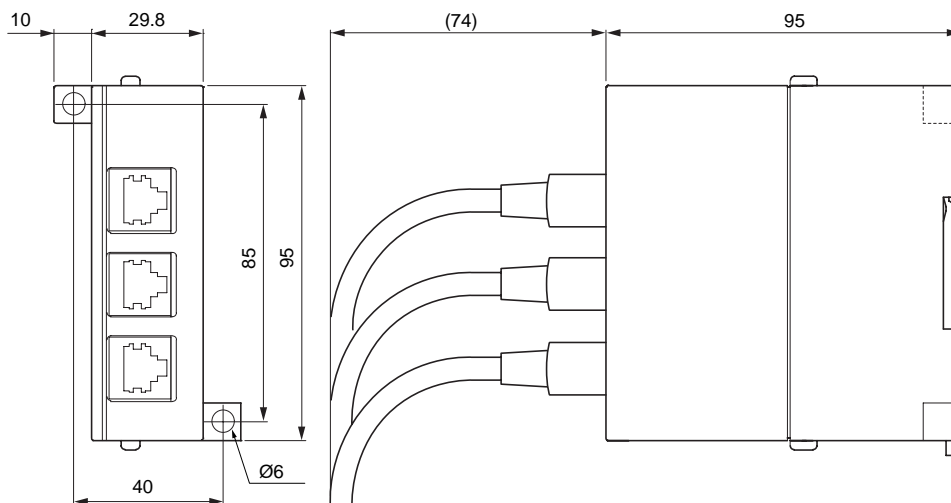
Section 4 Installation and Wiring

⚠ Caution	Do not install or use the product as shown below. Doing so may cause damage, malfunction, or failure of the product.

1) Do not drop or bring down the product.

2) Do not install the unit in locations which are subject to excessive vibration.

3) Do not install the unit in locations where corrosive gas is present.

4) Do not mount the unit on a panel in which high-voltage devices (3000V, 6000V or higher) are mounted.

5) Do not use the same power supply which supplies the power to a noise generating device.

High-voltage device

Noise generating device

6) Do not use the unit in locations which are subject to high or low temperature or high humidity, or locations where condensation may occur because of rapid temperature changes.

Operating temperature: 0 to 55°C
Operating humidity: 20 to 95%RH (without condensation)

4-2-1 Checking delivered products

When unpacking the delivered products, make sure the following:
> 1) The product is exactly the one that you have ordered.
> 2) No products have been damaged during transportation.
> 3) There are all the parts. (For the supplied parts, see the type list in subsection 1-2)

⚠ Caution
◊ Do not use one found damaged or deformed when unpacked, otherwise, failure or erratic operation might be caused.

4-2-2 Installing the control panel

⚠ Caution
◊ Use the control panel under environmental conditions described in the manual. ◊ Using the control panel on locations which are subject to high temperature, high humidity, condensation, dust, corrosive gas, or excessive vibration or shock may cause electrical shock, fire accident, malfunction, or failure.

To further improve the reliability and safety of system, observe the following points:

Item	Remark	Specification
Operating temperature	· The rated operating temperature range is 0 to 55° C · Avoid installing the control panel in locations which are exposed to direct sunlight.	· If the ambient temperature is too high, install a fan or air conditioner; if it is too low, install a heater inside the control panel.
Relative humidity	· The relative humidity range is 20 to 95%. · Be careful not to allow condensation due to rapid temperature changes.	· In the winter time in particular, turning on or off the room-heater may cause condensation due to rapid temperature change. If there is a possibly of condensation, keep the air conditioner turned on even during the night.
Resistance to vibration	· Half amplitude: 0.15mm, Constant acceleration: $19.6m/s^2$ (Note)	· If the control panel is subject to excessive vibration or shock, use vibration-absorbing rubber to secure the control panel or perform anti-vibration processing for the building or floor.
Resistance to shock	· Acceleration peak: $147m/s^2$ (Note)	
Dust	· No conductive dust present	· If excessive gas is present, perform air purification for the control panel.
Corrosive gas	· No corrosive gas present	

Note: When mounted by DIN rail, there should be no vibration or shock.

When mounting the SPH onto the control panel, there are two methods for mounting: mounting the base board directly onto the control panel, and mount the base board using the DIN rail.

4-3-1 Mounting the base board directly onto the control panel

To mount the base board directly onto the control panel, use the base board mounting bracket (NP8B - □) supplied as an accessory.

(1) Mounting dimensions
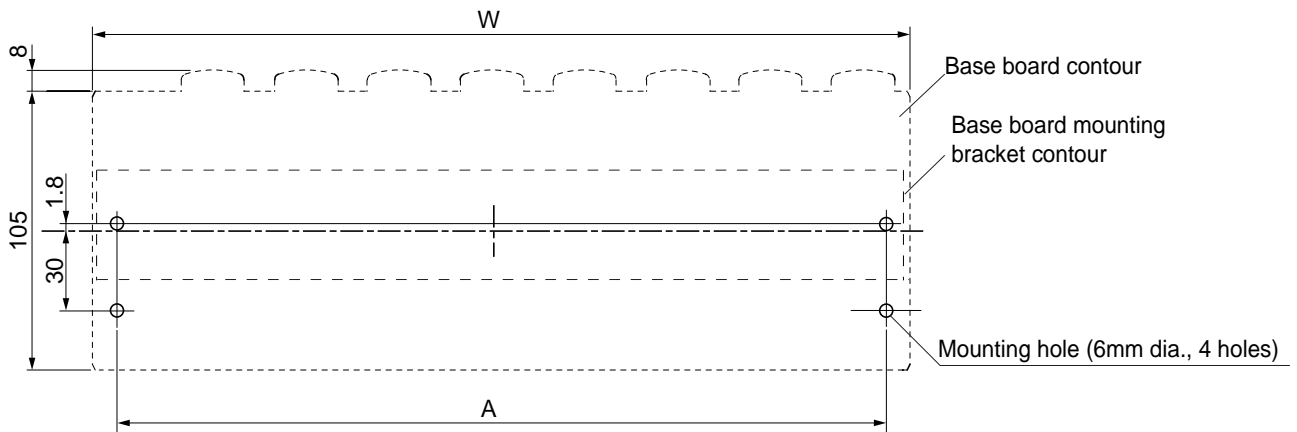
Base board type No.	Mounting hole span A (mm)	Base board width W (mm)
NP1BS-03	115	133
NP1BS-06	220	238
NP1BS-08/08S/08D	290	308
NP1BS-11/11S/11D	395	413
NP1BS-13/13S	465	483
NP1BP-13/13S/13D	465	483

(2) Base board mounting method
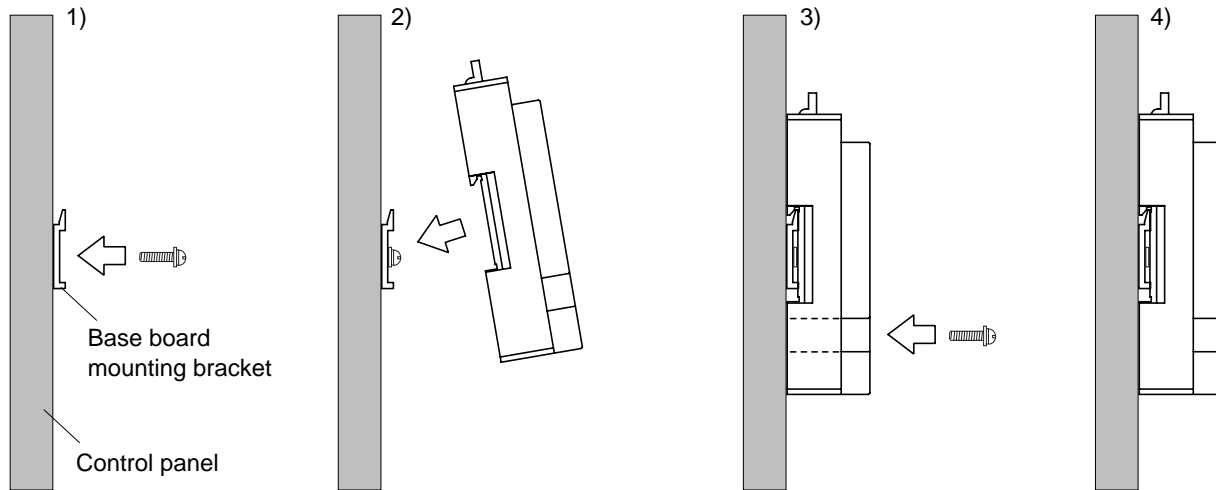
1) Fix the base board mounting bracket onto the control panel with M5 screws.
2) Hang the base board on the base board mounting bracket.
3) Fix the base board by inserting the screws through the direct-mount holes.
4) After mounting the base board, mount the power supply module, the CPU module and other modules.

4-3-2 Mounting with a DIN rail

To mount the base board on the control panel using a DIN rail, use the base board mounting studs which are available as optional items.

(1) Base board mounting stud (NP8B-ST)

Fix the base board mounting studs (options) on the both side of the base board, so that the base board is fixed.
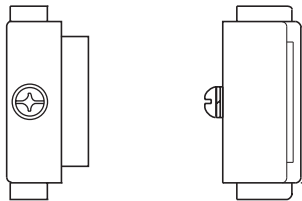
(2) DIN rail

The following DIN rails should be used.

Type	Height (mm)	Length (mm)	Material
TH35-7.5	7.5	900	Iron
TH35-7.5AL	7.5	900	Aluminum
TH35-15AL	15	900	Aluminum

(3) Base board mounting method

DIN rail
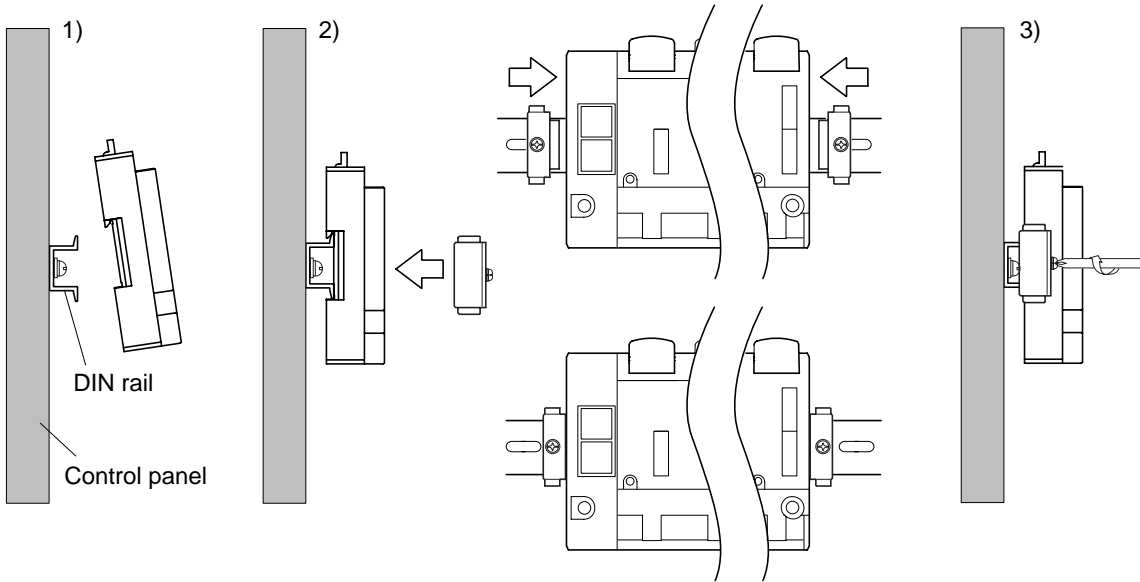
Control panel

1) Fix the DIN rail onto the control panel, and hang the base board on the DIN rail.
2) Insert the base board mounting studs to the sheaths of the base board from the both sides through the DIN rail.
3) Screw down the base board mounting studs. (Tightening torque: 1.0 to 1.3 N·m)

Note: Be sure to fix the base board mounting studs on the both sides of each base board.
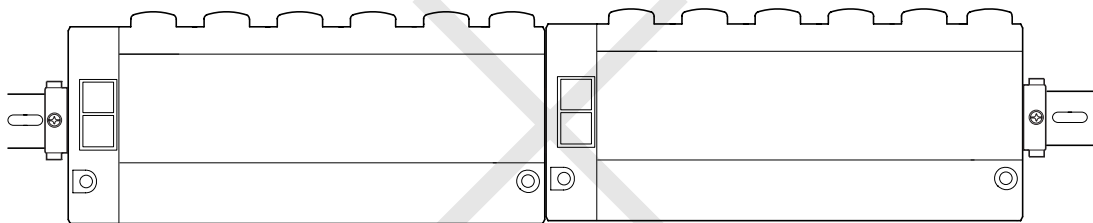
Incorrect
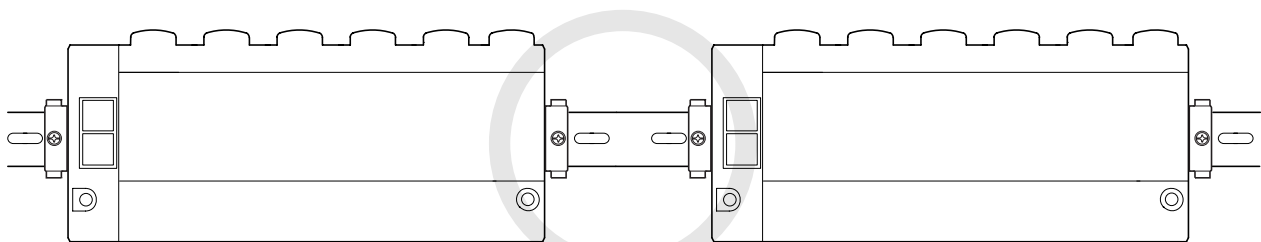
Correct

80mm or more

4-3-3 Mounting modules to the base board

1) Raise the coupler lock which is attached to the slot where the module is inserted. Hang the hock of the module's backside on the lower part (the aluminum part) of the base board.

Coupler lock

Hock
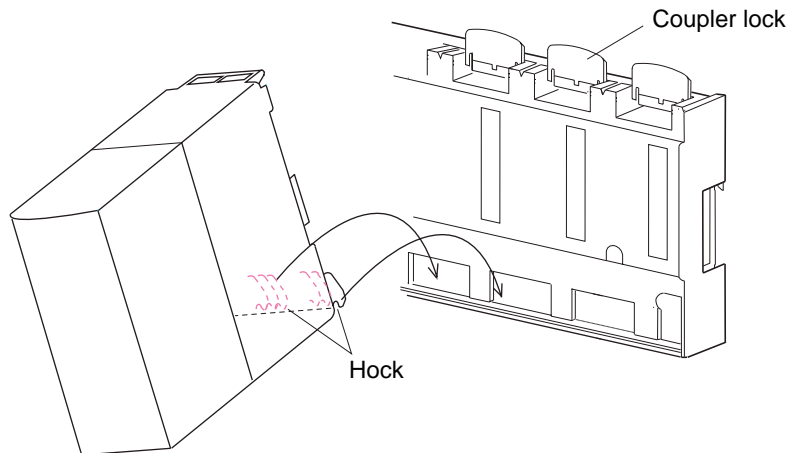
2) Fix the upper part of the module's backside on the base board.
   * Confirm that the hook of the module is stable on the lower part of the base board and is not sliding left or right. If the module is pushed in a sliding position, the connector may be damaged.

The lower part (the aluminum part) of the base board
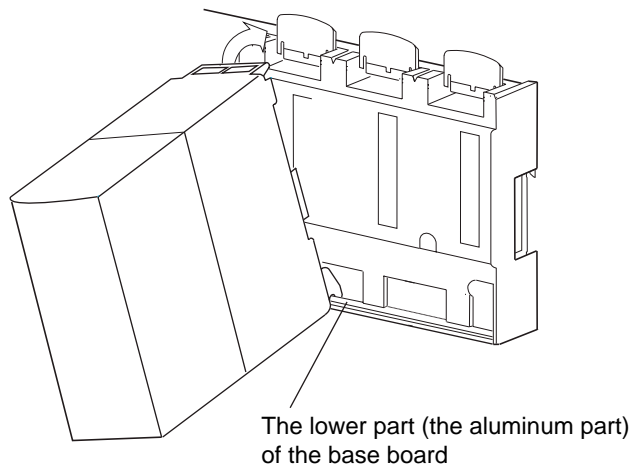
3) Confirm the coupler lock to hang on the hole which is in the upper part of the module's backside. If the module is loose, push the coupler lock to the direction of the arrow.
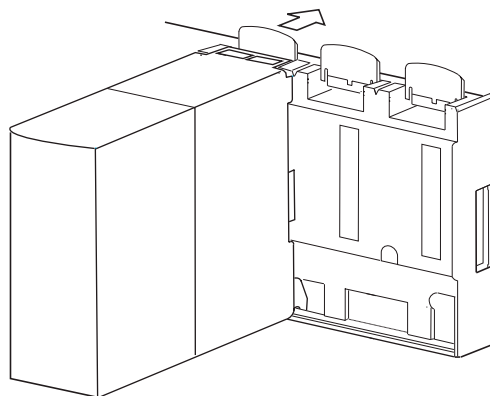
* Remove the module by the reverse procedure with bending the coupler lock.

Note: 1) Do not remove a module in which the power is ON. Confirm the ALM LED (Red) of the power supply module is OFF before removing the module.
2) If the module should be mounted with not hanging the hock to the base board, bend the coupler lock to remove the module with pushing the hock to the base board.
   Removing by force might cause to be broken.

4-3-4 Mounting dimensions of base board and module

Mounting dimensions of the base board and principal modules are shown below.
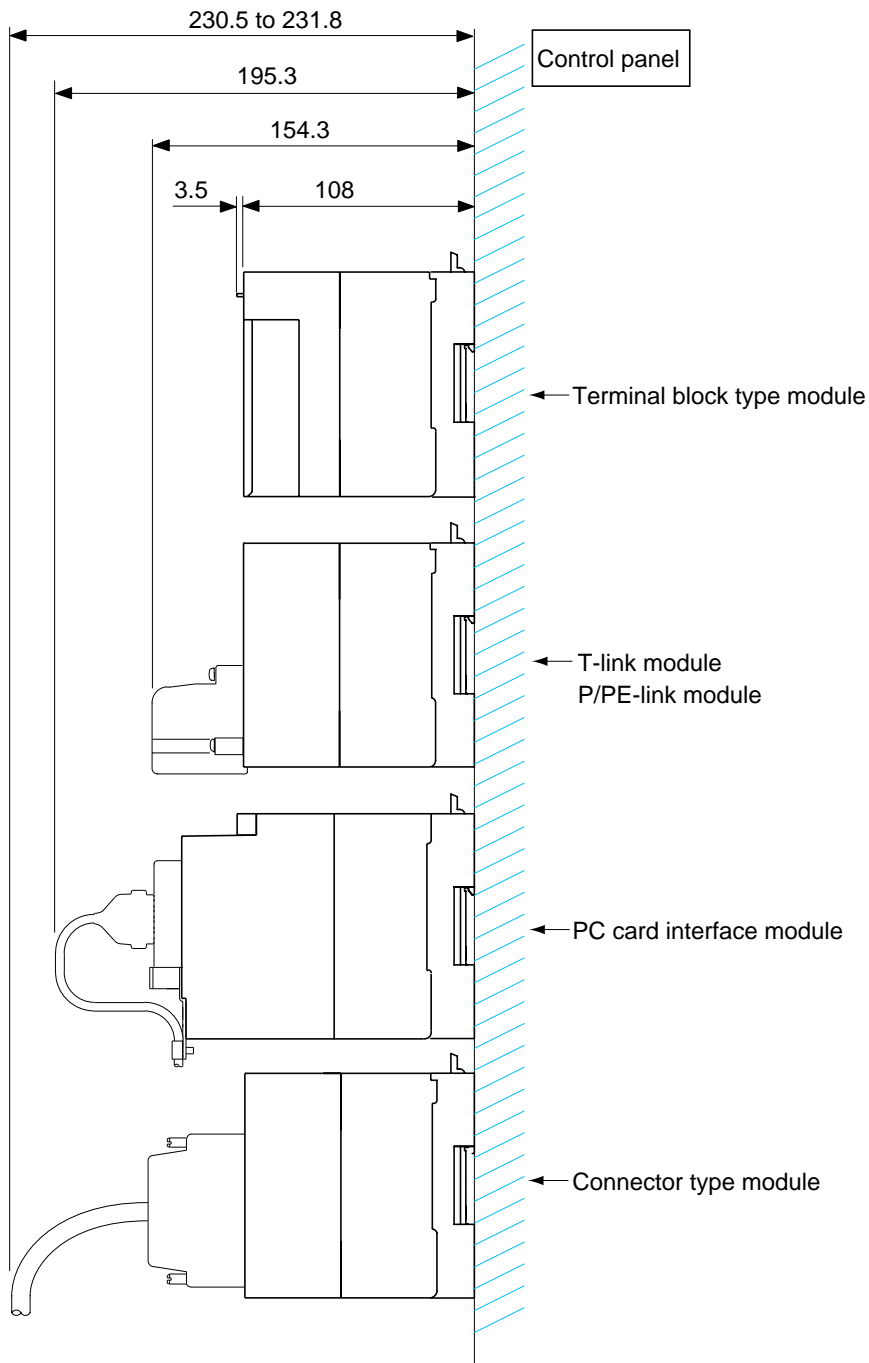
Note: Using the above information, construct the control panel after considering ventilation, workability and maintainability.

4-3-5 Installing PLC units

⚠ **Caution**
◊ Keep an open space around the PC unit as shown below to obtain sufficient ventilation; otherwise, abnormal temperature rise or failure occurs.

Keep an open space as follows:

1) Keep an open space of 110mm (vertical) or 10mm (horizontal) between the PLC units, between remote I/O modules, and between the PLC unit and remote I/O module.

Note: When the base board is mounted on a DIN rail, keep an open space of 80mm in consideration of mounting bracket dimensions and the workability.

2) Keep an open space of 50mm between the PLC unit and other device and between the PLC unit and the wall to obtain sufficient ventilation.
3) Avoid installing heat generating devices (heaters, transformers, or resistors) underneath the PLC unit.
4) Shield or separate the PLC unit as far from high-voltage device, high-voltage cables, or power equipment as possible. Avoid installing PLC I/O cables unit and high-voltage or power equipment cables in parallel.
5) Install the PLC unit perpendicular to the panel floor.
6) The PLC must be installed in a vertical position. Do not install the PLC in other position.
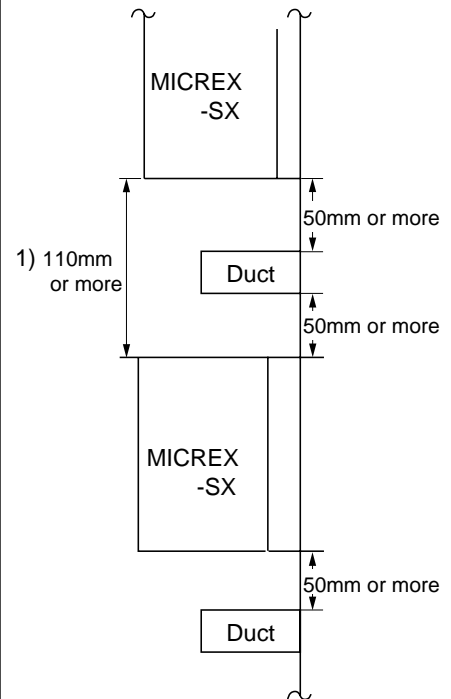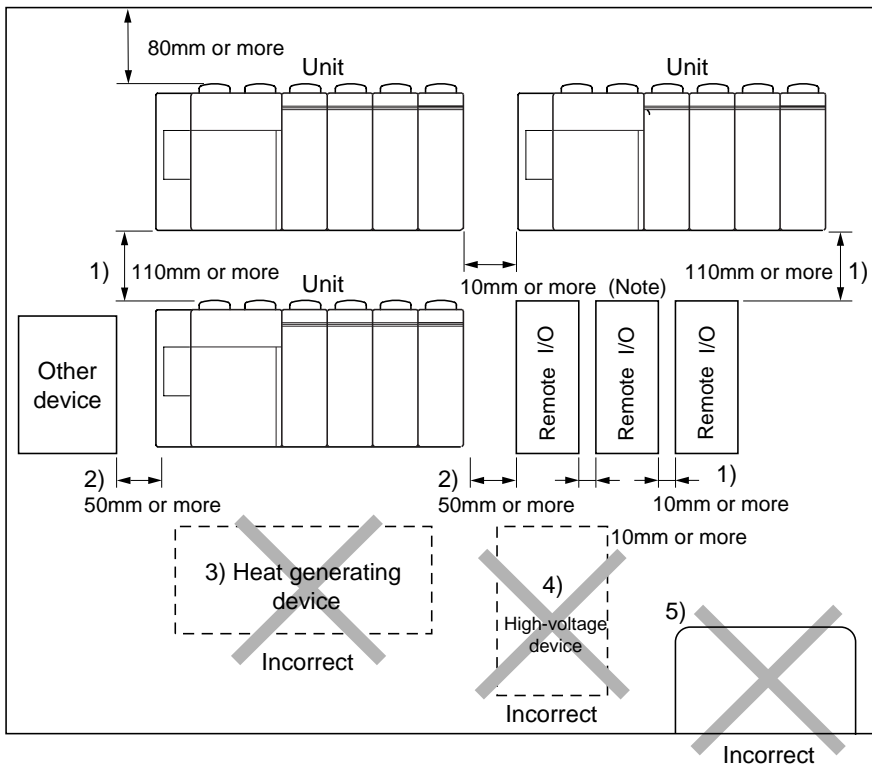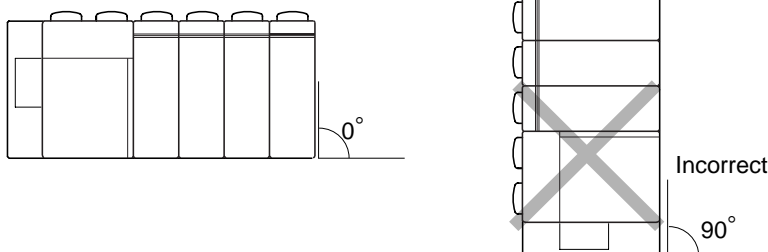
4-4-1 Safety precautions for wiring

When performing wiring, observe the following points:

(1) Warning for wiring

⟨!⟩ **Warning**
◊ Never touch any part of charged circuits as terminals and exposed metal portion while the power is turned ON. It may result in an electric shock to the operator.   ◊ Turn OFF the power before mounting, dismounting, wiring, maintaining or checking, otherwise, electric shock, erratic operation or troubles might occur.   ◊ Place the emergency stop circuit, interlock circuit or the like for safety outside the PLC. A failure of PLC might break or cause problems to the machine.   ◊ Do not open the FG terminal with the LG-FG short circuited. (It must be grounded, otherwise it might cause electric shock.)

(2) Cautions for wiring

⚠ **Caution**
◊ Select a wire size to suit the applied voltage and carrying current, and carry out wiring according to the operating instructions and manual. Poor wiring might cause fire.   ◊ Periodically make sure the terminal screws and mounting screws are securely tightened. Operation at a loosened status might cause fire or erratic operation.   ◊ Contaminants, wiring chips, iron powder or other foreign matter must not enter the device when installing it, otherwise, erratic operation or failure might occur.   ◊ Before installing or wiring the PLC, take measures against static electricity, wearing a static eliminating band, for example, to discharge static electricity that accumulates on your body.   ◊ Do not directly touch IC pins on the printed circuit board or connector pins. Much static electricity may cause malfunction or failure.

(3) Cautions for checking wiring

⚠ **Caution**
◊ Sufficiently make sure of safety before program change, forced output, starting, stopping or anything else during a run.   ◊ Engage the loader connector in a correct orientation, otherwise, an erratic operation might occur.

(4) Cautions after wiring

⚠ **Caution**
◊ Remove the dust-cover seals of modules after wiring, otherwise, fire, accidents, failure or fault might occur.

(5) Other precautions

a)For wiring terminal block type module, take the following precautions.

· Use the crimp terminals not to contact with each other and keep a clearance of 3.2mm or more.

· Apply the insulation sheath for the crimp terminal.
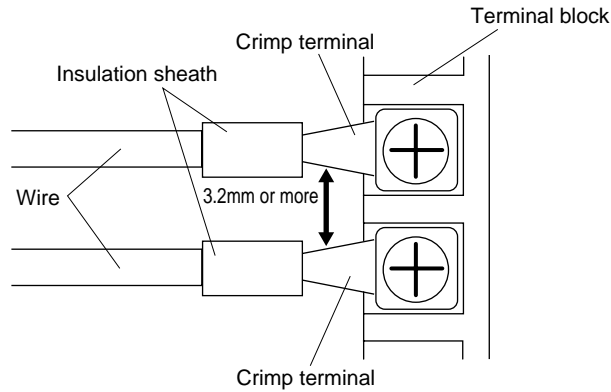
· Keep the bending of 1.5 times of the sheath for the wire, otherwise, a break might occur.

b)Wiring of NP1S-81 A, NP1S-91 A(UL Recognized condition)

Power supply terminal of NP1S-81 A and NP1S-91 A is UL recognized as Factory wiring only.

If you wire power line cable at field, do not directly wire from outside of control panel to power supply module (NP1S-81 A or NP1S-91 A) terminal.

Please locate terminal block inside of control panel and connect power line together at this terminal.

Or use power line cable that is wired at factory.

4-4-2 Wiring of power supply

AC power supply

Keep the distance between the insulating transformer (or the noise filter) and the power supply module as short as possible, and the cable must be twisted densely.

Breaker

AC power supply

Insulating transformer, Nose filter

M4 screw

1)

NP1S-22

PWR

ALM

INPUT

100-120V AC
200-240V AC
50/60Hz

LG

FG

CAUTION
SHORT:
100V AC
OPEN:
200V AC

ALM

100V AC:85 to 132V AC
200V AC:170 to 264V AC

Do not bundle up and do not close.

3)

2)

4)

Grounding
(ground resistance
of 100Ω or less)

Voltage selection
Short: 100V AC
Open: 200V AC

(Note) Be sure to use crimp terminals.
(Tightening torque: 1.2N·m)

DC power supply

Keep the distance between the DC power supply and the power supply module as short as possible, and the cable must be twisted densely.

Breaker

DC power supply

M4 screw

1)

NP1S-42

PWR

ALM

INPUT

24V DC

LG

FG

NC

NC

ALM

24V DC:22.8 to 26.4V DC

3)

Grounding
(ground resistance
of 100Ω or less)

4)

(1) Wiring of power supply

For AC power supply

Wire to a 100 to 200V AC or 200 to 240V AC power supply. The thickness of the wire must be 2mm^2, and the wire must be twisted densely.

For DC power supply

Wire to a 24V DC power supply (22.8 to 26.4V DC).

[Tips]

The tolerance range of SPH AC power supply is 85 to 132V AC for 100V AC, and 170 to 264V AC for 200V AC. But the voltage is recommended to be as near the rated voltage (100 to 110V AC, 200 to 220V AC) as possible.

In the case of the lower voltage, a small voltage drop will cause a power failure. If power supply voltage fluctuation exceeds the specified range, connect a voltage stabilizer to the power supply.

For noise reduction of the power supply, an insulating transformer or a noise filter is effective between the breaker and the power supply module. Take care of the following points:

- Do not bundle up or do not close the primary wire and the secondary wire of the insulating transformer or the noise filter.
- Keep the distance between the insulating transformer (or the noise filter) and the power supply module as short as possible, and the cable must be twisted densely.

(2) Voltage selection (for only AC power supply)
100V AC: Short (using a jumper plate)
200V AC : Open

(3) Grounding
For grounding, follow the description below.

· Connect the FG terminal to the integrated ground section of each control panel (FG bus, FG integrated terminal block, or stud) in branch-type configuration. The thickness of the ground wire must be 2mm^2. Allocate the grounding point as near the module as possible, and keep the ground wire as short as possible.

· The integrated ground section of each control panel must be connected to the integrated ground board, which is installed according to the distribution of devices in a branch-type configuration. The thickness of the ground wire must be 5.5mm^2 or more.

· Separate the ground wire as far from the lines of high-voltage circuits and main circuit as possible. In addition, keep the distance at which they run in parallel as short as possible.

· For grounding, use an exclusive ground pole and wire which are separated from the ground system of other power circuits.

· The grounding should be exclusive. The grounding resistance is 100Ω or less. Separate the ground pole 10m or more from that of other power circuit.

· When an exclusive grounding is not available, use a common grounding as shown below.

· When installing in a place affected by frequent lighting surges, all the CPU modules and input/output modules should be electrically insulated from the control panel. Also, modules and units should be earthed to the ground individually.

PLC Other device	PLC Other device	PLC ✕ Other device
Grounding resistance 100Ω or less	Grounding resistance 100Ω or less	
Exclusive grounding·······Best	Common grounding·······Good	Common grounding·······Not acceptable

---
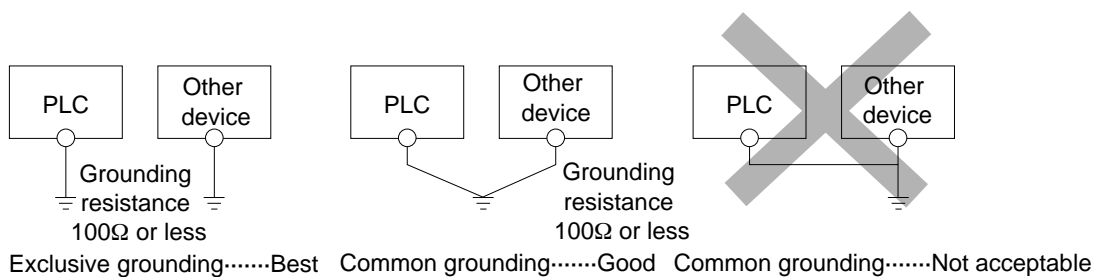
⚠ Warning

◊ Do not open the FG terminal with the LG-FG short circuited. (It must be grounded, otherwise it might cause electric shock.)

<Grounding example>
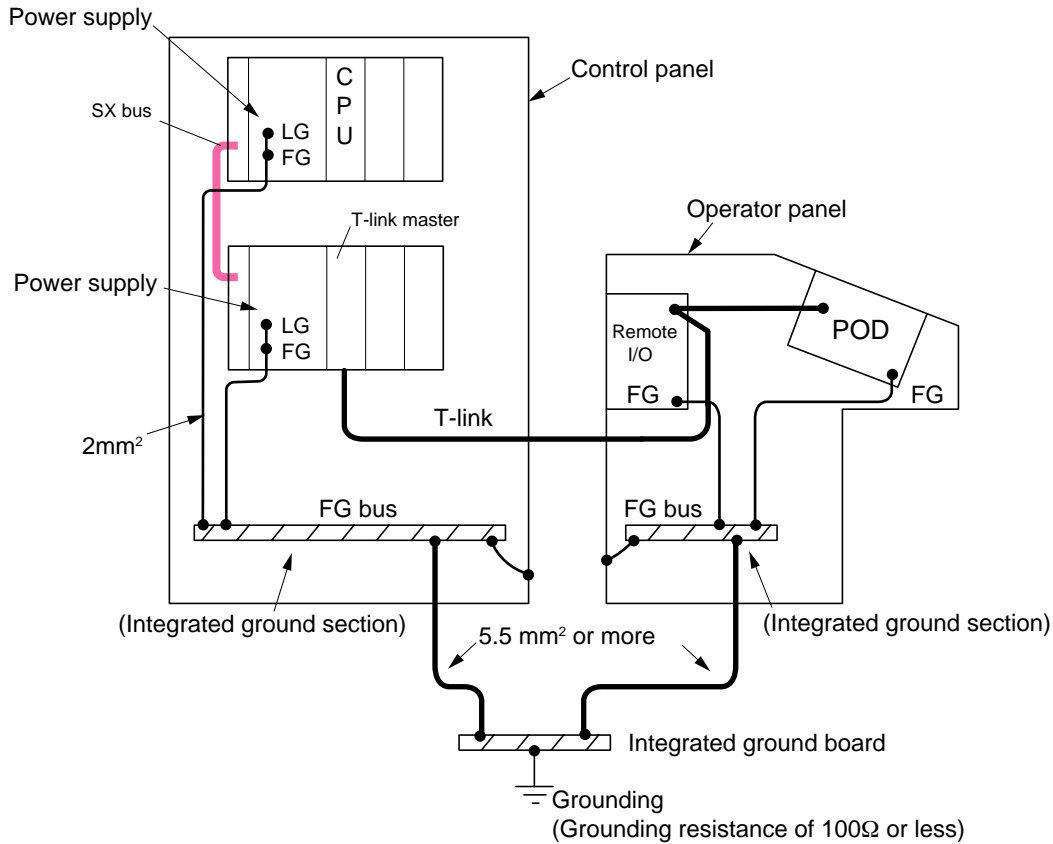
(4) ALM Contact wiring

When two (or three) power supply modules are mounted on one base board for the purpose of redundancy, the ALM contact can be used to detect any fault in power supply modules. (See Note)

The ALM contact should be wired to an input module or an external alarm lamp.

Note: The ALM contact provided built-in the "NP1S-22" and "NP1S-42" only. The ALM contact not provided built-in the "NP1S-91" and "NP1S-81".

The ALM contact is an NC contact. While the power supply module is normal (output voltage is 22.8 to 26.4V), the ALM contact is OFF. If the power supply module is not normal, the ALM contact is ON.

<Examples>

Examples with DC input module (NP1X1606-W) are shown below.

To ALM connector of the power supply module
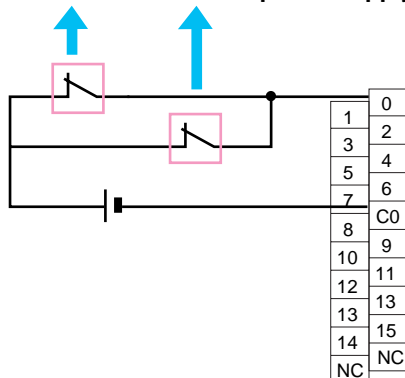
4-4-3 I/O wiring

I/O wiring depends on the module type, connected external devices, electrical specifications and the environment.
The following is a general description.

(1) For terminal block type

<Applicable crimp terminals and cable sizes>

There are two types of terminal block: the 10-pole type (M3) and 20-pole type (M3). Select the appropriate cable, and crimp terminals to be used. Applicable cable sizes and crimp terminals are as follows:

Maker	Form	Type	Cable size	
			AWG #	mm^2
AMP	Round terminals	36467	22 to 18	0.3 to 0.8mm^2
		34104		
		34105		
Nichifu	Round terminals	0.3-3	24 to 20	0.2 to 0.5mm^2
		0.3-3N		
		1.25-3	22 to 16	0.3 to 1.3mm^2
		1.25-3N		
		1.25-3S		
		1.25-3.5N		
		1.25-3.5S		
		2-3N	16 to 14	1.3 to 2.0mm^2
	Angle edge terminals	0.3Y-3	24 to 20	0.2 to 0.5mm^2
		1.25Y-3	22 to 16	0.3 to 1.3mm^2
		1.25Y-3N		
		1.25Y-3S		
		1.25Y-3.5		
		2Y-3	16 to 14	1.3 to 2.0mm^2
		2Y-3.5S		
		AT1-10	22 to 16	0.3 to 1.3mm^2
		AT2-10	16 to 14	1.3 to 2.0mm^2
JST	Round terminals	SRA-20-3.2	22 to 18	0.3 to 0.8mm^2
		SRA-20T-3.2		
NTK	Round terminals	0.4-3	26 to 22	0.2 to 0.3mm^2
		1.25-3	22 to 16	0.3 to 1.3mm^2
	Angle edge terminals	VR1.25-3		
		VD1.25-3		
		VD2-3S	16 to 14	1.3 to 2.0mm^2
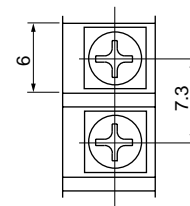
Terminal dimensions

When 2.0mm^2 wire is used as signal line, the terminal cover might not be closed.

<Tightening torque>

When using crimp terminals, tightening torque is 0.5 to 0.7N·m.

(2) For connector type

<Applicable connectors and cable sizes>

40-pin connectors (Fujitsu) are used as shown below.

Classification	Type (Fujitsu)		Cable size
	Jack	**Cover**	
Soldered type (Note 1)	Socket: FCN-361J040-AU	FCN-360C040-B (B type)	AWG23 or less (0.60 mm dia. or less)
Crimp type	Housing: FCN-363J040 Contact: FCN-363J-AU	FCN-360C040-D (D type: Wide mouthed type) FCN-360C040-E (E type: Long screw type) FCN-360C040-J2 (J2 type: Thinly, obliquely mouthed type)	Standard terminals: AWG24 to 28 (0.51 mm dia. to 0.32 mm dia.) Thick terminals: AWG22 to 28 (0.64 mm dia. to 0.32 mm dia.)
Wire wrapping type	FCN-362C040-AU		AWG28 to 30 (0.32 mm dia. to 0.26 mm dia.)
Insulation displacement type	FCN-367J040-AU/FW	(Cover is not necessary.)	Flat cable 1.27 mm pitch (Note 2) Strand wire: AWG28 (0.08 mm^2) Solid wire: AWG30 (0.05mm^2)
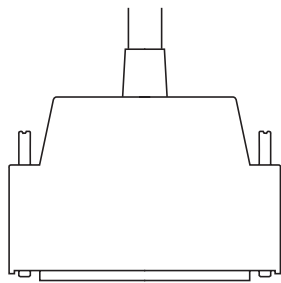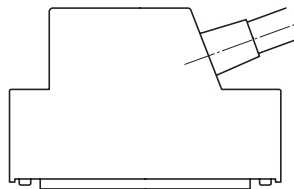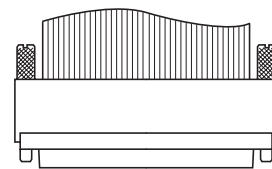
Soldered type (Note: 1) Crimp type   Wire wrapping type   Insulation displacement type

Note: 1) For the soldered type, NP8V-CN1 (Fuji) is supplied.
2) Be sure to use shielded twisted-pair cable for the signal line of the modules that are related to positioning. Flat cable may not be used for this purpose.

4-4-4 SX bus expansion cable wiring

SX bus expansion cable (exclusive-use) is used to connect base boards.

Conncet the cable from OUT to IN of base boards. OUT to OUT connection or IN to IN connection is impossible to communicate. System does not work in this case.

SX bus terminating plug should be connected at the end of the SX bus.

SX bus terminating plug

(Note)

SX bus terminating plug
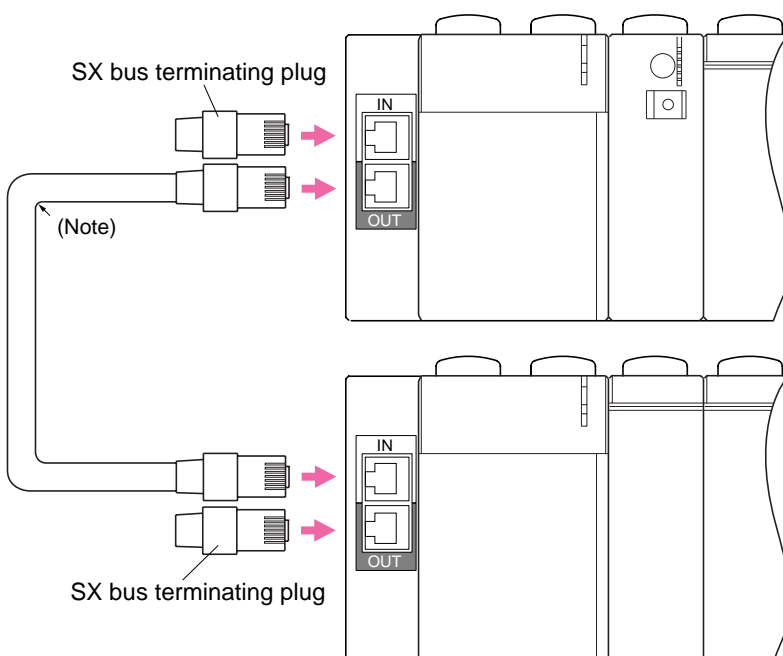
Note: 1) The bending radius of the SX bus expansion cable should be 50mm or more.

Note: 2) SX bus expansion cable should be inserted or removed straight.

4-4 Wiring

4-4-5 Wiring of power supply for SX bus optical converter

The SX bus optical converter (NP2L-OE1) has power supplied via the SX bus cable or from an external power supply. To supply power from an external source, be sure to use a switching power supply with reinforced insulation and a capacity of 24V DC, 1A or more. Even when no external power supply is used, be sure to ground the FG terminal (by Class D grounding).
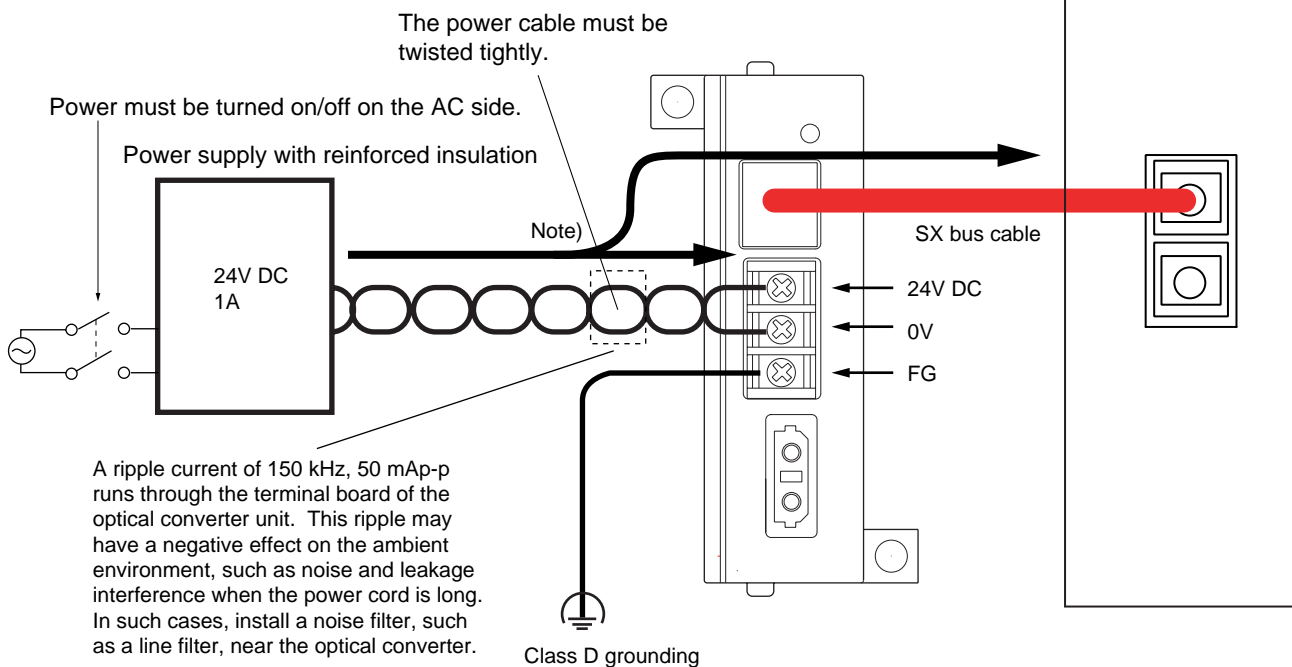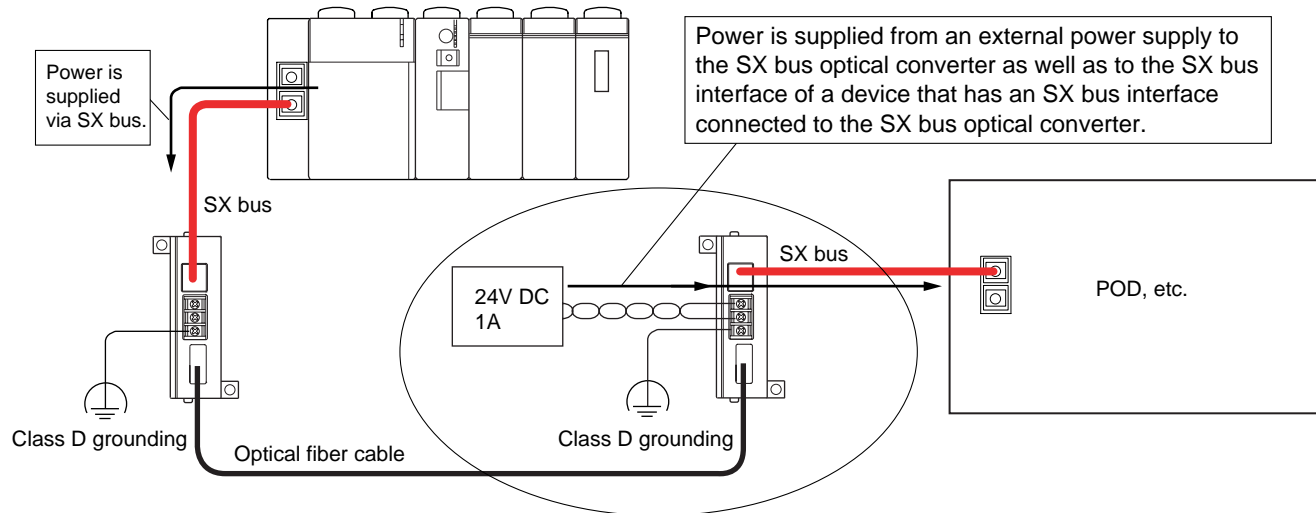
Note: The power that is supplied to this power terminal board is also supplied to the SX bus optical converter and the interface of the POD or servo amplifier that is connected by SX bus cable (maximum 0.7 A). When too many SX bus devices are connected and the power supplied via the SX bus exceeds 0.7 A, the monitoring circuit in the SX bus optical converter reacts to cut off power supply. For power restoration, after removing the cause of an overcurrent, turn on the power supply for the system once again.

4-4-6 Noise reduction of external wiring

For noise reduction techniques for electric devices, suppressing the noise source is most important. And it is also important not to accept the noise. To improve the system reliability, the following countermeasures should be executed as many as possible.

(1) Shielding cable should be used for the TTL signal or analog I/O signal, and grounding on the PLC side. However for certain cases of external noise, grounding should be done for the device side.
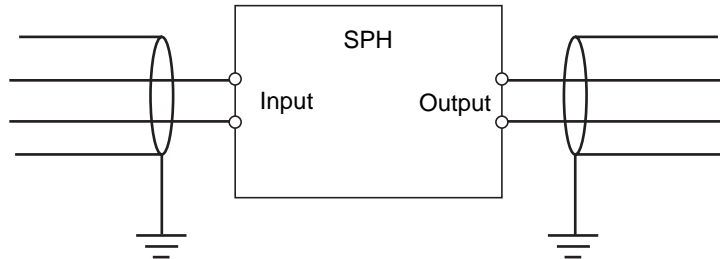
(2) Signal cables must be separated from power cables.

Ceiling duct type   **Floor duct type**   **Pipe arrangement type**
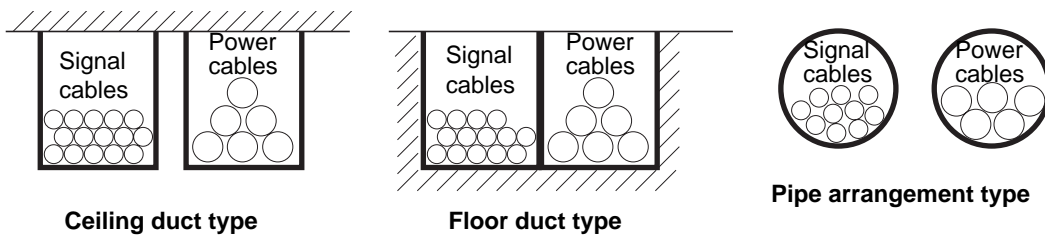
Note: These cables should be installed as shown in the following figure.
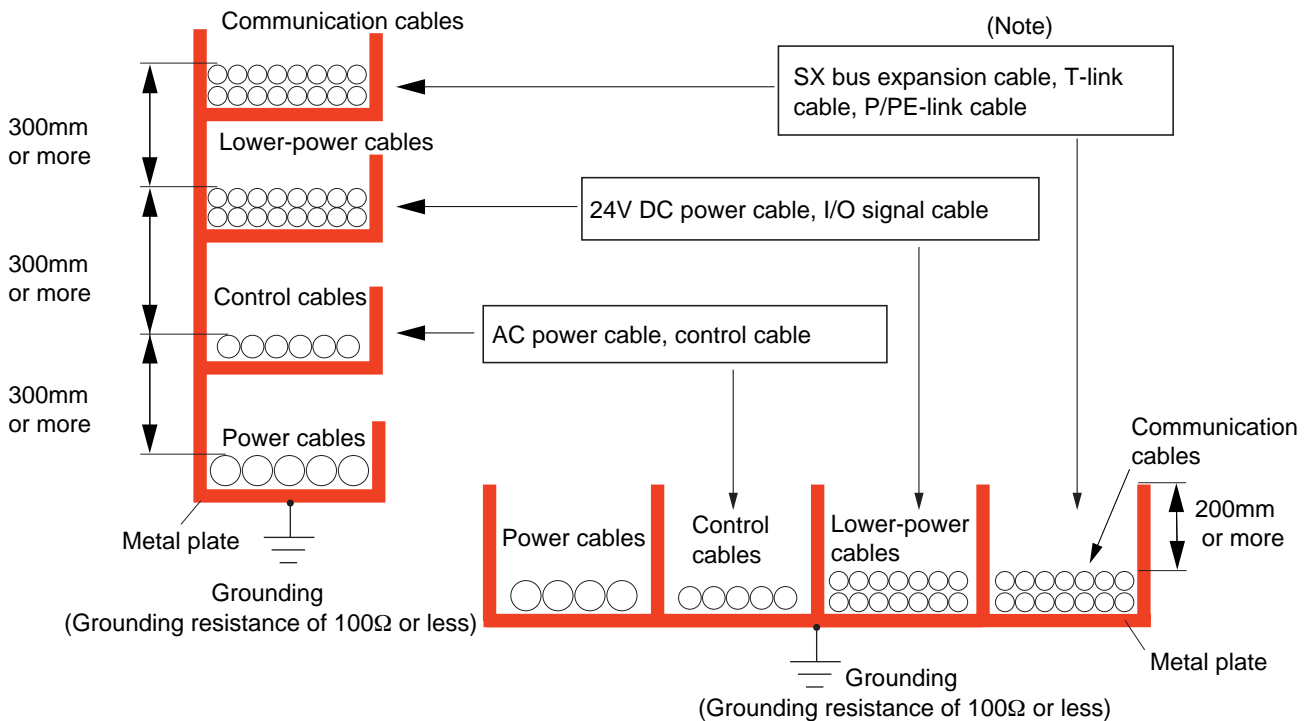
Note: For T-link wiring and P/PE-link wiring, refer to the corresponding manuals.

4-4-7 Emergency stop and interlock relay

Since the PLC is provided with a sufficient level of reliability, use of the PLC does not result in a reduction in system safety. However, like any other electronic device and control equipment, the PLC is not perfect and has potential for failure. To further improve safety, it is necessary to implement a safety circuit which makes it possible to stop system operation in the event of emergency or trouble. The safety circuit should be configured as an external circuit.

(1) Emergency stop

It is necessary to configure an emergency stop circuit as an external circuit and install an emergency stop switch in a location which is easy for the operator to use. This emergency stop circuit is normally integrated into the interlock circuit which disconnects the I/O control power supply in the event of failure.

(2) Interlock relay

The interlock relay (ILR) opens if an emergency or a failure occurs to disconnect the power output. The interlock circuit incorporates a RUN contact in series with the ILR which closes only during PLC operation. If a failure is detected by the PLC self diagnostic function, the ILR opens.

The configuration of safety circuit differs according to the PLC configuration and controlled equipment. The following shows an example.
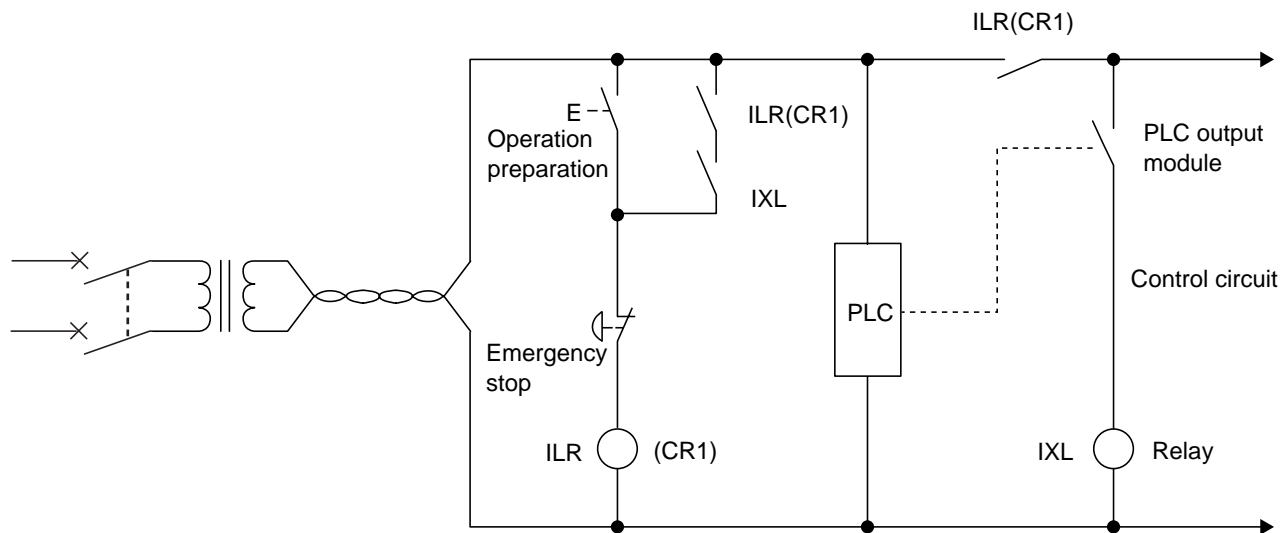
4-4-8 Phase fault protection of digital output module

Digital output module has no phase fault protection.
IF the phase fault protection is needed, connect the following fuse to each point externally.

Module type	Max. load current/point	Fuse type	Fuse maker
NP1Y08T0902	2.4A	GP40 (4A)	
NP1Y08U0902	2.4A	GP40 (4A)	
NP1Y16T09P6	0.6A	GP10 (1A)	
NP1Y16U09P6	0.6A	GP10 (1A)	
NP1Y32T09P1	0.12A	GP032 (0.32A)	
NP1Y64T09P1	0.12A	GP032 (0.32A)	
NP1Y32U09P1	0.12A	GP032 (0.32A)	
NP1Y64U09P1	0.12A	GP032 (0.32A)	
NP1Y32T09P1-A	0.12A	GP032 (0.32A)	
NP1Y06S	2.2A	GP50 (5A)	Daito Communication Apparatus Co., Ltd.
NP1Y08S	2.2A	GP50 (5A)	
NP1Y08R-04	2.2A (at AC)	GP50 (5A)	
NP1Y16R-08	2.2A (at AC)	GP50 (5A)	
NP1W1606T	0.6A	GP10 (1A)	
NP1W1606U	0.6A	GP10 (1A)	
NP1W3206T	0.12A	GP032 (0.32A)	
NP1W3206U	0.12A	GP032 (0.32A)	
NP1W6406T	0.12A	GP032 (0.32A)	

Section 5 Maintenance and Inspection

For use of the SPH under the best operating conditions, periodic inspection must be performed.

5-1-1 Inspection frequency
The SPH is a highly-reliable programmable controller, consisting mainly of semiconductor devices. However, because deterioration of devices may occur due to environmental conditions, periodic inspection is recommended. The standard inspection should be done once or twice a year; however, it can be shorter, depending on environmental conditions. If any inspection result does not match the rated value, check the operating conditions to make sure they are appropriate.

5-1-2 Cautions on using the product

⚠ **Caution**
◊ Select a wire size to suit the applied voltage and carrying current, and carry out wiring according to the operating instructions and manual. Poor wiring might cause fire. ◊ Operate (keep) in the environment specified in the operating instructions and manual. High temperature, high humidity, condensation, dust, corrosive gases, oil, organic solvents, excessive vibration or shock might cause electric shock, fire, erratic operation or failure. ◊ Contaminants, wiring chips, iron powder or other foreign matter must not enter the device when installing it, otherwise, erratic operation or failure might occur. ◊ Periodically make sure the terminal screws and mounting screws are securely tightened.

5-1 General Inspection Items

5-1-3 Inspection items

When inspecting the equipment, use the following inspection table.

Inspection item		Inspection contents	Criteria	Inspection method
CPU ERR/ALM LED		Confirmation of ERR/ALM LED	Lamps must be OFF.	Visual inspection
Power supply module	Voltage	Is the voltage within the normal range when measured at a terminal block ?	AC: 100V: 85 to 132V 240V: 170 to 264V DC: 24V: 19.2 to 30V	Voltmeter
	Voltage fluctuation	Are there frequent momentary power failures or abrupt voltage rises or drops ?	Voltage fluctuations must be within the above range.	Oscilloscope
Remote I/O power supply	Voltage	Is the voltage within the normal range when measured at a terminal block ?	AC: 100V: 85 to 132V 240V: 170 to 264V DC: 24V: 19.2 to 30V 110V: 90 to 140V	Voltmeter
	Voltage fluctuation	Are there frequent momentary power failures or abrupt voltage rises or drops ?	Voltage fluctuations must be within the above range.	Oscilloscope
Ambient environment	Temperature	Is the temperature within the specified range ? (temperature in the panel when installed inside the panel)	0° to 55° C	Max./min. thermometer
	Humidity	Is there condensation or extreme discoloration or corrosion ?	20% to 95%RH	Visual inspection, hygrometer
	Vibration	Is there any vibration ?	There must be no vibration.	Check by touching
	Dust	Is there any dirt or other foreign matter ?	There should be no dirt or other matter.	Visual inspection
Installation status		Are all modules mounted securely ?	No looseness	Screwdriver
		Are there any loose screws on the external wiring terminals ?	No looseness	Screwdriver
		Are cable connectors inserted securely ?	No looseness	Visual inspection, screwdriver
		Are any external wiring cables damaged ?	No abnormal appearance	Visual inspection
Battery		Is it time to replace the battery ?	Indication on battery effectiveness label	Visual inspection
Spare parts		Is the designated quantity available ? Are storage conditions appropriate ?	See the inspection records.	
Program		Were any errors detected through verification ?	There must be no errors.	Program verification

Note: 1) If a fault occurs, replace the entire faulty unit or module. For this replacement, a minimum amount of space components should be provided.
   2) Battery voltage drops even when not being used because of slight self-discharging. Replace old batteries with new
      ones before their effective service life expires.
   3) For spare power supply modules, power on once every six months.
      (To prevent discharging of aluminium electrolytic capacitor in the power supply module)

Replace the battery with a new one at the determined replacement time even if the battery alarm is not indicated.
If BAT (LED) lights on, replace the battery with a new one immediately.

• Battery specification

Item	Specification	
	NP8P-BT	**NP8P-BTS (Mass battery unit)**
CPU that can be installed	All versions of all CPUs	NP1PS-74: hardware version V22 or later NP1PS-74R: hardware version V25 or later NP1PS-117: hardware version V25 or later NP1PS-117R: hardware version V20 or later NP1PS-245R: all versions NP1PS-74D: all versions
Battery voltage/capacity	3.6V/1000mAh	3.6V/2700mAh
Backup time (ambient temperature at 25° C)	NP1PS-32/32R: 5 years NP1PS-74/74R/117/117R: approx. 1.3 years NP1PS-245R: approx. 0.7 year NP1PM-48R/48E/256E/256H: 5 years NP1PH-08/16: 5 years NP1PS-74D: approx. 0.65 year	NP1PS-74/74R/117/117R: approx. 3.5 years NP1PS-245R: approx. 2 years NP1PS-74D: approx. 1.75 years
Backup time after detection of the battery failure (ambient temperature of the battery at 25° C)	NP1PS-32/32R: approx. 230 hours (approx. 9 days) NP1PS-74/74R: approx. 140 hours (approx. 5 days) NP1PS-117/117R: approx. 140 hours (approx. 5 days) NP1PS-245R: approx. 80 hours (approx. 3 days) NP1PM-48R/48E/256E/256H: approx. 230 hours (approx. 9 days) NP1PH-08/16: approx. 230 hours (approx. 9 days) NP1PS-74D: approx. 60 hours (approx. 2.5 days)	
Battery guaranteed term	5 years (Years/Month is indicated on the battery). The battery warranty period indicates the date which is 5 years from the date of manufacture.	
Battery for exchang	NP8P-BT	NP8P-BT1
Mass	Approx. 10g	Approx. 50g (Contain a built-in battery)

* Ambient temperature
When the system control power supply is turned off (when the CPU module is inactive), the battery power is consumed for memory backup. Since, in this case, no heat is generated by the CPU module, the backup period is calculated by assuming that the ambient temperature is 25 °C. If the ambient temperature in the location where the SPH system is installed is higher than 25 °C, determine the replacement period of batteries by considering the fact that the backup period is reduced by a factor of about two for each 10 ∞C increment in the ambient temperature.

* Inspection interval
Inspect the batteries periodically by referring to the above table "Backup period after detecting a battery error." It is recommended to choose the inspection interval by using half of "Backup period after detecting a battery error" or less as a measure of inspection interval. If the inspection interval is too long, the batteries may have been exhausted when a battery error is detected.

• Precautions
    · Do not short across the battery.
    · Do not discard in a fire.
    · Do not attempt to recharge the battery.
    · Do not disassemble the battery.

• Battery replacement procedure

(1) Turn OFF the power. (Battery can be replaced without disconnecting the control power supply.)

(2) Open the CPU battery cover.

(3) Remove the battery connector and then replace the battery with a new one and fix it. Replace quickly (within 5 minutes). If the CPU is left without battery for a long period, user programs will be lost.

(4) Close the battery cover.

(5) Turn ON the system power.

5-3-1 Ordering notes

When ordering electrical and control equipment (or requesting price estimates), the following general notes are to be observed, unless otherwise specified in the estimation paper, contract paper, catalogs, or specifications.
When the product is delivered, check the contents of the package as soon as possible. Even before inspection, use caution on storing and using the product safely.

5-3-2 Free-of-charge warranty period and scope of warranty

[Free-of-charge warranty period]

(1) This product is covered by a warranty for a period of one year from the date of purchase or 18 months from the date of manufacture described in the nameplate, whichever comes earlier.

(2) This warranty period may not be applied if the operating environment, operating condition, operating frequency, or number of operations affects the operating life of the product.

(3) The warranty period for the product section repaired by Fuji Electric service sector is six (6) months from the date of completion of repair.

[Warranty period]

(1) If a failure judged to be the responsibility of Fuji Electric occurs during the warranty period, the failed section of the product is replaced or repaired on a free-of-charge basis at the site of purchase or delivery of the product. However, the following failures are not covered by this warranty.
  1) Failures occurring through inappropriate condition, environment, operation, or use not described in the catalog, operating manual, or specification.
  2) Failures occurring through cause other than the purchased product or delivered product.
  3) Failures occurring through customer's equipment or software design, or cause other than products from Fuji Electric.
  4) Failures occurring through programs not developed by Fuji Electric as for programmable products
  5) Failures occurring through modification or repair not performed by Fuji Electric
  6) Failures occurring through failure to perform correctly maintenance or replacement of the consumables described in the operating manual or catalog
  7) Failures occurring through cause which cannot be forecasted by science and technologies practically used at the time of purchase or delivery
  8) Failures occurring through use of the product which is not intended by Fuji Electric
  9) Failures occurring through natural calamities, disasters, or other cause judged not to be the responsibility of Fuji Electric

(2) The warranty is limited only to a single purchased product and a single delivered product.

(3) The upper limit of the warranty period is (1). Any damages caused by failures of the purchased product and delivered product (damages to or loss of machinery and equipment, or passive damages) are not covered by this warranty.

[Failure diagnosis]

Temporary failure diagnosis is intended to be performed by the customer. However, upon request from the customer, Fuji Electric or Fuji Electric service network offers surrogate services on a fee basis. The fee is borne by the customer according to the fee code of Fuji Electric.

[Exclusion of responsibility of warranty such as opportunity loss]

Regardless of the free-of-charge warranty period, damages judged not to be the responsibility of Fuji Electric, opportunity loss on the customer side caused by failure of products from Fuji Electric, passive damages, damages caused by exceptional circumstances regardless of forecast by Fuji Electric, secondary damages, accident compensation, damages to products not from Fuji Electric, and damages to other business are not covered by this warranty.

[Repair period after production stoppage and supply period of spare parts (maintenance period)]

As for retired models (products), Fuji Electric performs repair work within seven (7) years from the date of retirement. As for major spare parts for repair, Fuji Electric also performs repair work within seven (7) years from the date of retirement. With electronic parts, however, difficulty in procurement or production may be anticipated because of short life cycles and therefore repair or spare parts supply may be difficult even during the warranty period. For details, please contact Fuji Electric sales office or service sector.

5-3-3 Service costs

The price of the product does not include maintenance and servicing costs, such as the cost of dispatching an engineer to the customer. The customer will be charged for actual expenses in the following cases.

(1) Guidance for installation and adjustment, and attendance at a test operation

(2) Maintenance, inspection, adjustment, and repair

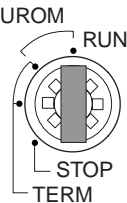(3) Technical guidance and technical education

Appendix 1 Operation of the user ROM card adapted CPU with the Key Switches
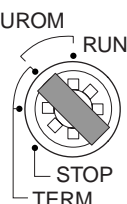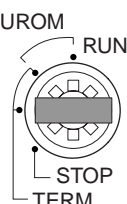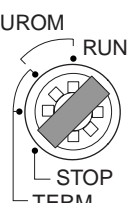
Appendix 1 Operation of the user ROM card adapted CPU with the Key Switches

This appendix describes how the user ROM card (CF or SD) adapted CPU (having "R","D","E" or "H" at the end of type code) with various key switch setting and precautions thereabout.
   * When no user ROM card is installed, it operates the same as the CPUs that are not adapted to user ROM card.

Appendix 1-1 Operation of the CPU at Power On
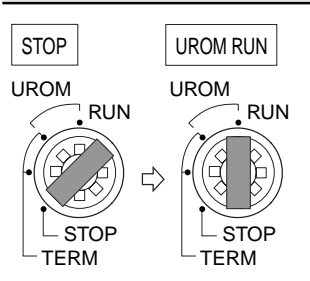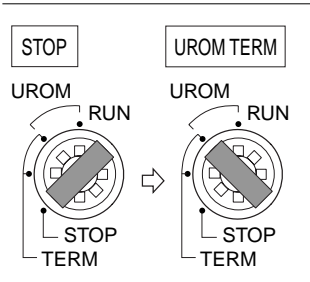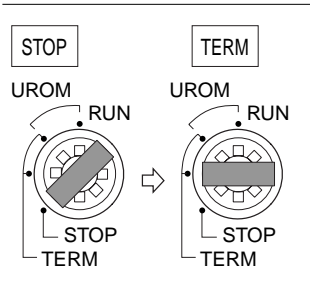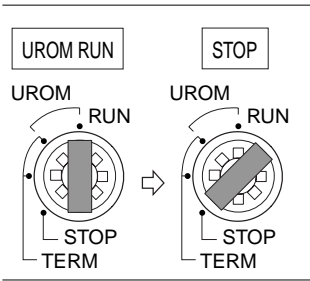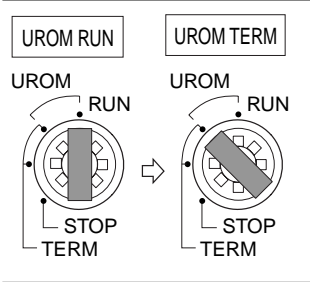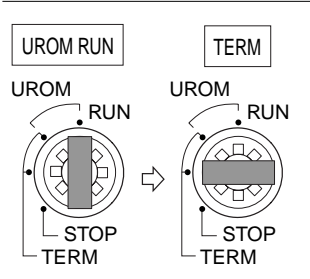
The following table summarizes how the CPU operates at power on with various key switch setting.

Position of the key	Operation of the CPU at power on

UROM RUN
 	
	Compares the run project stored in the CPU internal flash memory with that stored in the user ROM card.
	 <When match>
	   Operation is started using the run project stored in the CPU internal flash memory.
	 <When mismatch>
	   Run project is copied from the user ROM card to the CPU internal flash memory, and operation is started according to the content of the copied project (see note).

UROM TERM
 	
	Compares the run project stored in the CPU internal flash memory with that stored in the user ROM card.
	 <When match>
	   No run project is copied from the user ROM card to the CPU internal flash memory. Operation is started using the run project stored in the CPU internal flash memory, according to the content of [Running specification at power on] on the [CPU running definition] tab window.
	 <When mismatch> (Note)
	   No run project is copied from the user ROM card to the CPU internal flash memory.
	   Run project is copied from the user ROM card to the CPU internal flash memory (see note), and operation is started using the copied run project, according to the content [Running specification at power on] on the [CPU running definition] tab window.
	 • TERM = Run (default) ⇒ Operation is started.
	 • TERM = Last State,
	   ⇒ When the power was turned off in running condition last time, operation is started. When the power was turned off in stop condition last time, operation is not started.
	 • TERM = Stop ⇒ Operation is not started.

TERM 	The CPU operates using the run project stored in the CPU internal flash memory, according to the content of [Running specification at power on] on the [CPU running definition] tab window. • TERM = Run (default) ⇒ Operation is started. • TERM = Last State, ⇒ When the power was turned off in running condition last time, operation is started. When the power was turned off in stop condition last time, operation is not started. • TERM = Stop ⇒ Operation is not started. * Because the CPU does not recognize the user ROM card, no comparison is made between the run project stored in the CPU internal flash memory and that stored in the user ROM card.
STOP 	• The CPU continues to stop. Operation is not started. * Because the CPU does not recognize the user ROM card, no comparison is made between the run project stored in the CPU internal flash memory and that stored in the user ROM card.

Note: For more information about the precautions when copying a run project from the user ROM card to the CPU internal flash memory, refer to "Appendix 1-3 Operation of the CPU when the comparison of run project resulted in mismatch".
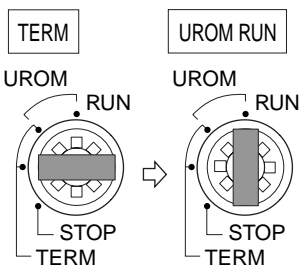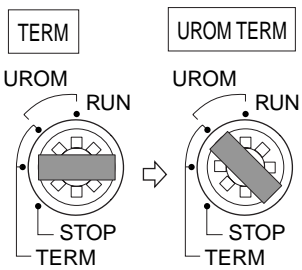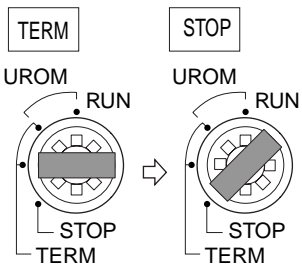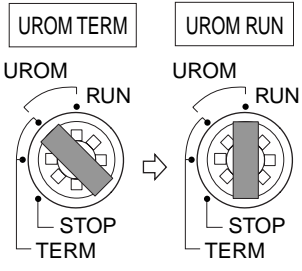
Appendix 1-2 Basic Operation of the CPU when the Key Switch is Operated

Basic operation of the CPU when the key switch is operated is described below.

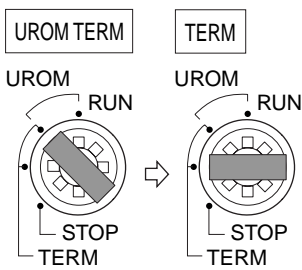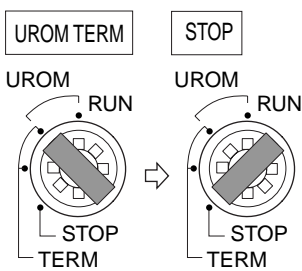| Position of the key	Operation of the CPU at power on
STOP ⇒ UROM RUN	Compares the run project stored in the CPU internal flash memory with that stored in the user ROM card. <When match> Operation is started using the run project stored in the CPU internal flash memory. <When mismatch> Run project is copied from the user ROM card to the CPU internal flash memory, and operation is started according to the content of the copied project (see note).
STOP ⇒ UROM TERM	The CPU continues to stop. Operation is not started. Compares the run project stored in the CPU internal flash memory with that stored in the user ROM card. <When match> No run project is copied from the user ROM card to the CPU internal flash memory. <When mismatch> Run project is copied from the user ROM card to the CPU internal flash memory, and operation is started according to the content of the copied project (see note).
STOP ⇒ TERM	The CPU continues to stop. Operation is not started. * No comparison is made between the run project stored in the CPU internal flash memory and that stored in the user ROM card.
UROM RUN ⇒ STOP	The CPU stops running. * No comparison is made between the run project stored in the CPU internal flash memory and that stored in the user ROM card.
UROM RUN ⇒ UROM TERM	The CPU continues to run. * No comparison is made between the run project stored in the CPU internal flash memory and that stored in the user ROM card.
UROM RUN ⇒ TERM	The CPU continues to run. * No comparison is made between the run project stored in the CPU internal flash memory and that stored in the user ROM card.

Note: For more information about the precautions when copying a run project from the user ROM card to the CPU internal flash memory, refer to "Appendix 1-3 Operation of the CPU when the comparison of run project resulted in mismatch".

Position of the key	Operation of the CPU at power on

TERM ⇒ UROM RUN	Compares the run project stored in the CPU internal flash memory with that stored in the user ROM card.
	
	[When the CPU has been stopped]
	  <When match>
	  Operation is started using the run project stored in the CPU internal flash memory.
	  <When mismatch>
	  Run project is copied from the user ROM card to the CPU internal flash memory, and operation is started according to the content of the copied project (see note).
	
	[When the CPU has been running]
	  <When match>
	  Operation is continued using the run project stored in the CPU internal flash memory.
	  <When mismatch>
	  Operation is continued using the run project stored in the CPU internal flash memory, but the system falls in nonfatal fault condition due to mismatch.

TERM ⇒ UROM TERM	Compares the run project stored in the CPU internal flash memory with that stored in the user ROM card.
	
	[When the CPU has been stopped]
	  <When match>
	  No run project is copied from the user ROM card to the CPU internal flash memory. The CPU continues to stop.
	  <When mismatch>
	  Run project is copied from the user ROM card to the CPU internal flash memory (see note).
	  The CPU continues to stop.
	
	[When the CPU has been running]
	  <When match>
	  Operation is continued using the run project stored in the CPU internal flash memory.
	  <When mismatch>
	  Operation is continued using the run project stored in the CPU internal flash memory, but the system falls in nonfatal fault condition due to mismatch.

TERM ⇒ STOP	[When the CPU has been stopped] The CPU continues to stop. [When the CPU has been running] The CPU stops running.
UROM TERM ⇒ UROM RUN	[When the CPU has been stopped] The CPU stops running. Note: No comparison is made between the run project stored in the CPU internal flash memory and that stored in the user ROM card. [When the CPU has been running] The CPU continues to stop. Operation is not started. Note: No comparison is made between the run project stored in the CPU internal flash memory and that stored in the user ROM card.

Note: For more information about the precautions when copying a run project from the user ROM card to the CPU internal flash memory, refer to "Appendix 1-3 Operation of the CPU when the comparison of run project resulted in mismatch".

Appendix 1-2　Basic Operation of the CPU when the Key Switch is Operated

Position of the key	Operation of the CPU at power on
UROM TERM ⇨ TERM (key switch diagrams)	The CPU keeps the operating condition that has taken effect with the switch set at the "UROM TERM" position. [When the CPU has been stopped] The CPU continues to stop. [When the CPU has been running] The CPU continues to run.
UROM TERM ⇨ STOP (key switch diagrams)	[When the CPU has been stopped] The CPU continues to stop. [When the CPU has been running] The CPU stops running.

Appendix 1-3 Operation of the CPU when the Comparison of the Run Project Resulted in Mismatch

When the CPU recognizes a user ROM card, it compares the run project stored in the CPU internal flash memory with that stored in the user ROM card. If the comparison resulted in a "mismatch", the run project stored in the user ROM card is copied to the CPU internal flash memory. However, if the user ROM card has failed or is not initialized, the CPU falls in a fatal fault condition. In addition, depending on the content of the run project stored in the user ROM card, unexpected operation may occur. So, carefully read the following precautions, and operate the key with the greatest possible care.

* The CPU compares run projects based on the date and size of the files.
* User ROM card is recognized at the following timing:
• When the key switch is changed over to UROM TERM or UROM RUN
• When the CPU is reset or powered on again with the key switch set at UROM TERM or UROM RUN

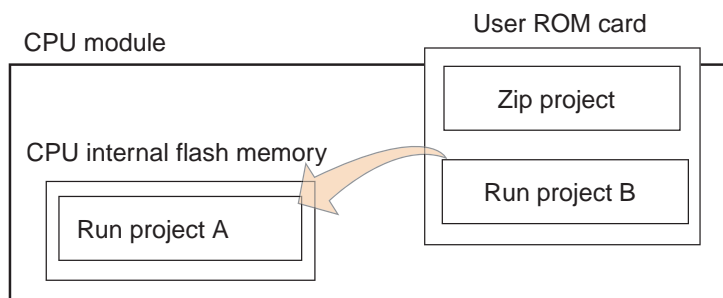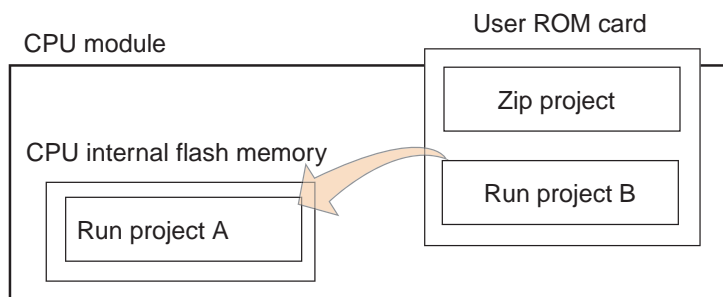| ⚠ **CAUTION** |
|---|
| **1)** When the run project stored in the user ROM card is empty
The existing run project of the CPU internal flash memory is overwritten with the empty data, resulting in the condition that there is no run project in the CPU module. If the CPU is started in this condition, the CPU recognizes the actual system configuration to start running. However, because of empty run project, the CPU cannot run the system.
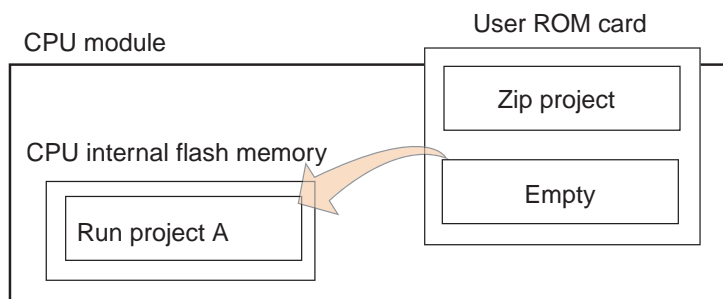
Note: The retain memory in the CPU module is cleared. |
| **2)** When the run project stored in the user ROM card is different (when system definition is different)
The run project stored in the CPU internal flash memory is overwritten with the different project. If the system definition of the overwritten run project is different from actual configuration, system configuration definition error occurs when the CPU is started, resulting in a fatal fault.

Note: if memory boundary definition is different, the retain memory in the CPU module is cleared. |
| **3)** When the run project stored in the user ROM card is different (when system definition is same but program is different)
The run project stored in the CPU internal flash memory is overwritten with the different project. If the system definition of the overwritten run project is the same as actual configuration, the CPU starts running normally. |

Appendix 1-3 Operation of the CPU when the Comparison of the Run Project Resulted in Mismatch


⚠️ **CAUTION**

4) When a user ROM card that is not yet initialized or whose run project data is destroyed is used
If such user ROM card is recognized when the CPU is stopped, the CPU falls in a fatal fault condition and operation cannot be started.
If such user ROM card is recognized when the CPU is running (when the key switch is changed over from TERM to UROM TERM or UROM RUN while the CPU is running), the CPU continues to run in nonfatal fault condition.
* No run project is copied from the user ROM card to the CPU internal flash memory.

User ROM card

CPU module

CPU internal flash memory

Not initialized
Run project data destroyed

Run project A

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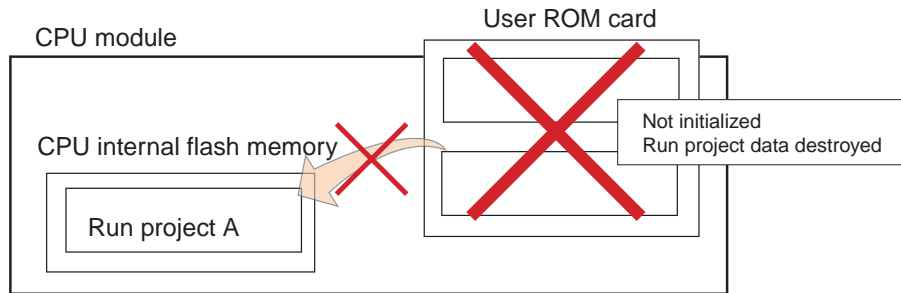
5) When the user ROM card cannot be recognized
If a user ROM card that is not DOS-formatted is installed, the CPU cannot recognize the user ROM card. In this case, the CPU operates the same as when no user ROM card is installed.

The CPU cannot recognize
the user ROM card

CPU module

CPU internal flash memory

Not DOS formatted

Run project A
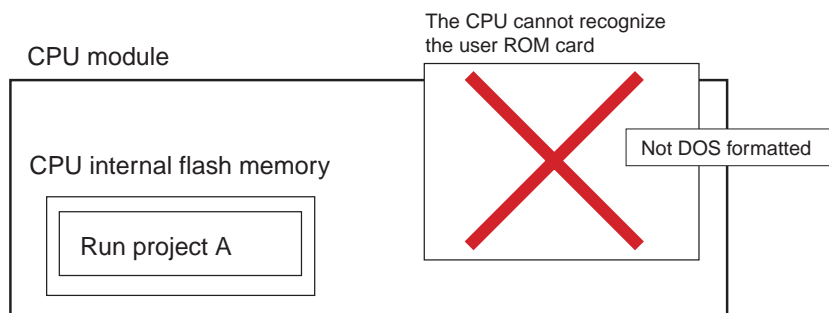
* The user ROM card that is used with SPH series is a compact flash memory, which must be DOS-formatted per FAT file system. (In case of SPH2000/3000 series, "FAT" or "FAT32")If other file format is used, the CPU operates as follows:
  • SPH300 and FAT32 ⇒ The CPU operates the same as above 4)
  • NTFS ⇒ The user ROM card cannot be recognized. The CPU operates the same as when no user ROM card is installed.